

The semantics of verbs

1. Introduction

We have been assuming that the lexicon is a separate module of the linguistic system, which “feeds” the syntactic component.

Clearly, lexical items contain some types of information which are necessary for the syntactic component, e.g. the valence of a predicate (one-place, two-place etc.). Other aspects of lexical meaning, instead, do not seem to be relevant to syntax (e.g. the difference in meaning between ‘walk’ and ‘run’).

Yet, the assumption that syntax only “sees” the valence of a predicate – as it is encoded in the number of lambda prefixes in its denotation – seems too limited, because it doesn’t allow us to capture certain regular patterns in the mapping from lexical semantics to syntax: for instance, the fact that (with active voice) the Agent of a two-place predicate is realized as the external argument/subject, while the patient is realized as an internal argument (direct object).

Starting from the mid-Eighties of the last century, some scholars (Larson 1987, Baker 1988, Grimshaw 1990 a.o.) have proposed mapping principles that regulate the correspondence between an internally ordered *argument structure* of predicates (e.g.: ⟨Agent, Patient⟩) and the syntactic structure: the correspondence is regulated by so called *linking rules*. Here is one example from Levin & Rappaport-Hovav (1995, 136):

(1) break: [[x do-something] cause [y become broken]]

a. Immediate cause linking rule

The argument of a verb that denotes the immediate cause of the eventuality described by the verb is its external argument.

b. Directed Change Linking Rule

The argument of a verb that corresponds to the entity undergoing the directed change described by the verb is its direct internal argument.

The linking problem was particularly acute in the domain of one-place verbal predicates, where it was necessary to distinguish between *unaccusative* and *unergative*¹ verbs (a distinction first introduced by Perlmutter 1972 in Relational Grammar).

If we assume that argument structure is inherently ordered, it is natural to try to relate this ordering to the general format by which syntax represents hierarchical relations, i.e. by means of dominance relations. This move has the following consequence:

– that part of lexical meaning which is visible to syntax is separated from the ‘encyclopaedic’ part, which is not;

¹ Sometimes called ‘intransitive’ verbs.

– the ordering of argument structure is assimilated to the hierarchical organization of the syntactic component.

This approach, initiated in the programmatic paper by Hale & Keyser (1993), originated a number of proposals which lead to a ‘constructivist’ view of the syntactically relevant parts of lexical meaning: under this view, argument structure is built directly in the syntax, via a decomposition of the V head in a set of ‘verbal shells’, leading to the ‘vP hypothesis’.²

However, the various approaches differ w.r.t. the primitive notions that they adopt. Some theories refer to the notion of thematic roles such as Agent, Patient, Experiencer, Goal etc. (cf. Borer). Here we will examine a different line of research which relates argument structure to the notion of aspectual role, i.e. the role that a given argument plays in the internal structuring of the event.

2. *A brief excursus on event semantics*

Davidson, D. 1967. The logical form of action sentences. In N. Rescher (ed.), *The Logic of Decision and Action*, University of Pittsburgh Press. Ristampato in Davidson (1980), *Essays on Actions and Events*, Oxford University Press, Oxford/New York.

Let us consider a sentence like (3):

(3) The war lasted five years.

Up to now, we have analysed the denotation of a common noun in terms of a set of entities, a subset of D_e . What is, then, the denotation of a noun like *travel*? Could it be the set of entities that have the property of travelling? This is rather the denotation of a noun like *traveller*. Note also that the property of lasting five hours is not a property of the individual who travels, but rather of *the event* of travelling *itself*. We must then conclude that the noun *travel* denotes a set of entities of a special sort, namely *events*.

This implies that we must add to the domain D_e of our model, in addition to ordinary individuals, also events. But this assumption does not automatically imply any ontological assumptions about the structure of the world(s): we refer here to the notion of *linguistic ontology*, namely the ontology that is necessary to support an adequate analysis of linguistic data, which may (or may not) reflect the way that we conceptualize reality: this is outside the scope of linguistics proper (cf. Bach 1986a, 1986b, and lesson 1).

Event-based semantics was introduced by Davidson (1967) in his analysis of action sentences like the following (we are still disregarding tense):

² The first version of this idea is the *VP-shell hypothesis* by Larson (1987, *Linguistic Inquiry*).

- (4) a. Terry met Sam.
 b. Terry met Sam [PP in Paris].
 c. Terry met Sam [PP in Paris] [PP in 1954].

Davidson aims at capturing the following entailment relations that hold between the sentences in (4):

- (4c) \rightarrow (4b), (4a);
 (4b) \rightarrow (4a).

Suppose that we treat the PPs in (4) as if they were additional arguments of the predicate (in addition to TERRY and SAM):

- (5) a. MEET (TERRY, SAM)
 b. MEET (TERRY, SAM, PARIS)
 c. MEET (TERRY, SAM, PARIS, 1954)

This analysis raises the problem of variable polyadicity of the predicate: we have to assume that the predicate MEET can select from 2 to 4 arguments (or maybe even more), depending on the sentence. On the other hand, variable polyadicity does not in itself account for the observed entailment relations, because nothing guarantees that if a relation $R(x,y,z)$ holds, then also $R(x,y)$ or $R(x,z)$ will hold.

Davidson's insight is that the PPs in (4) should be analysed as properties of events, which are predicated of the event itself. In order to obtain this, Davidson introduces in the verb's denotation an *event position* (also known as 'Davidsonian position'), so that the verb comes to denote a relation between two individuals and an event, rather than a simple relation between two individuals:

- (6) MEET (TERRY, SAM, e)
 or, in the neo-Davidsonian approach (T. Parsons):
 MEET (e) & R1(e, TERRY) & R2 (e, SAM)
 where R1 e R2 are thematic roles, i.e. specific relations between an individual and an event.

'e' is a variable over events which – after the other verbal arguments have been saturated – gets bound by an existential closure operator \exists (meaning: there is a... such that)

- (7) $(\exists e)[\text{MEET (TERRY, SAM, e)}]$ (= (4a))

The locative PP (*in Paris*) and the temporal PP (*in 1954*) denote a relation between a spatial/temporal location and the event itself: these relations are conjoined to the fundamental relation expressed by the lexical semantics of the verb in (6):

- (8) $(\exists e)[\text{MEET (TERRY, SAM, e)}] \wedge \text{PLACE (e, PARIS)}$ (= (4b))
 (9) $(\exists e)[\text{MEET (TERRY, SAM, e)}] \wedge \text{PLACE (e, PARIS)} \wedge \text{TIME (e, 1954)}$ (=4c)

The entailments relations in (4) are then guaranteed by simple conjunction elimination.

In set-theoretic terms, the VP denotes a set of events of a certain type {e: MEET (TERRY, SAM, e)}, the locative PP also denotes a set of events {e': PLACE (e, PARIS)} and (8) corresponds to the intersection between these two sets of events; Existential closure applies to this intersection, thus, intuitively, this intersection contains at least one element.

Main idea: the verb's arguments are participants in an event, and 'thematic roles' are specific relations between an individual and an event.

3. *The Aspectual Interface Hypothesis* (Tenny 1992)

Tenny, Carol (1992). The aspectual interface hypothesis. In: Ivan A. Sag & Anna Szabolcsi (eds.), *Lexical Matters*, 1-27. Menlo Park, CA: CSLI/SRI International.

Going back to the question of how to distinguish unaccusative from unergative predicates, the main insight, due to Tenny (1992), is that with unaccusatives the syntactic subject is an internal argument which measures out the event, and in some cases delimitates it. E. g. in:

(10) The ice melted

the event terminates when the relevant quantity of ice is completely melted; in

(11) The boat sank

the sinking event terminates when the boat is completely under water.

Italian shows an interesting alternation in this respect:

- (12) a. Gianni ha corso in giardino.
Gianni has run in the garden
b. Gianni è corso in giardino.
Gianni is run in the garden

In (12b), the auxiliary (*essere* 'be') tells us that the predicate is unaccusative: it selects a locative PP which defines the final point in the path that the subject traverses. Thus, the subject measures out the event by moving along a path whose final point is explicitly indicated. In (12a), instead, the auxiliary *avere* 'have' indicates an unergative predicate: here the PP does not define a path, but simply indicates the 'surroundings' where the running event takes place. There being no defined path, the unfolding of the event cannot be measured.

With incremental predicates, the unfolding of the event consists in a gradual change in a specific property of the internal argument (e.g. (13)); sometimes there is also a final state, the attainment of which concludes the event (e.g. (14)):

(13) Mary has fattened.

(14) The grapes ripened.

The Aspectual Interface Hypothesis assumes that the only part of the lexical meaning of a verb that is relevant to syntax is that concerning *lexical aspect* (a.k.a. Aktionsart), namely, the internal structure of the event described by the overall predicate.

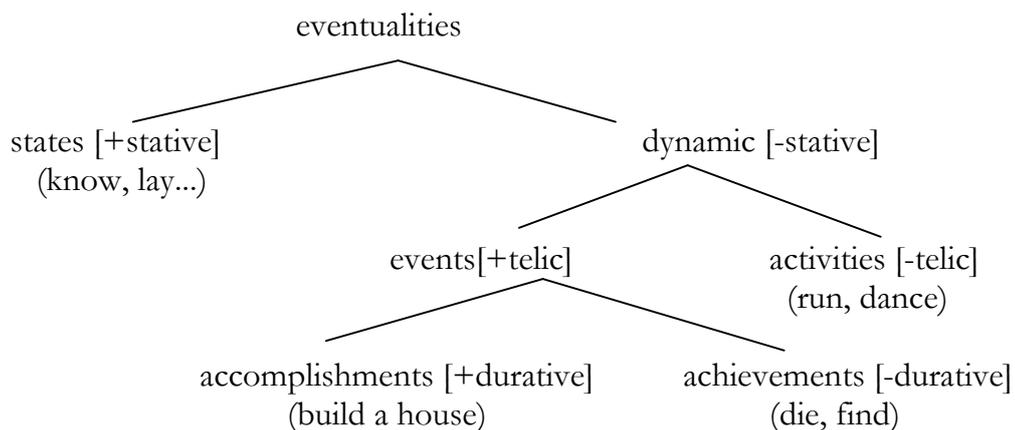
The *internal argument* – generated as a complement to the lexical head V has the aspectual role of measuring the unfolding of the event:

Those predicates whose unique argument measures out the event are unaccusative, i.e. the unique argument is projected in the syntax as an internal argument.

4. Vendler's classification

Vendler, Zeno. 1957/67. Verbs and times. In: *Linguistics in Philosophy*. Ithaca: Cornell University Press.

The notion of lexical aspect, a.k.a. Aktionsart (not to be confused with grammatical aspect) refers to the classification of predicates proposed by Vendler (1957/67):³



Among the ‘eventualities’ (the most general cover term), states ‘hold’ while dynamic eventualities happen. The following tests discriminate between [+stative] and [-stative] eventualities:

³ It is also possible to distinguish durative vs. non-durative states and processes, but here we keep to Vendler’s original distinctions.

a) The imperative is incompatible with [+stative] predicates::

- (15) a. * Be tall!
b. * Know Latin!

(16) Learn Latin!

b) [+stative] predicates do not allow for the progressive:

- (17) * Leo is knowing Latin
(18) Leo is learning Latin

c) [+stative] predicates do not allow for agent-oriented adverbs:

- (19) * Leo intentionally knew Latin.
(20) Leo intentionally skipped the lesson.

Among [-stative] eventualities, a further distinction is that between *telic and atelic ones*. A telic eventuality is one that inherently has a ‘culmination point’ or *telos*. E.g., the eventuality described by *build a house* inherently reaches its telos when the house is completely built. In certain terminological uses, the term ‘event’ only refers to telic eventualities, whereas atelic ones are called *activities*. Activities are essentially processes with an internal dynamism (as opposed to states) but without an inherent culmination point (unlike events). The telicity opposition is diagnosed by the following tests:

d) Telic events are compatible with the adverbial ‘in X time’, which measures the interval between the beginning of the event and the culmination point. These are instead incompatible with activities, which lack a culmination point:

- (21) a. Leo arrived in Milan in two hours.
b. Leo built a house in two years.
(22) * Leo ran in ten minutes.

e) On the contrary, activities are compatible with the adverbial ‘for X time’ (23). The latter is instead problematic with telic predicates: either it is impossible, as in (24a), or it forces an a-telic interpretation of the predicate, in which the culmination point is not reached, as in (24b):

- (23) Leo ran for ten minutes.
(24) a. * Leo arrived in Milan for an hour.
b. Leo built a house for six months.

Recall from (12) above that in Italian, certain motion verbs like *correre* ‘run’ are ambiguous between an unaccusative version and an unergative one; on Tenny’s hypothesis, the unaccusative version is telic, since the event is measured up to its culmination point. This accounts for the following pattern:

- (25) a. Leo è corso a casa in dieci minuti. (unaccusative, +telic)
 b. *Leo ha corso in giardino in dieci minuti (unergative, -telic)

As for transitive verbs, the type of direct object can affect the telicity of the described eventuality: with certain verbs, an internal argument denoting an indefinite quantity yields an atelic predicate (26), while a ‘quantized’ internal argument yields a telic predicate (27):

- (26) Leo swallowed candies for ten minutes / *in ten minutes (-telic)
 (27) Leo swallowed three candies in one minute/*for one minute

In this case as well, the internal argument measures the unfolding of the event (see Krifka 1992, a.o., for detailed discussion and a formalization).

Finally, among telic events Vendler distinguishes

- the durative ones (accomplishments), where the telos is preceded by a process phase which is an integral part of the event (e.g.: to build a house)
- the non-durative ones (achievements), which consist in a simple transition from one state to a different state, without a process phase constituting an integral part of the event (though there may well be a ‘preparatory phase’, e.g. in *to die*).

To sum up, Tenny’s hypothesis implies that the verbal argument which measures the unfolding of the event must be syntactically realized as the complement of the verb (the direct object of a transitive verb or the subject of an unaccusative verb.) This aspectual role, however, does not hold for the internal argument of a [+stative] verb (e.g., *know*).

5. *The external argument*

Kratzer, A. 1996. Severing the external argument from its verb. In J. Rooryk & L. Zaring, eds. *Phrase structure and the lexicon*, 109–137.

Kratzer adopts the minimalist idea that the VP must be articulated in two ‘shells’, usually dubbed vP and VP (but Kratzer dubs the higher one ‘VoiceP’, while Collins 2005 distinguishes vP and VoiceP, cf. Collins 2005). The higher shell introduces the external argument: the latter is, therefore, *not* directly selected by the lexical V head. We will not review here the empirical arguments in support of this distinction, but we will just consider how one can get to a compositional analysis of the two shells.

- a) A transitive VP simply denotes a relation between an event and one or more internal arguments. E.g. [VP meet Sam] denotes the relation $[\lambda y. [\lambda e. \text{MEET}(y, e)]]$ (SAM) = $[\lambda e. \text{MEET}(e, \text{SAM})]$: the characteristic function of the set of events of meeting Sam;
- b) v (or Kratzer’s Voice) introduces a further relation between individuals and events: $\lambda x. \lambda e. \text{AGENT}(x, e)$: this is combined with the event description provided by the VP via the rule of Event Identification (NB: s is the type of events here!):

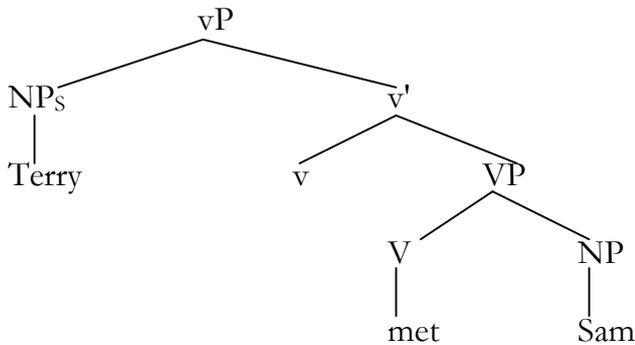
(28) Event Identification (EI: Kratzer 1996, 122)

$$f_{\langle e, \langle s, t \rangle \rangle} \quad g_{\langle s, t \rangle} \quad \rightarrow \quad h_{\langle e, \langle s, t \rangle \rangle} \quad : \quad \lambda x_e \lambda e_s [f(x)(e) \ \& \ g(e)]$$

$$(29) \quad [\lambda x. \lambda e. \text{AGENT}(x, e)] \quad [\lambda e. \text{MEET}(e, \text{SAM})] \quad \rightarrow \quad [\lambda x. \lambda e. \text{AGENT}(x, e) \ \& \ \text{MEET}(e, \text{SAM})]$$

The Agent role is then saturated by merging an external argument in Spec,vP.⁴

(30)



$$[[V]] = [\lambda z_e. [\lambda e'_s. \text{MEETING}(e', z)]]$$

$$[[VP]] = [[V]] ([[NP]]) = [\lambda e'_s. \text{MEETING}(e', \text{SAM})]$$

$$[[v]] = [\lambda y_e. \lambda e''_s. \text{AGENT}(y, e'')]$$

$$[[v']] = [\lambda x_e. \lambda e_s. [[v]](x)(e) \wedge [[VP]](e)] \quad (\text{Event Identification})$$

$$= [\lambda x_e. \lambda e_s. [\lambda y_e. \lambda e''_s. \text{AGENT}(y, e'')](x)(e) \wedge [\lambda e'_s. \text{MEETING}(e', \text{SAM})](e)]$$

$$= [\lambda x_e. \lambda e_s. \text{AGENT}(x, e) \wedge \text{MEETING}(e, \text{SAM})]$$

$$[[vP]] = [[v']] ([[NP_S]]) =$$

$$= [\lambda x_e. \lambda e_s. \text{AGENT}(x, e) \ \& \ \text{MEETING}(e, \text{SAM})] (\text{TERRY}) =$$

$$= [\lambda e_s. \text{AGENT}(\text{TERRY}, e) \ \& \ \text{MEETING}(e, \text{SAM})]$$

Suggested readings:

Bach, Emmon. 1986a. Natural Language metaphysics. . In: *Logic, methodology and Philosophy of Science VII*, ed. by R. Barcan Marcus, G. J. W. Dorn and P. Weingartner. Elsevier Science Publishers, 573-595

Maienborn, C. 2011. Event semantics. In: C. Maienborn, K. von Heusinger & P. Portner (eds.), *Semantics. An international handbook of natural language meaning*, Volume 1. Berlin / New York: Mouton de Gruyter (§§ 1-3).

⁴ This approach allows for a passive Voice/v that introduces an existentially closed external argument, without projecting it in the syntax.