1066

ON THE DIFFERENCES BETWEEN THE TENSE-PERSPECTIVE-ASPECT SYSTEMS OF ENGLISH AND DUTCH.

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INTRODUCTION

As is well known, while stative verbs in English are fine in the simple present (1a), eventive verbs do not get episodic interpretations, but habitual ones (1b). The episodic interpretation is expressed with help of the progressive. Consequently, like stative verbs, progressives of eventive verbs are fine in the simple present, without a forced habitual interpretation (1c):

Stative verbs:
(1a)   I **know** him / I **resemble** my aunt / I **am** in Amsterdam / The garbage **stinks.**
Eventive verbs: habitual interpretation
(1b)   I **drive** in my car / I **run** to school / I **sleep** in the nude
Progressives:
(1c)   I **am driving** in my car / I **am running** to school / I **am sleeping** in the nude.

There is an account of the facts in (1), which is also well known and which goes back to Taylor 1977 and Dowty 1979. It goes as follows:

The present in English is a **point of time** and **not a stretch of time**.
-Stative verbs can be true at points of time (states don't take time), hence the facts in (1a) (i.e. I **can** literally **be** in Amsterdam at a point of time).
-Eventive verbs cannot be true at points of time (events take time), hence the facts in (1b): you can't say that I drive a car **now**, because driving events don't fit into **now** (which is a point).
Habits, on the other hand, are like states, and can be true at points, so the cases in (1b) can be uttered truthfully now on an habitual interpretation.
-Finally, if we assume that progressives can be true at points of time as well, we get the facts in (1c).

I think that this analysis is insightful and basically correct, and I will adopt it in this paper. There are questions, however, about *how* it should be adopted. There are, as I see it, three main issues.

Issue 1.
The facts in (1b) are typical of English, and are not found in related languages, in particular, not in Dutch, the language with which I will be comparing the English facts throughout this paper. In Dutch, eventive verbs in the simple present unproblematically get episodic interpretations, so the cases in (2) (corresponding to 1b) can have episodic or habitual interpretations:

(2) Ik **rij** in mijn auto/ Ik **ren** naar school/ Ik **slaap** naakt

Now, at first sight, we may simply assume that in Dutch the present is not a point, but can be a stretch. However, that assumption would miss a point that can be observed when we look at accomplishments in the simple present:

> (3) Ik **schrijf** een boek.
>   I   write   a   book
>   I am writing a book

This sentences is fine too in the simple present, but – and this is the crucial point – it has a progressive interpretation. Now, simply assuming that the present is a stretch in Dutch, wouldn't get you that: it would predict that (3) is like the English simple past sentence *I wrote a book*, but then present, meaning, that at the end of the **now** interval there is a book. And this is not correct.

This suggests that the point about Dutch is not that –unlike English – it allows the present to be a stretch, but that it allows progressive interpretations for eventive verbs in the simple present. And that means that the difference between English and Dutch need not be located in the Dowty/Taylor assumption at all, but has to do with the availability of progressive interpretations.

Issue 2.
The second issue concerns the facts in (1c): progressives are true at points. This makes perfect sense on an analysis of the progressive like that of Vlach 1981, where the progressive is assumed to be a stativizing operation: if the output of the progressive operation is stative, then, like the statives in (1a), the result can be true at a point, hence the facts in (1c).

However, I will be concerned in this paper not with Vlach's analysis, but my own in Landman 1992.   I assumed in Landman 1992 that events, unlike states, have **stages,** that the semantics of the progressive makes reference to event stages, and that these stages are themselves events. States don't have stages, and hence stative verbs don't occur in the progressive.

But this raises the question of how a theory like Landman 1992 can account for the facts in (1c): if the progressives in (1c) make reference to stages of events, and these stages are themselves events, then clearly these stages of events can be fitted into points of time **as little** as the events that they are stages of can. And that means that, at first sight, Landman 1992 would predict - contrary to fact - that the cases in (1c) couldn't have episodic interpretations either. So how do we predict the progressive facts in (1c)?

Issue 3.
There is a well known exception to the facts about episodic interpretations in (1b): in sequencing discourse, like sportscasterese and detective novel reconstruction, eventive verbs are fine in the simple present, without a forced habitual interpretation:

> (4) a. Cruyff passes the ball to Keizer, Keizer back to Cruyff, he passes one,
>   he passes two, he shoots, ... it's a goal!
>   b. I think what happened is the following: At ten, he gets out of the house,
>   drives to the building, arriving there at ten thirty. Then he goes into the
>   apartment and shoots them. etc. etc.

I will not be concerned with issue 3 in this paper. The theory that I will develop allows –as far as I can tell – several ways in which these facts can be fitted in, and I don't have highly developed thoughts about which way is the better. So I will leave this issue open.

This paper is concerned with the first two issues. The paper consists of three parts.

In the first part of the paper I make a distinction between **segmental homogeneity** and **incremental homogeneity**.

I argue that, when we consider an interval of time, we can look at this along two semantically relevant axes: we can either look along the axis of points in this interval, which is what we would do if, say, we want to divide the interval into successive segments – I call this the **segmental axis**; or we can look at the interval incrementally, from an initial subinterval, an onset, to larger initial subintervals – I call this the **incremental axis**.

The Dowty-Taylor distinction comes in as part of a proposal concerning homogeneity of the interpretations of stative verbs versus activity verbs. I propose that both kinds of interpretations are homogenous, but along different axes. The interpretations of stative verbs are homogenous along the segmental axis – if a state holds at an interval it holds at every point in that interval. The interpretations of activity verbs, on the other hand, are homogenous along the incremental axis – if an activity holds at an interval, it holds at the onset and at all initial subintervals of our interval that contain the onset. I motivate this distinction by looking at pauses in states and in activities. The discussion leads to the introduction of a **projection operator** which I call INTERNAL, which projects from the incremental axis onto the segmental axis.

I argue that the notion of incremental homogeneity and the projection operator provide an insightful solution to the problem raised in the second issue: how can progressives be true at a point of time?

This means that, in the analysis of present progressives there are three relevant notions: present tense, progressive aspect, and projection. The question then becomes: where does projection come from?

In the second part of this paper, I propose – inspired by Reichenbach and others – that the grammar (at least of English and Dutch) makes available a system of three semantic categories: **tense**, **perspective**, and **aspect**, where each category is a set of available semantic operations: for tense: **present** and **past**, for aspect, **progressive** and **perfect**, and for perspective, **internal** and **external**. I argue that incremental homogeneity allows us to identify the projection operation with **internal perspective.**

With this I come to the differences between English and Dutch, i.e. the first issue. I propose that in English the categories of perspective and aspect are fully lexicalized, meaning that all available semantic operations are tagged to lexical items, while in Dutch in each of these categories there is one operation which is not lexicalized. And I take the latter to mean that the non-lexical operation in question can be semantically realized without this being lexically visible. I call this proposal 1066 for reasons explained there.

The third part of this paper explores a strong hypothesis: all observable differences between English and Dutch that concern the tense/perspective/aspect cluster derive directly or indirectly from the differences postulated by 1066.

I argue my case for four phenomena where English and Dutch differ. First, the differences between Dutch and English noted in the first issue: stative versus

eventive verbs in the simple present. Secondly, differences between Dutch and English relating to stative versus eventive verbs in the simple past in the presence of a *when*-clause. Thirdly, differences concerning the relation between continuous *since* clauses and the perfect. Fourthly, differences concerning stage level statives in the progressive. In all these cases I argue that the differences derive from 1066 directly or with minimal additional assumptions that can be independently motivated.

PART 1: SEGMENTAL AND INCREMENTAL HOMOGENEITY

1.1. INTERVALS

I will assume that the domain of time forms a point-generated interval structure. For this, we assume, as base, a linear order $<T,<_T>$ of points of time, and define:

> The **interval structure based on** $<T,<_T>$ is the structure: $<I,\subseteq,<>$, where:
> 1. I, the set of intervals in T, is the set of non-empty convex subsets of T.
>   (where i is convex iff if p,r $\in$ i and p $<_T$ q $<_T$ r then q $\in$ i)
> 2. Temporal inclusion, $\subseteq$, is the subset relation.
> 3. Temporal precedence, $<$, is defined as:
>   i $<$ j iff for every p $\in$ i for every q $\in$ j: p $<_T$ q.

Thus, intervals are uninterrupted stretches of time, and the interval structure contains minimal intervals (the singleton sets). I will call the minimal intervals of the structure **points**, and the non-minimal ones **stretches.** The structure that you get by restricting an interval structure to the stretches only, I will call the **stretch structure**.

   (Interval structures, as defined here, are **atomic** in the sense of van Benthem 1983: every interval contains a minimal interval (a point). This doesn't entail, though, that the **stretch** structure is also atomic: if the underlying order is dense, the interval structure will be atomic, but the stretch structure will be atomless. Thus, differing from the literature (Kamp 1979, van Benthem 1983, Landman 1991), I will assume that notions like discreteness and density do not concern the interval structure itself, but its corresponding stretch structure. This is, because I want to have points in the structure, even if the structure is dense. Anyway, I will not here have anything to say about whether time should be dense or not.)

   Because I take intervals to be convex, interval structures are not Boolean structures (they are not even distributive), so these structures differ from the temporal structures assumed by Link 1987, Krifka 1989, Hinrichs 1985 and others. They have pretty pictures too, though, the natural models are 'half chess-boards':

   For example, a structure with four points 1,2,3,4 give the following interval structure: (ordered by $\subseteq$).
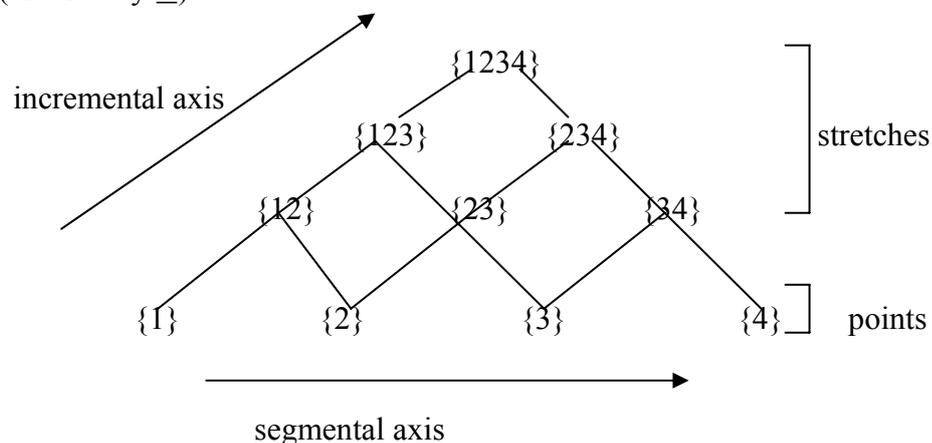
We see at the bottom row the points, and above that the stretches (intervals bigger than a point). Of crucial importance are the two axes indicated:

-The **segmental axis**, horizontal in the picture, looks at intervals as **time segments**: along the segmental axis, we see that the interval {1234} can be **segmented** into two consecutive intervals: {1} and {234}.

-The **incremental axis,** diagonal in the picture, looks at intervals **incrementally**: along the incremental axis, we see that {1234} can be regarded as a sequence of **incremental** intervals {1}, {12}, {123}, {1234}.

We define **incremental inclusion** for intervals as:

$p \subseteq_i q$ iff $p \subseteq q$ and for no $t \in q$: $\{t\} < p$

1.2. EVENTUALITIES

As in much other work (e.g. Bach 1986, Link 1987), I assume a semantic domain **EV** of **eventualities** and I assume that verbs and verb phrases denote sets of eventualities. I assume with these authors that aspectual classes, 'aktionsarten', concern differences in the internal structure of eventualities, more specifically the internal structure of **singular** eventualities. Singular eventualities are eventualities that count as *once* when we ask how often something happened.. I assume that EV is a domain of singular eventualities, and plurality of events is completely ignored in this paper. Thus, my structures for singular eventualities will not look like those of Krifka 1989 or Hinrichs 1985, i.e. they will not be Boolean structures. If plurality is added to the theory, such a Boolean structure needs to be imposed on top of the structures discussed here.

I follow the standard division of eventualities into **states** (e.g. *know the answer*, *be in Amsterdam, stink)*, **activities** (e.g. *run, write, waltz*), **accomplishments** (e.g. *write a book*) and **achievements** (e.g. *reach the summit*), but in this paper I only develop the part of the theory that concerns states and activities. For the purpose of this paper, the domain of eventualities is partitioned into two sets, a set **STATE** of states, and a set **EVENT** of activity-events.

A brief remark about accomplishments. With Rothstein 2004, I assume that the interpretations of accomplishments are (roughly) of the form $\lambda e.V(e) \wedge$ CHANGE(e), where V, the verbal predicate, is an activity predicate and CHANGE(e) means that e measures out a change, in Rothstein's sense. These predicates behave like activities with respect to their verbal predicate (but not with respect to the CHANGE predicate). I will use this assumption in the paper (thus, even though I don't give a semantics for *write a book* here, we will be able to discuss what book-writing events entail about writing activities).

I have sorted the domain EV into states and events. I will use unsorted variables x,y… to range over eventualities, and sorted variables s_i to range over states, and e_i to range over events.

With Link 1987 and many others, I assume that the domains of eventualities and intervals are linked through a temporal trace function**:**

The **temporal trace function**, τ, is a partial function from eventualities and worlds into intervals. If $\tau(x,w) \neq \bot$, τ maps x in w onto its running time.

($\bot$ stands for 'undefined'. I will suppress the world parameter throughout (but take it to be understood).)

1.3. PARTS OF EVENTS AND CROSS-TEMPORAL IDENTITY

I will assume that the domain EV is structured by a number of relations and operations:

> An **eventuality structure** is a structure:
> $\langle EV, \sqsubseteq, \sqsubseteq_i, \sim, \preceq_s, \preceq_e,$ **i-stage-of**, O$\rangle$
> where:
> 1. EV = STATE $\cup$ EVENT and STATE $\cap$ EVENT = Ø
> 2. $\sqsubseteq$, the relation of **part of**, is a partial order on EV.
> 3. $\sqsubseteq_i$, the relation **initial part of**, is a partial order on EV.
> 4. $\sim$, the relation of **cross-temporal identity**, is an equivalence relation on EV.
> 5. $\preceq_s$ and $\preceq_e$, the relations of **ct-subeventuality**, are defined below.
> 6. **i-stage-of**, the incremental stage-of relation, is defined below.
> 7. O, the **onset function**, is a function from EVENT into EVENT.

Giving a full axiomatization of the intended structures requires a paper of its own. I will here explain the ideas and mention only some of the constraints that need to be imposed.

The domain of eventualities is ordered by a part-of relation $\sqsubseteq$. This is the relation that holds, for instance, between the invasion in Normandy and the Second World War: the first event is not simply temporally included in the second, it is an integral part of it. We impose, as an obvious constraint:

> $\forall x \forall y[\ x \sqsubseteq y \land \tau(y) \neq \bot$ then $\tau(x) \subseteq \tau(y)]$
> If y is an eventually that is temporally realized in a world, then its parts are realized in that world at subintervals of its running time.

It will be useful to introduce a special case of this relation, the initial part-of relation $\sqsubseteq_i$. This is the relation that holds, for instance, between the invasion of Poland and the Second World War (assuming that we let the Second World War start there), and that holds between the Blitz Krieg and the Second World War. Obvious constraints here are:

> $\forall x \forall y[x \sqsubseteq_i y \rightarrow x \sqsubseteq y]$
> $\forall x \forall y[x \sqsubseteq_i y \land \tau(y) \neq \bot \rightarrow \tau(x) \subseteq_i \tau(y)]$
> The initial parts of an event that is temporally realized in a world are realized at initial subintervals of its running time.

$\sim$ is a relation of cross-temporal identity. This requires some explanation.

We have assumed, with Link 1987, that the temporal trace function is a partial function. This means that an eventually that is realized in a world is realized only once in that world, at its running time. This means that my running today and my running in a week time are **different** eventualities (of the same event type, runnings of me); they are not the same eventuality realized twice at different times, since no eventuality is realized twice.

We have also restricted our attention to **singular** eventualities: if I run today and I run again in a week time, I run twice. EV will contain these two runnings, but not the sum of these two runnings, since I ignore plurality.

But, following Bach 1986, we will characterize aspectual differences as differences in **eventuality-sub-structure**. What this means is that we will assume that if a state of Fred being in Amsterdam, or an activity of Fred running, is realized at a certain interval, this will have consequences about states of Fred being in Amsterdam, resp. Fred running at subintervals of that interval.

Now, take a state s of Fred being in Amsterdam with running time last week. And look at Fred on Monday of last week and on Friday of last week. Since Fred was in Amsterdam all of last week, there is going to be a state s_1 of Fred being in Amsterdam with running time Monday, and a state s_2 of Fred being in Amsterdam with running time Friday. That gives us three states, all with different running times, and the states s_1 and s_2 don't even temporally overlap. How many times was Fred in Amsterdam? Well, obviously only once. This means that, while the model **makes** s, s_1 and s_2 into three distinct eventualities, it shouldn't **count** them as three distinct eventualities: for the purpose of counting, they count as one. The same holds for the substates of the state me being in Amsterdam which was realized when I was there last February: they too count as one. But if I take a February-state and a last-week-state, they count as two: I was in Amsterdam twice this year, once in February, once last week. We express the difference with help of the cross-temporal identity relation.

Two states that are cross-temporally identical may have different running times, but count as the same state. The same holds for activities: my running from 2 till 2.15 and my running from 2.45 till 3.00 are part of my running from 2 till 3; they have different running times, but don't count as different runnings, because I ran once today. We express this by saying that these 'three' runnings are cross-temporally identical.

Thus, the notion of cross-temporal identity, as understood here, concerns what we are willing to regard, in a context, as the same event for the purpose of expressing how often something happened. A full axiomatization of the intended notion of cross-temporal identity is beyond the scope of this paper, but I give some constraints here that give an idea of what I have in mind:

$\forall e \forall x [e \in \text{EVENT} \land e \sim x \rightarrow x \in \text{EVENT}]$
Events are only cross-temporally identical to other events, and hence states are only cross-temporally identical to states (since $\sim$ is an equivalence relation).

$\forall x \exists y: x \sim y \land \forall z [z \sim y \rightarrow z \sqsubseteq y]$
Each equivalence class of cross-temporally identical events has a $\sqsubseteq$-maximal element.

This means that our domain EV can be regarded as consisting of a set of eventualities that all count as different eventualities (the maximal elements of the equivalence classes), together with their parts.

$\forall x \forall y \forall z [x \sqsubseteq z \land x \sim z \land y \sqsubseteq z \land \tau(x) \subseteq \tau(y) \rightarrow y \sqsubseteq x]$
If x is a cross-temporally identical part of z, and y is a part of z that is temporally included in x, then y is part of x.

Not any part of an eventuality is a cross-temporally identical part, it must to be 'big enough', or encompassing enough, to count as the same thing. Thus, the invasion in Normandy is not a cross-temporally identical part of the Second World War, because

other things were happening at the same time that are also part of the Second World War, but not of the invasion in Normandy.

$$\forall x \forall y[x \sim y \wedge \tau(x){=}\tau(y) \rightarrow x = y]$$
Cross-temporally identical eventualities with the same running time are identical.

This constrains the 'sameness' of cross-temporally identical events: a cross-temporally identical part of an event realized at an interval is 'the same event', occurring at a subinterval: in other words, when **cross**-temporality is eliminated, cross-temporal identity becomes real identity.

1.4. STATES AND SEGMENTAL HOMOGENEITY

With the notions introduced so far, we can **define** cross-temporally identical sub-eventualities. I will use this notion for **states**, and introduce it as a relation between states:

ct-substates:
$$\preceq_s \; := \; \lambda s_2 \lambda s_1.s_1 \sqsubseteq s_2 \wedge s_1 \sim s_2$$

Thus, a ct-substate of a state s is a state which is a cross-temporally identical part of s. With this notion, we impose a notion of segmental homogeneity on the domain of states. This notion is nothing but an eventuality version of the **subinterval condition** of Bennett and Partee 1972, taken over in Dowty 1979:

Segmental homogeneity of states:
Let $s \in$ STATE and $\tau(s){\neq} \perp$.
$\{\tau(s_1): s_1 \preceq_s s\} = \{i: i \subseteq \tau(s)\}$

Segmental homogeneity says that if a state s is realized at an interval i, all its ct-substates are realized at subintervals of i, and at each subinterval of i a ct-substate of s is realized. This means that if a state of me being in Amsterdam is realized at the interval last week, we find a co-temporally identical state of me being in Amsterdam at every subinterval of last week, and hence a state of me being in Amsterdam will be realized at every point during last week. Thus, during this interval, we find states of me being in Amsterdam homogeneously along the segmental axis.
We tie this to the semantics of **stative verbs** through a closure principle:

Stative verbs are closed under cross-temporal identity:
Let α be a **stative verb** and let $[\![\alpha]\!] \subseteq$ STATE be the interpretation of α.
If $s_1 \in [\![\alpha]\!]$ and $s_1 \sim s_2$ then $s_2 \in [\![\alpha]\!]$

I assume that this constraint applies also to a stative predicate like *be in Amsterdam*. The constraint says that if s_1 is a state of me being in Amsterdam and s_2 is cross-temporally identical to s_1, then s_2 is also a state of me being in Amsterdam.
A consequence of this constraint is that the interpretations of stative predicates are closed under ct-substates.
The idea about segmental homogeneity is as follows. A state s that is realized at an interval i (but, say, not before i) gets established at the beginning of i, and as we

follow the time axis from left to right inside i we only come across points where a ct-substate of s is realized.. We only need to assume that this property inherits up from the points in an interval to the interval to get segmental homogeneity.

1.5. ACTIVITIES AND INCREMENTAL HOMOGENEITY

On the domain of events, we have the **same** relation of ct-subevent we defined for states:

ct-subevents, stages:

$\preceq_e := \lambda e_2 \lambda e_1. e_1 \sqsubseteq e_2 \wedge e_1 \sim e_2$

This is, in essence, the relation that I called **stage-of** in Landman 1992. Also in this paper, I will use this relation in the semantics of the progressive. But I introduce here a second relation: **i-stage-of**.

i-stage-of $:= \lambda e_2 \lambda e_1. e_1 \sqsubseteq_i e_2 \wedge e_1 \sim e_2$

With Dowty and Taylor, I assume that events cannot be realized at points of time. I assume, with Dowty 1979, that the reason is that activities like waltzing take some time to get established. That is, for activities it takes some time before we accept that an event of the right type goes on. This means that if we have a waltzing activity e realized at an interval i, there is going to be an initial subinterval j of i where the waltzing activity is **first** realized, meaning that no waltzing activity is realized at proper subintervals of j. What does it mean that the waltzing activity is first realized at j? I take it to mean that j is the smallest initial subinterval of i where an event e_1 is realized that is cross-temporally identical to e. I call e_1 the **onset** of e.

I will assume that all events have onsets, and for this I have introduced the onset function O in the eventuality structure. The Dowty/Taylor assumption can be given the following form:

Dowty/Taylor:
$\forall e \in \text{EVENT}: \neg \text{POINT}(\tau(O(e)))$
The running time of an onset which is realized is a **stretch**, not a point.

I don't strictly speaking need the notion of onset in the theory, but I find it a useful way of thinking about events, and I find it conceptually unproblematic to assume that language users postulate onsets even for activities that get established at very small intervals, like *move*. If you don't want to make this assumption, it is technically straightforward to formulate an alternative without onsets.

Our waltzing activity e realized at i gets first established at the onset as waltzing event O(e). How does it go on from there? Well, we assume that the waltzing activity continues from $\tau(O(e))$. And that means that, as time passes, we get a longer and longer waltz. Now, we **can** think of this segmentallly as more and more little waltzing segments being chained to O(e), but it is more natural to think of this **incrementally:** we get a longer and longer waltz at incrementally longer and longer intervals, and this means: we find events cross-temporally identical to e along the incremental axis, until we get e itself. This relation, that looks at cross-temporal parts of an event along the incremental axis I call the **i-stage-of** relation.

Thus, an i-stage of an event e, in this terminology, is an event which is a cross-temporally identical **initial** part of s. With this notion,. we can formulate an obvious constraint on the notion of onset:

$$\forall e[\textbf{i-stage-of}(O(e), e) \land \forall e_1[\textbf{i-stage-of}(e_1, e) \rightarrow \textbf{i-stage-of}(O(e), e_1)]$$
The onset of e is an i-stage of e, namely the minimal i-stage of e.

My proposal concerning the semantics of activities is that they satisfy a constraint of homogeneity similar to that of states but along the axis that is relevant for events, the incremental axis:

Incremental homogeneity of activity events:
Let $e \in$ EVENT and $\tau(e) \neq \perp$.
$\{\tau(e_1): \textbf{i-stage-of}(e_1, e)\} = \{j: \tau(O(e)) \subseteq_i j \subseteq_i \tau(e)\}$

This means that if activity e is realized at interval i, the i-stages of e are realized at initial subintervals of i, between the interval at which the onset of e is realized and i, and at every initial subinterval of i between the onset of e and i an i-stage of e is realized.

For activity verbs (and this includes the verbal predicates of accomplishments) I assume the same closure principle as for stative verbs:

Activity verbs are closed under cross-temporal identity:
Let α be an **activity verb** and let $[\![\alpha]\!] \subseteq$ EVENT be the interpretation of α.
If $e_1 \in [\![\alpha]\!]$ and $e_1 \sim e_2$ then $e_2 \in [\![\alpha]\!]$

This means that if an activity e of Fred waltzing goes on at i, the i-stages of that event are ordered along the incremental axis between the onset and e. By the closure under cross-temporal identity, all these i-stages are themselves events of Fred waltzing. Thus, indeed, we find activities of Fred waltzing homogeneously along the incremental axis.

The idea, then, is that the constraint on *waltz* is that **as soon as** an event has enough 'schwung' to count as waltzing, **it continues to count as waltzing**, for as long as we are willing to count what we find as the same event (cross-temporally). And crucially, this does **not** mean that we count further **segments** as waltzing (since those themselves may be too small to count as waltzing), but that **incrementally bigger events** count as waltzing.

Note that incremental homogeneity does not mean that no other subintervals of i have activities of Fred waltzing in them. For instance, if O(e) is, say, Fred's first one-two-three, and Fred is a fanatical dancer, he may well continue directly with a second one-two-three, and this would naturally count as an event of Fred waltzing as well, and in fact, as an event cross-temporally identical to e. On the present definition it qualifies as a **stage** of e, but not as an **i-stage**, it would be an i-stage of $e - O(e)$. But if the second one-two-three counts as an event of Fred waltzing, then all the events on **its** incremental axis, up to $e - O(e)$ count as events of Fred waltzing as well.

The present theory takes in essence the same view on homogeneity of states as Dowty 1979 (and many others). Dowty 1979 and Bach 1986 have stressed that activities seem to be homogenous in a similar but not identical way. Several proposals can be found in the literature as to the nature of this similarity. For instance, Dowty 1979 assumes that activities are homogenous as well, but not all the way down; Krifka 1989 assumes that both stative predicates and activity predicates are cumulative; Rothstein 2004 uses a more restricted notion of s-cumulativity. However, all 'homogeneity' constraints on activities in the literature that I have seen

(and that includes my own Landman 1992) try to characterize the 'homogeneity' of activities in a segmental way (by looking at subsegments, or piecing adjacent segments together). The present proposal differs from all these. What I am suggesting here is that it is fruitful for aspectual theory to think of the semantics of states and activities as involving in essence the same notions, but defined segmentally for states, and incrementally for events, i.e. that it is fruitful to think of states and events as, so to say, living along two different axes. I am well aware that this is programmatic, since I do not have the space here to present in detail the consequences of this view for aspectual theory and compare it with alternative proposals in the literature. What I **will** do here is motivate the distinction between segmental homogeneity and incremental homogeneity by discussing pauses in states and pauses in events.

1.6. PAUSES IN STATES AND PAUSES IN EVENTS

The following picture shows segmental homogeneity at work in states.

The basic picture for states: A = me be in Amsterdam B = me be in Brussels

segmental homogeneity
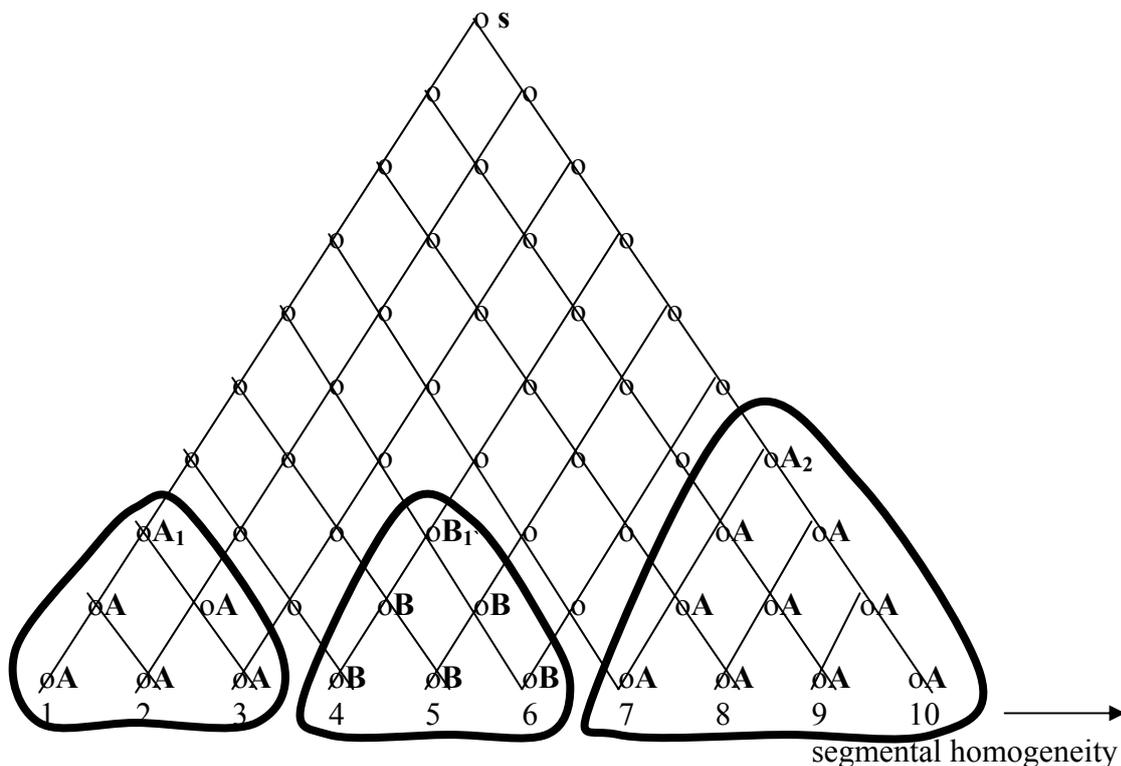
We see here a state of me being in Amsterdam, A_1, followed by a state of me being in Brussels, B_1, followed by a state of me being in Amsterdam A_2. For each of these states, the ct-substates are encircled. We see that, up to cross-temporal identity, there is one state of being in Amsterdam which holds at the points 1,2,3, one state of being in Brussels which holds at the points 4,5,6, and one state of being in Amsterdam which holds at the points 7,8,9,10.

Let us now ask what happens if we consider the topstate s of the chessboard as a state of me being in Amsterdam cross-temporally identical to A_1 and to A_2. In this case we must regard B_1 as a **pause** in state s.

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What do we do with pauses in states? Well, if they are small enough, we just ignore them, assume that they didn't really happen (say, when a traffic light shows a momentary flicker in the red). But what if they are bigger? Look at the following dialogue:

(5) A. I was in Amsterdam from January to June.
    B. But I saw you at a conference in Paris in March.
    A. I meant, I was **living** in Amsterdam from January to June.
    B. But I visited you in the apartment you rented in Brussels for three weeks in May.
    A. Yes, I meant, I was **domiciled** in Amsterdam from January to June.

B is, of course, a pedant, but what is interesting is how A answers him. That is, I think that A's reactions are completely natural in this context. A starts with a stative statement *I was in Amsterdam*. B challenges this statement. In his reaction, A replaces his original stative predicate with a new one: *I was living in Amsterdam*. Since this is compatible with being at a conference in Paris in March, A has moved to a predicate which does not have the original pause. B nags on. A repeats the strategy, he replaces his second stative predicate by a new stative predicate that removes B's second pause.

The point is this: this is exactly what you would **expect** A to do if segmental homogeneity is a constraint on stative predicates. The naturalness of A's reactions in the above dialogue, then, suggests that Bennett and Partee 1972 were right about stative predicates: pauses are not natural in states, *ceteris paribus* stative predicates satisfy segmental homogeneity..

We come to activities like *waltz*. Here we have the following picture:

The basic picture for events: W = waltz

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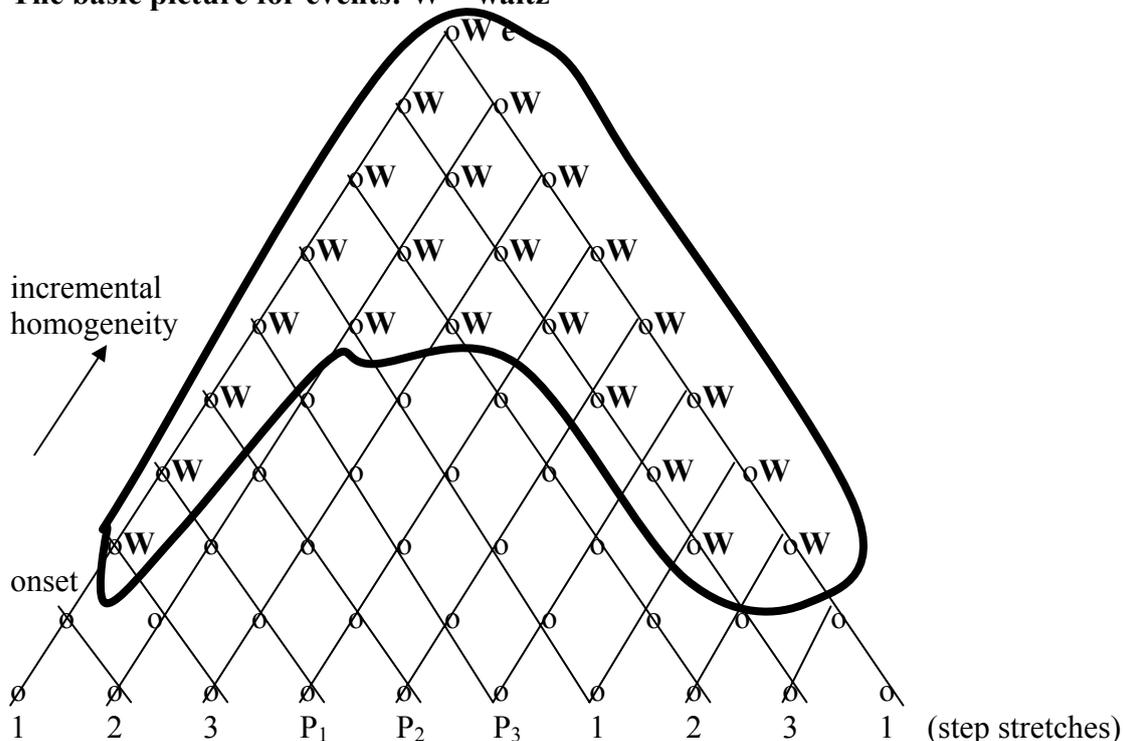
In this example we make the not completely serious simplifying assumption that three steps make a waltz if they are in the right order, but it doesn't matter which is the first step. The points are labeled by the steps that take place at them (1231231). We see in the middle a pause stretch $P_1P_2P_3$ where Fred catches his breath (it is a Viennese Waltz).

The topnode of the picture gives us the whole waltzing event e as we are looking at it. Its i-stages sit along the incremental axis going up from point 1, i.e. they sit along the axis: 1, 12, 123, etc.

At interval 123 we reach a stretch that is big enough to count as waltzing, so this interval contains waltzing i-stage O(e). Incremental homogeneity says that as long as we find along this axis eventualities cross-temporally identical to O(e), they will continue to count as waltzing. This means that we will find waltzing i-stages at every bigger stretch **on this axis,** and that includes e.

The stretches on the second diagonal axis count as waltzing because they increment **their** onset, and the latter satisfies the waltzing-criterion given here, etc.

We are now interested in the pause stretch $P_1P_2P_3$. Consider the following dialogue:

(6) A. I waltzed the whole time the orchestra played.
    B. But I say you standing still in middle for a whole stretch.
    A. You do, when you waltz.

B is trying to bring up the same kind of objection to A's statement as in the case of the states. In this case, however, A is not tempted to redefine his activity predicate (?I meant, I **pause-waltzed** the whole time the orchestra played). Instead, his reaction, which does not withdraw his original statement, is perfectly fine. This is accounted for by incremental homogeneity. Incremental homogeneity says that what is relevant for activities is not primarily determined segmentally but incrementally. P_1, P_2, P_2 may be pause points, and $P_1P_2P_3$ a pause segment, but that is perfectly compatible with the intervals $123P_1$, $123P_1P_2$, $123P_1P_2P_3$ containing waltz-i-stages: that is, when regarded incrementally, the activity can be carried over pause segments.

This point gets strengthened when we look at the progressive. As is well known, progressives can be uttered truthfully at points that fall inside pause segments:

(7) B (at pause point P_1): What are you doing?
    A (at pause point P_2): I am waltzing.
    B (at pause point P_3): But you're not waltzing.
    A (at pause point P_3): O yes I am, here we go again, one, two three...

I discussed a similar example in Landman 1992:

(8) B: What's happening.
    A: [Drinking coffee in the lobby of the concert hall]:
       They're performing the St. Matthew Passion.

We naturally use the progressive in a pause segment, because what is important for the truth of the progressive is not what is the case segmentally, but what is the case incrementally. The segment in the lobby is indeed not a performance segment, but the **i-stage** starting at, say, the first chord of *Kommt ihr Töchter* up to the coffee point **is** an i-stage of performing the St. Matthew Passion. And that is what counts.

What we see then is that there is no pressure to eliminate pause segments in events (as long as we're willing to say that the same event is continuing, of course). Incremental homogeneity, then, is a proposal as to why there is no such pressure for activities, while there is such pressure for states.

## 1.7. THE PROGRESSIVE AND THE PROJECTION OPERATOR.

The VP *perform the St. Matthew Passion* denotes a set of accomplishment events each of which starts with *Kommt ihr Töchter* and ends with *Ruhe sanfte, sanfte Ruh*. Following Landman 1992, I assume that the progressive VP *performing the St. Matthew Passion* denotes the set of the performing **stages** of each of these events, that is, the set of ct-subevents, with a modal restriction. The modal restriction says that you only include a **stage** e_1 of VP-event e in the denotation of the progressive if **the minimal i-stage of e that e is part of,** e_m, stands in a modal relation to e that I define in Landman 1992: e is realized on the continuation branch of e_m.

Now, though none of these stages can be realized at a point of time, nevertheless we would say that the progressive is true at the coffee drinking point. And the above discussion suggests why this is so.

I repeat: the i-stage starting at, say, the first chord of *Kommt ihr Töchter* up to the coffee point is an i-stage of performing the St. Matthew Passion. **And that is what counts**. In other words, *They are performing the St. Matthew Passion* is true at the coffee point, because there is an event e which is a complete performance, not necessarily completely realized, and there is a **stage** e_1 of e in the denotation of *performing the St. Matthew Passion* such that **the endpoint of the minimal i-stage of e that e_1 is part of, $\tau(e_m)$** is the coffee point. These events e_1 and e_m are performing stages of an event which is a complete performance. Moreover, in the context of the example it is clear that not only is e_m a **proper** stage of this complete performance, but there is (in the context) no reason to think that not more, longer stages are going to be realized incrementally (the break is over in ten minutes).

By incremental homogeneity, the latter are also performing stages. And this means that by **locating the endpoint** of this performing stage at the coffee point we are, so to say, **locating the coffee point** in the midst of the performance progression.

This gives us an analysis that allows progressives to be true at points. What we make use of in this analysis is an operation of **projection**. We project events that are realized along the incremental axis onto the segmental axis, via the endpoints of their running times:

Projection:

incremental axis

segmental axis

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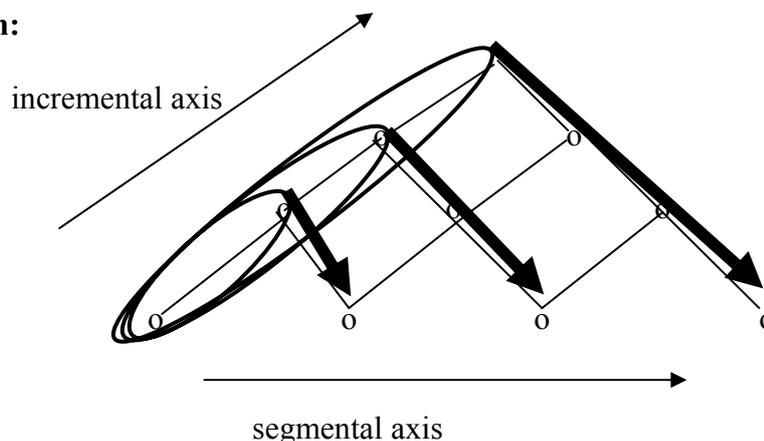
The suggestion is that the joint effect of the progressive operation and projection in our example, in the context of incremental homogeneity, gives a semantics that has the effect of locating points of time in the midst of the progression of i-stages. If we assume that it is **this** that makes the progressive true at such points, we get a very reasonable semantics for the progressive, which allows the progressive to be true at points, without squeezing stages into points. We only need to add the assumption that the present tense tells us that the speech point is one of those points to get a full semantics for the present progressive.

The next question then is: where does this operation of projection come from? That brings us to the second part of this paper.

PART 2: TENSE, PERSPECTIVE, ASPECT AND 1066.

2.1. STARTING FROM REICHENBACH

On the analysis of present progressives sketched in the last subsection, the semantics of present progressives involves applying a sequence of three operations to VP interpretations:

        TENSE   ASPECT   VP
        (PRESENT (PROJECTION (PROGRESSIVE (α))))

In the eventuality theory, the VP denotes a set of events α, and in the theory of the progressive of Landman 1992 adopted here, (PROGRESSIVE(α)) is a set of event stages, hence also a set of events.

As is well known, Reichenbach 1947 introduced a theory of tense based on three notions: speech time, reference time, and event time. In the present theory, event time comes in through the temporal trace function τ; thus, it can be identified with the running time of an event in the VP interpretation α, or, in the case of the progressive, with the running time of a stage in (PROGRESSIVE(α)). Speech time, one would assume, is introduced by the operation of present tense.

What about reference time? For Reichenbach, tense was a complex notion, which introduces both speech time and reference time. Let us distinguish between Reichenbach's **framework** (temporal interpretation involves speech time, reference time, and event time), and Reichenbach's concrete **proposal** (tense introduces both speech time and reference time). Then it is possible to adopt Reichenbach's framework, but not the concrete proposal.

In particular, instead of assuming one complex tense operation introducing both speech time and reference time, one can assume that this operation is really the composite result of two operations, an operation introducing reference time, followed by one introducing speech time. The later would be the tense operation proper.

But this way of thinking obviously has a direct link to the above interpretation schema for present progressives. If we can think of the projection operation as an operation introducing reference time, we have, within a Reichenbachian framework, a **grammatical** rationale for its presence in the interpretation of present progressives.

Now this may sound a bit parochial, i.e. maybe interesting for Reichenbachians, but my claim in this paper is more far reaching than that.

I will argue that it is indeed **appropriate** to think of projection as a reference time introducing operation and that separating this aspect of interpretation into a **linguistic category** of its own, – a category that I will call **perspective** – on a par with categories of **tense** and **aspect,** gives us a framework that allows us to localize the semantic differences between English and Dutch, with – I hope to convince you – very interesting semantic consequences.

2.2. THE TENSE-PERSPECTIVE-ASPECT SYSTEM OF ENGLISH AND DUTCH.

Though it can be formulated without, it will be easiest to formulate the theory with functional categories. I assume that the syntax of both English and Dutch has a hierarchically ordered system of optional functional categories: *tense, modality, perspective,* and *aspect*. Semantically, each of these categories is associated with a set of semantic operations, the available interpretations. I will call this the associated **semantic category**. I will assume that in English and in Dutch the semantic categories of **tense**, **perspective** and **aspect** are small, each of these categories consists of only two operations, and I assume that this is **not** where the difference between English and Dutch lies: English and Dutch have exactly the same semantic categories of **tense**, **perspective** and **aspect** (i.e., the same sets of available semantic operations associated with these functional categories). The following picture shows the grammatical assumptions and the names of the operations:

tense:	modality:	perspective:	aspect:
PAST	**HABITUAL**	**EXTERNAL**	**PERFECT**
PRESENT	**FUTURE**	**INTERNAL**	**PROGRESSIVE**
	…..		
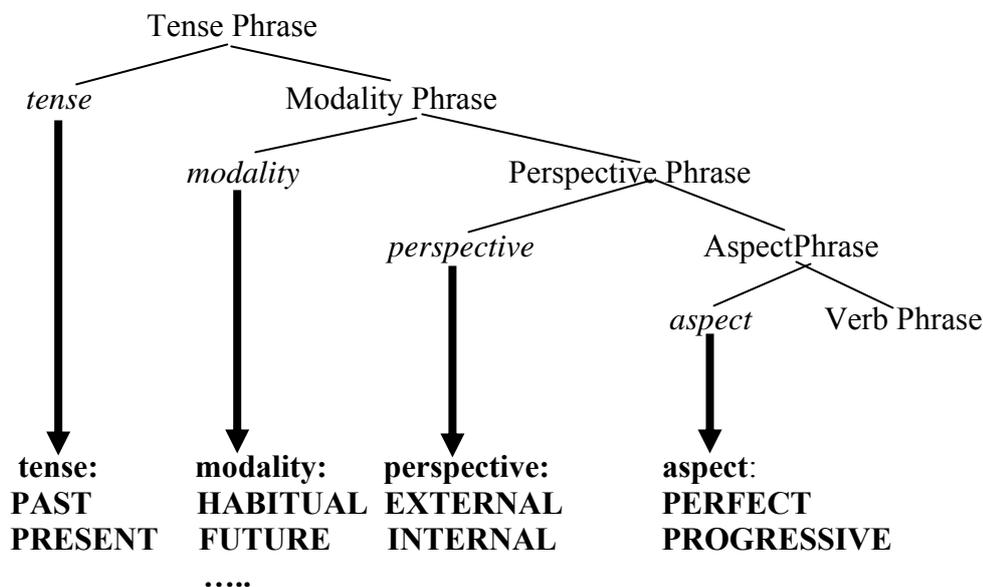
I introduce the category of *modality* at this point only because I have a brief discussion of habitual interpretations later in the paper, and in order to answer the obvious question: where is the future in this theory? I assume (with many others) that the future in English is a modal, and make the same assumption for Dutch. But I will have nothing to say about the future in this paper.

I call this system of categories the tense-perspective-aspect (tps) system (ignoring modality), and this paper is concerned with the tps-systems of English and Dutch, and by that I mean that I am in this paper concerned with how these operations are realized **in these categories** in English and Dutch.

It is part of the theory that the syntactic categories in question are **optional** and **semantically interpreted**.

Optional means that a derivation may choose not to realize the syntactic category. For the semantics, I take that to mean that, if one of these categories is **not** realized at the appropriate stage of the syntactic derivation, **none** of the available corresponding semantic operations is realized at the **corresponding** stage of the semantic derivation.

Semantically interpreted means that if one of these categories **is** realized at the appropriate stage of the syntactic derivation, **one** of the corresponding available semantics operations **must be** realized at the **corresponding** stage of the semantic derivation.

This should be interpreted with care. The fact that, say, Dutch specifies PROGRESSIVE as one of the operations in the category **aspect** does not mean that Dutch could not specify the same operation in another category, or as the interpretation of a special construction. And hence, it doesn't necessarily mean that if the category *aspect* is not specified in a derivation, the derived sentence cannot have a progressive interpretation: if the language allows it, it could get a progressive interpretation at another stage of the derivation. I say Dutch, because I will later assume that Dutch has this special option. What it does mean is that a derivation in Dutch which does not realize *aspect* cannot get a progressive interpretation **through the tpa-system**. And it means that a language that realizes PROGRESSIVE only through the tpa-system – and I will assume that English is such a language – could indeed only generate progressive interpretations by realizing the category *aspect*.

2.3. THE SEMANTIC OPERATIONS OF THE ENGLISH AND DUTCH TPA-SYSTEM.

My next move is to introduce some ontological extravagance, which – I stress – can be diligently undone, but which will make some aspects of the theory easier to formulate. The tpa-system consists of sets of operations. But operations from what into what?

For **progressive aspect**, I have already in the first part of this paper specified my assumption: progressive aspect is an operation on sets of eventualities (in fact, sets of events). I will make the same assumption for **perfect aspect**, and assume that **aspect operations** are functions from sets of eventualities to sets of eventualities. With e the type of eventualities, this makes them operations of type $\langle\langle e,t\rangle,\langle e,t\rangle\rangle$. (Note that I am assuming the type of VPs to be $\langle e,t\rangle$, which means that throughout this paper I will ignore **in the type** the contribution of the external subject.).

Standard tense logic assumes that **tense operations** are operations on sets of points of time or (in interval semantics) on sets of intervals of time. Thus, standardly, they are functions from sets of points to sets of points, or from sets of intervals to sets of intervals.

Taking the two together in a hierarchical tpa-system, this would suggest that **perspective operations** are functions from sets of eventualities into sets of points of time, or sets of intervals.

This is not the way I will set up things. For my purposes it will be useful to assume that:

> **All of the operations in the tpa-system are operations on sets of eventualities, hence all of them are operations from sets of eventualities to sets of eventualities, operations of type $\langle\langle e,t\rangle,\langle e,t\rangle\rangle$.**

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As mentioned, this will require some extravagance in the ontology of eventualities (in particular, the ontology of states).

Before going into the details of the operations, it is useful at this point to highlight a Davidsonian assumption about my grammar. Since VPs denote sets of eventualities, and the tpa-operations denote operations on sets of eventualities, tensed sentences will denote sets of eventualities as well. In other words, as in non-tensed Davidsonian theories, what the present grammar derives for a sentence is an event type of type $<e,t>$. And I will make the standard assumption that an interpretation of type t is derived by **existential closure over the eventuality argument**.

Now for the extravagance.

First I introduce a useful predicate on states:

> **pointstate**(s) iff s $\in$ STATE $\land$ s is a **point**
> **r-pointstate**(s) iff s $\in$ STATE $\land$ $\forall w \forall v[\tau(s,w) = \tau(s,v) \land \tau(s,w)$ is a **point**]

A pointstate is a state whose running time is a point, not a stretch. An r-pointstate is a pointstate which is **temporally rigid**, in that its running time is the same point in every world.

My ontological extravagance lies in the assumption that the model is supplied with a rich set of pointstates and r-pointstates:

> **r-pointstate assumption:**
> STATE contains at least as many r-pointstates as the interval structure I contains points.

It is, as we will see, this assumption that allows me to treat tenses and perspectives as operations on sets of eventualities, because with this assumption, all reference to points of time can be mimicked with pointstates.

This holds in particular for Reichenbach's speech points and reference points. I will assume that r-pointstates can be manipulated in dynamic interpretation structures for discourse (which I will not specify here, but take for granted). And this means that we can introduce the following predicates on r-pointstates:

> **Perspective states**:
> s is a **perspective state relative to** D,
> **pers**$_D$(s) iff s is an r-pointstate that is made salient in discourse D.

> **Tense states:**
> s is a **tense state relative to** D,
> **tense**$_D$(s) iff s is an r-pointstate that is made salient in discourse D as a **speech state** (i.e. its running time is a speech point).

These dynamic predicates obviously form a link between the sentence grammar (the derivations) and a more general discourse theory. The index D, hence, is quite essential to the theory. However, the discourse aspects of tense and perspective play no role in the discussion in this paper, hence, I will suppress, for readability, index D in the rest of this paper, and call the predicates **pers** and **tense**. Nevertheless, the index is essential to the correct interpretation of what I have in mind.

In the present theory, **tense states** play the role of Reichenbach's **speech points**, while **perspective states** play the role of his **reference points**.

With these assumptions, I will now define the semantic operations of the tpa-system of English and Dutch that I assume.

ASPECT.
There are two aspectual operations, PERFECT and PROGRESSIVE.
PROGRESSIVE is the operator from Landman 1992:

> **PROGRESSIVE** =
> $\lambda P \lambda e. \exists e_1 \in P: e \preceq_e e_1 \wedge$ **CONTINUATION**(e, e_1)

e and e_1 are variables over eventualities, P over sets of eventualities.
The progressive maps a set of events P onto the set of all events that are stages of some event in P with a further modal constraint added.

CONTINUATION(e, e_1) means: $\forall w$: if $\tau(e,w) \neq \perp$ then e_1 is on the continuation branch of e in w. This notion is defined and discussed extensively in Landman 1992. It means in essence that if stage e of e_1 is realized in a world, then the minimal i-stage of e_1, e_m, that e is part of is realized in that world, and e_1 itself is realized in world where a reasonable amount of interruptions of the continuation process of e_m are discarded. This modal condition plays no important role in this paper, so I refer to Landman 1992 for discussion.

The output of the progressive operation on a set of eventualities is always a set of events (stages), never states. If the input is a set of states (i..e. the interpretation of a stative VP), the output is going to be empty or undefined, since states do not have stages. I take this to mean that:
The progressive cannot apply felicitously to stative predicates.

While the progressive is an operation that brings you from events to event stages, I will assume here that the perfect is a maximality operator:

> Let $\preceq = \preceq_s \cup \preceq_e$
> **PERFECT** =
> $\lambda P \lambda e. P(e) \wedge \forall e_1 \in P: e \preceq e_1 \rightarrow e = e_1$

Here e is a variable over eventualities, events or states. The input of the perfect operation is a set of eventualities, say, states of me being in Amsterdam, or events of me running. The output of the perfect operation is the set of eventualities **among those** that are **maximal** with respect to the appropriate cross-temporal identity relation; thus the output will be the set of maximal states of me being in Amsterdam, or maximal processes of me running, where maximal means, the maximal ones that we count as one.

The maximality aspect of the perfect operation will have the consequence that we derive for the present perfect in (9) a reading where the state of me being in Amsterdam no longer holds at the speech time:

(9) I have lived in Amsterdam.

I will show in the third part of this paper how continuous interpretations with the present perfect can come about in a natural way in the framework; in contrast to (9),

in (10) the natural reading is that the state of me living in Amsterdam is not over before the speech time, but continues up to that time:

(10) I have lived in Amsterdam since 1992.

Maximality with respect to cross-temporal identity has one all important consequence, that will play a central role in this paper:

> **If the input set of eventualities is itself a set of eventualities that are already maximal with respect to cross temporal identity, the aspectual operation of perfect is the identity operation.**

This means that we can expect to find contexts where the **aspectual** operation of perfect is neutralized. In such contexts we may see, say, a present perfect, but the semantics would only contribute perspective and tense. This happens in two kinds of cases: First, I take the eventualities in the denotation of **accomplishment** VPs to be cross-temporally maximal events, due to their telicity. Second, and most important in this paper, if the input predicate for the perfect denotes a **set of pointstates,** the aspectual operation of perfect will be neutralized, since in a set of pointstates P, every pointstate $p \in P$ is maximal **in** P.

Proof: let P be a set of pointstates and $p \in P$. Assume $p \preceq_s q$ and $q \in P$. Then q is itself a pointstate and $p \sqsubseteq q$ and $p \sim q$. $p \sqsubseteq q$ means that $\tau(p) \subseteq \tau(q)$, and since both of these running times are points, this means that $\tau(p)=\tau(q)$. By the constraint on $\sim$, this means that p=q.

We will see that this last property has very interesting consequences at various points in this paper. It is, *de facto*, the main rationale for the above proposal for the perfect.

TENSE
There are two tense operations, PAST and PRESENT.

> **PAST** =
> $\lambda P \lambda t.\textbf{tense}(t) \wedge \exists e \in P: \tau(e) < \tau(t)$

Here e and t are variables over eventualities. Due to the restriction with the predicate **tense** t is *de facto* a variable over pointstates. The input of PAST is a set of eventualities, the output is a set of pointstates, in fact, tense states.

To see how this works, think of an example like *John wrote a book*. The input of PAST is a set of events which are book-writings of John , say, $BOOKWRITE_j$. The output, $PAST(BOOKWRITE_j)$ is the set:

> $\lambda t.\textbf{tense}(t) \wedge \exists e \in BOOKWRITE_j: \tau(e) < \tau(t)$
> The set of tense states whose running time is **after** that of some bookwriting event of John.

When we do existential closure on the eventuality argument, we get an existential statement:

> $\exists t[\textbf{tense}(t) \wedge \exists e \in BOOKWRITE_j: \tau(e) < \tau(t)]$

This says that there is a pointstate t, whose running time is identified in the discourse as a speech time, call it **now**, and there is a bookwriting event of John, whose running

time is before now. Thus, PAST is in essence the standard Priorian past tense operation.

PRESENT =
$\lambda P\lambda t.\textbf{tense}(t) \wedge \exists e \in P: \tau(e) = \tau(t)$

The input of the operation PRESENT is also a set of eventualities, and the output is also a set of pointstates, tense states. If we take as input a set of eventualities P, apply PRESENT and do existential closure over the eventuality argument, we get a statement of the form:

$\exists t[\textbf{tense}(t) \wedge \exists e \in P: \tau(e) = \tau(t)]$

This means that there is a pointstate, whose running time is in the discourse identified as a speech time, call it **now**, and the running time of some eventuality in P is **identical** to the point **now**.

This means that some eventuality in P should hold **now.** This is fine enough if P is the interpretation of a stative predicate, because then, by segmental homogeneity, P will contain states whose running time is a point. But if P is the interpretation of an eventive predicate, present tense cannot apply to it, since P will not contain any eventualities whose running time is a point, and hence for no event in P can the running time be identified with a tense point. Thus:

The operation of PRESENT cannot felicitously apply to eventive predicates.

This means that we have build the Dowty/Taylor assumption into the semantics of the operation of present tense. But note: I am assuming that English and Dutch **share** the semantic operations I am defining here. This means that the operation of present tense cannot felicitously apply to the interpretations of eventive predicates in English **and** in Dutch. This is good for English, but, since eventive verbs in Dutch are perfectly felicitous in the present tense without a forced habitual interpretation, more will need to be said about Dutch.

PERSPECTIVE

There are two perspective operators, EXTERNAL and INTERNAL.
This is the point where the incremental theory of eventualities comes in. The perspective operators are **stativity operators** that involve **projection** from the incremental axis onto the segmental axis.

For interval i, let **end(i)** be the **endpoint** of i (or the limit, if i is open).

EXTERNAL =
$\lambda P\lambda p.\textbf{pers}(p) \wedge \exists e \in P \; \textbf{end}(\tau(e)) < \tau(p)$

Here e and p are variables over eventualities. Due to the restriction with the predicate **pers,** p is *de facto* a variable over pointstates. The input of EXTERNAL is a set of eventualities, the output is a set of pointstates, in fact, perspective states.

In fact, the endpoint operation plays no real role in the operation of **external** perspective: obviously, for every event e and pointstate p:

$\textbf{end}(\tau(e)) < \tau(p)$ iff $\tau(e) < \tau(p)$

Thus, the above operation is equivalent to:

$\lambda P\lambda p.\textbf{pers}(p) \wedge \exists e \in P: \tau(e) < \tau(p)$

This means that the operation of external perspective is the **same** operation as the operation of past tense, except that it has the predicate **pers** rather than **tense**, so the output is a set of perspective states. But, just as PAST gives you the set of tense states in the discourse which are after some input event, EXTERNAL gives you the set of perspective states in the discourse which are after some input events.
Thus, taking an external perspective on P means: go stand at a salient perspective point in the discourse where some P event is past.

So far, the theory is a straightforward incorporation of Reichenbach's distinctions (except maybe for the Dowty/Taylor assumption). The innovation comes with **internal** perspective.

INTERNAL =
$\lambda P \lambda p.\textbf{pers}(p) \wedge \exists e \in P: \textbf{end}(\tau(e)) = \tau(p)$

The input of internal perspective is also a set of eventualities, and the output a set of perspective states. But for set of eventualities P, the output INTERNAL(P) is the set of perspective states whose running time is **the endpoint** of the running time of some eventuality in P. This is precisely the projection operation that I introduced in the first part of this paper. The relation between internal perspective and present tense is **not** the same as what we saw for external perspective and past tense. External perspective is just past tense with the **tense** predicate replaced by the **pers** predicate. But where present tense equates the running time of input events with the speech point, internal perspective doesn't equate the **running times** of input events with perspective points, but only the **endpoints** of the running times of input events. And such an equation is possible, whether the input is a set of states or a set of events.

It may be funny to call an operation which associates perspective with the endpoints of the running times of input events *internal* perspective. We will see, when I discuss some examples in detail at the end of this part, that, due to homogeneity, this is (for most cases) actually quite adequate.

For easy reference, I repeat here the logical facts about this system of operations that I have mentioned along the way:

FACT 1. IF A IS A SET OF ACCOMPLISHMENT EVENTS, PERF(A) = A.
FACT 2. IF A IS A SET OF POINT STATES, PERF(A) = A.
FACT 3. IF A IS A SET OF STATES, PROG(A) IS UNDEFINED.
FACT 4. IF A IS A SET OF EVENTS, PRES(A) IS UNDEFINED.

2.4. LEXICAL SYSTEMS AND MARKEDNESS SYSTEMS

I am concerned with the categories of the tpa-system (and similar categories like *modality*).

I will call the pair $<\alpha,\boldsymbol{\alpha}>$, where α is one of these functional categories, and $\boldsymbol{\alpha}$ its interpretation set, a **system**.

I will call operation P a **lexical operation** in system $<\alpha,\boldsymbol{\alpha}>$ if $P \in \boldsymbol{\alpha}$ and P is the interpretation of a lexical item (like a morpheme) of category α.

I will call system $<\alpha,\boldsymbol{\alpha}>$ a **lexical system** if every operation in $\boldsymbol{\alpha}$ is a lexical operation in $<\alpha,\boldsymbol{\alpha}>$.

I will call operation P an **unmarked operation** in system $<\alpha,\boldsymbol{\alpha}>$ if P is not a lexical operation in $<\alpha,\boldsymbol{\alpha}>$.

I will call a system <α,**α**> a **markedness system** if one of the operations in **α** is unmarked in <α,**α**>.

I come to the central assumption. It concerns **null heads**:

> **The null head assumption**:
> I will assume that if P is an **unmarked** operation in system <α,**α**>, we have in the grammar a **null α head with interpretation P**, i.e. an interpretation pair: <[$_α$ **e**], P>,
> Vice versa, I will assume that if P is a **lexical** operation in system <α,**α**>, α does **not** contain a null head with interpretation P.

This assumption means that if P is an **unmarked** operation in system <α,**α**>, it can be realized in the semantic derivation **without** this being lexically or morphologically visible, and also that if P is a **lexical** operation in <α,**α**>, it can only be realized at the relevant stage of the semantic derivation, by realizing in the corresponding syntactic derivation a lexical α-head with P as interpretation.

Since in a lexical system all operations are lexical, the null head assumption means that in a lexical system there cannot be a semantically interpreted null head. And this means that lexical systems are **semantically perspicuous**: what you get semantically is what you see morphologically.

In a markedness system, the lexical operations are semantically perspicuous, but the unmarked operation is not: a null α-head can be realized, and then P will be realized without this being visible morphologically. As we will see, lexical systems are perspicuous, but rigid, while markedness systems are less perspicuous, but flexible.

With this, we are ready to discuss the tpa-systems of English and Dutch.

2.5. THE ENGLISH AND DUTCH TPA SYSTEMS

ENGLISH
ASPECT IN ENGLISH:
English has a perfect participle (*kissed* in *have kissed*) and a progressive participle (*kissing* in *is kissing*). The simplest assumption for English, and the one I will make, is that the category *aspect* has two lexical heads:

[$_{aspect}$ *-ed*] → PERFECT
[$_{aspect}$ *-ing*] → PROGRESSIVE

Thus, <*aspect*,**aspect**> in English is a **lexical system**: both PERFECT and PROGRESSIVE are lexical operators.

PERSPECTIVE IN ENGLISH:
In English, the perfect participle selects the auxiliary *have*, the progressive selects the auxiliary *be*. But what are these auxiliary verbs? I propose that they are lexical heads of the category *perspective*, with the following interpretation:

[$_{perspective}$ *have*] → EXTERNAL
[$_{perspective}$ *be*]   → INTERNAL

This means that <*perspective*,**perspective**> in English is a **lexical** system, both EXTERNAL and INTERNAL are lexical operators.

Note that the distribution of *aspect* and *perspective* in English is not free: if, in the derivation of a tensed sentence *aspect* is syntactically realized, *perspective* is as

well. Moreover, in such a derivation **perfect aspect** selects **external perspective**, **progressive aspect** selects **internal perspective**. These connections are not derived in the present theory, so far they have to be stipulated. I will be perfectly happy if they can be made to follow from the syntactic and/or semantic theory of these heads; I myself have no such theory to offer here.

TENSE IN ENGLISH:
The past tense in English is lexically marked, *-ed*, the present tense is not (what is sometimes called present tense morphology is really number and person morphology). The simplest assumption for English is that the category *tense* has one lexical head, and one unmarked head with the following interpretations:

      [_{**tense**} *-ed*] → PAST

[_{tense} ...

well. Moreover, in such a derivation **perfect aspect** selects **external perspective**, **progressive aspect** selects **internal perspective**. These connections are not derived in the present theory, so far they have to be stipulated. I will be perfectly happy if they can be made to follow from the syntactic and/or semantic theory of these heads; I myself have no such theory to offer here.

TENSE IN ENGLISH:
The past tense in English is lexically marked, *-ed*, the present tense is not (what is sometimes called present tense morphology is really number and person morphology). The simplest assumption for English is that the category *tense* has one lexical head, and one unmarked head with the following interpretations:

    [$_{\text{tense}}$ *-ed*] → PAST

    [$_{\text{tense}}$ e]   → PRESENT

Thus, <*tense*,**tense**> in English is a **markedness** system, with lexical operator PAST and unmarked operator PRESENT.

DUTCH
ASPECT IN DUTCH:
Dutch has a perfect participle (*gekust* ('kissed') with perfect morphology *ge-t*), but not a progressive participle. Dutch has a progressive **construction,** and in fact, more than one such constructions.
There is a prepositional construction, as in (11):

    (11) Ik ben *aan het lopen*.
       I am *at the walking*
       I am walking.

Here *lopen* is a noun which takes the definite article *het*. *Aan het lopen* is a prepositional phrase with a progressive meaning.
      Dutch also forms progressives with verbs *zitten* ('sit'), *staan* ('stand'), *liggen* ('lie'), *hangen* ('hang'),... plus infinitive:

    (12) Ik *zit te werken*.
       I *sit to work*
       I am working.

Here the complex VP *zit te werken* has a progressive meaning.
(Note that in the class of verbs that allow this progressive meaning, *zitten* is the unmarked verb: (12) can even be used when I am not actually sitting. This is not true for the other verbs: *Ik lig te werken* means, I am working, while lying.)
      I assume that in (11) *be* is the copula which is required to form a predicate out of a prepositional phrase. And I assume that both (11) and (12) are special constructions, and that in these constructions the progressive meanings are not realized through the tps-system of Dutch, but as part of the construction. With these assumptions it become plausible to assume, as I will, that Dutch does not have a lexical *aspect* head with a progressive meaning.
      Thus I will assume that in Dutch the category *aspect* has one lexical operator and one unmarked operator:

    [$_{aspect}$ *ge-t*] → PERFECT

    [$_{aspect}$ e]   → PROGRESSIVE

Thus <aspect,**aspect**> is a **markedness** system in Dutch, with unmarked operator PROGRESSIVE.

PERSPECTIVE IN DUTCH:

As is well known, auxiliary selection in Dutch is complex.

I have already indicated that the progressive construction *aan het lopen* presented in (11) selects *zijn* ('be'), but this construction is a prepositional phrase in predicate position, and **all** prepositional phrases in predicate position require the copula *zijn*. There is, thus, no reason to assume that in this construction *zijn* is a perspective selected by progressive aspect (unlike in the parallel case in English).

For perfect participles, we find the following situation:

-The perfect participles of t**ransitive verbs** select *hebben* ('have'):

> (13) Ik **heb**   Marie gekust.
>   I   **have** Marie kissed
>   I have kissed Marie.

-For the perfect participles of **intransitive verbs** we get a **split system**:

-the perfect participles of **unaccusative verbs** or **achievements verbs** (depending on your theory) select *zijn*:

> (14) Ik **ben** gestorven.
>   I   **am** died
>   I have died.

-the perfect participles of **other intransitive verbs** select *hebben*:

> (15) Ik **heb** gelopen.
>   I   **have** walked

-And we find an alternation with directional resultative phrases: even though *hebben* is selected in (15), we get *zijn*, if we add a directional resultative phrase:

> (16) Ik **ben** naar huis gelopen.
>   I   **am** to   home walked
>   I have walked home

These facts are well known, there is a huge literature on them to which I have nothing to contribute in this paper. What is relevant for our purposes is that auxiliary selection in Dutch is obviously not driven by the participles. I will assume, like I did for English, that the auxiliaries we find for perfect participles **are** perspective heads. I will furthermore assume, like I did for English, that **perfect aspect** selects **external perspective**. From this it follows that the auxiliaries *hebben* and *zijn* that enter into this particular alternation are **both** lexical perspective heads with interpretation EXTERNAL.

I already assumed that there is no lexical progressive aspect head in Dutch. I will here assume that there is also no lexical internal perspective head in Dutch. With this we get:

[*perspective* hebben] → EXTERNAL
[*perspective* zijn]   → EXTERNAL
[*perspective* e]   → INTERNAL

<*perspective*, **perspective**> is a **markedness** system in Dutch, with lexical operator EXTERNAL and unmarked operator INTERNAL.

 While I assume that Dutch is like English, in that in the derivation of tensed sentences perfect aspect selects external perspective, there is no similar requirement for progressive aspect and internal perspective in Dutch. Thus in Dutch unmarked progressive aspect and unmarked internal perspective are independent of each other: either one can be realized without the other. This will play an important role in the paper.

TENSE IN DUTCH:
Like in English, the past tense is morphologically marked (*-te*), the present tense is not marked.

[**tense** *-te*] → PAST
[**tense** Ø]   → PRESENT

So like in English, <*tense*,**tense**> is a markedness system in Dutch with unmarked operator PRESENT.

 The different options available to English and Dutch can be made clear as follows. Consider the aspect system. In English it is a lexical system. This means that at a relevant stage of the derivation we have three options:
  a.) *aspect* is not realized   - no semantics of aspect is realized.
  b.) [*aspect* *-ed*] is realized   - semantics: PERFECT
  c.) [*aspect* *-ing*] is realized - semantics: PROGRESSIVE
In Dutch, the aspect system is a markedness system. Here too we have three options, but not the same three:
  a.) *aspect* is not realized   - no semantics of aspect is realized.
  b.) [*aspect* *ge-t*] is realized - semantics: PERFECT
  c.) [*aspect* e] is realized   - semantics: PROGRESSIVE

Thus, progressive aspect in Dutch can be realized without being morphologically visible.

2.6. 1066

I have proposed that aspect and perspective are lexical systems in English, but markedness systems in Dutch. I call this proposal **1066**. And I add to this a synchronic and a diachronic hypothesis:

> **The synchronic hypothesis for 1066:**
> 1066 is the only real difference between the English and Dutch tpa systems: all other synchronic differences either follow from 1066, or can be regarded as responses to it.

In the third part of this paper I will discuss supporting evidence for this hypothesis.

> **The diachronic hypothesis about 1066:**
> 1066 got established by a change in English in the transition from Old English to Middle English.

Vlach 1981 mentions that it is a standard assumption among scholars in the history of English, that the English progressive participle developed from a prepositional construction like we find in Dutch, i.e. *walking* derives from *a-walking*, and the latter from what was still a prepositional construction in Old English.

Textbooks of Old English (e.g. Mitchell and Robinson, 1964) will tell you that the auxiliary selection system in Old English was the same as the Dutch system (a split auxiliary system for perfect participles), while the modern English auxiliary system was established by the time of Middle English.

Portner 2003 mentions in a footnote that the one Germanic language that seems to have some of the peculiarities of the English perfect, namely the lifetime effect that he discusses, is Danish.

The diachronic hypothesis about 1066 is that these facts are connected. Diachronically, the hypothesis is that the only major thing that happened in the history of the English tpa system is that in the transition from Old English to Middle English, a markedness system for aspect and perspective was replaced by a lexical system.

The Danish connection may suggest that this change took place under Viking influence, so a more proper name for the theory would have been: 'Sometime between 792 and 1066' (or the-Eric-the-Viking-theory of perspective and-aspect), because I most definitely do not claim that the change took place as a consequence of the Normandic invasion in 1066 (it couldn't, because William the Conqueror and his lot spoke French, and in all respects discussed here, French patterns with Dutch, and not with English).

I have nothing more to say about the diachronic hypothesis in this paper, except to point out that the more plausible I can make the synchronic hypothesis, the more interesting the diachronic hypothesis becomes. I will come back to this briefly in the conclusion of this paper.

2.7. GETTING A FEEL OF THE SYSTEM

To get a feel of the system I discuss here two examples in English.

  (17) John was writing a book.

We derive the following structure and meaning for (17):

[$_{tenseP}$ *John* [$_{tense}$ –ed] [$_{perspectiveP}$ *be* [$_{aspectP}$ *-ing*   [$_{VP}$ *write a book*]]]]
(EC   (PAST   (INTERNAL (PROGRESSIVE (BOOKWRITE$_j$)))))

EC stands for existential closure.
Working out the semantics, we get:

$\exists t[\textbf{tense}(t) \wedge \exists p[\textbf{pers}(p) \wedge \tau(p) < \tau(t) \wedge \exists e[\textbf{end}(\tau(e)) = \tau(p) \wedge$
   $\exists e_1 \in \text{BOOKWRITE}_j: e \preceq_e e_1 \wedge \text{CON}[e,e_1]]]]$

There is a tense state, call it **now**, and a perspective state p **before now**, and a **stage** e of a bookwriting event and the endpoint of the running time of stage e is the perspective time p (and that complete bookwriting event gets modally realized on the continuation branch of the minimal i-stage e_m of e_1 that e is part of).
  As it should, this does not entail that the complete bookwriting is temporally realized in the world in question, but it does entail that the stage is, and that the stage is realized in the past. So the sentence expresses that a bookwriting stage has its endpoint at a perspective point before now.
  If we derive the **present** progressive, the only thing that changes semantically is that < gets replaced by =. Then the statement expresses that a bookwriting stage has its endpoint now. We see that, as I explained before, these progressive statements are unproblematically true at points. The reason is that **in between** tense and aspect internal perspective is realized. While the output of the progressive operation is a set of events, the output of internal perspective is a set of pointstates, and present tense can apply to the latter without problem. In other words, internal perspective is a **stativizer**, it maps sets of events onto sets of states. This means that the perspective phrase itself is a **stative** predicate, and, as we have seen, present tense applies unproblematically to stative predicates.
  I have said that it is appropriate to think of this operation as **internal** perspective. Think of this perspective operation as a **dart** that you throw at a book writing event. By incremental homogeneity, you can throw this dart quite indiscriminately at the book writing (with your eyes closed, behind your back): as long as you hit it **internally**, that is, after the onset and before the end, you will find a book writing **stage** that **ends** there. Internal perspective gives you the perspective where the dart hits the event internally; i.e. where it hits, a stage has its endpoint.
  Thus, for progressive predicates, internal perspective indeed locates the perspective in the midst of the progression. By homogeneity, the same is true for stative predicates and activity predicates in general: if we throw the dart in the middle of a state s with running time $\tau(s)$, we will find, by segmental homogeneity, a ct-substate that holds at the perspective time, and if we throw a dart in the middle of an activity e with running time $\tau(e)$, we will find, by incremental homogeneity, a stage of e that ends there.

So the name **internal** perspective is quite appropriate (though not, as we will see in the next subsection, if we throw the dart at an accomplishment).

The second example shows off some of the intricacies of the theory.

(18) John has been writing a book.

$[_{tenseP}$ John e $[_{perspectiveP}$ *have* $[_{aspectP}$ *-en* $[_{perspectiveP}$ *be* $[_{aspectP}$ *-ing* $[_{VP}$*write a book*$]]]]]]$
(EC   (PRES   (EXT   (PERF   (INT   (PROG (BOOKWR$_j$)))))))

I will work my way up this time. We start with a set of book writings BOOKWR$_j$. PROGRESSIVE gives you the set of stages of these book writings.   Next INTERNAL gives you the set of perspective states that are located at the endpoints of these writing stages.

Next PERFECT applies to this set. But this set is a set of **pointstates** and we have proved (FACT 2) that PERFECT is the **identity function** on a set of pointstates.

Thus, perfect aspect has no semantic effect in this context. But it selects external perspective. This means that, in this context, the total semantic effect of *have ...-ed* reduces to EXTERNAL.

So, we have so far a set of **internal perspective states**, and next, EXTERNAL gives you a set of **external perspective states**: the output of EXTERNAL contains, for each of these internal perspective states, the perspective states that are later than it.

PRESENT next gives you a set of tense states: a set that contains, for each of these external perspective states, the tense states that have the same running time. EXISTENTIAL CLOSURE finally says that there is such a tense state.

This means that we get the following truth conditions for (18): there is a tense state t, with running time **now**, and a(n external) perspective state p$_e$ with running time **now,** and a(n internal) perspective state p$_i$, with running time **before** now, and a bookwriting **stage** e which ends at p$_i$.

Thus (18) is true if a book writing stage ends at a perspective point before now (and is looked at from a present perspective). Again, this doesn't tell us anything about whether a complete bookwriting is realized or not.

Thus, also in this complex case the theory derives the correct truth conditions. Notice the crucial role that internal perspective plays in this derivation. Had we forgotten about INTERNAL, we would have gotten truth conditions that are dramatically wrong. PERFECT would have applied to the interpretation of the progressive predicate, picking out the maximal stages, which would have given us BOOKWRITE$_j$ back as the interpretation of the higher aspect phrase, and we would incorrectly have predicted that (18) is equivalent to (19):

(19) John has written a book.

I take this as supporting evidence for the theory: for aspect and perspective, what you get is what you see, and what you see in (18) is a sequence of progressive aspect, internal perspective, perfect aspect and external perspective. So what you get is the result of applying the semantic interpretations of what you see (plus the interpretation of present tense and existential closure, which you don't see but get nevertheless).

PART 3: DERIVING DIFFERENCES BETWEEN ENGLISH AND DUTCH.

3.1. THE SIMPLE PRESENT.

1066 tells us the following about English.
If you want to get a perspective operation or an aspect operation realized in the meaning of a tensed sentence in English (through the tpa-system), you can only do that by realizing the corresponding perspective or aspect head. Moreover, in a tensed sentence, these are realized in pairs: both *have* and *–en* or both *be* and *–ing*.
    1066 tells us that the situation is different in Dutch: you can realize PROGRESSIVE by realizing [$_{aspect}$ e]; you can realize INTERNAL by realizing [$_{perspective}$ e], and you can realize the one without the other. From this it follows that:

> **Consequence:**
> **-Simple tenses in English don't have perspective.**
> **-Simple tenses in Dutch can have internal perspective.**

In a picture:

ENGLISH *Fred danced*   **DUTCH**   *Fred danste*
[$_{tenseP}$ *Fred* **-ed** [$_{VP}$ *dance*]]   [$_{tenseP}$ *Fred* **-te** [$_{perspectiveP}$ **e** [$_{VP}$ *dans*]]]
EC(PAST(DANCE$_f$)))   EC(PAST(INTERNAL(DANCE$_f$)))
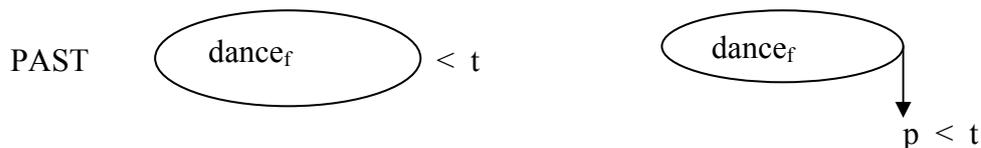
In the simple past, this doesn't seem to make much of a difference in truth conditions (but see the next subsection):

The running time of a dancing event   The endpoint of the running time of a
of Fred is before now   dancing event of Fred is before now

But the difference shows up in the simple present, to which we now turn.

PREDICTIONS FOR THE ENGLISH SIMPLE PRESENT:
Simple tenses in English don't have perspective or aspect. Thus the syntax and semantics of the simple present in English is of the form:

> [$_{tenseP}$ [$_{tense}$ **e**] VP]
> EC(PRESENT(VP))

This is not a problem if the VP is a **stative** predicate like *be in Amsterdam*.

> (20) Fred is in Amsterdam.
>   [$_{tenseP}$ *Fred* **e** [$_{PredP}$ *be in Amsterdam*]]
>   EC(PRESENT(BE IN AMSTERDAM$_f$))
> $\exists t[\textbf{tense}(t) \land \exists s \in$ BE IN AMSTERDAM$_f$: $\tau(s)=\tau(t)]$

States are segmentally homogeneous. This means that if t is a tense state with running time **now**, and s a state of Fred being in Amsterdam with running time τ(s) which includes τ(t), then, by segmental homogeneity, there will be a state of Fred being in Amsterdam whose running time **is** τ(t), and hence (20) is true.

With this, 1066 predicts:

In English, stative predicates are felicitous in the simple present.

But, if the VP is an **eventive** predicate, there is a problem.

(21) Fred dances.
$[_{tenseP}$ *Fred* **e** $[_{VP}$ *dance*$]]$
EC(PRESENT(DANCE$_f$))
$\exists t[\textbf{tense}(t) \wedge \exists e \in DANCE_f\colon \tau(e)=\tau(t)]$

In this case, for the simple present statement to be true, there must be a dancing **event** e such that $\tau(e)=\tau(t)$, **now**. But this is impossible by the Dowty/Taylor assumption: the running time of events is always a stretch, never a point. So PRESENT cannot equate these running times, and there is a conflict that 1066 cannot resolve:

In English, eventive predicates are not felicitous in the simple present (with an eventive meaning).

But, of course, eventive predicates are **not infelicitous** in English in the simple present, they are felicitous, but get **habitual** interpretations. This can be accounted for by a plausible independent assumption:

Habituality:
In English and in Dutch, the system <*modality*,**modality**> contains an **unmarked** modal operator HABITUAL.

By the grammatical assumptions I have made, this means that the grammar contains a null modality head: $[_{modality}$ e $]$ with interpretation HABITUAL. This is a reasonable assumption: Dahl 1995 points out that across languages, among modals, there is a strong tendency for habituality to be unmarked.

Now, it goes far beyond the scope of this paper to go into the details of the semantics of modals, but I **will** mention the one aspect of their semantics that is important here:

Modality:
All auxiliary modals are stativity operators. This means that the output of any such modal operator can be true at points.

For habituality this means, of course, that the **habit** fits into points, not that the instantiations of the habit fit into points.

Now, by 1066, the assumption of habituality means that English (and Dutch) simple present tense sentences **can** have an habitual interpretation without this being morphologically marked. This means, then, that we predict another analysis of (21):

(22) Fred dances.
[$_{tenseP}$ *Fred* **e** [$_{modalityP}$ **e** [$_{VP}$ *dance*]]]
EC(PRESENT(HABITUAL(DANCE$_f$)))

By the modal semantics HABITUAL(DANCE$_f$) is going to be a set of states which can be unproblematically true at points. So we predict:

> **In English, eventive predicates are felicitous in the simple present with an habitual interpretation.**

Since for eventive predicates there is no other option in English (except, as mentioned, in Sportscasterese, which I don't deal with in this paper) it follows that in English, eventive predicates in the simple present get habitual interpretations.
 To complete the picture we note that:

> **In English, predicates with auxiliary modals in the present, present perfects and present progressives are felicitous, the latter two, because they have perspective realized.**

PREDICTIONS FOR THE DUTCH SIMPLE PRESENT:

For **stative** predicates, the situation in Dutch is exactly as in English, so:

> **In Dutch, stative predicates are felicitous in the simple present.**

 For **activity** predicates, we get the following situation. If we make the same derivation for *Fred danst* as we did for *Fred dances* in (16), we run into the same problem. But, by 1066, in Dutch we have an alternative derivation, we can realize [$_{perspective}$ e] with interpretation INTERNAL:

(23) Fred danst.
[$_{tenseP}$ *Fred* **e** [$_{perspectiveP}$ **e** [$_{VP}$ *dans*]]]
EC(PRESENT(INTERNAL(DANCE$_f$)))
$\exists t[\mathbf{tense}(t) \land \exists p[\mathbf{pers}(p) \land \tau(p))=\tau(t) \land \exists e \in DANCE_f: \mathbf{end}(\tau(e))=\tau(p)]]$

This says that the endpoint of the running time of a dancing event is at $\tau(t)$, i.e. at **now**. As we have seen, by incremental homogeneity, if there is a dancing event e, whose running time $\tau(e)$ includes $\tau(t)$ (after the onset), there is a stage of that event, which is itself a dancing event, whose running time ends at $\tau(t)$. And this means that in this situation (23) will be true. Thus, with 1066, we predict:

> **In Dutch, activity predicates are felicitous in the simple present (with an eventive interpretation).**

For simple present **accomplishments** like (24), there is pressure in the system.

(24) Fred schrijft een boek.
 Fred writes a   book

For accomplishments, the internal perspective dart is thrown precisely at the endpoint. This is not a problem if the dart is then ordered in the past, but it **is** a bit of a problem, if it is identified with the present. On an analysis of (24), along the lines of (23) (with [*perspective* e]), (24) is predicted to be true if a complete bookwriting event of me ends at t. Since I have written four books, there are only four points of time in my lifetime at which I could truthfully have asserted (24), on this analysis. Since that is not very much, this interpretation of accomplishments wouldn't be very useful.

By 1066, there is an **alternative** derivation of sentence (24): realize **both** [*perspective* e] and [*aspect* e]:

(25) Fred schrijft een boek.
   [*TenseP* *Fred* e [*PerspectiveP* e [*AspectP* e [*VP* *schrijf een boek*]]]]
   EC(PRESENT(INTERNAL(PROGRESSIVE(BOOKWRITE$_f$))))

This is exactly the interpretation that we derived for the English present progressive *Fred is writing a book* in the previous section. And this **is**, of course, a useful interpretation.

While 1066 allows both derivations for accomplishments in Dutch as felicitous, the above considerations about usefulness would favor the derivation in (25) as the most prominent one for accomplishments in the simple present. Thus we predict:

In Dutch, accomplishment predicates are felicitous in the simple present with a progressive interpretation.

This is exactly what we find in Dutch: (25) is perfectly felicitous and means: *Fred is writing a book*.

Finally, since I assume that Dutch, like English, has an unmarked modality head with interpretation HABITUAL, it follows that Dutch eventive predicates in the simple present are **ambiguous** between eventive and habitual interpretations. This too is the case: (23) differs from the corresponding example in English in that it allows an eventive interpretation, but it also allows the same habitual interpretation as in English. This too follows from the assumptions.

3.2 THE SIMPLE PAST AND OVERLAPPING *WHEN*.

In this section I am concerned with predicates in the simple past in the presence of a *when*-clauses.

A caveat to start with. I am concerned here with a difference between Dutch and English that, to my knowledge, has not been discussed in the literature before (though some of the English facts have been noted in Mittwoch 1988). I am concerned here with giving an account of these facts, and I can in no way do justice to the ins and outs of the semantics of *when*-clauses, on which there is, of course, a huge literature. Thus, my assumptions about *when*-clauses are going to be very minimal, compatible, I think, with many much more worked out proposals in the literature.

It is well known that in past sentences with a *when*-clause like (26), the time of the *when*-clause and the event time of the main clause can, but need not overlap:

(26) When John came in, Mary left.

Often, the event time of the main clause will follow that of the *when*-clause; Partee 1984 notes examples where the event time of the main clause even precedes that of the *when*-clause. Now, there is quite some literature on what interpretations you can get for different predicates inside the *when*-clause, but, maybe surprisingly, not as much about what interpretations you can get for different predicates inside the main clause. The latter is what I am concerned with here, and I am particularly interested in the following question: which main-clause predicates allow **overlapping** interpretations, interpretations where the time of the main-clause and the time of the when-clause overlap, when the predicate in the *when* clause is eventive?

Let's come to the facts. In English and in Dutch, **stative** predicates allow an overlapping reading for *when* clauses.

> (27) a. John **was angry** when Mary came in.
>   b.The traffic light **was red** when Mary crossed.

> (28) a. Jan **was boos**, toen   Marie binnenkwam.
>   Jan was angry when Marie entered
>   b. Het stoplicht   **was rood**, toen Marie overstak.
>   The traffic light was red   when Marie crossed

Thus, (27a) and (28a) allow the interpretation (27a-overlap), and (27b) and (28b) allow the interpretation (27b-overlap).

> (27a-overlap): John was (already) angry at the time Mary came in.
> (28b-overlap): The traffic light was (already) red at the time Mary crossed.

(27a) and (28a) have a second natural interpretation, an inchoative, or even causative interpretation (27a-later):

> (27a-later): John got angry at or after the time Mary came in.

That these later-interpretations are in some sense causal is suggested by the fact that you don't always get them. For instance, a similar interpretation is absent in (27b) and (28b), the most plausible reason being (roughly) that traffic lights don't turn red as a consequence of crossing.

When we come to **activity** predicates, we notice differences between English and Dutch. In Dutch, the facts for activity predicates are exactly what we find for stative predicates:

> (29) De staaf **vibreerde** toen   Jan hem aanraakte.
>   The rod   vibrated   when Jan it   touched
>   The rod vibrated when Jan touched it

> (29-overlap) The rod was (already) vibrating, when Jan touched it.
> (29-later)   The rod started to vibrate, when Jan touched it.

(30) a. Marie **sliep**, toen   Jan binnenkwam.   (**simple past**)
           Marie slept when Jan came in
     b. Marie **lag te slapen**, toen Jan binnenkwam (**progressive**)
           Mary lay to sleep, when Jan came in
     c. Marie **was in slaap**, toen Jan binnenkwam   (**stative**)
           Marie was asleep,   when Jan came in

As in the case of (28a), (29a) has both an overlap reading and this inchoative reading. (30a) does not have this inchoative reading (presumably for the same reason why (28b) doesn't have it), but it does have the overlap reading, i.e. it means the same as the progressive in (30b) and the stative in (30c).
       The differences come in in English:

(31)   The rod **vibrated** when John touched it.
(31-overlap) #The rod was (already) vibrating when John touched it.
(31-later)   The rod started to vibrate when John touched it.

(32) a. #Mary **slept**, when John came in.   (**simple past**)
     b. Mary **was sleeping**, when John came in.   (**progressive**)
     c. Mary **was asleep**, when John came in.   (**stative**)

Unlike the Dutch case in (29), (31) in English does not have the overlap interpretation (31-overlap), it only has the inchoative interpretation (31-later). Similarly, unlike the corresponding Dutch case, (32a) is actually infelicitous in English; to express the overlap-reading which the corresponding Dutch example has, you have to use (32b) or (32c).
       I add one more telling piece of date for Dutch. In Dutch **accomplishment** predicates in the simple past allow both accomplishment and progressive interpretations:

(33) a. Jan **schreef een brief**.
            Jan wrote   a   letter
Accomplishment reading: Jan wrote a letter.
Progressive reading: Jan was writing a letter.

Both of these interpretations are expected by 1066, given the above discussion of accomplishments in the simple present.
       However, in the context of a *when*-clause with the overlap interpretations, the accomplishment interpretation is not possible, and the sentence has a progressive interpretation: i.e. (34a) means the same as the progressive (34b):

(34) a. Jan **schreef een brief** toen Marie binnenkwam.
            Jan wrote a   letter when Marie came in
       b. Jan **zat een brief te schrijven** toen Marie binnenkwam.
            Jan sat a   letter to write   when Marie came in
            Jan was writing a letter when Marie came in.

       What is striking about these facts jumps to the eye, if, for the moment, we ignore the 'later'-reading. Then we see that:

Observation:
The differences between Dutch and English that we observe here for main clause predicates in the past in the context of a *when*-clause are **exactly the same** differences that we observed before for Dutch and English predicates in the context of the present: in English, stative predicates are felicitous, while eventive predicates are not (ignoring the 'later'-reading). In Dutch, stative predicates and activity predicates are both fine, but accomplishments get a progressive reading.

How do we account for this? This is where 1066 comes in. If we can give an analysis for the *when*-clause that creates a relation to the main clause predicate that is essentially similar to the relation that the operation PRESENT has to its complement predicate, then the differences between Dutch and English observed here will follow from 1066. This is what I propose.

My first assumption, which I take to be uncontroversial, is that the *when*-clause can adjoin to *tense'* in the main clause. This means that semantically it can be in the scope of the main clause past tense operator, while taking scope over any further main clause operators.

My second assumption is central enough to call it a proposal:

Proposal:
Semantically, when the predicate in the *when*-clause is eventive, the *when*-clause functions as a **perspective** on the main clause.

On the intuitive notion of perspective, as for instance Reichenbach 1947 and Doron 1991 use it (the first under the name of 'reference time', the second under the name of 'point of view'), this assumption makes a lot of sense: the *when* clause is used to locate an event in the matrix, just like perspective does.

But, of course, I am taking the theory of perspective developed in this paper seriously. When I say perspective, I **mean** perspective in my sense; discourse salient **pointstate**.

While I will not go here into the details of the internal semantics of *when*-clauses, I propose that the semantics derives for *when John came in* a set of perspective states**:**

PERS(COME IN$_j$) is a set of perspective states, where each perspective is a current perspective on an eventuality of John coming in.

 (Simplest would be to assume that **PERS(when John came in)** is just INTERNAL(COME IN$_j$), i.e. $\lambda p.\textbf{pers}(p) \wedge \exists e \in$ COME IN$_j$: **end**$(\tau(e))=\tau(p)$, but I am not sure that the perspectives must necessarily come from the end points of the running times of the eventualities in the *when*-clause denotation. So I leave the exact relation open here.)
With this, I propose the following semantics for the *when*-clause:

***When*-clause semantics**:
The adverbial phrase *when John came in* is interpreted as:
$\lambda P \lambda e.P(e) \wedge \exists p \in$ **PERS(COME IN$_j$)**: $\tau(e)=\tau(p)$

The crux of this semantics is the identity statement $\tau(e)=\tau(p)$. Since p is a pointstate, $\tau(p)$ is a point. This means that, on this semantics, the *when*-clause has indeed the same effect on the set of eventualities it applies to (the main-clause set of

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eventualities), as present tense does: it requires a set of eventualities to operate on that can hold at points.

Thus, if we apply the *when*-clause interpretation to a **stative** main clause predicate, like BE ASLEEP$_m$ there is no problem, we get:

$\lambda s.$ BE ASLEEP$_m$(s) $\wedge$ $\exists p \in$ PERS(COME IN$_j$): τ(s)=τ(p)

and with past tense and existential closure, we derive:

Mary was asleep when John came in
$\exists t[\textbf{tense}(t) \wedge \exists s[\tau(s) < \tau(t) \wedge s \in$ BE ASLEEP$_m$ $\wedge$
$\exists p \in$ PERS(COME IN$_j$): τ(s)=τ(p)]]
A state of Mary being asleep held at a past perspective point current with an event John coming in.

But, if we apply the *when*-clause interpretation to an **eventive** main clause predicate, like SLEEP$_m$, there **is** a problem:

$\lambda e.e \in$ SLEEP$_m$ $\wedge$ $\exists p \in$ PERS(COME IN$_j$): τ(e)=τ(p)

is empty or undefined, because the running time of events is never a point.

Now we come to the assumption that the *when*-clause can be adjoined to *tense'*. This doesn't make a difference in English, but it does in Dutch.

If the *when*-clause adjoins to *tense'* , then we have in Dutch, for the main clause predicate it adjoins to, **the same possibilities** available as we had in the present tense cases above: we can realize unmarked internal perspective in activity predicates, and if we do, the predicate that the *when*-clause adjoins to will itself denote a set of perspective states, and the derivation will not run into the problem. Similarly, for accomplishment predicates, we can realize unmarked internal perspective and unmarked progressive aspect, and derive a progressive reading (the unnaturalness of a non-progressive reading can be accounted for along similar lines as we did for the present).

The proposal I made about the semantics of the *when*-clauses was the same for English and Dutch. The proposal is, of course, incomplete, because it says nothing about how the 'later' readings come about. But with respect to the availability of **those** readings, Dutch and English don't seem to differ. Thus indeed:

The differences between English and Dutch follow from 1066.

A note on 'later' readings.
Giving an adequate analysis of the 'later' readings is beyond the scope of this paper. But something can be said, albeit tentatively. Suppose that we assume that these readings are indeed inchoative, or even causal. Then we can assume that they come about, because the derivations of the main predicates in question allow for morphologically invisible realization of an inchoative, or even causal operation in these environments in Dutch and English.

Such an operation can naturally be assumed to be a **modal** operation. This would give us another interpretation of the null modal head (besides habituality), which makes the system <*modality*,**modality**> more complex than a markedness system as I defined it (a markedness system has one null head). And this means that a **theory** would be required about the distribution of interpretations of the null modal head (explaining, among others, why we get habitual interpretations in one environment, and inchoative, causal ones in another). Even in the absence of such a theory (and I don't have one), one more thing can be said.

I said before that I assume that all auxiliary modal operators are **stativity** operators. The way this is naturally achieved is by assuming that modal operators **incorporate** operations of the same sort as my perspective operations **as part of their meaning**.

So, for concreteness, a causal operation could be formulated as:

CAUSE =
λPλp.**pers**(p) ∧ ∃e ∈ P: **begin**(τ(CAUSE(e))=τ(p)

where CAUSE(e), the cause of event e, is an eventuality contextually chosen as a scapegoat for e happening. The modality would come in by the modal-temporal relation **mod** that we would assume to hold between CAUSE(e) and e. (A pure inchoative interpretation could be derived from this by setting CAUSE(e)=e.).

Crucially, applying such an operation in the course of the derivation of the main clause predicate, would indeed make the resulting predicate **stative**, and hence the interpretation of the *when*-clause adverbial given above would apply to the interpretation of this modal or inchoative predicate felicitously, in English, and in Dutch.

In sum, I suggest that the 'later' readings come in, in English and in Dutch, through a null-modality head with as interpretation a modal stativity operation which produces the 'later' effect. But obviously, the exact nature of this operation, and its distribution, require an *in depth* study that this paper can't even start to provide.

3.3. CONTINUOUS *SINCE*.

3.3.1. A continuity operator.

What I will be concerned with in this section is what the OED calls **continuous** *since*, as in (35):

(35) Fred has lived in Amsterdam since 1992.

The OED describes the meaning of continuous *since* by saying that the *since*-clause in (35) expresses that an eventuality, here a state of Fred living in Amsterdam, continues from 1992 **to the present**. While this seems plausible enough for (35), it is easy to see that this description is incorrect. Look at (36):

(36) I had been working on this problem since 1992, when Gennaro solved it in 1996.

In (36), the *when*-perspective point is identified with the past external perspective point of the matrix predicate. Clearly, (36) does **not** express that my working on this problem continues to the present, it expresses that it continued to that perspective point.

Continuous *since 1992* in (35) and (36) expresses that an eventuality continues from 1992 to the perspective point.

(This is not a new observation, but something that is widely assumed in the literature.)

Continuous *since* contrasts with **non-continuous** *since*, as in (37):

(37) I have written two books since 1992.

These two types of readings are discussed in Mittwoch 1988 (and in much literature since, e.g. papers in Alexiadou, Rathert and von Stechow 2003). I will in this paper only discuss continuous *since*; I present an analysis of non-continuous *since* and a discussion of the data in English and Dutch in Landman 2006b.

So we are interested in (35) on the continuous interpretation:

(35) Fred has lived in Amsterdam since 1992.

The truth conditions of (35) specify, one way or other, that there is an interval, whose beginpoint is in 1992, whose endpoint is the perspective point, and *live in Amsterdam* holds throughout that interval. I will assume that semantic derivation of (35) involves an operator **CONTINUOUS** which takes the interpretation of *live in Amsterdam* as input. Note that, since I don't assume anything yet about where this operator comes from, I am not making any linguistic claim yet, I am just formulating the problem in a particular way. This operator will need to express that *live in Amsterdam* holds continuously from a point stipulated by *since 1992* to be in 1992 to a point after that, the perspective point.

What does it mean that *live in Amsterdam* holds continuously?
I will assume that continuity involves **universal temporal quantification**. This assumption is, I think, uncontroversial: it's what you would think it involves, and it's what is standardly assumed in the literature about these cases (following Mittwoch 1988). However, I will make one further assumption, and that is that continuity involves **continuous** universal temporal quantification. This aspect is usually ignored in the semantic literature about cases like (35), but I think it is important.

What does **continuous** universal quantification mean? I take that to mean what one would think it means: universal quantification **that doesn't allow gaps**. But that means something important:

Continuous universal quantification is segmental homogeneity.

This implies that the continuity operator expresses that **at every point** in the relevant interval, some eventuality in *live in Amsterdam* **holds**. And this has an important consequence:

The input of the continuity operator can be a stative predicate but not an eventive predicate.

The reason is that eventive predicates only take events in their denotation, and events cannot hold at points of time. Hence the continuity operator is **undefined** for eventive input predicates.

What I propose now, and this is the heart of my analysis, is the following:

The output of the continuity operator is stative.

When you think about it, this is a very reasonable assumption: it says that the continuity operator is **not** an operator that somehow pieces together a continuous stretch of **states** into an **event**. The output is itself stative.

Of course, we need to determine what the output of the continuity operator **is**, and there are different lines one can pursue here. I will formalize the idea in the following way.

I will assume that the continuity operator **CONTINUOUS** is an expression of type **<<e,t>,<e,<e,t>>,** the type of operators that take a set of eventualities as input and give a **relation** between eventualities as output. For the semantic of **CONTINUOUS** it is useful to introduce a definition:

Let i,j be intervals:

$$[\textbf{i,j}] = \begin{cases} [t_1,t_2] \text{ if } i = \{t_1\} \text{ and } j = \{t_2\} \text{ and } i < j; \\ \\ \text{undefined otherwise.} \end{cases}$$

On this definition, [i,j] is only defined if i and j are **points** (and i < j).
(For point t and interval i, I will write $t \in i$ for $\{t\} \subseteq i$.)

With this, I define **CONTINUOUS** as follows:

> **CONTINUOUS** =
> $\lambda P \lambda x_2 \lambda x_1. \forall t \in [\boldsymbol{\tau(x_1),\tau(x_2)}]: \exists x \in P: \tau(x)=t$

We see here that indeed **continuous** universal quantification is interpreted as segmental homogeneity. As explained, this means that the input predicate can only be stative. But it can easily be seen that the output of **CONTINUOUS** is a **relation between pointstates**: namely, the relation that holds between pointstates s_1 and s_2 iff some input state is true at every point in the interval $[\tau(s_1),\tau(s_2)]$. This is, because of the definition of $[\tau(x_1),\tau(x_2)]$. $[\tau(x_1),\tau(x_2)]$ is only defined if $\tau(x_1)$ and $\tau(x_2)$ are points, hence, if x_1 and x_2 are pointstates.

My next assumption is that phrases like *since 1992* **require** what we could call an interval-building operator. This can be captured by assuming the following interpretation:

> *since 1992* =
> $\lambda O \lambda P \lambda x_2 \lambda x_1 . \tau(x_1) \subseteq \textbf{1992} \wedge \textbf{1992} < \tau(x_2) \wedge \textbf{O}(P,x_1,x_2)$
> where **O** is of type <<e,t>,<e,<e,t>>.

(**CONTINUOUS** is one operator of type <<e,t>,<e,<e,t>> that I assume. The other relevant one that I assume is an operation **BETWEEN** which I discuss in Landman 2006b, for the semantics of non-continuous *since*.)
With this, we generate:

> **Continuous** *since 1992*:
> $\lambda P \lambda s_2 \lambda s_1. \tau(e_1) \subseteq \textbf{1992} \wedge \textbf{1992} < \tau(e_2) \wedge \forall t \in [\boldsymbol{\tau(s_1),\tau(s_2)}]: \exists s \in P: \tau(s)=t$

> The relation that holds between pointstates s_1 and s_2 and set of states P, if $\tau(s_1)$ is in 1992, $\tau(s_2)$ is after 1992 and P is true at every point from $\tau(s_1)$ to $\tau(s_2)$.

So far, I have only talked about the **meaning** of the continuity operator and of the *since* phrase in examples like (35), and not yet about the remaining salient aspect of the meaning of (35): the **perspective linking**, i.e. the fact that the endpoint of the interval introduced by the continuity operator is set to the perspective point. Since what I have said so far doesn't take much of grammatical stand (i.e. it doesn't tell you where the continuity operator comes from in the derivation), it can in principle be tagged onto any existing analysis of cases like (35). This is not so for what I will assume for perspective linking.

Mittwoch 1988 assumes that the continuity operator is introduced by the **perfect** (and I now use *perfect* in a broader sense that I did before, as an operation that involves introducing a perspective time). Mittwoch assumes that the perfect is ambiguous between a universal and an existential interpretation, and what I have called the continuous interpretation is, of course, her universal interpretation. This view is widely followed in the literature (see e.g. papers in Alexiadou, Rathert and von Stechow 2003). On this view, perspective linking can easily be made part of the semantics of the perfect (since the perfect introduces both the continuity operator and the perspective point).

I will take a different view here. I will assume that the continuity operator is an optional null operator, just like – as we have seen – an habitual operator is an optional null operator. As with the habitual operator, there may be constraints on the optionality that I haven't investigated (i.e. it may not always be available in a derivation). And as with the habitual operator, there may be circumstances where it is triggered in a derivation. For instance, if we realize *since 1992*, **one** of the operators **CONTINUOUS** or **BETWEEN** is triggered (see Landman 2006b for discussion).

I propose that perspective linking is not expressed as part of the meaning of the operator **CONTINUOUS**, but as a grammatical semantic constraint on that operator:

> **Perspective linking**:
> In a felicitous derivation the operator **CONTINUOUS** must be in the scope of a **perspective operator** and must be temporally linked to that perspective operator.

What does it mean that the operator **CONTINUOUS** is temporally linked to the perspective operator? It means basically the following: if in a derivation **CONTINUOUS** is realized and gets to be in the scope of a perspective operator, then we will derive something of the form:

$$\lambda p.\textbf{pers}(p) \wedge \exists s_1 \exists s_2[\textbf{CONTINUOUS}(\alpha,[\tau(s_1),\tau(s_2)]) \wedge \varphi(p)]$$

In this interpretation, the operator **CONTINUOUS** is linked to the perspective operator if:

$\lambda p. \textbf{pers}(p) \wedge \exists s_1 \exists s_2[\textbf{CONTINUOUS}(\alpha,[\tau(s_1),\tau(s_2)]) \wedge \varphi(s_1,s_2,p)] =$
$\lambda p. \textbf{pers}(p) \wedge \exists s_1 \exists s_2[\textbf{CONTINUOUS}(\alpha,[\tau(s_1),\tau(s_2)]) \wedge \boldsymbol{\tau(s_2) = \tau(p)} \wedge \varphi(s_1,s_2,p)]$

I will not be concerned here with formalizing this constraint more than I have done here. Rather I will be concerned with how the grammar goes about satisfying it (in English and in Dutch.)

3.3.2. The predicate that continuous *since* clause applies to.

I have now specified what I assume English and Dutch share. Let's now look at the differences. I will first be concerned with the predicates that the continuous *since*-clause applies to.

　　　　We consider English first.

By the perspective linking constraint, the continuous *since*-clause must be in the scope of a perspective operator. By the semantics, the predicate it applies to must be stative. Now, in English, perspective comes with aspect directly below it, but the aspectual operators themselves have no effect on stativity: they map eventive predicates onto eventive predicates and stative predicates onto stative predicates. This means that it doesn't matter (for our purposes here) whether the continuous *since* clause is generated under or above aspect, as long as it is generated under perspective, and we can just as well assume here that it is generated under aspect. This means, then, that in sentences with one perspective (and one aspect) morphologically realized, the predicate we get by stripping off perspective, aspect and the continuous *since* phrase must be stative.

　　　　This means that we predict that in English stative predicates can be felicitously modified by a continuous *since*-clause (under perspective and aspect), but eventive predicates cannot. This is what we find:

　　　　(38)　a.　I have **lived in Amsterdam** since 1992　　　　**Stative**
　　　　　　　　b. # I have **done the dishes** since this morning.　　**Eventive**
　　　　　　　　　　(infelicitous on a continuous interpretation)

Now, we know that the categories of *perspective* and *aspect* (and I will assume *modality* as well) can be realized more than once in a phrase. We saw this already in example (18):

　　　　(18)　John has been writing a book.

This means that we have the possibility in English of realizing internal perspective-progressive aspect **in the scope of** external perspective-perfect aspect, and also of realizing there a null modal head with an habitual interpretation. In both cases, we have in the scope of the external perspective and perfect aspect, a **stative** predicate. Hence, we predict that the continuous *since*-clause **can** adjoin to the latter predicates. Thus, the facts in (38) expand in English to the following facts:

Stative predicates, predicates with internal perspective and progressive aspect and habitual predicates in English are felicitous with a continuous *since*-clause under external perspective and perfect aspect:

　　　　(39) a. I have **lived in Amsterdam** since 1992　　　　　**Stative**
　　　　　　　　b. I have **be**en **doing the dishes** since this morning.　**Int. + Progressive**
　　　　　　　　c. I have **driv**en **a car** since 1992　　　　　　　**Habitual**

Eventive predicates in English are infelicitous with a continuous *since*-clause under external perspective and perfect aspect.

　　　　Systematically what we find for eventive predicates in these contexts is that they are fine with an habitual interpretation; they are infelicitous when the habitual

interpretation is made to disappear, but they become fine again, when a progressive is added:

(40) a. I have **driv**en **a car** since 1992   **Habitual**
     b. #I have **driv**en since this morning   **Eventive non-habitual**
     c. I have **be**en **driving** since this morning.   **Internal + Progressive**

(41) a. I have **smok**ed since 1992   **Habitual**
     b. #You have **smok**ed since I came in   **Eventive non habitual**
     c. You have **be**en **smoking** since I came in. **internal + Progressive**

(as before # in (40b) and (41b) means infelicitous with the continuous interpretation)

These facts (some of which were discussed in Mittwoch 1988) follow from the proposed semantics of the continuity operator and 1066.

I will assume that in Dutch, like in English, categories of *perspective* and *aspect* can be realized more than once in a phrase. But that will mean that examples with eventive predicates corresponding to the infelicitous eventive examples in English, will have felicitous derivations in Dutch, because in Dutch we can realize a **null internal** perspective lower in the clause, and hence get a **stative** predicate to which the continuous *since*-clause can adjoin (under the higher perspective). Given this, with 1066 we expect: **unlike in English, in Dutch eventive predicates are felicitous in such contexts, and accomplishment predicates get a progressive interpretation.** And this is indeed what we find:

(42) a Ik heb sinds vanochtend   **de afwas** ge**daa**n.
        I have since this morning the dishes done
        I have been doing the dishes since this morning
     b. Ik heb sinds vanmorgen ge**red**en.
        I   have since this morning driven
        I have been driving since this morning
     c. Ik heb sinds vanmorgen   **een brief** ge**schrev**en
        I   have since this morning a   letter written
        I have been writing a letter since this morning.

While all these examples are fine, there is a different, preferred, way of expressing these meanings in Dutch. For that I turn to the **perspective linking constraint**.

3.3.3. Satisfying the perspective linking constraint.

Let us take a stative predicate, for example *Fred live in Amsterdam,* and let **LiA** be the set of states of Fred living in Amsterdam. Then we can adjoin *since 1992* and form a felicitous predicate:

(*Fred) live   in Amsterdam since 1992*:
(*Fred) woon in Amsterdam sinds 1992*
$\lambda s_2 \lambda s_1 . \tau(s_1) \subseteq \mathbf{1992} \wedge \mathbf{1992} < \tau(s_2) \wedge \mathbf{CONTINUOUS}[s_1, s_2, \mathbf{LiA}]$

The relation that holds between pointstates s_1 and s_2 if s_1 is in 1992, s_2 is after 1992 and at every point from $\tau(s_1)$ till $\tau(s_2)$ Fred lives in Amsterdam.

The perspective linking constraint tells us that we must realize in the derivation a higher perspective such that the **second** argument of that higher perspective (i.e. the perspective argument) and the **first** argument of this relation are temporally identified.

What we will study now is **how** the grammars of Dutch and English can do this, and what the results are.   I will split this discussion into two parts. First, I will argue in this section, that, without specifying the exact details of how in the grammar perspective linking comes about, we can, already at this stage see, with 1066, what the differences between Dutch and English are going to be, so I will discuss these here. After that, in the next section, I give a grammatical implementation of perspective linking.

DUTCH

We assume we have derived so far:

[$_{VP}$ *woon in Amsterdam sinds 1992*]

$\lambda s_2 \lambda s_1.\tau(s_1) \subseteq$ **1992** $\wedge$ **1992** $< \tau(s_2) \wedge$ **CONTINUOUS**[$s_1,s_2,$**LiA**]

with the requirement of perspective linking. The latter requirement means that this meaning must occur in the scope of a higher perspective. In Dutch, this higher perspective can be a **null** perspective head with interpretation **INTERNAL**.
Thus we can derive in Dutch:

[$_{PerspectiveP}$ **e** [$_{VP}$ *woon in Amsterdam sinds 1992*]

Assuming that perspective linking is successfully dealt with, we can continue the derivation by realizing the **present** and derive:

(43) Ik woon sinds 1992 in Amsterdam.
       I live   since 1992 in Amsterdam

Hence, 1066 predicts:

The continuous construction in Dutch can take the form of a simple present: 'the continuous present'

And this is indeed the case:

(44) a. Ik woon sinds 1992 in Amsterdam.   (stative)
             I live   since 1992 in Amsterdam.
       b. Ik rij   sinds 1992 auto.   (habitual)
           I drive since 1992 car
       c. Ik ben sinds vanmorgen aan het afwassen   (progressive)
            I am   since this morning at the dishwashing
       d. Ik *was*   al   since vanmorgen   vroeg *af*.   (simple present)
           I   dishwash already since this morning early

ENGLISH

By 1066, the Dutch strategy of realizing a null-perspective head to which perspective linking takes place is not available in English. This means that, if we realize a continuous *since*-clause in English, we **must** realize a lexical perspective that the *since*-clause is in the scope of. Moreover, by 1066, we cannot just realize a lexical perspective, in English: if we realize perspective, we must realize **both** perspective

and aspect. And this means that we must realize **either both** external perspective and perfect aspect, *have –en* **or both** internal perspective and progressive aspect, *be –ing***.**

What I will argue now is that, given the semantics of the continuity operator, and the theory of eventualities underlying 1066, the second option –realizing *be –ing*, is not a possibility.

The reason is **stativity**.
Suppose we realize *be –ing*.
Look at the following structure:

[*PerspectiveP* *be*   [*AspectP* *–ing*   [VP *live in Amsterdam sinds 1992*]]]
  INTERNAL   **PROGRESSIVE**   **LiA**
  ↑   ↑   ↑
  1   2   3
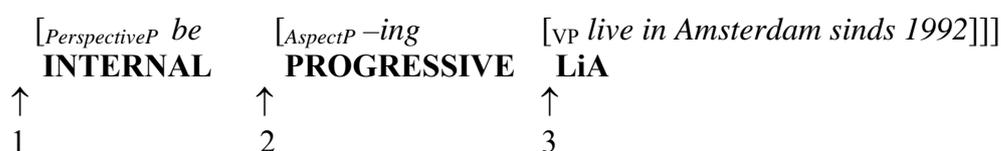
The arrows indicate the adjunction sites for *since 1992* that one might consider. Now, *since 1992* cannot be adjoined at site 1, because that violates the perspective linking constraint (it is not in the scope of **INTERNAL**).

Since 1992 cannot be adjoined at site 2 either. The reason is that **PROGRESSIVE** is an operation which maps sets of events onto sets of events. This means that the output of **PROGRESSIVE** is a set of events. But the output of **PROGRESSIVE** is the input of **CONTINUOUS** if the continuous *since* phrase is generated at site 2, and the input of **CONTINUOUS** must be a set of states. And this is a conflict.

Since 1992 cannot be adjoined at site 3 either.
Assume that *since 1992* is adjoined at site 3. Then the interpretation of *live in Amsterdam since 1992* forms the input for the operation **PROGRESSIVE**.

Now, so far *live in Amsterdam since 1992* denotes a **relation**, and not yet a **predicate**, but that is a technical detail of grammar. The important fact is that, by the semantics of **CONTINUOUS,** *live in Amsterdam since 1992* is **stative**, it denotes a relation between pointstates.   As we will see, the grammar **can** turn this relation into a predicate, but it can only turn it into a **stative predicate**, a predicate of pointstates. And this means that if *since 1992* is generated at site 3, the input of **PROGRESSIVE** will be a stative predicate. But, by the semantics of **PROGRESSIVE** this is infelicitous, as infelicitous as applying the progressive to the stative predicate *know the answer* in (45):

(45) #John is knowing the answer.

With that we have derived:

> **Perspective linking in English cannot take place to internal perspective, but only to external perspective.**

We cannot realize *be –ing* to achieve perspective linking, hence, by 1066, we must realize *have –en*:

> **In English the continuous *since*-construction requires external perspective and (hence) perfect aspect, *have -en*. There is no simple present continuous construction, as there is in Dutch.**

While formulated for continuous *since* here, the same argument applies to non-continuous *since*, see Landman 2006b for discussion. This means that we derive a well known fact about the *since* construction in English (discussed, e.g. in Dowty 1979, Mittwoch 1988 and many papers since) illustrated in (46):

(46) a. I have lived in Amsterdam since 1992.
          #I lived in Amsterdam since 1992.
     b. I have driven a car since 1992.
          #I drove a car since 1992.
     c. I have been doing the dishes since this morning.
          #I was doing the dishes since this morning

Thus we derive the association in English of the *since* phrase with the perfect (once again in the broader sense) from the stativity of the operator that *since* requires (here **CONTINUOUS**) and 1066.

It is important to note that what plays a crucial role in deriving these differences between English and Dutch is the central assumption of 1966 that in Dutch, unlike in English, we can realize internal perspective **without** realizing progressive aspect. Turning this upside down, the facts discussed in this section **motivate** the central idea of 1066: while other theories regard what I have called perspective and aspect as ingredients of **one** grammatical operation (the progressive or the perfect), 1066 assumes that these ingredients are grammatically **separate** operations. Here, then, we see a case, in Dutch, where one (internal perspective) occurs without the other (progressive aspect).

3.3.4 A type shifting account of perspective linking

3.3.4.1. Type shifting principles.

I assume here (as I assume in all my work) a type-driven type shifting perspective on grammar. The semantics needs to build a meaning for a phrase α based on the meanings of the parts. To do that it has, as a start, available the meanings of the parts, the basic operations of meaning-composition, **functional application** and **function composition,** and the type that the meaning of α should be of. Often this is enough to build a meaning for α, but often it is not. In the latter case we have a **semantic mismatch.** Semantic mismatches do not necessarily make derivations crash: the grammar has a mechanism for resolving semantic mismatches at no cost, the **type shifting theory**, a set of **type shifting principles**. The type shifting theory is operative (under grammatical restrictions) where the grammar comes across a semantic mismatch that it cannot resolve by other means.

I assume that type shifting principles are of three sorts.
-Standard **lifting** operations (like the operation that lifts an individual to the set of its properties and the operation that lifts a relation between individuals to the corresponding relation between generalized quantifiers).
-**Domain shifts** (like the pair of operations of intensionalization and extensionalization, and of parceling and grinding; in general, operations that concern what I have called 'dual perspective intensionality' in Landman 2006a)

-**Natural semantic operations**.
The latter are the most important in the present context. What I have in mind are the kind of operations that David Dowty discussed as **grammatical relations** in Dowty 1982: operations that seem to play, across languages, and across categories, a central grammatical role, operations that often are grammaticized in one language but can be argued to be active, even if null, in other languages, operations that often are grammaticized in some categories, but can be argued to be operative, even if null, in other categories. They are, in short, precisely the principles that Partee 1987 proposes as natural candidates for type shifting principles.

Natural candidates for type shifting principles of the third type are the following:
-**Conjunction**: as a type shifting operation, conjunction shifts predicates to **intersective** modifiers (e.g. intersective adjectives and adverbials).
-**Existential closure, EC,** the operation which closes the first argument in of a relation existentially. This operation is invoked in deriving sentence interpretations of type t, in deriving the interpretations of indefinite noun phrases, in some languages without this being lexically marked, in others marked by indefinite morphemes.
-**Converse, CONV**, the operation that makes the last argument in in a relation the first argument in. I argue for this operation as a type shifting operation in the context of *there*-insertion contexts in Landman 2004. It is invoked in the semantics of **passive**, see e.g. Dowty 1982.
-**Passive**, **PASS**, this is the composition of existential closure and converse, it existentially closes the last argument in of a relation:

$$\textbf{PASS} = \lambda R \lambda y. \exists x[R(x,y)]$$

This operation has been widely assumed to be operative in the semantics of passives since the first semantic discussions of passive (e.g. Partee 1975). It is this operation that I will use as a type shifting principle here (plus another operation that I will only introduce later).

3.3.4.2. Resolving perspective linking in Dutch.

We assume we have derived in Dutch so far:

[$_{VP}$ *woon in Amsterdam sinds 1992*]
$\lambda s_2 \lambda s_1. \tau(s_1) \subseteq \textbf{1992} \wedge \textbf{1992} < \tau(s_2) \wedge \textbf{CONTINUOUS}[s_1, s_2, \textbf{LiA}]$

For ease of reference, I will call this relation **S.**
I will use the following notation:

<α, β> means: α and β need to combine into a single meaning, but there is a semantic mismatch to be resolved.

We realize a null perspective head, and derive:

[$_{PerspectiveP}$ **e** [$_{VP}$ *woon in Amsterdam sinds 1992*]]
Interpretation: <INTERNAL, S>

There is a semantic mismatch here: **INTERNAL** is of type <<e,t><e,t>>, while its argument **S** is of type <e,<e,t>>. This mismatch needs to be resolved, and here is a lovely little fact:

FACT: **Resolving the semantic mismatch <INTERNAL, S> with type shifting operation PASS results in an interpretation in which the operator CONTINUOUS is temporally linked to the operator INTERNAL.**

And this means that the perspective linking constraint is satisfied.
The type shifting theory will not miss out on this opportunity to, as we say in Dutch, catch two flies in one swat, and we derive:

[*PerspectiveP* **e** [*VP* *woon in Amsterdam sinds 1992*]]
Interpretation: (INTERNAL(PASS(S)))

which is (after doing all the reductions):

[*PerspectiveP* **e** [*VP* *woon in Amsterdam sinds 1992*]]
$\lambda p.\mathbf{pers}(p) \wedge \exists s_2 \exists s_1[\ \tau(s_1) \subseteq \mathbf{1992} \wedge \mathbf{1992} < \tau(s_2) \wedge$
$\mathbf{CONTINUOUS}(s_1, s_2, \mathbf{LiA}) \wedge \boldsymbol{\tau(s_2)=\tau(p)}\ ]$

The set of perspective states p such that I live in Amsterdam is true all points from a point in 1992 to the time of p, which is after 1992.

This meaning satisfies temporal linking because obviously:
$\lambda p.\mathbf{pers}(p) \wedge \exists s_2 \exists s_1[\ \tau(s_1) \subseteq \mathbf{1992} \wedge \mathbf{1992} < \tau(s_2) \wedge$
$\mathbf{CONTINUOUS}(s_1, s_2, \mathbf{LiA}) \wedge \boldsymbol{\tau(s_2)=\tau(p)}\ ]$
=
$\lambda p.\mathbf{pers}(p) \wedge \exists s_2 \exists s_1[\ \tau(s_1) \subseteq \mathbf{1992} \wedge \mathbf{1992} < \tau(s_2) \wedge$
$\mathbf{CONTINUOUS}(s_1, s_2, \mathbf{LiA}) \wedge \boldsymbol{\tau(s_2)=\tau(p)} \wedge \boldsymbol{\tau(s_2)=\tau(p)}\ ]$

Thus, the perspective linking constraint is satisfied and we can continue to derive a sentence, by realizing the present:

(47) Ik woon sinds 1992 in Amsterdam.
      I live   since 1992 in Amsterdam
      [*tenseP* *Ik* **e** [*perspectiveP* **e** [*VP* *woon in Amsterdam sinds 1992*]]]
      $\exists t[\mathbf{tense}(t) \wedge \exists p[\mathbf{pers}(p) \wedge \tau(p)=\tau(t) \wedge \exists s_2 \exists s_1[\ \tau(s_1) \subseteq \mathbf{1992} \wedge \mathbf{1992} < \tau(s_2)$
      $\wedge \mathbf{CONTINUOUS}[s_1, s_2, \mathbf{LiA}] \wedge \tau(s_2)=\tau(p)\ ]]]$

In a picture:

48
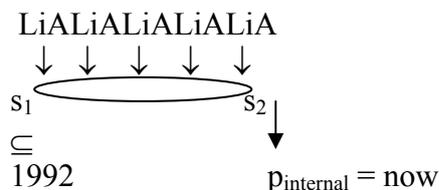
3.3.4.3. Resolving perspective linking in English.

In English, as explained above, we have to realize:

> [*PerspectiveP* have [*AspectP* be [VP *live in Amsterdam since 1992*]]]
> **Interpretation:** <**EXTERNAL, <PERFECT,S>>**

Now I make an observation that will simplify the discussion. The operation
PERFECT requires as input a **set** of eventualities, but it is given a **relation** between
eventualities. If the derivation is to be successful, the grammar will need to derive a
set of eventualities. But the relation between eventualities in question is a relation
between **pointstates**. And I will make the plausible assumption that the grammar can
derive from this relation only a set of **pointstates**. Now, the operation **PERFECT** is
a maximalization operation. And, as we have seen before, applying **PERFECT** to a
set of pointstates is the **identity operation,** because all pointstates are maximal in a
set of pointstates. And this means that, semantically, we can just **ignore** the operation
of **PERFECT.** (For concreteness, we can assume that we resolve the inner type mismatch with
composition, we derive: <**EXTERNAL**, **PERFECT o S**>, which indeed is <**EXTERNAL, S**>.)

Thus, we have:
> [*PerspectiveP* have [*AspectP* be [VP *live in Amsterdam since 1992*]]]
> **Interpretation:** <**EXTERNAL, S>**

In this case, the type shifting operation **PASS** is of no help, because it can easily be
checked that:

FACT: **Resolving the semantic mismatch <EXTERNAL, S> with type shifting
operation PASS does not result in an interpretation in which the
operator CONTINUOUS is temporally linked to the operator
EXTERNAL.**

So we need another type shifting operation.
      Jacobson 1999 amply shows the usefulness and naturalness of what could be
called a **composition cum binding** operation, her operation **z**.
      The idea of **z** is simple: we can describe **function composition** informally as:
compose two functions f and g by applying g to a variable x, applying f to g(x) and
abstracting over x: $\lambda x.f(g(x))$. Operation **z** applies **both** f and g to a variable x,
applies f(x) to g(x), and abstracts over x: $\lambda x.((f(x))(g(x)))$. So:

> $z = \lambda g \lambda f \lambda x.((f(x))(g(x)))$

We can apply **z** in the present context, except that we need to **convert EXTERNAL**
so that the perspective argument is first argument in:

> **BIND** $= \lambda S \lambda O.z(CONV(O),S)$ $= \lambda S \lambda O \lambda e.(((CONV(O))(e)),R(e))$

Now we use the following fact:

FACT: **Resolving the semantic mismatch <EXTERNAL, S> with type shifting operation BIND results in an interpretation in which the operator CONTINUOUS is temporally linked to the operator EXTERNAL.**

So we resolve the mismatch with type shifting operator **BIND** as:

[$_{PerspectiveP}$ *have* [$_{AspectP}$ *be* [$_{VP}$ *live in Amsterdam since 1992*]]]
Interpretation: BIND(EXTERNAL,R)

and derive:

[$_{PerspectiveP}$ *have* [$_{AspectP}$ *be* [$_{VP}$ live in Amsterdam since 1992]]]
Interpretation:
$\lambda p.\ \textbf{pers}(p) \wedge \exists s_1[\tau(s_1) \subseteq \textbf{1992} \wedge \textbf{1992} < \tau(p) \wedge \textbf{CONTINUOUS}[s_1,p,\textbf{LiA}]$

The set of perspective states p such that I live in Amsterdam is true all points from a point in 1992 to the time of p, which is after 1992.

This is, of course, equivalent to:

$\lambda p.\ \textbf{pers}(p) \wedge \exists s_1 \exists s_2[\tau(s_1) \subseteq \textbf{1992} \wedge \textbf{1992} < \tau(p) \wedge \textbf{CONTINUOUS}[s_1,s_2,\textbf{LiA}] \wedge s_2{=}p]$

And this meaning obviously satisfies temporal linking because:

$\lambda p.\ \textbf{pers}(p) \wedge \exists s_1 \exists s_2[\tau(s_1) \subseteq \textbf{1992} \wedge \textbf{1992} < \tau(p) \wedge \textbf{CONTINUOUS}[s_1,s_2,\textbf{LiA}] \wedge s_2{=}p]$
=
$\lambda p.\ \textbf{pers}(p) \wedge \exists s_1 \exists s_2[\tau(s_1) \subseteq \textbf{1992} \wedge \textbf{1992} < \tau(p) \wedge \textbf{CONTINUOUS}[s_1,s_2,\textbf{LiA}] \wedge s_2{=}p$
$\wedge \tau(e_2) = \tau(p)]$

What we have derived is (in essence) the **same** interpretation as the one we derived for the perspective phrase in Dutch. Adding present tense, and doing existential closure gives us (48):

(48) I have lived in Amsterdam since 1992
[$_{tenseP}$ *I e* [$_{perspectiveP}$ *have* [$_{aspectP}$ *-ed* [$_{VP}$ live in Amsterdam since 1992]]
$\exists t[\textbf{tense}(t) \wedge \exists p[\textbf{pers}(p) \wedge \tau(p){=}\tau(t) \wedge$
$\exists s_1[\tau(s_1) \subseteq \textbf{1992} \wedge \textbf{1992} < \tau(p) \wedge \textbf{CONTINUOUS}(s_1,p,\textbf{LiA})$

There is a tense state and a cotemporal perspective state and some pointstate s_1 in 1992 such that the tense and perspective are later than 1992, and at each point from s_1 to the perspective point *I live in Amsterdam* is true.

In a picture:

LiALiALiALiALiA
↓ ↓ ↓ ↓ ↓
s_1 ⟨⟩ s_2 ⎤
= ⎥ bind
$\tau(s_1)$ < $p_{external}$= now
⊆
1992
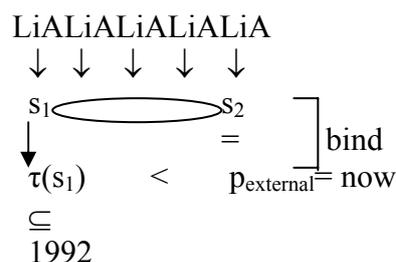
The reading we get is equivalent to what we got in Dutch, but in English it must be expressed in the present perfective, while in Dutch it can be expressed in the simple present. (The resolution mechanism that we have used in English is available in Dutch too, though it is obviously less simple than the internal perspective strategy: indeed, as I mentioned before, perfects with continuous *sinds* are ok in Dutch, though Dutch speakers would more readily use the continuous present. Some complications with non-continuous *since* are discussed in Landman 2006b.)

3.3.5. Continuity and the perfect.

Unlike Mittwoch 1988, and papers following that, I have not made the continuity operator part of the semantics of the perfect (in the broad sense again). I have made it an operator that maps a set of states onto a relation between states, and I have derived the relation between this operation and the perfect in English from the stativity of this operator, 1066, and the perspective linking constraint. The perspective linking constraint doesn't require there to be a perfect, for *since* to be felicitous, it requires there to be a **perspective**. Since this perspective can be **internal** perspective in Dutch, we derive the fact that in Dutch we have a present continuous. Had we made the continuity operator part of the semantics of the perfect, then we would have had a different, most likely less general and less unified story about the Dutch present continuous. This, then, seems to be an advantage of the present account.

I have so far discussed continuous interpretations in the presence of a *since* phrase. In such cases, a perspective linked operator is triggered in the derivation. But I have assumed that the continuity operator is a null operator which can be realized independently of a *since* phrase. This means the following for English: if, in English, we have a sentence in which external perspective and perfect aspect, *have –en*, are realized, and in which the main predicate is **stative,** that sentence **could** (*ceteris paribus*) have a continuous interpretation. if, however, the main predicate is **eventive**, the sentence couldn't have a continuous interpretation. If the main predicate is stative, we could realize the null operator **CONTINUOUSLY** and derive a felicitous interpretation. If the main predicate is eventive, realizing **CONTINUOUSLY** does not yield a felicitous interpretation.

This predicts, then, that in English a sentence with a **stative** predicate, like the italicized phrase in (49) and (50), is ambiguous (both continuations in (49) are felicitous), but a sentence with an **eventive** predicate, like (50), is not ambiguous, and hence the continuation in (50) is infelicitous:

    (49) A. What have you been doing with your life?)
        B. a. I have *be*en *writing a book.* It's finished now.
        B. b. I have *be*en *writing a book*. In fact, I still am.

    (50) I have *writt*en *a book*. #In fact, I am still writing it.

And this seems to be correct.

The perfect, and in particular the English perfect, is an exceptionally well studied phenomenon. I am well aware that there is a world out there of intricate facts that I haven't taken into account, and interesting analyses of those facts that one would have to take into account, in providing a satisfactory account of the perfect. Thus, I am well aware that what I have been assuming about the perfect is tentative, and may need considerable modification.

Yet, I think the present approach is interesting and promising, **precisely** because 1066 focuses on something the importance of which has, I think, been

underestimated in the literature (one exception is the work of Frank Vlach, e.g. Vlach 1981).

1066 generalizes the stative/eventive distinction from a distinction in lexical predicates to a distinction in predicates in general. With that, the framework allows us to study in detail the effects of different kinds of operators: operators with an eventive input and an eventive output, operators with a stative input and a stative output, and, importantly, stativizing operators. And the gist of the present paper is precisely that the effects of stative and stativizing operators are many, and indeed that it is this which has been underestimated. The grammatical assumptions of 1066 make it possible to study and localize these effects cross-linguistically. With respect to the phenomena studied in this section, this allowed us to reduce what seem to be **major** differences between English and Dutch to one simple difference: Dutch allows null internal perspective.

3.4. STAGE LEVEL STATIVES IN THE PROGRESSIVE.

In the previous three sections I have discussed differences between English and Dutch that, so to say, follow directly from 1066. The differences discussed in this section don't directly follow from 1066, but can be seen as responses to it.

Dowty 1979 argues that the so-called *do*-test (felicity of VP in contexts like *what X did was VP*) is an aspectual test, and not an agentivity test. Dowty shows that intransitive movement verbs, like *roll* are eventive, and come out as felicitous on the *do*-test, **even** if the subject is non-agentive. This holds both in English and in Dutch:

(51) a. What the ball did was roll down the hill.
     b. Wat de bal deed was de heuvel afrollen.
       What the ball did   was the hill   roll down

Stative verbs, on the other hand, are not felicitous in the *do*-test, and again this holds both in English and in Dutch:

(52) a. #What John did was resemble his aunt.
     b. #Wat   Jan deed was *op* zijn tante *lijken*.
        What Jan did   was   his aunt resemble
     c. #What the sock did was lie under the bed.
     d. #Wat   de sok deed was onder het bed liggen.
        What the sock did   was under the bed lie

Dowty 1979 points out that, what he calls, following Carlson 1977, **stage level statives** like *sit/lie/hang*... are, surprisingly enough, felicitous in the progressive, while, as is well known, normally statives are not:

(53) a. The sock was lying under the bed.

The fact that I want to draw attention too here, is that there is a difference in this respect between English and Dutch: sentences like (53b) and (53c) in Dutch are just as hilariously infelicitous as the cases in (52):

(53) b. #De sok   was onder het bed aan het liggen   (progressive)
          The sock was under the bed at   the lying
    c. #De sok   lag onder het bed te liggen.   (progressive)
          The sock lay under the bed to lie

How can we account for these facts?
First, I propose a lexical constraint on the semantics of *do* which English and Dutch share:

Lexical constraint on the semantics of *do*:
You can only *do* things that you can do in stages.

This means that the semantics of *do* requires the VP in the *do*-test to denote a set of eventualities that you can do in stages. I take this to mean that the VP must denote a set of eventualities of which each ~-maximal element has more than one stage (otherwise you can't do it in stages). And this means:

Consequence: *do* requires the VP to denote a set of eventualities of which
each ~-maximal element **has proper stages**.

Since this is the case for eventive verbs, and not for stative verbs, eventive verbs are felicitous in the *do*-test and stative verbs are not: the lexical constraint on the meaning of *do* accounts for the facts in (51) and (52). What is needed still, is an account of the differences in (53).

Here 1066 provides a heuristics. We observe a difference between English and Dutch which obviously relates to the tpa-system. The first question to answer is: who is to blame? Dowty 1979, and others after him, have tried to come up with a semantic rationale for the fact in (53a), i.e. a story that makes it **reasonable** that stage level states could be used in the progressive. On such an account, Dutch is to blame for the difference: the Dutch apparently don't allow something that is, if Dowty and the others are right, eminently reasonable.

1066 suggests a different line of thought. On 1066, English is the language that underwent a change in the tpa-system. Given that, it is more reasonable, or more promising, to think of the facts in (53a) as a consequence of something that happened in English (and by that I don't mean that the English got semantically enlightened, while the continent continued to suffer in semantic darkness). Moreover, the nature of the change plays a role too. On 1066, the change was from a markedness system for perspective and aspect to a lexical system. This means, in particular, that the progressive operator got lexicalized. But, taking into account the rate of semantic change for normal lexical items (rapid), one would expect that *ceteris paribus*, a lexicalized operator is more likely to undergo semantic change, pick up bits of extra meaning, than an unmarked operator.

Given this, 1066 suggests that maybe we shouldn't be looking for a deep fundamental account of why stage level states can occur in the progressive in English: a superficial account, which ties the facts to a little lexical change in English may just be more appropriate.

Here is a suggestion.
The progressive operator **PROGRESSIVE** I defined above makes use of the stage-of relation: $\preceq_e$. This operation is used in Dutch. Let us assume that English uses an

operation **PROGRESSIVE***, which is the same operation, except that it uses a relation $\preceq_e*$, where:

$$\preceq_e* = \preceq_e \cup \{<s,s>: s \text{ is a stage level state}\}$$

What does this mean?

Stage level states are states and not events. Stage level states do not have $\preceq_e$-stages, so, obviously they do not have **proper** $\preceq_e$-stages. Stage level states do not have proper $\preceq_e*$-stages either, but they **do** have **improper** $\preceq_e*$-stages. This means that the $\preceq_e*$ relation takes the *stage* in *stage level states* serious: while they are not events, and don't have stages, for $\preceq_e*$, they can **themselves** count as stages.

On this proposal, the English progressive uses an ever so slightly more liberal notion of 'stage-of' than Dutch does, a notion which counts stage-level states as improper stages of themselves. And this is all.

This is a little lexical change if ever I saw one, and it is enough to account for all the data introduced in this section. Nothing changes in English with respect to the *do*-test: even if we calculate that test in terms of $\preceq_e*$ rather than $\preceq_e$, stage-level statives are infelicitous in the *do*-context because they don't have **proper** stages.

The difference comes in in the progressive. The semantics of the progressive is not formulated in terms of a proper stage-of relation, but just a stage-of relation (even though pragmatically we will usually strengthen this to 'proper stage'). The only semantic difference between **PROGRESSIVE** and **PROGRESSIVE*** is that the latter can apply to stage level states.

If you're looking for sweeping deep semantic explanations, this is of course unbearably stipulative, superficial and disappointing. But I think that the facts in (53), in the light of 1066, call for an account that **is** superficial, and in that light, the present suggestion gains plausibility.

CONCLUSION

I have given a general theory of segmentally homogeneous states and incrementally homogeneous events; of stative operators, eventive operators and stativizing operators; and of a tense-perspective-aspect (tpa) system, general enough to apply to both Dutch and English.

1066 consists of three parts:
1. The synchronic hypothesis that the Dutch and English tpa systems differ in that the English perspective and aspect systems are lexical systems, while the corresponding Dutch systems are markedness systems.
2. The diachronic hypothesis that this difference is the result of a change that took place in the transition from Old English to Middle English (under Viking influence?)
3. The hypothesis that all other differences follow from this one change directly, or indirectly, either as a reaction to pressures built up by the change, or as lexical change made possible by the change of status from an unmarked operator to a lexical operator.

Of course, 1066 is an empirical hypothesis, and we may well find differences in the tpa systems that cannot be attributed to it. But so far, we **have** looked at several quite complex constructions, and 1066 has been very successful in them.

Ending with a bit more diachronic musing I note the following.

English and Dutch branched off a **very** long time ago. Yet, apart from **one** big change, 1066, and its consequences, **nothing** much has happened in the tpa systems of these languages. This means that the tpa system of these languages is a **remarkably stable and conservative** system. What is interesting is that we **do** find semantic change, but that the rate of this kind of semantic change is much slower than lexical, phonological, or syntactic change. That is, of course, linguistically (and cognitively) interesting in its own right, but it also gives a heuristics for thinking about other languages, and even language families. Given the fact that, as far as the tpa system is concerned, English and Dutch are practically dialects of the same language, one would be surprised to find the tpa systems of closely related languages to be very different.

For instance, the suggestion here is that the English tpa system forms a lexicalized variant of the older Germanic markedness system, which has been preserved in other Germanic languages like Dutch. Now, with respect to the facts about perspective and aspect discussed in this paper, the Romance languages seem to be more like Dutch, and not like English (and we find in Romance split auxiliary systems like Dutch). With this, the heuristics would suggest that Romance may share the perspective and aspect markedness system with Germanic (the differences, presumably, lying in the categories of tense and modality). This, of course, would date the markedness perspective and aspect system as far back as before the split between Germanic and Romance.

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