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Do sentences have tense?

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Workshop on Tense

0. Introduction

Under the classical treatment in LFG, tense is a feature encoded in morphology or in the lexicon and projected into f-structures. It is formulated, as all other features, as an attribute-value equation; the values of the tense attribute generally are the labels by which traditional grammar refers to the tenses of the specific language.

A fact often not made explicit by syntacticians is that these labels need to be interpreted in semantics. The semantics of tenses has been formulated as a theory of temporal reference since the seminal work of Reichenbach (1947). Subsequently this theory has been integrated into a theory of context change, which widens the domain of tense semantics from the sentence to discourse (Kamp. 1979, Kamp & Rohrer 1983). Functional linguistics since Weinrich (1964, 1971) investigates the role tenses play in textual organization and discourse pragmatics.

The aim of this workshop is to discuss a conception in which tense and temporal reference is distributed in a new way. It is assumed that tense features belong to morphological structure and are not projected to f-structure. Instead, they are mapped onto f-structure features based on the insights of tense semantics. Since there are no tense features in f-structure, according to this approach, sentences do not have tense.

In this contribution to the workshop, I will discuss this idea from a slightly skeptical point of view.

1. Some general reflections on features

Features are a format of representation. There is a wide range of different facts, which can be expressed by features. Therefore, features have no on-

tology. Reflecting on features can only mean to be aware of the use, which a certain type of linguistic thinking makes of features and how this use can be improved.

Since features do not have an ontology, it is not obvious why different kinds of features should be defined for each layer of representation. Features flow from layer to layer. But not all features flow in the same way.

2. How to model the morphology-syntax interface

Some features (μ-features) are needed only in morphology. Tense auxiliaries are assigned a μ-tense value in morphology, which is not passed on as such to syntax, but is needed for the elaboration of the tense value at the level of the sentence (see below). So-called past participles of passivizable verbs have two mutually exclusive features at the sentence level (past vs. passive), but morphology does not make such a difference. Therefore there is only one morphological feature for both, call it "μ-PARTICIPLE = II", which must be replaced with "PARTICIPLE = PAST" or "PARTICIPLE = PASSIVE" before lexical insertion. A third case regards inflectional classes. They can be treated as morphological agreement operating on inflectional class features, such as "μ-CLASS = n". Schwarze (1999a). But there is no need to postulate a full set of μ-features, most of which are trivially mapped to syntax[1]. On the contrary, it is linguistically interesting to see how some features flow across borders, from morphology to syntax and semantics, and others, the morphological features proper, are confined to morphology (cf. Mayo 2000:170).

3. Kinds of features

A feature system may be described according to two points of view: their origin, i.e. the place where they are encoded (3.1), and their flow within the grammar and their effect (3.2).

[1] An alternative to such a full set of μ-features is to introduce, in order to account for morphological structure, a specific set of morphological c-structure categories. Schwarze (1999b) uses lower case letters for lexical words (n, v, a, …) and other morphological segments: n/v, v/n, n/n, … for affixes of word formation, n_infl, v_infl, … for inflectional affixes.

3.1 Where are features encoded?

3.1.1 Lexically encoded features

Most features are or may be lexically encoded. For reasons of computational realism, the lexicon must be modeled as being organized into various regions (Mayo (2000). Hence lexically encoded features can be located more specifically.

The largest region is ***Lexical Conceptual Structure*** (LCS, cf. Mayo 2000:195). All lexical words are encoded in that region, mainly with their predicate features (1). Agreement features (2) are encoded in LCS if they are properties of lexical words. This is the case, e.g. for gender in languages like French or German, where all nouns have a lexically encoded gender value. Inflectional class features are encoded in LCS under the same condition. (3) refers to the main classes of verbs inflection of Italian; the values are the respective infinitive endings.

(1) PREDICATE = 'SEE <(SUBJ), (OBJ)>', …

(2) GENDER = {MAS, FEM}
NUMBER = {SG, PL, …}

(3) μ-CLASS = {ARE, IRE, ERE}

Other features, concerning, e.g., agreement and tense, may be encoded in LCS if the are properties of irregularly inflected word forms. These, in fact, are stored as syntactic words in LCS.

Last, but not least, grammatical functions may be encoded in LCS, namely in the lexical entries of control verbs.

The next region is the region of ***syntactic operators*** (Opr, cf. Mayo 2000: 197). It contains "grammatical" prepositions, determiners, negation particles and similar forms. Examples of the features encoded in Opr are given under (4).

(4) P_CASE = {A, DE, …}
SPEC = {DEFINITE, DEMONSTRATIVE, POSSESSIVE, PARTITIVE, …}
NEG = +

Grammatical functions may also be thought to be encoded in Opr, e.g. if there are pronouns which are specialized for the subject function.

Finally, there is the ***morphological*** region of the lexicon (Mrph, cf. Mayo 2000: 1999). It contains all kinds of affixes. Among the features encoded in Mrph we find again the agreement and the inflectional class features, which, as other features, thus have competing different origins. Moreover, Mrph contains the μ-features for tensed auxiliaries and, in the classical treatment of tense, the tense and mode values that are expressed by suffixes.

Those derivational affixes, which operate on the lexical meaning of their bases, encode a derivational predicate (DPRED, cf. Mayo et al. 1995:932), which triggers a semantic change. In the lexical model proposed in Mayo et al. (1995), Schwarze (1999b) and Mayo (2000) DPRED must be resolved, i.e. a new predicate must be derived, before lexical insertion.

3.1.2 Features encoded as rule annotations

One of the most basic properties of LFG is that grammatical functions are normally introduced as c-structure annotations. The same holds for sentence types (declarative, interrogative etc.) But according to the conception of morphology advocated here, features may also be introduced by annotations to morphological rule. (5) is a rule which, for languages like English, French or German derives singular nouns without adding a suffix. According to the conventions mentioned in fn. 1 above, *N* is a syntactic noun, accepted by the syntax, and *n* a lexical noun, which has no number.

(5) N → n
↑ = ↓
(↑ NUM) = SG

3.1.3 Derived features

A small number of features are ***lexically derived***. The functional analysis of participles mentioned above is such a case. Two lexical rules may by formulated, (6) for the participles of all verbs, and (7) for the participles of passivizable verbs:

(6) μ-PARTICIPLE = II PARTICIPLE = PAST

(7) μ-PARTICIPLE = II PARTICIPLE = PASSIVE
If OBJ the grammatical functions governed by the verb

Obviously, the formulation of the condition in (7) is only a sketch.

Other features are ***constructionally derived***. This is the case for the representation of compound tenses (8) and aspect periphrases (9), furthermore for the number and gender of coordinated noun phrases (10), and for the imperative mode, when the verb has the same form as the infinitive (11) or the subjunctive (12).

(8) Fr. Il a plu.
it has rained
'It rained'
TENSE = COMPOUND_PAST

(9) Fr. Il va pleuvoir.
it goes rain
'It is going to rain'
TENSE = PRESENT, ASPECT = IMMINENT

(10) Fr. le garçon et la fille
[the boy-MAS-SG and the GIRL-FEM-SG]
'The boy and the girl'
NUM = PL, GEN = MAS

(11) It. Non preoccuparti.
not worry-INFINITIVE you
'Don't worry'
MODE = IMPERATIVE

(12) It. Non si preoccupi.
not REFL-PERS3 worry-PERS3-SUBJUNCTIVE
'Don't worry' (politeness form)
MODE = IMPERATIVE

Since tense is the topic of this workshop, I will briefly show how compound tenses can be treated in terms of constructionally derived features. The values of the TENSE attribute are a closed list, which varies cross-linguistically. For French they are listed under (13).

(13) TENSE = {PRESENT, FUTURE, CONDITIONAL, IMPERFECT, SIMPLE_PAST, COMPOUND_PAST, PLUPERFECT, PAST_ANTERIOR, FUTURE_ANTERIOR}[2]

Five of these tenses (PRESENT, FUTURE, CONDITIONAL, IMPERFECT, SIMPLE_PAST) are realized as simple tenses, i.e.. by inflection only. The remaining four (COMPOUND_PAST, PLUPERFECT, PAST_ANTERIOR, FUTURE_ANTERIOR) are realized as compound tenses, i.e. by an auxiliary, which is inflected as a verb, and a past participle. Since the compound

[2] One might want to classify the conditional as a mode, rather than as tense. I will not go into this problem in this paper.

tenses form a closed list, they can be derived by a list of inferences, which operate on f-descriptions, namely:

(14) ***Derived tense features***

(↓ AUX μ-TENSE) = PRES & (↓ PART) = PAST
(↑ TENSE)= COMPOUND–PAST

(↓ AUX μ-TENSE) = FUT & (↓ PART) = PAST
(↑ TENSE) = FUT_ANT

(↓ AUX μ-TENSE) = IMPERF & (↓ PART) = PAST
(↑ TENSE) = PLUPERFECT

(↓ AUX μ-TENSE) = SIMPLE_PERF & (↓ PART) = PAST
(↑ TENSE) = PAST_ANT

3.2 What features do and how they flow

Inflectional class features support morphological wellformedness. They stay in morphology.

Predicates express the distinctiveness of lexical and pronominal meanings. They are pointers to the semantics. They are projected from the lexicon to f-structure and to semantic structure (σ-structure).

Gender features support grammatical and anaphoric agreement. They are projected from morphology and the lexicon to f-structure, and, to the extent they are used for anaphoric agreement, to σ-structure, where they are needed for discourse semantics.

Person and number features are similar. They support grammatical and anaphoric agreement and may be interpreted in sentence and discourse semantics (anaphora). If this is the case, they are passed on from morphology and the lexicon to f-structure and σ-structure.

Specification features support sentence as well as discourse semantics. They flow from the lexicon to f-structure and σ-structure.

PCase features distinguish subclasses of grammatical relations (objects, obliques, infinitival complements, adjuncts). With the exception of those which distinguish subclasses of infinitival complements, they are projected from the lexicon to f-structure and σ-structure.

Tense and aspect[3] features, in the classical view, are interpreted in sentence and discourse semantics and pragmatics. If a language has tense agreement (*consecutio temporum*) they support mere wellformedness conditions. They are projected from morphology to f-structure and, in most cases, to σ-structure.

Mode features may support mere syntactic wellformedness conditions, but may also be interpreted in sentence semantics and discourse pragmatics. If this is the case, they are projected to f-structure and to σ-structure.

Sentence type features support syntactic wellformedness and express prototypical kinds of speech acts per default. They are shared by f- and σ-structure.

Grammatical functions support syntactic wellformedness and are a criterion for distinguishing semantic argument positions. They stay at the f-structure level, but are mapped onto semantic arguments in σ-structure.

4. F-structures, σ-structures and semantics

At this point, it may be useful to mention that f-structures are not semantic representations. As was implied in the characterizations given in section 3.2, they contain two kinds of information, information, which is needed for constraints on syntactic and semantic wellformedness, and information that must be available to semantics. This part of the information contained in f-structures is mapped onto σ-structure. And σ-structure, which is f-structure stripped of that information, which is not needed for semantics, is often semantically underspecified. Thus the values of the SPEC attribute, e.g., are related to, but do not determine quantification. SPEC = DEF, e.g., may be interpreted as the iota-operator, as the generic quantifier etc. It is the task of semantics proper to resolve such cases of underspecification.

[3] It is useful to make a distinction between tense and aspect feature on formal grounds, because aspect periphrases interact with (morphological) tense. But semantically, tense and aspect features are not clearly separated.

4.1 To what degree should f-structure prepare semantic interpretation?

F-structures may vary with respect to whether they have a closer resemblance with c-structures or with semantic representations.

They are naturally remote from c-structures if they are mapped onto a set of very different c-structures. NUMBER is an example. On one hand it originates in morphology, on the other hand it is derived at the sentence level in coordinated NPs.

In actual grammar writing, there often are alternatives regarding the f-structure representation one wants to have: should a given partial f-structure be closer to c-structure or closer to semantics? Lexical prepositions are an example. The partial f-structure is closer to c-structure, if the preposition is represented as a one-place predicate (15). It is closer to semantics, if the preposition is a two-place predicate (16):

(15) PRED = 'DANS <(ARG)>'
(16) PRED = 'DANS <(ARG1), (ARG2)>'

In (15), the right sister of the preposition is ARG; in (4), it is ARG2. When local PPs are represented as in (15), f-structure only identifies the localizing object (the GROUND); semantics gets no cue how to find the localized object (the FIGURE). On the contrary, when local PPs are represented as in (16), f-structure helps to also identify the localized object (the FIGURE), via lexical semantics. ARG1 is identical with the SUBJECT if the verb is an intransitive verb of motion, with the OBJECT if the verb is a transitive verb of motion, and it is the event variable if the PP is an ADJUNCT.

A treatment that is close to semantics gives semantics a more precise input. It is not clear, however, whether it reduces computational complexity.

4.2 How can temporal information be made more explicit at the f-structure level?

Tense features, as used in the classical LFG treatment, are remote from semantic representations of the Reichenbach tradition. When tense is morphologically expressed by a suffix, there is a formal similarity between (morphological) c-structure and the representation of tense at f-structure,

even though f-structure displaces tense from the verb to the sentence. But there is no resemblance at all between c-structure and f-structure when the value of the TENSE attribute is constructionally derived. Why, then, should one not treat tense in such a way that its functional representation is equally remote from morphological and constructional encoding? To simply eliminate tense features from f-structure seems to be a plausible reaction to this situation.

As a concrete research program, that solution would mean that one would have to reformulate some version of temporal semantics in the format of the LFG feature calculus. Under (17) - (25) I give a sketchy overview of the features one would need to introduce. Notice that some of the values are sorted variables. *t* for times, *s* for states of affairs (events, states, etc.). Moreover, the values of attributes representing relations between time intervals (23) have a kind of complexity, which is not used in classical LFG.

(17) STATE_OF_AFFAIRS = {EVENT, STATE, … }

(18) EVENT = {s, …}

(19) STATE = {s, …}

(20) TIME = {UTTERANCE_TIME, EVENT_TIME, REFERENCE_TIME}

(21) UTTERANCE_TIME = {t, …}

(22) TIME–INTERVAL = {t, …}

(23) TEMPORAL–RELATION = {BEFORE (ARG1), (ARG2), AFTER (ARG1), (ARG2), COINCIDING (ARG1), (ARG2)}

(24) ARG1 = {t,…}

(25) ARG2 = {t,…}

Reformulating standard logic into a feature calculus is probably feasible. But is it reasonable? A temporal semantics will be needed anyway. Does it make sense to shift such an amount of structure from semantics to syntax? I do not see the criteria on the base of which one could decide whether this should be done or not, and there is a risk that the efforts which such a research program requires may not bring about an advance in linguistics. Of course this is just a doubt.

But there are more tangible objections to the research program under discussion. One is that a given tense may be ambiguous and that the various

interpretations must be retrieved from the context. A second objection is that the meaning of tense is not restricted to temporal reference.

4.3 The semantic variation of tenses

The semantics of temporal reference has to deal with the polysemy of tenses. The French Imparfait is an example:

(26) Il y a une heure, il **pleuvait** encore.
there is an hour it rained-IMPERF still
'An hour ago, it was still raining.'

The sentence refers to a single event, where the event time is before the utterance time, and it is of unbounded duration.

(27) Quand j'étais jeune, **j'allais** nager tous les jours.
when I was young I went-IMPERF swim all the days
'When I was young, I went swimming every day.'

The sentence refers to a sequence of repeated events, where the event time is before the utterance time and the repetition unbounded.

A more intricate polysemy is inherent to the French Simple Perfect, as used in literary narrative. When verb forms in the Simple Perfect follow each other in a text (28), the default is that these verbs refer to a sequence of events; with each verb the text world advances in time.

(28) Sara **alla** dans la cuisine, **avala** un bol de café froid et **sortit** sur la véranda (Klein & Kleineidam 1994:268)

'Sara went into the kitchen, swallowed a bowl of cold coffee and went out to the veranda.'

This interpretation depends on various factors. It requires the identity of the subject and scripts for coherent sequences of events. If these conditions are not met, a series of verbs in the Simple Perfect may very well refer to events, which are not in a sequence, cf. (29):

(29) Après le baccalauréat, Charles **commença** ses études de médecine, Gaston **fit** le tour du monde et Édouard se **maria**.

'After high school graduation, Charles began to study medicine, Gaston went on a world tour, and Édouard got married.'

This example shows that at the text level, there is additional systematic semantic variation in temporal reference.

4.4 Temporal reference vs. the semantics of tense

The semantics of temporal reference does not capture the whole range of polysemy that tenses may have. Therefore a distinction must be made between the semantics of temporal reference and the semantics of tense.

The ***semantics of temporal reference*** extracts relevant information from tenses and the lexical semantics of verbs, temporal adverbs and prepositions, and other lexical material. The ***semantics of tense*** must account for the whole range of information conveyed by tenses.

In addition to temporal reference tenses also convey modal and pragmatic information. Take the French Future as an example:

(30) Je sais qu'elle **partira** demain.
I know that she leaves-FUTURE tomorrow
'I know that she will leave tomorrow.'

The sentence refers to an event whose time is after utterance time.

(31) Elle **aura** une trentaine d'années.
she has-FUTURE a thirty-APPROXIMATION of years
'She may be about thirty years old.'

The sentence refers to a situation whose time coincides with the utterance time; it conveys the modality of a supposition.

(32) Pour moi ce **sera** un thé.
for me it is-FUTURE a tea
'I will have a cup of tea.'

The sentence refers to an event whose time is after the utterance time; it conveys the pragmatic value of an order; it is specific to the speech-act of ordering in a café or restaurant.

(33) Pour vous répondre, je vous **dirai** que …
for you answer I you say-FUTURE that …
'To give you an answer, I'd say that …'

The sentence refers to an event whose time coincides with the utterance time; it conveys the pragmatic value of politeness.

If tense values were to be banned from f-structure, the complete modal and pragmatic information would have to be made explicit at the passage from morphological tense to f-structure. Therefore the program to replace

the tense features of the sentence with more explicit features is far more complex than it seems to be.

5. Conclusion

So what should be the answer to the question I formulated in the title? The answer differs, depending on the point of view.

From the point of view of theory, the answer is negative. Sentences have a form and a meaning. Regarding the expression of temporal information, they have tensed verbs on the one hand, and time reference on the other. It cannot empirically be shown that sentences "have tense".

From the point of view of method, however, the answer is less obvious. F-structure is an intermediate layer of representation between constituent structure and semantics. Its main justification is its contribution to the expression of wellformedness conditions for sentences. A second important justification is its usefulness for cross-linguistic analyses and typology. In fact, f-structures, even though they are not universal, are a better *tertium comparationis* than c-structures. And there might be a third justification of postulating a level of f-structure, namely that it reformulates morphological and surface syntactic information in such a way that semantics can be done in more general terms.

The substitution of μ-features with tense features proper to f-structure, as far as compound tenses and aspect periphrases are concerned, goes in that direction. It frees semantics from the task of computing constructionally encoded temporal information. Tense features at the f-structure level are well motivated under this perspective. It is doubtlessly possible to without them. But I hope to have shown that such a revision of the model will meet more difficulties than it seems to at a first glance.

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