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EVENT STRUCTURE AND THE CLASSIFICATION OF VERBS

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Abstract: *In the present article it will be assumed that events may be split into subevents and that there is a temporal relationship of precedence or overlap between subevents. Event structure is understood as the set of subevents together with the temporal relationship holding between them. An essential part of event structure can be determined by means of temporal adverbials. It will be claimed that at least ten different verb classes can be identified on the basis of event structure. It will also be pointed out that in some cases event structure has to be derived compositionally.*

Key words: *event structure, subevents, temporal relationship, verb classification, compositionality.*

1. The Notion of Event Structure

Predicates have an argument structure and an event structure. Minimally, event structure consists of the set of subevents constituting the event and of the temporal relationships between these subevents (Pustejovsky 1995, Engelberg 2000). There are at least tw types of temporal relationship: (a) temporal precedence '<' and (b) simultaneity or temporal overlap '<>', E.g. the event denoted by the verb *build(x,y)*, if used nonprogressively, consists of two consecutive subevents, a process (the process of building *y*) and a resulting state (*y* is ready); the process precedes the resulting state: $e_1^{Process} < e_2^{State}$; the event denoted by the verb *accompany(x,y)* consists of two simultaneous or overlapping subevents: $e_1^{Process} <> e_2^{Process}$. Stative verbs denote a single event: the event of being in a certain state, e.g. *hate(x,y)*, which can be represented as e^{State}. Simple process verbs, too, denote a single event, e.g. *run(x)*, which can be represented as $e^{Process}$. There are also verbs which denote a single punctual event, e.g. *cry out(x),* represented as $e^{Punctual}$. The verb *outlive(x,y)* has a more complex event structure: if a person outlives another, he/she is still alive after the second person has died. We'll assume that presupposed states/processes as well as implied states/processes are integral part of event structure. In the case of *build(x,y)* the resulting state is implied, in the case of *reach(x,y)* the preceding process/activity is presupposed.

2. Verb Classification

Verbs have often been classified on the basis of their event structure. In quite a few cases, event structure can be identified by means of temporal adverbials (Vendler 1967, Dowty 1979). However, normally only four event types were discussed: states (*own, know, hate*), processes (*run, write, listen*), achievements (*reach, find, win*) and accomplishments (*build, grow up, recover*).

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1. Bill owned an expensive car for two weeks/at five o'clock/*in two hours.
2. John was running for two hours/at five o'clock/*in two hours.
3. Mary wrote a book in three months/*at five o'clock/*for three months.
4. The children reached the top in two days/at five o'clock/*for two hours.

States and processes can be distinguished by means of temporal adverbials provided that we also take into account the meaning of the temporal adverbials. Time point adverbials may have different functions in the case of states, processes and achievements. Activities take *for*- and *at*-, accomplishments *in*-, and achievements *in*- and *at*- adverbials. *For*-adverbials are just durative (they denote in (2) the length of the process though they may also denote the length of the subsequent event, as we shall see presently), *in*-adverbials delimit the duration of a process (in fact, they are ambiguous, they may either denote the length of the process until its termination or the time span from speech time until the time point when the event takes place: *Bill will leave in two hours*, in this case they are purely deictic) and *at*- adverbials are punctual (and are normally deictic but can also be used to identify punctual events). In addition to these three temporal adverbials at least the following three types of adverbials must be taken into consideration: *by*-adverbials, as in (5), *for*-adverbials denoting the length of the subsequent state, as in (6), and *until*-adverbials denoting the end point of a process, as in (8).

5. Bill survived his wife by ten years.
6. The students occupied the university for five days.

Note that in (6) the *for*-adverbial denotes the length of the subsequent state while in (2) it refers to the length of the process. The event denoted by *occupy* is compatible with punctual and delimiting temporal adverbials whereas the event expressed by *survive* is only compatible with *by*-adverbials.

7. a. Bill survived his wife by ten years/*at five o'clock/*for ten years/*in ten years.
   b. The students occupied the university for five days/in five days/at five o'clock.

Since *survive* does not represent a verb class, we will leave it out of consideration. The fact that the verb *occupy* is compatible with *in*- and *at*-adverbials implies that it can be a punctual and a process verb.

In some languages some verbs may take *until*-adverbials only. Compare the following Hungarian sentence, in which the verb *elborozgat* 'drink wine for a while' expresses the delimitative aktionsart:

8. Öt óráig/*öt órán át/*öt óra alatt/*öt órakor elborozgattak.
   'They were drinking wine until five o'clock'

To sum up, we have to count with the following temporal adverbials:

9. a. *for*-adverbials referring to the length of a process (G. *während,* F. *pendant,* H. *át*)
   b. *in*-adverbials (G. *in*, F. *en*, H. *alatt*) (the deictic use is rendered in H by the postposition *múlva*)
   c. *at*-adverbials (G. *um*, F. à, H. *–kor*)
   d. *for*-adverbials referring to the length of the subsequent state (G. *für,* F. *pour,* H. *-ra*
   e. *until*-adverbials (G. *bis,* F. *jusque, v*H *–ig*)

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Note that *at*-adverbials identify punctual events if no other temporal adverbial is admitted (cf. below example (12)).

Recall that so far we have identified the following verb classes:

(a) states (*own, resemble, consist, know, hate, perceive*)
(b) processes (*run, walk, work, read, paint*)
(c) accomplishments (*build, grow up, recover*)
(d) achievements (*reach, stop, recognize, find, win, die*)

States are represented by e^{State}, processes by $e^{Process}$, accomplishments by $e^{Process} < e^{State}$, the event structure of achievements as in (d) contains a punctual event and a subsequent state: $e^{Punctual} < e^{State}$. However, achievements are a heterogeneous class: the verbs *reach* and *stop* presuppose a preceding process: $e^{Process} < e^{Punctual} < e^{State}$, whereas this is not the case with *recognize* and *find* (*I found ten dollars in the street*). The verbs *reach* and *stop*, too, differ from each other because *stop*, but not *reach*, is compatible with *for*-adverbials referring to the length of the subsequent state:

10.a. They stopped for two hours.
b. *They reached the top for two hours.

The difference between (10a) and (10b) is that in the former case the 'stopping'-event can be reversed, i.e. movement can be resumed whereas once the top was reached, no reversal is possible. Finally, there is also a difference between *stop* and *win*, as shown by (11a,b).

11.a. They stopped for two hours.
b. They won the whole week long.

(11b), but not (11a), expresses a succession of punctual events, which yields an imperfective reading. This reading is not possible in the case of *win the race* (**They won the race for two hours*), i.e. if the object noun is spelled out. (In Hungarian the difference would appear in the form of the presence/absence of the verbal particle: *nyer* 'win' – *meg-nyer* 'win something'.) Note that $e^{Punctual} < e^{State}$ characterizes *win the race* but not *win*, the latter being a punctual event without a subsequent state and belongs in this respect to the class of verbs represented by *knock, wave, tap,* etc.. These verbs differ from other punctual verbs such as *cry out, call out, shout out,* which can never occur with *for*-adverbials:

12.He cried out *in two hours/*for two hours/at five o'clock.

The main semantic difference between the *stop*-type and the *cry out*-type verbs seems to be that the former are achievements ($e^{Process} < e^{Punctual}$), whereas the latter are not. Notice that the *cry out*-type verbs have no place in the Vendler-Dowty-typology.

To sum up, we have established the folllowing verb classes thus far:

(a) states (*own, resemble, consist, know, hate, perceive*)
(b) processes (*run, walk, work, read, paint*)
(c) accomplishments (*build, grow up, recover*)
(d) punctual verbs with a subsequent state but without any preceding process
(e) (*recognize, find*)
(f) punctual verbs with a preceding process and a subsequent state (*reach, stop, win*
(g) with a direct object)
(h) punctual verbs which are not achievements, and which do not presuppose any preceding process and do not imply any subsequent state (*cry out, shout out*).

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Class (e) can still be split into two subclasses according to whether the subsequent state is reversible (*stop, pause*) or irreversible (*reach, win*) since the former, but not the latter admit *for*-adverbials which denote the length of the subsequent state. It can be argued that reversible states are controlled states (controlled by the Agent) in agentive sentences and belong thus to the class of so-called dynamic states. If we distinguish normal states from dynamic states, we can assign two different event structures to *pause* and *reach*, i.e. $e^{Process} < e^{Punctual} < e^{DynState}$ and $e^{Process} < e^{Punctual} < e^{State}$. The verbs *open, lock, go out, leave* are similar to the *pause*-type verbs since they imply a dynamic state but they differ from them since they presuppose a preceding state rather than a process: $e^{State} < e^{Punctual} < e^{DynState}$. In other words, class (e) contains three classes of verbs, all with different event structure.

(e_1) punctual verbs with a preceding process and a subsequent dynamic state (*stop, pause*)

(e_2) punctual verbs with a preceding process and a subsequent state (*reach, win*)

(e_3) punctual verbs with a preceding state and a subsequent dynamic state (*open, go out*)

The second class can further be split into two subclasses: (intransitive) *win,* but not *reach,* is compatible with *for*-adverbials denoting the length of the (iterated) process.

13. The car stopped for a couple of minutes.
14. *They reached the top for several hours.
15. The won for hours.

(15) denotes an iterative event, i.e. several 'winning'-events, *win*-type verbs are in this sense related to the *knock*-type verbs (cf. (16a,b) but their event structure is identical with that of the *reach*-type verbs:

16. a. Bill knocked at the door at two o'clock.
    b. Bill knocked at the door for two hours.

Knock-type verbs are compatible both with *at*- and *for*-adverbials, they are verbs without a preceding process and a consequent state. The verb *knock,* and similarly *wink, tap, wave, cough,* denotes a repetitive process. As for event structure, *knock*-type verbs and *cry out*-type verbs have lexically identical event structures, but they represent two different verb classes. Notice that (16a,b) seems to contradict the claim that *at*-adverbials can be used to identify punctual events only if no other temporal adverbial is admitted. However, (16b) does not express a single knocking event but a series of such events.

At least one further verb class must be added to the ones discussed thus far: the *live through*-type verbs are incompatible with any temporal adverbial (cf. *We have lived through the war*, the verb denotes a durative but at the same time terminated event). The class of these verbs imply another durative event (or events), which is contained in the temporal interval of the event denoted by the verb.

(g) *live through*-type verbs (*live through, go through*)

The verb *live through* is incompatible with temporal adverbials for the simple reason that the duration as well as the termination of the event is determined by another event denoted by an event noun:

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17. They lived through the war *in six years/*****for six years/*by six years.

There are some other verbs, which seem to be incompatible with temporal adverbials for other reasons, e.g. *fail, forget.*

18. The bomb failed to explode *at five o'clock/*for five hours/*in five hours.
19. John forgot to call you up *at five o'clock/*for five hours/*in five hours.
20. The plan failed at five o'clock/for five hours/*in five hours.
21. I forgot your name at five o'clock/for five hours/*in five hours.

These verbs refer to something that did not take place, the negation of an event is not an event, *fail* and *forget* don't have any event structure.

(h) *fail* and *forget*

To summarize, then, we have arrived at ten verb classes ((a)-(h) and the subclasses of punctual verbs), which all have different event structures. However, it should be made clear that we did not aim at completeness: a more systematic examination of verbs may lead to some more verb classes.

3. The Compositionality of Event Structure

Yet another verb class is respresented by verbs such as *dust, clean, dub*, which are compatible with both *for-* (process) and *in-*adverbials, in the first case they have a process-reading, in the second case an accomplishment-reading:

22. a. Bill was dusting the living room for hours.
    b. Bill dusted the living room in two hours.

The verb *dust* is clearly a process (activity) verb with the event structure $e^{Process}$, the termination is brought about by the presence of the *in*-adverbial in (20b), where the event structure $e^{Process} < e^{State}$ is derived compositionally. (Of course, *dust* must be characterized as belonging to a separate lexical verb class.) Similarly, it can also be argued that *knock*-type verbs are turned compositionally into iterative predicates.

A large number of process verbs exhibit the same phenomenon. For example, verbs of motion with directional adverbials denote predicates with a subsequent state: *He was running – He was running into the room.* Similarly, transitive activity verbs with optional object arguments are processes if the object noun is not spelled out. They can, however be turned into accomplishment predicates by means of an overt object (depending on the form of the verb and on the type of the object noun): *He was writing – He wrote a book.*

Languages may differ in the ways process verbs are being turned into accomplishment verbs or punctual events. Compare the following English and Hungarian sentences:

23. a. She dried her hair for ten minutes.
    b. She dried her hair in ten minutes.
24. a. Tíz percig szárította a haját.
    b. Tíz perc alatt megszárította a haját.

There is a resulting state in (23b), but not in (23a). The verbs are identical, the difference can only be explained compositionally: the accomplishment reading is brought about by the composition of the process verb with the delimiting temporal adverbial. In Hungarian, on the other hand, the process verb *szárít* in (24a) is turned into an accomplishment predicate by prefixation: *meg-szárít* 'particle + dry'. In this respect

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Hungarian is similar to the Slavic languages.

Compositionality can also be observed in the case of verbs with phasic structure such as *wag***.** In English the process reading is expressed by the progressive past, the semelfactive by the simple past. In Hungarian the semelfactive contains the prefectivizing particle *meg***.** The difference between the process and punctual reading is exemplified in (25a,b) and (26a,b).

25.a. The dog was wagging its tail (for several minutes).
b. The dog wagged its tail once (at five o'clock).
26.a. A kutya csóválta a farkát (több percen át).
b. A kutya megcsóválta a farkát (öt órakor).

Consequently, the punctual reading is brought about compositionally: it is due to the adverb *once* in English and to the verbal particle *meg-* in Hungarian.

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