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Aspectual scope and the difference between logical and semantic representation☆

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Abstract

A common theory of aspect marking, which we might label 'selection theory', assumes that (viewpoint) aspect and Aktionsart (temporal schemes expressed by predicates or, compositionally, by propositions) stand in an operator–operandum relationship, where aspect operators select matching elements in an Aktionsart, thereby highlighting specific boundaries or phases. In this paper, I show that under the premise of a selection theory, we need to distinguish between two types of nondefeasible (non-pragmatic) meaning representations: Whereas semantic representations are aspectologically relevant and inside the scope of aspect operators, logical representations, i.e., representations including all truth conditions contributed by an expression, are outside the scope of aspect operators. This distinction allows a more principled notion of 'aspectual pair' in Slavic languages and has also important consequences for cognitive architecture in the domain of meaning representations.

1. Introduction

Aspectology has long been concerned with the fact that grammatical (or 'viewpoint') aspect interacts in systematic ways with the temporal characteristics of predicates or whole propositions, i.e., with what is often referred to as lexical and sentential 'Aktionsart'. Whereas traditionally the interaction between aspect and Aktionsart is often seen as a side-issue, this interaction has been taken as the core

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concept in 'selection theories' of aspect (e.g., Johanson, 1971, 1996, forthcoming; Breu, 1984, 1985, 1994; Timberlake, 1985; Sasse, 1991a,b).[1] The basic tenet of such theories is that, while having essentially the same representational format, aspect and Aktionsart are in an operator–operandum relation. Aspect operators can then be said to 'select' matching items in the Aktionsart, thereby locating specific event parts in the course of time.

To give a classical example, we may briefly illustrate the theory by the truth-conditional effects of the French *imparfait* discussed by Garey (1957):

(1) a.	Il se baignait.	→	Il s'est baigné.
	'He was bathing.'		'He bathed.'
b.	Il se noyait.	*→	Il s'est noyé.
	'He was drowning'		'He drowned.'

Although the same aspecto-temporal forms are used in (1a) and (1b), the truth values of the forms in the *imparfait* differ dramatically: whereas *il se baignait* 'he was bathing' implies that the subject referent bathed, *il se noyait* does not support an analogous inference. (1b) merely suggests that the subject referent was in a stage that COULD have culminated in being drowned but did not necessarily do so. In a selection theory this difference is explained in a straightforward manner: The imperfective aspect contained in the French *imparfait* is defined as a selector of 'phases', i.e., of temporal extensions in an Aktionsart. In both (1a) and (1b), the *imparfait* selects a phase, abbreviated here as 'φ' – but in different configurations. The Aktionsart of *se baigner* 'to bathe' in (1a) is [φ], i.e., it has temporal extension and is not specified for any boundaries. By contrast, the Aktionsart of *se noyer* 'to drown' in (1b) is 'telic', i.e., it contains not only a phase, but also a final transitional boundary towards which the situation develops over time. If we use 'τ' to symbolize a boundary, this can be represented as [φ τ]. Selection of φ in [φ τ] implies that there is another part of the event, viz. the final τ, that is not selected and is therefore not necessarily implied by the form. By contrast, selection of φ in the Aktionsart [φ] of *se baigner* in (1a) implies that the whole event took place.

Notice that the difference between telic and atelic predicates is a semantic difference, i.e., a difference that arises from language-specific lexical properties rather than from nonlinguistic conceptualisation. Languages differ in the specification of Aktionsarten. Whereas, for instance, French *mourir* and Engl. *to die* are telic ('[φτ]') and include a pre-lethal phase (cf. *he was dying*, *il mourait*), their Chinese 'equivalent' *sǐ* denotes a sudden transition and its subsequent state ([τ φ]) (cf. Valin and LaPolla, forthcoming). Against this background, it seems that aspect markers clearly operate on semantic representations.

There are some grammatical markers that can operate not only on semantic representations, but also on pragmatic, i.e., inferentially enriched representations. An

[1] Alternatives to selection theories try to define aspect categories without regard to Aktionsart structure (e.g., Comrie, 1976) or reject – often implicitly – any differentiation of grammatical aspect and lexical Aktionsart (e.g., Dowty, 1979).

example is negation. As pointed out by Horn (1985), *not* cannot only negate semantic values (2a) but also implicata such as the quantity implicatum in (2b).

(2) a. Around here, we don't like coffee.
'not (like)'
b. Around here, we don't LIKE coffee – we LOVE it.
'not (at most 'like')'

The question that arises from this observation, and that I want to address in this paper, is whether the domain of operation of aspect markers, i.e., their 'cognitive scope', is limited to semantic representations or whether, and to what extent, aspect markers can also operate on other types of 'meaning' representations.

In Section 2, I will show that, like negation, aspect can operate on conversational implicata and that aspect operators are not sensitive to differences (if any) in the representational format of semantic and pragmatic information. Section 3 is concerned with another type of 'meaning', viz., with LOGICAL entailments. I will put forward evidence from English and Belhare (a Tibeto-Burman language of Nepal; cf. Bickel, 1996) that logical entailments of verbs are in some cases outside the scope of aspect operators. This suggests that aspect operators are sensitive to a distinction between two types of contextually nondefeasible meaning, viz. semantic and logical information. The observation that aspect markers cannot operate on some types of logical entailments provides in Section 4 a simple account of a long-standing issue in Slavic aspectology, viz. the controversy whether verbs like *ponimat'* 'to understand (imperfective)' and *ponjat'* 'to understand (perfective)' are two distinct lexemes or whether they make up a monolexemic 'aspectual pair'.

If true, the distinction between semantic and logical information that is suggested by the present study is quite surprising since many linguists and philosophers would assume that these kinds of information cannot be told apart and that semantic representation can even be equated with logical form! I will discuss the theoretical implications of this finding in the concluding section.

2. What kind of information can aspect operate on?

Like negation, aspect can operate on conversational implicata. Consider the following example: There is a widespread restriction on imperfective aspect markers like English *be ... V-ing*.[2] Their semantics makes them incompatible with punctual change of state predicates, unless they are given a repetitive reading as in (3).

(3) *The light was flashing. [if not repetitive]

[2] The difference between 'imperfective' and 'progressive' aspect is immaterial to the discussion. I follow Comrie (1976) in analyzing progressives as a special case of imperfectives. In a selection theory this means that progressives select only a subclass of phases, to wit, 'dynamic' phases (cf. Bickel, 1996: Chapter 2).

Selection theories provide a straightforward way to account for this effect. An imperfective marker is defined as selecting phases ('φ'), i.e., nonpunctual stretches of time. If there is a corresponding phase in the Aktionsart, the imperfective selects it; if there is none, the marker cannot apply and the sentence is ill-formed. This is precisely what happens in our example (3): punctual change of state predicates denote a transition or boundary ('τ') and do not include a phase. The repetitive reading offered as a means of 'saving' the sentence follows from Gricean implicature calculation (Grice, 1975). The rough lines of such an abductive calculation are the following.

By uttering (3), the speaker can't have deliberately produced an ill-formed string (cf. the over-all 'Co-operative Principle'). The use of an imperfective, however, presupposes that there is a phase in the Aktionsart. Therefore, the speaker must have thought that there is a phase, despite the fact that there is no phase semantically encoded (cf. the Quality Maxim 2: 'Do not say what you believe to be false!'). If the speaker had meant repeated events, there would have been a phase since iterations make up an extended stretch of activity, i.e., a phase. Therefore, the speaker meant 'repeated flashing' by saying (3).

On an alternative account, the imperfective would have to be analysed as polysemous between an actual and an iterative meaning. Such an analysis would not only be painfully cut by Occam's razor, it also treats as idiosyncratic what is a very common if not universal phenomenon of conversational inference. Iterative readings as in (3) are attested in a wide variety of languages, and the pragmatic operations producing them seem to be the same in languages like Turkish (Johanson, 1971), Russian (Johanson, 1996), or Belhare (Bickel, 1996). The Gricean account captures this generalisation in a simple way and also explains why the normal reading of the imperfective in non-punctual predicates (e.g., *she is working*) does not suggest iteration but simple progression. Since in non-punctual predicates there is a phase inherent in the semantic Aktionsart, the imperfective can and does select this phase. There is no need to assume that the speaker 'smuggled in' iteration.

In the Gricean account proposed above, iterations were said to induce phases. For the purposes of aspectual selection, these phases are the same as simple phases encoded in a predicate. If we analyse iteration as a plural function operating on event representations (cf. Talmy, 1988; Jackendoff, 1991; etc.),[3] we can describe iteration in parallel with simple lexical phases. The only assumption we need to make is that iteration has the temporal property of duration, i.e., of a phase (cf., for example, Vendler, 1967, or Chung and Timberlake, 1985). To make Aktionsarten more explicit, I use association lines to link phases ('φ') and boundaries ('τ') to the elements whose temporal properties they are. Then, a durative predicate like English work will be associated with a φ (4a), as much as the plural operator (4b): Both elements entail temporal extension. The verb *flash*, by contrast, has a τ property, i.e., the predicate has the punctual Aktionsart [τ]. I enclose in square brackets Aktionsart elements belonging to a single lexical item.

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[3] Eventually, one might want to distinguish different plural functions that capture the difference between habitual, repetitive, and frequentative readings.

(4) a. *work* b. *flash*

work'(x)	PL(**flash'**(x))
[φ]	φ ([τ])

The parallelism between lexically encoded and pragmatically inferred phases is most evident if we compare (4b) with a case where a plural-induced phase is semantically given. As noted in the introduction, an important property of telic predicates is the defeasible nature of their result implication. From *he was dying*, it does not necessarily follow that he died. In a famous critique, Weinrich (1964) rejected this idea by pointing out how cynical it would be not to conclude the death of the troops in (5).

(5) Chefs, soldats, tous mouraient.
'Chiefs, soldiers, all died.'

However, as already argued by Johanson (1971: 206), the crucial fact about examples like (5) is the multitude of subjects. The quantifier *tous* and the plural inflection entail a plural operator and since *mourir* does not allow a co-operative reading (as in *They all worked together on the same paper*), this operator must have scope over the whole proposition rather than over the subject alone. I represent this as in (6), where [φ τ] represents the telic Aktionsart of *mourir*:

(6) *tous mourir*

PL(**mourir'**(x))	
φ	([φ τ])

Accordingly, unlike simple telic predicates, (5) does not necessarily imply defeasability of the result. If the imperfective marker is taken as selecting the outer phase in (6), it refers to the distributive nature of an irreversible event in (5). If aspect is interpreted with inner scope, i.e., as operating on the telic phase in (6), (5) describes a collection of moribund people.

Notice that in all representations in (4) and (6), there is the same phase symbol φ, albeit in different configurations and derivations. In (4a), φ is linked to a verbal predicate, in (4b) and (6) it is linked to an operator. The difference between (4b) and (6) does not consist in the representational format but only in the way how this format is derived. In (4b), PL is pragmatically inferred whereas in (6) it has semantic (lexically encoded) support in form of *tous* and plural inflection. This representational uniformity of φ is what allows a general definition of the imperfective as a φ-selector. There is no need to postulate polysemy or multifunctionality nor to differentiate between the imperfective selecting a pragmatically inferred phase (4b) and a semantically encoded phase ((4a) and (6)). The uniformity of phase (and boundary) repre-

sentations in semantic and pragmatic composition is captured by the Aspectual Uniformity Hypothesis hypothesis in (7). Since selection theories of aspect also assume a representational uniformity of aspect and Aktionsart elements (cf. Timberlake, 1985; Sasse, 1991a), the hypothesis is formulated quite generically:

(7) *The Aspectual Uniformity Hypothesis:*
Aspect and Aktionsart representations have the same format and this format is the same on all levels of meaning composition (lexical semantics, morphological derivation, sentential semantics, and pragmatic enhancement).

According to this hypothesis, the very same input to aspectual selection, e.g., phases, can arise from semantic decoding as well as from heuristic (abductive, non-monotonic) inference. Notice that the Aspectual Uniformity Hypothesis does not entail that semantics and pragmatics cannot be distinguished, although it is consistent with such a view (as advocated, among others, by Jackendoff, 1983, or Langacker, 1987). The rules deriving semantic representations, i.e., decoding rules, might still be distinct (even modularly distinct) from the non-monotonic inference rules governing pragmatic representations. In any event, it seems imperative to distinguish between the computational mode (decoding vs. inference) and the representations over which the computations run.[4]

As it stands, the Aspectual Uniformity Hypothesis predicts that aspect operators can select phases and boundaries no matter how they originated, i.e., from whatever computational (or 'cognitive') device they are the output. However, there is one such device which creates representations that are not open to aspectual selection. This device is logical entailment and in the next section I will demonstrate this.

3. Constraining the scope of aspect operators

Consider the logical form of a sentence like (8a). Most logicians will no doubt concur with Dowty (1979) that the truth of (8a) is determined by the comparison of a state of being outside the room at a time interval *I* and a state of being inside at an immediately subsequent interval *J* (8b) (also cf., among many others, von Wright, 1963, or Vendler, 1967).

(8) a. John entered the room.
b. *John entered the room* is true at a time interval *T* iff $[\exists I, \exists t_i(T).\ t_i \subset I \ \& \ \neg p]$ $\& \ [\exists J, \exists t_f(T).\ t_f \subset J \ \& \ p]$, i.e. there is an interval *I* containing the initial bound t_i of *T* such that ¬p is true and there is an interval *J* containing the final bound of *T* such that *p* is true at *J*, where *p* is 'John is inside the room'.

[4] Advocates of a 'pragmantics cocktail' (Levinson's (forthcoming) term) base their arguments usually on representational formats (where they are often right), and tend to ignore the mode of meaning computation (where they would be wrong). For some recent defences of a strict semantics vs. pragmatics distinction, see Bierwisch and Schreuder (1992), Levinson (1995, 1997), Wilkins and Hill (1995) or Bickel (1997).

The logical form in (8b) is general for all change of state predicates (such as *destroy*, *open*, *freeze*, etc.). Therefore, the form can be used to define a general 'Natural Logic' operator BECOME(p). This allows lexical decomposition of *enter* into BECOME(**inside'**). The change operator BECOME corresponds to a boundary symbol τ, and since we are dealing with a change from '¬p' to 'p', this symbol must be initial. The predicate **inside'** is stative, i.e., not limited to a single point in time. It therefore associates with a phase:

(9) BECOME(**inside'**(x,y))
[τ φ]

However, this can't be right. The representation in (9) predicts that there is a phase of being inside. As such, it should be selectable by an aspect operator that selects phases. The English imperfective is such an operator, but applying the operator to *to enter* does not give a state reading:

(10) John was entering the room (when Sue called him back.)

What we get instead is a telic processual meaning. In order for this to be possible, there must be a phase preceding a final boundary. If there were no phase, we would expect an implicature in parallel with example (3), i.e., an implicature of repetition. The phase must be before τ since the Aktionsart is telic.

(11) **enter'**(x,y)
[φ τ]

This implies that although a phase of being inside is LOGICALLY entailed by (8a), this phase is not SEMANTICALLY represented. If we assume that aspect operators are able to select phases only if they are semantically represented, it follows that (10) cannot refer to a phase of being inside the room.

It could be argued that this all just follows from the incompatibility of the English imperfective with state predicates (**she is being inside*), controversial though the formulation of this restriction is (cf. Bickel, 1996: Chapter 2, for some discussion). However, the problem remains the same if we switch to a language where the imperfective is fully compatible with state predicates. In Belhare the imperfective suffix *-yakt* 'IPFV' happily occurs with static verbs (12a). If we look at the translational equivalent of *to enter*, viz., *likma*, the suffix coerces an implicature of iteration (12b). The truth conditions contributed by *likma* are the same as with English *to enter*: from (12c) it follows that the subject is inside the house, i.e., that (12a) holds true at an interval immediately subsequent to the situation described in (12c).

(12) a. Khim u-rakg-e yuŋ-yakt-he.
house 3POSS-inside-LOC be-IPFV-PAST
'S/he was inside the house.'

b. Khimm-e lig-yakt-he.
house-LOC enter-IPFV-PAST
'S/he went into the house again and again.'
c. Khimm-e lig-he.
house-LOC enter-PAST
'S/he entered the house.'

As with English *to enter*, the logically implied state of being inside is not open for aspectual selection in Belhare *likma*. Different from English, however, is that there is no phase element at all represented in *likma*. If there were, (12b) should have (10), i.e., 'was entering', as a possible reading. The Belhare predicate denotes a punctual change of state:

(13) **likma'**(x, y)
|
[τ]

There are predicates which do contain a post-τ phase as in (9). Whereas this is virtually unknown in English (Sasse, 1991b), Belhare has a set of verbs, mostly denoting experience or motion, which are in minimal contrast with the structure in (13). Representative of a large group of experience verbs is *misen nima* 'to (get to) know',[5] which has the semantic structure in (14).

(14) **misen.nima'**(x, y)
|
[τ φ]

In the unmarked past, *misen nima* 'to know' behaves like *likma* 'to enter' and usually entails a change of state (15a). Unlike *likma*, however, *misen nima* also includes a post-transitional state in its semantics. This has two consequences. First, an imperfective can select this phase, which induces a state reading (15b) and second, since the unmarked past is aspectually indeterminate, (15a) can also simply refer to a past state of knowledge. Both options are not available for *likma* 'to enter'.

(15) a. Misen nis-e-ŋ.
know-PAST-1sg.ACTOR
'I got to know her/him.' or 'I knew her/him.'
b. Misen ni-yakt-he-ŋ.
know-IPFV-PAST-1sg.ACTOR
'I knew him/her.' or 'I used to know him/her.'

Although there is a crucial Aktionsart difference between *likma* 'to enter' and *misen nima* 'to (get to) know', both would be assigned the same Natural Logic rep-

[5] Monolexemic items in Belhare often consist of two separate morphological words.

resentation. Both terms contribute the same truth conditions and are defined by the logical form BECOME( ): *likma* is defined by BECOME(**inside'**(x,y)) and *misen nima* by BECOME(**know'**(x,y)). This means that the logical form cannot predict the difference between the two predicate types in aspectual behaviour. Under an alternative account, one might want to analyse *misen nima* 'to (get to) know' as polysemous with one meaning being static **know'**(x, y), the other one being processual BECOME(**know'**(x, y)). However, this would wrongly predict that the imperfective *misen niyakthen* in (15b) could have the telic reading 'I was getting to know, I was learning', in analogy to English *John was entering* in (10). The difference between static 'to know' and processual 'to get to know' in Belhare is fully predictable from grammatical aspect choice. The imperfective allows only selection of the static phase. The simple past allows both a perfective selection of the initial boundary, yielding an ingressive reading, or of the phase, yielding a state reading (see (15a)). The readings of (15a) and (15b) are the simple effects of grammar-lexis interaction that have been forcefully demonstrated for similar cases in other languages by Breu (1984, 1994) and Sasse (1991a,b). There is no motivation for allocating the readings to lexical polysemy.

If, as seems unavoidable, both the predicate type of *likma* 'to enter' and the type of *misen nima* 'to (get to) know' are defined by the same structure BECOME( ), it is evident that logical form does not provide enough information about Aktionsart. If there were only logical form and aspect could operate on this representation, then we could not explain why the imperfective of *likma* 'to enter' cannot refer to a state whereas it can with *misen nima* 'to (get to) know'. And if we could explain the state readings of *misen nima* by invoking polysemy, we could not, in turn, explain why *misen niyakthen* 'I knew' cannot refer to a process. The facts are easily explained, however, once we assume the following constraint on aspectual scope:

(16) *The Aspectual Scope Constraint:*
Aspect markers may operate on Aktionsart information produced by the semantic rules S_1 ... S_n and by the pragmatic rules P_1 ... P_n, but not by the logical rule $L_{\tau\rightarrow\varphi}$ which entails a phase φ subsequent to any transition τ.

It is a task for future research to further determine what other logical rules *L* should be listed together with $L_{\tau\rightarrow\varphi}$. As to rules of pragmatic inference *P* and semantic composition *S*, we encountered evidence so far for one rule that produces selectable Aktionsarten, viz. event quantification ('PL-insertion') in (3) and in (5). Although it is not my goal here to explore in any sufficient way the full range of rules *S*, *P* and *L* affected by the Aspectual Scope Constraint, one additional pragmatic rule is important to notice. This is 'event termination' (or 'τ-insertion'). What is at stake is the following.

The very notion of boundary, represented here by τ, entails that it can be adjacent only to a phase, here represented by φ. A sequence *[τ τ] is logically impossible. (What else than a phase could there be between two boundaries that are not identical in time?) So, if there is a pragmatic rule that adds an end boundary, there must be a phase to which this boundary can be added. Together with the Aspectual Scope Con-

straint that marks representations produced by $L_{\tau \rightarrow \varphi}$ as irrelevant for aspect operators, this intrinsic property of time structure accounts for a long-standing issue in Slavic aspectology, to which I shall turn now.

4. Ingressive-stative predicates in logic and semantics

The aspectual behaviour of Belhare *misen nima* 'to (get to) know' is a well-known phenomenon in traditional aspectology. Many languages have sets of predicates where the perfective gives an ingressive reading and the imperfective is restricted to a state reading (e.g., Comrie, 1976: 19ff.). Cast into a selection theory, such predicates are 'ingressive-stative', i.e., they contain a sequence of initial boundary and subsequent phase: [τ φ] (cf. Johanson, 1971; Sasse, 1991a,b; Breu, 1994; etc.). The imperfective is again defined as a φ-selector, the perfective as a τ-selector. To take a standard example, the Ancient Greek 'Aorist' in (17a) refers to an inception ('τ' in [τ φ]), whereas the imperfective 'Imperfect' denotes a state (17b) ('φ' in [τ φ]).

(17) a. E-basíleu-s-e.
PAST-reign-AORIST-3sg
'He became king.'
b. E-basíleu-e.
PAST-reign-3sg ('Imperfect')
'He was king.'

Since the predicate is open to the right, (17a) usually implicates that the subject is still king at the moment of utterance. It is possible, however, to 'close' the situation by adding a time adverbial as in the equally famous example (18).

(18) Étē pentḗkonta e-basíleu-s-e.
year:ACC fifty:ACC PAST-reign-AORIST-3sg
'He reigned for fifty years.'

The adverbial is in the 'accusative of direction' and denotes the end boundary of an interval. Thus, the temporal structure it encodes is determined by a [τ] associated with the argument of a directional TO-predicate. Semantic composition of *basíleu-* with [τ φ] and *étē pentḗkonta* with [τ] results in an Aktionsart [τ φ τ]. A perfective operator will then select both the initial and the final boundary, resulting in just the 'delimitative' reading that we get in (18):

(19) **basíleuein'**(x) TO(50 years)
| |
τ φ τ

If the discourse context makes it clear enough, we do not need to specify linguistically an amount of time in order to cancel the implicature from 'he became king'

to 'he is still king'. An example of this type but with Spanish *conocer* 'to (get to) know' is discussed by Chapado and García (1991: 51). The imperfective again refers to a state (20a), the perfective to its inception (20b). If for contextual reasons, however, we know that María is dead, the state in (20c) is thought of as being terminated in the past.

(20) a. Conocía a Maria.
'I knew Maria.'
b. Conocí a María (hace muchos años).
'I got to know Maria (many years ago).'
c. Tú conociste muy bien a María.
'You knew Maria very well.'

The difference between imperfective (20a) and perfective (20c) is that (20c) allows a delimitation of the state, thereby suggesting María's death. By contrast, (20a) explicitly excludes any implication about the boundaries of the state of knowledge or the situation that the knowledge is about.

Evidently, the state delimitation in (20c) derives from contextual, not from semantic knowledge. The end-boundary is introduced by implicature. The resulting Aktionsart ([τ φ] plus [τ]) is again [τ φ τ], i.e., exactly the same as the [τ φ τ] structure that resulted from semantic composition in (19). Accordingly, the perfective viewpoint operator in (20c) selects both boundaries and produces a delimitative reading. This parallelism of semantic and pragmatic event termination recapitulates the parallelism between semantic and pragmatic event quantification that was discussed in Section 2. We can therefore safely add 'event termination' ('τ-insertion') to the list of semantic and pragmatic rules accessible to aspectual operations in (16). At first sight, ingressive-stative predicates are also attested in Russian. Consider the following examples (Comrie, 1976: 19).

(21) a. On ponima-l ėto.
he understand:IPFV-PAST that
'He understood it.'
b. Nakonec on ponja-l v čem delo.
at.last he understand:PFV-PAST in what matter
'At last, he grasped what was up.'

From this, we would expect that it is possible to pragmatically terminate the state and let the perfective select both inception and termination of the state ([τ φ τ]). A good testing frame for this is a situation, where 'A understood p before, but, after having thought it all over, A no longer understands p'. If the perfective can be read as delimitative, i.e., if the operator can select both the lexically given initial τ and the pragmatically introduced final τ, the proposition can be expressed by a perfective form. Otherwise, the perfective cannot be read delimitatively. Spanish passes the test (as does Belhare; see Bickel, 1996). The verb *entender* behaves like *conocer*, so that

perfective *entendí* means 'I grasped' but imperfective *entendía* 'I understood'. It is perfectly fine to say (22).

(22) Antes lo entendí, pero ahora no lo entiendo.
'Before, I understood it, but now I don't.'

In contrast, the Russian version in (23) sounds terribly odd. Only the imperfective form *ponimal* could save the sentence form ungrammaticality. At first sight, this is quite surprising, given the semantic parallelism between Russ. *ponimat'/ponjat'* and Span. *entender*.

(23) *Ran'še ja ėto ponja-l, no sejčas bol'še ja ėto ne
Before I that understand:PFV-PAST but now more I that not
ponimaj-u.
understand:IPFV-1sg.NONPAST
'*I got to understand it, but now I don't.'

It is a long-standing controversy in Russian philology whether the perfective forms *ponjat'* and the imperfective *ponimat'* make up a single ingressive-stative lexeme with two aspectual forms (e.g., Breu, 1985: 15), or whether there are two distinct lexemes, viz., a *perfectivum tantum* 'to grasp' (*ponjat'*) and an *imperfectivum tantum* 'to understand' (*ponimat'*) (e.g., Miller, 1970: 491). Usually, the arguments are based on intuitions about whether there is only one 'meaning' in two time perspectives or whether there are two independent events. I take (23) to provide a knock-down argument against a mono-lexemic analysis (which is not to say that the verbs are not closely related!). For, if there were a single ingressive-stative predicate in parallel with Span. *entender* 'to (get to) understand', there would have to be a [τφ] sequence which can be pragmatically closed. The resulting [τ φ τ] sequence in turn must be selectable for a perfective. However, it is not. If we assume, on the contrary, that *ponjat'* is a punctual change of state predicate (time structure: [τ]) and *ponimat'* a state predicate (time structure: [φ]), (23) is accounted for. The sentence is ungrammatical because it is impossible to add a boundary to a boundary without there being a phase in between (time structure: *[τ τ]).[6]

[6] An alternative account might appeal to the unmarkedness of the Russian imperfective. If the perfective *indefinido* in Spanish is also analyzed as the unmarked member of the opposition, the two forms could be expected to have overlapping distribution. However, while this might explain a preference for imperfective *ponimal* in (23), it does not account for the ungrammaticality of *ponjal*. There is no general rule that makes the Russian perfective incompatible with a temporarily delimitated state. The following example from Maslov (1948: 303) is a case in point.

(i) Rimskaja imperija prosuščestvovala pjat'sot let.
Roman:NOM.FEM.sg empire.NOM.sg exist:PFV:PAST:FEM.sg five.hundred year:GEN.pl
'The Roman Empire existed for five hundered years.'

Also, in an account based on markedness one would need to claim that in (22), *Antes lo entendí, pero ahora* (or: *despues*) *no lo entiendo*, the *indefinido* is used in a non-aspectual 'generally factual' (*obščefaktičeskoe*) meaning. This is at odds with the integration of the state in a sequence of situations, a prop-

Still, *ponjat'/ponimat'* IS intuitively an ingressive-stative predicate since there is a unitary meaning of 'understanding' with the two aspects simply focusing on different parts, viz. the achievement of a state and the state itself. However, this is a fact about LOGICAL representation and not about SEMANTIC representation (and I wouldn't dare to speculate which of these representations is more accessible to intuition!). It definitely belongs to the truth conditions of *ponjat'* that there is a change from a state of ignorance to a state of understanding (however short the latter may be): *"On ponjal knigu* does imply *On ponimaet knigu"* (Miller, 1970: 491). In other words, *ponjat'* has the logical form BECOME(**understand'**(x,y)), just like Span. *entender*. But, according to the Aspectual Scope Constraint in (16), this is outside the scope of aspectual operations. What is accessible for aspect is only the semantic time representation of *ponjat'*, and this is [τ]. Thus, the quandary in Russian philology arises simply from a conflation of semantic and logical representation. Both sides are right, those who claim one lexeme 'BECOME(**understand'**(x,y))', and those who claim a change of state predicate with [τ] and a state predicate with [φ]. But they are talking about different levels of representation.

5. Conclusions

I started off from two premises of a selection theory of aspect: (a) aspect and Aktionsart are in an operator–operandum relation and (b) this operation consists in aspect selecting matching items in Aktionsart. The main evidence for these two premises comes from systematic interactions between aspect operators and Aktionsart structures. Under any theory that incorporates these two premises, we need to distinguish between semantic and logical representation in such a way that the latter contains the entailments of the former and that at least the part of logical representation that is produced by the inference from transitions τ to phases φ (i.e., by the rule $L_{\tau\rightarrow\varphi}$) is outside the scope of aspectual operations. Notice that it is irrelevant for this finding whether 'logical form' or 'logical representation' is taken to be directly truth-evaluable (e.g., May, 1985) or in need of explicature to be truth-evaluable (e.g., Sperber and Wilson, 1986). The essential point is rather that at least some part of logical form is not accessible for at least one part of grammar, which is aspect marking. (Needless to say, this finding is at odds with the common assumption in Government and Binding Theory that logical form is directly read off syntactic representations or is even part of syntax.)

An important corrollary of our finding is that logical entailments are not a safe guide to semantic representation. In fact, the only criterion for semantic analysis that

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erty of 'taxis' usually associated with aspectual specifications (Sasse, 1991a,b; Breu, 1994). Another example of the *indefinido* with an implicated end-boundary in sequential taxis is (ii) from Chapado and García (1991: 50).

(ii) Fernando fue agente de seguros, perteneció a la mafia, se casó, se diversió.

Note that, like *entender*, *ser* is an ordinary ingressive-stative predicate, where the perfective usually denotes the inception of the state: *Fue médico a los 24 años* translates 'at the age of 24, he became medical doctor', and not 'he was doctor'.

is left is what Jackendoff (1983) called the Grammatical Constraint (and, from a mentalist perspective, also the Cognitive Constraint that ensures a well-working interface between semantic and conceptual representation). This is to say that semantic structures only need to satisfy the requirement of grammatical operations. In our case, they need to contain all and only the information that grammatical aspect markers, along with other grammatical devices, can operate on. Whatever else is entailed about 'aspectual' structure is part of logical but not *ipso facto* part of semantic representation.

Many linguists and cognitive scientists have argued that truth-conditional or 'logical' analysis does not provide the right sort of format for explicating semantics. Logical form is both too poor and roo rich to capture linguistically encoded meaning. It is too poor because of the more 'subjective' aspect of language like perspectivisation, discourse markers or conventional implicatures (e.g., Langacker, 1987; Wierzbicka, 1987). Logical form is too rich because linguistic representations are not directly truth-evaluable without prior pragmatic enrichment (cf. Sperber and Wilson's (1986) 'explicatures' that fix variables, resolve ambiguities, bridge ellipses etc.; also cf. Gazdar, 1979; Levinson, forthcoming, etc.): a sentence like *she went* has a truth value only if the pronoun and the time specification is interpreted in a context.

It is obvious that abductive enrichments like explicatures cannot be part of the encoded semantics (if we are to avoid the conclusion that a pronoun like *she* is infinitely ambiguous). Now we see that deductive enrichment is not part of semantics either. This implies that truth-conditional analysis cannot in principle substitute for semantic analysis, even if there is a deductive entailment relation between semantics and logic. If, in this sense, semantics is not a notational variant of logical form, there is no need for semantic representation to exhaustively describe truth conditions. Notice that this amounts to saying that a semantic analysis can be correct without containing all information that is needed in the truth evaluation of an expression (see Bickel, forthcoming, for an analytical exercise based on this assumption). Put differently, to know the semantics of a sentence is not the same as to know the conditions under which the sentence would be true! Rather, it is much less, and logical form is a mere derivative of semantics. This finding, if generalised, has major implications for the theory of meaning, which I want to briefly sketch in the remainder.

The idea that semantic representations are extremely impoverished structures could lead to more realistic accounts of linguistic processing. Suppose semantic representation contains all logical entailments. No doubt a word like *sugar* would then contain a semantic marker [SWEET]. This marker would be on a par with such semantic constituents as [COUNTABLE], [ANIMATE], or [PUNCTUAL]. This is an odd situation, and probably one of the reasons why semantic theory often looks so suspicious to syntacticians. There is a big difference between markers like [SWEET] and markers like [COUNTABLE]. In order to form grammatically correct sentences in English, a speaker has to attend to the notion [COUNTABLE] whenever s/he uses a noun. Without this information the simple grammaticality distribution in (24) could not be accounted for.

(24) a. The spaghetti was (*were) delicious.
b. The noodles were (*was) delicious.

The notion of countability is crucial for a rule of grammar (verb agreement). In stark contrast, no rule of English grammar is sensitive to the notion of sweetness. To assume that both kinds of information are on the same level of representation is counter-intuitive. Notions like countability must be constantly available to grammar, since it is impossible to build English sentences without on-line access to this information. In order to use the noun *sugar*, I have to know that it denotes non-countable stuff but not that it denotes sweet stuff. There is no reason to assume that the notion of sweetness is available in linguistic processing whenever one uses the word *sugar*. Quite to the contrary, it seems odd to assume that the notion of sweetness is ever mentally activated when I ask you to pass me the sugar for my cup of tea. To know that *sugar* entails *sweet* is a matter of LOGICAL, not of SEMANTIC representation. As such, it is outside the scope of grammar.

This implies that semantic representation is not decomposed beyond what is necessary for grammar rules. On this view, the controversy about the merits and deficits of decompositional meaning analysis loses much of its relevance. As argued by Fodor et al. (1975), it is psychologically implausible to assume that words are processed as complex compositional structures (also cf. Levinson, 1997). Rather, they are processed as more or less monadic chunks. If there are detectable components in them, they represent at most grammatically relevant features like [COUNTABLE] or [PUNCTUAL]. This does not entail, however, that decomposition is irrelevant for meaning analysis. Decompositions are essential for logical representations, but not for semantics in the narrow sense of 'linguistically encoded meaning'. As emphasised by Jackendoff (1990: 39), if meaning postulates are formulated so as to capture generalisations across words (e.g., with *x killed y* → *y died* and *x lifted y* → *y rose* etc. being instances of a general postulate *x caused E to occur* → *E occurred*), they are but notational variants of decompositional analyses. However, such decompositions need not be part of semantics. They are part of the semantics only to the extent that some grammatical rule is sensitive to them, for instance, if a language has a productive morphological causative formation – but not beyond that. From this point of view, to acknowledge that words are processed in monolithic chunks is fully compatible with decompositional meaning analyses. However, the chunks are in the semantics, the ingredients are in the logic.

Another potential corollary of a strict logic vs. semantics distinction concerns a long-standing issue in philosophical approaches to meaning. Since Quine (1951) the notion of 'analytical' entailment as opposed to 'synthetic' meaning has become dubious. However, if the analytic can't be distinguished from the synthetic, how can semantic knowledge, which necessarily includes all analytical entailments (see, e.g., Kempson, 1977), ever be distinct from world knowledge? To give up the analytic vs. synthetic distinction challenges the very possibility of semantics as a purely linguistic enterprise. Even worse, if semantic knowledge is not different from conceptual knowledge, how is it possible that speakers of the same language can communicate, given the tremendous variation in individual conceptual knowledge (a question raised most eloquently by Putnam, 1975, 1988)? It is no surprise that the Quinean argument is commonly rejected by linguists, usually just by appealing to seemingly uncontentious examples like *x fell asleep* → *x slept* or *x is a cat* → *x is an animal*

that ARE intuitively analytical. Under the hypothesis that semantic and logical representation are distinct, however, there is no need to bother at all about analyticity in semantic theory. To know the semantics of a word reduces to knowing only the information that is relevant for grammar. Whatever else one may or may not know about the meaning – and one MAY know a word's analytical entailments – is not part of semantic representation but of logical meaning postulates and pragmatic implicatures. As Dowty (1979: 387) observed from a philosophical point of view, semantic representations in a mentalist sense underdetermine truth-conditional intensions. In Putnam's (1988: 25) words, "[r]eference is socially fixed and not determined by conditions or objects in individual brains/minds". This explains why people can use words like *gold* in a perfectly grammatical and unsuspicious way but still disagree in what they would take to be the analytic entailments of *gold*, to take up Putnam's example (e.g. 'has atomic number 79' or 'is the second most expensive metal'). To a surprising degree, conceptual diversity does not disable successful communication. The members of a speech community share the semantic but not necessarily the logical representation. The former is an essential prerequisite to language understanding, the latter is socially distributed knowledge and can be discovered in specific discourse settings, scientific and other.

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