The Hungarian Definiteness Effect Hoax

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ABSTRACT

The so-called Definiteness Effect (DE) in Hungarian concerns certain verbs (mainly of creation), called DE-verbs in what follows, and can be summarized as follows: (1) an indefinite theme can only be interpreted as specific when it co-occurs with the prefixed version of such verbs; (2) when the prefixless version of such verbs co-occurs with a specific theme, the sentence can only be interpreted as progressive. This particular manifestation of the relationship between specificity and aspect has puzzled linguists for almost twenty years now. We provide an account of the phenomenon on the basis of the following assumptions: (1) the treatment of the specificity of indefinites must rely on a concept of various levels of individuation; (2) Hungarian has a particular construction, similar but not identical to a presentative, which is responsible for the behaviour of prefixless DE-verbs.

1. INTRODUCTION

In this paper we try to explain what has been called the definiteness effect (DE) related to certain verbs (which mostly mean some kind of creation or making something available), which we will call DE-verbs. The problems in this, as we will see, are related to the interactions between verb aspect and definiteness (or, rather, specificity), as well as the semantics of the prefixed-prefixless variants of Hungarian verbs.

The central facts about Hungarian DE are the following:

(1) Prefixless DE-verbs can be perfective:
Írtam egy levelet
‘I wrote a letter’
(Under normal circumstances, in Hungarian, the use of a prefixless verb that has a prefixed variant is imperfective in neutral sentences.)

(2) Prefixless DE-verbs with a definite theme cannot be perfective:
Írtam a levelet
*wrote-I the letter-ACC
‘I wrote the letter’
OK ‘I was writing the letter’

(3) Indefinite themes with prefixed DE-verbs must be specific:
Megírtam egy levelet
E.g., ‘I wrote one of the letters’

The interpretation of the last sentence is not the only possible one: as we will see in a moment, a specific indefinite need not (but certainly can) refer to an arbitrary member of a previously known set.

The Hungarian DE was first formulated in Szabolcsi (1986). The original term was used by Barwise and Cooper (1981) and de Jong and Verkuyl (1984) for the phenomenon that the theme of existential sentences (of the form there is/are...) cannot be definite. The typical explanation of this phenomenon is that definite
(and specific) expressions presuppose the existence of their referent, whereas existential sentences assert the existence of their theme, hence definites and existential sentences are incompatible with each other. Szabolcsi (1986) argues that the Hungarian DE is a similar phenomenon, claiming that DE-verbs contain an exist meaning component, which would correspond to a logical existence predicate. Her account for the relationship of the DE to aspect is based on the alleged neutralizing effect of the progressive aspect. We will turn back to such neutralizing effects later on. In our view, one of the weakest points in Szabolcsi’s (1986) account is that she does not account for the behaviour of the prefixed counterparts of DE-verbs (which, in terms of their meaning, must contain the same exist meaning component as their prefixless versions).

In what follows, we will first examine the concept of specificity. We will propose that specificity is a fundamentally epistemic concept: an entity is specific if it is possible (for someone) to know what the entity in question is. Second, we will show that the meaning of the Hungarian verbal prefix, at least when used with DE-verbs, is that an event type (a potential event) becomes instantiated by the event denoted by the sentence. Hence the presuppositional character of those prefixed verbs: when claiming that an event type gets instantiated, we presuppose that it was a possible event in the first place. This presupposition makes it necessary to use specific themes with such verbs. In his third part we address the question how specificity is related to verbal aspect. As a matter of fact, the only problematic point is how a prefixless DE-verb (which, in principle should not have a perfective interpretation, since it lacks the actualization component) can be interpreted as perfective and, conversely, why an imperfective prefixless verb must have a specific theme. We claim that the relevant examples indicate the existence of a separate construction, similar to the ‘presentative’, which licenses the perfective reading. That is, the particular type of Hungarian sentences in question (a subtype of so-called thetic sentences) idiosyncratically require a prefixless verb and an indefinite theme (to be interpreted non-specifically), among other idiosyncratic properties.

2. SPECIFICITY

The most widespread definition of specificity among the numerous ones proposed in the literature of the topic is that of Enç (1991). According to this definition, the core of specificity is discourse-linkedness. A specific noun phrase is understood as referring to an entity that has been mentioned earlier or at least tightly related to one (e.g., a member of a previously mentioned collection). In the former case, the noun phrase is usually definite, whereas the latter is usually expressed with indefinite noun phrases. True, most phenomena in Hungarian that are sensitive to specificity support this definition in that, e.g., if the prefixed version of a DE-verb has an indefinite theme, then the theme can be interpreted as an arbitrary member of a previously mentioned collection, as we have seen above. However, in other cases, the same type of indefinite noun phrase is interpreted differently:

(4) Specific theme without collection antecedent
Kírúgtak, mert nem írtam meg egy szerződést.
‘They fired me because I didn’t write a contract’

To be sure, the indefinite is interpreted specifically here (e.g., it does not have the second reading above). However, the indefinite need not have a collection antecedent. I may have been fired because I forgot or refused to write the single contract I had to (and perhaps it was the single contract ever to be written in the history of my company). The only sense in which the contract I did not write has an antecedent is that the sentence implies that I was asked/ordered/supposed to write one. Note that the audience does not have to be able to identify this antecedent from the context. As a matter of fact, the example above can be uttered out of the blue. So this looks much less of an anaphor than a simple presupposition: It is very common that presuppositions can be accommodated without any contextual clue, whereas anaphors usually cannot be resolved without there being some overt or suggested antecedent.

Obviously, we have to modify the definition of specificity in the light of this observation: instead of discourse-linkedness, we have to speak of presuppositions. But what presuppositions exactly? It seems that the presupposition in question is a fairly underspecified one: it cannot be that of the existence of the given entity, since it can co-occur with verbs of creation, like in our last example. In such cases, it only presupposes
an obligation, intention, plan or idea of its (coming into) existence.

Since the ‘antecedent’ of a specific indefinite exists only in someone’s obligation, intention etc., it is far from ‘specific’ in the everyday sense. Only the obligation, intention, etc. are ‘specific’ in some sense. But in what sense exactly? Consider the following quotation from The Name of the Rose (originally quoted in von Heusinger, 2002):

(5) The fact is, Benno said, he had overheard a dialogue between Adelmo and Berengar in which Berengar, referring to a secret Adelmo was asking him to reveal, proposed a vile barter, which even the most innocent reader can imagine.

In this case, even the speaker is unable to identify the secret in question, except with the descriptions the secret Adelmo asked Berengar to reveal or the secret Benno heard Adelmo ask Berengar to reveal.

Thus, we have to adopt a weak definition of specificity, along the following lines:

(6) **Specificity**

A reference to an entity is specific iff it presupposes the possibility of the existence of the entity. By the ‘possibility’ of its existence we mean the existence of an intentional eventuality the actualization of which yields the coming into existence of the entity in question, i.e., an intentional entity the actualization of which could be the entity in question.

There are many ways to formally express this definition, e.g., we can use Kripke’s (1959) ‘possible entities’ as a means to capture Brentano’s (1874, 1995) concept of intentional entities. The philosophical concept of intentional entities allows us to make a distinction between, say, simply drawing lines on a sheet of paper as opposed to a situation in which the same person is trying to produce a drawing that (s)he has a plan about. The difference is that, in the second case, the drawing has an intentional object, whereas it lacks one in the first case. An intentional object does not have to exist, as we have seen in the example about the contract-writing that never took place. Under the Kripkean formulation, we can say that a process is associated with an intentional object iff all its culminations fall into the partition of possible worlds in which the entity in question actually exists (i.e., it falls within the extension of the existence predicate in that world; its intentional existence means that it is a member of the domain of possible entities that is independent of all possible worlds).

Therefore, if a sentence presupposes a process associated with an intentional object, then it indirectly also presupposes the existence of the actualization of that object provided that the process culminates. For example, a drawing or writing process has an intentional object (i.e., it is not just the random drawing of lines or Dadaist automatic writing) if all its potential culminations fall into the partition of possible worlds in which its object exists (i.e., if it is true for each potential culmination that something has been drawn/written).

Another interesting possibility is to make use of the semantics of questions proposed by Groenendijk and Stokhof’s (1997), where the conditions for the existence of an exhaustive answer to a question is very similar to what one would consider as the conditions of the existence of an intentional entity. In particular, an exhaustive answer to a question like ‘Which x P(x)?’ can be characterized by a set of possible worlds in each of which the entities that satisfy the open sentence (in our case, P(x) or ‘I didn’t write the contract x’) are identical. Thus, such a question induces an equivalence classification over the class of possible worlds (in terms of what entity the open sentence holds for), and each class represents an exhaustive answer. The relevant presupposition, therefore, is that the relevant equivalence classification is not empty.

The relationship of the existence of an exhaustive answer and specificity (or, equivalently, the existence of an intentional entity) can be illustrated with the fact that only specific indefinites license which-questions:

(7) a. — *Megírtam egy levelet*
   
   **PREF:** wrote-I a letter-ACC
   
   E.g., ‘I wrote one of the letters’
   
   — *OK Melyik levelet?*
   
   which letter-ACC
   
   ‘Which letter?’
   
   b. — *Irtem egy levelet*
   
   wrote-I a letter-ACC
   
   ‘I wrote a letter’
In the case of ‘I didn’t write a contract’, $P(x)$ would be ‘I didn’t write the contract $x$’, and ‘Which contract didn’t you write?’ is a perfectly appropriate question. Let us emphasise that this presupposition is a truly existential one: what the (true) answer exactly is is irrelevant, all that matters is that there is one.

3. THE CONTRIBUTION OF THE PREFIX

Let us turn now to the verbal prefix in Hungarian. It has been emphasised in the literature (Kiefer, Piñón etc. [..]) that the prefixed variants of Hungarian verbs are perfective (in particular, when their meaning is not idiosyncratic, and when it alternates with the prefixless variant — DE-verbs are just like that). By perfectivity people seem to mean that such verbs refer to processes together with their culmination. (Piñón even claims that Hungarian prefixed verbs refer to the culmination proper; we will falsify that claim later in this paper.) The problem with this view is that it does not explain why the themes of DE-verbs, when indefinite, can only be interpreted as specific. Perfectivity on its own does not have such a consequence (as witnessed by the first series of our examples, in the beginning of this paper, which illustrate that the prefixless variants of these verbs can also be used perfectly). There is nothing about a culmination that would per se imply that the event in question is the actualization of an intentional eventuality. As a matter of fact, the perfective use of the prefixless variants (with indefinite themes) refers to events that are accompanied by the coming into existence of an entity, yet they do not have such an implication. For example, take Anna Szabolcsi’s (p.c.) pair of examples:

\begin{itemize}
  \item \textit{Szabolcsi’s illustration of prefixed vs. prefixless DE-verbs}
  \begin{itemize}
    \item \textit{a.} Szerveztem egy konferenciát.
      \textit{organized-I a conference}\text{-acc}
      ‘I organized a conference’
    \item \textit{b.} Megszerveztem egy konferenciát.
      \textit{prefix-organized-I a conference}\text{-acc}
      ‘I organized a conference’
  \end{itemize}
\end{itemize}

The difference is subtle, yet crystal clear to all speakers of Hungarian: The first sentence can be uttered felicitously by the director of the institute, but not by his/her secretary; the situation is the opposite with the second. For a director often decides on the organization of the conference (creates the intentional object and, if successful, the conference’s taking place is the outcome of his decision), whereas a secretary often does most of the organizational work, but (s)he is almost never the actor of the original intention. The idea of organizing the conference must exist before the secretary’s actually organizing it.

As a consequence, we claim that the contribution of the verbal prefix (at least in the cases when its forms the prefixed variant of the prefixless counterpart) is that the event referred to is the actualization of an intentional eventuality. This correctly implies the presupposition that the intentional eventuality in question exists in the first place. On the other hand, it also implies perfectivity, because the only way in which the eventualities in question get actualized is by culmination.

It is important to emphasise at this point that verbal prefixes do not have the same kind of meaning contribution with other verbs as they have with DE-verbs. For example, the verb út ‘beat’ cannot be used perfectly in this prefixless form (so perhaps it should be glossed ‘be beating’ or ‘keep beating’), whereas its most frequent prefixed variant, \textit{megút} ‘beat’ simply means something like ‘beat once’, and is perfective. In such cases the meaning of the prefix has no bearing on any process different from the one denoted by the verb or on the identity of the theme.
4. PREFIXLESS DE-VERBS

As is clear from the above, using a DE-verb without a prefix in an assertion does not give rise to the claim that the actualization of an intentional eventuality have taken or will take place. So it is quite natural that such prefixless verbs can be used imperfectively or in progressive clauses. On the other hand, while the semantic contribution of the prefix with DE-verbs implies perfectivity, as we have seen, the converse is not true: Hungarian prefixless DE-verbs (unlike other process-denoting prefixless verbs) can still be perfective. We have seen that in examples like ‘I wrote a letter’ and ‘I organized a conference’ above. In such sentences, the theme is not claimed to be the actualization of an intentional object. For example, as we have seen, ‘I organized a conference’ (with the prefixless verb szervez ‘organize’) can be uttered by the director in the sense ‘I decided to organize a conference and had my employees organize it’, so that the birth of the intentional entity is understood as part of the entire event.

On the other hand, we see no reason why the prefixless version should exclude the previous existence of an intentional entity. A specific or definite theme presupposes the existence of the entity in question, but the sheer fact that the verb is prefixless should not come into conflict with that presupposition. Yet, the so-called Definiteness Effect seems to witness such a conflict. As we have seen in the introductory examples, the prefixless variant of a DE-verb cannot, in the unmarked case, co-occur with a definite theme (in fact, it cannot with a specific indefinite theme, either).

What is the ‘unmarked case’ in which the DE arises? A simple examination of the facts shows that (pace those mentioned earlier who speak of the ‘neutralization’ of the DE, i.e., special circumstances that suspend it) the ‘unmarked case’, although simple indeed, is not that unmarked after all:

(9) Cases in which no DE can be observed
   a. Presence of a focussed constituent:
      i. [pTEGNAP] írtam a levelet
         yesterday wrote-I the letter-ACC
         ‘It’s yesterday that I wrote the letter’
      ii. [pÉN] írtam a levelet
          I wrote-I the letter-ACC
          ‘It’s me who wrote the letter’
      iii. [pIRTAM] a levelet
          wrote-I the letter-ACC
          ‘I WROTE the letter [rather than, e.g., copied it]’
   b. In a subordinate clause:
      i. a levél, amit írtam
         the letter which-ACC wrote-I
         ‘the letter I wrote’
      ii. a nap, amikor a levelet írtam
          the day which-TEMP the letter-ACC wrote-I
          ‘the day on which I wrote the letter’
      iii. a fiú, aki a levelet írta
           the boy who the letter-ACC wrote-3SG
           ‘the boy who wrote the letter’

In all these cases, the prefixless DE-verb happily co-occurs with a definite or a specific indefinite theme, yet it is interpreted perfectly. So maybe it would be better to say that the so-called DE only manifests itself in a main clause that does not contain a focussed constituent. If one looks at it from this angle, one also notices that there are other severe restrictions on such DE contexts. For example:

(10) No quantification over sentences exhibiting DE
    *háromszor szerveztem egy konferenciát
    three-times organized-I a conference-ACC

(11) No negation of sentences exhibiting DE
    *nem szerveztem egy konferenciát
    not organized-I a conference-ACC
As far as we know, there is no reason given anywhere in the literature why these sentences should be bad. The first one could well mean ‘it happened three times that I organized a conference’, whereas the second could mean ‘it is not the case that I decided to organize a conference and I did so’, but they are both simply out.

Szabolcsi (1986) accounts for what she calls ‘the neutralization of the DE’ by restricting this to verbs meaning ‘(cause to) come to exist in a particular fashion’. Although her account is not fully explicit, it seems that she stresses the ‘particular fashion’ meaning component, which may become more prominent than the existential component. É. Kiss (1995) shows that ‘neutralization’ also extends to plain existential verbs, including the Hungarian equivalent of English be, therefore she rejects Szabolcsi’s analysis. The account given in É. Kiss (1995) is that in sentences containing contrastive focus, the main assertion is not the existence of something any more; the existential statement is in the presupposition part of the sentence, so no anomaly arises between assertion and presupposition. However, none of the authors we are aware of (except Kálmán (1995)) recognizes the other types of ‘neutralization’, or, as we would put it, the restricted distribution of DE-structures (i.e., no DE in embedded clause, no temporal quantification in a DE-structure, etc.).

The conclusion that we can draw from these facts is that it is sentences exhibiting DE that are special, not the ones in which it is ‘lifted’. In particular, we should analyse them as a special sentence or verb phrase pattern (some would call it a construction) that prescribes the presence of a stressed prefixless verb (thus excluding focus and negation) and an indefinite post-verbal theme. The semantico-pragmatic characterization of this construction, as always, is more difficult. Informally, we could say that it expresses the creation of an entity ‘out of the blue’, so to say, without referring to any antecedent state, and/or an event in which some salient participant enters into a very close relationship with an entity that was previously completely out of sight (in particular, consumption verbs fit this picture because actually incorporating something results in a very, very close relationship). The latter possibility is most obvious when the DE-verb is not a verb of creation at all:

(12) löptam egy biciglit
    stole-I a bike-ACC
    ‘I stole a bike’

This sentence is not appropriate if the speaker will not use the bike in the consequent state (unless the speaker stole it for someone else, in which case a dative should also be present).

(13) hoztam egy asztalt
    brought-I a table-ACC
    ‘I brought a table’

Again, the sentence implies that whoever the speaker brought the table for will use it as a table. As we realize thanks to Szabolcsi (p.c.), the thing brought need not even be a table originally, the point is that it will be used as a table by the beneficiary.

(14) Löüttem egy vadkacsát
    shot-I a wild duck-ACC
    ‘I shot a wild duck’

What is interesting in this example is that it cannot be used for referring to a situation in which the speaker shot a wild duck but did not fetch it: it implies that (s)he shot the wild duck for him/herself. In other cases, the prefixed variant has to be used.

As these examples suggest, one particular feature of this construction is that a beneficiary is always understood or explicitly present in it, at least when the verb is not a creation or consumption verb. So, if the verb denotes a creation/consumption event, that is a sufficient condition for it to qualify as a DE-verb; with other verbs, a beneficiary who will use the direct object in the consequent state is required.

As a matter of fact, almost arbitrary event-denoting verbs can be coerced into the construction if an beneficiary is made explicit and the context is appropriate. The following example is again due to Szabolcsi (p.c.):

(15) mostam magamnak egy autót
    washed-I myself-DAT a car-ACC
c. ‘I washed myself a car’

This sentence can be used in a context when, say, you can only drive out from the garage if you wash it first, i.e., if washing the car makes it available for use. Hence, the special ‘DE’-construction can be used.
5. ANALYSIS

In what follows, we will present an analysis of the relevant facts using a multi-modal dynamic framework. We will make explicit most of the concepts used in the informal explanations above. Of the earlier attempts to explain the Hungarian definiteness effect, ours is closest to that of Maleczki (1995). Maleczki correctly observes that the aspectual properties of such sentences depend on whether the entity denoted by the object phrase is individuated sufficiently or not, but the framework she uses is fully extensional and, as a consequence, the relevant distinctions cannot be expressed in it. Our notion of specificity might be seen as the formal elaboration of her 'disjunctive/conjunctive reference' (roughly corresponding to what late mediaeval logicians called various modes of *descensus ad inferiora*) in an appropriate dynamic intensional setting.

5.1. The logic

We will assume an intensional semantics in which the model consists of the triplet $\mathcal{M} = (\mathcal{D}, E, \mathcal{F})$, where $\mathcal{D}$ is the non-empty domain of Kripkean possible individuals, $E$ is the distinguished existence function, and $\mathcal{F} = (\mathcal{W}, R)$ is a Kripke-frame with a set $\mathcal{W}$ of possible worlds and a set $R$ of accessibility relations. The relationship of $\mathcal{D}$, $E$ and $\mathcal{F}$ is that the existence function assigns a subset of $\mathcal{D}$ to every possible world: for every $w \in \mathcal{W}$, $E(w) \subseteq \mathcal{D}$ is called the universe of the possible world $w$, i.e., the actual individuals in $w$. We will also stipulate, for each model, a special unary accessibility relation $A \in R$ which is true for the single possible world $w \in \mathcal{W}$ that is considered the actual world. We will write $\text{Act}(\mathcal{M})$ for the actual world in the model $\mathcal{M}$.

We will use a type-theoretic logical language with a traditional Fregean type theory. The function $\text{Dom}_\mathcal{M}$ assigns a domain to every type; it is defined as follows:

(i) $\text{Dom}_\mathcal{M}(\epsilon) = \text{def} \mathcal{D}$, i.e., the domain of the type of individuals is the domain $\mathcal{D}$ itself;
(ii) $\text{Dom}_\mathcal{M}(t) = \text{def} \{0, \mathcal{D}\}$, i.e., the domain of truth values consists of the empty set and $\mathcal{D}$ itself (this is a convenient choice for two entities that always differ);
(iii) $\text{Dom}_\mathcal{M}(\langle \tau_1, \tau_2 \rangle) = \text{def} \text{Dom}_\mathcal{M}(\tau_1) \times \text{Dom}_\mathcal{M}(\tau_2)$, i.e., the domain of a functor type is the space of functions from the domain of the type of the operand to the domain of the type of the value.

As usual, a non-logical constant $c$ of type $\tau$ is assigned an extension in each possible world $w$ (written $w(c)$), in accordance with its type:

$$c \in \text{Con}_\mathcal{M} \Rightarrow w(c) \in \text{Dom}_\mathcal{M}(\tau).$$

Variables, on the other hand, are assigned values by assignment functions. $g$ is an assignment function iff

$$x \in \text{Var}_\mathcal{M} \Rightarrow g(x) \in \text{Dom}_\mathcal{M}(\tau).$$

As usual, we will use a static semantic-value function, written $| \cdot |^\mathcal{M}_g$ (where $g$ is an arbitrary assignment function). The following types of complex expression are the most important ones in the language:

$$c \in \text{Con} \Rightarrow |c|^\mathcal{M}_g = \text{def} \text{Act}(\mathcal{M})(c);$$
$$x \in \text{Var} \Rightarrow |x|^\mathcal{M}_g = \text{def} g(x);$$
$$F \in \text{Expr}_{\langle \tau_1, \tau_2 \rangle}, a \in \text{Expr}_{\tau_1} \Rightarrow |F(a)|_g^\mathcal{M} = \text{def} |F|^\mathcal{M}_g(\langle a \rangle^\mathcal{M}_g);$$
$$E \in \text{Expr}_{\tau_2}, x \in \text{Var}_{\tau_1} \Rightarrow |\lambda x E|^\mathcal{M}_g = \text{def} \{ (e_1, e_2) \in \text{Dom}_\mathcal{M}(\tau_1) \times \text{Dom}_\mathcal{M}(\tau_2); |E|^\mathcal{M}_g[x : e_1] = e_2 \},$$

where $g[x : e_1]$ is an assignment function yielding the same values as $g$, except that it yields $e_1$ when applied to $x$.

We can also introduce existential quantification and negation in the standard way. If $x$ is a variable of type $\tau$ and $\varphi$ is a formula ($\varphi \in \text{Expr}_\mathcal{M}$), then

$$|\exists x \varphi|^\mathcal{M}_g = \text{def} \begin{cases} \text{true} \quad \text{iff there is an } e \in \text{Dom}_\mathcal{M}(\tau) \text{ s.t. } |\varphi|^\mathcal{M}_g[x : e] = \text{true}; \\ \text{false} \quad \text{otherwise}; \end{cases}$$
$$|\neg \varphi|^\mathcal{M}_g = \text{def} \begin{cases} \text{true} \quad \text{iff } |\varphi|^\mathcal{M}_g = \text{false}; \\ \text{false} \quad \text{otherwise}. \end{cases}$$
And, of course, modal formulae: if $R \in \mathcal{R}$ is an accessibility relation, then $\Box R \in \text{Expr}_{(t,t)}$ such that, if $\varphi \in \text{Expr}_t$ is a formula, then

$$|\Box R \varphi|_g^{(W,R)} = \begin{cases} \text{true} & \text{if for all } w' \in W, \text{ if } R(\text{Act}(\mathcal{M}), w'), \text{ then } |\varphi|_g^{(W,R[A^t(w')])} = \text{true}; \\
\text{false} & \text{otherwise.} \end{cases}$$

Here $\mathcal{R}[A : \{w'\}]$ stands for the same set of accessibility relations as $\mathcal{R}$, except for the special ‘actual’ relation, which is true for the single possible world $w'$.

The dynamic semantic-value function, written $[\cdot]_g$ assigns a function from information states to information states to any expression of type $t$ (i.e., any formula $\varphi \in \text{Expr}_t$). An information state $\sigma$ is a set of pairs of the form $\langle W, R \rangle$, where $W \subseteq W$ is a set of possible worlds, $R \subseteq \mathcal{R}$ is a set of accessibility functions; the same stipulations apply to such pairs (called possibilities) as to models. Each of them represents a possibility of truthfully embedding what has been processed previously into a model. The accessibility functions in the possibilities serve various purposes, e.g., some of them represent temporal relations over the possible worlds (see below).

Most of our formulae simply behave as filters when interpreted dynamically, i.e., they simply throw away those possibilities from the input information state which fail to make them true. In particular, take the dynamic interpretation of propositional constants:

$$p \in \text{Con}_t \Rightarrow [p]_g(\sigma) = \text{def} \{ (W, R) \in \sigma : [p]_g^{(W,R)} = \text{true} \}.$$ 

Unlike in previous dynamic semantic theories, existential quantification is also interpreted as a filter:

$$[\exists x \varphi]_g(\sigma) = \text{def} \{ (W, R) \in \sigma : [\exists x \varphi]_g^{(W,R)} = \text{true} \}.$$ 

We can do this because we do not adopt the so-called ‘bound-variable’ view of anaphoric reference, i.e., we do not assume that a pronoun is like a variable that is bound by a previous existential quantifier. Instead, we follow the so-called E-type approach to anaphors, i.e., we interpret them on a par with definite descriptions. A definite description presupposes that, in all possibilities, its extension is a singleton set. If $\varphi \in \text{Expr}_t$ is a formula, and $x$ is a variable of some type $\tau$, then $\lambda x \varphi \in \text{Expr}_\tau$, and

$$|\lambda x \varphi|_g^{\mathcal{M}} = \text{def} \begin{cases} \text{undefined} & \text{if } \text{Card}(|\lambda x \varphi|_g^{\mathcal{M}}) \neq 1; \\
\{e\} & \text{otherwise, where } |\lambda x \varphi|_g^{\mathcal{M}} = \{e\}; \end{cases}$$ 

Here $\lambda x \varphi$ is defined as usual: For any $v \in \text{Var}_{\tau_1}$ and $E \in \text{Expr}_{\tau_2}$ for some types $\tau_1, \tau_2$, the expression $\lambda v E$ is of type $\langle \tau_1, \tau_2 \rangle$, and is interpreted as follows:

$$|\lambda v E|_g^{\mathcal{M}} = \text{def} \{ (e_1, e_2) \in \text{Dom}_{\mathcal{M}}(\tau_1) \times \text{Dom}_{\mathcal{M}}(\tau_2) : |E|_g^{\mathcal{M}}[e_1] = e_2 \},$$

where $g[v : e_1]$ is the same assignment as $g$, except that it assigns the value $e_1$ to the variable $v$.

The fact that certain existentially quantified sub-formulae do not produce available ‘antecedents’ for such descriptions simply stems from the fact that an existential within the scope of a modality (or negation) do not guarantee the unambiguity of the description in question in the actual worlds in the possibilities. On the other hand, if a definite description is embedded within a modality, then it will look for an antecedent in the corresponding alternative possible worlds, so the phenomenon called ‘modal subordination’ can be dealt with.

What we cannot deal with using this machinery, though, is the so-called ‘foregrounding’ effect, namely, that entities explicitly mentioned in the discourse are more likely to serve as antecedents as those the existence of which is only implied. This phenomenon is not very sharp, though, and we have the impression that it is not strictly necessary to include its treatment in the logic itself.

It would clearly be too complicated and off-topic to deploy a full machinery for dealing with the entire dynamics of discourse with the representations of the interlocutors’ information states, their mutual knowledge, and so on (including the ‘foregrounding’ effects just mentioned). But information states as defined here could be the basic ingredients of such a model. In what follows, we will assume, for the sake of simplicity, that the information states used correspond to the speaker’s knowledge or what the hearer might assume about the speaker’s knowledge. Such knowledge includes information on various stages of the real world (or even imaginary worlds), including stages preceding, overlapping with or following the speech situation. All such temporal and non-temporal relations between the various possibilities in an information state will be expressed using the model’s accessibility relations.
5.2. Specificity

When people talk about nominal expressions interpreted as specific, they do not always make it explicit that specificity is to be understood with respect to an information state. For example, an expression can be interpreted non-specifically in the sense that the referent is not specific ‘previously’, i.e., in the information state preceding the utterance (this is the case in there-constructions). As a matter of course, such referents are specific after the utterance has been processed, as opposed to, say, incorporated arguments which, if they can be thought of as referring at all, do not give rise to a specified referent. [cite Wacha]

On the other hand, when talking about specific referents (including the referents of definite noun phrases and specific indefinites), one means that the referent is somehow specific enough before the utterance. The which/what-test that we have used before is diagnostic for this kind of specificity. If one uses a which/what-question, one presupposes that the interlocutor can provide a description of the referent different from the one just uttered. For example, if our interlocutor says, There is a cat on the mat, it does not make much sense to ask Which/What cat? because the there-construction does not guarantee that such a different description is available:

(16)
— There is a cat on the mat.
— Which/What cat?
— How do you mean ‘which/what cat’? The one on the mat.

As opposed to this, so-called specific uses of indefinites license such questions:

(17)
— I was fired because I failed writing a contract.
— Which/What contract?
— ...

It even makes sense to speak of specificity not with respect to an entire information state, but to some subset of the possibilities in it, e.g., with respect to the possibilities concerning the reference time of a narrative. [quote Name of the Rose]

We are now ready to define what it means for a term T of type τ to be specific in an information state or in a set of possibilities σ. What it means is simply that it can be the antecedent of an E-type pronoun, i.e., if λxϕ is a description of it, then ιxϕ is defined in the given set of possibilities. In some sense, this means that the subject to whom the information state belongs ‘knows’ the identity of the referent in a certain sense, but it does not mean that the referent has to be the same entity in each possibility.

Clearly, our updates are such that once a term is specific in an information state, then it remains so under subsequent updates.

5.3. Processes and their themes

In this paper we do not aim at providing a formal interpretation for a ‘fragment’ of some language as it is usually done in the Montagovian tradition. Instead, we try to characterize those models, information states, etc. which can be referred to successfully by a given type of expressions. For example, when we say ‘process’, we mean a configuration in a model or information state which licenses linguistic expressions that are commonly called ‘process-denoting’ ones, without trying to specify which expression denotes which process exactly.

Obviously, a time interval can be said to exhibit a process if we can measure a monotonic change in some parameter (the values of which are ordered in terms of some partial ordering ≤) by taking consecutive samples from the interval. Just how continuous and monotonic the change should be is a matter of granularity, and there is no universal standard for that. At any rate, temporal succession can be modelled in our intensional semantics by distinguishing a temporal precedence relation π among our accessibility relations, and we will disregard the granularity problem. We conceive of possible worlds as representing temporal intervals in the world, which are not only ordered in terms of π, but also in terms of containment: another accessibility relation, call it ⊑, will correspond to that relation. If ⊑(w₁, w₂) (or w₁ ⊑ w₂), then the interval corresponding
to \( w_1 \) is a sub-interval of the one corresponding to \( w_2 \). There are rather straightforward axioms linking the two relations together, e.g., \( \pi(w_1, w_2) \) and \( w'_1 \subseteq w_1 \) imply \( \pi(w'_1, w_2) \).

Most processes are associated with a **theme**, i.e., an entity that undergoes the change (there are a few exceptions, e.g., weather processes like ‘getting dark’, which do not seem to have themes). It is the state, location etc. of the theme that is characterized by the changing parameter. On the other hand, the theme must have a property \( P \) all through the process which corresponds to the manner or character of the change. For example, in a process of opening, the theme is the thing being opened, and the predicate is ‘be opened’; \( P \) must stand in a **causal** relationship with the designated changing parameter of the theme (it is because the door is being opened that its degree of openness increases). What a causal relationship exactly consists in, however, lies far beyond the scope of this paper.

In sum, we can say that a process is going on throughout the temporal interval corresponding to a possible world \( w \), affecting the parameter ‘par’ of the theme ‘th’ in the particular manner \( P \) iff the following holds:

\[
\text{Process}(w, \text{par}, \text{th}, P) \iff \text{def} \\
\text{state}/\text{loc}(\text{par}, \text{th}) \& \text{caus}(P, \text{th}, \text{par}) \& P(\text{th}, w) \& \\
\forall w_1, w_2 \subseteq w[P(\text{th}, w_1) \& P(\text{th}, w_2) \& \pi(w_1, w_2) \rightarrow \text{par}(\text{th}, w_1) \leq \text{par}(\text{th}, w_2)].
\]

Here the predicate ‘\text{state}/\text{loc}’ determines whether something is a state/location parameter of an entity; the formula ‘\text{caus}(P, \text{th}, \text{par})’ expresses that the property \( P \) must stand in a causal relation with the relationship of the theme to the parameter in question, but the details of that need not concern us here. Also, if the theme is a **patient**, then the process also has an **agent** that can be made responsible for the theme undergoing the change, but that detail will not be crucial for the moment, either.

What will be crucial, though, is how **telic** expressions are to be interpreted. A telic expression refers to a process as having a **culmination** point, a natural endpoint of the process. What is needed for such an expression to be fortunate is the existence of a predicate \( C \) that does not hold for the theme ‘th’ throughout the process, except in the very last interval. Moreover, the fact that the theme acquires the property \( C \) is causally related to the process in question. The property \( C \) can be practically anything that bounds the process, e.g., ‘being built’, ‘being located at a certain place’, or even ‘being actually existent’, and can be expressed in a variety of ways in natural language, e.g., through the lexical content of a verb, an argument or an adjunct.

\[
\text{TelicProcess}(w, \text{par}, \text{th}, P, C) \iff \text{def} \\
\exists w_c \subseteq w \\
(\forall w'[\pi(w_c, w') \rightarrow \pi(w, w')] \& \\
C(\text{th}, w_c) \& \forall w'' \subseteq w[\pi(w'', w_c) \rightarrow \neg C(\text{th}, w'')]).
\]

This definition says that a telic process, in addition to being a process, has a culmination interval \( w_c \) which is a final interval of \( w \) (every interval following \( w_c \) also follows \( w \)), \( C \) is true for the theme in this final interval, and \( C \) is false for the theme in all sub-intervals \( w'' \) of \( w \) that precede \( w_c \).

### 5.4. Imperfective and perfective

While the existence of a process, we believe, is the property of a model or a partial model, **imperfective** versus **perfective** reference is a linguistic issue. When a natural-language expression makes reference to a process, it can always do so in an imperfective manner, which essentially claims the existence of the given process (in a given interval called the **reference time**) in the sense of our earlier definition of ‘Process’, without any reference made to the culmination. For example, *Joe was running* contains such an imperfective reference. When the expression is telic, on the other hand, speakers have more options: they can refer to the process imperfectively, just the same as with atelic processes (except that an eventual culmination is specified, using some modality, without claiming that the process culminates in the possible world referred to). This type of expression (e.g., *Joe was building a house*) is called a **progressive** expression; the details of the modality of the culmination are irrelevant here. The other option is not just specifying what the
eventual culmination is, but to actually claim the existence of the culmination within the given world, as in *Joe has built/wanted to build/… a house*. This is what we called a perfective way of referring to a process; it is different from the imperfective one in that its reference time contains the culmination point.

‘Perfective’ is a cover term for many different ways of referring to processes, depending on how big an environment of the culmination point belongs to the reference time, whether the reference time includes a resulting state, and so on, but we do not have to make any further distinctions for our present purposes. Also, languages tend to use expressions very similar to those referring perfectly to processes when they refer to distinguished intervals similar to culminations (i.e., which are distinguished by a predicate becoming true in them). Therefore, in many languages, predicates expressing such changes viewed as ‘momentary’ or ‘punctual’ (neglecting the internal structure of the event) are expressed in the same way as predicates referring to processes perfectly.

5.5. *Expression of the theme and the culmination*

In natural languages, the theme of a process is commonly expressed with a direct object (or the subject of an intransitive process-denoting verb), irrespective of whether the process is telic or not. The descriptive content of the direct object makes it possible to identify (or at least imagine) the kind of entity that undergoes the process. In such cases, if the process is telic, the culmination is expressed with an oblique complement (like a locative with a telic motion verb, or a resultative). In such cases, the grammatical expression of the theme is traditionally called an affected direct object, as in *I was carrying/carryed the table (into the room/towards the room)*; the term ‘affected subject’ is not often used, as far as we know, although it could be for cases like *The boy was running (into the store)*.

However, when a process is telic, there is another way of referring to the theme, namely, by referring to the result obtained in the culmination point, in which case the culmination is incorporated (i.e., not expressed separately). This is what is traditionally called an affected direct object (which could also be extended to subjects, of course). For example, in *I made/was making a kite* refers to a telic process where the culmination is incorporated into the direct object (it could be expressed separately, although sometimes it would be clumsy, e.g., *I made/was making this stuff into a kite*). The point is that, in this case, the descriptive content of the direct object does not necessarily identify what the theme is like throughout the process, but it refers to what it becomes as a result of the culmination. (It is also true that languages can refer to would-be objects with descriptions expressing what they will become, e.g., we can refer to the plans of a house as *the house*, but that is a separate issue.)

Owing to the possibility of incorporating the culmination (i.e., using affected direct objects/subjects), process-denoting expressions can even be ambiguous, e.g., *I was baking/baked a cake* can refer to two different courses of events. Under the most plausible reading, the cake is made through the baking process, i.e., it is only an ‘intentional cake’ before the culmination point; under the less plausible reading, however, this expression refers to the rare situation when someone puts a cake into the oven and bakes it for some curious reason. In the latter case, the theme qualifies as ‘a cake’ already before the baking process starts.

5.6. *(Im)perfectivity and (non-)specificity*

Clearly, it follows from the above that only affected direct objects can refer to themes of telic processes that are non-specific with respect to the process interval (or any interval before that). This is due to the fact that the outcome of a process does not have an individuality before the process comes to an end. There exists no cake during the process of baking a cake; the intentional object may exist, but the theme is not identical with that. When such an affected object is specific with respect to the process interval (or any interval before that), that means that the outcome of the process has an individuality as an intentional entity before its coming into existence (e.g., a plan of, a contract for, or just an intention to baking the cake in question has existed before the reference interval). This is what a prefixed telic process verb expresses in Hungarian.

The other side of this coin is that an affected direct object has to be specific with respect to the process
interval. For example, under the bizarre reading of *I baked/was baking a cake*, the cake must already exist before I start re-baking it for some curious reason. The reason is simple: in our definition of ‘Process’, the theme corresponds to a variable bound by a wide-scope existential quantifier (a so-called de re existential), which means that the theme is one and the same entity in all sub-intervals of the process interval, which is exactly what our definition of specificity requires (with respect to the given interval).

So we have the following cases:

(18) a. *I was/am cleaning a/the window.*
   (affected direct object, past/present imperfective → specific)
   b. *I will/would write a book.*
   (affected direct object, future/conditional perfective → non-specific)

How about *I will/would write the book*? Though similar in form to the last example, the direct object here is not an affected direct object in the sense that the theme in question must qualify as a book already in the utterance situation, although an intentional one, one that is not actually existent. The definite (hence, specific) expression *the book* here must be licensed by a presupposition that such an intentional entity already exists in the speech situation, although probably not in the sense of actual existence, because, say, the speaker has a contract or some other kind of obligation for writing the book. So, even though the actual object will eventually come into being through the writing process only, if it ever takes place, it is technically speaking (and linguistically) specific at the time of utterance.

5.7. ‘DE-verbs’

A DE-verb is simply one that refers to a telic process with a theme. In addition, when used in the particular construction we have examined, DE-verbs have a ‘beneficiary’ argument, an entity that must enter into an intimate relationship with the theme due to the culmination. [...] Since the predicate that becomes true at the culmination point includes that the particular relation between the beneficiary and the theme becomes established, this entails that the direct object must be an affected object by definition (even though it need not come into being through the process), hence, non-specific if used in a future/conditional sentence (with respect to the speech time or with respect to the reference time).

REFERENCES


