Sorani Kurdish person markers and the typology of agreement

Olivier Bonami
U. Paris 4 &
Laboratoire de Linguistique Formelle
olivier.bonami@paris-sorbonne.fr

Pollet Samvelian
U. Paris 3 &
Mondes iranien et indien
pollet.samvelian@univ-paris3.fr

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Introduction

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- Cross-linguistic tendency for person markers (Corbett 2003,2006):

  (1) a. agreement ⇔ affixal status
  b. pronouns ⇔ clitic status

- Sorani Kurdish goes against these tendencies in a striking way:
  - clitics and affixes switch their functions (agreement vs. pronouns) in different constructions
- Outline:
  - Description of SK Person marking
  - Formal analysis in HPSG+PFM (Pollard and Sag, 1994; Stump, 2001)

1 Sorani Kurdish Person marking

A synopsis of Kurdish conjugation

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- Verbs inflect for tense (past vs. present), aspect (bounded vs. unbounded), mode (indicative vs. subjunctive vs. imperative), polarity (positive vs. negative), voice (active vs. passive), perfect (±).
- Three (morphomic) stems: the 'present stem', the 'past stem' and the 'passive stem'.
- Perfect tenses are historically periphrastic; current status uncertain.

- Position classes:

polarity/ mode	aspect		person endings	
næ	dæ	-**stem**-	ɪm	**mode/ tense**
bi			i	
mæ			ɛt	ɑjæ
nɑ			ɪn	
			ɪn	

Subject marking in the present

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Conventions:
- Subject and subject markers are **underlined and in boldface** (blue on the slides)
- Objects and object markers are *underlined and in italics* (red on the slides)

- Verbal Person Endings (VPEs) express agreement with the subject

(2) a. **nærmin** *æsp-ækan* dæ-kɪr-**e**
Narmin horse-DEF.PL UNBD-buy.PRS-3.SG
'Narmin is buying the horses.'

b. **bɑzɪrgɑn-ækɑn** *æsp-ækan* dæ-kɪr-**ɪn**
merchant-DEF.PL horse-DEF.PL UNBD-buy.PRS-3.PL
'The merchants are buying the horses.'

- *pro* drop

(3) a. *æsp-ækan* dæ-kɪr-**e**
horse-DEF.PL UNBD-buy.PRS-3.SG
'(S)he is buying the horses.'

b. *æsp-ækan* dæ-kɪr-**ɪn**
horse-DEF.PL UNBD-buy.PRS-3.PL
'They are buying the horses.'

Object marking in the present

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- Pronominal objects may be marked by full pronouns or 'Mobile Person Markers' (MPMs)

- MPMs are bound forms with a special distribution
- MPMs are pronouns, not agreement markers

(4) a. **(mɪn)** *æsp-ækan* bo nærmin dæ-kɪr-**ɪm**
I horse-DEF.PL for Narmin UNBD-buy.PRS-1.SG
'I am buying the horses for Narmin.'

b. **(mɪn)** bo nærmin=*jan* dæ-kɪr-**ɪm**
I for Narmin=3.PL UNBD-buy.PRS-1.SG
'I am buying them for Narmin.'

c. * **(mɪn)** *æsp-ækan* bo nærmin=*jan* dæ-kɪr-**ɪm**
I horse-DEF.PL for Narmin=3.PL UNBD-buy.PRS-1.SG
'I am buying the horses for Narmin.'

MPMs

1sg : ɪm
2sg : ɪt
3sg : i
1pl : mɑn
2pl : tɑn
3pl : jɑn

Two positions for Mobile Person Markers

slide 7

- If the verb is not VP initial, then the MPM is a second position clitic within the VP.

(5) a. **sɑrɑ u** **sirwæn** [bæ ŋærmin=*i* (bæ kurdi) dæ-le-**n**]
Sara ans Sirwan to Narmin=3.SG (in Kurdish) UNBD-tell.PRS-1.SG
'Sara and Sirwan are telling it to Narmin (in Kurdish).'

b. **(mɪn)** [bæ durbin=*jan* dæ-bin-**ɪm**]
I with binoculars=3.PL UNBD-see.PRS-1.SG
'I see them with binoculars.'

c. [zor=*ɪt* dæ-bin-**ɪm**]
much=2.SG UNBD-see.PRS-1.SG
'I see you often.'

- If the verb is VP initial, then the MPM is an endoclitic within the V.

(6) a. dæ=*j*-le-**m**
UNBD=3.SG-tell.PRS-1.SG
'I am telling it.'

b. kɪri-*n*=**i**
buy.PAST-3.PL=3.SG
'He bought them.'

Person marking in the past

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- For intransitive verbs, nothing is changed.
- For transitive verbs, the same two classes of personal forms bear reversed functions:
  - MPMs realize subject agreement.
  - PVEs are object pronominal affixes.

(7) a. **bazırgan-ækan** æsp-ækan=**jan** dæ-kıri
merchant-DEF.PL horse-DEF.PL=3.PL UNBD-buy.PST
'The merchants were buying the horses.'

b. **bazirgan-ækan** dæ=**jan**-kır-*ın*
merchant-DEF.PL UNBD=3.PL=buy.PRS-3.PL
'The merchants are buying them.'

Split ergativity?

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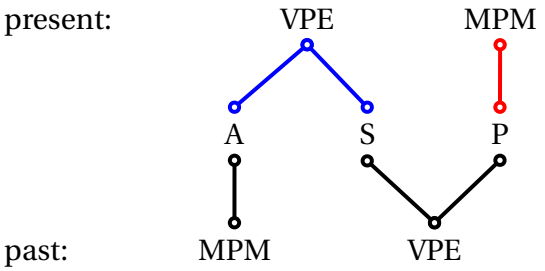
- Morphosyntactic alignment is reminiscent of a split ergative system (Thackston, 2006).



- Note that other Kurdish dialects are clearly ergative in the past (Mackenzie 1961).
- Mackenzie speaks of MPMs in past transitive clauses as 'agential suffixes'.

Ergativity is not the right category

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- Whereas the selection of a form of the marker follows an ergative pattern, the function of that marker does not.
  - In the past transitive construction, the MPM qualifies as an agreement marker: it is obligatory, and may cooccur with a phrase.
  - In the past transitive construction, the VPE qualifies as a pronoun: it is in complementary distribution with a syntactically realized object.

(8) a. * **bazırgan-ækan** *æsp-ækan* dæ-kıri
merchant-DEF.PL horse-DEF.PL UNBD-buy.PST
'The merchants were buying the horses.'

b. * **bazırgan-ækan** *æsp-ækan*=**jan** dæ-kıri-*n*
merchant-DEF.PL horse-DEF.PL=3.PL UNBD-buy.PST-3.PL
'The merchants were buying the horses.'

Interim conclusion

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- In Sorani Kurdish, two sets of person markers (VPEs and MPMs) switch their function depending on the verbal tense and construction.
- The same morphosyntactic value is realized by two different sets of forms, which are in complementary distribution.

- Morphological reversal similar to the one observed in Northeastern Neo-Aramaic (Baerman 2007).
- The case is more interesting because one of the markers is an (endo)clitic.

2 The analysis

Outline

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- We use a combination of
  - HPSG: feature structures, morphology-syntax interface
  - PFM: morphological realization
- We need three analytical tools
  - Typology of the functions of PMs:
    - Argument types (Miller & Sag, 1997)
  - Account of form-function reversals:
    - Unordered rule blocks (Stump, 2001)
  - Account of MPMs as (endo)clitics:
    - Morphology-syntax co-analysis (Crysman, 2002)

Miller & Sag (1997) on French pronominal affixes

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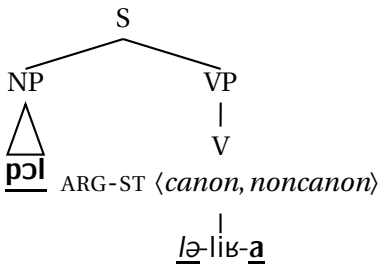
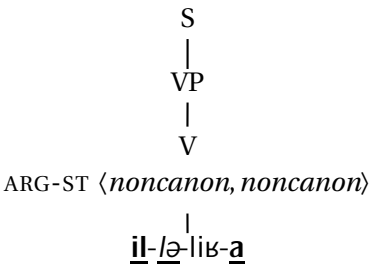
- Two types of arguments: *canon*ical and *noncanon*ical.
- Syntax only realizes canonical arguments.
- Pronominal affixation: rule realizing noncanonical arguments.
- Agreement: rule realizing arguments irrespective of their type.



‘Paul will read it’



‘He will read it’

Back to SK: Person markers in the present

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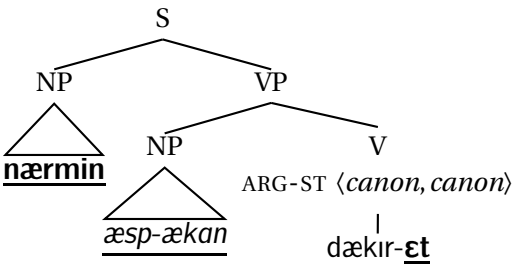
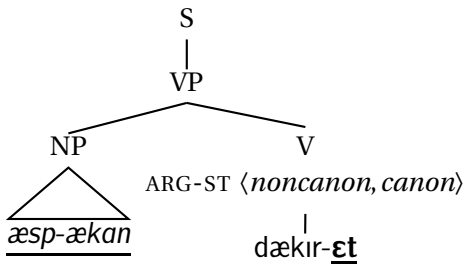
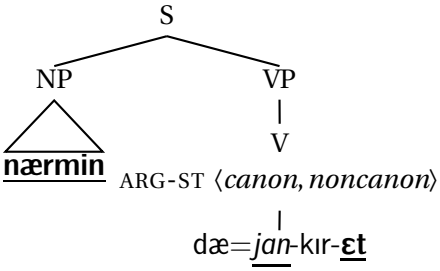
- MPMs are (object) pronominal clitics, VPEs are (subject) agreement.



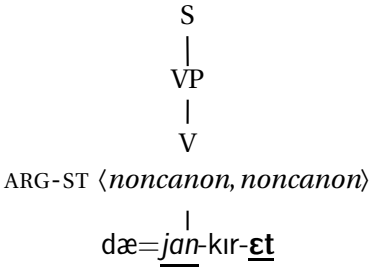
'Narmin buys the horses.'



'He buys the horses.'



'Narmin buys them.'



'He buys them.'

Person markers in the past (transitive constructions)

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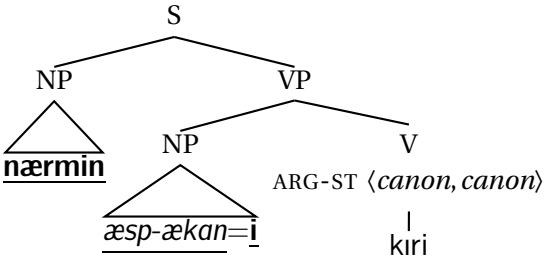
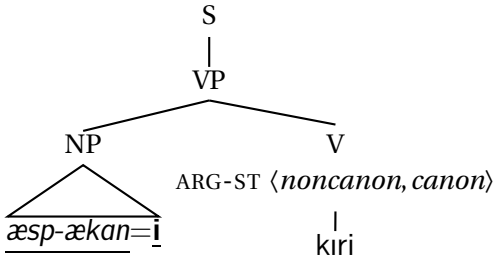
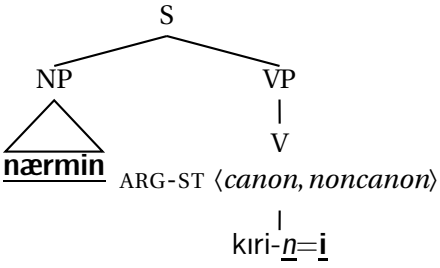
- MPMs are (subject) agreement, VPEs are (object) pronominal affixes.



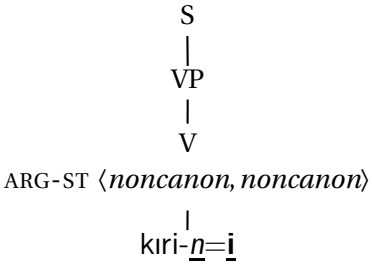
'Narmin bought the horses.'



'He bought the horses.'



'Narmin bought them.'



'He bought them.'

Accounting for form-function independence

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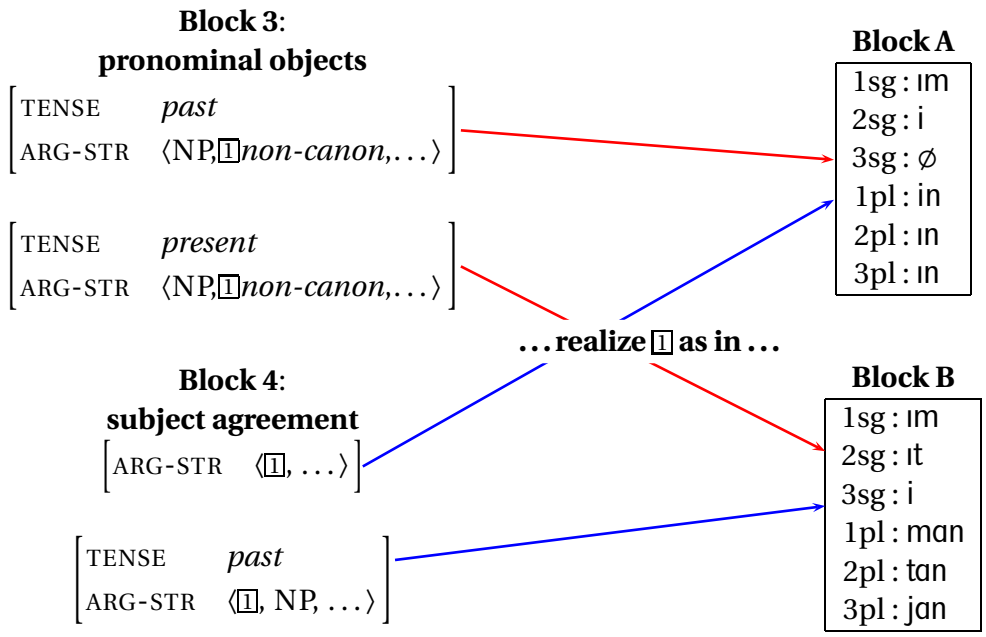
- Unordered rule blocks (Stump, 2001: chap. 5):



Accounting for MPMs: endoclisis

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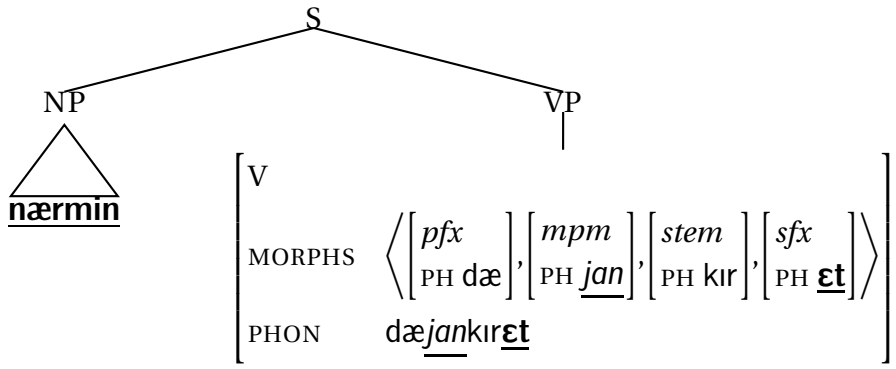
- Realization rules output morph lists, not phonological strings (Crysmann 2002).
- Rules introducing MPMs do not specify their position on the morph list.

(9) $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & [3pl] \\ \text{BLOCK} & B \end{bmatrix} \longrightarrow \boxed{1} \bigcirc \left\langle \begin{bmatrix} mpm \\ \text{PH} & \text{jan} \end{bmatrix} \right\rangle$

- A noninitial MPM is like an ordinary affix.
- Interface constraint: verb carrying an noninitial MPM ⇔ VP initial.



'Narmin buys them.'

Accounting for MPMs: distant realization

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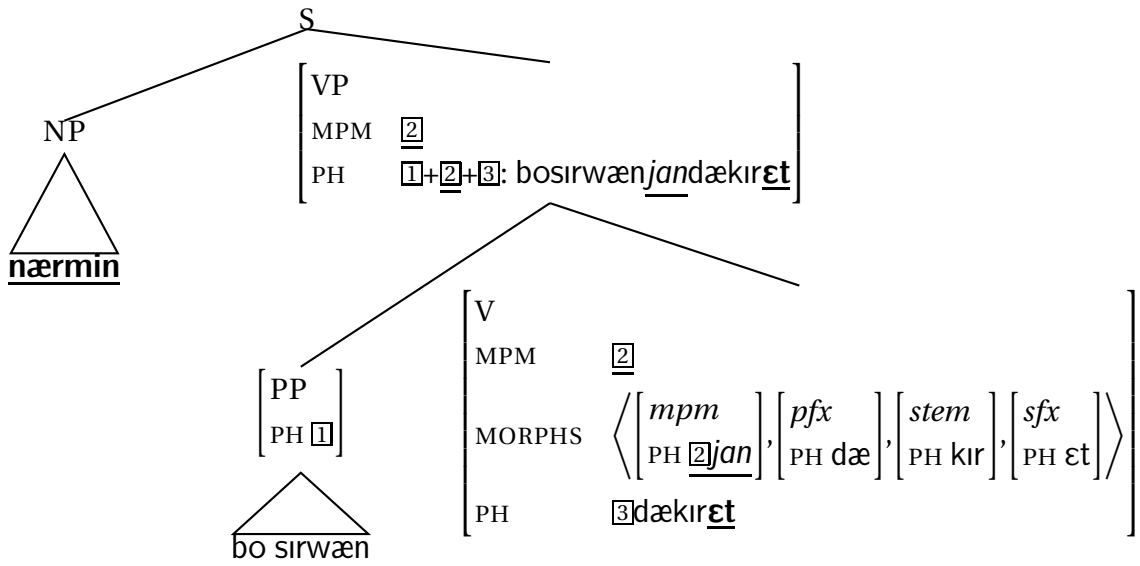
- MORPHS-initial MPMs are realized distantly, after the first constituent of the VP.



'Narmin buys them for Sirwan.'

3 Conclusions

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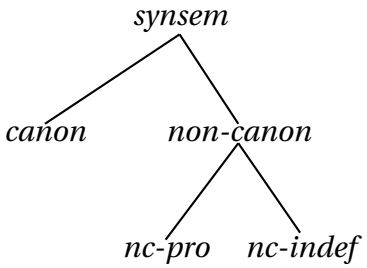
- The complexity of the Sorani Kurdish person marker system requires a combination of known analytic tools:
  - Typed feature structures, parallel rule blocks / rules of referral, morph-based realization rules, edge inflection
- It is always tempting to see typological correlations at work within a language.
- Sorani Kurdish warns us against this: from (1) it does not follow that a language cannot have both agreement clitics and pronominal affixes.

4 Appendix: the grammar

We propose an HPSG grammar interfaced with a typed-feature structure version of Paradigm Function Morphology (TFS-PFM). TFS-PFM is just like PFM except for two facts:

- The feature bundles of PFM are replaced by typed feature structures; more concretely, the feature bundles realized by the paradigm function correspond to an HPSG *word* object.
- The realization rules themselves are written in a feature-structure notation. This does not change the expressive power of the theory in any way, but makes for more readable (to our eyes) rules.

4.1 The morphology-syntax interface



Further constraints on subtypes of *synsem*:

(10) a. $\textit{sign} \rightarrow \left[\text{SYNSEM} \quad \textit{canon}\right]$

b. $\textit{nc-pro} \rightarrow \left[\text{CONT} \quad \begin{bmatrix}\textit{pronominal} \\ \text{INDEX} \quad \textit{referential}\end{bmatrix}\right]$

c. $\textit{nc-indef} \rightarrow \left[\text{CONT} \quad \begin{bmatrix}\textit{exist-rel} \\ \text{INDEX} \quad \boxed{1} \\ \text{RESTR} \quad \{\}\end{bmatrix}\right]$

Only objects may be null indefinites:

$\textit{verb} \rightarrow \left[\text{ARG-ST} \quad \left\langle \neg \textit{nc-indef}, \ldots \right\rangle\right]$

4.2 The morphology

An extensive sample of the data to be accounted for is given in tables 1–3.

		1SG	2SG	3SG	1PL	2PL	3PL
IND. PRST	POS	dækæwɪm	dækæwit	dækæwɛt	dækæwin	dækæwɪn	dækæwɪn
	NEG	nɑkæwɪm	nɑkæwit	nɑkæwɛt	nɑkæwin	nɑkæwɪn	nɑkæwɪn
IND. PAST BND	POS	kæwtɪm	kæwtit	kæwt	kæwtin	kæwtɪn	kæwtɪn
	NEG	nækæwtɪm	nækæwtit	nækæwt	nækæwtin	nækæwtɪn	nækæwtɪn
IND. PAST UNBND	POS	dækæwtɪm	dækæwtit	dækæwt	dækæwtin	dækæwtɪn	dækæwtɪn
	NEG	nædækæwtɪm	nædækæwtit	nædækæwt	nædækæwtin	nædækæwtɪn	nædækæwtɪn
SUBJ. PRST	POS	bɪkæwɪm	bɪkæwit	bɪkæwɛt	bɪkæwin	bɪkæwɪn	bɪkæwɪn
	NEG	nækæwɪm	nækæwit	nækæwɛt	nækæwin	nækæwɪn	nækæwɪn
SUBJ. PAST	POS	bɪkæwtɪmɑjæ	bɪkæwtitɑjæ	bɪkæwtɑjæ	bɪkæwtinɑjæ	bɪkæwtɪnɑjæ	bɪkæwtɪnɑjæ
	NEG	nækæwtɪmɑjæ	nækæwtitɑjæ	nækæwtɑjæ	nækæwtinɑjæ	nækæwtɪnɑjæ	nækæwtɪnɑjæ
IMPER.	POS		bɪkæwæ			bɪkæwɪn	
	NEG		mækæwæ			mækæwɪn	

Table 1: Synthetic tenses for the intransitive verb kæwtɪn ‘fall’

	PRONOMINAL OBJECT					
SUBJECT	1SG	2SG	3SG	1PL	2PL	3PL
1SG	nærdımım	nærdımi	nærdım	nærdımin	nærdımın	nærdımın
2SG	nærdıtım	nærdıti	nærdıt	nærdıtin	nærdıtın	nærdıtın
3SG	nærdımi	nærditi	nærdi	nærdini	nærdını	nærdını
1PL	nærdmanım	nærdmani	nærdman	nærdmanin	nærdmanın	nærdmanın
2PL	nærdtanım	nærdtani	nærdtan	nærdtanin	nærdtanın	nærdtanın
3PL	nærdjanım	nærdjani	nærdjan	nærdjanin	nærdjanın	nærdjanın

Table 2: The verb nærdın 'send' in the positive indicative past bounded, with endoclitic subject agreement and object pronominal suffix

	PRONOMINAL OBJECT					
SUBJECT	1SG	2SG	3SG	1PL	2PL	3PL
1SG	næmnærdım	næmnærdi	næmnærd	næmnærdin	næmnærdın	næmnærdın
2SG	nætnærdım	nætnærdi	nætnærd	nætnærdin	nætnærdın	nætnærdın
3SG	næjnærdım	næjnærdi	næjnærd	næjnærdin	næjnærdın	næjnærdın
1PL	næmannærdım	næmannærdi	næmannærd	næmannærdin	næmannærdın	næmannærdın
2PL	nætannærdım	nætannærdi	nætannærd	nætannærdin	nætannærdın	nætannærdın
3PL	næjannærdım	næjannærdi	næjannærd	næjannærdin	næjannærdın	næjannærdın

Table 3: The verb nærdın 'send' in the negative indicative past bounded, with endoclitic subject agreement and object pronominal suffix

4.2.1 Some design decisions

- Realization rules are not transitions between phonological forms, but between lists of morphs (Crysmann, 2002).
- Morphs carry a type and a phonological form. We distinguish four types of morphs *stem*, *pfx* (prefix), *sfx* (suffix), *mpm* (mobile person marker).
- Normally the phonology of a word is the concatenation of the phonology of its morphs, in the order given by the morph list.
- "$\oplus$" denotes list concatenation, whereas "+" denotes concatenation of phonological representations.[1]
- "$\bigcirc$" denotes the shuffle operation (Reape, 1994). $\langle x_1,\ldots,x_n\rangle \bigcirc \langle y\rangle$ denotes a list where y has been inserted in some position within $\langle x_1,\ldots,x_n\rangle$.

4.2.2 Features

TAM features relevant to Kurdish conjugation are:

[1]We do not wish to commit to any particular take on the nature of phonological representations. However, for concreteness and as a strating points, one may assume phonological representations to consists of lists of segments. Then $x_1x_2\cdots x_n$ conventionally denotes the list of segments $\langle x_1, x_2, \ldots, x_n\rangle$; "+" reduces to "$\oplus$" applied to lists of segments; and morph lists are lists of lists.

- TENSE: *present* or *past*
- POLARITY: *positive* or *negative*
- ASPECT: *bounded* or *unbounded*
- VOICE: *active* or *passive*
- *perfect*: + or −
- It is usual to assume a three-way mode distinction in Kurdish, between *indicative*, *imperative*, *subjunctive*.[2]. We reanalyze the *indicative-imperative-subjunctive* distinction using two binary features ROOT and REALIS; indicatives are underspecified for ROOT.

indicative	[REALIS +]
imperative	[ROOT +, REALIS −]
subjunctive	[ROOT −, REALIS −]

  Present forms are unbounded. Imperatives only have present forms. Irrealis forms are compatible with aspectual distinctions but never mark them in the morphology.

We leave aside forms of the perfect and forms in the passive voice.

Three rule blocks are responsible solely for the expression of TAM features:

(11) Bloc 0: stem selection[3]

a. $\left[\begin{array}{ll} \text{BASE} & \boxed{1} \\ \text{FEATS} & \left[\begin{array}{ll} \text{TENSE} & \textit{past} \\ \text{STEMS} & \left[\text{SLOT}1 \quad \boxed{1}\right] \end{array}\right] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{0} \end{array}\right] \longrightarrow \boxed{1}$

b. $\left[\begin{array}{ll} \text{BASE} & \boxed{1} \\ \text{FEATS} & \left[\begin{array}{ll} \text{TENSE} & \textit{prst} \\ \text{STEMS} & \left[\text{SLOT}2 \quad \boxed{1}\right] \end{array}\right] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{0} \end{array}\right] \longrightarrow \boxed{1}$

(12) Bloc 1: aspect

a. $\left[\begin{array}{ll} \text{BASE} & \boxed{1} \\ \text{FEATS} & \left[\begin{array}{ll} \text{ASPECT} & \textit{unbounded} \\ \text{REALIS} & + \end{array}\right] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{1} \end{array}\right] \longrightarrow \langle \left[\begin{array}{ll} \textit{pfx} & \\ \text{PH} & \text{dæ} \end{array}\right] \rangle \oplus \boxed{1}$

[2]We classify as a 'past subjunctive' what is classified by Thackston (2006) as a 'past conditional, form 1'. Thackston's 'past subjunctive' is for us a present perfect subjunctive. The classification of past irrealis (subjunctive or conditional) forms in Sorani is somewhat complex, and existing descriptions are lacking in detail. We leave this issue for future research.

[3]Here we rely on Bonami & Boyé's (2006) approach to stem selection within HPSG, where each lexeme comes equipped with a *stem space* as a value of a STEMS feature. Rules of stem formation account for the makeup of the stem space in regular cases, but these are not written in the format of realization rules.

(13) Bloc 2: polarity and mode

a. $\left[\begin{array}{ll} \text{BASE} & \boxed{1} \\ \text{FEATS} & \left[\text{POLARITY} \quad \textit{negative}\right] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{2} \end{array}\right] \longrightarrow \langle \left[\begin{array}{ll} \textit{pfx} & \\ \text{PH} & \text{næ} \end{array}\right] \rangle \oplus \boxed{1}$

b. $\left[\begin{array}{ll} \text{BASE} & \boxed{1} \\ \text{FEATS} & \left[\begin{array}{ll} \text{REALIS} & - \\ \text{POLARITY} & \textit{positive} \end{array}\right] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{2} \end{array}\right] \longrightarrow \langle \left[\begin{array}{ll} \textit{pfx} & \\ \text{PH} & \text{bɪ} \end{array}\right] \rangle \oplus \boxed{1}$

c. $\left[\begin{array}{ll} \text{BASE} & \boxed{1} \\ \text{FEATS} & \left[\begin{array}{ll} \text{POLARITY} & \textit{negative} \\ \text{ROOT} & + \\ \text{REALIS} & - \end{array}\right] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{1-2} \end{array}\right] \longrightarrow \langle \left[\begin{array}{ll} \textit{pfx} & \\ \text{PH} & \text{mæ} \end{array}\right] \rangle \oplus \boxed{1}$

(14) Portmanteau:

$$\left[\begin{array}{ll} \text{BASE} & \boxed{1} \\ \text{FEATS} & \left[\begin{array}{ll} \text{POLARITY} & \textit{negative} \\ \text{TENSE} & \textit{prst} \\ \text{REALIS} & + \end{array}\right] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{1-2} \end{array}\right] \longrightarrow \langle \left[\begin{array}{ll} \textit{pfx} & \\ \text{PH} & \text{nɑ} \end{array}\right] \rangle \oplus \boxed{1}$$

A further block, ordered after blocks for person markers, is used only in the past subjunctive:

(15) $$\left[\begin{array}{ll} \text{BASE} & \boxed{1} \\ \text{FEATS} & \left[\begin{array}{ll} \text{REALIS} & - \\ \text{TENSE} & \textit{past} \end{array}\right] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{5} \end{array}\right] \longrightarrow \boxed{1} \oplus \langle \left[\begin{array}{ll} \textit{sfx} & \\ \text{PH} & \text{ɑjæ} \end{array}\right] \rangle$$

4.3 Person markers

Person marking relies on the technology of parallel rule blocks (Stump, 2001; chapter 5). Blocks 3 and 4 are responsible respectively for object marking and subject marking, but the rules in the two blocks refer to two further blocks corresponding to VPEs and MPMs

(16) Block 3: object realization

a. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & \begin{bmatrix} \text{ARG-STR} & \langle [\,], \boxed{2}\textit{nc-pro}, \ldots \rangle \end{bmatrix} \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{3} \end{bmatrix} \longrightarrow \text{narrowest}\left(\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & \boxed{2} \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{B} \end{bmatrix} \right)$

b. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & \begin{bmatrix} \text{TENSE} & \textit{past} \\ \text{ARG-STR} & \langle [\,], \boxed{2}\textit{nc-pro}, \ldots \rangle \end{bmatrix} \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{3} \end{bmatrix} \longrightarrow \text{narrowest}\left(\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & \boxed{2} \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{A} \end{bmatrix} \right)$

c. $\begin{bmatrix} \text{BASE} & \boxed{1} \oplus \langle \boxed{2} \rangle \\ \text{FEATS} & \begin{bmatrix} \text{TENSE} & \textit{past} \\ \text{ARG-STR} & \left\langle [\textit{3sg}], \boxed{3}\textit{nc-pro}, \ldots \right\rangle \end{bmatrix} \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{3} \end{bmatrix} \longrightarrow \boxed{1} \oplus \text{compact}\left(\text{narrowest}\left(\begin{bmatrix} \text{BASE} & \langle \boxed{2} \rangle \\ \text{FEATS} & \boxed{3} \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{A} \end{bmatrix} \right) \right),$

where $\text{compact}\left(\left\langle [\text{PHON} \quad \boxed{1}], \ldots, [\text{PHON} \quad \boxed{n}] \right\rangle \right) = \left\langle \begin{bmatrix} \textit{stem} \\ \text{PHON} \quad \boxed{1} + \cdots + \boxed{n} \end{bmatrix} \right\rangle$

(17) Block 4: subject realization

a. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & \begin{bmatrix} \text{ARG-STR} & \langle \boxed{2}, \ldots \rangle \end{bmatrix} \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{4} \end{bmatrix} \longrightarrow \text{narrowest}\left(\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & \boxed{2} \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{A} \end{bmatrix} \right)$

b. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & \begin{bmatrix} \text{TENSE} & \textit{prst} \\ \text{ARG-STR} & \langle [\textit{3sg}], \ldots \rangle \end{bmatrix} \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{4} \end{bmatrix} \longrightarrow \boxed{1} \oplus \langle \begin{bmatrix} \textit{sfx} \\ \text{PH} \quad \text{et} \end{bmatrix} \rangle$

c. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & \begin{bmatrix} \text{ROOT} & + \\ \text{REALIS} & - \\ \text{ARG-STR} & \langle [\textit{sg}], \ldots \rangle \end{bmatrix} \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{4} \end{bmatrix} \longrightarrow \boxed{1} \oplus \langle \begin{bmatrix} \textit{sfx} \\ \text{PH} \quad \text{æ} \end{bmatrix} \rangle$

d. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & \begin{bmatrix} \text{TENSE} & \textit{past} \\ \text{ARG-STR} & \langle \boxed{2}, \text{NP}, \ldots \rangle \end{bmatrix} \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{4} \end{bmatrix} \longrightarrow \text{narrowest}\left(\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & \boxed{2} \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{B} \end{bmatrix} \right)$

(18) Block A: verbal person endings

a. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & [\textit{1sg}] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{A} \end{bmatrix} \longrightarrow \boxed{1} \oplus \langle \begin{bmatrix} \textit{sfx} \\ \text{PH} & \text{ɪm} \end{bmatrix} \rangle$

b. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & [\textit{2sg}] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{A} \end{bmatrix} \longrightarrow \boxed{1} \oplus \langle \begin{bmatrix} \textit{sfx} \\ \text{PH} & \text{i} \end{bmatrix} \rangle$

c. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & [\textit{1pl}] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{A} \end{bmatrix} \longrightarrow \boxed{1} \oplus \langle \begin{bmatrix} \textit{sfx} \\ \text{PH} & \text{in} \end{bmatrix} \rangle$

d. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & [\textit{pl}] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{A} \end{bmatrix} \longrightarrow \boxed{1} \oplus \langle \begin{bmatrix} \textit{sfx} \\ \text{PH} & \text{ɪn} \end{bmatrix} \rangle$

(19) Bloc B: mobile person marker

a. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & [\textit{1sg}] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{B} \end{bmatrix} \longrightarrow \boxed{1} \bigcirc \langle \begin{bmatrix} \textit{mpm} \\ \text{PH} & \text{ɪm} \end{bmatrix} \rangle$

b. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & [\textit{2sg}] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{B} \end{bmatrix} \longrightarrow \boxed{1} \bigcirc \langle \begin{bmatrix} \textit{mpm} \\ \text{PH} & \text{ɪt} \end{bmatrix} \rangle$

c. $\begin{bmatrix} \text{BASE} & \boxed{1} \\ \text{FEATS} & [\textit{3sg}] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & \textit{B} \end{bmatrix} \longrightarrow \boxed{1} \bigcirc \langle \begin{bmatrix} \textit{mpm} \\ \text{PH} & \text{i} \end{bmatrix} \rangle$

d. $\left[\begin{array}{ll}\text{BASE} & \boxed{1} \\ \text{FEATS} & [\textit{1pl}] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & B\end{array}\right] \longrightarrow \boxed{1} \bigcirc \left\langle \left[\begin{array}{ll}\textit{mpm} & \\ \text{PH} & \mathsf{man}\end{array}\right] \right\rangle$

e. $\left[\begin{array}{ll}\text{BASE} & \boxed{1} \\ \text{FEATS} & [\textit{2pl}] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & B\end{array}\right] \longrightarrow \boxed{1} \bigcirc \left\langle \left[\begin{array}{ll}\textit{mpm} & \\ \text{PH} & \mathsf{tan}\end{array}\right] \right\rangle$

f. $\left[\begin{array}{ll}\text{BASE} & \boxed{1} \\ \text{FEATS} & [\textit{3pl}] \\ \text{CLASS} & \textit{verb} \\ \text{BLOCK} & B\end{array}\right] \longrightarrow \boxed{1} \bigcirc \left\langle \left[\begin{array}{ll}\textit{mpm} & \\ \text{PH} & \mathsf{jan}\end{array}\right] \right\rangle$

4.4 Accounting for mobile person markers

The rules in block B introduce an MPM on the MORPHS list without constraining its position. We specify it by (i) ensuring that the MPM can only be in first second position; (ii) realizing first position MPMs distantly but second position ones distantly.[4]

(20) Word-initial MPMs are to be realized distantly

$$\textit{word}\rightarrow\left[\begin{array}{ll}\text{PHON} & \boxed{1}+\cdots+\boxed{n} \\ \text{MORPHS} & \left\langle \left(\left[\begin{array}{ll}\textit{mpm} & \\ \text{PHON} & \boxed{0}\end{array}\right] \right), [\text{PHON} \quad \boxed{1}], \ldots, [\text{PHON} \quad \boxed{n}] \right\rangle \\ \text{MPM} & \boxed{0}\end{array}\right]$$

(21) MPM is a HEAD feature

(22) Distant MPMs are realized in second VP position

a. $\textit{vp}\rightarrow\left[\begin{array}{ll}\text{PHON} & \boxed{1}+\boxed{0}+\boxed{2}+\ldots+\boxed{n} \\ \text{DTRS} & \left\langle [\text{PHON} \quad \boxed{1}], [\text{PHON} \quad \boxed{2}], \ldots, [\text{PHON} \quad \boxed{n}] \right\rangle \\ \text{MPM} & \boxed{0}\end{array}\right]$

b. $\textit{non-vp}\rightarrow\left[\begin{array}{ll}\text{PHON} & \boxed{1}+\ldots+\boxed{n} \\ \text{DTRS} & \left\langle [\text{PHON} \quad \boxed{1}], \ldots, [\text{PHON} \quad \boxed{n}] \right\rangle\end{array}\right]$

(23) Syntactic order rules

a. $\left[\text{MORPHS} \quad \langle \textit{non-mpm}, \textit{mpm}, \ldots \rangle\right] \prec \text{X}$

b. $\text{X} \prec \left[\text{MORPHS} \quad \langle \textit{mpm}, \ldots \rangle\right]$

c. $\boxed{1} \prec \left[\text{VAL} \quad \langle \ldots, \boxed{1}, \ldots \rangle\right]$

[4] This account is directly inspired by both Kupść & Tseng (2005), which uses EDGE features to realize affixes nonlocally, and Crysmann (2006), which uses syntax-morphology coanalysis to the same end. However we take stock of the simpler situation in Kurdish to avoid some of the overhead of these approaches.

(24) Order on MORPHS

$$\textit{verb}\rightarrow \left[\textsc{morphs}\quad \langle \textit{stem}\rangle\right] \vee \left[\textsc{morphs}\quad \langle \textit{morph},\textit{morph}\rangle\right] \vee \left[\textsc{morphs}\quad \langle \textit{morph},\textit{morph}\rangle \oplus \textit{list}(\textit{non-mpm})\right]$$

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