Modelling Possession and Agreement in Hungarian DPs: A paradigmatic approach

Tibor Laczkó
University of Debrecen

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Abstract

In this paper I will present a formal LFG account of the basic morphosyntactic properties of Hungarian possessive DPs. I will argue for a Word and Paradigm mode of analysis (as opposed to the Item and Arrangement and the Item and Process alternatives, frequently used in other theoretical frameworks). In addition, I will discuss the relevant implementational issues.

1 Introduction

Earlier LFG analyses of Hungarian possessive DPs have, for the most part, dealt with some basic (morpho)syntactic issues, for instance, c-structure representation, the grammatical/discourse functions of nominative and dative possessors, the treatment of pro-drop, and the encoding of definiteness in possessive DPs with various types of possessors; see Laczkó (1995), Chisarik & Payne (2001), Charters (2014), and Laczkó (2017), among others. In this paper, I set out to develop a formal LFG analysis of the fundamental morphosyntactic aspects of the behaviour of Hungarian possessive DPs in comparison with some important previous accounts in alternative frameworks. My approach will be along the general Word and Paradigm lines (as opposed to the Item and Arrangement and Item and Process lines) of morphological analysis. I will also discuss implementational issues.

The structure of the paper is as follows. I present the relevant data in section 2. I discuss three previous accounts that represent the three major lines of morphological investigation in section 3. I develop my Word and Paradigm analysis in section 4. I give a brief summary in section 5.

2 The basic facts

In this section, I briefly present the phenomena under investigation.

(A) Hungarian possessive DPs host nominative or dative possessors, see (1a) and (1b).[1]

(1) a. *Kati* *toll-a*
Kate.NOM pen- POSS.3SG
'Kate's pen'

b. *Kati-nak* *a* *toll-a*
Kate-DAT the pen- POSS.3SG
'Kate's pen'

[1] The general pattern is this: NP_{DAT} D NP_{NOM}, i.e. if the definite article is present in the DP, it obligatorily follows the dative possessor, and it obligatorily precedes the nominative possessor; and only one of the two possessors can occur in any single possessive DP (see Laczkó 1995 and Bartos 2000, for instance).

(B) The possessed noun agrees with the possessor, see (1) and (2), and possessor pro-drop is possible (typical), see (2).

(2) *a* *(mi)* *toll-unk*
the we.NOM pen-POSS.1PL
'our pen'

(C) The possessum exhibits rich inflectional behaviour: it is morphologically marked for (i) possession, (ii) number, (iii) agreement with the possessor. In the most transparent (i.e. truly agglutinative) cases, three different (strictly ordered) morphs[2] encode these morphosyntactic features, see (3a). However, descriptively speaking, there are several feature value combinations in the case of which we can only find two overt inflectional elements or one attached to the noun stem, see (3b) and (3c,d), respectively. Note that *-i* is the plural marker of the possessum, see (3a,b,d), and *-k* is the plural marker of ordinary nouns, e.g. *a hajó-k* 'the ships'.[3]

(3) a. *a* *toll-a-i-nk*
the pen-POSS-PL-1PL
'our pens'

b. *a* *toll-a-i*
the pen-POSS-PL.3SG
'her pens'

c. *a* *toll-a*
the pen-POSS.3SG
'her pen'

d. *a* *hajó-i*
the ship-POSS.PL.3SG
'her ships'

In any theoretical framework, a formal analysis of the phenomena presented above is bound to face the following challenge at least: the treatment of morphological forms that are not (fully) agglutinative, see (3b-d) vs. (3a).

[2] Several morphological approaches (see Kiefer 2000 and Bartos 2000 below, for instance) use the classical (abstract) notion of a morpheme, which can be realized by several different (allo)morphs. In my analysis in this paper, I do not assume the existence of morphemes, and I only employ morphs, i.e. overt morphological elements.

[3] In what follows, I will omit POSS from the glosses when it is not relevant for the discussion of the given examples.

3 On some previous analyses

When the morphological composition of a word is not (fully) agglutinative, as in (3b-d), basically there are three strategies that can be followed: *Item and Arrangement* (IA), *Item and Process* (IP), and *Word and Paradigm* (WP); see Spencer (1991, 2004).

A) IA is templatic in nature: it assumes strictly ordered morpheme positions, and, consequently, it needs to admit zero (allo)morphs when there is no full (overt) agglutination.
B) IP, instead, fuses two or more ("underlying") morphemes into a single morph in such cases.
C) WP, by contrast, employs paradigmatic slots, the feature value combinations of which are realized by particular word forms of varied morphological compositions (whether fully agglutinative or not).

Interestingly, there have been analyses of the basic Hungarian possessive morphological phenomena along all the three strategic lines listed above.

(A) Kiefer (2000: 592-593) analyzes the examples in (4) as shown in (5).

(4) a. *ház-a-i-m*
house-POSS-PL-1SG
'my houses'

b. *kalap-om*
hat-POSS.SG.3SG
'my hat'

(5) a.

STEM	POSS	PL	AGR
ház	a	i	m

b.

STEM	POSS	AGR
kalap	∅	om

As (5) demonstrates, this is an IA style templatic approach that assumes the notion of morpheme, and uses zero allomorphs where necessary.[4]

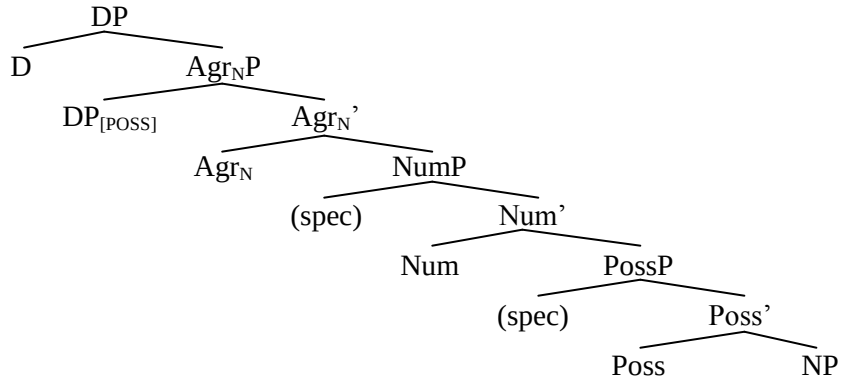
It should be obvious that an LFG analysis cannot adopt (or adapt) an approach along these templatic and zero allomorphic lines as the

[4] It is just a minor point that in Kiefer's system there is no SG morpheme (always to be realized by a zero (allo)morph), see his representation in (5b). Thus, there is no general (SG/PL) templatic slot here: the relevant slot is always PL.

overwhelming majority of approaches in this framework strictly reject empty elements either in syntax or in morphology.[5]

(B) Bartos (2000), in his MP and Distributional Morphology[6] framework, follows the IP strategy. Subscribing to Baker's (1985, 1988) Mirror Principle, he proposes the following internal structure for Hungarian DPs.

(6)



In his system, Poss, Num and Agr_N are suffixal (morphemic) heads.[7] He employs two major operations: morphosyntactic merger and morphological fusion. In the derivation, first Poss and NP are morphosyntactically merged (and, because of the bound morphemic nature of Poss, Poss attaches to the noun head). Next, Num merges with the Poss+NP complex. Finally, AgrN merges with the Num+Poss+NP unit.[8] The appropriate "spell-out" of these abstract morphosyntactic feature value combinations quite often requires morphological fusion (when there is no (full) transparency, i.e. agglutination, and a single morph encodes the feature values of more than one morpheme). The most important aspects of the analysis of (4a) and (4b) in Bartos's system are as follows.

In the case of the transparent (i.e. fully agglutinative) (4a), there are three instances of morphosyntactic merger, see (7a-c), and there is no need for morphological fusion, because each relevant (bound) morpheme has its respective morph realization.

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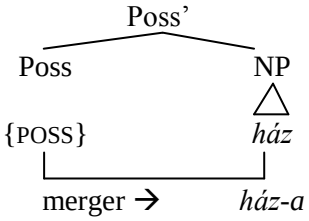
[5] For a salient exception in the domain of syntax; see Bresnan's (2001) treatment of certain long-distance dependency relations by dint of an empty category in c-structure. However, I am not aware of such exceptional treatments in the domain of morphology.

[6] See Halle and Marantz (1993, 1994) and Marantz (1997), for instance.

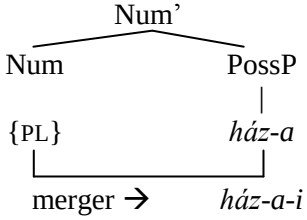
[7] Hungarian morpheme order is appropriately mirrored by the syntactic functional category arrangement in (6).

[8] The syntactic hierarchy of the three relevant functional projections and the merge operation prescribe the order of the morphemes in question attaching to the noun stem, thereby obeying the Mirror Principle (head+Poss+Num+Agr_N).

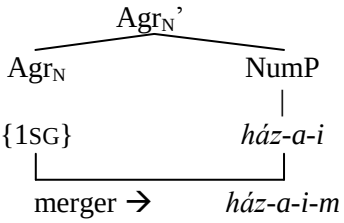
(7) a.



b.



c.



Bartos's analysis of (4b) is as follows (2000: 677).

(8) [$_{word}$ {kalap} + {POSS} + {1SG}] **fusion** →

[$_{word}$ {kalap} + {POSS, 1SG}]

insertion:	*kalap*	*-m*
phonological adjustment:	*kalapo*	*-m*

It should be obvious (again) that an LFG analysis cannot adopt (or adapt) an approach along these (either syntactic or lexical) fusional (IP) lines, given its WYSIWYG principle.

(C) Spencer and Stump (2013) outline an inferential-realizational approach to the inflectional properties of Hungarian possessive noun phrases in Stump's (2001) Paradigm Function Morphology (PFM) framework.[9] It is

[9] The main goal of Spencer and Stump (2013) is to develop a principled morphological analysis of Hungarian inflected (i.e. case-marked) personal pronouns. They exhibit a rather marked behaviour: in terms of their role in the syntax, they are case-marked pronouns; however, morphologically the case marker functions as the stem and it is inflected for person and number just like a possessive noun. Capitalizing on Stump's (2002) extended PFM model (PFM2), this approach

inferential in that its rules deduce complex morphological forms (like *sings*) from more basic forms (like *sing*). It is realizational in that it assumes that the association of an inflected word with its set of morphosyntactic feature values serves as a precondition for (and not a consequence of) its morphological formation.[10] They describe the most crucial aspects of PFM's formalism as follows.

> Each cell in the paradigm of a lexeme corresponds to a particular morphosyntactic property set for which that lexeme inflects; accordingly, each cell in the paradigm of lexeme L is […] formalized as a pairing <R,σ> of L's root R with the morphosyntactic property set σ to which that cell corresponds. A language's paradigm function is therefore a function PF whose domain is the set of such pairings and whose range is the set of realizations for those pairings. We assume that each realization is itself the pairing of a word form w with the morphosyntactic property set that it realizes. That is, where (i) σ is a complete and coherent property set for which lexeme L inflects, (ii) R is a L's root, and (iii) w is the inflected word form realizing lexeme L and the property set σ, PF(<R,σ>) = <w,σ>" (2013: 1222).

For instance, their representation of (9) is as in (10).[11]

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employs two paradigmatic dimensions: content paradigm (specifying the syntactic properties of the word) and form paradigm (specifying the morphological properties of the word). Normally, there is a default linkage between the two paradigms; however, there can also be a "mismatch" between them, and that is how Hungarian case-marked pronouns can be treated. Given that Spencer and Stump (2013) concentrate on the PFM2 analysis of these miscreant Hungarian pronouns, they do not demonstrate in a detailed fashion how ordinary inflected possessive nouns can be treated in the original PFM model. However, the essence of their presentation and exemplification of the model is fully satisfactory for the purposes of this paper, see below.

[10] "… in a realizational model it is the set of morphosyntatic properties associated with a word form that determines the shape of that word form (what affixes it bears and so on), whereas in an incremental model the affixes themselves bring morphosyntactic properties which are then added as the affixes are added" (2013: 1222).

[11] In (9) I employ the glossing that corresponds to their morphological analysis of this word. Below, I will make a critical remark on an aspect of this analysis. The main point is that *háza* should be appropriately analyzed as a morphologically complex unit: *ház-a* [STEM-POSS].

(9) *háza-i-m-ban*
house-PL-1SG-INE
'in my houses'

(10) PF(<*ház*,σ: {NUM:pl, CASE:inessive, INFL:{PER:1, NUM:sg}}>)
= <*házaimban*,σ>

(10) is the result of the nested application of three realization rules, in other words, these rules operate in three ordered blocks. The realization rules have the following general format.

(11) n, X_C, τ → *f* (X)
where: n = rule-block index
X = variable over the forms to which the rule applies
C = class of forms to which the rule applies
τ = the morphosyntactic property set realized by the application of the rule
f = the morphophonological operation by which the rule realizes τ

The relevant rules for (9) and (10) are as follows (2013: 1223).

(12) a. I, X_N, {NUM:pl, INFL:{PER:*α*, NUM:*β*}} → X'*i*, where X' is the thematized stem of X.
b. II, $X_{[-V]}$, {INFL:PER:1, NUM:sg}} → X*m*
c. III, X_N, {CASE:inessive} → X*ban*

In the first block, the rule adds the special (and formally invariant) plural morph in the possessive paradigm, *-i*, to the "thematized" stem, see (12a). The problem here is that *-a* at the end of *háza* is not part of the stem. There is clear morphophonological evidence that the *-a/-e/-ja/-je* morphs encode possessivity in such words; see Bartos (2000) and Kiefer (2000), among others.[12] From this it follows that for the treatment of case-marked possessive

[12] The problem with Hungarian nouns like *ház* 'house' is as follows. When *ház* takes other inflectional suffixes, crucially the accusative marker (*-t*) and the (nonpossessive) plural marker (*-k*), it can really be argued and assumed that the stem receives a theme vowel (*-a*), see (i) and (ii) – as opposed to plural possessive forms, which should not be analyzed in the same manner, as shown in (iii).

(i) *háza-t* (ii) *háza-k* (iii) *háza-i-m*
house-ACC house-PL house-PL-1SG

However, there are (morphophonologically) classifiable nouns that have a particular theme vowel (*-o*) when the accusative marker or the plural marker is attached to

nouns like (9) a four-block system would be appropriate: POSS+NUM+INFL+CASE.

In the second block in (12) the agreement features (INFL) are encoded. This rule takes *házai* as its input, and it yields *házaim*, see (12b).

The third-block rule adds the case-marker: *házaim* → *házaimban*, see (12c).

PFM handles "zero-morpheme" or fusional cases with the following general rule (2013: 1224), without postulating "real" zero morphemes or fusional operations.

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them, but in their plural possessive forms their alleged "theme vowel" is *-a*, compare (i)-(iii) with (v)-(vii).

(iv)	*tánc*	(v)	*tánco-t*	(vi)	*tánco-k*	(vii)	*tánca-i-m*
	dance		dance-ACC		dance-PL		dance-PL-1SG

Moreover, there is also a morphophonologically identifiable group of nouns that follow the same "accusative and (nonpossessive) plural theme vowel" pattern; however, in their possessive forms the plural marker (*-i*) is preceded by *-ja* (or *-je*, depending on the rules of vowel harmony), see (ix)-(xi).

(viii)	*bolt*	(ix)	*bolto-t*	(x)	*bolto-k*	(xi)	*boltja-i-m*
	shop		shop-ACC		shop-PL		shop-PL-1SG

On the basis of the patterns above there is a consensus in current morphological approaches (even of varying persuasions) to the effect that the *-a/-e/-ja/-je* (allo)morphs are the markers of possessivity. Consequently, the correct morphological analyses of (iii), (vii) and (xi) are as shown in (xii), (xiii) and (xiv), respectively.

(xii)	*ház-a-i-m*	(xiii)	*tánc-a-i-m*	(xiv)	*bolt-ja-i-m*
	house-POSS-PL-1SG		dance-POSS-PL-1SG		shop-POSS-PL-1SG

Given the larger picture illustrated in (i)-(xiv), it stands to reason that in the case of *ház* 'house' the correct morphological analysis is as shown in (xii), as opposed to (iii), and it simply so happens that *-a* is Janus-faced: it is either a theme vowel, see (i) and (ii), or the POSS marker, see (xii).

Also notice that the "theme vowel" analysis of (iii) is crucially challenged by the existence of the *-ja/-je* allomorphs. In this connection it is especially noteworthy that an ambiguous word form can take either *-a/-e* or *-ja/-je*, and the choice has a disambiguating function, see (xv-xx).

(xv)	*kar-t*	(xvi)	*karo-k*	(xvii)	*kar-ja-i-m*
	arm-ACC		arm-PL		arm-PL-1SG
(xviii)	*kar-t*	(xix)	*karo-k*	(xx)	*kar-a-i-m*
	faculty-ACC		faculty-PL		faculty-PL-1SG

In addition, there is also a significant degree of interspeaker variation as to the choice between *-a/-e* and *-ja/-je* even in the case of unambiguous words.

(13) Identity Function Default: *n*, X_U, {} → X

It is assumed that in all languages every rule block *n* has (13) as its default, which is the least specific member of the rule set. It applies unless it is overridden by a more specific rule in the given block, in other words, unless there is a rule operating with a morph encoding a more marked feature value (X belongs to the universal class of stems: X_U, and {} is a subset of σ). Spencer and Stump (2013) use the example of *ház* 'house' as in (14).

(14) *ház*
house.SG.NOM

This word form ("by default") realizes the following paradigm cell: <*ház*, {NUM:sg, INFL:no, CASE:nom}>.

Given the architecture and principles of LFG, an analysis along the general WP lines seems to be most appropriate. In the next section I will explore the theoretical and implementational avenues an LFG approach can take, and I will propose an account in each of these two dimensions. In the discussion I will also make some remarks on Spencer and Stump's (2013) PFM treatment of the inflectional behaviour of Hungarian nouns.

4 Developing an LFG analysis

4.1. The theoretical dimension

As I pointed out in the previous section, an LFG analysis of these Hungarian inflectional phenomena (and such inflectional phenomena across languages in general) is most appropriately developed along the WP morphological lines, given the fundamental properties of the IA, IP and WP approaches, on the one hand, and the basic architecture and principles of LFG, on the other hand.

It seems to me that in theory Spencer and Stump's (2013) PFM treatment of inflection could be directly accommodated in an LFG approach.[13] We could assume that their paradigmatic block rules are lexical redundancy rules that produce fully fledged, fully inflected lexical items. The only significant modification that would be necessary would be adding the [±POSS] feature to

[13] They extensively argue against the MP-Distributional-Morphology style syntactic analysis of inflectional phenomena in general and that of the behaviour of "inflected pronouns" in particular. They claim that morphology belongs to the lexical component of grammar.

NUM, AGR,[14] and CASE, see the relevant discussion in section 3. One of the potential problems with this accommodation pertains to the general design of morphological analysis. Inflectional morphology would be paradigmatic, without morphs having distinct lexical forms, while derivational morphology would be (because it must be) morph(eme)-based. This split, however, could be at least partially justified by claiming that it is a natural consequence of the fundamentally distinct properties of these two major types of morphological process. Despite this fact, in what follows I will argue for a morph-based approach to inflection in (what I claim) a basically paradigmatic spirit. An immediate advantage of this alternative, of course, is that both inflection and derivation can be handled on the same (morph-based) platform. If in all other respects the two approaches are equally plausible and tenable then the one with this platform uniformity should be preferred.

Consider the Hungarian possessive paradigm in (15).

(15)

STEM	**{POSS; NUM; AGR}**	**{POSS; NUM; AGR}**
	{POSS; SG; 1SG}	{POSS; PL; 1SG}
	{POSS; SG; 2SG}	{POSS; PL; 2SG}
	{POSS; SG; 3SG}	{POSS; PL; 3SG}
	{POSS; SG; 1PL}	{POSS; PL; 1PL}
	{POSS; SG; 2PL}	{POSS; PL; 2PL}
	{POSS; SG; 3PL}	{POSS; PL; 3PL}

Three remarks are in order here. (A) Recall that Spencer and Stump (2013) do not assume the POSS feature. (B) My AGR corresponds to their INFL. (C) Given that the treatment of case-marking is not relevant for the purposes of this paper, I will leave it out from the paradigmatic system to be discussed below.

The analysis to be developed here in the paradigmatic spirit is based on a sketchy proposal I made in Laczkó (2001).

Consider the examples in (3) from section 2, repeated here for convenience.

(3) a. *a* *toll-a-i-nk*
the pen-POSS-PL-1PL
'our pens'

b. *a* *toll-a-i*
the pen-POSS-PL.3SG
'her pens'

[14] AGR corresponds to their INFL. I think AGR would be a better label, given that number marking and case marking are also inflectional by nature.

c. *a* *toll-a*
the pen-POSS.3SG
'her pen'

d. *a* *hajó-i*
the ship-POSS.PL.3SG
'her ships'

My approach is morph-based (as opposed to morpheme-based approaches) and it is paradigmatic (WP vs. IA or IP). I assume that a morph (possibly in allomorphic variation) has a customary lexical form representation. However, one and the same morph can contribute partially different feature values to more than one paradigmatic slot. For instance *-a* is simply the marker of possessivity in (3a) and (3b), whereas it encodes possessivity, number and agreement in (3c). The *-i* morph simply encodes the plurality of the possessed noun in (3a), but it also marks agreement in (3b), and it represents all the relevant feature values in (3d): possessivity, number and agreement, see (16).

(16)

STEM	**{POSS; NUM; AGR}**	**{POSS; NUM; AGR}**
toll 'pen' [3a-c]	{POSS; SG; 1SG}	{POSS; PL; 1SG}
	{POSS; SG; 2SG}	{POSS; PL; 2SG}
	{POSS; SG; 3SG} ***a*** [3c]	{POSS; PL; 3SG} ***a+i*** [3b] ***i*** [3d]
hajó 'ship' [3d]	{POSS; SG; 1PL}	{POSS; PL; 1PL} ***a+i+nk*** [3a]
	{POSS; SG; 2PL}	{POSS; PL; 2PL}
	{POSS; SG; 3PL}	{POSS; PL; 3PL}

I capture this by employing functional annotational disjunctions, see (17).

(17) a. *-a* (↑ POSS) [3a,b]
((↑ POSS PERS) = 3 [3c]
(↑ POSS NUM) = SG
((↑ POSS PRED) = 'PRO'))

b. *-i* (↑ POSS) [3a]
(↑ NUM) = PL
((↑ POSS PERS) = 3 [3b,d]
(↑ POSS NUM) = SG
((↑ POSS PRED) = 'PRO'))

The default function of *-a* is to encode possessivity. I represent this with the (↑ POSS) existential constraint, which requires this function to be present in

the f-structure of the noun phrase, see the top disjunct in (17a). The ability of *-a* to additionally mark 3SG AGR is encoded in the lower disjunct in (17a). The *-i* morph always expresses the plurality of a possessed noun, hence the (↑POSS) and (↑NUM) = PL pair of annotations in the top disjunct in (17b).[15] Here, too, its ability to additionally mark 3SG AGR is encoded in the lower disjunct in (17b). The optional (↑ POSS PRED) = 'PRO' annotation in the last line in the lower disjunct in both (17a) and (17b) is the standard LFG device for handling pro-drop.

The use of a particular morph with the appropriate feature value combinations has a set of complex morphophonological constraints that must be incorporated in any approach, whether IA, IP or WP. For instance, the plural possession *-i* must always be preceded by a vowel. If the stem-final vowel is not *-a*, *-e* or *-i*, this morph is simply added to the stem, see (18).

(18) *autó-i-m*
car-POSS.PL-1SG
'my cars'

If the final vowel is *-a* or *-e*, vowel-lengthening takes place (*-a→-á*, *-e→-é*), see (19) and (20).[16]

(19) a. *fa*
tree
'tree'

b. *fá-i-d*
tree-POSS.PL-2SG
'your[SG] trees'

(20) a. *kecske*
goat
'goat'

b. *kecské-i*
goat-POSS.PL.3SG
'her goats'

If the final vowel is *-i*, *-ja/-je* must be inserted between the two *-i*-s, see (21).[17]

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[15] The plurality of non-possessed nouns is encoded by *-k* (and its allomorphs); therefore, in its lexical form we need to use the following pair of annotations: ~(↑POSS) and (↑NUM) = PL.

[16] This, however, is not restricted to *-i* attaching to nouns ending in *-a* or *-e*. Any suffix (with either an initial consonant or an initial vowel) will trigger this process, see (ii) and (iii). From this it follows that this lengthening requirement must be encoded in the lexical forms of nouns with final *-a* or *-e*.

(i) *fa*
tree
'tree'

(ii) *fá-ban*
tree-INE
'in tree'

(iii) *fá-ért*
tree-CAUSFIN
'for tree'

(21) a. *taxi*
taxi
'taxi'

b. *taxi-ja-i-nk*
taxi-POSS-PL-1PL
'our taxis'

If the stem ends in a consonant, *-a/-e/-ja/-je* must be inserted before *-i*, see (22) and (23).

(22) a. *busz*
bus
'bus'

b. *busz-a-i-tok*
bus-POSS-PL-1PL
'your[PL] buses'

(23) a. *kert*
garden
'garden'

b. *kert-je-i-m*
garden-POSS-PL-1SG
'my gardens'

As these examples show, the system of morphophonological conditions and constraints is rather complex, and they need to be captured in a formally appropriate manner in any approach.[18] For a detailed and comprehensive discussion of these morphophonological phenomena; see Rebrus (2000). In an LFG approach, we need to encode this morphophonological dimension in the lexical forms of the words and the bound morphs involved.

Now (re)consider a quote from Spencer and Stump (2013) in Footnote 10, repeated here for convenience.

> "… in a realizational model it is the set of morphosyntatic properties associated with a word form that determines the shape of that word form (what affixes it bears and so on), whereas in an incremental model the affixes themselves bring morphosyntactic properties which are then added as the affixes are added" (2013: 1222).

In light of this quote, my LFG analysis proposed above may seem to be incremental rather than realizational – at first sight. After all, I use affixes (i.e. suffixes), and they are added one after the other to a word stem by dint of lexical redundancy rules, and, in the strict sense of the word they add morphosyntactic information incrementally. As usual, these redundancy rules

[17] Most probably the insertion of *-ja*/*-je* is triggered by processing factors: if two *-i*-s are adjacent, it may not be easy to acoustically identify the second *-i*, which encodes an important morphosyntactic property: the possessivity feature.

[18] As I have also pointed out, occasionally a lexically ambiguous word (with the same phonological shape) requires *-a/-e* in one reading and *-ja/-je* in another. In addition, there are also speaker-choice differences in the case of a great number of words. All such additional complications need to be appropriately captured in the lexical forms of the words involved.

create fully-fledged (i.e. fully inflected) word forms in the lexical component of the grammar It is also true that when a suffix is added, it contributes a particular morphosyntactic feature value (set).[19] The problem then would be that according to Spencer and Stump (2013) their PFM model is inferential and realizational, and if my approach is incremental rather than realizational, then its paradigmatic nature becomes questionable. My response to such concerns is as follows.

(A) The way in which I envisage the process of developing all the details of an LFG analysis of these Hungarian inflectional phenomena is absolutely paradigmatic, therefore inferential, in nature. First, the relevant paradigmatic system needs to be established, see (15) above.[20] Next, all the attested morphs or morph combinations must be associated with their respective paradigmatic cells. For a simple example, see (16). Then the individual morphs have to be exhaustively characterized with respect to their feature value contributions to (possibly) various cells in their lexical forms. For some examples, see (17). The important point is that this approach is morph-based (and not morpheme-based), and the treatment of morphs is paradigm-driven.

(B) True, the lexical redundancy rules I assume add morphs one after the other (and these morphemes contribute morphosyntactic information incrementally). If several morphs are involved, in an ordinary morphological approach this cannot really be otherwise. However, as I pointed out in (A) above, this incremental information contribution is strictly paradigm-driven.

(C) It is noteworthy in this context that as far as I can tell Spencer and Stump's (2013) PFM analysis and mine are essentially the same in nature, although the formal devices and the rules differ considerably. Their approach, too, is paradigm-driven (not surprisingly, of course, because this is its defining property). In their system paradigm cell satisfaction is carried out by strictly ordered rules that operate in blocks, and these blocks are arranged on the basis of the order of the morph types that contribute the relevant types of feature values. When these rules work one after the other, the newly added morpheme does contribute specific values towards the satisfaction of the requirements of a particular paradigm cell. In my view, this aspect of the PFM approach exhibits the same kind and degree of incrementality as the fundamentally similar aspect of my approach, see (B) above.

(D) Finally, Spencer and Stump's (2013) approach avoids the postulation of zero morphs or fusion by introducing a default rule the essence of which is that in any block of rules the default is that the input and the output forms are

[19] And, as I have shown, the same morph can realize (partially) different value sets, largely determined by its actual morpho(phono)logical environment. This is an important factor for the assessment of the (paradigmatic vs. nonparadigmatic) nature of my analysis.

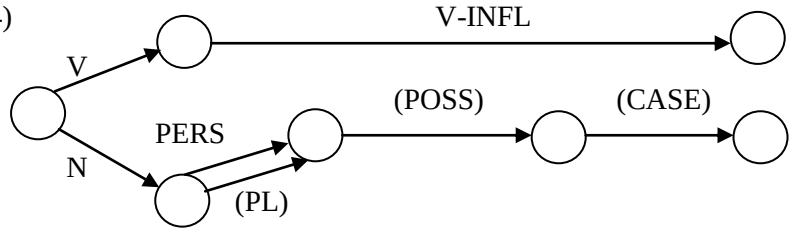
[20] Recall that in Spencer and Stump's (2013) system the POSS feature is not distinguished, see (10) in section 3.

identical morphologically (i.e. no new morph is added), see the Identity Function Default in (13) in section 3; however, the feature value set of the new form is richer: it also realizes the features that the overt morphs in that block contribute. In my system in cases of lack of full agglutination a particular morph is directly associated with the whole relevant set of feature values. Consequently, my approach is less "procedural", as it employs fewer morphological rules/processes, hence it is more paradigmatic in nature in this respect.

4.2. The implementational dimension

In his discussion of the fundamental aspects of developing the morphological component of a computational grammar of Hungarian, Prószéky (2000: 1039) schematizes the system of Hungarian inflectional suffixes on a computational platform as in (24).

(24)



We have verbal (V) and nominal (N) inflection. In the case of verbal inflection, there is just one inflectional-paradigmatic slot (V-INFL). It is filled by morph-complexes encoding value sets for the following feature-complexes {INDICATIVE; TENSE; AGR} or {CONDITIONAL; AGR} or {IMPERATIVE; AGR}.[21] In the case of nominal inflection, the fundamental contrast is that between possessive inflection and nonpossessive inflection. In (24) PERS represents the possessive line, and (PL) the nonpossessive line. PERS in this system stands for a single paradigmatic slot for the {POSS; NUM; AGR} feature complex. On the nonpossessive line NUM is encoded: SG is unmarked, PL is realized by *-k* and its allomorphs (as opposed to *-i* in the possessive paradigm). (POSS) indicates a slot for an optional special pro morph (either in the singular or in the plural) standing for a possessed noun.[22] The final slot is for case markers.

[21] In the case of the AGR feature there are two subparadigms with respect to definite and indefinite object marking in all the three alternative feature complexes.

[22] As in (ii) and (iv) [next page]. Incidentally, this also means that the paradigmatic space in the Hungarian nominal inflectional domain needs to be augmented.

An efficient implementational version of an LFG grammar of Hungarian needs to be developed along the lines of these general computational-morphological assumptions. Given that even morph complexes that are traditionally analyzed as combinations of morphs function as single, unanalyzed morphs individually filling their respective paradigm cells, the representation in (16) of the relevant morphs in the examples in (3) needs to be modified in this approach as shown in (25).

(25)

STEM	**{POSS; NUM; AGR}**	**{POSS; NUM; AGR}**
toll ‘pen’ [3a-c]	{POSS; SG; 1SG}	{POSS; PL; 1SG}
	{POSS; SG; 2SG}	{POSS; PL; 2SG}
	{POSS; SG; 3SG} ***a*** [3c]	{POSS; PL; 3SG} ***ai*** [3b] ***i*** [3d]
hajó ‘ship’ [3d]	{POSS; SG; 1PL}	{POSS; PL; 1PL} ***aink*** [3a]
	{POSS; SG; 2PL}	{POSS; PL; 2PL}
	{POSS; SG; 3PL}	{POSS; PL; 3PL}

(26) and (27) present all the possible allomorphs (as single morphological objects) in their respective paradigm cells, cf. PERS in (24).

(26)

{POSS; NUM; AGR}	STEM	MORPH
{POSS; SG; 1SG}:	*stem*	*m, am, em, om, om*
{POSS; SG; 2SG}:		*d, ad, ed, od, öd*
{POSS; SG; 3SG}:		*a(á), e(é), ja(já), je(jé)*
{POSS; SG; 1PL}:		*nk, unk, ünk*
{POSS; SG; 2PL}:		*tok, tek, tök, atok, etek, ötök*
{POSS; SG; 3PL}:		*uk, ük, juk, jük*

(i) *János* *toll-a*
John.NOM pen-POSS.SG.3SG
‘John’s pen’

(ii) *János-é*
John-POSS_PRO
‘that of John’s’

(iii) *a* *fia-m* *toll-a-i*
the son-POSS.SG.1SG pen-POSS.PL.3SG-PL
‘my son’s pens’

(iv) *a* *fia-m-é-i*
the son-POSS.SG.1SG -POSS.PRO-PL
‘those of my son’s’

(27)

{POSS; NUM; AGR}	STEM	MORPH
{POSS; PL; 1SG}:		*im, aim, eim, jaim, jeim*
{POSS; PL; 2SG}:		*id, aid, eid, jaid, jeid*
{POSS; PL; 3SG}:	*stem*	*i, ai, ei, jai, jei*
{POSS; PL; 1PL}:		*ink, aink, eink, jaink, jeink*
{POSS; PL; 2PL}:		*itok, itek, aitok, eitek, jaitok, jeitek*
{POSS; PL; 3PL}:		*ik, aik, eik, jaik, jeik*

Needless to say, this approach dramatically simplifies the task of the developer of an implemented grammar, and almost astronomically enhances speed and efficiency both in parsing and in generation in this domain of the grammar. Fundamentally, it has to deal with the morphophonological aspects (the conditions and constraints) of a single morph boundary, while a morphosyntactically transparent, fully analytical approach needs to cope with three such boundaries with significant further complications caused by instances of systematic lack of (full) agglutination. In addition, it can be argued that this radically simplified treatment with respect to the number of morphs involved is truly paradigmatic in nature. In this inflectional domain "horizontally" there is a stem and a single inflectional cell (with a particular set of morphosyntactic feature values), and each cell is filled with a single morphological object (an unanalyzed morph and its (also unanalyzed) allomorphs).[23] Of course, the cost is that it cannot formally directly capture the (otherwise attestable) morphosyntactic contributions of parts of (complex but unanalyzed) morphs. This is something an implementational grammar can (happily) live with; see Prószéky (2000), for instance. More theoretically biased approaches favour the morph-separation method; see Spencer and Stump (2013) and my proposal in section 4.1. However, at this point, let me speculate about how these implementational and theoretical biases could possibly be reconciled.

It may be the case that Hungarian native speakers store morph complexes like those in (26) and (27) in their mental lexicon, in addition to the simplex morph forms. If we want to model this, we need to have separate lexical forms for these morph complexes as well. The basic idea would be that each simplex morph (with its allomorphs) would have its own lexical form with

[23] Notice that Spencer and Stump (2013) also postulate a single paradigmatic cell combined with the stem. "For instance, the Hungarian lexeme HÁZ 'house' (root *ház*) has (<*ház*,σ: {NUM:pl, CASE:inessive, INFL:{PER:1, NUM:sg}}>) as one of its cells" (2013: 1222). Two remarks are in order here. (A) Recall again that they do not distinguish the POSS feature. (B) They put the case feature into this single cell, as opposed to Prószéky's (2000) and my view.

the specification of its basic function (e.g. *-ja:* POSS, *-i:* PL, *-m:* 1SG), and all their attested paradigmatic combinations into a complex form (with a complete set of of morphosyntactic feature values) would also have their respective lexical forms. In a significant sense (and as a probably not very far-fetched analogy) this would be similar to compounding: there are simplex words and there are compound (complex) words in the lexicon, the latter consisting of the former. The psychological plausibility of this assumption could be tested in the following way. The production and the processing of inflected possessive nouns would need to be measured with technical devices of high precision. If nouns with a simplex morph in a particular paradigmatic cell were produced and processed at exactly the same speed as nouns with a (more) complex morph in the same cell (e.g. *-i* vs. *-jei*) then this fact would lend considerable support to the assumption I made above.[24] I leave exploring this issue to future research.

5 Conclusion

In this paper, I have developed a WP analysis of Hungarian possessive inflectional phenomena in an LFG framework, by comparing it with previous alternative analyses along the three major lines of morphological investigation (IA, IP and WP).

My analysis is morph-based (and not morpheme-based). The basic idea is that a morph (in various morphological configurations) can contribute partially different sets of morphosyntactic feature values to different paradigmatic cells, largely depending on morphophonological conditions and constraints. This is encoded in its lexical form by means of functional disjunctions.

Capitalizing on Prószéky (2000), I pointed out that from an implementational perspective it is far more efficient to assume that unanalyzed complex morphs (and their allomorphs) fill each paradigmatic cell. Finally, I speculated that this "simplistic" approach can possibly be accommodated even in more theoretically biased analyses.

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[24] In addition, I think experimenting across cells would also be important, given that the possible difference in the degree of complexity could be the greatest there (1 vs. 3 elements), e.g.: *-i* vs. *-aim*.

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