TOWARDS
A TOTALLY LEXICALIST
MORPHOLOGY

GÁBOR ALBERTI / KATA BALOGH /
JUDIT KLEIBER / ANITA VISZKET

Department of Linguistics
University of Pécs
H-7624 Pécs, Ifjúság útja 6.
e-mail: gelexi@btk.pte.hu, aalberti@axelero.hu
internet: http://lingua.btk.pte.hu/gelexi

GÁBOR ALBERTI, KATA BALOGH, JUDIT KLEIBER, ANITA VISZKET

1. *Introduction*

In a series of articles (Alberti et al. 1999–2003) we argued for the principle of *total lexicalism* within the generative paradigm and the necessity of the elaboration of a grammar, a "Generalized Argument Structure Grammar" (and its computational implementation), serving as the model of this metatheoretical principle.[1]

GASG is based on lexical items which are *signs,* monostratal representations in the same sense used in HPSG and UCG (van Eijck and Kamp 1997), whose inner structure is so rich that they can capture all features (e.g. case and agreement (person, number, gender, definiteness) features (see Lehmann 1988)) of relevant "environmental" words occurring in potential sentences containing the given words.

In the model demonstrated in our earlier papers these richly structured lexical items were assigned to *words,* and the lexical description of morphologically complex words — very frequent in languages like Hungarian — was claimed to be calculable in a multiple lexical inheritance network (in a never specified way…). A better method (TLM: "totally lexicalist morphology") is proposed in this paper which suits the principle of total lexicalism directly: *each single morpheme within words is to be assigned a lexical item.*

The first argument in favor of TLM is just the above mentioned compatibility with GASG: instead of constructing the lexical representation of millions of inflected words in a language with rich morphology[2] or working out an independent method of calculating these representations, a significantly less number of lexical items should be created ($? k_i$ instead of $? k_i$). Furthermore, TLM ensures that a sentence in a language with rich morphology is associated with a grammatical structure similar to that of its translation in an isolating language because the number of morphemes is essentially the same in the two sentence versions — with radically different word numbers (see 3-4); it is a superficial parametric difference in GASG that two lexical items "seek" each other as separate words or morphemes in the same word (or possibly morphemes of different words). This homogeneous treatment of languages of different types serves as the second argument for the TLM approach.

These two arguments promote a similar approach — "each morpheme is a lexical item" — within other generative frameworks, e.g. in the transformational one basically (but just *not* in this respect) following Chomsky's (1995) Minimalism. Bartos' (2000a,b) Hungarian morphosyntax is a prominent current example. Thus GASG(TLM) should be compared with this theory. In sections 4 and 5 this work is done, in the area of morphology of Hungarian verbs and nouns, respectively. We intend to show the advantages of GASG over PSG (phrase structure grammars) in respect of the treatment of semantic scope relations of morphemes, especially in cases of inverse scope relations.

Before this, however, the general arguments in favor of GASG should be summarized in section 2 and basics of our "totally lexicalist" Hungarian morphology should be sketched in section 3. We have aligned with the theoretical character of the *Approaches* series by scrutinizing the problem of morpheme scopes in this paper (sec3-4) whilst in our Düsseldorf talk the straightforward implementability of GASG(TLM) in Prolog was demonstrated in details.

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[2] Both a verb and a noun have thousands of inflected versions in Hungarian.

2.   *Total Lexicalism, GASG and LDRT*

2.1   *Five Arguments for GASG*

Five arguments for total lexicalism / GASG are summarized below. Then the (discourse-) semantic theory belonging to GASG is illustrated.

GASG can be regarded as a modified Unification Categorial Grammar (Karttunen 1986, Zeevat 1987) from which the principal and single syntactic "weapon" of categorial grammars, Function Application, has been omitted. What has remained is the Saussure–Pollard notion of *lexical sign* and the mere technique of *unification* as the engine of combining signs. The computation thus requires no kind of linguistic operation: neither Move, nor Merge, nor traces (Chomsky 1995), nor Function Application, nor Composition, nor Type Raising (Partee et al. 1990). That is why —since Merge and Move are dispensed with— we claim GASG to be derivable from the general philosophy of the Chomskyan Minimalist Program as a realization of the expected *conceptual minimum* (Chomsky 1995), the "Perfect Syntax"; which serves as a crucial metatheoretical argument in favor of totally lexicalist grammars. In the same sense, GASG can also be regarded as the *perfect* realization of the mottoes of the "father" of another PSG, Tree Adjoining Grammar (Joshi 2003): "Complicate Locally, Simplify Globally", and "Grammar ? Lexicon".

The main theoretical argument in favor of GASG is that it promises a better answer to the stubborn problem of *compositionality* as to the morphosyntax? DRS (Discourse Representation Structure) transition than PSGs. The failure of elaborating a properly compositional solution to this language? DRS transition arises from the fundamental incompatibility of the strictly *hierarchically* organized generative syntactic phrase structures (e.g. Chomsky 1957, 1995) with the basically *unordered* DRSs (or ones ordered but in an entirely different way). Nowadays (Zeevat 1987, Karttunen 1986, van Eijck and Kamp 1997) some kind of Categorial Grammar is held to promise the best chance to capture the language? DRS transition in a properly compositional manner: a version of Classical CG with capacity increased by the technique of *unification,* applied in Prolog, for instance (UCG). The basic problem with UCG, which has amounted to the starting-point of GASG, lies in the fact that syntax, deprived of the information concerning sentence cohesion in favor of the unification mechanism and reduced to the primitive task of combining adjacent words, will produce linguistically irrelevant constituents. According to Karttunen's (1986: 19) remark on UCG trees: they look like PS trees but they are only "analysis trees"; and he adds "all that matters is the resulting [morphological] feature set."

Our empirical arguments in favor of GASG concern a few weakly-motivated subtheories of PSGs such as the areas of *"stylistic rules"* —where nothing in the overt syntax or in the logical form motivates some phonological changes (see the case of *sajnos* 'unfortunately' in example (2) in section 3) — and scopal *ambiguities* —where nothing in the overt syntax or in the phonological form (after Spell-Out) motivates some semantic alternatives. Sections 4 and 5 are devoted to this latter topic.

Finally, we have a practical argument concerning application: GASG promises a straightforward implementation in Prolog due to its *static* nature (no "derivation", no language- or linguistics-specific computation). Judit Kleiber thoroughly demonstrated our morphophonological parser in Düsseldorf, Kata Balogh demonstrated our semantic parser in Borjomi and Mexico (Alberti et al. 2002, 2003); now our theoretical claims will be focused on, aligned with *AtoH* traditions.

2.2 *The (Discourse-) Semantics Belonging to GASG*

In the case of a sentence that have proved to be grammatical on the basis of the morphosyntactic compatibility of its lexical items, the unified "sum" of the semantic components of these items (def4.3.3. in Alberti et al. 2003) provides a "proto-" DRS. Our proto-DRSs seem to have a very simple structure in comparison to DRSs with the multiply embedded box constructions shown in van Eijck and Kamp (1997). Nevertheless, they store the same information due to the conditions of a special status, see the right hand side of the DRS box below, controlling the embedding of the proto-DRS into the interpreter's current information state, which is represented as a "lifelong" DRS.[3] Moreover, several cases of ambiguities can simply be traced back to an underspecified state of the special embedding conditions, enabling us to dispense with "artificially" creating different syntactic scopes for the same word order. Let us consider an illustration of these facilities.

(1) a. Most widowers court a blonde.

most(e0;e1,e2)	fixpoint(e0), e0<e1, e1<e2, newref(e0)
widower(e1;r2)	newref(e1), newref(e2)
court(e2;r2,r3)	newref(r2), e1?r2
blonde(r3)	newref(r3), *r3????*

c.   e2?r3: 'It is often true that if someone is a widower he courts a blonde.'

d.   e0?r3: 'There is a blonde whom most widowers court.'

The basic proposition (whose Davidsonian/eventuality referent is e0) is that a situation [e1: somebody is a widower] *often* implies another situation [e2: he courts somebody]; symbols '<' refer to these situations' not being facts of the interpreter's "real" world but their and some of their characters' belonging to fictive worlds. The widower necessarily belongs to the fictive world of our thinking about an abstract situation (e1?r2). But which world does the blonde belong to? Referent r3 is looking for its place… And it can find its place in different worlds (1c-d) — without assuming different syntactic structures behind the two readings.[4]

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[3] The crucial innovation of Lifelong DRT (Alberti 2000), what provides an effective means for formal analysis of special texts, lies in regarding the interpreter's information state containing the mutual background knowledge shared by "speaker" and interpreter as a gigantic "lifelong" DRS where all pieces of the interpreter's lexical, cultural/encyclopedic and interpersonal knowledge are accessible whose mobilization the exhaustive interpretation of the given text requires. Another decisive property of LDRT is that the interpreter's "possible worlds" (of wishes, beliefs etc.) are no parallel alternatives but they constitute a *partially ordered* system of worlds with the interpreter's "real world" as the *least* element of the ordering. *Referents* maintain connections among worlds: each referent is defined as belonging to a single world but a referent is *accessible* from every *later* world in the partially ordered "tree" of worlds (i.e. in a fictive world, elements of the real world can be referred to, but not *vice versa).*

[4] (1d) illustrates a case of "inverse scope" relation (Szabolcsi 1997) in the sense that in the usual argument hierarchy subject is over object but here the generalized quantifier belonging to the object has a scope over that belonging to the subject. Inverse scope relations may appear depending on the language and the given quantifier pairs. This dependence in LDRT means the decision (in semantics!) whether the referent belonging to a *lower* argument is allowed to belong to the world of the Davidsonian/eventuality co-argument's referent or it is expected to belong to a world *earlier* than the world of a *higher* co-argument.

3.   *Totally Lexicalist Morphology*

3.1   *The Definition of Immediate Precedence Between Words*

As a first approximation, the Hungarian example below in (2) is intended to illustrate the crucial means of GASG substituting for phrase structure building mechanisms (in a simplified way, on the basis of our earlier papers): *ranks* of requirements concerning immediate precedence ('immprec') between words standing in different grammatical relations.

An adjective, for instance, is lexically required to immediately precede the noun whose referent is the same: see *holland lánynak* 'Dutch girl-DAT' ({dutch(r1), girl(r2), r1=r2}); and the two words *do* satisfy this requirement in the sequence of words shown in (2). This case is to be regarded as the *direct* satisfaction of a requirement. The trick of GASG lies in the possibility for satisfying *(immprec* and other) requirements *indirectly.* Another type of adjective, *kedves* 'gentle', for instance, is also required to immediately precede the same noun. With word 'Dutch' deleted, we would get a perfect sentence, where the requirement of 'gentle' would be satisfied directly. Sentence (2), however, is also correct in its original form. We say that the *immprec* requirement of 'gentle' has been satisfied *indirectly,* which should be defined on the basis of our syntactic observations. The definition should say that an *immprec* requirement of rank k between X and Y (in this order) is *satisfied* if for each intervening word Z, there is an *immprec* requirement between X and Z or Z and Y of a higher rank n (which means: n<k)

(2)   P é t e r - n e k   a   f i - a   a d - o t t   s a j n o s   a   J á n o s   n é g y   h ú g - á - r a
      Peter-GEN the son-POSS.3SG give-PAST unfortunately the Janos four sister-POSS.3SG-SUP
      v i g y á z - ó   k é t   k e d v e s   h o l l a n d   l á n y - n a k   e g y   k ö n y v - e t.
      care-PRES.PART two gentle Dutch   girl-DAT   a   book-ACC
      'Unfortunately Peter's son has given a book to the two gentle Dutch girls taking care of John's four little sisters.'
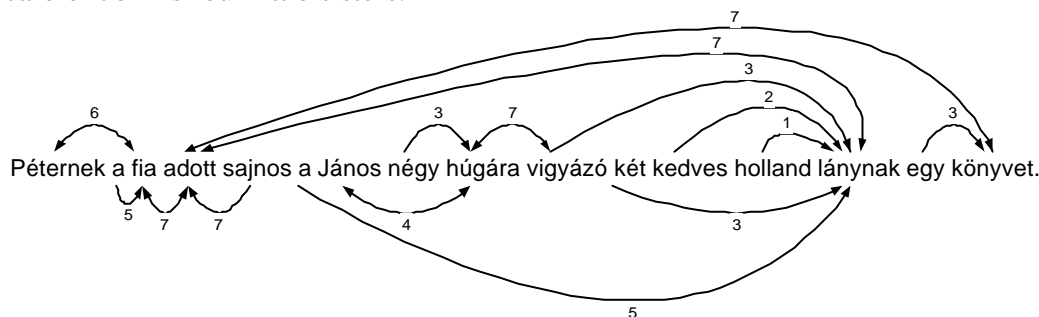
The above-sketched definition of indirect satisfaction of *immprec* is not sufficient, however, witnessed by the case of the definite article *a* and the noun belonging to it, *lánynak.* Suppose their immprec requirement has a rank value 5 — which is a higher rank than, say, the rank of the *immprec* requirement between (the nominal element of) an argument (e.g. *lánynak* 'girl-DAT', *könyvet* 'book-ACC') and its regent ("lexical head": *adott* 'gave'): 5<7. According to what has been said so far, the appearance between 'the' and 'girl' of two adjectives (ranks 1, 2), a numeral (rank 3) and a participle (rank 3) is legitimate; the position of the dependants of the participle, however, requires a *recursive* extension of the definition: dependants, and dependants of dependants, and dependants of dependants of dependants, …, of legitimately intervening elements are legitimately intervening elements again, independently (!) of the ranks between these dependants (e.g. Alberti 2001a).

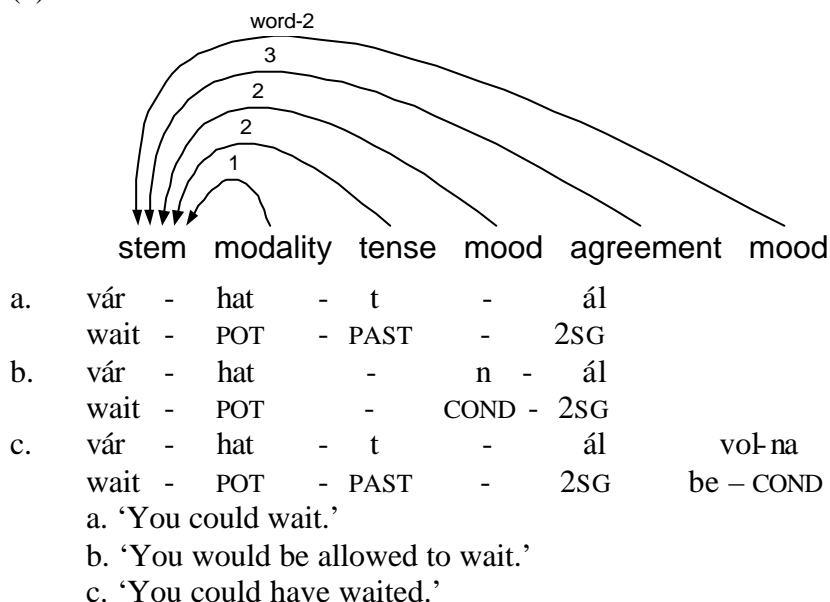## 3.2 *Scrambling of Arguments and Free Adverbs for the Regent*

The position of the free adverb *sajnos* 'unfortunately' between the regent and two of its arguments in (2) above is correct in Hungarian, but not in English. It is English that shows the basic strategy of PS grammars: a regent makes a constituent with their arguments, and free adverbs are excluded from this unit. They have no semantic reason to intervene, which holds true of Hungarian as well. We thus should have recourse to (weakly motivated) *stylistic rules* (where nothing in the overt syntax or in the logical form motivates some phonological changes) in order to explain the several potential positions of *sajnos* and other free adverbs in Hungarian sentences.

GASG offers a very simple *parametric* solution for *scrambling* phenomena and its distribution across languages. English belongs to the language type where the *immprec* rank between an argument and its regent is strictly higher than that between a free adverb and the verb (or the word that it adjoins to). Whilst Hungarian belongs to another language type where the two sorts of immprec ranks *coincide.* What is to be added is that they are *weak* ranks in the sense that 'nʔk' is permitted in the definition of the satisfaction of *immprec* requirements mentioned above example (2).

3.3 Immprec *Requirements in the Morphology of Hungarian Verbs*

As Figures (3) and (4) below show, our TLM approach to Hungarian morphology is based on the application of the same *immprec* requirements between stem–suffix pairs *within* words as those *between* words discussed in 3.1. More precisely, we do not need the recursive extension of the core definition of the satisfaction of *immprec* requirements, mentioned after (2), as "intervening" morphemes have no "dependants" — which has something to do with the *regular* nature of morphology (Karttunen 2003) compared to the *mildly context-sensitive* human syntax (Partee et al. 1990, Joshi 2003, Alberti 2001a).

(3)

	stem	modality	tense	mood	agreement	mood
a.	vár -	hat	- t	-	ál	
	wait -	POT	- PAST	-	2SG	
b.	vár -	hat	-	n -	ál	
	wait -	POT	-	COND -	2SG	
c.	vár -	hat	- t	-	ál	vol- na
	wait -	POT	- PAST	-	2SG	be – COND

a. 'You could wait.'
b. 'You would be allowed to wait.'
c. 'You could have waited.'

The rank values 1, 2 and 3 above concern morpheme classes to appear within the same word. They guarantee that certain morpheme types will never interchange
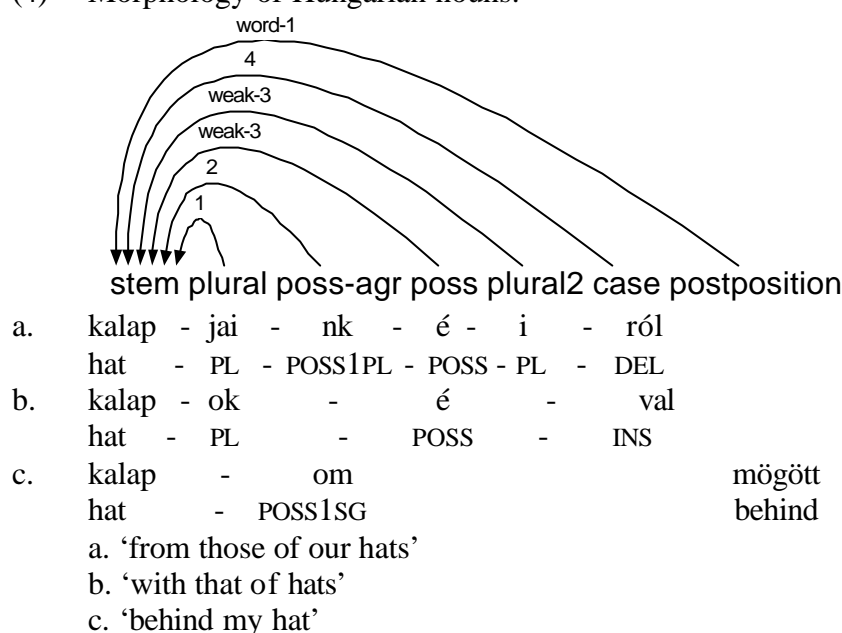
(e.g. *vár-sz-ott-hat* 'wait-2SG-PAST-POT), and tense and mood morphemes will never occur as suffixes of the same stem (e.g. *vár-t-ná-l* 'wait-PAST-COND-2SG'), due to the *strict* (and not *weak,* see 3.2) character of rank values 2. In this latter case, the COND morpheme can be linked to the stem in another way: by means of an *immprec* requirement between separate words (see also 4.2.)

3.4 *Immprec Requirements in the Morphology of Hungarian nouns*
       The rank values 1, 2, 'weak-3' and 4 below determine four template positions after the Hungarian noun stem. Values 4 and 'word-1' account for the difference between case suffixes and postpositions: the latter can (should) be regarded as independent words as they are allowed to be stressed and show no vowel harmony with the noun stem.

(4)   Morphology of Hungarian nouns:

	stem	plural	poss-agr	poss	plural2	case	postposition
a.	kalap	- jai	- nk	- é	- i	- ról	
	hat	- PL	- POSS1PL	- POSS	- PL	- DEL	
b.	kalap	- ok		é		- val	
	hat	- PL		POSS		INS	
c.	kalap		- om				mögött
	hat		- POSS1SG				behind

         a. 'from those of our hats'
         b. 'with that of hats'
         c. 'behind my hat'

Values 'weak-3' account for a peculiar property of Hungarian morphology: possessive morpheme *-é* and its plural morpheme *–i* can be iterated: e.g. *kalap-jai-nk-é-i-é-ról* 'from that of those of our hats' (cf. (4a)). The lexical item of this *-i,* however, should contain the requirement that the immediately preceding morpheme be the *-é* mentioned above: e.g. * *kalap-jai-nk-i-ról.* Some speakers also reject the iteration of *-é* without the plural morpheme: e.g. *???kalap-om-é-é* 'hat-POSS1SG-POSS-POSS' ('that of that of my hat'), which is a piece of information that the lexical item of *-é* is to contain, requiring that the immediately preceding morpheme be not another *-é.*
       Lexical requirements like these mentioned in 3.3. and 3.4. can easily be formulated in GASG: a lexical item belonging to a morpheme should *find* certain elements in a sequence of morpheme sequences (=words), typically its stem and the immediately preceding morpheme, in order to check their relevant features, including the satisfaction of *immprec* relations. After successful checking, certain variables in the description of the given lexical item are *unified* with the morphemes successfully found.

It is typical in Hungarian that two, three, or sometimes more *allomorphs* can realize an abstract morpheme. We have considered the decisive factors of selecting the appropriate allomorphs summarized in (5) and (6) in our theoretical work as well as in the computational implementation. As a suffix necessarily requires a stem, but not *vice versa,* the search between stem and suffix is *unidirectional*: only the suffix seeks the stem. It "technically" means that the lexical description belonging to the suffix contains a variable to be unified with the stem; and it should also contain a variable to be unified with the immediately preceding morpheme. Finding the stem requires the satisfaction of *immprec* conditions whereas in cases of "forward checking" demonstrated in (5) "the immediately preceding morpheme" is to be checked. The ACC morpheme, for instance, requires its last vowel to be long in certain cases (5a), to be short in other cases (5b), and to disappear in a third group of cases (5c). These are the conditions of the successful unification of a certain variable in the lexical item of ACC.

(5)   ***"Forward searching": checking lexical requirements***
a.   lengthening: e.g. *bombá-t* 'bomb-ACC' vs. *bomba-ként* 'bomb-FORM'
b.   shortening: *kanal-at* 'spoon-ACC' vs. *kanál-ként* 'spoon-FORM'
c.   stem-internal V~? alternation: *bokr-ot* 'bush-ACC' vs. *bokor-ként* 'spoon-FORM'

One might think that cases of "backward searching", see below, are more problematic to our totally lexicalist approach because of the *unidirectional* search between stem and suffix, since in (6a) the stem seems to check the vowel of the suffix. Cases of (6b-c) also seem to require the opposite direction of search as morphemes decide the quality or appearance of the *successive* morphemes. We are claiming, nevertheless that it is the later suffix, again, whose lexical item should find the stem and the immediately preceding suffix…

(6)   ***"Backward searching": setting the underspecified phonetic form***
a.   frontness vowel harmony (? stem): *tevé(-i)-hez* 'camel(-POSS.3SG.PL)-ALL' vs.
           hajó(-i)-hoz 'ship(-POSS.3SG.PL)-ALL'
b.   roundness vowel harmony (? preceding suffix):
           fej-hez 'head-ALL' vs. *fej-ünk-höz* 'head-POSS.1PL.ALL'
c.   appearing "linking vowel" (V~? alternation, "opening (relative) stem"):
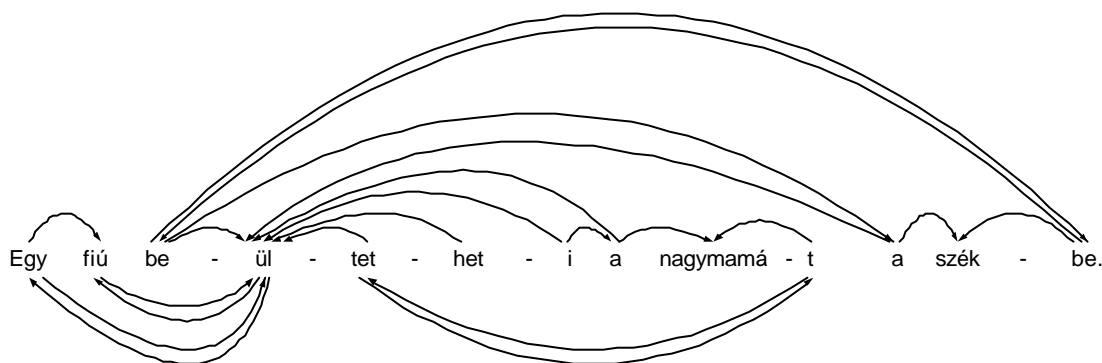   *fá-t* 'tree-ACC' vs. *fá-nk-at* 'tree-POSS.1PL-ACC' vs. *fánk-ot* 'doughnut-ACC'

How is it possible? Now the technique of unification is to be applied in another, but as easily accessible, way. We have given the phonetic form of the suffix in question in an underspecified way. We claim (Alberti et al. 2003) that the phonetic form of problematic morphemes are worth segmenting into exactly three parts, out of which one or more parts are to be denoted by a variable. And when their lexical item finds the stem or the "immediately preceding morpheme", the above mentioned phonetic variable is unified with a particular phonetic form depending on certain features of the morpheme successfully found. The lexical item of the ALLATIVE case – *hVz,* for instance (6a-b), has an underspecified middle segment, where V? {*e,o,ö*}; and if it finds a stem containing back vowel(s), the frontness feature of variable V is unified with value *[back],* resulting in vowel *o*; and if it finds a stem containing front

vowel(s) and an immediately preceding morpheme containing + or – round vowel(s), the frontness and roundness features of variable V are unified with the corresponding values, resulting in vowel *ö* or *e*, respectively.

Our morphology itself, as a system generating well-formed words of a language, can be at most as good as the *finite-state* transducer providing lexical forms and surface forms of words simultaneously: we accept Karttunen's (2003) viewpoint that this *regular* solution to morphology is just the *perfect* one, at least within the system of the Chomskyan hierarchy of grammars (Partee et al. 1990). Our morphology, however, immediately serves a more ambitious purpose, as is illustrated[5] below: morphemes "look for" each other within as well as *outside* word boundaries — and this latter facility makes it possible to establish grammatical relations between pairs of words on the basis of their certain morphemes.

(7) Egy fiú be-ül-tet-het-i   a nagymamá-t a szék-be.
  a   boy into-sit-CAUSE-POSSIB-SG3DEFOBJ the grandma-ACC the chair - INE
  'A boy can make the grandma sit into the chair.'

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4.   Morpheme Order and Semantic Hierarchy in Hungarian Verbs

Sections 4-5 are devoted to the problem of semantic interpretation of multimorphemic Hungarian verbs and nouns with surface morphology (morpheme strings withind words) as a starting-point. We could not say that *semantics were (to be) derived from surface morphology* in the relevant studies. Instead, some background representation is to be found from which both semantics and surface morphology can (are to) be derived.

In the (transformational) generative framework, this "background representation" is obviously *syntax,* the central component (Bartos 2000a-b). Then the relevant relations / mappings between components / operations of UG (syntax, semantics and morphology, in a simplified formulation) should be fixed. Bartos (2000a-b) has chosen the following system of (more or less) standard assumptions as his starting-point:

(8) a. SYNTACTIC REPRESENTATION OF [SEMANTIC] SCOPE (see Aoun & Li 1993:8):
Scope is represented syntactically by c-command: *x* is in the scope of *y* iff *y* c-commands *x*. Asymmetric scope relations are due to asymmetric c-command.
   b. UNIVERSAL HIERARCHY OF FUNCTIONAL PROJECTIONS (Cinque 1999):
The ordering of functional projectional layers in a clause reflects a universal hierarchy.
   c. MIRROR PRINCIPLE (Baker 1985):
Morphological derivations directly reflect syntactic derivations and vice versa.
   d. NO COVERT MOVEMENT (AT LEAST FOR SCOPE INVERSION) (Kayne 1998: 128):
"Scope must be expressed hierarchically. [...] Scope reflects the interaction of merger and overt movement."

The application of this attractive and quite strong system of theoretical assumptions in (8) to the Hungarian morphological and semantic data demonstrated in (10), (14) and (18) below results in the following syntactic hierarchy (based on asymmetric c-command relations), which is to express the basic semantic hierarchy (scope relations) as well:

(9)   HIERARCHY IN HUNGARIAN VERBS (Bartos 2000a-b): Mood > Tense > Modality

There are data, however, in conflict with the Hungarian theory of verb expressed by (8)+(9). The interpretations demonstrated below in (11) and (15) have forced Bartos (2000a-b) to weaken the universal hypothesis in (8) at certain points (8b,c). Furthermore, we show an interpretation in (19) which is in an unsolvable conflict even with the weakened version of theory (8)+(9). We regard these "inverse-scope" phenomena as arguments against PS grammars — in favor of a totally lexicalist approach where the problematic morpheme orders can be regarded as satisfying *immprec* requirements *indirectly* (see (13) below).

4.1   *Scopal Ambiguity Between Tense and Modality*

Let us start with Bartos' (2000a) examples (10a-b) and (11a-b) and analyses concerning the possible scope orders between T(ense) and Mod(ality). The rigid …POSS-PAST-… templates in (10b) and (11b), together with principles (8b-c), would imply that only the interpretation in (10a) exists, in harmony with (9).

(10)a. It WAS [POSSIBLE [for them to wait]. PAST [POSS [...]]   T > Mod

  b. Az elítélt-ek csak az udvar-on *vár-hat-t-ak*   a látogatók-ra.
      the convict-s only the yard-SUP wait-POSS-PAST-3PL the visitors-SUB
      'The convicts could / were allowed to wait for the visitors only in the yard.'

(11)a. It is POSSIBLE [that they waitED].   POSS [PAST [...]]   Mod > T

  b. A fiúk talán   a másik kapu-nál *vár-hat-t-ak*,…
      the boys perhaps the other gate-ADE wait-POSS-PAST-3PL
      'The boys perhaps may have waited at the other gate,… (that's why we missed each other)'

Bartos (2000a) can account for the unfavorable "inverse scope relation" in (11) while more or less retaining (8)+(9). We do not intend to enter into precise technical details. The essence is that the Mood node should be regarded as acting as a *proxy* (i.e. a slot which can be filled by some other head for checking), to which the [Mod V+Mod] complex can raise, and in this position Mod will c-command T, "enabling the "inverse" Mod > T scope reading".

The cost mentioned by Bartos (2000a) is the violation of the Mirror Principle in its bidirectional version shown in (8c): the "vice versa" clause should be deleted because syntax does not reflect morphology. We claim that (8b) has weakened as well: the universal hierarchy of functional projections should be completed with a list saying which projection can serve as a proxy for which other projection in which language — this seriously decreases the explanatory power of the originally attractive universal concerning possible PS trees of UG.

In GASG(TLM), the common semantic content of (10a) and (10b) can be represented by the proto-DRS in (12a) below: there is a statement e10 according to which e11 took place in the *past*, there is another statement e20 according to which e21 is a *possible* situation or statement, and a third situation (e30) is also mentioned, in which a referent (r31) *waits for* another referent (r32). The specified content of (10a) can be derived from proto-DRS (12a) by adding the special proto-DRS (12b), which is practically an "equation system" among proto-referents. Similarly: the content of (11a) is the merger of (12a) and (12c).

(12)a. {PAST(e10; e11), POSSIBLE(e20; e21), WAIT(e30; r31, r32), …} ? (10a), (11a)

  b. {e11=e20, e21=e30} ? (10a)

  c. {e21=e10, e11=e30} ? (11a)

The two different DRSs result from putting together the same lexical items in two different ways, which means two different processes of "morphosyntactic" unification. In the case of (10a), the lexical item of PAST "begins to seek" the situation that held earlier (e11), and it finds e20, which is the fact that somebody is allowed to do something (e21); and the lexical item of this licence finds the activity permitted (e21): to wait (e30). The final semantic result is that somebody *was* allowed to wait, but (s)he/they is/are not necessarily allowed to wait *now*. As for the morphosyntactic aspect of this building process, the suffix belonging to PAST requires the lexical item of its argument, i.e. the suffix belonging to POSSIBLE, to immediately precede it, and POSSIBLE also requires its argument, practically the stem belonging to WAIT, to immediately

precede it. The word *várhattak* 'wait-POSS-PAST-3PL' in (10b) *directly* satisfies the two *immprec* requirements mentioned above.

GASG(TLM), of course, should face to the problem of "inverse scope" too, since the verb in (11b) shows the same morpheme order whilst now the suffix of POSSIBLE requires the suffix belonging to PAST to immediately precede it ("it is probable that something happened in the past"). The word *várhattak* 'wait-POSS-PAST-3PL' in (11b) does not satisfy this *immprec* requirement — at least not *directly*. But we can have recourse to *indirect* satisfaction of *immprec* again, as was demonstrated in 3.1. The appropriate definition is shown below in (13):

(13) Requirement *immprec-n(A,B)* can be *satisfied indirectly* if there is a morpheme X and there are (stronger competing) requirements immprec-k(X,A) and immprec-l(X,B), l<k<n, which are satisfied.

Its application thus goes as follows. Let *n* be the rank of the *immprec* requirement between PAST and POSSIBLE. *A, B* and *X* play the roles of PAST, POSSIBLE and the stem, respectively. Values of *l* and *k* have been provided in Figure (3): l=1, k=2. We need not fix the precise value of *n;* it is to be selected to be a *weaker* rank. Hence, the "morphological ranks" provided in (3) will decide the order of morphemes, independently of their current scope order.

The generalization in background is that *word* is a strong, real unit within sentence, with strong "frozen" stem–affix *immprec* ranks (see 3.3-4), which cannot be overridden by the weaker ranks belonging to *immprec* requirements concerning (sometimes opposite) current semantic scope relations. We hypothesize that the "frozen" morpheme order shows the preferred / more frequent scope relations, and languages belong to two types (and maybe there are intermediate types). In the type of Hungarian, definition (13) is valid, enabling us to express inverse scope relations — that will be corroborated in 4.2-3 as well. The other type lacks a definition like (13), so morpheme order truly reflects scope relations (and opposite scope relations can be expressed only by subordinate clauses). The spirit of the system of principles shown in (8) is characteristic of the latter type. If the content of Cinque's (1999) universal is true, there is no third language type: in which morpheme order within words would be so free that it could truly follow different scope relations.

4.2   *Scopal Ambiguity Between Mood and Tense*
Bartos' (2000a) examples serve as an illustration again (14-15):

(14)a.   It WOULD be the case [that they waitED]. COND [PAST [...]]   Mood > T
    b.   Az orök   *vár-t-ak   vol-na*, ha mond-t-ad   vol-na nekik.
        the guards   wait-PAST-3PL expl-COND if   tell-PAST-2SG expl-COND to-them
        'The guards would have waited if you had told them to.'

(15)   a. It WAS the case [that they WOULD wait]. PAST [COND [...]] T > Mood
    b.   A vendégek igazán   *vá-rt-ak   vol-na* még, de túl késo volt.
        the guests   really wait-PAST-3PL expl-COND still but too late was-3SG
        'The guests really would have waited / wished to wait, but it was too late.'

Interpretation (14a) is in accordance with the hierarchy in (9). The inverse scope relation demonstrated in (15) can also be reconciled with (8)+(9), says Bartos (2000a), but we say that the cost is the weakening of (8b) and (8c) again. [6]

It is to be explained why the word forms in (16a) do not exist. We follow Bartos (2000a) in assuming that this is the business of morphophonology: "…the T-affix and the M-affix become adjacent, and both are *analytical* affixes from a point of view, but two adjacent analytical affixes would violate a filter to the effect that two affixes adjacent to each other may not belong to the same domain-forming type (synthetic or analytic). This observation has been encoded in a general morphological template for Hungarian by Rebrus (2000)." We can add to this explanation that choosing the same (strong) rank values in Figure (3) for the stem–Tense and the stem–Mood *immprec* requirements is an elegant numerical parametric formulation of the observation.

(16)a. *vár-t-(a)ná-nk / *???   b. *vol-ná-nk   vár-t
     wait-PAST-COND-1PL / wait-COND-PAST-1PL   expl-COND-1PL wait-PAST
     'We would have waited.'

The semantic content of (14a) and (15a) can be derived from the common proto-DRS shown in (17b) below, where the lexical item belonging to HOLD is a semantically empty one whose "meaning" is that 'it holds that…'. We need it, however (17a), because of the morphophonological reasons discussed above.

(17)a. {PAST(e10; e11), COND(e20; e21, (e22)), WAIT(e30; r31, r32), …} ? *(16a)
  b. {PAST(e10; e11), COND(e20; e21, (e22)), WAIT(e30; r31, r32), HOLD(e40; e41)}
  c. (17b) ? {e21=e40, e41=e10, e11=e30} ? (14a)
  d. (17b) ? {e11=e20, e21=e40, e41=e30} ? (15a)

The interpretation in (14a), then, can be calculated by unifying the appropriate proto-referents (17c), yielding the following, correct, meaning: "It WOULD be the case [that it HELD in the past [that they waited]]." The parallel morphosyntactic building consists of the attaching of the conditional suffix to the expletive, resulting in *volna,* which requires the verb containing the suffix of PAST to immediately precede it as a separate word (3). The basis of the other interpretation in (15a) is that there *was* a will in the past (17d). [7] As for the morphosyntactic form belonging to the interpretation shown in (17d), variants like the one in (16b) should be excluded. As in 4.1., we say that the "frozen" morphological template demonstrated in (3) is determined by stronger ranks than the current scopal relations, and we should add that the expletive *vol-* has a special lexical property: Tense and Agreement features cannot be attached

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[6] As for the problem with (8c), the same can be said as in 4.1. As for (8b), Bartos' solution "is a head-chain <Mood, Modality>, where Mood lacks interpretable content, i.e. serves as an expletive somewhat similar to dummy *there* in English, while Modality lacks phonological shape (somewhat like a trace)." Thus universal (8b) should be completed with a (language-dependent?) list of possible head-chains, which weakens the original generalization.

[7] It can be observed that the same suffix, *-nA,* is associated with different meanings. The POSS suffix *-hAt* is polysemic as well, we will see in 4.3 ('general possibility', 'license', 'expectation'). This phenomenon, however, has no influence on our discussion on *scopal relations.*

to it, but Tense can be attached to a dependant of the expletive, i.e. the real semantic stem.[8]

4.3   *Scopal Ambiguity Between Mood and Modality*

That is the point where we do not follow Bartos' (2000a) interpretations. He discusses only the "canonical" interpretation demonstrated in (18) below, and he derives the conclusion that there is no scopal ambiguity between Mood and Modality from the system of principles (8)+(9). This kind of scopal ambiguity would totally spoil Cinque's (1999) universal (18b).

(18)a. It WOULD be [POSSIBLE [for them to wait]].   COND [POSS [...]] M > Mod
  b. Ha szükséges vol-na,   *vár-hat-ná-nak*   idebent.
      if   necessary would-be-3SG wait-poss-cond-3pl   in-here
      'They could wait in here if it was necessary.'

Nevertheless, he refers to another interpretation of *vár-hat-ná-nak* in his footnote 6: "Note, incidentally, that [this form] is in fact ambiguous: besides the reading given in [(18) in this paper], it can also mean 'It would be good if they waited / could wait.' But this reading is not different from the one in [(18)] in terms of scope relations — the nature of this difference, however, is not easy to capture, and this issue will not be pursued here."

(19)a. ??? POSS (? LICENSE ? EXPECTATION) [COND (? WILL) [...]] Mod > Mood
  b. Igazán   *vár-hat-ná-nak*   egy perc-et!
      Really   wait-POSS-COND-3PL   a minute-ACC
      'It would be good if they waited a minute.' ?
      'I wish they waited / were prepared to wait / intended to wait a minute.'

Let us analyze the meaning of (19b) thoroughly. Which factor of the meaning can be attributed to which suffix? What is clear is that both in (18) and in (19) a plausible interpretation of "possibility" is the speaker's *license,* and in (18) this license depends on a condition while in (19) the speaker definitely wants something, without any condition. This latter fact suggests that the COND suffix has a narrow scope in (19). And we can say that its meaning is the same as in (15b): *vár-ná-nak (szívesen)* 'they wish to wait (with pleasure)'. What is misunderstanding here is that (19b) seems to speak about the speaker's wish. Well, it *does* speak about the speaker's wish, primarily, but it also speaks about the subject's wish in the sense that the speaker *wishes₁* that the

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[8] The unavoidable application of a semantically empty lexical item is a means we have already used in GASG: the English yes/no question forms have been accounted for (Alberti 2000a, ex. 15). Why should we say *Did she write it?* instead of *Wrote she it?,* which is correct e.g. in German? First of all, we attribute interrogation to a separate lexical item whose specialty lies in the fact that it has no own word but it contains requirements on relative positions of the basic participants of the English sentence: the finite element, the subject, and the main verb, which does not necessarily coincide with the finite element. Its strongest requirement is that the finite element is to (immediately) precede the subject (cf. *Schreibt sie das?* 'write-3SG she it' in German). The main verb, however, obligatorily requires the subject to precede it — in English, but not in German. Thus the single English interrogative order is the following: *..., finite element, subject, main verb,...* Hence, the main verb cannot play the role of the finite element, but a dummy finite element should be applied.

subject *wished₂* to wait a minute. Then the first *wish* is to be attributed to the POSS suffix. We claim that *-hAt* is suitable for expressing the speaker's wish, indeed. *El-me-het-nek!* 'away-go-POSS-FORMAL2PL', for instance, can mean that the speaker practically orders his hearers to go away. The explanation is that the suffix of (general) "possibility" has a narrower secondary meaning which concerns the speaker's license, and the explicit declaration of license can be regarded in certain situations as an (polite expression of) expectation or will of the speaker.

Our above-sketched opinion about the interpretation of (19) has led us to emphasize again (see the last paragraph of 4.1) that Hungarian belongs to a language type where the "frozen" morphology excludes no inverse scope relations, in opposition to the spirit of the (transformational PS) theory summarized in (8)+(9). In GASG(TLM) the tool is at our disposal to account for inverse scope relations: the requirements concerning them are to be satisfied *indirectly* — which requires the construction of no complicated syntactic structures full of "empty" positions for whose existence there is no theory-external evidence.

5. Morpheme Order and Semantic Hierarchy in and around Hungarian Nouns

In this section potential inverse scope relations are studied, relative to (8)+(20):

(20) HIERARCHY IN HUNGARIAN NOUNS (Bartos 2000b):
      P/K (postposition/case) > D > Agr > Det > Num > Poss

5.1 *Scopal Ambiguity Between Num and Poss*

As is raised also by Bartos (2000b: 673), an interpretation like the one mentioned in (21d) is not excluded either whilst there is no inverse morpheme order.[9]

(21)a.a   fiú malac-a-i   / *malac-ok-ja
       the boy pig-POSS-(POSS)PL(3SG) / pig – PL - POSS3SG
       'the boy's pigs'
   b. {BOY(r1)}, {OWN(r21, r22)}, {GROUP(r3) ? [x3? r3 ? Q(x3)]}, {PIG(r4)}
   c. Num > Poss: the boy has pigs which make no herd
       {BOY(r1), GROUP(r3) ? [x3? r3 ? {PIG(x3), OWN(r1, x3)}]}[10]
   d. Poss > Num: there is a herd of pigs, which is the boy's possession
       {BOY(r1), OWN(r1, r3), GROUP(r3) ? [x3? r3 ? PIG(x3)]}

In GASG(TLM) (21c) and (21d) are both results of legitimate unification. As for morphosyntactic building, (21d) is problematic in that a plural object (a group) is possessed, so first the plural suffix should be attached to the stem, and then the possessive suffix should be attached to the plural suffix. What was said in 4.1, can be repeated here: the "frozen morphology" provided in (4) is stronger than current semantic demands concerning *immprec* relations. Thus we should have recourse to definition (13), and we can get both interpretations without differences in morphology.

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[9] The Num–Poss scopal ambiguity is not triggered by the possessor's plurality (e.g. *a fiú-k malac-a-i* 'the boy-PL pig-POSS-(POSS)PL(3SG)'). A plural possessor is a second source of ambiguity as it provides another plural object: {GROUP(r5) ? [x5? r5 ? Q(x5)]}. This proto-DRS together with those in (21b) can be unified in so many ways that we postpone the analysis of this problem to future research.

[10] One might think that the formula 'OWN(r21, r22)' of (21b) cannot be put in the middle of the conclusion part of an implicative formula. It is not the case in our LDRT semantics (2.2), however: both referents and propositions are allowed to be assigned to different "worlds" (see (1) again).

5.2 *The Scope of Case*

In the hierarchy shown in (20) above, the Case node occupies a high position, in harmony with the logic of PS grammars: As a first step a nominal head should collect its arguments and other dependants around itself, resulting in a DP, which refers to an entity. Then this DP as a whole will be marked with a case by a superior lexical head, which takes this DP as its argument: [DP…]+K. This strategy, however, may lead us to a morphological conflict when the last word of the DP is not the N head itself: doubly case-marked nouns would be required, as is exemplified below:

(22)a.*Mi vol-t az ok-a [a menekülés-etek a város-*ból]-nak*?
  what is-PAST [the reason-POSS3SG the escape-POSS2PL the city – ELA] - DAT

 b. Mi vol-t az ok-a [[a menekülés-etek-nek] a város-*ból*]?
  what is-PAST the reason-POSS3SG [[the escape-POSS2PL - DAT] the city – ELA]
  'What was the reason of your escape from the city?'

(23)a.*Mi vált-ott-a ki [a menekülés-etek a város-*ból]-t*?
  what trigger-PAST-DEFOBJ out [the escape-POSS2PL the city - ELA] - ACC

 b. Mi vált-ott-a ki [[a menekülés-etek-et] a város-*ból*]?
  what trigger-PAST-DEFOBJ out [the escape-POSS2PL - ACC the city - ELA]
  'What triggered your escape from the city?'

The solution of the language to the conflict can be seen in (22b) and (23b) above: the case suffix is to be attached to the N head in the middle of the DP. PS syntactians (see Bartos 2000b, 12.2.2.3.) are forced to say that the N head is the last element of an entire DP, and what follows it, constitutes an *additive* zone: [DP [DP…N]+K YP].

We mention two arguments against this approach. A more special one concerns the cases where a *subcategorized argument* follows the nominal head, as in (22a) and (22b): a head X and its argument(s) are to constitute the minimal XP (or X'): [XP … X YP…]. Our general argument concerns all cases discussed in subsection 12.2.2.3. of Bartos (2000b): we should identify the sequence of words referring to an entity by substitution. "What was the reason of *that*?" "What triggered *that*?" In these sentences *that* clearly refers to 'your escape from the city'. Hence, this expression serves as the possessor of 'the reason' as well as the object of 'triggered'; thus, the case suffix should mark this expression *as a whole.*

We regard the problem discussed in this subsection as a substantial argument against the fundaments of phrase-structure "logic", according to which, in the course of a "building from bottom upwards", an element (say, denoted by X) constitutes a phrase with its dependants ([X … X [Y… Y…]]), and then this phrase builds into superior structures ([Z … Z [X…]). In the totally lexicalist approach, the double linkage of X can be considered in a less biased way: X is to stand in an *immprec* relation both with Z (whose argument it is) and with Y (which is its argument). Hence, two rank parameters should be fixed, from construction to construction. In the case of English auxiliaries, for instance, the rank of the superior linkage is worth selecting to be stronger. In this way, *will* can be inserted between the main verb and its argument: *I go home* ? *I will go home,* in harmony with the interpretation 'it will be the case that [I go home]'.

There are many constructions, however, where there is no conflict at all, due to the order parameter. We mean the order Z, X, Y, illustrated also by (22) and (23) above. And there is no conflict between the case suffix (-*nAk /-t* above) and the argument of the noun

('city'), either! The case suffix is required to be attached to the noun 'escape' and to constitute a word with it, where the representative of the argument, the noun 'city', is required to immediately follow the word 'escape' as a separate word. We would like to emphasize again, in order to highlight the superiority of the totally lexicalist strategy, that these two requirements stand in no conflict at all, whilst the PS syntax gets in a serious conflict with either morphology (double case-marking) or semantics (spurious units).

Bartos (2000b: 690-691) mentions the Hungarian *focus test,* illustrated below in (24), as serving as an argument for regarding the nominal expressions with the nominal head followed by other words as an additive construction. The test is based on the observation that two or more constituents cannot be focussed.

(24) *[A menekülés-ünk -et a város-ból] vált-ott-a ki ez a probléma
      [the escape-POSS1PL - ACC thecity-ELA] trigger-PAST-DEFOBJ out this the problem
      'It is our escape from the city that this problem triggered.'

In the transformational framework, this reasoning can be refused by referring to the *right-branching* character of the expressions in question: right-branching constituents are excluded from *several* syntactic positions (Alberti and Medve 2002). In GASG, we should refer to the special lexical item that the focus meaning belongs to (Alberti 1999). It has no own word, but it decides the position of two relevant participants: the focussed item and the finite verb (which serves as the representative of the part of sentence expressing the *presupposition*). They are required to be adjacent to each other in an intonational unit with only a single stressed syllable (…*ME-ne-kü-lé-sün-ket vál-tot-ta…).* This connection are not allowed to be intervened by an argument of the focussed item.

Finally, we would like to mention a word-level problem with the PS building logic ("from bottom upwards") we criticized "universally" after (23). The examples below in (25a-b) follow this logic: the first suffix that is attached onto the noun stem is the representative of the (possessive) argument of the given noun, and then comes the case suffix, which is the representative of the "superior" verb that takes the noun (and its dependants) as its argument.

(25)a. Kawalla - *y* - *ta*   ensilla - rqa -nki - chu? (Bolivian Quechua)
       horse-*POSS.1SG-ACC*   saddle- PAST -2SG - QUES
       'Did you saddle my horse?'
   b. Fel – nyergel – t - ed - e   a   lov - *am* - *at*? (Hungarian)
       PV_{up}- saddle- PAST -2SG – QUES the horse-*POSS.1SG-ACC*
       'Did you saddle my horse?'
   c. Ol-en   petty -   nyt   hevose -*e* - *ni*. (Finnish)
       is-1SG be-disappointed-PERF horse - *ILLAT-POSS.1SG*
       'My horse was a disappointment to me.'

The Finnish "logic", however, illustrated in (25c), is the opposite. Thus, it is not excluded in UG that, out of the competing suffixes, the one expressing the "superior" argument-linkage proves to be stronger than the one expressing the "inferior" one. In GASG(TLM), the "frozen morphology" of Finnish nouns can be formulated in this way (cf. (4)), by fixing the rank values appropriately.

5.3 *The Scope of Det and D*

We are going to study ambiguities which can be derived from different unifications ((26c-d), (27c-d)) (of proto-referents) of the same lexical items ((26b), (27b)). The crucial difference lies in the decision whether the group of three Englishmen (referred to as a 'group r3') is said to be polite and to have arrived yesterday, or there may be more than three Englishmen, out of which we select three ones on the basis of further factors (persons x3 such that x3 is polite / arrived yesterday).

(26) a. a három udvarias angol / *[/???]az udvarias három angol
   the three polite Englishman / the polite three Englishman
   'the three polite Englishmen'
 b. {POLITE(r1)},{ENGLISHMAN(r21, r22)},{GROUP(r3) ? ?3(r3)? [x3? r3 ? Q(x3)]}
 c. Det > A: out of the Englishmen, the three polite ones
   {GROUP(r3) ? ?3(r3) ? [x3? r3 ? {ENGLISHMAN(x3), POLITE(x3)}]}
 d. A > Det: the three Englishmen, who are all polite
   {GROUP(r3) ? [x3? r3 ? ENGLISHMAN(x3)], POLITE(r3)}

(27) a. a három tegnap érkezett angol / a tegnap érkezett három angol
   the three yesterday arrived Englishman / the yesterday arrived three Englishman
   'the three Englishmen that arrived yesterday'
 b. {ARR-YEST(r1)},{ENGLISHMAN(r21, r22)},{GROUP(r3) ? ?3(r3)? [x3? r3 ? Q(x3)]}
 c. Det > Prt: out of the Englishmen, the three ones that arrived yesterday
   {GROUP(r3) ? ?3(r3) ? [x3? r3 ? {ENGLISHMAN(x3), ARR-YEST(x3)}]}
 d. Prt > Det: the three Englishmen, who arrived yesterday
   {GROUP(r3) ? [x3? r3 ? ENGLISHMAN(x3)], ARR-YEST(r3)}

The problems illustrated above concern *word order*, and not morpheme order. Thus now we cannot compare the "frozen morphology" given in (4) to a morpheme order which current semantic scope relations *would* require (see 5.1, 4.1-3), but we are performing an analogous reasoning. As is provided in Figure (2), the *immprec* rank of the adjective–noun relation is fixed as 2 (or 1 in the case of adjectives of nationality), and the rank of both the adjectival participle–noun relation and the Det(erminer)–noun relation is 3. These values explain the *two* word order variants in (27a), compared to the *single* variant in (26a), provided that values '3' are *weak* ranks.

These are quite strong ranks. We are arguing that the second type of meaning mentioned in (26d) and (27d) results from a connection whose *immprec* relation's rank is weaker. We have referred to the connection between the lexical item of 'polite'/'arrived' and that of the determiner 'three'. "Semantically", the former item needs the group referent provided by the latter one, and, concomitantly, it requires the latter one to immediately follow it. It can be assumed, however, in harmony with the spirit of (13), that the *immprec* rank of this semantically-induced requirement is weak while the "original" strong requirement concerning the *Prt/Adj – Noun* adjacency is still to satisfy. Therefore, the (three) "frozen" word-order variants in (26a) and (27a) will appear as surface orders, independently of the current scope relations — which holds true of not only (26a) where there is only one ("frozen") word order, but of (27a), too, where both word orders allow both meanings.

Finally, we mention a kind of ambiguity without formal semantic calculations:

(28)a.az udvarias angol-ok / *udvarias az angol-ok
    the polite Englishman-PL / polite the Englishman-PL
  b. D > A: 'out of the Englishmen, the polite ones'
  c. A > D: 'the Englishmen, who are all (/typically) polite'

The reading referred to in (28c) results from the inverse scope relation 'A > D' because the definite article is responsible for finding the referent of 'the English nation' in the background knowledge, and the adjective concerns this referent.

6. *Summary*

A "totally lexicalist (Hungarian) morphology" (GASG(TLM)) has been demonstrated in this paper, which suits the principle of total lexicalism directly: *each single morpheme within words is to be assigned a lexical item.*

We sketch in section 3 how the (direct or *indirect*) satisfaction of the system of requirements of these lexical items concerning each other yields the acceptable morpheme orders of Hungarian verbs and nouns (3-4) and "selects" the appropriate allomorphs (5-6). In sections 4 and 5 the associated *meanings* are studied, with special respect to *ambiguities*. In an adequately restrictive theory of generative PS grammar (see (8), Bartos 2000a-b), an ambiguous expression is often qualified as the surface coincidence of a *predictable* straight and an *unfavorable* inverse scope relation.

The conclusion of section 4 is that the morphology of Hungarian verbs is so rich in ambiguities that the PS theory formulated in (8)+(9) should be weakened to unfavorable extent while GASG(TLM), due to the technique of *indirect satisfaction* of adjacency requirements, can account for the entire range of ambiguities. Section 5 demonstrates how the approach elaborated in section 4 can be extended to the area of the morphology of Hungarian nouns, in order to capture less-known ambiguities and account for them.

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