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GERMAN *SCHON – ERST – NOCH*: AN INTEGRATED ANALYSIS*

0. INTRODUCTION

0.1. *The Scope of this Study*

The following study presents an analysis of the particles *schon*, *erst*, and *noch* in temporal and analogous uses. The central item is *schon*, which in the uses considered here is related to *noch* and *erst* in a simple, well-defined way. For *schon*, it can be claimed that the study applies to three out of four possible types of temporal uses. The fourth type of use is left untreated, since it would require a semantic theory of temporal frame adverbials in imperfective sentences which, so far as I can see, is not yet developed. It appears, however, very unlikely that the formal analysis of the fourth type would invalidate the hypothesis about the basic meaning of *schon* derived from the study of the first three types. Insofar, this paper offers a description of the basic meaning of *schon*, which is common to and independent of the various ways it can be used. There are other, modal, uses of *schon*, which this study does not cover. They are sufficiently different from the temporal uses to be regarded not instances of the same basic meaning but rather occurrences of different words. In contrast to the temporal *schon*, for which there are corresponding expressions in many languages, the modal variants of *schon* represent an idiomatic trait of German which is only incidentally paralleled in other languages, if there are parallels at all.

As far as *noch* and *erst* are concerned, this study offers an analysis which applies only to those uses where they are used as counterparts of *schon*. *Schon*, *noch*, and *erst* join in certain conceptual paradigms of a fundamental and general type for which I coined the term "phase-quantification" in Löbner (1987). Phase-quantification constitutes a very simple way of modifying plain yes/no-predications by focussing on the transition from a positive to a negative phase (or vice versa) on some scale. (Under a scale I understand any set with a linear ordering, e.g., a quantity scale, the scale underlying the meaning of a scalar adjective, or the time-scale.) In a sense, this is the most simple pattern of quantification possible.

Phase-quantification and quantification in general is primarily a con-

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ceptual scheme and not so much the immediate format of the lexical meanings of certain natural language words, although there certainly are genuine quantifier expressions. Among the three particles studied here, only *schon* appears to be a genuine phase-quantifier. Both *erst* and *noch* have basic meanings which, on the one hand, allow for non-quantificational uses – such as *erst ich, dann du* ("first me, then you") or the use of "$noch_2$" mentioned below – and, on the other, enable the particles to enter the conceptual scheme of phase-quantification under certain circumstances.

The paper offers an analysis of three temporal types of uses, which do not correspond to different meanings of *schon* but are rather to be considered three different conceptual configurations in which the same basic meaning appears in different guises. The treatment of the first type of use involves a discussion of various semantic and pragmatic questions about phase-quantification. The second type exhibits an interesting interaction of focussing and phase-quantification. The discussion of the third type provides an independent argument for an analysis of temporality which involves not one but two dimensions. Finally, the analysis of the local uses offers an occasion to study how conceptions basically applying to the one-dimensional space of time can be transferred to two- or three-dimensional space.

It is the more general perspectives which made it worth while to study these particles extensively, although they might not appear to deserve so much attention in their own right.

0.2. *Preliminary Remarks about Tense and Aspect*

The basically temporal particles *schon*, *erst*, and *noch* have to be studied in the context of tense and aspect. In some languages, e.g., Luganda (cf. Comrie 1985, 53ff), the respective meanings are even integrated in the morphological tense system. I restrict myself to a brief sketch of the basic conception of tense and aspect underlying the following analysis. A more detailed exposition is given in Löbner (1988).

In what follows, the distinction between imperfective and perfective aspect (in the sense of Comrie, 1976) will play an important role. This dichotomy has been essentially clarified by Galton (1984). According to this study, sentences in the perfective aspect concern events, whereas sentences in the imperfective aspect concern states.

STATES are properties of times. (Times are intervals, either points or longer.) States obtain or fail to obtain at a given time. The state of affairs that consists in a state's not obtaining is itself a state: i.e., states possess

contraries. States are either static or dynamic. Dynamic states, or states of change, consist in a constant change. They correspond to the "processes" in Vendler (1967). Static states coincide with Vendler's "states". States cannot be individualized or counted, but they allow a specification of duration.

Sentences in the imperfective aspect express that a state obtains at a certain time. They can be considered one-place predicates about temporal individuals. In absence of temporal quantification and explicit specification of the time referred to, imperfective sentences refer to an implicit time t_e, which I will call the "reference time" below.

EVENTS, on the other hand, are abstract individuals. They always involve change, e.g., the transition of one state into another. They can be classified and counted. They do not possess a negation as a contrary, as states do. (A storm is an event, but there are no "non-storms".) Events take place. Just as a real object has its location in space, an event is located in time.

Perfective sentences concern the temporal location, the succession, etc. of events. The temporal location is expressed by tense and frame adverbials. The sentence radical specifies the kind of event. The temporal location consists in the specification of a time interval *in*to which the event falls. Events cannot be located *at* times, as any change can only be stated with reference to at least two times. If perfective sentences are negated, then the negation is not part of the sentence radical. *He did not win* means that there is no event of the kind "he wins" in the past time-interval referred to, and not that there is an event of the kind "he does not win" in that period.[1]

(1)	Examples for imperfective sentences:	t_e
	I am not hungry.	time of utterance
	I was then writing my thesis.	"then"
	I have eaten.	time of utterance
(2)	Examples for perfective sentences:	temporal location:
	He came, he saw, he conquered.	past
	I'll come back tomorrow.	"tomorrow"

As far as imperfective sentences are concerned, there are in principle three possibilities for the overlap of phases of the state involved and the possibly extended reference time. We assume that an imperfective sentence, as a predicate over times, yields a truth-value only if the reference time either falls entirely into a positive phase of the state or entirely into a negative phase. In case of a partial overlap, no truth-value will be

defined. This assumption is part of the general constraint that predicates yield truth-values for given arguments only if the arguments are homogeneous with respect to the property expressed by the predicate.

This assumption enables us to treat the reference time t_e logically as an individual, i.e., as though it were a point. From a logical point of view, it is not the lack of duration which makes a time an individual, but the lack of structure with respect to the predicate at issue. To be an individual is not a matter of physics.

Frame adverbials in imperfective sentences provide a second predication about the reference time. This matter is semantically complex and not yet settled theoretically. Unfortunately, it interferes with our analysis of one of the uses of the particles. For that reason we exclude from our discussion the cases where *schon* and *erst* focus on a temporal frame adverbial in an imperfective sentence.

For perfective sentences, we make a similar homogeneity assumption. The time which the event itself takes up is meant to fall entirely into the time interval specified by tense and frame adverbials. Again a partial overlap is excluded. From a logical point of view, events – or to be precise: their temporal extensions – are again individuals.

1. THE BASIC MEANING OF *SCHON* AND *NOCH*

I will discuss three different uses of *schon* and its counterparts *noch* and *erst*. The three uses share a common basic meaning which will be illustrated by means of the first and simplest use. This basic use of *schon* and *noch* is represented by occurrences of the particles as sentential operators in imperfective sentences. I confine myself to those cases where the reference time is identical with the time of utterance. Inclusion of other cases would not open any new perspectives. Not only *schon* and *noch* in German are used in this way, but also the Dutch particles *al* and *nog*, English *already* and *still*, and French *déjà* and *encore* – to cite only a few examples from other languages.

1.1. *Negations and Duality*

In imperfective sentences, such as

(3) *Das Licht ist schon an.*
The light is already on.

(4) *Das Licht ist noch an.*
The light is still on.

schon and *noch* cannot be directly negated:

(5) *Ist das Licht schon an?*
*–Nein, das Licht ist *nicht schon an.*

(6) *Ist das Licht noch an?*
*–Nein das Licht ist *nicht noch an.*

(When I talk of "negation", here and below, and use the symbol ~, I always mean the *strong*, presupposition-preserving negation. Sentences can be true or false, or lack a truth-value if some presupposition is not fulfilled.)

Instead of **nicht schon* and **nicht noch* one uses *noch nicht* and *nicht mehr*, respectively.

(7) *Ist das Licht schon an?*
–Nein, das Licht ist noch nicht an.

(8) *Ist das Licht noch an?*
–Nein, das Licht ist nicht mehr an.

The following relations hold for any imperfective sentence *p*:

(9) $\sim(schon\ p) \Leftrightarrow noch\text{-}nicht\ p$
$\sim(noch\ p) \Leftrightarrow nicht\text{-}mehr\ p$

The fact that *noch nicht* is used as the negation of *schon* moreover suggests a closer relationship between *noch* and *schon*:

(10) $\sim(schon\ p) \Leftrightarrow noch\ (\sim p)$
$\sim(noch\ p) \Leftrightarrow schon\ (\sim p)$

This connection becomes obvious, when the negation of a sentence containing *schon* or *noch* is not brought about by means of the negative counterparts of the particles but by negating the embedded state *p*. Let us assume for the sake of simplicity that the following equivalence holds:

(11) $\sim$(*Das Licht ist an.*) $\Leftrightarrow$ *Das Licht ist aus.*

We can then express the content of (7) and (8) also by (12) and (13), illustrating the relationship stated in (10).

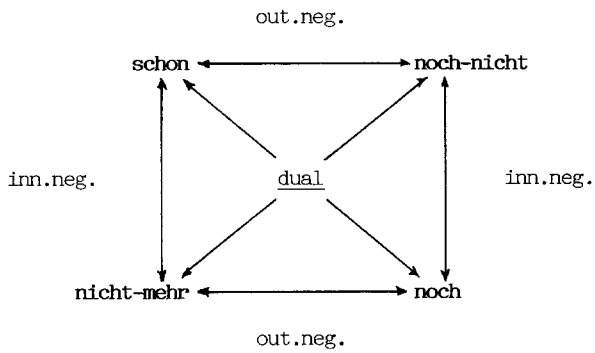
(12) *Ist das Licht schon an?*
–Nein, das Licht ist noch aus.

(13) *Ist das Licht noch an?*
–Nein, das Licht ist schon aus.

What the equivalences in (10) state is that *schon* and *noch* are dual operators. Duality always involves two negations: the "inner negation"

of the operand and the "outer negation" of the operator. Two operators are dual iff the inner negation of one is equivalent to the outer negation of the other.[2] There are, hence, four operators which are closely related to each other via inner and outer negation: *schon*, *noch*, *noch-nicht*, and *nicht-mehr*. This complex relationship is depicted in the following diagram:

(14)



Each arrow holds for both directions (e.g., *schon* is the outer negation of *noch-nicht* and vice versa). Consequently, the following four statements are equivalent:

(15) *Das Licht ist schon an.*
Das Licht ist nicht mehr aus. (inner negation)
~(*Das Licht ist noch nicht an.*) (outer negation)
~(*Das Licht ist noch aus.*) (dual)

The duality of *schon* and *noch* implies that *noch-nicht p* is equivalent to *noch* (*nicht p*). Hence I will drop the hyphen from now on, simply writing *noch nicht p*.

Although the semantic relationships between the members of the duality square shown in (14) are obvious and easy to state, they are often not mentioned and taken into account in the literature. Doherty (1973) and Abraham (1976, 1980) are the only authors who mention the duality relations (although not explicitly by that name). Horn (1970) and also König (1977), who adopted the basic analysis of Horn, assume a temporal symmetry of *schon* and *noch* instead, according to which *noch p* means for the past the same as *schon p* means for the future. This view fails to do justice to the duality relationship as well as to the presuppositions of *schon p* and *noch p*, as will become apparent by the subsequent analysis. Rombouts (1979), too, considers *schon* and *noch* as temporal mirror images of each other.

The semantic relationships illustrated in the diagram represent con-

siderable constraints on any adequate semantic description of the four particles. If one assumes that negation is semantically analysed, then every analysis of one of the four elements is at the same time an analysis of the remaining three.

Among the formal semantic descriptions in the literature, there is none which fulfils this criterion of adequacy, neither Horn (1970) and König (1977), nor Hoepelman and Rohrer (1981), Steube (1980) or Nerbonne (1983). Only the informal accounts of Doherty (1973), Abraham (1976, 1980), and Vandeweghe (1983) satisfy the duality conditions. The analysis presented in the next section essentially agrees with Vandeweghe's, which was developed independently.

1.2. *The Semantics of the Particles*

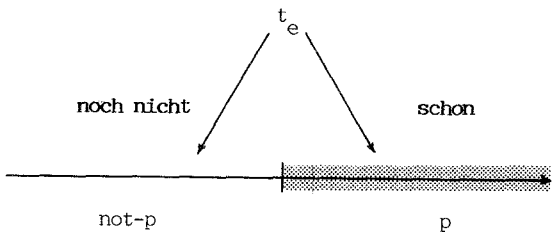
Before we can start to discuss the presuppositions of the particles considered, we need a more precise definition of their semantic format. Sentences of the form *schon/noch/noch nicht/nicht mehr p*, being imperfective sentences, refer to a certain time t_e, as does the embedded imperfective sentence itself. In order to make this explicit, we write the reference time as another argument of the operator: *schon*(t_e, p) means "at the time t_e it is true that *schon* (i.e., already) p". I define the first type of use as follows:

TYPE 1. *Schon* and *noch* (and their negations) are sentential operators. Their scope is an imperfective sentence, referring to a time t_e. Diagram (14) applies to this use. In particular, *schon* and *noch* are dual:

$$schon(t_e, p) \Leftrightarrow \sim noch(t_e, \sim p)$$

As *schon*(t_e, p) and *noch nicht*(t_e, p) are negations of each other, the two sentences have the same presupposition. This presupposition is the condition under which the alternative "schon(t_e, p) or noch nicht(t_e, p)" is possible. This is the case if and only if there is a phase of not-p which has begun before t_e. If this phase extends until the time t_e, then *noch nicht*(t_e, p) is true. If the negative phase has ended by the time t_e and is succeeded by a positive phase p that contains t_e, then *schon*(t_e, p) is true. The alternative is illustrated in the following diagram.

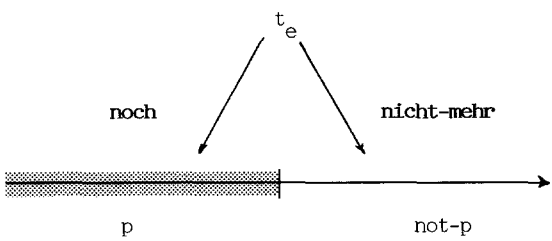
(16)



We start from a phase of not-p which begins in any case at some time before t_e. t_e itself either falls into this negative phase or into the following positive phase (if there happens to be such a phase). The operators *schon* and *noch nicht* pick out a well-defined interval out of the overall time-axis, i.e., the time interval starting with the last negative phase beginning before t_e and ending with the eventually following positive phase. In this way, the particles give rise to an alternative between two unique phases of p and not-p within an interval which contains at most one change from not-p to p. This alternative together with the condition that the eventual transition is from not-p to p and not the other way is the semantic contribution of *schon* and *noch nicht*.

On the other hand, the alternative between *noch*(t_e, p) and *nicht mehr*(t_e, p) is possible under the reverse presupposition. Starting from the fact that there is a positive phase of p which began before t_e, the question is whether this phase continues until t_e – "noch(t_e, p)" – or has been succeeded by a negative phase – "nicht mehr(t_e, p)".

(17)



The two diagrams (16) and (17) directly illustrate the semantic relationships of the duality square (14). Inner negation, i.e., negation of the operand p, leads to the exchange of the positive and the negative semi-phase: the perspective of *schon/noch nicht*(t_e, p) changes into the perspective of *noch/nicht mehr*(t_e, p). The analysis thereby fulfils the requirement implicit in (14), that the presupposition of *schon/noch nicht*(t_e, p) must be identical with the presupposition of *noch/nicht mehr*(t_e, $\sim p$). Outer negation corresponds to an exchange of the positive and the negative case.

According to this analysis, there is clearly no temporal symmetry relation between *schon* and *noch*. (Note, e.g., that *schon*(t_e, p) implies the existence of a change, in contrast to *noch*(t_e, p).) In agreement with Vandeweghe (1979, 1983) I prefer to talk of "perspectives" instead of "presuppositions". The particles *schon* and *noch* put the state p under a certain specific perspective. *Schon*(t_e, p) introduces the perspective that after a phase of not-p a positive phase sets in and, under this perspective, states that p is the case at the reference time. *Noch*(t_e, p) states p for the

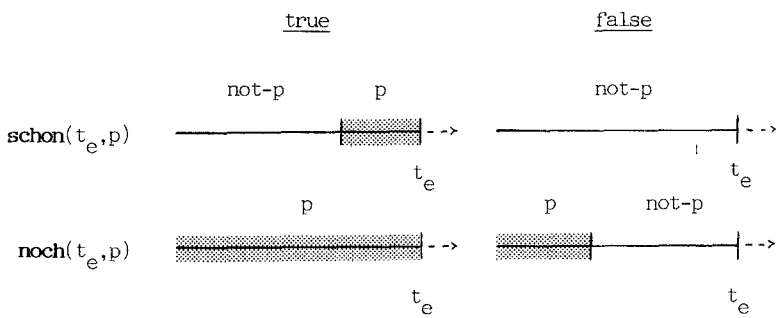
reference time under the reverse perspective, that after an existing positive phase of p a negative phase sets in.

1.3. *Truth-conditions*

In a sense which will be made more precise later, the approach taken here is operational rather than truth-conditional. The posing of a perspective is something which does not fit into the usual setting of model-theoretic semantics with a direct correspondence between linguistic forms and a model-structure. The conditions stated here are stronger. In addition to mere truth-conditions, the analysis presented here contains an hypothesis about the way in which the truth-conditions come about. In principle, proper truth-conditions can be formulated in many different ways involving different procedures of truth-value calculation. The analysis I suggest is meant not to be arbitrary in this regard, at least as far as the involvement of characteristic perspectives is concerned.

The perspectives admitted by statements of the form *schon*(t_e, p) and *noch*(t_e, p) lead to the following pictures of the developments in which the sentences receive truth-values:

(18)



In the literature on the particles, it is generally assumed that they carry presuppositions. This means that we have to allow for truth-value gaps, where the presuppositions fail. Any formulation of truth-conditions has to define not only the cases where the sentences are true, but also those where they are false (in the strong sense), since the latter are not just the complement of the former. Sometimes the objection has been raised that under this line of analysis the truth-conditions for *noch*(t_e, p) are hardly discernible from those for the simple statement $p(t_e)$. This is a fallacy, however, due to the failure of the "tertium non datur" principle here. It is right that *noch*(t_e, p) is true roughly in those cases where $p(t_e)$ is true, except for the developments in which t_e is the very beginning of a phase of p. But clearly, the two statements are **false** under different conditions.

Noch(t_e, p) is false if $p(t_e)$ is false and, in addition, a positive phase of p precedes the negative phase into which t_e falls. Similarly, *schon*(t_e, p) is in this sense a special sub-case of $p(t_e)$, namely the case of $p(t_e)$ being true after being false.

To be sure, together with the simple statement $p(t_e)$ very often also *schon*(t_e, p) and *noch*(t_e, p) are true or false. E.g., if *It is dark* is true, it is usually also true that it is already dark and that it is still dark. The conditions which allow the more specific perspectives are not very restrictive. This is not a shortcoming of the analysis proposed: the mere possibility of a special perspective does not imply that the choice of this perspective is communicatively relevant. We will come back to this and similar questions in paragraph 1.5.

Some authors adopted the view that the actual or a possible course of events after the time t_e is part of the truth-conditions of *schon*(t_e, p) and *noch*(t_e, p). This question, however, can be handled in a radically minimalistic manner: The truth or falsity of *schon*(t_e, p) and *noch*(t_e, p) does not impose any constraints at all on the time after t_e. Doherty (1973) and Horn (1970) (as well as König, 1977) postulated that the truth of *schon*(t_e, p) implies that the state p extends beyond t_e. If this were in fact a condition for the truth of that sentence this would mean that one can truely utter *schon*(t_e, p) only if one knows how things go on with respect to p after the time t_e. This is not the case. In order to know if the sentence *schon*(t_e, p) is true, one only needs to know whether the state p has set in after some time before t_e when it did not obtain and whether it still obtains at t_e. Information about the time after t_e is as unnecessary here as for the evaluation of the simple sentence $p(t_e)$.

The case of *noch*(t_e, p) is not different in this respect: one has to check if the state p obtains from an earlier time on without interruption up until t_e (inclusively) and assign a truth-value accordingly. Several authors, e.g., Steube (1980) and Hoepelman and Rohrer (1981) include modal conditions for the time after t_e in the truth-conditions. Hoepelman and Rohrer, e.g., make the expectation of the speaker that the state p does not obtain at the time t_e part of the truth-conditions of both *schon*(t_e, p) and *noch*(t_e, p). This assumption, however, cannot be maintained in view of simple counterexamples such as

(19) *Wie ich erwartet hatte, war das Licht schon/noch an.*
As I expected, the light was already/still on.

In the case of *noch*(t_e, p), one might feel tempted to consider at least the possibility of a negative phase after t_e as a truth-condition. But this is only a pragmatic constraint. It derives from the maxime to provide for

the possibility that a sentence can be false. To make such a contingency or informativity condition part of the truth-conditions of sentences, however, would mean to ban tautologies and contradictions from natural language semantics.

Nerbonne (1983) considers imperfectivization of the embedded sentence as part of the meaning (and truth-conditions) of *schon*(t_e, p). This view confuses cooccurrence-conditions for (certain uses of) *schon* with truth-conditions.

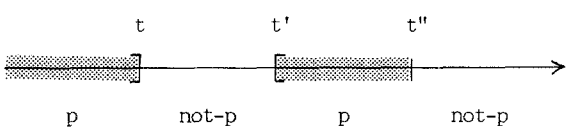
1.4. *The Meaning Formalized*

I shall describe the meanings of the particles in the format of phase-quantification developed in Löbner (1987), thereby embedding the phenomena studied here into the more general complex of natural language quantification. The formalization developed below is a slight generalization of phase-quantification. I will not pursue those properties of the particles which are due to general constraints on phase-quantifiers, such as monotonicity and persistency properties or generalizations concerning the lexicalization of such operators (see the paper cited above for details).

As we have seen, the alternative whether *schon*(t_e, p) or *noch nicht*(t_e, p) holds presupposes a phase of not-p before t_e. Let s be the starting point of this negative phase (eventually the start of the time scale itself). The question if *schon*(t_e, p) is true can be put in the following way: are there times within the half-open interval (s, t_e] (open on the left and closed on the right), at which the state p obtains?

In order to formalize this alternative correctly, we have to take into account two conditions. First, we must not start from just any preceding negative phase, but from the last one (if there is any). Secondly, not every time can serve as reference time, even if there is a preceding negative phase: the potential reference time must not be the very starting point of a negative phase. (Obviously, in such a case *schon*(t_e, p) is neither true nor false.) Let us consider the following sequence of positive and negative phases of p on the time scale:

(20)



From the beginning of time up to t, and including t, the state p obtains. In the (on both sides open) interval (t, t'), not-p is the case. From

t' on, including t', p obtains again, up to t''. Under these circumstances, possible time-sections enabling the specific perspective of $schon(t_e, p)$ are all intervals $(t, t_e]$ with t_e later than t but earlier than t''. The point t'' can serve as reference time if and only if it is the last time at which p obtains (and not the first time at which not-p is the case again). For the time after t'', there are further possible perspectives for $schon(t_e, p)$ based on intervals $(t'', t_e]$ with appropriate times t_e after t''.

Let me refer to those intervals which allow for the perspective of $schon(t_e, p)$ in a slightly implicit manner as those intervals which are "admissible in terms of t_e and p". Once we have defined the set of admissible intervals, we can easily formulate the truth conditions of $schon(t_e, p)$.

In the given context, where the time coordinate is the only relevant coordinate of propositions, we can regard propositions as (partial) functions from times to the set $\{0, 1\}$ of truth-values (1 for "true").

The set of times has a linear ordering $<$[15]. The set of truth-values can be given a linear ordering, too, in two obvious ways: either we consider 0 less than 1, or 1 less than 0. In the following definitions, I use the standard ordering with 0 less than 1 and the subjunction arrow $\rightarrow$ for "less or equal", in accordance with its use in propositional logic.

We can now state the essential property of admissible intervals in the algebraic terms of monotonicity[15]. Any admissible interval starts with a phase of not-p and is monotone in terms of p: i.e., starting with times t for which $p(t) = 0$, it may extend to later times t' with $p(t') = 1$, but must not contain any yet later times t'' with $p(t'') = 0$ again. The formal definition of admissibility is this:

DEFINITION 21. I is an **admissible interval in terms of p and t_e**, for short: $I \in \mathbf{AI}(t_e, p)$ iff

(i) $I = (t_i, t_e]$ for some $t_i < t_e$

(ii) I begins with a phase of not-p:
$\exists t' \in I \ \forall t \in I(t < t' \rightarrow \sim p(t))$

(iii) the function p is monotone in the interval I:
for all t, $t' \in I$, if p is defined for t, t' then
if $t < t'$ then $p(t) \rightarrow p(t')$

The set of admissible intervals is empty unless there is an open interval of not-p earlier than t_e. This condition for any admissible interval I excludes the possibility of t_e being a starting-point of not-p, since in this case p would not be monotone in I.

Apparently, the admissible intervals for $noch(t_e, p)$ and *nicht mehr*(t_e, p) are those admissible in terms of t_e and **not-p**: i.e., intervals

with a monotone development from p to not-p, and hence from 0 to 1 in terms of not-p.

Now, the crucial truth-criterion for $schon(t_e, p)$ is whether in the admissible intervals a transition from not-p to p takes place. If there is a transition in some such interval then there is a transition in all such intervals. All admissible intervals are equivalent with respect to this property, or, to put it in slightly more abstract terms: the set $AI(t_e, p)$ is homogeneous with respect to the crucial property. In order to capture this feature we introduce the partially defined "homogeneous quantifier" $\exists\forall$ which is defined if and only if universal and existential quantification yield the same truth-value:

DEFINITION 22. For any formulae φ and ψ which may or may not contain x free:

$$\exists\forall x(\varphi : \psi) =_{df} \begin{cases} \exists x(\varphi \wedge \psi), \text{ if } \exists x(\varphi \wedge \psi) \leftrightarrow \forall x(\varphi \rightarrow \psi) \\ \text{undefined else} \end{cases}$$

Due to the crucial condition we might as well define $\exists\forall x(\varphi : \psi)$ as $\forall x(\varphi \rightarrow \psi)$. The homogeneous quantifier is self-dual, i.e., inner negation and outer negation are equivalent: if $\exists x(\varphi \wedge \psi)$ and $\forall x(\varphi \rightarrow \psi)$ have the same truth-value, so do $\exists x(\varphi \wedge \sim\psi)$ and $\forall x(\varphi \rightarrow \sim\psi)$. Hence, if $\exists\forall x(\varphi : \psi)$ is defined $\exists\forall x(\varphi : \sim\psi)$ is, too, and has the same truth-value as $\sim\exists\forall x(\varphi : \psi)$. Let me also point out that $\exists\forall x(\varphi : \psi)$ is only defined if $\exists x\varphi$ is true, since otherwise $\exists x(\varphi \wedge \psi)$ and $\forall x(\varphi \rightarrow \psi)$ have different truth-values for any formula ψ whatsoever, namely 0 and 1 respectively. $\exists\forall x(b(x) : p(x))$ can be paraphrased as "for some and all b's: p holds", or, more concisely, as "the b's are p".[3]

The definition of the homogeneous quantifier enables us, finally, to formulate the truth-conditions of $schon(t_e, p)$ in the spirit of the paraphrase "the admissible intervals exhibit a transition from not-p to p" and correspondingly for the other particles:

(23)

schon	$(t_e, p) =$	$\exists\forall I(I \in AI(t_e, p) : \exists t(t \in I \wedge p(t)))$
noch nicht	$(t_e, p) =$	$\sim\exists\forall I(I \in AI(t_e, p) : \exists t(t \in I \wedge p(t)))$
noch	$(t_e, p) =$	$\sim\exists\forall I(I \in AI(t_e, \sim p) : \exists t(t \in I \wedge \sim p(t)))$
nicht mehr	$(t_e, p) =$	$\exists\forall I(I \in AI(t_e, \sim p) : \exists t(t \in I \wedge \sim p(t)))$

The formulae correctly reflect the duality relationships displayed in diagram (14). Note that the inner negation of p affects two occurrences of p in each formula.

Let me demonstrate how the presuppositions and truth-conditions are taken care of, taking $noch(t_e, p)$ as an example. The quantifier $\exists\forall I(I \in$

$AI(t_e, \sim p)$:) is only defined if the set of admissible intervals in terms of t_e and not-p is not empty. Thus the formula carries the presupposition that there are intervals which start with a positive p-phase and exhibit not more than one change from p to not-p before t_e. Now, if the admissible intervals contain no times where p is not true, then, obviously p is true throughout the whole intervals including the end-point t_e. This yields the correct truth-conditions.

In a last, almost trivial step, we exploit the self-duality of the quantifier $\exists\forall$ in order to formulate the meanings in a way that separate the presuppositional part from the assertion proper by the colon:

(24)

schon	$(t_e, p) = \exists\forall I(I \in AI(t_e,$	$p)$: $\exists t(t \in I \wedge p(t)))$
noch nicht	$(t_e, p) = \exists\forall I(I \in AI(t_e,$	$p)$: $\sim\exists t(t \in I \wedge p(t)))$
noch	$(t_e, p) = \exists\forall I(I \in AI(t_e,$	$\sim p)$: $\sim\exists t(t \in I \wedge \sim p(t)))$
nicht mehr	$(t_e, p) = \exists\forall I(I \in AI(t_e,$	$\sim p)$: $\exists t(t \in I \wedge \sim p(t)))$

The formalization proposed here has the advantage that it is not necessary to single out any particular interval among the admissible ones, which is in accordance with the pragmatics of the particles. To be sure, one may often refer to a certain interval, e.g., the one starting with the latest time about which one knows whether p or not-p holds, or starting with some other specific point-in-time. But since any admissible interval is representative of the whole class, the choice of any particular interval is irrelevant.

I am now in a position to express more precisely what I meant when I was claiming above that the approach taken here is operational rather than truth-functional. The analyses are to be taken as proposals for a conceptual analysis of the meanings of the particles. Sentences containing them are **about** the admissible developments up to t_e in terms of p. The existence of admissible cases is a presupposition of any such sentence, and hence the conception of the admissible cases seems to be a necessary step in the mental processing of the propositional content of the sentence. Making sense of any such sentence means constructing a specific alternative on the basis of the admissible cases as a first step, and only then, as a second step, checking (or registering, or asking, or whatever) which alternative applies.

1.5. *On the Pragmatics of the Particles*

The specific perspectives inherent in the semantics of the four particles impose constraints on the situations in which they can be used. I will

briefly discuss three pragmatic questions:

(1) Under which circumstances are these specific perspectives possible?
(2) Under which circumstances are they relevant?
(3) Which connotations derive from typical constellations of use?

Semantic Incompatibilities

As semantic incompatibilities we can consider cases in which *schon*(t_e, p) and *noch*(t_e, p) can not be used because the required succession of a negative and a positive phase (or vice versa) is impossible for semantic reasons. One group of cases are the "eternal" or time-less statements, which do in general not allow for *schon* and *noch* (I will mark semantically deviant sentences with § henceforth):

(25) *Zwei plus zwei ist §schon/§noch vier.*
Two plus two already/still equals four.

Among temporally contingent states, all irreversible states are incompatible with the perspective of *noch*, and conversely *schon* excludes those states which cannot be preceded by a contrary state. Hence, under normal circumstances, the following sentences will not be used:

(26) *Sie ist §schon/§noch nicht jung/Jungfrau.*
She is already young/a virgin./
She isn't young/a virgin yet.
(27) *Sie ist §noch/§nicht mehr alt.*
She is still old./She isn't old any longer.

Of course, statements such as (26) are perfectly possible in contexts where somebody can be young or a virgin, after not having been so before. (To be sure, in such a case *wieder* ("again") would be preferred instead of *schon*).

For analogous reasons, the use of *schon* and *noch* is marked in the following sentences:

(28) *Es ist schon/§noch spät.*
It's already/still late.
(29) *Es ist §schon/noch früh.*
It's already/still early.

The perfect tense in most of its uses indicates the transition into the (at least preliminarily) irreversible state after some event. This holds in

particular for the resultative perfect and the so-called experiential perfect (Comrie, 1976, pp. 31–33). The course of events expressed in these cases is compatible with the perspective of *schon* but not of *noch*:

(30) *Ich habe schon/noch nicht gegessen.*
I have already eaten/not yet eaten.

(31) *Ich habe §noch/§nicht mehr gegessen.*[4]
I have still eaten/not eaten anymore.

(32) *Er hat schon eine/noch keine Ausstellung in New York gehabt.*
He has already had an exhibition in New York./
He hasn't had an exhibition in New York yet.

(33) *Er hat §noch eine Ausstellung/§keine Ausstellung mehr in New York gehabt.*
He still/no longer has had an exhibition in New York.

The cases of semantic incompatibility provide an argument for the conceptual level of semantic analysis proposed here. From a truth-conditional point of view, it would appear that the cases involving *noch* are considerably better than those involving *schon*. The former, in a sense, don't state anything at variance with the facts, in contrast to the latter. However, the bad examples cited appear to be equally bad, regardless of which particles they contain. One possible explanation is that such sentences can be refuted already at a level of conceptual analysis which precedes any reference to actual situations. To put it in terms of the analysis suggested: in these cases we know by the very conceptual content of the sentence that the set of admissible cases is degenerate.

Contrast

Schon(t_e, p) states $p(t_e)$ for the case, that not-p obtained before, and the alternative of $p(t_e)$ would be that the state p is not entered up to the time t_e. Out of this special contrast, prototypical situations of use can be derived. The relevance of an utterance depends on the degree to which it contains new information for the addressee. If we concentrate on the meaning contribution of *schon* – analogous considerations apply to the other particles – it appears that those cases are particularly relevant in which the contrary was anticipated. There may be several reasons for anticipating the contrary. The anticipation can be due to expectations, hopes, or fears of the discourse participants. But the contrary anticipation can also simply result from the fact that the case considered is parallel to another case in the context. The following example illustrates

that point:

(34) *Susi ist schon verheiratet, Anna noch nicht.*
Susi is already married, Anna isn't yet.

Independently of any expectations, there is just a contextual contrast. In a similar way, though mediated by a legal constraint, *noch* is motivated in the following sentence:

(35) *Er möchte gern Auto fahren, aber er ist noch zu jung.*
He'd like to drive, but he is still too young.

Inherited Perspectives

The cases (34) and (35) can be considered instances of the more general phenomenon of perspective transfer. Often a discourse participant introduces a perspective which will be adopted by the next speaker. This may happen even if the perspective is not appropriate from the point of view of the next speaker. Consider the following example which was pointed out to me by Anita Mittwoch. Person A tells person B that she has applied for American citizenship, and person B asks person A whether her husband has applied, too. Person A answers:

(36) *Er ist schon Amerikaner, denn er ist in Amerika geboren.*
He surely is already American, in fact he was born in America.

First, person B has transferred the perspective "first not an American citizen, but later" from person A to A's husband. Then person A adopted that perspective temporarily when answering. She did so, although she knew better, in order to be cooperative. But in the same sentence she cancels the presupposition in the second clause. This example does not invalidate our analysis, but rather confirms it. (36) would not be possible in isolation, and it would be misleading without the second clause.

Valuations "Early" and "Late"

According to some authors, *schon* has a secondary meaning component "early", and *noch* "late". Indeed, this can be considered as a part of the meaning of the particles, but not as an additional meaning component. It can rather be derived from the meaning as formulated above. If *schon*(t_e, p) is true, the state p has been entered relatively early when compared with the contrasting case *noch nicht*(t_e, p). The opposite ap-

plies to *noch*(t_e, p). Note that the valuation "early" or "late" depends on contextually varying cases of comparison. In this point, *schon* and *noch* resemble scalar adjectives such as *early* and *late*, *big* and *small* etc., to a high degree. In Löbner (1987) I have shown, that the particles considered here have indeed the same meaning format as scalar adjectives.

Proximity to the Transition Point

The meaning of *schon*(t_e, p) and *noch*(t_e, p) is often understood to implicate that the reference point t_e is close to the transition between p and not-p. Thus, e.g., *schon*(t_e, p) is taken to implicate "noch nicht lange $p(t_e)$". This tendency of sentences containing *schon* (and the opposite tendency of sentences with *noch*) can be explained on the basis of our analysis by means of Grice's maxime of relevance. The truth-conditions of *schon*(t_e, p) do not specify the length of the two semi-phases or the distance between t_e and the transition point (or zone). They are in this sense topological and not metrical conditions. The transition from the first into the second semi-phase, however, is the only event which is significant for the truth-value of the sentence. This change will not be relevant, in the sense of the maxime, if it is not at issue. And this, in turn, will in general be the case if the transition is relatively close to t_e.

These considerations apply not only to type-1 uses, but mutatis mutandis to the other uses as well, which I am going to turn to in the next sections. Detailed discussions of pragmatic questions can be found in Vandeweghe (1983), Rombouts (1979) and others among the works cited.

2. *SCHON* AND *ERST* WITH SCALAR FOCUS

In type-1 uses, the scope of *schon* is the whole sentence (unless the particle itself is within the scope of a higher operator). *Schon* occurs in a quite similar meaning in a second type of uses focussing, however, only on a part of the sentence, e.g.,

(37) *Sie hat schon* ***fünf*** *Kinder.*
She has already five children.

(Here and below the focus of the particle is indicated by bold type.) In such cases, too, the predicate in focus contains an imperfective statement, although not directly about the reference time t_e but about the value of some time-dependent function at the time t_e. In sentence (37) this would be the number of children of the woman referred to at the

respective time t_e. Every part of the sentence can be focussed provided it specifies the value of a time-dependent function, taking values on a scale. In this type of use, the dual counterpart of *schon* is not *noch* but *erst*, as the following examples may illustrate:

(38)a. *Hat sie schon **fünf** Kinder? – Nein, erst **vier**.*
Has she already got five children? – No, only four so far.

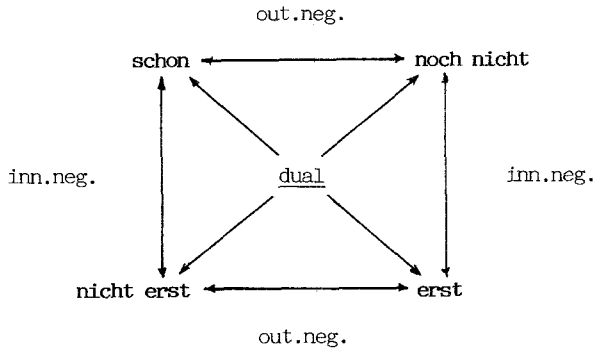
b. *Hat sie erst **vier** Kinder? – Nein, schon **acht**.*
Has she only got four children so far? – No, eight already.

TYPE 2. *Schon* and *erst* are focussing sentential operators with scope S and focus P in S.[5] S/P (i.e., the co-text of P in S) defines a time-dependent function f with scalar values. P is an imperfective predicate about the value $f(t_e)$ of f at the time t_e. *Schon* and *erst* are duals:

$$schon(t_e, P, S) \Leftrightarrow \sim erst(t_e, \sim P, S)$$

The negation of *schon* in this type of use is *noch nicht*, *erst* being negated regularly through *nicht erst*. The duality diagram for type 2 is as follows:

(39)



2.1. *Some Examples*

In the second type of use, *schon* and *erst* focus on the value of a function from time to values on some scale. This presupposes a monotone development of that function in the time about the reference time t_e.

(40) *Saskia hat schon **sechs** Pfannkuchen gegessen, Benni erst **drei**.*
Saskia has already eaten six pancakes, Benni only three so far.

The addition of *schon* and *erst* introduces the perspective of a temporal development into the sentence meaning, which would otherwise be

absent:

(41) *Saskia hat* ***sechs*** *Pfannkuchen gegessen, Benni (nur)* ***drei.***
Saskia has eaten six pancakes, Benni (only) three.

Under the perspective of (40) the persons involved are eating pancakes at the time t_e, one after the other, whereby the number of pancakes eaten by each of them increases monotonely during the time. The contrast of *schon* is a less advanced state, the contrast of *erst* a more advanced state.

The direction of the change need not be increasing. Appropriate contexts allow also for decreasing values:

(42) *Die Temperatur steht erst bei* ***300°****, nicht schon* ***höher.***
The temperature is at just 300°, it is not higher yet.

(43) *Die Temperatur steht erst bei* ***300°****, nicht schon* ***niedriger.***
The temperature is at just 300°, it is not lower yet.

Both sentences are possible, depending on whether the temperature is supposed to be rising or falling. Other frequent cases are specifications of frequency, duration or time as far as they concern the development until the time t_e:

(44) *Mary hat John schon/erst* ***600*** *Mal geküßt.*
Mary has already kissed John 600 times./
Mary has kissed John only 600 times as yet.

(45) *Sie ist schon/erst* ***seit drei Monaten*** *mit ihm liiert.*
She has already been going out with him for three months./
She has only been going out with him for three months as yet.

(46) *Heute hat sie schon/erst* ***drei Stunden*** *geschlafen.*
Today she's already slept for three hours./
Today she's only slept for three hours as yet.

(47) *Es ist schon/erst* ***eins.***
It's already/only one (o'clock).

The meaning of type-2 sentences can be explained compositionally from the separated meaning effects of focussing and the basic meaning of the particle *schon*. Let us consider first the semantic effect of focussing.

2.2. *The Semantic Contribution of Focussing*

Schon and *noch* can focus on parts of the sentence of variable size:

(48)a. *Wieviele Seiten hast du bis jetzt getippt? – Ich habe schon/erst* ***31*** *Seiten getippt.*

How many pages have you typed up to now? – I have already typed 31 pages./I have only typed 31 pages as yet.

(48)b. *Wieviel hast du bis jetzt getippt? – Ich habe schon/erst **31 Seiten** getippt.*
How much have you typed up to now? – I have already typed 31 pages./I have not typed more than 31 pages as yet.

(48)c. *Wieviel hast du bis jetzt getan? – Ich habe schon/erst **31 Seiten getippt**.*
What have you done up to now? – I have already typed 31 pages./I have not done more than type 31 pages so far.

Let us now isolate the semantic contribution of the focussing.

(49)a. *Ich habe **31** Seiten getippt.*
(49)b. *Ich habe **31 Seiten** getippt.*
(49)c. *Ich habe **31 Seiten getippt**.*

In contrast to the simple sentence

(50) *Ich habe 31 Seiten getippt.*

the sentences (49a/b/c) presuppose sentences (51a/b/c).

(51)a. *Ich habe eine gewisse Anzahl von Seiten getippt.*
I have typed a certain number of pages.

(51)b. *Ich habe etwas getippt.*
I have typed something.

(51)c. *Ich habe etwas getan.*
I have done something.

Taken as a whole, sentence (50) is a predicate about the situation referred to, and thereby about the reference time t_e. In contrast to (50) the focussing sentences only specify a certain variable or parameter of the situation referred to:

(52)a. *Ich habe x(-viele) Seiten getippt.*
(52)b. *Ich habe x(-viel) getippt.*
(52)c. *Ich habe x(-viel) getan.*

In every particular situation, the variable x has a precise value on some scale. This value is specified by the respective focus-predicate "31"/"31 Seiten (pages)"/"31 Seiten getippt (typed 31 pages)" more or less precisely. Written in a half-formal manner, the meaning would be:

(53)a. **31**(ιx(ich habe x Seiten getippt)).
(53)b. **31-Seiten**(ιx(ich habe x getippt)).
(53)c. **31-Seiten-getippt**(ιx(ich habe x getan)).

with the general form

(53)d. $\mathbf{P}(\iota x(\mathrm{S/P}(x)))$

S/P(x) being S where the focussed predicate P is replaced by x. The (bold-type) focus-elements serve as predicate with the following iota-term as argument. The iota-terms are defined exactly under the presuppositions (51). The three iota-terms correspond to three functions which assign a value to every possible situation of reference. (The values lie within ranges A, B, and C which I need not specify here.)

(54) F_a: Sit → A / F_b: Sit → B / F_c: Sit → C

The context of the focus-predicate P, i.e., the matrix S/P, together with the general syntactic/semantic status of P in S, uniquely defines a function F. The meaning of the focussing sentences in general is hence:

(55) P(F(s))

s being the situation referred to. This presupposes that the function F has a value at the situation s.

2.3. *The Semantic Contribution of schon and erst*

The particle *schon*, now, applies to the predication "P(F(s))", with its basic meaning of the type-1 uses. First it effects a parametrization of the function F to its temporal component

f: Time → A/B/C

The statement is reduced to its temporal aspect "P($f(t_e)$)" – "the value of f at the time t_e falls into the range P". Specific for the particle *schon* is the perspective "first not P, then P": in the positive case, the stage P is reached until the time t_e, in the negative case not. Hence we can derive the meaning of type-2 uses directly from that of type-1 uses.

Admissible intervals are those in which the composed function P∘f (with P∘$f(t)$ being defined as P($f(t)$)) is monotone. Again, P is a binary predicate about possible values of f. But, in contrast to type 1, the alternative between P and not-P is not exhaustive with respect to the whole scale of possible values of f. I will come back to this point in the next section. The function P is always a partial monotone function from the range of f (here A/B/C) into some scale with a coarser ordering. Given the monotonicity of P, the condition that P∘f is monotone does not entail that f itself is monotone, but is equivalent with the following weaker constraint on f:

(56) Any cases where f is not monotone are not significant in terms of P. Formally: if $P \circ f$ is defined for t and t', then

$$\text{if } t \leqslant t' \text{ and } f(t') > f(t), \text{ then } P(f(t)) = P(f(t')).$$

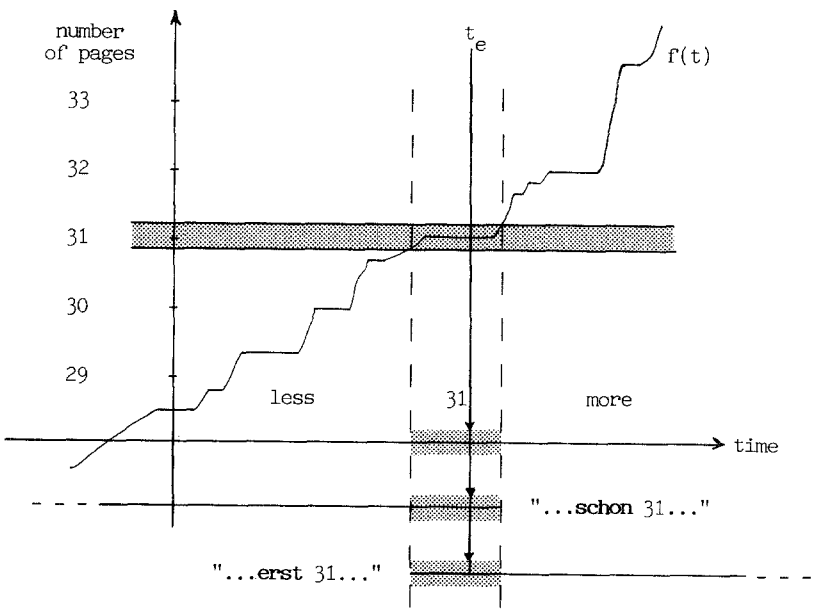
(The proof of the equivalence is mathematical routine.[15])

The formal meanings of *schon* and *erst* in uses of type 2 are thus direct instances of the meanings of *schon* and *noch* in type-1 uses.

(57)
$$\begin{aligned} \textbf{schon}(t_e, P, S) &= \text{schon}(t_e, P \circ f) \\ &= \exists \forall I(I \in AI(t_e, P \circ f): \exists t(t \in I \wedge P(f(t)))) \\ \textbf{erst}(t_e, P, S) &= \text{noch}(t_e, P \circ f) \\ &= \exists \forall I(I \in AI(t_e, \sim P \circ f): \sim \exists t(t \in I \wedge \sim P(f(t)))) \end{aligned}$$

The contrast in case of *schon* consists in the values of f before t_e which do not (yet) fall under P, i.e., lower values in case of an overall increase. The contrast in case of *erst* is constituted by those values of f after t_e which do not fall under P, i.e., higher values if the values are increasing. The following diagram displays a possible development of the values of f for the sentence (48a), the phases which are run through, and their projections onto the time-axis. Beneath the time-axis the time intervals relevant for the perspectives of *schon* and *erst* are depicted.

(58)



2.4. *erst and noch*

The use of *noch* as the dual counterpart of *schon* is restricted to type 1. It can, however, be difficult to distinguish between type 1 and type 2 in some cases. The difference between those cases in which *noch* and *erst* occur seems to be semantically definable: *noch* is used in those cases where the state *p* and the contrasting posterior state represent an exhaustive (or binary) alternative, *erst*, in contrast, is used if there are more than these two possibilities. To illustrate this point, let us consider three examples.

(59) *Hast du schon etwas gegessen? – Nein noch/§erst nichts.*
Have you already eaten something? – No, nothing yet/only nothing up to now.

(60) *Hast du schon **viel** gegessen? – Nein §noch/erst **wenig**.*
Have you already eaten a lot? – No, only a little up to now/a little yet.

"Something or nothing" is an exhaustive alternative, but not "much or little", which excludes "nothing".

(61) *Ist es schon hell? – Nein, noch/§erst nicht.*
Is it already light? – No, not yet/only not up to now.

(62) *Ist es schon **hell**? – Nein, **es dämmert** (§)noch/erst.*
Is it already light? – No, it is still dawning/it is dawning yet.

In this case, at least at the surface, there is no difference with respect to the focus of *schon*. The alternative between "hell (light)" and "nicht hell (not light)" is exhaustive, but the one between lightness and dawn is not. (*Es dämmert noch* is, however, acceptable if the alternative of darkness is contextually excluded, i.e., if it is presupposed that it is at least dawning, if not light already.)

In view of these data it appears appropriate to redefine type 1 and type 2 as follows: In type 1, the particle focusses on a predication which together with the contrasting predication yields an exhaustive alternative, i.e., values of a polarity scale with just two ranks. In type 2, the particles focus on a predication which together with the contrasting predication provides only two alternatives on a scale with more ranks.[6]

A further interesting example in this connection is represented by the following three sentences:

(63) *Ich habe schon* 200 *Mark.*
I have already got 200 marks.

(64) *Ich habe noch* 200 *Mark.*
I have still got 200 marks.

(65) *Ich habe erst* ***200 Mark.***
I have only got 200 marks so far.

What is surprising at first sight is the fact that, under normal circumstances, sentences (63) and (65) imply an increase of the amount of money, while (64) implies a decrease.

The predicate "200 Mark" supplies a mid-scale range with a (vague) upper and lower bound. The unmodified sentence

(66) *Ich habe* 200 *Mark.*
I have got 200 marks.

is, under normal circumstances, tantamount to

(67) *Ich habe* 200 *Mark oder mehr.*
I have got 200 marks (or more).

This does not mean that the predicate "200 Mark" means "200 marks or more" in general, or in this sentence. Rather the suspension of the natural upper bound is a consequence of the context "Ich habe . . .", which is non-exhaustive without further assumptions. (Normally, one is not supposed to enumerate all his possessions whenever one states "I have . . ."). Together with maybe the majority of transitive verbs, "I have" as a predicate is cumulative and distributive[7] with respect to the object position. Predicates with this property suspend the upper bound under non-exhaustive interpretations, as can easily be seen. E.g., *I have X* trivially implies *I have X-or-more*, since the predicate is cumulative. Conversely, *I have X-or-more* implies *I have X* due to the distributivity, as *X* is a part of *X*-or-more. Thus, under a non-exhaustive interpretation, both sentences are equivalent.

Now, *schon* in (63), when taken as type 1, and *noch* in (64) focus on the whole sentence and hence comprise the whole VP within their focus. The negation of the remaining sentence (66) is

(68) *Ich habe keine* 200 *Mark*, i.e., *Ich habe weniger als* 200 *Mark.*
I haven't got 200 marks.

The characteristic perspective of $schon(t_e, p)$, "first not-p, then p", thus yields an increase of money, whereas the opposite perspective of $noch(t_e, p)$ forces one to assume a contrary development for (64).

Erst in (65), however, focusses on 200 *Mark* or 200, and so could *schon* in (63) be taken to do, under a type-2 interpretation. (65) presupposes

that the speaker has some amount of money and specifies that amount, i.e., "ιx(ich habe x Mark)". As the focussed predicate is not within the scope of *ich habe* its upper bound is not suspended. It thus provides a tripartition of the scale which allows for both the specific perspective of *schon* (200 at t_e, not 200 before) and *erst* (200 at t_e, later not 200). This explains, why focussing makes the use of *schon* (type 2) and *erst* possible, but not why the increasing perspective is preferred if not the only one possible. One half-way plausible explanation would be that the increasing perspective is natural for *schon* as "less than 200 (marks)" is the natural contrast of "200 (marks)" in the given context of possession (note that the context in (42/43) above, where both directions are possible, is not cumulative and distributive.) If *schon* is generally bound to the increasing perspective in such contexts, then *erst* is bound to it, too, as it is the dual of *schon*.

3. *SCHON* AND *ERST* FOCUSSING ON FRAME ADVERBIALS

3.1. *Delimitation Against the Previous Use*

There is a further use of *schon* and *erst* where the particles have a temporal frame adverbial as focus, which is to be distinguished from uses of type 2. (König 1979 and Vandeweghe 1985 have discussed this use). Frame adverbials specify the time interval within which an event takes place or in which the reference time t_e of an imperfective statement falls.

The following sentences represent the imperfective case:

(69) *Schon* ***im letzten Jahr*** *(= nicht erst später) war John mit Mary bekannt.*
John already knew Mary last year.

(70) *Erst* ***jetzt*** *(= nicht schon früher) spielen sie miteinander Tennis.*
Only now are they playing tennis together.

These uses instantiate the fourth type, which will not be treated here. We will rather restrict our consideration to the perfective case, which is theoretically less involved:

TYPE 3. *Schon* and *erst* are focussing sentential operators with scope S and focus T in S. T is a temporal frame adverbial, specifying the time in which a certain event e takes place. (S is a perfective sentence.) *Schon* and *erst* are dual:

$$schon(e, \mathrm{T}) \Leftrightarrow \sim erst(e, \sim \mathrm{T})$$

In this kind of use, the negation of *schon* can be either *noch nicht* or

nicht schon. Both are accepted to about the same degree.[8] Apart from that difference, the duality square (39) for type 2 carries over to type 3. Examples:

(71) *Er kommt schon/erst* ***morgen*** *in Frankfurt an.*
He is already arriving at F. tomorrow./
He won't be arriving at F. until tomorrow.

(72) *Schon/erst* ***vor drei Tage*** *wurde sie krank.*
She already/only got sick three days ago.

(73) *Schon am Anfang/Erst am Ende der Tagung hat John Mary geküßt.*
John already kissed Mary at the beginning of the meeting./
Not until the end of the meeting did John kiss Mary.

Here, the meaning of *schon* and *erst* appears to be opposite to the meaning in type-2 sentences. The contrast of "schon zu T" (already at T) is "erst später als T", and the contrast of "erst zu T" (as late as T) is "schon früher als T" – whereas the contrasting phase in sentences of type 1 and type 2 is an earlier phase for *schon* and a later phase for *erst/noch*. The difference is particularly striking, if one compares statements of type 2 about the time of the day and perfective statements with a similar time specification for an event:

(74) Type 2:
Es ist schon ***zwei*** *– nicht erst* ***eins***.
It is already two – not (still) one.
Es ist erst ***zwei*** *– nicht schon* ***drei***.
It is only two – not three yet.

(75) Type 3:
Sie kommt schon ***um zwei*** *– nicht erst um* ***drei***.
She is already coming at two – not at three.
Sie kommt erst ***um zwei*** *– nicht schon um* ***eins***.
She won't be coming until two – and not already at one.

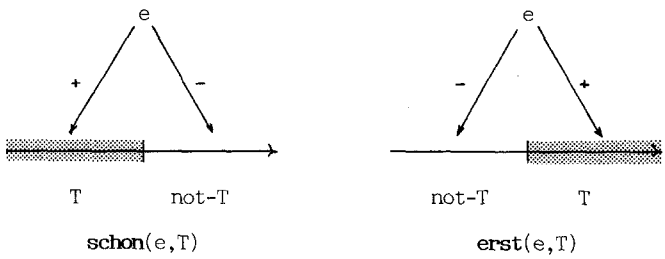
Consequently, the semantic incompatibilities are also opposite:

(76) Type 2:
Es ist schon/§erst ***spät***.
It is already late./It is still (only) late.
Es ist §schon/erst ***früh***.
It is still early./It is already early.

(77) Type 3:
Sie kommt §schon/erst ***spät.***
She'll actually be coming late.
Sie kommt schon/§erst ***früh.***
She'll actually be coming early.

Sentences of type 3 have the presupposition that the event referred to takes place at some time. The crucial question is whether it takes place later or earlier than at the time specified. Let *e* be the event in question. The specific alternatives of *schon*(*e*, *T*) and *erst*(*e*, *T*) can be illustrated as follows:

(78)



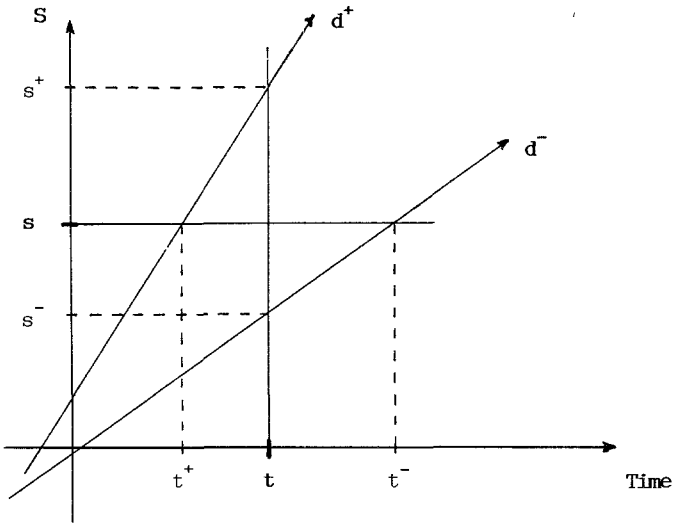
How can this apparently contradictory finding be accounted for on the basis of the fundamental meaning of *schon* assumed so far? As König (1979) has formulated similarly, the common denominator of *schon* in the uses of type 2 and type 3 is that in the positive case, the course of events is relatively advanced when compared with the contrasting negative case: the event or state under consideration occurs earlier than in the contrasting case. In case of *noch* and *erst* the positive case consists in a course of events which is less advanced than in the contrasting case.

3.2. *Two Temporal Dimensions*

These findings can be accounted for if one realizes that what we are actually dealing with is not one but two temporal dimensions. Any development (or history, or course of events) can only be described in a two-dimensional space. We do, in fact, assume that a particular process can take more or less time or that a particular event can occur earlier or later. This means that the occurrence of events is logically independent of the time when they occur. The association of times and particular events is contingent. Let me refer to the totality of facts at a given time *t* as the "state-of-affairs obtaining at *t*". The state-of-affairs at *t* may comprise all facts of the world but will usually be restricted to a certain aspect of the situation considered.

The succession of events, of course, is not completely independent of time. It has an intrinsic order, due to causal laws and other constraints, which is equidirectional with time. Any function which associates states-of-affairs with the times at which they are obtaining must correlate later times with more advanced states-of-affairs. Thus, if we call such functions "developments", we have to define them as monotone functions from Time to S, the set of states-of-affairs with its intrinsic ordering. The following diagram displays two possible developments d^+ and d^-, d^+ representing a faster development, and d^- a slower one.

(79)



t is an individual time, s a particular state-of-affairs. If we focus on the time t, then d^+ is faster than d^- in that the state-of-affairs s^+ obtaining at t in the development d^+ is more advanced than the state-of-affairs s^- which is obtaining at t in the development d^-. If, on the other hand, we consider the particular state-of-affairs s, then d^+ is faster than d^- since in the development d^+ s is reached at a time t^+ which is earlier than t^-, the time at which s is reached in d^-.

The two perspectives just considered correspond immediately to the distinction between imperfective and perfective aspect. Simple sentences refer to a particular situation, i.e., a point $\langle t, s \rangle$ of a development, consisting of a time t and the state-of-affairs s which is obtaining at t in this development.

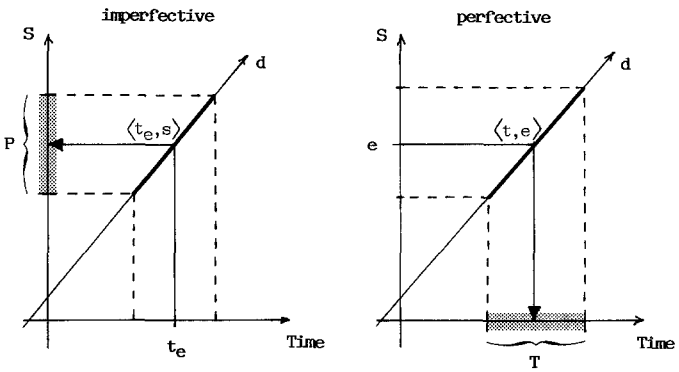
- The imperfective aspect fixes the time-coordinate of the situation as reference-time t_e. The sentence provides a predicate about the state-of-affairs obtaining at t_e and thereby (in-

directly) a predicate P about t_e. Loosely speaking, t_e is located in a phase P on the S-axis.

- The perfective aspect fixes the S-coordinate of the situation by referring to a particular event e. The sentence provides a predicate T about the corresponding time $t_a(e)$ at which e occurs, by means of tense and frame adverbials. This is (indirectly) a predicate about e. Loosely speaking, e is located within an interval T on the time-axis.

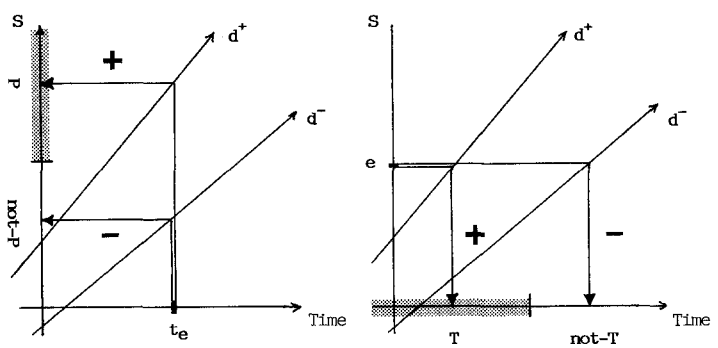
The two cases are illustrated in the diagrams below. It is important to realize that, due to the monotonicity constraint on developments, the orderings in terms of time, developmental stages, and succession of events are essentially the same. Phases on the S-axis correspond to stages of d and intervals of the time-axis.

(80)



If we recall that type-1 and type-2 uses of *schon* (and the other particles) are imperfective, whereas type-3 uses are perfective, we can easily illustrate the common meaning of the two cases by means of contrasting slower and faster developments d^+ and d^-.

(81)

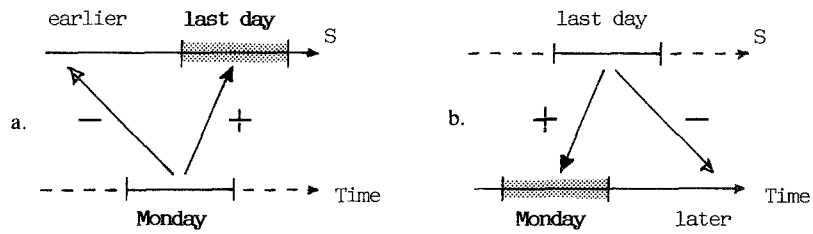


The positive cases are those of *schon*(t_e, p) and *schon*(e, T). The diagrams contain in an obvious way the earlier versions in (16) and (78).

In certain cases, where time and state coincide, both prespectives yield the same truth-conditions although in a different way. Consider the following examples:

(82)a. (Type 2):
*Montag ist schon **der letzte Tag**.*
Monday is already the last day.

b. (Type 3):
*Schon **Montag** ist der letzte Tag.*
It is already Monday that is the last day.



Under both perspectives, the underlying developments are such that in the positive case Monday coincides with the last day, whereas in the negative case Monday is earlier than the last day (or equivalently: the last day is later than Monday).

3.3. *The Meaning Formalized*

The meaning of type-3 sentences can, again, be analyzed as the combined effect of focussing and the addition of *schon* or *erst*. Consider, e.g., the following sentence:

(83) *Er kommt schon **morgen**.*

The simple sentence

(84) *Er kommt morgen.*

without *schon* and without focussing on the frame adverbial *morgen*, states that within the period specified by *morgen* and the (non-past) tense an event will take place of the kind expressed by the rest of the sentence. *Morgen* functions as a temporal predicate which applies to the time when the event takes place.

If we now focus on the frame adverbial, as in

(85) *Er kommt **morgen**.*

we presuppose the existence of an event of the kind

(86) *Er kommt.*

The frame adverbial then applies to the time, when this specific event occurs. (85) means

(87) *morgen*(ιt(*er kommt zur Zeit t*))
tomorrow(ιt(he comes at the time *t*))

(Note, that the use of the iota-term presupposes (86).) If we abbreviate "ιt(the event *e* takes place at *t*)" as "$t_a(e)$)", then (87) becomes an instance of the general semantic format of perfective sentences with focus on a frame adverbial:

(88) $T(t_a(e))$

(88) is an exact analogue of (55) above.

The intervals admissible under the perfective perspective are those which end with *e* or, to be precise, with $t_a(e)$. For the sake of simplicity, I assume that $t_a(e)$ ist just a point-in-time. The definitions can be generalized in an obvious way to cover non-punctual events. In addition, the admissible intervals must be monotone in terms of T or not-T. As a consequence of the perspectival switch, *schon* in its type-3 uses admits all intervals starting with a positive phase of T rather than with a negative phase, in contrast to the imperfective uses.

We can use the semantic conceptions already defined to formulate the meanings of the type-3 uses. Type-3 *schon* is essentially a type-1 *noch*, type-3 *erst* a type-1 *schon*:

(89) $\mathbf{schon}(e, \mathrm{T}) = \mathrm{noch}(t_a(e), \mathrm{T})$
$= \exists \forall I(I \in AI(t_a(e), \sim T)\colon \sim \exists t(t \in I \wedge \sim T(t)))$
$\mathbf{erst}(e, T) = \mathrm{schon}(t_a(e), T)$
$= \exists \forall I(I \in AI(t_a(e), T)\colon \exists t(t \in I \wedge T(t)))$

Thus, what constitutes the common meaning of *schon*, in both the imperfective and the perfective constellation, is not the form but (1) the general format of phase-quantification, (2) the implicativity (*schon S* implies *S*), and (3) the fact that the situation referred to is due to a development that is faster than in the contrasting case.

The analysis is confirmed by equivalences such as the following:

(90)a. Type 3:
Er kommt **schon** *im Frühling.*
He is already coming in spring.
=Type 1:
Wenn er kommt, ist **noch** *Frühling.*
When he comes, it will still be spring.

(90)b. Type 3:
Er kommt ***erst*** *im Herbst.*
He won't be coming before the autumn.
=Type 1:
Wenn er kommt, ist ***schon*** *Herbst.*
When he comes, it will already be autumn.

The perspectival ambiguity relating type-2 and type-3 uses of *schon* and *erst* is also instantiated in other cases. Consider the respective meanings of the adverb *schnell* ("quickly") in the following examples:

(91)a. *Komm schnell, – aber fahr langsam.*
Come quick(ly)/fast – but drive slowly.
b. *Fahr schnell – es ist schon spät.*
Drive fast – it is late already.

In (91a) the adverb *schnell* refers to the time-axis, i.e., it means an early location of the event on the time-axis, whereas in (91b) it refers to the development on the S-axis. In both cases the outcome will be the same: a relatively early arrival of the person addressed. In Japanese, to cite another example, the pair of scalar adjectives *hayai/osoi* is ambiguous in the same way, *hayai* meaning both "quick" and "early", and *osoi* both "slow" and "late".

4. PERFECTIVE *NOCH*

There are two perfective uses of *noch* which shall be briefly touched here. They drop out of the general discussion, since *noch* in both these uses stands on its own, not being a dual counterpart of *schon* or any other operator.

4.1. *The so-called noch$_2$*

The first use of *noch*, sometimes referred to as "noch$_2$"[9] is present in sentences such as:

(92) *Sie kommt noch.*
She'll come yet/eventually.

In such sentences, *noch* is used to express that there is a certain development under way which (finally) leads to an event of the kind

stated. In this use, too, the negation of *noch* is *nicht mehr*:

(93) *Sie kommt nicht mehr.*
She won't come anymore.

(92) and (93) do not presuppose that an event of the kind takes place at some time. The sentences do not refer to a specific event and hence cannot be treated in the way we treated type-3 sentences above. Moreover, in this use, *noch* is not dual to *schon*. There are, to be sure, uses of *schon/noch nicht* which appear similar to (92), but they differ in that they presuppose the existence of an event of that kind:

(94) *Sie kommt schon.*
She is already coming.
(95) *Sie kommt noch nicht.*
She isn't coming yet.

There is an elegant non-solution to the use of *noch* exemplified in (92). The bare sentence

(96) *Sie kommt.*
She is coming.

in its usual, perfective interpretation refers to a future time. Its meaning can roughly be thought of as

(97) Pros (sie-KOMM)

in the sense of Galton (1984, p. 48). *Pros* is a prospective operator, *sie-KOMM* an "event-radical"; (97) means that "there will be an event of the kind *she-COME*". Now, if one assumes that the implicit future tense operator lies within the scope of *noch*, we get an interpretation of (92) and (93) which nicely fits the truth-conditions and uses just the basic meaning of *noch*:

(98) noch(t_e, Pros(sie-KOMM))
(99) nicht-mehr(t_e, Pros(sie-KOMM))

Furthermore, if we apply inner negation to (98) and (99) we get

(100) noch(t_e, ~Pros(sie-KOMM))
(101) nicht-mehr(t_e, ~Pros(sie-KOMM))

which is equivalent to (102) and (103) respectively.

(102) noch nicht(t_e, Pros(sie-KOMM))
(103) schon(t_e, Pros(sie-KOMM))

Statements of the type Pros(E), now, if they are true at t_e, have always been true before t_e. Hence they do not allow for the perspective of *schon/noch nicht*, and thus we even would be supplied with an explanation for the fact that *schon* does not occur in this specific context. There is, however, a datum which throws a serious shadow on this nice hypothesis: the fact that this interpretation does not carry over to the corresponding past tense sentences:

(104) *Sie kam noch.*
She did come (after all).

If the Galton analysis is right for (92), then the simple sentence

(105) *Sie kam.*
She came.

should be interpreted as (106):

(106) Perf(sie-KOMM).

This statement, however, cannot be embedded into the scope of *noch*, since, in turn, the perspective of *noch/nicht mehr* does not allow for operands of the form "Perf(E)", which express irreversible states.

Not being in a position to describe the semantics of sentences (96) and (105) formally, we can only state, that the meanings of (92) and (104) must be something similar to the following:

(107) $\exists e(\text{sie-KOMM}(e) \wedge \text{Tense}(e) \wedge \text{noch}(t_a(e), \text{P}))$

(92)/(96) and (105)/(104) are clearly existential, since the respective negations deny the occurrence of any event *e* of the kind "sie-KOMM". "Tense" is a temporal predicate which specifies the event *e* as non-past (92) or past (104), respectively. The consideration of (104) has shown that the tense operator does not lie within the scope of *noch*. The particle rather contributes the information that the event in question occurs before a certain phase P ends which began before and constitutes some connection with the previous course of events.[10] In this use, thus, *noch* functions like temporal frame adverbials, constraining the temporal space specified by the tense-operator. *Noch* is probably not a phase-quantifier in this use. *Schon*, *noch*, and *erst* in the other uses discussed above and below, modify an overt predication of the sentence, the predication in focus. Instead of just a plain yes/no-outcome of the predication, they

differentiate by focussing on a transition between "yes" and "no". Apparently, this is not the role *noch* plays in its "$noch_2$"-uses.

4.2. *Noch Focussing on Temporal Frame Adverbials*

There is yet another temporal use of *noch* which we shall briefly discuss. In this use, reference is made to a specific event, and *noch* focusses on a frame adverbial, just as *schon* and *erst* in the uses of type 3.

(108) *Sie kommt noch* ***heute***.
She is coming this very day.

This use of *noch*, in contrast to *schon* and *erst*, is restricted to time specifications which include the reference time t_0.[11] The following sentence is marked,

(109) §*Sie kommt noch* ***übermorgen***.

unless it is clear that for independent reasons reference is implicitly to the day after tomorrow. *Noch* in this use, means that the event in question occurs while the time specification is still valid: "it is still T, when e occurs".[12] This would simply be

(110) $\text{noch}(e, \text{T}) \Leftrightarrow \text{noch}(t_a(e), \text{T})$

if this would not mean to drop the condition that T has to cover t_0. If T happens to do so, $noch(e, \text{T})$ is truth-conditionally equivalent with $schon(e, \text{T})$, and, indeed, (108) is hard to distinguish from

(111) *Sie kommt schon* ***heute***.

It can only be speculated upon the question why we do not encounter the perspectival switch here displayed by *schon* and *erst* in type-3-use. The basic meaning of *schon* is relative earliness, whereas the basic meaning of *noch* is something like an addition to or a continuation of an existing situation (cf. the literature cited in Note 9 and Shetter (1966)). Under the special type-1 constellation, this enables *noch* to function as the dual counterpart of *schon*. But independently of that use, there are other manifestations of a basic meaning which possibly is non-temporal.

There are a number of uses which can be treated parallel to the temporal uses considered so far. The closest relatives are the secondary temporal uses.

5.1. *Secondary Temporal Uses*

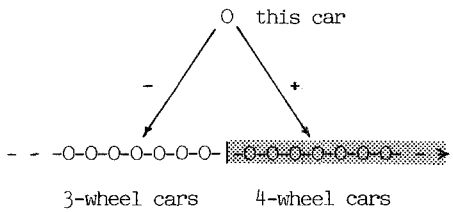
In these uses, the time scale and the reference point thereon are replaced by a scale of objects which are located in time and hence (indirectly) temporally ordered, though not as strictly as time itself. Two objects may be contemporary and also exist at overlapping time periods. If a sentence contains a predicate about such objects which applies only to objects out of a certain period, then we are supplied with the prerequisites for the use of the *schon*-group: a temporally ordered scale with phases of opposite predication upon it. Consider, e.g., a car-maker who produces cars with three wheels up to a certain time and after that cars with four wheels. Under such circumstances it would make sense to utter either of the following sentences:

(112) *Dieser Wagen hat schon vier Räder.*
This car has already got four wheels.

(113) *Dieser Wagen hat noch drei Räder.*
This car still has three wheels.

or the respective negations with *noch nicht* and *nicht mehr* in place of *schon* and *noch*. These sentences are type-1 analogues. (112) would express the following state of affairs:

(114)



The formal description of the meaning carries over to this case. Note, that the subject of the sentence takes over the role of the implicit parameter t_e. This is not necessarily so. The particles *schon* and *noch* can modify any temporally contrasted predication, not only the sentence's VP. Consider a different example:

(115) *Diesen Aufsatz hat er schon mit seinem neuen PC geschrieben.*
He's written this paper with his new PC already.

where the first argument of *schon* appears as the direct object and the second as a predicate "etwas sein, was er mit seinem neuen PC geschrieben hat". It is not difficult to find also type-2 and type-3 analogues.

(116) *Madame Curie wußte erst* ***wenig*** *über die schädlichen Wirkungen der Radioaktivität.* (type 2)
Madame Curie still knew little about the unwholesome effects of radioactivity.

(117) *Erst/Schon* ***Brandt*** *begann mit der Ostpolitik.* (type 3)
It was Brandt (and nobody before him) who first started the ostpolitik./Brandt (already) had the idea of starting the ostpolitik.

Indirect time reference of the kind involved here is a common phenomenon. It is possible whenever temporal location can be derived from other specifications. One frequent case is the specification of spatial location of the object which indirectly determines also the time when that object was there:

(118) *In Japan I used to smoke Mild Seven.*

5.2. *Other Scales*

The relation to time can be dropped altogether in favor of any other scale. Often cited are examples such as

(119) *Peter ist noch gemäßigt, Paul ist schon radikal.*
Peter is still moderate, Paul is already radical.

These sentences are type-1 analogues. A scale of radicalism replaces the time-axis, and the person referred to, or, more generally, the logical arguments of the scalar predicate replace the reference time.

This transition from temporal to non-temporal cases has a wide range of parallels among other temporal expressions. Consider, e.g., the application of temporal conjunctions such as *when*, *as*, *while*, *before* and temporal quantifiers such as *always*, *sometimes*, *never* to temporally unlocated abstract cases.

Sentence (120) would be a type-2 case, and (121) of type 3.

(120) *Das ist schon/erst ein* ***Mittelklassewagen.***
This is already/still a middle-class car.

(121) *Schon/erst* ***ein Mercedes*** *würde sie zufriedenstellen.*
Even/Nothing less than a Mercedes would satisfy her.

5.3. *Local Uses*

Less trivial than the other cases is the reconstruction of the application of *schon/erst/noch* to local cases. Again, there are analogues to all three

types:

(122) *Basel liegt schon in der Schweiz.*[13] (type 1)
Basel is already within Switzerland.

(123) *Basel liegt noch in der Schweiz.*
Basel is still within Switzerland.

(124) *Mexiko liegt erst/schon* ***in den Subtropen.*** (type 2)
Mexico is only/already within the subtropics.

(125) *Schon/erst* ***oberhalb 2000 m*** *wachsen keine Bäume mehr.*
Trees don't grow anymore already above 2000 m./ (type 3)
Only above 2000 m don't trees grow anymore.

I confine myself to the discussion of uses of the first type. Let me abbreviate the general case as *schon*(l_e, P), l_e being a certain location and P any predicate applying to locations.

One problem we can settle in advance is the question of the topological relationship of the location l_e and the portion [P] of space to which P applies. Just as in the temporal case we can and must assume that the area [P] does not cut across the location l_e. In order to be an acceptable argument for the predicate P, l_e must be homogeneous with respect to P, i.e., l_e has to lie completely inside or completely outside of [P]. The homogeneity assumption is a presupposition of the sentence P(l_e) and hence a fortiori of the sentences *schon/noch* P(l_e), as these sentences lack a truth-value if this presupposition is violated. Consider, e.g.,

(126) *Istanbul is in Europe.*
(127) *Istanbul is in Asia.*

Neither sentence is true, and I consider also neither sentence false. The two predicates occurring are just inapplicable to Istanbul and hence fail to yield a truth-value.

On the basis of the homogeneity assumption we can treat the location l_e as a point, since it is logically equivalent to a point (if any point out of l_e lies in [P] or outside of [P] then l_e does so as a whole).

It has often been stated, that sentences of the form *schon*(l_e, P) are perspectival. The question whether *schon*(l_e, P) or *noch nicht*(l_e, P) is true induces a perspective from outside of [P], and *noch*(l_e, P) as well as *nicht mehr*(l_e, P) suggests a stand-point within [P]. The intuitive meaning of *schon*(l_e, P) is something like

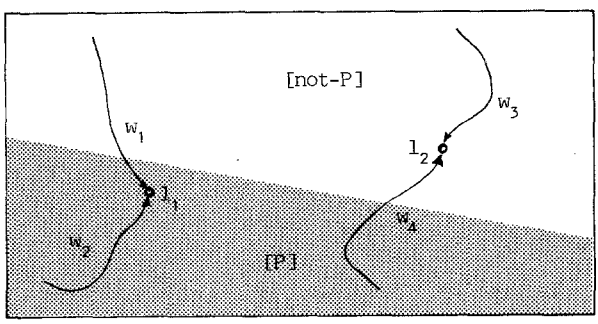
(128) If you go to l_e you will enter [P].

and *noch*(l_e, P) means

(129) If you go to l_e you will not leave [P].

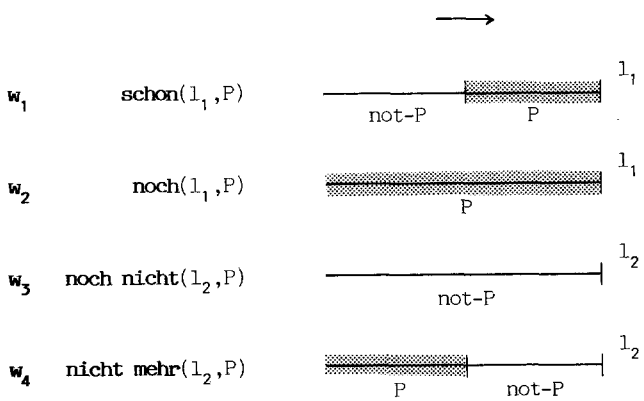
(129) presupposes that you run through a portion of [P] and (128) presupposes the passage through a portion of [not-P]. It does not matter exactly which way you go: what matters is whether you cross a border between [P] and [not-P] before you reach l_e, and whether it is [P] or [not-P] which lies beyond that border. Consider the following paths w_1, w_2, w_3, w_4 and imagine a stand-point at their respective starting-points.

(130)



When referring to the four paths shown in the picture, the following sentences will be true:

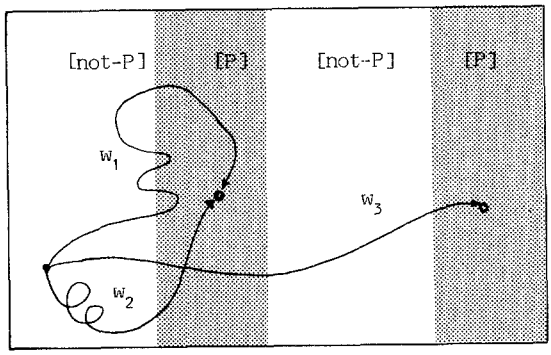
(131)



The paths exhibit exactly the same topological structure as the section of the time axis under the perspective of temporal type 1 *schon/noch/noch nicht/nicht mehr*(t_e, p) (cf. (18) above). Now, apparently, there are paths with the same initial and terminal points as those in (130) but with a different, more complex topological structure. In order to transfer the temporal case to multi-dimensional spaces, we have to exclude all those paths which have topological properties impossible in the one-dimensional space of the time-axis. One such case is paths with loops:

you cannot run through the same time twice. Another case is paths which cross the same borderline between [P] and [not-P] more than once. In time, you cannot enter a phase and go back behind its initial point again. These conditions exclude paths such as w_1 and w_2 in (132). w_1 and w_2, in a sense, exhibit avoidable complexities anyway. But there are also cases, such as the path w_3, in which a multiple border-crossing is unavoidable.

(132)



The latter kind of case can also occur under certain temporal perspectives. When Mary gets on the Transib at Moscow for an eight-days ride she might ask John.

(133) *Will it already be dark when we arrive at Nakhodka?*

In such cases, *schon* focusses on the last possible transition, which is the only one relevant. Intervals or paths with additional transitions are ruled out as inadmissible by the monotonicity requirement.[14] If we now define the admissible paths in analogy to admissible intervals, i.e., as linearly ordered sets which are monotone in terms of P, then paths with loops will be ruled out for the reason that they cannot be linearly ordered and paths such as w_1 drop out since they are not monotone. Let us call the set of admissible paths with respect to l_e and P "AP(l_e, P)". Then the correct formalizations of the particle meanings in the local uses are these:

(134) **schon**$(l_e, \mathrm{P}) = \exists\forall w(w \in \mathrm{AP}(l_e, \mathrm{P}): \exists l(l \in w \wedge \mathrm{P}(l)))$
noch$(l_e, \mathrm{P}) = \exists\forall w(w \in \mathrm{AP}(l_e, \sim\mathrm{P}): \sim\exists l(l \in w \wedge \sim\mathrm{P}(l)))$

In topology, paths are defined as certain functions from an interval of the real numbers into some topological space. We prefer to define paths as the ranges (i.e., sets of values) of functions from time-intervals into a set X. (This is obviously equivalent, but more suggestive.) In particular, admissible paths in our terms will be the ranges of "admissible path-

functions", the crucial criterion being whether it is possible to introduce a linear ordering in the path, which in turn allows to postulate the monotonicity of admissible paths in terms of P.

DEFINITION 135. f is an **admissible path-function** into X iff

(i) for some time-interval $(t_i, t_e]$ $f: (t_i, t_e] \rightarrow X$

(ii) f is convex in the following sense:
$\forall t, t', t'' \in (t_i, t_e]\ (t < t' < t'' \wedge f(t) = f(t'') \rightarrow f(t') = f(t''))$

If f is any function from a time-interval (or any other linearly ordered set) into X we can introduce an ordering among the values of f as follows:

(136) $l \leqq l' \Leftrightarrow_{df} \exists t, t'(f(t) = l \wedge f(t') = l' \wedge t \leqslant t')$

It is mathematical routine to show[15] that the relation so defined is a linear ordering if and only if f fulfils the convexity condition (ii) in (135).

We can now, in a sense, dispense with the underlying path-functions and time-intervals and define admissible paths as follows, in perfect analogy with the definition of admissible time-intervals above:

DEFINITION 137. w is an **admissible path in X in terms of P and l_e**, for short: $w \in \mathrm{AP}(l_e, \mathrm{P})$ iff w is the range of an admissible path-function into X with the linear ordering $\leqq$ as defined in (136), and

(i) l_e is the end of w:
$\forall l \in w(l \leqq l_e)$

(ii) w begins in an area of not-P:
$\exists l' \in w\ \forall l \in w(l < l' \rightarrow \sim P(l))$

(iii) the function P is monotone in w:
for all l, l', if P is defined for l, l' then if $l \leqq l'$ then $\mathrm{P}(l) \rightarrow \mathrm{P}(l')$

The local uses represent a final generalization. Technically, the direct uses discussed in Sections 1 to 3 are special cases of the local ones in that admissible time-intervals are admissible paths in time in a trivial sense (with identity maps as underlying path-functions). These uses are direct in an intuitive sense, as they do not involve a transfer of the temporal ordering into some other set. The derived uses discussed in this section can all be considered "local" uses. Without changing the definitions, we can think of admissible paths as something like admissible sequences with a transferred temporal ordering the source of which may or may not play a role in the final conceptual result. In all cases, *schon* and the other particles considered express a very simple topological property, namely the presence or absence of a transition between a positive and a negative section of (a homogeneous class of) temporally ordered sequences.

APPENDIX: LINEAR ORDERINGS

A relation $\leqq$ on a set X is a *linear ordering* iff it fulfils the following conditions:

(i)	reflexivity	$\forall x\ x \leqq x$
(ii)	antisymmetry	$\forall x, y(x \leqq y \wedge y \leqq x \rightarrow x = y)$
(iii)	transitivity	$\forall x, y, z(x \leqq y \wedge y \leqq z \rightarrow x \leqq z)$
(iv)	totality	$\forall x, y(x \leqq y \vee y \leqq x)$.

Let A, B be sets with linear orderings $\preccurlyeq$ and $\leqq$ respectively. Then $f: A \rightarrow B$ is *monotone* iff for all $x, y \in A$, if f is defined for x, y then, if $x \preccurlyeq y$, then $f(x) \leqq f(y)$.

PROPOSITION 1. Let A, B, C be sets with the linear orderings $\preccurlyeq$, $\leqq$, $\rightarrow$ respectively, let $f: A \rightarrow B$, $g: B \rightarrow C$ be (partial) functions, g monotone. The composition $g \circ f: A \rightarrow C$ is monotone iff f fulfils the following condition:

(*) for all x, y, if $g \circ f$ is defined for x, y, then if $x \preccurlyeq y$ and $f(x) > f(y)$, then $g(f(x)) = g(f(y))$.

Proof. (a) If (*) is true, then $g \circ f$ is monotone:

Let $g \circ f$ be defined for x, y, $x \preccurlyeq y$. Then due to the totality of $\leqq$, either $f(x) \leqq f(y)$ or $f(x) > f(y)$. If $f(x) \leqq f(y)$ it follows from the monotonicity of g that $g(f(x)) \rightarrow g(f(y))$. If $f(x) > f(y)$, then $g(f(x)) = g(f(y))$ due to (*), whence $g(f(x)) \rightarrow g(f(y))$, by reflexivity of $\rightarrow$.

(b) If $g \circ f$ is monotone, then (*) is true:

Let $g \circ f$ be defined for x, y, let $x \preccurlyeq y$ and $f(x) > f(y)$. Since $g \circ f$ is monotone, it follows from $x \preccurlyeq y$ that (i) $g(f(x)) \rightarrow g(f(y))$. From $f(x) > f(y)$ and the monotonicity of g, it follows that (ii) $g(f(y)) \rightarrow g(f(x))$. Due to the antisymmetry of $\rightarrow$, (i) and (ii) are equivalent to $g(f(x)) = g(f(y))$.

Note that proposition 1 holds in general for relations which are reflexive and antisymmetric.

PROPOSITION 2. Let $f: A \rightarrow B$ be any partial function, $\preccurlyeq$ a linear ordering on A, B′ the range of f, i.e., the set $\{y \in B \mid \exists x \in A\ (y = f(x))\}$. On B′ we define $\leqq$ as follows:

$$x \leqq y \Leftrightarrow_{df} \exists a, b \in A(f(a) = x \wedge f(b) = y \wedge a \preccurlyeq b)$$

Then $\leqq$ is a linear ordering on B′ iff f is convex in the following sense:

(*) $\forall a, b, c \in A(a \preccurlyeq b \preccurlyeq c \wedge f(a) = f(c) \rightarrow f(a) = f(b))$.

Proof. (a) If (*) is true then $\leqq$ is a linear ordering:

(i) Reflexivity: Let $x = f(a)$, then since $a \preccurlyeq a$, $x \leqq x$.

(ii) Antisymmetry: If $x \leqq y$ and $y \leqq x$, then there are a_1, a_2 such that $f(a_1) = x \wedge f(a_2) = y \wedge a_1 \preccurlyeq a_2$, and a_3, a_4 such that $f(a_3) = y \wedge f(a_4) = x \wedge a_3 \preccurlyeq a_4$. Since $\preccurlyeq$ is a linear ordering, the elements $a_1, \ldots, a_4$ can be arranged in ascending chains in one of the following six ways (in terms of the indices): 1234, 1324, 3124, 1342, 3142, 3412. In the first three cases, a_2 lies between a_1 and a_4. From $f(a_1) = f(a_4) = x$ it follows from (*) that $f(a_1) = f(a_2) = y$, whence $x = y$. In the last three cases, a_4 lies between a_2 and a_3. Since $f(a_2) = f(a_3) = y$, it follows from (*) that $f(a_2) = f(a_4) = x$, whence $x = y$.

(iii) Transitivity: If $x \leqq y$ and $y \leqq z$, then there are a_1, a_2 such that $f(a_1) = x \wedge f(a_2) = y \wedge a_1 \preccurlyeq a_2$, and a_3, a_4 such that $f(a_3) = y \wedge f(a_4) = z \wedge a_3 \preccurlyeq a_4$. Again, $a_1, \ldots, a_4$ can be ordered in the six ways described in (ii). In the first five cases, it follows from $a_1 \preccurlyeq a_4$, that $x \leqq z$. In the last case it follows from (*) that since $f(a_3) = f(a_2) = y$ that $f(a_1) = f(a_4)$, whence x, y, z all coincide and, by reflexivity (already proved), $x \leqq z$.

(iv) Totality: Let $f(a) = x$, $f(b) = y$. Since either $a \preccurlyeq b$ or $b \preccurlyeq a$ it follows that either $f(a) \leqq f(b)$ or $f(b) \leqq f(a)$ by the definition of $\leqq$.

(b) If $\leqq$ is a linear ordering, then (*) is true:

Let $a \preccurlyeq b \preccurlyeq c \wedge f(a) = f(c)$. Since $a \preccurlyeq b \preccurlyeq c$ entails $f(a) \leqq f(b) \leqq f(c)$ it follows that $f(a) \leqq f(b) \leqq f(a)$, whence, by antisymmetry, $f(a) = f(b)$.

NOTES

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[1] Event radicals behave like sortal nouns. Sortal nouns, too, specify types of objects and do not possess a negation. (Note that, e.g., *woman* is not a negation of *man*, since the term does not cover everything which is no man.) Negated nouns, likewise, do not specify objects as not being of that type: *I ate no bananas* does not mean that I ate something which failed to be bananas.

[2] See Löbner (1987) for a comprehensive discussion.
[3] Plural definites behave exactly like $\exists\forall$ quantifiers: they have the same existential presupposition and there is only one way of negation, namely predicate negation as opposed to predicate assertion. (Cf. Löbner (1985) for a detailed argumentation of this point).
[4] Note, that throughout this section it is assumed that *noch/nicht mehr* are combined with imperfective statements (type-1 use). (31) and (33) are perfect under a perfective interpretation; *s.* Section 4 for this type of use of *noch/nicht mehr*.
[5] I consider the whole sentence S as the scope of the particle. Its focus is some part P within S. Cf. e.g., Jacobs (1983, p. 8ff.) for details of this conception.
[6] Note that this difference is marked in other cases, too, e.g., in the formal differences between polarity- and constituent interrogatives.
[7] A predicate P is cumulative iff whenever it is true of X and of Y it is also true of X-and-Y. It is distributive iff it carries over from X to any parts of X, if it is true of X.
[8] Result of about 30 interviews of native speakers chosen at random.
[9] Cf. "*noch*$_2$" in Abraham (1980), the "antiterminatief *nog*" in Vandeweghe (1984), or the discussion of *noch* in Doherty (1973, p. 157ff.).
[10] This is just what *noch*(t_e, p) states about t_e with respect to p. Cf. the literature cited in note 9) for more elaborate discussions of the semantic connections between this and other uses of *noch*, and also for more and slightly different examples of this use.
[11] Strictly speaking, this is not the time t_e referred to above, which was defined as the temporal argument of imperfective sentences. t_0 here is the time to which deictic and relative time specifications are anchored.
[12] I have found an example in the "Süddeutsche Zeitung" which contains both this use of *noch* and an explicit paraphrase in this sense: "(Title of the article) SPD befürchtet, daß der Bundestag *noch während der Gespräche* der Stationierung zustimmen soll.... (.....) Kohl nehme damit eilfertig die ihm zugeschobene Rolle an, die Nachrüstung einzuleiten, *während die Großmächte noch am Verhandlungstisch säßen*, erklärte der stellvertretende SPD-Fraktionsvorsitzende Horst Ehmke ..." (Süddeutsche Zeitung 1./2. Okt. 1983, p. 1). (The SPD fears that the German parliament will vote in favour of deployment while the talks are still going on ... the representative of the SPD parliament group, Horst Ehmke, declared that, in so doing, Kohl had too hastily accepted the role he was forced into, launching rearmament while the super powers were still having negotiations.
[13] This sentence also has a temporal interpretation, according to which it expresses that after a time, when Basel did not belong to Switzerland, it now does. This interpretation is covered by the type-1 analysis and will not be considered in the following discussion. The same applies to sentences (119), (120), (123).
[14] We can easily be more tolerant in this point and admit all intervals or paths which are admissible in the broader sense that they are admissible *from a certain point on*.
[15] See the appendix for mathematical details.

REFERENCES

Abraham, Werner: 1976, '*noch* and *schon* als polare Satzfunktoren', in K. Sprengel, W.-D. Bald, and H. W. Viethen (eds.): *Semantik und Pragmatik*, Niemeyer, Tübingen, pp. 3–20.
Abraham, Werner: 1980, 'The Synchronic and Diachronic Semantics of German Temporal *noch* and *schon*, with Aspects of English *Still*, *Yet*, and *Already*', *Studies in Language* **4**(1), 3–24.
Bäuerle, Rainer: 1979, *Temporale Deixis, Temporale Frage*, Gunter Narr, Tübingen.
Comrie, Bernard: 1976, *Aspect*, Cambridge University Press, Cambridge.
Comrie, Bernard: 1985, *Tense*, Cambridge University Press, Cambridge.
Doherty, Monika: 1973, '*Noch* and *schon* and their Presuppositions', in F. Kiefer and N. Ruwet (eds.), *Generative Grammar in Europe*, Reidel, Dordrecht, pp. 154–177.
Galton, Antony: 1984, *The Logic of Aspect*, Clarendon Press, Oxford.

Hoepelman, Jaap, and Christian Rohrer, 1981, 'Remarks on *noch* and *schon* in German', in P. J. Tedeschi and A. Zaenen (eds.), *Tense and Aspect. Syntax and Semantics*, Vol. 14, Academic Press, New York, pp. 103–126.

Horn, Laurence R.: 1970, 'Ain't it Hard (Anymore)', *CLS* **6**, 318–327.

Jacobs, Joachim: 1983, *Fokus und Skalen*, Niemeyer, Tübingen.

König, Ekkehard: 1977, 'Temporal and Non-Temporal Uses of *schon* and *noch* in German', *Linguistics and Philosophy* **1**(2), 173–198.

König, Ekkehard: 1979, 'A Semantic Analysis of German *erst*', in R. Bäuerle, U. Egli and A. von Stechow (eds.), *Semantics from Different Points of View*, Springer, Berlin, Heidelberg, New York, pp. 148–160.

Löbner, Sebastian: 1985, 'Definites', *Journal of Semantics* **4**, 279–326.

Löbner, Sebastian: 1987, 'Quantification as a Major Module of Natural Language Semantics', in J. A. G. Groenendijk and M. B. J. Stokhof (eds.), *Studies in Discourse Representation and the Theory of Generalized Quantifiers, Papers of the Fifth International Amsterdam Colloquium* 1984, Foris, Dordrecht, pp. 209–241.

Löbner, Sebastian: 1988, 'Ansätze zu einer integralen Theorie von Tempus, Aspekt und Aktionsarten', in V. Ehrich and H. Vater (eds.), *Temporalsemantik*, Niemeyer, Tübingen, pp. 163–191.

Nerbonne, John A.: 1983, *German Temporal Semantics: Three-Dimensional Tense Logic and a GPSG Fragment*, Ohio State University Doctoral Dissertation. Garland Publ., New York, London, 1985.

Rombouts, Jos: 1979, 'Dutch *nog* and *al* as Degree Particles', in W. Vandeweghe and M. van de Velde (eds.), *Bedeutung, Sprechakte und Texte*, Niemeyer, Tübingen, pp. 101–110.

Shetter, William Z.: 1966, 'The Meaning of German *noch*', *Language* **42**(1), 42–66.

Steube, Anita: 1980, *Temporale Bedeutung im Deutschen, Studia Grammatica* **XX**, Akademie-Verlag, Berlin.

Vandeweghe, Willy: 1979, 'Perspectivity Operators in Dutch: *al*, *nog*, $nog_{n,m}$', in W. Vandeweghe and M. van de Velde (eds.), *Bedeutung, Sprechakte und Texte*, Niemeyer, Tübingen, pp. 111–122.

Vandeweghe, Willy: 1983, 'De partikels van de *al/nog/pas*-groep in het Nederlands. Een semantische en pragmatische studie', Doctoral Dissertation, Rijksuniversiteit te Gent, Gent.

Vandeweghe, Willy: 1985, 'Aspektivische partikels en de klassifikatie van bijwoordelijke bepalingen van tijd', in K. van den Eynde, M. Dominici and S. P. Verluyten (eds.), *Linguistics in Belgium* **6**, Antwerp Papers in Linguistics, Universitaire Instelling Antwerpen, Antwerpen, pp. 158–175.

Vendler, Zeno: 1967, *Linguistics in Philosophy*, Cornell University Press, Ithaca.

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