

UDI PERSON MARKERS AND LEXICAL INTEGRITY

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Abstract: In Udi, person markers occur either within the verb, in positions determined by internal morphological structure, or else at the right edge of a syntactic constituent in focus. Harris reasons that since describing the distribution of these person markers requires reference to both morphological and syntactic entities, this phenomenon challenges the lexicalist separation of morphology and syntax advocated by the Lexical Integrity Hypothesis. I argue that one can maintain a lexicalist approach by adopting lexical sharing, which allows words to instantiate multiple terminals. Udi person markers are positioned within the word by purely morphological alignment constraints; words containing a person marker instantiate an additional terminal, which is positioned by purely syntactic alignment constraints. This analysis preserves the separation of morphology and syntax, showing that the data surrounding Udi person markers are not, in fact, damaging to lexicalist theory.

1 The problem

In her richly detailed study of the morphosyntax of Udi,¹ Harris (2002) claims to have found counterevidence to the lexicalist separation between syntax and morphology, such as is assumed in the Lexical Integrity Hypothesis (Bresnan, 2001, p. 92). She examines *person markers* (PMs), a class of clitics that agree in person and number with the subject; (1) shows the paradigm of general PMs.² For Harris, describing the distribution of PMs requires an intermingling of morphological and syntactic constraints that she feels renders lexicalist theories untenable. I begin with a brief overview of her analysis and conclusions, before going on to suggest ways in which a lexicalist approach could overcome Harris's objections.

(1)		SG	PL
	1	zu, z	yan
	2	nu, n, lu, ru	nan, lan, ran
	3	ne, le, re	q'un

1.1 The distribution of person markers in Udi

Harris's treatment of Udi PMs is couched within *Optimality Theory* (OT), using the notion of *Generalized Alignment* (McCarthy and Prince, 1993). This employs the Align relation, defined in (2), to state violable constraints governing the relative positioning of edges, left or right, of entities designated by prosodic or grammatical categories. I present Harris's main constraints with just enough data to illustrate her proposed domination hierarchy. See Harris 2002, chaps. 6–7 for full details.

(2)	Align(Cat ₁ , Edge ₁ , Cat ₂ , Edge ₂)	↔	\forall Cat ₁ \exists Cat ₂ such that Edge ₁ of Cat ₁ and Edge ₂ of Cat ₂ coincide,
	where Cat ₁ , Cat ₂ \in PCat \cup GCat (prosodic and grammatical categories),		
	Edge ₁ , Edge ₂ \in {L(ef), R(igh)}.		

(McCarthy and Prince, 1993, p. 2)

¹Udi belongs to the Lezgian family of North Caucasian languages. It is traditionally spoken in the villages of Nic and Oghuz in Azerbaijan. In the 1920s, émigrés from Oghuz took Udi to the village of Oktomberi in Georgia. More recent migration has spread Udi to Russia (Clifton et al., 2002).

²Special PMs exist for inversion, possession, and question structures (Harris, 2002, §2.5.1).

One place where PMs may occur is following a subset of tense-aspect-mood (TAM) suffixes, namely the FUT(ure)II, S(u)BJ(uncti)V(e)I, and SBJVII, as well as the IMP(erative) when plural. These suffixes are almost always realized as *al* or *a*. Constraint (4) aligns the left edge of the PM with the right edge of the suffix.

- (3) a. b-*al-le*³ b. b-*a-ne* c. b-*a-ne-y* d. b-*a-nan*
do-FUTII-3SG do-SBJVI-3SG do-SBJVII-3SG-PAST do-IMP-2PL
- (4) ALIGN-PM-*al/a* (abbreviated *al/a*)
Align(PM,L,*al/a*,R) (Harris, 2002, pp. 27, 149)

A PM may also arise on a *focus constituent* (FocC). Thus, *ne* ‘3SG’ is attached to AdvP in (5), PP in (6), and NP in (7); each is interpreted as sentence focus and appears immediately before the verb, where FocC usually occurs in Udi. Constraint (8) aligns the left edge of the PM with the right edge of FocC.

- (5) irähät-en *mya-ne* bist’a cil-l-ux
peasant-ERG here-3SG sow.PRES seed-OBL-DAT
‘The peasant sows seeds here.’
- (6) äyel-en *k’uč’an-ne* beḡ-sa
child-ERG puppy.ABSL-3SG watch-PRES
‘The child is watching a puppy.’
- (7) *xe-n-en-k-ne* tay-sa
water-OBL-ERG-for-3SG thither-PRES
‘She went for water.’
- (8) ALIGN-PM-FOCC (abbreviated FOCC)
Align(PM,L,FocC,R) (Harris, 2002, pp. 95, 120, 150)

When an *al/a* TAM suffix is present, like *al* ‘FUTII’ in (9), the PM cannot attach to FocC; thus, shifting the PM in (9) to *k’uč’an* ‘puppy’ would result in ungrammaticality. This motivates the domination hierarchy in (10).

- (9) äyel-en *k’uč’an* beḡ-*al-le*
child-ERG puppy.ABSL watch-FUTII-3SG
‘The child will watch a puppy.’
- (10) *al/a* ≫ FOCC (Harris, 2002, pp. 120, 150)

In Udi, the majority of verb stems are complex, combining an *incorporated element* (IncE) with a light verb. One sort of IncE is an infinitive marked with *es*; see *eč-es* ‘bring-INF’ and *cip-es* ‘spread-INF’ in (11), for example. An IncE may also be a noun, such as *aš* ‘work, business, matter’ in (12), an adjective, an adverb, or a simplex verb stem, among other things. A PM may occur between the IncE and the light verb, as seen in (11) and (12); constraint (13) favors this positioning, aligning the left edge of the PM with the right edge of the IncE.

³Initial /ɲ/ in a PM assimilates to a preceding liquid; see Harris 2002, §2.5.3.1 for discussion.

- (11) me pasčay-en eč-es-ne-st'a ...
 this king-ERG bring-INF-3SG-CAUS.PRES
 kul cip-es-ne-st'a pak-i
 earth.ABSL spread-INF-3SG-CAUS.PRES garden-DAT
 'This king has earth brought. . . ; he has it spread in the garden.'
- (12) zavod-a aš-ne-b-sa
 factory-DAT work-3SG-do-PRES
 'She works in a factory.'
- (13) ALIGN-PM-INCE (abbreviated INCE)
 Align(PM, L, IncE, R) (Harris, 2002, pp. 122, 151)

When an *al/a* TAM suffix is present, that suffix attracts the PM in preference to an IncE; thus, *le* '3SG' aligns with *al* 'FUTII' rather than *aš* 'work, business, matter' in (14). A FocC is also a more powerful attractant than an IncE; hence, in (15), *z* '1SG' aligns with *zavod-a* 'factory-DAT' in preverbal focus position, rather than with *aš*. These facts support the domination hierarchy in (16).

- (14) bez vič-en aš-b-al-le zavod-a
 my brother-ERG work-do-FUTII-3SG factory-DAT
 'My brother will work in a factory.'
- (15) zavod-a-z⁴ aš-b-sa
 factory-DAT-1SG work-do-PRES
 'I work in a factory.'
- (16) *al/a* » FocC » INCE (Harris, 2002, pp. 123, 151)

One of the more noteworthy places where a PM may occur is *inside* of a simplex verb stem. In (17), *ne* '3SG' occurs between the penultimate and final segments of the monomorphemic form *bəy* 'look.' The two part glossing with numeric subscripts, 'look₁-...-look₂,' is meant to represent the interruption of the simplex verb stem. Similarly, *z* '1SG' falls inside of *aq* 'receive, take' in (18). Constraint (19) stands out from previous rules; it aligns the *right* edge of the PM with the *right* edge of the simplex verb stem. Tableau (20) illustrates the application of (19). One violation-mark is assessed for each segment separating the two edges; the intervening segments are used for violation-marks in place of asterisks, to enhance clarity. The optimal place for the PM falls one segment before the end of the verb stem.

- (17) pasčay-un yar-en gölö be-ne-y-sa met'a-laxo
 king-GEN boy-ERG much look₁-3SG-look₂-PRES this.GEN-on
 'The prince looks at this for a long time.'
- (18) kayuz-ax a-z-q'-e
 letter-DAT receive₁-1SG-receive₂-AORII
 'I received the letter.'

⁴Here the PM *zu* '1SG' undergoes /u/-elision; see Harris 2002, §2.5.3.1 for discussion.

- (19) ALIGN-PM-VERB STEM (abbreviated VSTEM)
Align(PM, R, Verb stem, R) (Harris, 2002, pp. 125, 153)

(20)

'looks'	ALIGN-PM-VERB STEM
ne -beḡ-sa	be!ḡ
<i>b-ne</i> -eḡ-sa	eḡ!
☞ <i>be-ne</i> -ḡ-sa	ḡ
<i>beḡ-ne</i> -sa	ne!

The position inside of the simplex verb stem becomes unavailable for the PM if the option of aligning with an *al/a* TAM suffix, a FocC, or an IncE is available; thus, the PM is aligned with *al* 'FUTII' in (21), with *muqluy-en* 'pleasure-INST' in preverbal focus position in (22), and with the incorporated *xabar* 'ask' in (23). In contrast to (18) above, nowhere in (21)–(23) does the PM occur inside of the monomorphemic form *aq* 'receive, take.' These observations motivate the domination hierarchy in (24).

- (21) sa xinär-en...aq'-**al-le** k'alpesun-un p'iz-ax
one girl-ERG receive-FUTII-3SG read.MAS-GEN prize-DAT
'A girl... will receive the prize for studying.'
- (22) ...*muqluy-en-zu* aq'-sa
pleasure-INST-1SG receive-PRES
'[Whoever comes to me as a guest] I receive with pleasure.'
- (23) *xabar-re*-aq'-sa šot-uxo
ask-3SG-take-PRES him-ABL
'He asks him.'
- (24) *al/a* » FOCC » INCE » VSTEM (Harris, 2002, pp. 126f, 164)

1.2 Harris's conclusions and the goals of this study

Harris (2002, chap. 5) argues at length that Udi PMs are clitics, exhibiting many characteristics typically attributed to that class. She observes, for instance, that PMs are *promiscuous*, attaching to a variety of forms; the foregoing data show that the PM may associate not only with the verb, but also with adverb, preposition, and noun—see (5)–(7). Also, PMs may occur 'outside' of (i.e. farther away from the root than) other clitics; such is the case in (25), where *le* '3SG' trails the clitic *al* 'and.' Harris offers these and numerous other arguments.

- (25) abaz-in-**al-le** aš-b-esa
[coin]-INST-and-3SG work-do-PRES
'And he works for an abaza [twenty kopeks].'

Harris's examination of Udi PMs also reveals some theoretical surprises. If PMs are clitics, then the fact that they occur *inside* of a word means that they fall into the class of *endoclitics*, assumed by some to be nonexistent (e.g., Klavans, 1979). A further, closely related point is of particular interest here; in Harris's

account of the distribution of Udi PMs, the alignment constraints refer both to syntactic elements (FocC) and to verb-internal morphological items (*alla* TAM suffixes, IncE, verb stem). This point poses a challenge for lexicalist theories:

The problem is that the rules that position . . . PMs must be in part syntactic rules, given that PMs may occur on words outside the verb. . . But if the rules are syntactic, the Lexical Integrity Hypothesis claims that they do not have access to the internal structure of a word and therefore cannot position the PM inside the verb. . . (Harris, 2002, p. 3)

In this study, I consider the problem of describing the distribution of Udi PMs in a lexicalist framework and conclude that it is feasible, provided one uses the right tools. More particularly, my goal is to provide an analysis that avoids the intermixing of morphological and syntactic constraints, while reusing as much of Harris's original treatment as possible. The approach I sketch draws on *Optimal Paradigm Theory* (McCarthy, 2005) and *Optimality-Theoretic Lexical Functional Grammar* (OT-LFG, Bresnan, 2000; Sells, 2001), augmented with the mechanism of *lexical sharing* (Wescoat, 2002), to which I turn my attention next.

2 Lexical sharing

In traditional thinking, a clitic is a form that is syntactically free, but phonologically bound to a *host*. Thus, this view recognizes the existence of two separate elements of *c(onstituent)-structure*, corresponding to clitic and host. At the same time, Harris's discussion of Udi PMs suggests that clitic and host may be more than just phonologically bound; the clitic may reside inside of the host, its precise position there determined by the host's internal morphological composition. If the domain of morphology is the word, then it seems logical to say that the host-clitic amalgam functions as one word, at least as far as the Udi data are concerned. Lexical sharing is a mechanism designed to accommodate phenomena with these very characteristics, one word corresponding to multiple constituents in *c-structure*.

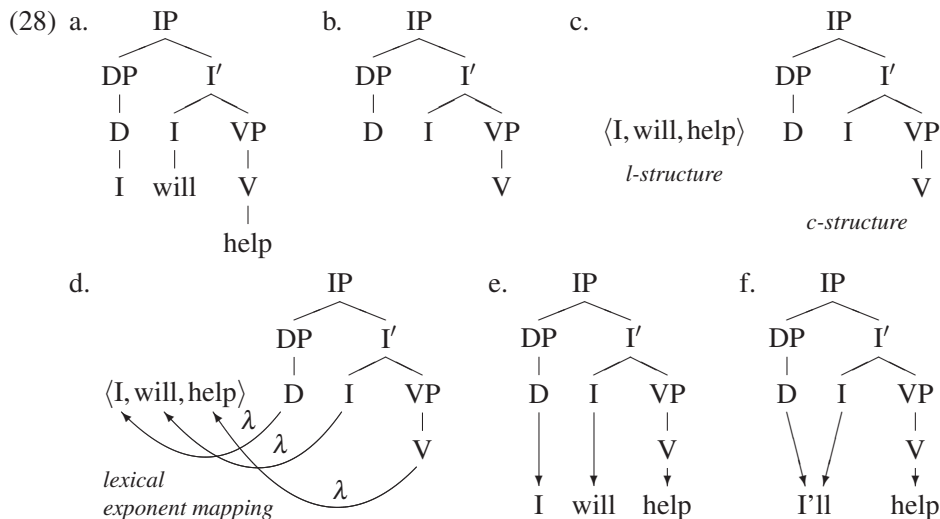
In this section, I exemplify lexical sharing with English data, mostly involving non-syllabic auxiliary contractions, such as *'ll* for *will*, when it is *not* pronounced as a syllable unto itself. I have argued (Wescoat, 2005) that the behavior of these contractions vis-à-vis their hosts resembles types of phenomena that occur within a word. For instance, non-syllabic auxiliary contractions are *selective*; they occur only with pronouns and question words. Thus, in (26a), non-syllabic *'ll* [l] accompanies the pronoun *I*, but only syllabic *'ll* [l̩] occurs with *so* in (26b). Moreover, (26a) illustrates that non-syllabic *'ll* can trigger an idiosyncratic alternation for *I*, [aɪ] ~ [ɑ]; in at least my dialect, the [ɑ] variant can occur nowhere else. While *I'll* [aɪl/ɑl] is one word, the conjunction in (27) suggests that it corresponds to two constituents, a D and an I; the auxiliary I resides in the left-hand conjunct, while the pronominal D lies outside of the conjunction and takes scope over both conjuncts. Thus, non-syllabic auxiliary contractions are good examples of lexical sharing.

(26) a. I'll [aɪl/ɑl] help. b. So'll [so.l̩/*sol] I. [“.” = syllable boundary]

(27) I'll [aɪl/ɑl] be there on Sunday and am looking forward to seeing you.

2.1 Basic concepts

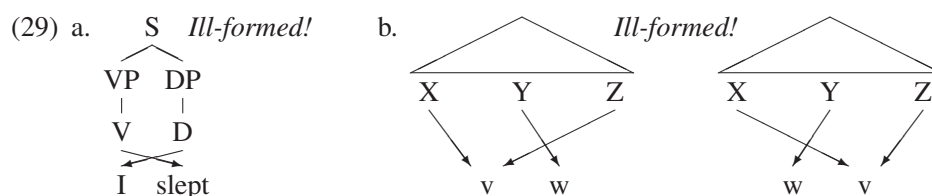
To provide a formal model of lexical sharing, I exploit the fundamental architecture of LFG, which assumes *parallel structures* related by *structural correspondences* (Kaplan, 1995). One may conceptualize lexical sharing in a series of steps. First, think of a traditional c-structure, as in (28a). A c-structure is a set of *nodes* N , labeled with syntactic categories or words, and related by a *mother function* $M : N \rightarrow N$ and a *precedence relation* $\leq \subseteq N \times N$. Second, remove from c-structure all nodes labeled with words, as in (28b). Note that this changes the set of *terminals* T , which comprises all non-mother nodes ($T = N - \text{ran}(M)$, where $\text{ran}(M)$ is the range of M); in (28b), T consists of the nodes labeled D, I, and V. Third, put the words into a separate representation called *l(lexical)-structure*, as in (28c). An l-structure, like $\langle I, \text{will}, \text{help} \rangle$, consists of a linearly ordered set of words W .⁵ Fourth, introduce a structural correspondence between c- and l-structure, in the form of the *lexical exponent mapping* $\lambda : T \rightarrow W$, as in (28d). If λ maps a terminal X to a word w , then one may say that w *instantiates* X , or that w is the *lexical exponent* of X . The domain of λ is all of T , and the range of λ is all of W . The graphic in (28d) employs the sort of curving lateral arrows most often employed for depicting structural correspondences in LFG; however, I believe it is more perspicuous to represent λ with vertical arrows descending from terminals to words lined up in order below c-structure, suppressing the l-structure's brackets and commas to avoid clutter, as in (28e). The λ mapping permits a straightforward representation of lexical sharing; λ may be one-to-one, as in (28e), or it may map two or more terminals into a single word, as in (28f), where the D and I 'share' *I'll*.



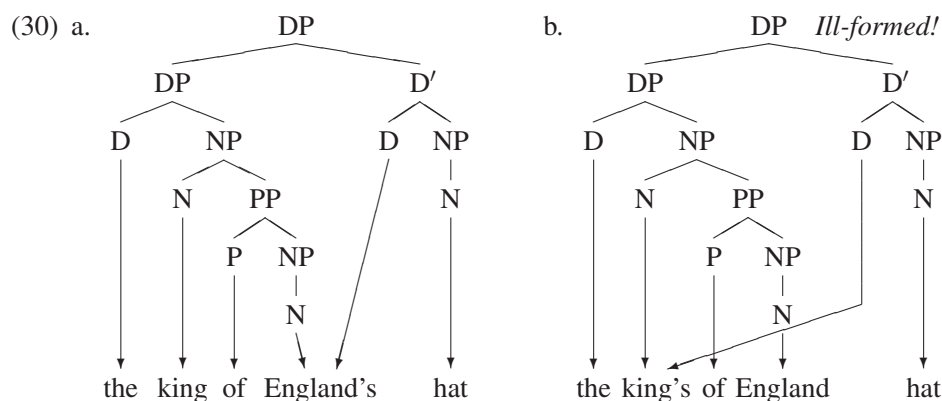
One must next restrict the relative ordering of c- and l-structure, to avoid such absurdities as (29a), where *I slept* is linked to a c-structure in verb-subject or-

⁵In fact, the 'words' in W are abstract elements labeled with word-forms. The word-form labels can occur more than once, associated with distinct elements of W , as in $\langle \text{the}, \text{dog}, \text{chased}, \text{the}, \text{cat} \rangle$.

der. Consistency in ordering between c- and l-structure is established by the *order preservation axiom*: For all terminals X and Y, if $\lambda(X)$ precedes $\lambda(Y)$, then X precedes Y. Simply put, this axiom prevents the arrows of the λ mapping from crossing. An order-preserving mapping, like λ , between linearly ordered sets, like T and W, is technically a *homomorphism*, so I call structures with crossing arrows *homomorphism violations* and I label them ‘*Ill-formed!*’ to emphasize that they are not countenanced by the theory. The homomorphic nature of λ also entails the *homomorphic lexical integrity theorem*: Only sequences of adjacent terminals may share a lexical exponent. By way of proof, note that if two terminals, X and Z, share a lexical exponent v, then an intermediate terminal Y with a distinct lexical exponent w inevitably causes a homomorphism violation, as suggested by (29b).



The homomorphic lexical integrity theorem leads to a class of empirical predictions that I call *edge attraction effects*. For ease of expression, I limit my attention to words that instantiate no more than two terminals. If terminals X and Y share a lexical exponent, and X resides in a phrase Z, while Y stands outside of Z, then X occurs at the edge of Z nearest Y, in one of the patterns $[Z \dots X] Y$ or $Y [Z X \dots]$. For example, suppose one analyzes the English possessive in 's with lexical sharing (Wescoat, 2002), assuming that the word marked with 's instantiates two terminals, one of them being the D that takes the possessor as its specifier. It then follows that the word bearing 's falls at the right edge of the possessor, as in (30a); otherwise, a homomorphism violation would result, as suggested by (30b).



As a grammar formalism, I use context-free rewriting rules, as in (31a), to describe c-structure, and a lexicon consisting of *lexical-exponent rules*, as in (31b), to describe λ . A lexical-exponent rule $w \leftarrow X_1 \dots X_n$ (with a leftward arrow) allows λ to map n adjacent terminals labeled from left to right X_1, \dots, X_n into w .

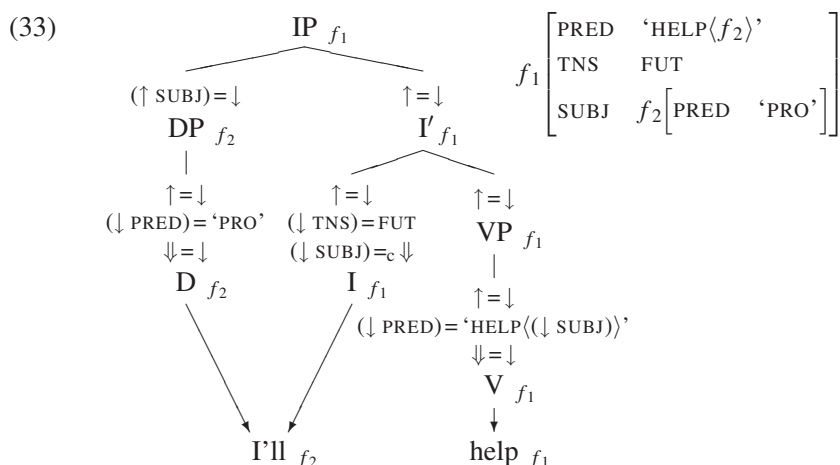
- (31) **Constituent-structure rules** **Lexical-exponence rules**
 a. $IP \rightarrow DP I'$ c. $DP \rightarrow D$ e. $I \leftarrow D$ g. $help \leftarrow V$
 b. $I' \rightarrow I VP$ d. $VP \rightarrow V$ f. $will \leftarrow I$ h. $I'll \leftarrow D I$

2.2 LFG and lexical sharing

To integrate lexical sharing into LFG, one must establish a relationship between l-structure and *f(unctional)-structure*, LFG's representation of grammatical functions. This may be accomplished in three steps. First, one must include elements of l-structure in the domain of the structural correspondence φ , which was originally conceived as a mapping from c- to f-structure (Kaplan, 1995); henceforth, $\varphi : N \cup W \rightarrow F$ is a mapping from nodes and words to members of the set F of f-structures. Second, one may define a new metavariable for convenient reference to the f-structures of lexical exponents; \Downarrow abbreviates $\varphi(\lambda(*))$ 'the f-structure of the lexical exponent of the current node [= *]'. Finally, one must provide the right-hand sides of lexical-exponence rules with functional annotations, as in (32).

- (32) a. $I'll \leftarrow$ D I b. $help \leftarrow$ V
 $(\downarrow PRED) = 'PRO'$ $(\downarrow TNS) = FUT$ $(\downarrow PRED) = 'HELP(\downarrow SUBJ)'$
 $\Downarrow = \downarrow$ $(\downarrow SUBJ) =_c \downarrow$ $\Downarrow = \downarrow$

If one assumes that c-structure rules receive functional annotations in accord with universal principles of structure-function mapping (Bresnan, 2001), then the rules shown above provide the c-, l-, and f-structure in (33) for *I'll help*.



Consider this grammar with lexical sharing in connection with the relation between syntax and morphology assumed under a lexicalist theory, as outlined here:

There are undeniably observable interactions between morphemes and syntax; ... however, ... the interactions are such that it is not necessary to intermix the terms and rules of syntax and morphology. Rather the two theories share a small theoretical vocabulary, including the parts of speech and certain features (such as 'tensed'), and the interpenetration that exists is channeled through this shared vocabulary. (Di Sciullo and Williams, 1987, p. 47)

The ‘shared vocabulary’ assumed in the present grammar with lexical sharing is almost identical to that employed in traditional LFG; a word transmits categorial and functional information to the syntax. However, rather than convey such information in reference to just one terminal, lexical sharing relays information about multiple terminals. The only qualitatively new type of information passed to the syntax concerns the *ordering* among the terminals being instantiated. Thus, I believe lexical sharing to be a moderate extension of previous practice, which remains true to the spirit of lexicalist theory.

3 The morphology of Udi person markers

3.1 Introducing and aligning person markers within the word

Maintaining Harris’s analysis of Udi PMs as clitics, one may treat words containing a PM as instances of lexical sharing. The difference between a word with a PM, such as *xabar-re-aq’-sa* ‘ask-3SG-take-PRES,’ and the corresponding word without a PM, such as *xabar-aq’-sa* ‘ask-take-PRES,’ is then that the former instantiates an extra terminal, to which I assign the syntactic category PM, for lack of any better classification. The lexical-exponence rules in (34) illustrate the difference.

- (34) a. *xabar-re-aq’-sa* ←
- | | |
|------------------------------------|-------------|
| V | PM |
| (↓ PRED)= ‘ASK((↓ SUBJ), (↓ OBJ))’ | (↑ SUBJ)= ↓ |
| (↓ TNS)= PRES | (↓ PERS)= 3 |
| ↓= ↓ | (↓ NMB)= SG |
- b. *xabar-aq’-sa* ←
- | |
|------------------------------------|
| V |
| (↓ PRED)= ‘ASK((↓ SUBJ), (↓ OBJ))’ |
| (↓ TNS)= PRES |
| ↓= ↓ |

The treatment sketched in (34) rests on certain expectations about morphology. Alongside derivation and inflection, I assume there is also *instantiation-altering morphology*; the presence of an instantiation-altering morpheme increases the number of terminals that a word instantiates. Udi PMs, like *re* ‘3SG’ above, are therefore instantiation-altering morphemes. Just as inflectional morphemes tend to occur ‘outside’ of derivational ones, I assume that in most cases instantiation-altering morphemes tend to lie ‘outside’ of inflection; thus, possessive ‘s follows plural *en* in *ox-en-’s*, for instance. Udi is unusual in not adhering to this tendency. Traditionally, linguists have regarded derivation as producing lexemes, inflection as producing word-forms, and the addition of clitics as producing *clitic groups*, the last not being a word. To the degree that a given clitic is analyzable with lexical sharing,⁶ I assume that it is an instantiation-altering morpheme and that forms in which it occurs are in fact words. Hence, *xabar-re-aq’-sa* ‘ask-3SG-take-PRES,’ with the PM *re*, is a word. Finally, I assume that the derivational, inflectional, and instantiation-altering morphology each defines its own domain within the word, so the present scheme can accommodate any morphophonological phenomenon that

⁶I do not claim that all clitic phenomena are analyzable with lexical sharing. However, it appears to me that most of what Zwicky (1977) calls *simple clitics* may be amenable to such treatment.

is thought to be sensitive to the difference between a ‘clitic group’ and a ‘word,’ where the latter is understood in the traditional sense, i.e., without clitics.

I next consider alignment of PMs within the word. For this purpose, I redeploy all of Harris’s alignment constraints that are sensitive to morphological categories; these are repeated in (35)–(37). (I will, however, modify constraint (35) shortly.) Note that only constraint (8), ALIGN-PM-FOCC, is excluded from this list. Alignment with FocC is nonetheless significant with respect to morphological alignment constraints; when a PM is associated with FocC, it may be attached to a non-verb, in which case the PM occurs word-finally, as in (5)–(7). To allow for this possibility, one may posit constraint (38). This constraint, which is violated when the PM is not in word-final position, is dominated by all of the constraints that mention morphological categories in the verb, as indicated in hierarchy (39).

- (35) ALIGN-PM-*al/a* (abbreviated *al/a*)
Align(PM, L, *al/a*, R) [= (4)]
- (36) ALIGN-PM-INCE (abbreviated INCE)
Align(PM, L, IncE, R) [= (13)]
- (37) ALIGN-PM-VERB STEM (abbreviated VSTEM)
Align(PM, R, Verb stem, R) [= (19)]
- (38) ALIGN-PM-FINAL (abbreviated FINAL)
Align(PM, R, Word, R)
- (39) *al/a* » INCE » VSTEM » FINAL

The morphological alignment constraints in (35)–(38) need not look outside of the word. Sample tableaux are given in (40) and (41). (I omit constraint (35), because it requires special consideration.) Listed in (40) are some of the candidates that would arise in connection with the combination of the IncE *xabar* ‘ask,’ the light verb *aq* ‘take,’ the tense *sa* ‘PRES,’ and the 3SG PM.⁷ Tableau (41) features the same PM with the noun *k’uč’an* ‘puppy.’ The asterisks in the columns labeled INCE and VSTEM arise because the definition of the Align relation in (2) is such that constraints (36) and (37) turn out to assert the existence of an IncE and a verb stem, respectively; obviously these elements of verbal morphology are absent from non-verbs. This does not affect the selection of the optimal candidate, though.

(40)

‘asks’	INCE	VSTEM	FINAL
ne-xabar-aq’-sa	n!exabar	xabaraq’	xabaraq’sa
☞ xabar- re -aq’-sa		aq’	aq’sa
xabar-a- ne -q’-sa	a!	q’	q’sa
xabar-aq’-sa- ne	a!q’sa	sane	

(41)

‘puppy’	INCE	VSTEM	FINAL
ne-k’uč’an	*	*	k’!uč’an
☞ k’uč’an- ne	*	*	

⁷For the 3SG PM, I list the alternants *ne* and *re* where phonologically appropriate.

3.2 The *al/a* tense-aspect-mood suffixes and paradigm gaps

Recall that Harris assumes hierarchy (42), in which ALIGN-PM-*al/a* dominates all other PM alignment constraints. It follows that a PM must accompany all TAM suffixes to which ALIGN-PM-*al/a* is sensitive.⁸ A lexicalist approach can model this generalization directly by predicting a gap in Udi verbal paradigms; words containing the relevant TAM suffixes but no PMs are lacking.

$$(42) \text{ } al/a \gg \text{FOCC} \gg \text{INCE} \gg \text{VSTEM} \quad [= (24)]$$

Optimal Paradigm Theory provides a theoretical foundation for this analysis. Relevant parts of McCarthy's (2005, p. 173) summary are reproduced in (43).

- (43) a. Candidates consist of entire inflectional paradigms, where an inflectional paradigm contains all and only the words based on a single lexeme...
 b. Markedness and Input-Output faithfulness constraints evaluate all members of the candidate paradigm. The violation-marks incurred by each paradigm member are added to those incurred by all the others.

On the foregoing foundation, Rice (2005, 2007) builds a theory of defective paradigms that contain *optimal gaps*. In OT, one naturally expects words to accrue violation-marks from a variety of constraints. On this basis, the optimal paradigm would seem to be one that contains only gaps and thereby accumulates no violation-marks. To avoid empty paradigms, Rice reasons that there must be MAX{CAT} constraints, which enforce expression of a morphological category CAT. A gap, symbolized \odot , would leave CAT unexpressed and thus would fall afoul of MAX{CAT}. The presence of MAX{CAT}, which punishes gaps, creates tension with constraints that punish actual words. For instance, if a constraint CONST dominated MAX{CAT}, then a gap would be more harmonic than a word *w* that violates CONST, as suggested in (44)—provided that no higher ranking constraint favors *w*. When the violation-marks for paradigms are summed, between any two paradigms that are identical except for the choice between including *w* or allowing a gap, the paradigm containing the gap will be more harmonic, as suggested by (45).

(44)

	CONST	MAX{CAT}
<i>w</i>	*!	
\odot		*

(45)

	CONST	MAX{CAT}
$\langle \dots, w, \dots \rangle$	$* \times (m + 1)$	$* \times n$
$\langle \dots, \odot, \dots \rangle$	$* \times m$	$* \times (n + 1)$

Returning to Udi, one may assume that there are constraints of the MAX{CAT} type for all TAM suffixes. For instance, in Udi MAX{FUTII} would be satisfied if the tense feature FUTII is expressed by the suffix *al*. Additionally, I propose to alter the statement of constraint (35), ALIGN-PM-*al/a*, by changing the order of

⁸This excludes imperative *a* in the singular; this form does not take a PM (Harris, 2002, p. 31).

the arguments to the Align relation; the revised constraint is given in (46). Recall that the definition of Align in (2) employs both a universal and an existential quantifier, which are distributed in such a way that the revised constraint in (46) may be paraphrased as ‘for any *al/a* TAM suffix, there exists a PM such that the right edge of the TAM suffix and the left edge of the PM coincide.’ Thus, constraint (46) is violated any time an *al/a* TAM suffix arises in a word that contains no PM; additionally, when a PM is present, the constraint requires it to be adjacent to the TAM suffix. Next I propose to make constraint (46) dominate $\text{MAX}\{\text{FUTII}\}$, as indicated in (47), as well as all similar constraints requiring expression of TAM features. Consider a form like *bey-al* ‘watch-FUTII,’ which one might have expected to be a part of the *bey* paradigm. Since *bey-al* contains the *al* suffix, which expresses FUTII, but has no PM, it violates (46). Therefore, *bey-al* is less harmonic than a gap and will thus be absent from the optimal *bey* paradigm, as suggested by (48). This scheme predicts a set of systematic gaps throughout the verbal paradigms of Udi, wherever *al/a* TAM suffixes occur without an accompanying PM.

(46) ALIGN-PM-*al/a* (abbreviated *al/a*)

Align(*al/a*, R, PM, L)

[cf. (4), (35)]

(47) *al/a* \gg $\text{MAX}\{\text{FUTII}\}$

(48)

<i>bey</i> paradigm	<i>al/a</i>	$\text{MAX}\{\text{FUTII}\}$
$\langle \dots, \text{bey-al}, \dots \rangle$	$* \times (m + 1)$	$* \times n$
$\langle \dots, \ominus, \dots \rangle$	$* \times m$	$* \times (n + 1)$

4 The syntax of Udi person markers

4.1 The place of the person marker in constituent structure

I now return to the matter of formalizing a lexical-sharing analysis of Udi PMs, focusing here on the syntax. Recall that a PM is an instantiation-altering morpheme that causes words to instantiate an additional terminal; to this terminal I assign the syntactic category PM. These points are illustrated in the lexical-exponence rules in (49) for *bey-al-le* ‘watch-FUTII-3SG’ and *k’uč’an-ne* ‘puppy-3SG.’ In order to construct the syntactic analysis, one must situate the PM constituent within c-structure.

(49) a. *bey-al-le* \leftarrow

V	PM
(\downarrow PRED) = ‘WATCH’ (\downarrow SUBJ), (\downarrow OBJ)’	(\uparrow SUBJ) = \downarrow
(\downarrow TNS) = FUT	(\downarrow PERS) = 3
$\downarrow = \downarrow$	(\downarrow NMB) = SG

b. *k’uč’an-ne* \leftarrow

N	PM
(\downarrow PRED) = ‘PUPPY’	(\uparrow SUBJ) = \downarrow
$\downarrow = \downarrow$	(\downarrow PERS) = 3
	(\downarrow NMB) = SG

When the PM is associated with the verb, a logical place for the PM constituent is right-adjoined to V, as illustrated in (50). The association of the adjoined PM with a grammatical function, viz. SUBJ(ect), is specified lexically; see

$$(52) \quad \text{a.} \left[\begin{array}{l} \text{PRED} \quad \text{'WATCH'} \langle f_1, f_2 \rangle \\ \text{TNS} \quad \text{FUT/PRES} \\ \\ \text{SUBJ} \quad f_1 \left[\begin{array}{l} \text{PRED} \quad \text{'CHILD'} \\ \text{CASE} \quad \text{ERG} \\ \text{PERS} \quad 3 \\ \text{NUMB} \quad \text{SG} \end{array} \right] \\ \\ \text{OBJ} \quad f_2 \left[\begin{array}{l} \text{PRED} \quad \text{'PUPPY'} \end{array} \right] \end{array} \right] \quad \text{b.} \left[\text{FOC} \quad \left\{ \text{PUPPY} \right\} \right]$$

Although FocC usually occurs in the position immediately before the verb, this is not invariably the case. Example (53) demonstrates that question words, which assume the role of focus, may sometimes occur sentence-initially, presumably in complementizer position. Note that the sentence-initial question word in (53) bears the PM *nu* '2SG.' By the assumptions outlined above, this means that there is a PM constituent. However, the placement of the adverb *mya* 'here' makes it unlikely that this PM constituent could be adjoined to V. I therefore assume that in this case the PM constituent is adjoined either to VP or to S. In sum, it appears that the PM constituent can be adjoined anywhere in the clause's functional domain, including V, VP, and S, all of which are mapped into the same f-structure by φ .⁹ Thus, one might generalize that there are no category-based constraints on the adjunction of the PM constituent; it can arise wherever the metavariable \uparrow will pick out the clausal f-structure.

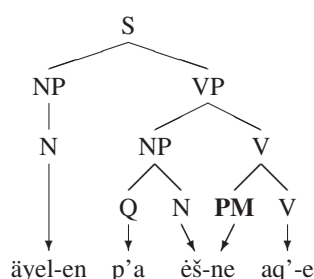
(53) *ek'aluḡ-nu mya are?*
 why-2SG here come
 'Why have you come here?' (Harris, 2002, p. 49)

The assumption that the PM constituent is adjoined to a node in the clause's functional domain gives an immediate explanation of the fact that the word bearing the PM morpheme must fall at the right edge of the FocC, as exemplified by *p'a èš-ne* 'two apple-3SG' in (54). This is the sort of edge attraction effect discussed in §2.1. Consider the c- and l-structure in (55). The PM constituent, which lies outside of the FocC, can share a lexical exponent with the adjacent N, as is shown, but it cannot share a lexical exponent with Q, since to do so would result in a homomorphism violation. Moreover, if one assumes that PM morphemes cause a new PM terminal to be instantiated to the *right*, yielding '*èš-ne* ← N PM' and not '*èš-ne* ← PM N,' then it is necessarily to the right edge of the FocC that the word bearing the PM morpheme will be attracted.

(54) *äyel-en p'a èš-ne aq'-e*
 child-ERG two apple-3SG take-AORII
 'The child took two apples.' (Harris, 2002, p. 55)

⁹I assume without argument that the sentences examined so far feature an exocentric S; however, nothing hinges on this analysis of the Udi clause.

(55)



4.2 Aligning the PM constituent

Next I consider alignment in the syntax, for which purpose I employ the framework of OT-LFG. This rests on the background assumptions of OT, which makes use of two components, GEN(eration), which enumerates a set of candidates, and EVAL(uation), which compares candidates to a hierarchy of violable constraints. In OT-LFG, GEN is an LFG; for my purposes, I assume that the LFG in question is one that incorporates lexical sharing, as described in §2.2. The candidates enumerated by this GEN are quadruples of c-, l-, f-, and i-structures.

Recall that the morphological alignment constraints discussed in §3 did not include Harris's ALIGN-PM-FOCC. This will now be repurposed as a syntactic alignment constraint that tracks the PM constituent rather than the PM morpheme. FocC can be identified as a phrase whose f-structure PRED(icate) FN (function) is a FOC(us) in i-structure. This state of affairs is illustrated in the c-, f-, and i-structures in (50)–(52), where the FocC is the NP in c-structure whose f-structure has as PRED the value 'PUPPY', the FN of which is PUPPY, which is in turn a member of the set that is the value of FOC in i-structure. I will continue to use 'FocC' as a convenient shorthand with this interpretation. I revise ALIGN-PM-FOCC by reordering the arguments of Align, in the manner described in §3.2 in connection with ALIGN-PM-*all/a*; the result, visible in (56), may be interpreted as saying 'for any FocC, there exists a PM constituent such that the right edge of the FocC and the left edge of the PM constituent coincide.' Since the elements of c-structure are not laid out in a linear fashion, it is hard to evaluate (56) as a *gradient* constraint, which may be violated to varying degrees depending on distances between constituents. I therefore treat syntactic alignment constraints like (56) as *non-gradient*, counting one violation if any constituent is ordered between aligned elements. Alongside (56), I provide a corresponding constraint that aligns PM constituents with V; this is shown in (57). The former constraint dominates the latter, as indicated in hierarchy (58).

(56) ALIGN-PM-FOCC
Align(FocC, R, PM, L)

[cf. (8)]

(57) ALIGN-PM-V
Align(V, R, PM, L)

(58) Align-PM-FocC \gg Align-PM-V

Tableau (59) illustrates the functioning of the foregoing constraints. The predictions are straightforward. If there is a FocC, ALIGN-PM-FOCC will require the PM constituent to be aligned with it. In the first candidate, the PM constituent immediately follows the FocC; with no intervening constituents, ALIGN-PM-FOCC is satisfied. The opposite is true of the second candidate, where V stands between the PM constituent and FocC. Thus, the first candidate is more harmonic. In cases where there is no FocC, however, ALIGN-PM-FOCC will be vacuously satisfied, and ALIGN-PM-V will come into play, requiring that the PM constituent be aligned with V.

(59)	‘I work in a factory.’	Align-PM-FocC	Align-PM-V
			*
		*!	

The responsibility of the syntactic alignment constraints in (56)–(57) is strictly limited to placing the PM constituent in the proximity of one or the other of the FocC and V. Beyond that, the location within the word of the PM morpheme is left entirely to the morphological alignment constraints.

There remains one unresolved issue. Recall that in Harris’s original analysis, the constraint aligning PMs with *al/a* TAM suffixes dominates the one aligning PMs with FocC. This predicts that (60a) is more harmonic than (60b). In contrast, under the system of syntactic alignment constraints set forth in this section, (60b) satisfies the dominant constraint, ALIGN-PM-FOCC, while (60a) does not; thus, the system advocated here seems to favor the ungrammatical (60b) over the grammatical (60a). The solution to this dilemma may be found in the discussion in §3.2, where it is posited that optimal verbal paradigms in Udi do not contain forms in which an *al/a* TAM suffix occurs without an accompanying PM morpheme. This implies that *bey-al* ‘watch-FUTII’ in (60b) is not an available word-form. Under these circumstances, (60a) prevails by default, despite the fact that it violates ALIGN-PM-FOCC.

- (60) a. *äyel-en k’uč’an bey-al-le* [= (9)]
 child-ERG puppy.ABSL watch-FUTII-3SG
 ‘The child will watch a puppy.’

- b. *äyel-en k'uč'an-ne bəy-al
 child-ERG puppy.ABSL-3SG watch-FUTII (Harris, 2002, p. 120)

5 Conclusion

Harris (2002) proposes an OT analysis of Udi PMs that combines constraints that make reference to both morphological and syntactic categories. She reasons that this analysis is at odds with lexicalist theories of grammar, such as that embodied in the Lexical Integrity Hypothesis, since it seems to defy the lexicalist separation of morphology and syntax. This study considers the main constraints employed in Harris's analysis and recasts them in a lexicalist approach. This is facilitated by the assumption of lexical sharing, which allows a single word to instantiate multiple elements of *c*-structure. Adding a PM morpheme to a word causes it to instantiate a new terminal, the PM constituent. Those of Harris's constraints that are sensitive to morphological categories are slightly modified and applied within the word to determine the position of the PM morpheme. One of Harris's constraints that makes reference to syntactic categories is slightly reworked and applied in the syntax to position the PM constituent. Working in parallel, the independent morphological and syntactic alignment constraints make the same empirical predictions as do the constraints posited by Harris that are the point of departure for this study. Thus, it appears that Udi PMs are not an obstacle to a lexicalist theory of grammar.

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