

Event Structure, Punctuality, and 'When'

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Nov 19th 2003

Abstract

In this paper, I discuss observations on 'when' given by Sandström (1993) for constructions of the form 'when A B', where A and B both describe events (as opposed to states). Sandström proposes that for events described in the simple past, the temporal interpretation of such sequences varies according to whether A describes a culminated process (CP) (accomplishment) or a culmination (CULM) (roughly, an achievement). She offers an account of this behaviour, based on the claim that culminations denote changes of state while culminated processes do not. I argue that this claim is unmotivated, and in addition, draw attention to a range of counter-examples to her generalisation. I present an analysis which is not based on the CP/CULM distinction but relies instead on the distinction originally proposed in (Dowty 1979) between the event structures CAUSE-BECOME and BECOME. I show that this

* I would like to thank Nicholas Asher, John Barnden, Peter Coxhead, Robin Cooper, Ivan Derzhanski, Jim McGilvray, Martin Mellor, Carlota Smith, Antonella Sorace, Mark Steedman and Alan Wallington for helpful discussion and comments. I am grateful to participants at the Time, Space and Movement Conference, Toulouse, 1995 for discussion and helpful suggestions concerning an earlier version. I am also indebted to the editors and an

distinction is closely related to whether the event has a prototypical agent. It is therefore thematic structure rather than temporal structure that determines the behaviour of ‘when’ in these cases.

1. Introduction

Sandström (1993) observes an interesting and, to my knowledge, previously unnoticed contrast between the behaviour of main-clause sequences of events described in narrative discourse, such as:

(1) Bertie arrived at the airport. He went to the check-in desk.

and ‘when’-constructions of the form:

‘when’ $e_1 e_2$

(where e_1 and e_2 are events¹) such as:

(2) When Bertie arrived at the airport he went to the check-in desk.

As Sandström points out, in DRT (Kamp and Reyle 1993), examples like (1) and (2) receive the same representation. This is the case, too, in the analysis of (Moens 1987), where in each case the event of Bertie going to the check-in desk is placed within the consequent state of the event of his arrival at the airport. However, while this treatment appears to work for examples like (1)

anonymous reviewer for Natural Language Semantics. Part of the work reported here was supported by an EPSRC Postdoctoral Fellowship.

and (2), there are other cases where it is unsatisfactory to give a uniform treatment to main-clause sequences and the corresponding ‘when’-constructions. The problematic cases include examples like:

(3) Bertie drank his beer. He left the pub.

(4) When Bertie drank his beer he left the pub.

Example (3) is fine, while (4) is rather odd and does not carry the same meaning as (3). For some reason, (4) sounds as though the event of Bertie leaving the pub does not follow the event of Bertie drinking his beer, but instead temporally coincides with or overlaps it.² In other words, the ‘when’-clause in (4) does not appear to advance the narrative in the same way as the ‘when’-clause in (2). In order to convey the meaning we require, we have to use the past perfect, as in:

(5) When Bertie had drunk his beer he left the pub.

We may ask why the past perfect is required in order to get this effect in (5), but not in (2).

Sandström claims that the relevant distinction here is between events of type CULMINATION (CULM) on the one hand and those of type POINT and CULMINATED PROCESS (CP) on the

¹ Sandström has a different proposal for ‘when’-constructions involving states, which will not concern us here.

³ Even on this reading it still does not sound quite right, but what is clear is that we certainly do *not* get the reading where Bertie drank his beer and then left. The reading that is available seems to correspond to something like “On the occasion that Bertie drank his beer...”

other.³ She maintains that, in cases where the ‘when’-clause describes a CULM, such as (2), the ‘when’-construction with the simple past can be used to achieve the same effect as the corresponding main-clause sequence. The effect is, as we saw above, that the main-clause event follows the ‘when’-clause event. For CPs and POINTs, however, the past perfect must be used to achieve this effect.

I will point out shortly some counter-examples to Sandström’s claim, and offer a revised analysis. First, however, it is necessary to look at her account in a little more detail.

2. Sandström’s analysis of ‘when’

In addition to the examples presented above, Sandström gives examples like:

(6) When Florence wrote a book, Agatha built a boat.

Here, the effect of forward movement of time, or “narrative advancement” is achieved with the past tense, even though the event in the ‘when’-clause is a CP. Sandström accounts for this by postulating a discourse relation known as **response**. If the main-clause event can be interpreted as a response to the ‘when’-clause event, then the effect of narrative advancement is achieved with the simple past. This does not work in (4), according to Sandström, because it is not easy to

³ The terminology used by Sandström, which I will use also, is that of (Moens 1987; Moens and Steedman 1988). Moens’ and Steedman’s culminated processes are roughly equivalent to Vendler’s accomplishments. Culminations and points each correspond to a sub-class of Vendler’s achievements. Culminations, according to Moens and Steedman, have consequent states, while points do not.

see Bertie's leaving the pub as a response to his drinking his beer. It is, however, much easier to interpret Agatha's building a boat as being a response to Florence's writing a book (perhaps Agatha was being competitive).

Compare, also:

(7) When Freddie poured his beer over Bertie's head, Bertie left the pub.

which can similarly be seen as response, resulting in narrative advancement.

Sandström proposes that 'when' (in a construction involving two events) may convey one of two relations, these being:

(A) **Consequentiality**. Sandström proposes that this relation comprises three sub-relations, these being:

(i) **Causation**. The main-clause event is caused by the 'when'-clause event.

E.g. *When Agatha pushed Bertie, he fell over.*

(ii) **Response**. The 'when'-clause event evokes the main-clause event as a response. An example is (7) above.

(iii) **Enablement.** This is different from causation and response in that rather than being a relation between two events, it is a relation between an event (the main-clause event) and a change of state (the referent of the ‘when’-clause). An example is (2) above. Sandström proposes that enablement relations also obtain in narrative discourse consisting of main-clause sequences. In this case, the enablement relation holds between the latest event to be presented by the discourse and what she calls the current episodic structure (or E-state) of the discourse, using the model of narrative structure developed in (Caenepeel and Sandström 1992).⁴

Note: There are a number of problems associated with distinguishing between ‘response’ and ‘enablement’, which I will address below.

(B) There is a relation **part-of** or **sub-event** between the events in the two clauses – i.e., the event described by the main-clause can be interpreted as a sub-event of the ‘when’-clause event. E.g. *When Florence visited the zoo she saw some penguins.*

Here, the effect is not one of temporal advancement but of temporal inclusion.

Sandström’s claim is that the notions of consequent state and enablement can be used to explain the different behaviour in ‘when’-constructions of CPs and POINTS on the one hand and

⁴ In fact, Sandström does not make it clear that it is the onset of the E-state rather than the E-state itself which is involved here. I have assumed that she intends to refer to the onset, as this makes the explanation of the main-clause sequence examples consistent with the explanation for the corresponding examples with ‘when’.

CULMs on the other. She proposes that CULM VPs “denote a change-of-state”, whereas CP and POINT VPs do not. Because CULM VPs denote not only the event itself but the corresponding change-of-state, the main-clause event can be related by enablement to the referent of the ‘when’-clause. This explains why (2) conveys the same effect as (1) – the relation is one of **enablement** in each case. Because, according to Sandström, CPs do *not* denote a change of state, the relation of enablement cannot hold in (4), and thus we do not get the effect of narrative movement.

Thus, for constructions of the form:

‘when’ e_1 (CULM, SP) e_2

enablement can hold between e_2 and e_1 (‘SP’ stands for ‘simple past’).

On the other hand, for constructions of the form:

‘when’ e_1 (CP, SP) e_2

the enablement relation is not possible.

This means that unless response or causation⁵ is possible the construction will sound odd. But if e_1 is described by a past perfect, then the consequent state of e_1 is denoted, and this allows the enablement relation to hold between e_2 and the onset of the consequent state of e_1 .

(I will consider counter-examples to Sandström’s claims in the next section.)

⁵ Or part-of, which, as we said above, corresponds to temporal inclusion.

One problem with her explanation is that Sandström stipulates that, but does not explain why, CULM expressions but not CP expressions denote changes of state. She is clearly not trying to argue that CPs do not have any consequent state associated with them at all. She says elsewhere (p.117)⁶ that “some CPs have an implied consequent state”, and divides CPs into those that, she claims, have an implied consequent state and those that, she says, do not.⁷ So Sandström apparently intends the difference to lie in whether the VP explicitly denotes the change of state to the consequent state or not. But she does not give any hint as to why it should be that CULM expressions, but not CP expressions, explicitly denote a change of state.⁸

Of course, it might be argued that a CULM expression denotes *only* the change of state, and no more, whereas a CP expression denotes not only the change of state but also the preparatory process leading up to it (in line with Moens 1987). But this still involves a change of state being part of the denotation of a CP expression, which does not fit with Sandström’s claim that CPs do not denote a change of state. And if this claim is unmotivated, then we are left without a way to explain the difference in behaviour of CPs and CULMs in this type of construction.

Furthermore, as I will show below when we look at a wider range of examples, the behaviour of simple past ‘when’-constructions can be seen *not* to correspond exactly to the CP/CULM

⁶ Page numbers from now on refer to (Sandström 1993).

⁷ She uses this to explain selectional restrictions of CP expressions with ‘for’-adverbials. The idea seems quite similar to Egg’s +/- change predicates in (Egg 1995).

⁸ Note that the reason that a POINT expression does not denote a change of state is clearer. POINTS, according to the analysis of (Moens 1987), which Sandström adopts here, do not have a consequent state at all.

distinction in the way that Sandström claims.

I will present some counter-examples in the next section, which show that the distinction Sandström identifies does not correspond to the aspectual class distinction between CPs and CULMs. I will propose a modified analysis which explains the counter-examples and deals with some other problems to be discussed shortly.

3. Counter-examples

It is possible to construct examples with CPs where enablement appears to be allowed in simple past ‘when’ constructions. Consider the following, where in each case the event described by the ‘when’-clause is a CP.⁹

- (8) When the ice melted (away), mammoths returned to the region.¹⁰
- (9) When the pavements dried (up), we went for a walk.
- (10) When Bertie’s socks dried (out), he put them on again.
- (11) When the tomatoes ripened, we picked them.
- (12) When Gussie’s leg healed (up), he recommenced his training.

⁹ Perhaps this assertion needs to be argued for. One way to do this is to consider, in the case of (8), for example, the sentence ‘The ice took a hundred years to melt’. Note that if this is true, we can say, at any time during the 100 year period ‘the ice was melting’. Now compare ‘Bertie took three hours to reach the top’. If this is true, we cannot say ‘Bertie was reaching the top’ at any arbitrary time in the 3 hour period. This is the type of test used in (Vendler 1967).

¹⁰ Some informants prefer these examples with the bracketed material added, possibly because this makes it clear that a CP not a PROCESS is involved, in the intended reading. This does not affect my point here.

The ‘when’ clause in each of these sentences describes a non-punctual event – they all come out as culminated processes (accomplishments) on the traditional tests (see (Vendler 1967), for example, and footnote (9) below). Yet they all give forward-movement.¹¹

One possibility we should consider is that, in at least some of these examples, the **response** relation is present. This would allow Sandström to explain why we get narrative advancement with the simple past. However, in Sandström’s account, one of the differences between response and enablement is that response does not require the first event (e_1) to be completed. For example, consider the case of (6), repeated here as (13):

(13) When Florence wrote a book, Agatha built a boat.

It is possible that Agatha starts building her boat before Florence has finished writing her book. There is no requirement that event e_1 be completed before event e_2 can begin. This is different from enablement, where, according to Sandström, e_1 must be completed before e_2 begins. Notice that in each of (8-12)¹² the sense conveyed is that e_1 is over before e_2 begins. It is the fact of Bertie’s socks being (completely) dried/dry that enables him to put them on again. Thus it seems that (8-12) are better seen as examples involving enablement. It seems that we may rule out causation in the above set of examples, too, as none of them seem to involve this relation, at least on an intuitive understanding of the term.

¹¹ A few informants say that they marginally prefer (8-12) with the past perfect. However, all my informants find the examples acceptable with the simple past, as given.

Of course, it may be that some “responses” do require the first event to be completed, while others do not. This raises a larger issue of how we are to decide whether response or enablement is present in a particular case. Sandström does not give any test for this¹³, but appears to assume that it will be clear in some intuitive fashion which relation is present. I suggest a test for enablement that relies on the observation that in the enablement cases it appears always to be possible to substitute the past perfect for the simple past in the ‘when’-clause, with very little or no change of meaning. This appears to be the case in all of (8-12) and in a wide range of other examples considered. I suggest the further test that, in the enablement cases, it is possible to substitute ‘once’ for ‘when’, with little or no meaning change.

I conclude, therefore, that examples (8-12) are indeed counter-examples to Sandström’s claim.

Now, if it is reasonable to say that Bertie’s putting his socks back on is “enabled” by their drying (out) (e.g. on a washing line), then surely we could similarly view Bertie’s putting his socks back on as being enabled by Bertie’s drying his socks (by hanging them on the line or putting them in a tumble drier, for instance). If this is the case, then the following should be felicitous:

(14) When Bertie dried his socks, he put them on again.

¹² With the exception, possibly, of (8).

¹³ Other than stipulating that response can only be invoked in a sentient agent. This appears to raise other problems, which I will not go into here.

Yet (14) sounds very odd. We do not get the expected forward movement of the narrative with the simple past – we need the past perfect in order to get the desired effect:

(15) When Bertie had dried his socks, he put them on again.

Why are (10) and (14) so different? For some reason, the specification of an agent in (14) appears to get in the way of the forward movement reading. Why should this be so? It even seems possible to use (10) and (14) to describe exactly the same event¹⁴ - yet the way the event is described rules out forward movement in one case and allows it in the other.

Before attempting an explanation, let us look at a counter-example of a different type.

Sandström's claim is that CULM 'when'-clauses always allow the enablement relation, and thus always succeed in moving the narrative forward. But consider the following:

(16) When Angela typed the last full stop of her essay she went to the pub.

Typing the last full stop of an essay appears to be an event of type CULM. It is effectively punctual (or as much so as any real-world event can be), and it marks the end of an associated CP, that of writing an essay. Furthermore, if we can say 'It took Angela ten minutes to type the last full stop of her paper', then we cannot, at any arbitrary time in those ten minutes, say 'Angela was typing the last full stop'. Thus we clearly seem to have a CULM here. We would

therefore predict, on Sandström's account, that the 'when'-clause in (16) would move the narrative forward and we would get a reading where Angela went to the pub after typing the last full stop. But it is very hard, if not impossible, to get this reading for (16).¹⁵

It appears, then, that there are punctual events which do not give the forward-movement reading with the simple past and 'when'. It seems clear that the punctuality feature is not what counts here.

To sum up, we have seen a number of counter-examples to Sandström's rules, including, as well as (16), the CPs in (8-12) which were problematic for her account. Perhaps the explanation for the different behaviours with respect to narrative movement is not to be found in aspectual class distinctions after all – or at least not if we make the distinction in terms of punctuality. Where else can we look for an explanation?

4. An alternative explanation

Notice that in all the examples (8-12) the 'when'-clause contains an intransitive, and, moreover, that these intransitives all belong to the sub-class of intransitives known as unaccusatives (Perlmutter 1978; Zaenen 1988; Levin and Rappaport Hovav 1995).¹⁶ It is, of course, widely

¹⁴ I use 'event' in a pre-theoretical sense here.

¹⁵ Note the contrast between (16) and:

(i) When Angela finished her paper she went to the pub.
which sounds better on a 'forward' reading than (16). For some speakers, however, (i) is not perfect, and they prefer the corresponding sentence with the past perfect 'had finished' in the 'when'-clause. I will return to this example towards the end of the paper.

¹⁶ This is shown, for example, by the fact that all of (8-12) allow resultative constructions – for example (8) allows 'away to nothing' to be added, to give:

accepted that the phenomenon known as unaccusativity is characterised by the (grammatical) subject having some non-agentive properties.¹⁷ I will explore this further below.

Some of Sandström's examples of CULMs that allow enablement with the simple past turn out to be unaccusatives, too. Below, I give her complete list of examples of CULMs that allow enablement (page and example numbers here refer to Sandström 1993).

p.62, 35(b): When she reached him she said in his ear

p.62, 35(c): When she recovered herself from the effort she tried in vain to catch a glimpse of the canoe

p.198, 39(c): When it came to my turn I drank

p.69, 43(a): When the bananas came they had their breakfast together

p.71, 47(a): When I reached her she turned

p.71, 47(b): When she recovered her balance she looked behind

Notice that that 39(c) and 43(a) are unaccusatives. The rest are transitive constructions, but note that 35(b), 35(c), 47(a) and 47(b) can all be seen as examples where the subject undergoes a

(ii) When the ice melted away to nothing, mammoths returned to the region.

Similarly, (11) can take the resultative phrase 'to full redness', giving:

(iii) When the tomatoes ripened to full redness, we picked them.

The possibility of adding a resultative phrase is given by Levin and Rappaport Hovav (1995) as a diagnostic of unaccusativity. Intransitives that are not unaccusatives (unergatives) do not allow this, as shown by, for example: '??Mary shouted hoarse', which cannot mean "Mary shouted herself hoarse" (see the discussion in (Levin and Rappaport Hovav, p.34ff)). See Section 6 for further discussion of unaccusatives.

¹⁷ See, for example, (Sanfilippo 1991), which uses Dowty's (1989) notion of thematic roles as cluster concepts.

change of state. They are not typical agent/patient constructions according to the tests given in (Dowty 1989). I give Dowty's list of entailments for agent and patient proto-roles below, for reference.

Proto-Patient

- (a) Undergoes change of state
- (b) Incremental theme
- (c) Causally affected by another participant
- (d) Stationary relevant to movement of another participant¹⁸

Proto-Agent

- (a) Volitional involvement in the event or state
- (b) Sentience (and/or perception)
- (c) Causing an event or change of state in another participant
- (d) Movement (relative to the position of another participant)

According to the above, in a prototypical event described by a transitive VP, the agent is described as causing an event or change of state in another participant (often the patient), while the patient is described as undergoing a change of state. Notice that in 35(b) it is the subject, not the object, that undergoes the change of state (a change of position in this case). 35(c) is

reflexive, so here again the subject undergoes a change of state (from exhaustion, or something similar, to recovery).

47(a) is like 35(b). In 47(b) there is no “real” object capable of being causally affected or of undergoing a change of state. The transitive construction describes, instead, a change of state of the subject, from being unbalanced to being balanced, or similar.

What emerges is that each of Sandström’s examples (and each my examples (8-12)) describes a *change of state in the subject*. Notice that what matters is what is explicitly described. We are not concerned with whether a change of state in the subject may be *inferred* from the information given.

Now let us look at the example (16) (repeated here as (17)) I gave earlier of a CULM that does not give narrative advancement with the simple past.

(17) When Angela typed the last full stop of her essay she went to the pub.

Notice that this sentence *does* appear to describe a typical agent/patient event, according to Dowty’s lists of entailments. The event is presented in such a way that the subject does not undergo a change of state but, rather, causes an event (the typing of the full stop). So it begins to look as though the criterion for the enablement relation (for cases of simple past ‘when’-clauses)

¹⁸ An additional entailment, (e), which Dowty expresses some doubt about, is not given here.

is not that the ‘when’-clause describes a CULM, but rather that the ‘when’-clause describes a particular kind of event where the subject has the role of a prototypical patient which undergoes a change of state. Let us provisionally call this type of event¹⁹ a **subject state transition**, abbreviated to SST. Clearly, the state transition need not be an instantaneous one – it may be protracted, as in the examples (8-12) given earlier. Many SSTs do appear to be effectively instantaneous and therefore of type CULM, but this is not always the case. It appears that it is not the aspectual class distinction between CPs and CULMs (defined in terms of punctuality) that is decisive, but the question of whether or not the event is presented or “packaged” in such a way as to describe a change of state in a prototypical patient realised as the subject. “Real world” properties of the event which may be inferred from what is described are not what is important here. It would be difficult to think of an event for which it is not possible to make the inference that some change of state takes place in the referent of the subject NP. Yet our analysis requires us to say that non-SST events do not correspond to a change of state in the subject. This may appear to be problematic. For example, in the case of the non-SST:

(18) Bertie dried his socks.

do we really want to maintain that Bertie does not change state? We might imagine Bertie entering into a state where he glows with pride at the task he has accomplished. But notice that this is merely an inference we may make on the basis of the information given – it is not a necessary entailment, and it may be cancelled. It goes beyond what we are explicitly told in (18),

¹⁹ Perhaps it would be better to refer to a particular kind of ‘event presentation’ or ‘event format’, as it is not “real world” characteristics of the event that are important here, but characteristics of the way the speaker chooses to describe the event. We will, however, continue to refer to ‘kinds of events’ here, and hope that the meaning is clear.

and, as stated above, what is important is the way that the event is presented, not what we may infer from it.

The distinction here between information that is explicitly described by an utterance and information which may be inferred from it is one that is important elsewhere. For example, the familiar classification of events into CPs, PROCESSES, etc, relies on this kind of distinction. It is possible that what we may think of as the “same event” out in the real world²⁰ may be described with equal validity either as a PROCESS or as a CP. If Florence writes three letters, then I may describe this event by saying:

(19) Florence wrote three letters.

which is a CP, or I may say:

(20) Florence wrote letters.

which is a PROCESS. Neither description is any more correct than the other. From the information given in (19) that there was an event of type CP, we may infer that there was a

²⁰ Using a pre-theoretical notion of event here.

related event of type PROCESS. Yet this does not allow us to add a ‘for’-adverbial to (19) and reason that the ‘for’-adverbial is modifying the inferred PROCESS.²¹

What is important in these cases is the way that the speaker chooses to describe some part of the world (see, for example, Krifka 1992 for related discussion). In the case of the SST/non-SST distinction, what matters is whether the event as presented by the speaker constitutes a change of state in the individual (with the role of prototypical patient) that is grammatically realised as the subject.

We can now say that, in the SST cases, the enablement relation holds between an event (as described by the main clause) and a change of state in the subject (as described by the ‘when’-clause). To summarise, we say that the enablement relation may hold:

- (a) between an event and a change of state into a consequent state (this is the case for the examples with the past perfect),
- (b) between an event and a change of state of a proto-patient subject (this is the case for the SST examples we have just been considering),
- (c) between an event and the onset of the current E-state of the discourse (this is the case for the main clause sequences).

²¹‘For’-adverbials may modify PROCESS descriptions but not CP descriptions unless the latter can be seen as iterations. See (Dowty 1979; Moens 1987).

By adding (b), we no longer have to make the distinction between CPs and CULMs – a distinction which does not appear to have any external motivation. That is, we no longer have to maintain that CULM expressions “denote a change of state” whereas CP expressions do not. Our modification also allows us, as shown above, to deal with the counter-examples given earlier.

5. SSTs and event structure

Why should SSTs behave in this way? Can we find any similar notion used elsewhere in the literature, and can we provide a deeper explanation of the interaction between SSTs and ‘when’? I will suggest now that we may find at least a partial answer by analysing SSTs in terms of event structure, using an idea from (Dowty 1979).

I propose that the notion of SST is closely related to an idea of Dowty’s to characterise what he calls (in Dowty 1979) ‘achievements’. Dowty does not use the traditional (Vendler 1967) characterisation of an achievement as a punctual telic event, but instead proposes that achievements (which may or may not be punctual) have a logical structure which he calls BECOME. Achievements, on this definition, are events which comprise a simple change of state, from a state $\sim\phi$ to a state ϕ . For example, “The soup cooled”, on a telic reading, would be represented (ignoring tense) as:

BECOME [*the soup is cool*]

Dowty characterises accomplishments, in contrast, as having a more complex structure. He proposes that an accomplishment consists of two parts, a “cause” part and a “become” part. For example, “Honorina painted a picture” would have the logical representation:

[[*Honorina paints*] CAUSE [BECOME [*a picture exists*]]].

Similarly, “Jeeves cooled the soup” would have the representation:

[[*Jeeves does something*] CAUSE [BECOME [*the soup is cool*]]].

Without worrying here about the exact meaning of CAUSE, we can interpret Dowty’s proposal as saying that achievements are simpler in form (we might say simpler in event structure) than accomplishments. Achievements, according to this proposal, comprise simply a transformation from one state to another, whereas accomplishments consist of both a transformation to a new state and an associated “causal event”, accomplished by an agent. Now, interestingly enough, while Dowty says several times that he views achievements as punctual and accomplishments as non-punctual, he hints more than once that the two distinctions may not coincide completely, and that not all achievements are necessarily punctual. He gives, for example, “the soup cooled down” a BECOME structure, even though, as I showed earlier, it passes the tests for a Vendler accomplishment.²²

²² See (Dowty 1979, pp. 71-99) for a full discussion.

It should be noted that Egg (1995, p.330-331), also points out that Dowty's achievement/accomplishment distinction made in terms of event structure is not the same as the punctual/non-punctual distinction, and gives a number of examples showing this.

So, by taking the crucial distinction to be the one between BECOME events and CAUSE-BECOME events, we have a way to predict the availability of the forward-movement reading with simple-past 'when'. If the 'when'-clause describes a BECOME event (a simple change of state) then the forward-movement reading is possible. On the other hand, if the 'when'-clause describes a CAUSE-BECOME event, then the forward-movement reading is not possible. We are now closer to an explanation for Sandström's observations and for the counter-examples (8-12).

Of course, we do not need to discard the SST notion, which employed the agent/patient characteristics of the sentence subject. Dowty, in his discussion of CAUSE-BECOME, identifies the subject of the "causal" part of an event like "Bertie broke the window" with an agent (although Dowty 1979 predates the notion of prototypical agent). See (Dowty 1979 pp. 120-125) for discussion. I will further explore the connections between SSTs, agentivity and Dowty's distinction, in Section 6.

It is interesting that Dowty's event-structure distinction should give the right predictions for 'when', given he developed it for wholly other purposes. The 'when' data suggests that the

event-structure distinction may be appreciably more meaningful and significant than the punctuality distinction, which a number of authors have argued in recent years may of little or no relevance to linguistic semantics – see, for example, (Verkuyl 1989; Egg 1995).

6. Event structure and unaccusativity

We have seen that the availability or otherwise of the forward-movement reading with simple past and ‘when’ depends on the nature of the event described by the ‘when’-clause. Events of type CAUSE-BECOME (where there is an associated causal event, with a proto-agent realised as the grammatical subject) do not allow the forward-movement reading. Events of type BECOME (which consist solely of a transition between states, with no associated causal event and agentive subject) *do* allow the forward-movement reading.

Can we probe any deeper, and explain why it is that events without proto-agents should allow forward-movement with ‘when’ in this way, while events that have proto-agents do not?

Let us look more closely at the relation between Dowty’s BECOME/CAUSE-BECOME structure and the well-studied phenomenon of unaccusativity.

The notion of unaccusativity is encapsulated by what is known as the ‘**unaccusative hypothesis**’ (Perlmutter 1978), which claims that intransitive verbs fall into two classes, the unaccusative verbs and the unergative verbs. These have different underlying syntactic configurations. From a

GB perspective (as taken, for example, by Levin and Rappaport Hovav (1995))²³ an unergative verb takes a D-structure subject and no object, while an unaccusative verb takes a D-structure object and no subject. In terms of argument structure, an unergative verb has an external argument but no direct internal argument, while an unaccusative verb has a direct internal argument but no external argument (unaccusatives are thus similar to passives in this respect).

Levin (1983) and others have suggested that a generalisation can be stated which links the syntactic property of unaccusativity with semantic properties, and which includes transitive verbs too. The claim is that **agent** arguments are D-structure subjects and **patient/theme** arguments are D-structure objects.

Now Pustejovsky (1991) and others have proposed that Dowty's BECOME is the event structure for unaccusatives. This ties in as follows with the GB account sketched above. If unaccusatives have no D-structure subject, and hence no agent, then there can be no "causal component" of the event (if we assume that the causal component is perpetrated by an agent), and the event must consist solely of a transition, undergone by a patient/theme. This, of course, corresponds to the BECOME structure.

Must the converse be true, that all BECOME structures are unaccusatives? It seems that this cannot be the case, since some BECOME events are realised as transitives (e.g., 'Bertie reached the top') so they clearly cannot be unaccusative.

²³ Others, such as Van Valin (1990), argue that the phenomena associated with the unaccusative/unergative

The important generalisation for us here is that the enablement relationship with ‘when’ is possible in cases where the event in the ‘when’-clause is of structure BECOME. Events of this type do not have agents – they are events where the grammatical subject corresponds to the thematic role of patient (or theme). This is why we can classify these events as being SSTs – the grammatical subject has patient-like properties, one of these being that it is described as undergoing a gradual (or incremental) change of state. The connection with unaccusatives is that verbs with subjects that are not prototypical agents are often (although not always) syntactically realised as intransitives, often with the bundle of features that leads them to be classified as unaccusatives.

The link we noted earlier between behaviour with ‘when’ and unaccusatives is thereby explained – while not necessarily providing us with an explanation on any deeper level. We must await further research to reveal whether the link with underlying argument structure will provide the key to a deeper understanding.

To sum up – we can now say that the enablement relationship with ‘when’ is possible in two different cases:

- (i) Where the ‘when’- clause is in the past perfect. The event structure here can be either BECOME or CAUSE-BECOME.

distinction are better explained in semantic terms.

- (ii) Where the ‘when’-clause describes an event of structure BECOME. We have seen that this is equivalent to the event having a prototypical patient which is realised as the subject.

Our account therefore does away with the need to say that enablement is possible for CULMs but not CPs, and with the need to explain this by making the vague and dubious claim that CPs do not denote a consequent state.

7. The proposal

I now present a proposal for ‘when’, which incorporates the event structure distinction developed above and also offers a clearer and more precise distinction between what we have been calling ‘enablement’ and ‘response’.

Firstly, I propose that what is important about the discourse relation that we have been calling (following Sandström) ‘**response**’ is that it is a relation between e_2 (the event described by the main clause) and the *occurrence of* e_1 (the event described by the ‘when’-clause). It is the fact that e_1 occurs at all that leads to, provokes, inspires, (or whatever...) e_2 . Thus we include the formerly-used notion of response but we widen the category to include causal relations (about which Sandström says very little), and we also to remove the confusing intentional connotations of the word ‘response’. Perhaps the simplest terminology is to say that e_2 is a **reaction** to the occurrence of e_1 , where the subject of a reaction need not, of course, be sentient.

Consider, for example:

(21) When Bertie broke the window, his Aunt scolded him.

Here, the event of Bertie's Aunt scolding him is a reaction to the occurrence of the window-breaking event.

Can we similarly clarify the **enablement** relation? I suggest that what is important about enablement is that it is a relation between e_2 and the *completion of e_1* (or, perhaps equivalently, the transition into a new state resulting from e_1). If the 'when'-clause is a past perfect, then e_2 is a reaction to the change of state into the consequent state of e_1 (or, equivalently, a reaction to the *onset* of the consequent state of e_1).

For example:

(22) When Bertie had broken the window, he climbed into the house.

Here, it is the onset of the consequent state of e_1 which is important. Once Bertie has broken the window, he is able (and/or willing) to climb through.

A second example is:

(23) When the window was broken, Bertie climbed into the house.

This conveys something very similar to (22). It is the onset of the window's state of being broken that allows or encourages Bertie to climb in. (Note, as mentioned earlier, that 'once' can be substituted for 'when' here, preserving meaning.)

Thirdly, we have:

(24) When the window broke, Bertie climbed into the house.

The 'when'-clause here describes a BECOME structure. Once again, it is the transition into a new state, that of the window being broken, which allows or encourages e_2 . Whereas in (22) the new state is the consequent state of e_1 , in this case the new state is what we might call the **resultative state** associated with e_1 .

So we can now break down the forward-movement uses of 'when' as follows:

(I) e_2 is a **reaction** to the **occurrence** of e_1 .²⁴ The **reaction** relation holds between two events, e_2 and e_1 .

Example: *When Jeeves dried Bertie's socks, Bertie put them on again*

(II) e_2 is a **reaction** to the onset of a new state "associated with e_1 ". This may happen in one of

²⁴ Nicholas Asher (p.c.) suggests that this might be seen as a reaction to the *fact* of e_1 's occurrence.

two ways:

- (i) e_2 is a **reaction** to the **completion** of e_1 . In this case, the reaction relation holds between e_2 and the onset of the consequent state of e_1 . This is conveyed by use of the perfect. This is possible with either a BECOME or a CAUSE-BECOME event structure for e_1 .

Examples: *When Bertie had dried his socks, he put them on again.*

When Bertie's socks had dried (out), he put them on again.

- (ii) e_2 is a **reaction** to the **occurrence** of e_1 , where e_1 comprises the transition into a new state (the resultative state). This necessitates e_1 having a BECOME structure. In this case, the reaction relation holds between e_2 and the beginning of the resultative state.

Example: *When Bertie's socks dried (out), he put them on again*

(II) also covers the main-clause discourse sequences, where the new state is what we may call, following (Caenepeel and Sandström 1992), the current episodic structure (E-state) of the discourse after the addition of e_1 .

We have therefore replaced the poorly-defined notions of response and enablement with a single discourse relation called 'reaction'. In (I), e_2 is a reaction to the occurrence of e_1 , while in (II),

e_2 is a reaction to the onset of a state introduced by e_1 . Elsewhere in this paper, I give tests for distinguishing between these cases, and in Section 9 I will consider (and reject) a slightly different way of dividing up the classification.

Note that I am not maintaining that all simple-past ‘when’-clauses describing BECOME events come into category (II). BECOME events may also partake in (I) – that is, e_2 may be a reaction to the occurrence of e_1 even though e_1 is of type BECOME. Consider, for example:

(25) When the tomatoes ripened, Dahlia jumped for joy.

Here we get the impression that Dahlia is reacting to the fact that the tomatoes ripened at all, rather than in some sense “waiting for them to ripen” in order to be surprised (notice that ‘once’ cannot be substituted for ‘when’ here). Compare:

(26) When the tomatoes ripened, Dahlia picked them.

which sounds much more as though Dahlia is waiting for them to ripen, and it is the completion of this ripening process that prompts her to pick them. ‘Once’ may be substituted here.

Although there are strong intuitions, we still lack formal criteria for making the distinction between (I) and (II). Such criteria are desirable but it is not clear at present how we can be more

precise. One speculation that may be relevant is that it is possible to react to the lack of occurrence of an (expected) event, whereas it is not possible to react to the completion of an event which does not occur. For example we can say:

(27) When the tomatoes didn't ripen, Dahlia complained to the garden centre.

'Because' seems a reasonable substitute for 'when' here. Compare:

(28) When the tomatoes didn't ripen, Dahlia picked them.

(28) sounds strange on a reading where Dahlia waited for the tomatoes "not to ripen" before she picked them. Work remains to be done on how to formulate precise criteria for making the distinction between (I) and (II) for cases where the 'when'-clause describes a BECOME event and thus in principle either (I) or (II) is possible.

8. A final loose end: the 'finish' example

There is an example that appears to be problematic for the account as it stands. Many speakers find the following acceptable, when used to mean that Bertie left the pub after he finished his beer:

(29) When Bertie finished his beer, he left the pub.

Some informants prefer the past perfect version:

(30) When Bertie had finished his beer, he left the pub.

However, the simple-past version, (29), is generally agreed to be much better than:

(31) When Bertie drank his beer, he left the pub.

We need to explain why (29) is acceptable (at least to some) on a forward-movement reading, in spite of the fact that it describes a CAUSE-BECOME event. Perhaps we can explain the forward movement by means of the *reaction-to-the-occurrence* relation (I). But then we would need to explain why Bertie's leaving the pub can be seen as a reaction to his *finishing* his beer, more readily than Bertie's leaving the pub can be seen as a reaction to his *drinking* his beer. Perhaps this makes some sense – it seems intuitively reasonable to respond to finishing one's drink by getting up and leaving, and perhaps arguably less so to respond to drinking a beer by getting up and leaving. But notice that it is possible, at least marginally, to say:

(32) Once Bertie finished his beer, he left the pub.

(32) is found to be at least as acceptable as (29), which suggests (see earlier) that we may have an example of (II) (*reaction-to-completion*) here. At any rate, it does not seem possible to dismiss this counter-example by deeming it an example of (I). Instead, I propose the following explanation.

Notice that the verb ‘finish’ expresses, by lexical means, the completion of an event. In (29), for example, although we have neither a past perfect nor a BECOME event, we could nevertheless argue that the lexical semantics of ‘finish’ conveys precisely our notion in (II)(i) above – the *completion of an event*. Thus, we can argue that the past perfect, which is normally required to focus our attention on the event’s completion, is simply not necessary here. That is, ‘finish’ has the same effect in this respect as the past perfect – it marks the completion of an event, or equivalently here, the onset of the consequent state arising from that event.

Further work may well reveal the existence of other lexical material which achieves similar effects.

We can now make a slight modification to our breakdown of the uses of ‘when’ (in the type of construction studied, and omitting the main clause sequence cases for brevity), to give the following:

- (I) e_2 is a **reaction** to the **occurrence** of e_1 . The **reaction** relation holds between two events, e_2 and e_1 .

Examples: *When Jeeves dried Bertie's socks, Bertie put them on again.*

When the tomatoes ripened, Dahlia jumped for joy.

(II) e_2 is a **reaction** to the onset of a new state associated with e_1 . This may happen in one of two ways:

- (i) e_2 is a **reaction** to the **completion** of e_1 . In this case, the **reaction** relation holds between e_2 and the onset of the consequent state of e_1 . This is conveyed by use of the perfect or by use of 'finish' (or both). It is possible with either a BECOME or a CAUSE-BECOME structure for e_1 .

Examples: *When Bertie had dried his socks, he put them on again.*

When Bertie's socks had dried (out), he put them on again.

When Bertie finished his beer, he left the pub.

- (ii) e_2 is a **reaction** to the **occurrence** of e_1 where e_1 comprises the transition into a new state (the resultative state). This necessitates e_1 having a BECOME structure. In this case, the **reaction** relation holds between e_2 and the beginning of the resultative state.

Example: *When Bertie's socks dried (out), he put them on again.*

When Bertie arrived at the airport, he went to the check-in desk.

When the tomatoes ripened, Dahlia picked them.

As stated earlier, (I) corresponds roughly to Sandström's "response" and (II) roughly to her

“enablement”. I have, however, clarified her definitions considerably and in addition have offered a new characterisation of (II)(ii) which better explains both her data and mine.

9. A further simplification?

Can we simplify the account any further? Notice that (I) and (II)(ii) have something in common – they are both **reactions** to the **occurrence** of the ‘when’-clause event. Perhaps it would make sense to put them together in our classification, thus simplifying it a little further.

Notice, however, that in (I) we have reaction to the occurrence of an event *per se*, while in (II)(ii) we have reaction to the occurrence of the transition into a new state. The difference shows up clearly in examples (25) and (26), repeated here as (33) and (34).

(33) When the tomatoes ripened, Dahlia jumped for joy.

(34) When the tomatoes ripened, Dahlia picked them.

Although the ‘when’-clause is the same in the two examples, (33) is an example of (I) and (34) an example of (II)(ii). There is a sense in (33) that Dahlia jumped for joy as a result of the fact that the tomatoes ripened at all. In (34), on the other hand, the sense is that Dahlia was waiting for the tomatoes to ripen, and once the waiting was over, and the resultative state began, she reacted by picking them. So while both are reactions to occurrences, (33) is a reaction to the

occurrence of an event and (34) is a reaction the occurrence of a transition to a new state. Thus it appears to make sense to keep them apart in the classification.

10. Conclusion

I began by drawing attention to some interesting data observed by Sandström concerning ‘when’. I showed that her account was flawed by virtue of there being counter-examples to her claims, and because of her vague and apparently unmotivated assertion that CULM expressions “denote a change of state” while CP expressions do not. I proposed a new analysis which better explains the data. The relevant distinction is no longer between CULMs and CPs but between events of structure BECOME and those of structure CAUSE-BECOME, using a distinction first proposed in (Dowty 1979).

It would be useful to investigate some wider implications of this work. It is interesting that, having ruled out the proposal that the accomplishment/ achievement distinction (defined in terms of punctuality) is responsible for the observations with ‘when’, we concluded by deciding that the relevant distinction was the one originally proposed by Dowty (1979) to distinguish between accomplishments and achievements, where this distinction is not made in terms of punctuality but in terms of thematic structure. The important thing about achievements (defined this way, as BECOME structures) is that they do not have (prototypical) agents.

Given that it is the way that the event is “thematically structured”, rather than the purely temporal matter of punctuality, which determines the behaviour of ‘when’ in these constructions,

it would be very interesting to look for other linguistic phenomena which can be explained by the BECOME/CAUSE-BECOME distinction or some underlying factor(s). It would also be interesting to look at other kinds of examples where the accomplishment/achievement distinction (characterised in temporal terms) has been said to be significant, and examine whether it is punctuality or thematic structure that is responsible.

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