Distributed Morphology without Movement, Fusional Morphology without Paradigms

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1 Introduction

- I briefly introduce the theory called Lexical-Realizational Functional Grammar (L_RFG), a form of Distributed Morphology (DM) built around a Lexical Functional Grammar (LFG) syntax.
- The theory has no movement (neither phrasal nor head), no zero morphs, and no paradigms.
- I show its application to complex phenomena in English, Ojibwe, Latin, and Ingush.

2 Lexical-Realizational Functional Grammar

- Lexical-Realizational Functional Grammar (L_RFG) is a fully constraint-based/declarative theory that marries Distributed Morphology (DM; Halle and Marantz 1993) as a theory of morphology to Lexical Functional Grammar (LFG; Kaplan and Bresnan 1982, Bresnan et al. 2016) as a theory of syntax and grammatical architecture.
- L_RFG uses the formal tools of LFG to model a constraint-based version of DM. L_RFG is thus 'constraints all the way down' (Asudeh et al. 2024b).
- Nevertheless, L_RFG is a daughter theory (i.e., version) of both DM and LFG.
- Following DM, it is a morphemic theory (*lexical* in the Stump 2001 classification) that has no lexical processes, but only a list of exponence mappings (*vocabulary items*).
- Following LFG, it has no zero morphs (the mechanism of *spanning* obviates these; (Merchant 2015, Haugen and Siddiqi 2016, Svenonius 2016, Asudeh et al. 2023)) and, as a non-derivational theory, no head or even phrasal movement (see Asudeh et al. 2023 for our alternative to head movement).
- From DM, L_RFG inherits strengths in dealing with *polysynthesis*.
- From LFG, L_RFG inherits strengths in dealing with *nonconfigurationality*.
- We have by now written quite a few papers in this framework, so I refer you to these for further details, if you're curious: Melchin et al. (2020a,b), Everdell et al. (2021), Asudeh and Siddiqi (2022), Asudeh et al. (2023), Asudeh and Siddiqi (2023), Asudeh (2024), Asudeh et al. (2024a,b), Asudeh and Siddiqi (2024). Most of these papers are available at our website, https://lrfg.online, and we are also currently writing a monograph (Asudeh and Siddiqi 2025).

2.1 Architecture

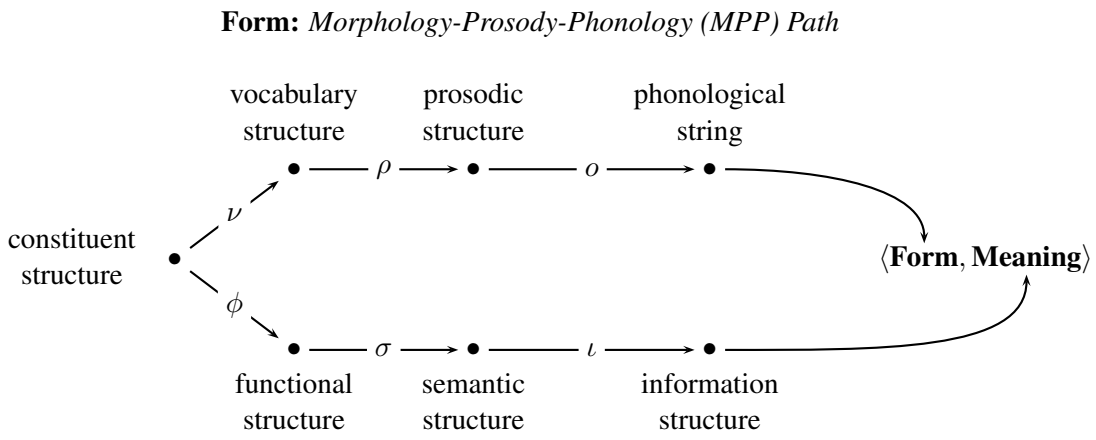


Figure 1: L_RFG's Correspondence Architecture

2.2 Exponence: V-structure

- Asudeh and Siddiqi (2025):

(1) **Definition of *exponent*:**
Exponents are interface objects that link a set of morphosyntactic properties, called *exponenda*, to a phonological representation, called a *(phonological) realization*.

- Asudeh et al. (2023: 41):

(2) exponend(um/a) $\xrightarrow{\nu}$ exponent $\xrightarrow{o \circ \rho}$ realization(s)

(3) $\ldots \xrightarrow{\nu}$

$$\left[\begin{array}{lll}
 & \text{FORM} & \left[\begin{array}{ll}
\text{PHON(OLOGICAL)REP(RESENTATION)} & \textit{phon. realization \& conditions} \\
 & \textbf{string} \\
\text{P(ROSODIC)FRAME} & \textit{prosodic unit} \\
 & \textbf{string wrapped around v-s} \\
\text{P(ROSODIC)DOMAIN} & \textit{prosodic unit} \\
 & \textbf{string wrapped around PFRAME value}
\end{array}\right] \\
 & \text{DEP(ENDENCE)} & \left\{\text{LT, RT}\right\} \\
 & & \textbf{set of symbols} \\
\textit{v-s} & \text{CLASS} & \left\{\textit{inflectional classes}\right\} \\
 & & \textbf{set of symbols} \\
 & \text{HOST} & \textit{v-s}\left[\begin{array}{ll}
\text{IDENT(ITY)} & + \\
 & \textbf{symbol} \\
\text{PHONREP} & \ldots \\
\text{PFRAME} & \ldots \\
\text{DEP} & \ldots \\
\text{CLASS} & \ldots
\end{array}\right]
\end{array}\right]$$

2.3 Vocabulary items and the vocabulary

- The Vocabulary in L_RFG is a list of vocabulary tiems, as in DM.
- However, L_RFG is somewhat more explicit about how the contents of the vocabulary are represented.
- In order to be selected for exponence, a vocabulary item must be compatible with the information in the syntax that it expones: categories and features.
- In order to be compatible, the exponenda in the vocabulary item must match the category/categories of the syntactic elements that it is expressing and it must contain a *subset* of the features that the syntax delivers for exponence.
- Let us call the syntactic exponenda *c-exponenda* (because they are represented at c-structure) and let us call the exponenda in the Vocabulary *v-exponenda*
- Thus, prospective v-exponenda must *match* the c-exponenda per the criteria above and v-exponenda are mapped to a v-structure by the ν correspondence function:

(4) $\langle$ $[C_1,\ldots,C_n]$, $F \cup G \cup I$ $\rangle \xrightarrow{v} \left[\quad\right]_{\textit{v-structure}}$

distribution *function/meaning*

- The first coordinate of the pair on the left-hand side is a list of c(onstituent)-structure syntactic categories representing the *distribution* of the exponendum.
  - It is a list in order to support *spanning*.
- The second coordinate is the union of three sets:[1]
  1. a set F, of equations and constraints about the f-structure
  2. a set, G, of Glue meaning constructors
  3. a set, I, of equations and constraints on i(nformation)-structure.
- This union, F ∪ G ∪ I, can be pronounced "fugui," given the resemblance of ∪ to "u," and we will henceforth refer to this component as a *fugui*.

2.4 Blocking and competition

- Like DM, L_RFG is an Elsewhere/Paninian theory of morphology.
  1. Blocking
  2. Emergence of the unmarked
- However, unlike much work in DM, L_RFG eschews the use of Optimality Theory (Prince and Smolensky 2004) for computing its competitions.
- Instead, we assume four blocking principles. I will only display present the intuitions behind these, but they are formalized in the body of L_RFG work listed above.
- The **MostInformative** family of principles concern information in the left-hand side of vocabulary items, i.e. information in v-exponenda.

  (5) **MostInformative**: Prefer portmanteau forms, whenever possible, on c-structural grounds. Choose the VI that realizes the greater list of categories.
  - Defined on lists: If list A contains list B, list A is more informative.

  (6) **MostInformative**$_f$: Prefer portmanteau forms, whenever possible, on f-structural grounds. Choose the VI that defines an f-structure that contains the greater set of features.
  - Defined on feature structures (f-structures): If feature structure A contains the information in feature structure B, feature structure A is more informative.

  (7) **MostInformative**$_s$: Prefer portmanteau forms, wherever possible, on semantic grounds. Choose the VI whose denotation is more semantically contentful.
  - Containment defined as structural proof entailment: If the proof for meaning A entails the proof for meaning B, meaning A is more informative.
- The remaining principle, **MostSpecific**, concerns the right-hand side of vocabulary items, i.e. information in the exponent v-structure.

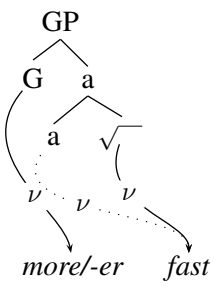
  (8) **MostSpecific**: Prefer affixes whenever possible.
  - Defined on feature structures (v-structures): same as (6).

[1] Any or all of these sets may be empty.

3 English: Containment in comparatives

- The English comparative (Asudeh and Siddiqi 2024) is a convenient case for illustrating how L_RFG deals with patterns like *good/better/best*, the so-called A/B/B pattern. .
  - Following Bobaljik (2012), a standard approach to the distribution of comparatives and superlatives is some type of *feature containment*.
  - Typological claim: if the comparative is suppletive for a given root, the superlative is never regular; i.e., *A/B/A.
  - Theoretical claim: this pattern arises precisely because superlatives also express the featural content of comparatives (in addition to the feature that marks superlative).
- We assume the following structure for the comparative and superlative in English:

(9)



  - Note that the dotted ν-mapping represents *Pac-Man spanning*: if a node would be unexponed due to a lack in the Vocabulary, it is mapped to the exponent of another node in the same projection (Asudeh et al. 2023), rather than to a null exponent.

- This also gives me the opportunity to introduce some detailed vocabulary items:

(10) a. $\langle$ [G], @CMPR $\rangle \xrightarrow{\nu}$
$\lambda\mathcal{P}_{es}.[\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}$

$$\begin{bmatrix} \text{PHONREP} & /\text{əɪ}/ \\ \text{PFRAME} & \subsetneq((\ )_\sigma(\cdot)_\sigma)_{ft} \\ \text{PDOMAIN} & (\ )_\omega \\ \text{DEP} & \text{LT} \\ \text{HOST} & \begin{bmatrix} \text{IDENT} & + \\ \text{PFRAME} & (\ )_\sigma((\ )_{\sigma=\mu}) \end{bmatrix} \end{bmatrix}$$

b. $\langle$ [G], @SUPR $\rangle \xrightarrow{\nu}$
$\lambda\mathcal{P}_{es}.[\mathbf{supr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}$

$$\begin{bmatrix} \text{PHONREP} & /\text{əst}/ \\ \text{PFRAME} & \subsetneq((\ )_\sigma(\cdot)_\sigma)_{ft} \\ \text{PDOMAIN} & (\ )_\omega \\ \text{DEP} & \text{LT} \\ \text{HOST} & \begin{bmatrix} \text{IDENT} & + \\ \text{PFRAME} & (\ )_\sigma((\ )_{\sigma=\mu}) \end{bmatrix} \end{bmatrix}$$

c. $\langle$ [G], @CMPR $\rangle \xrightarrow{\nu} \begin{bmatrix} \text{PHONREP} & /\text{moɪ}/ \\ \text{PFRAME} & (\cdot)_\omega \end{bmatrix}$
$\lambda\mathcal{P}_{es}.[\mathbf{cmpr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}$
$(\lambda P_{et}.[\mathbf{grade}_{\langle et,es\rangle}(P)]_{es})$

d. $\langle$ [G], @SUPR $\rangle \xrightarrow{\nu} \begin{bmatrix} \text{PHONREP} & /\text{most}/ \\ \text{PFRAME} & (\cdot)_\omega \end{bmatrix}$
$\lambda\mathcal{P}_{es}.[\mathbf{supr}_{\langle es,\langle s,et\rangle\rangle}(\mathcal{P})]_{\langle s,et\rangle}$
$(\lambda P_{et}.[\mathbf{grade}_{\langle et,es\rangle}(P)]_{es})$

- I'll ignore most of the details here, but I do want to draw your attention to the fact that VIs come with semantics, handled by glue semantics (Dalrymple 1999, Asudeh 2012).
- Thus, L_RFG takes compositional semantics seriously and treats it is a condition on exponence, thus opening up the possibility of a true theory of morphosemantics that is not parasitic on syntax (Asudeh and Siddiqi 2022, Asudeh 2024).
- However, in current work we treat the semantics as associated with VIs only and do not represent semantics as part of c-exponenda (i.e., targets for matching with VIs). This is a revision of what we did in Asudeh and Siddiqi (2022).

- Retuning to containment, it is the *macros* CMPR and SUPR that handle this.
  - A macro is just a named bundle of information (Dalrymple et al. 2004). When a macro is invoked by an @ call, the information named by the macro is simply substituted in place of the call.
  - These macros are defined as follows:

(11) a. SUPR := (↑ SUPERLATIVE) = +
@CMPR

b. CMPR := (↑ COMPARATIVE) = +

  - This results in f-structures like the following:

(12) a. $f\begin{bmatrix}\text{COMPARATIVE} & + \\ \text{SUPERLATIVE} & +\end{bmatrix}$ b. $g\begin{bmatrix}\text{COMPARATIVE} & +\end{bmatrix}$

  - Thus, the superlative contains the comparative as desired,

4 Ojibwe: Hierarchies as cascades

(13) gi- gii- waab -am -igw -naan -ag
2 PST see VTA INV 1PL 3PL
'They saw us(incl).'

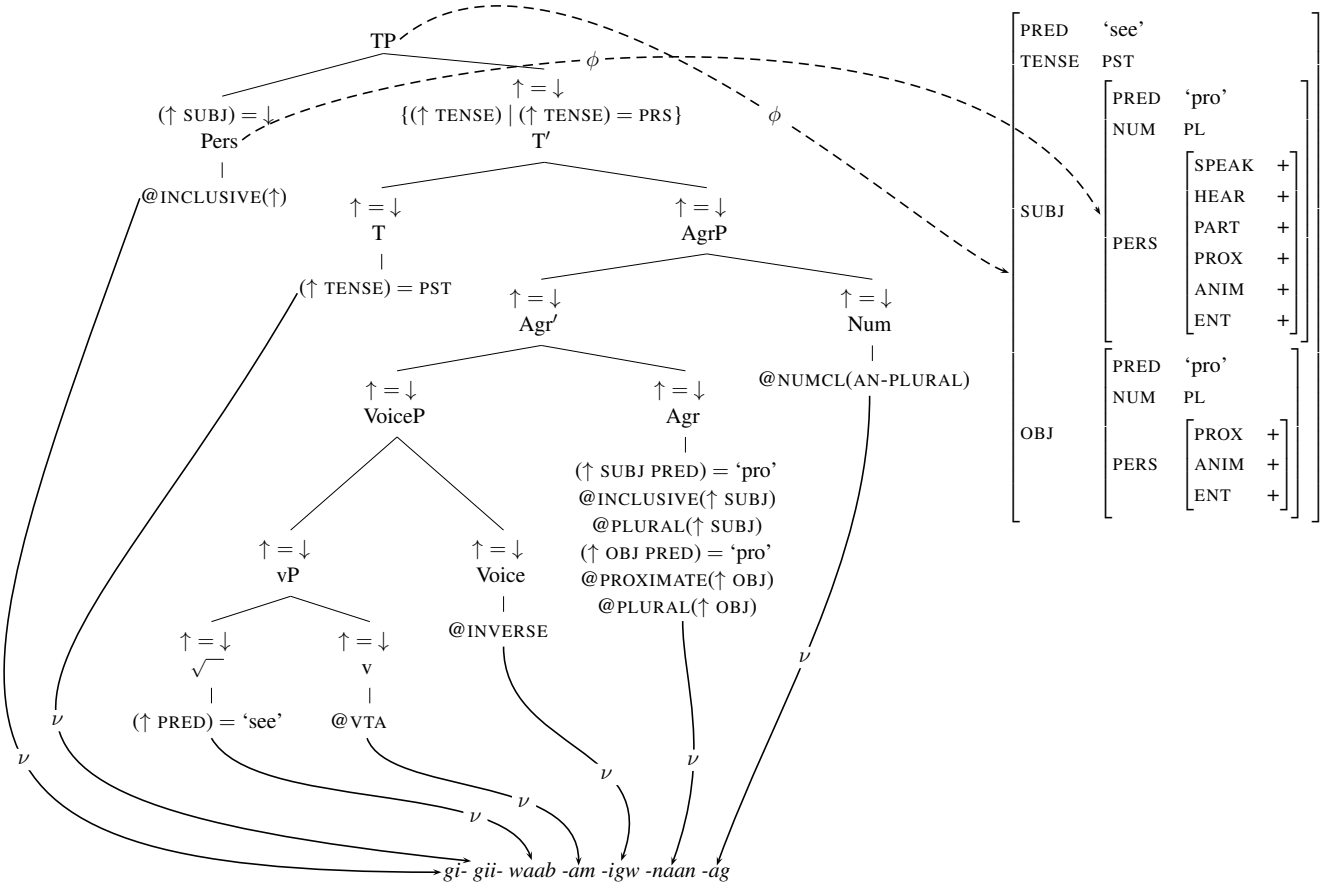


Figure 2: c-, f-, and abbreviated v-structures for *gigiiwaabamigwnaanag* 'they saw us(incl)'

Macro	*Description*	*Explanation*
INCLUSIVE(f)	(f PERS SPEAK) = + (f PERS HEAR) = + @PARTICIPANT(f)	1st person inclusive
SPEAKER(f)	(f PERS SPEAK) = + @PARTICIPANT(f)	1st person
HEARER(f)	(f PERS HEAR) = + @PARTICIPANT(f)	2nd person
PARTICIPANT(f)	(f PERS PART) = + @PROXIMATE(f)	1 and/or 2
PROXIMATE(f)	(f PERS PROX) = + @ANIMATE(f)	3 and above
ANIMATE(f)	(f PERS ANIM) = + @ENTITY(f)	3′ and above
ENTITY(f)	(f PERS ENTITY) = +	All persons (0 and above)

Table 1: Prominence hierarchy templates

Macro	*Description*	*Explanation*
PLURAL(f)	(f NUM) = PL	
SINGULAR(f)	(f NUM) = SG	
INAN-PLURAL(f)	@PLURAL(f) ¬(f PERS ANIM)	Inanimate plurals
AN-PLURAL(f)	@PLURAL(f) @ANIMATE(f) ¬(f PERS PART)	Animate 3rd person plurals
OBVIATIVE(f)	(f OBV) = + @ANIMATE(f) {@SINGULAR(f) | @PLURAL(f)}	Animate obviatives Number is ambiguous

Table 2: Number and obviation templates

Macro	*Description*	*Explanation*
VTA	($\uparrow_\sigma$ ARG$_1$) ($\uparrow_\sigma$ ARG$_2$)	Two semantic arguments
VTI	($\uparrow_\sigma$ ARG$_1$) ($\uparrow_\sigma$ ARG$_2$) ¬($\uparrow$ OBJ PERS ANIM)	Two semantic arguments Object is inanimate
VAI	($\uparrow_\sigma$ ARG$_1$)	At least one semantic argument
VII	($\uparrow_\sigma$ ARG$_1$) ¬($\uparrow$ SUBJ PERS ANIM)	At least one semantic argument Subject is inanimate
INDEP-ORDER(f)	@IPC ¬(GF f)	Indep. Prominence Constraint Cannot be embedded
CONJ-ORDER(f)	@CPC (GF f)	Conj. Prominence Constraint Must be embedded

Table 3: Verb class and order templates

5 Latin

- Declension and conjugation are handled with ease in word-based realizational theories such as Paradigm Function Morphology (Stump 2001, 2016).
- These are more challenging for morphemic theories that realize syntactic features, such as DM, because these are purely morphological phenomena and so there are no relevant (non-junk) syntactic features to expone.
- Latin declension is also particularly challenging because it displays both *metasyncretism* and *secondary exponence*, as shown in table 4.

  Metasyncretism the phenomenon whereby the same syncretism patterns arise in different paradigms

  Secondary exponence the phenomenon whereby the same syncretism patterns arise in different paradigms

	CLASS 2		CLASS 3	
	SG	PL	SG	PL
NOM	-s	-ī	-s	-$\boxed{\mu}$-s
ACC	-m	-$\boxed{\mu}$-s	-m	-$\boxed{\mu}$-s
GEN	-ī	-rum	-is	-um
DAT	-μ	-$\boxed{\boxed{\text{ī}}}$-s	-ī	-$\boxed{\boxed{\text{ibu}}}$-s
ABL	-μ	-$\boxed{\boxed{\text{ī}}}$-s	-e	-$\boxed{\boxed{\text{ibu}}}$-s

Table 4: Latin cases in 2nd and 3rd declensions (masculine only)

- Note the mention of paradigms in the definitions above.
- L_RFG doesn't have paradigms: can it do Latin?
- Yes it can: a full fragment of Latin declension is presented in Asudeh et al. (2024a).

- First, though, note that we model Latin as having a case hierarchy in the same way that we modelled the Ojibwe person hierarchy: macro cascades.

Macro	*Description*	*Explanation*
NOM(f)	(f NOMINATIVE)	Nominative case
ACC(f)	(f ACCUSATIVE) $=+$ @NOM	Accusative case
VOC(f)	(f VOCATIVE) $=+$ @NOM	Vocative case
GEN(f)	(f GENITIVE) $=+$ @ACC	Genitive case
DAT(f)	(f DATIVE) $=+$ @ACC	Dative case
ABL(f)	(f ABLATIVE) $=+$ @DAT	Ablative case

Table 5: Latin case hierarchy

- Here is just one VI from the fragment, which is sufficient to address metasyncretism and secondary exponence.

(14) $\langle$ [K], @DAT $\langle\langle(\uparrow \text{PLURAL})\rangle\rangle$ $\rangle \xrightarrow{\nu}$

$$\begin{bmatrix} \text{PHONREP} & /\bar{\text{i}}/ \\ \text{DEP} & \text{LT} \\ \text{CLASS} & \text{X}{=}1 \vee \text{X}{=}2 \\ \text{HOST} & \begin{bmatrix} \text{IDENT} & + \\ \text{CLASS} & \text{X} \end{bmatrix} \end{bmatrix} \vee \begin{bmatrix} \text{PHONREP} & /\text{ibu}/ \\ \text{DEP} & \text{LT} \\ \text{CLASS} & \text{X}{=}3 \vee \text{X}{=}4 \\ & \vee \text{X}{=}5 \\ \text{HOST} & \begin{bmatrix} \text{IDENT} & + \\ \text{CLASS} & \text{X} \end{bmatrix} \end{bmatrix}$$

  - Metasyncretism: the right-hand side of the VI is disjunctive—giving one form in first and second declension and another form in the other declensions.
    - Secondary exponence: the VI is conditioned by the feature PLURAL, so it will appear in PLURAL environments, but does not expone PLURAL.
    - This VI will appear in both DATIVE and ABLATIVE, because DATIVE is a subset of ABLATIVE (the latter has one more feature) and there is no competing ABLATIVE suffix in the fragment (the only VI specified with ABLATIVE is restricted from PLURAL environments).

6 Ingush

- The lab's most recent (unpublished) work is on Ingush, in particular the distribution and function of the additive clitic *=ʔa*, which has been discussed by Peterson (2001), Nichols and Peterson (2010), and Nichols (2011).
- It appears in a number of environments, such as certain focus constructions and also in *clause chaining*, where a (subordinate) clause is dependent for at least one of its arguments, and possibly other features, on the clause that the dependent clause modifies.

(15) aaz qa =ʔa b-oaqq hʕuoga. **focus**
1SG.ERG news =ʔa AGR-communicate 2SG.ALL
'And now I'll tell you some NEWS.'
(Peterson 2001: 146 (4a))

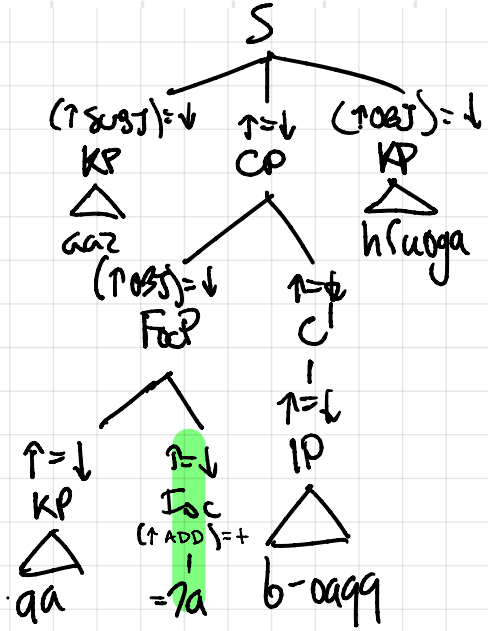
(16) je= žʕaalie-z =ʔa je= tsisk-az =ʔa dulx d-iʔ-anz-ar. **emphatic coordination**
or= dog-ERG =ʔa or= cat-ERG =ʔa meat AGR-eat-NEG-PAST
'Neither the dog nor the cat ate the meat.'
(Peterson 2001: 146 (5))

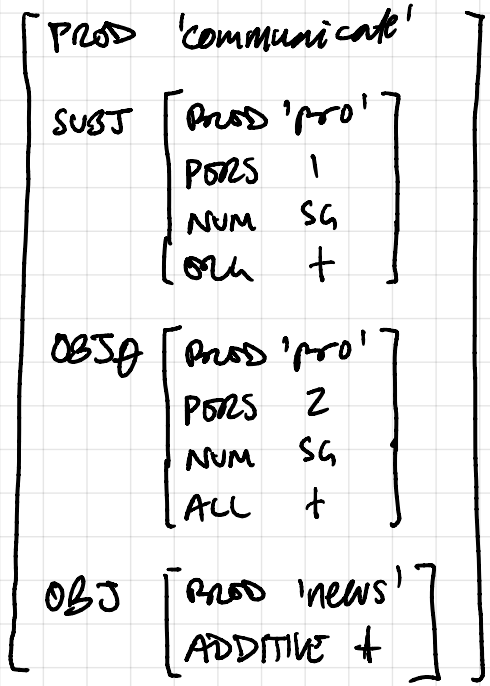
(17) ʕajšiet j-iilx-ača =ʔa muusaa v-ax-anz-ar. **concessive**
Aisha AGR-cry-TCV =ʔa Musa AGR-go-NEG-PAST
'Even when Aisha cried, Musa didn't go.'
(Peterson 2001: 145 (2))

(18) jett [laq =ʔa + laq-aa] b-el-ar. **clause chaining**
cow go.dry =ʔa go.dry-ACV AGR-die-PAST
'The cow stopped giving milk and died.'
(Peterson 2001: 147, (11))

(19) muusaa gaalie-ča banaana ʕa=či=ʔa j-ill-aa, v-ax-ar. **clause chaining**
Musa bag-ILOC banana down=in=ʔa AGR-put-ACV AGR-go-PAST
'Musa put the banana in the bag and left.'

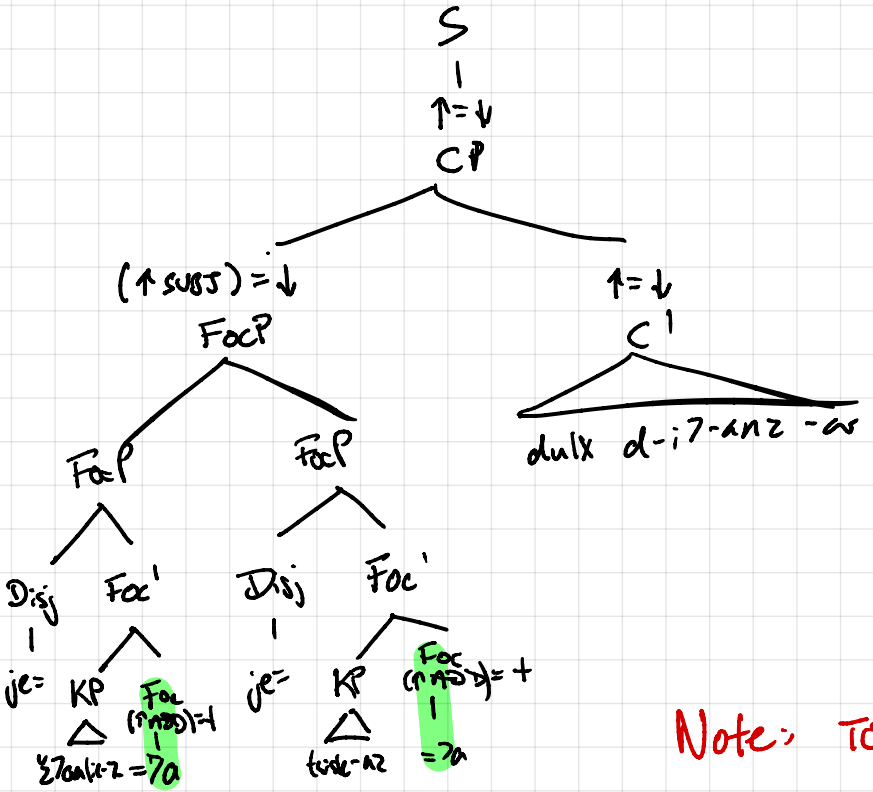
aaz qa =ʔa b-oaqq hʕuoga. **focus**
1SG.ERG news =ʔa AGR-communicate 2SG.ALL
'And now I'll tell you some NEWS.'
(Peterson 2001: 146 (4a))

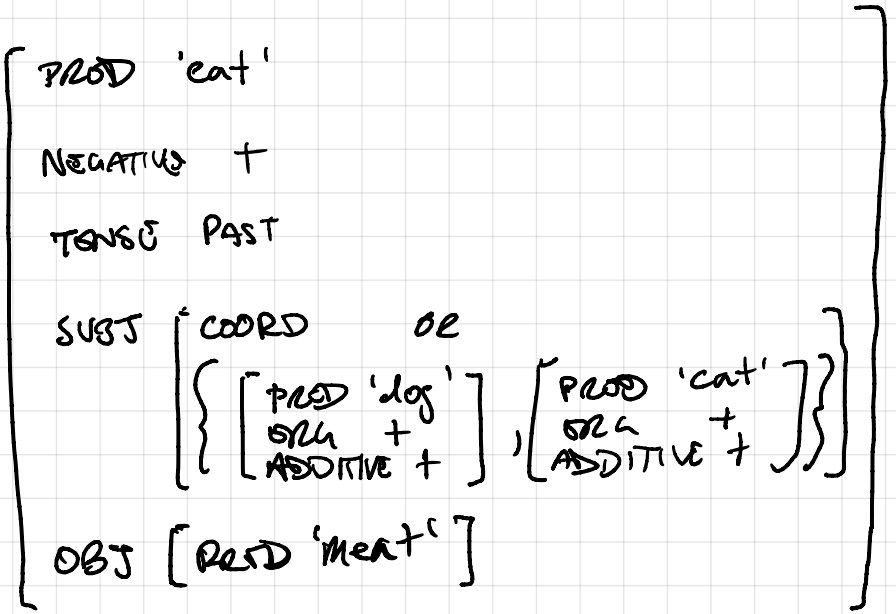




je= žʕaalie-z =ʔa je= tsisk-az =ʔa dulx d-iʔ-anz-ar. **emphatic coordination**
or= dog-ERG =ʔa or= cat-ERG =ʔa meat AGR-eat-NEG-PAST
'Neither the dog nor the cat ate the meat.'
(Peterson 2001: 146 (5))

It's not the case that the dog or the cat ate the meat





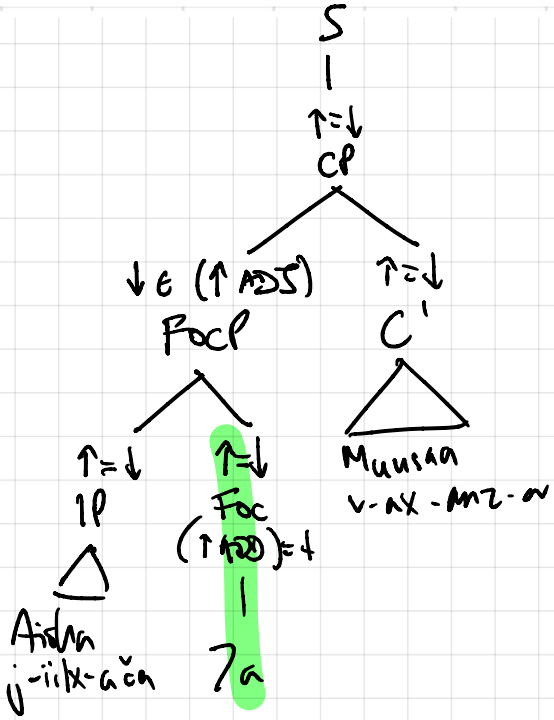
Note: TOPIC/FOCUS represented at information structure

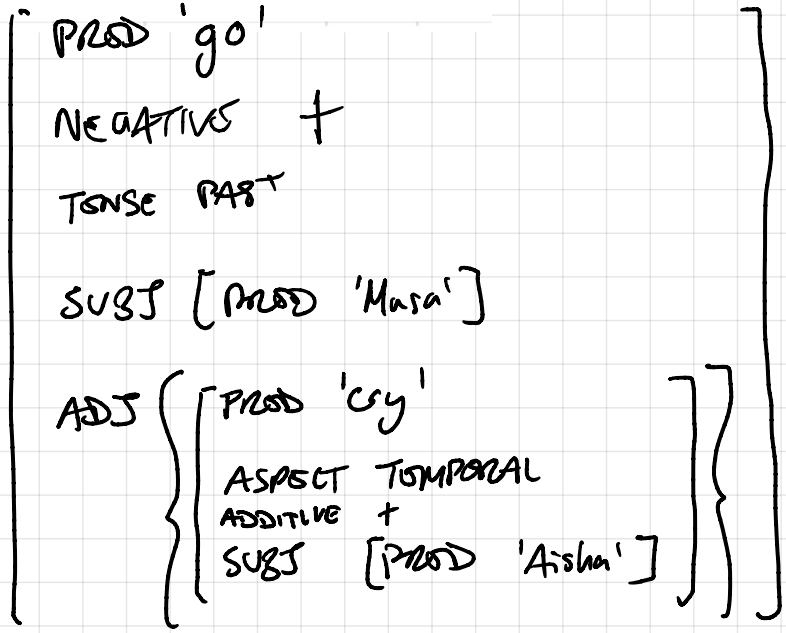
ʕajšiet j-iilx-ača =ʔa muusaa v-ax-anz-ar. **concessive**

Aisha AGR-cry-TCV =ʔa Musa AGR-go-NEG-PAST

'Even when Aisha cried, Musa didn't go.'

(Peterson 2001: 145 (2))





1. Concessive clause: aspect is TCV

2. ʔa appears to the right of TCV-marked verb

3. No copying

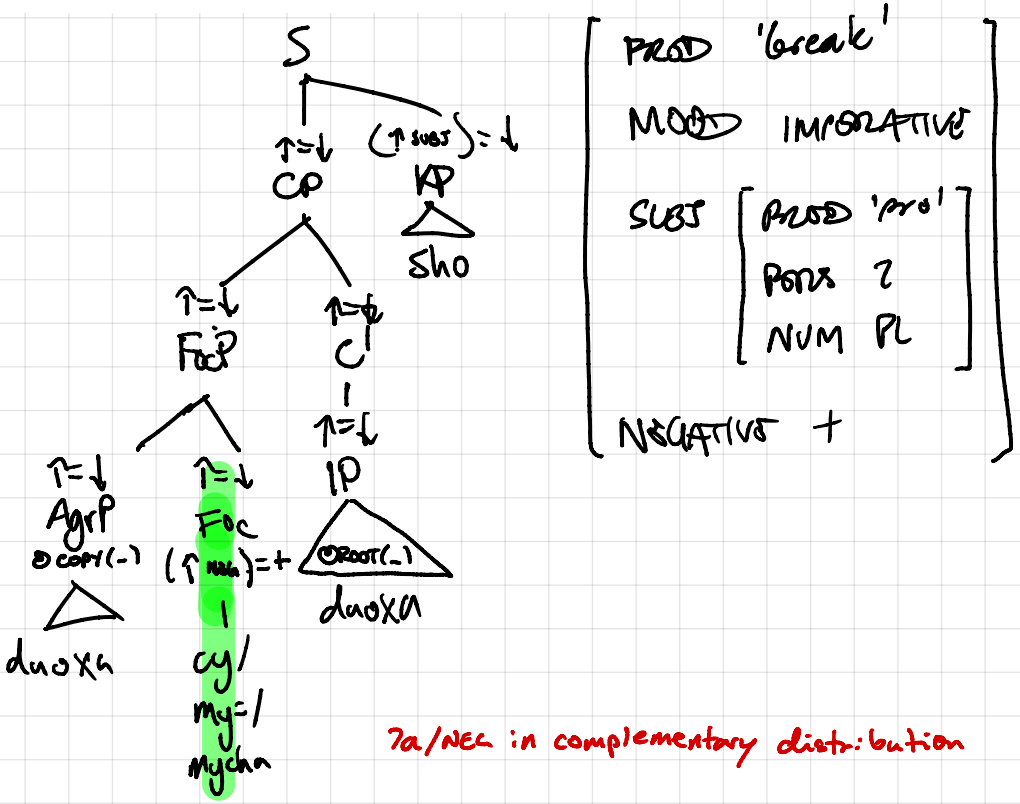
Nichols 2011

Negative focus

(222) Cynna niissa **vy** **mycha** **var** vai
2s.DAT equal:FOC RED NEG V.be.PST 1pIN.GEN
He had absolutely no equal among us.

(223) **Vala** **cy** **lezh** vyssaav yz? Note suppletion
RED NEG die.CVsim V.remain.NW.V 3s
He didn't die? ('He remained not dying?) (Listener double-checks what narrator said.)

(225) **Duoxa** **my=duoxa** sho
RED NEG=D.break.IMPV 2p
Don't despair.



PRED 'break'
MOOD IMPERATIVE
SUBJ [PRED 'pro' PERS 2 NUM PL]
NEGATIVE +

?a/NEG in complementary distribution

Clause chaining

Peterson p 150

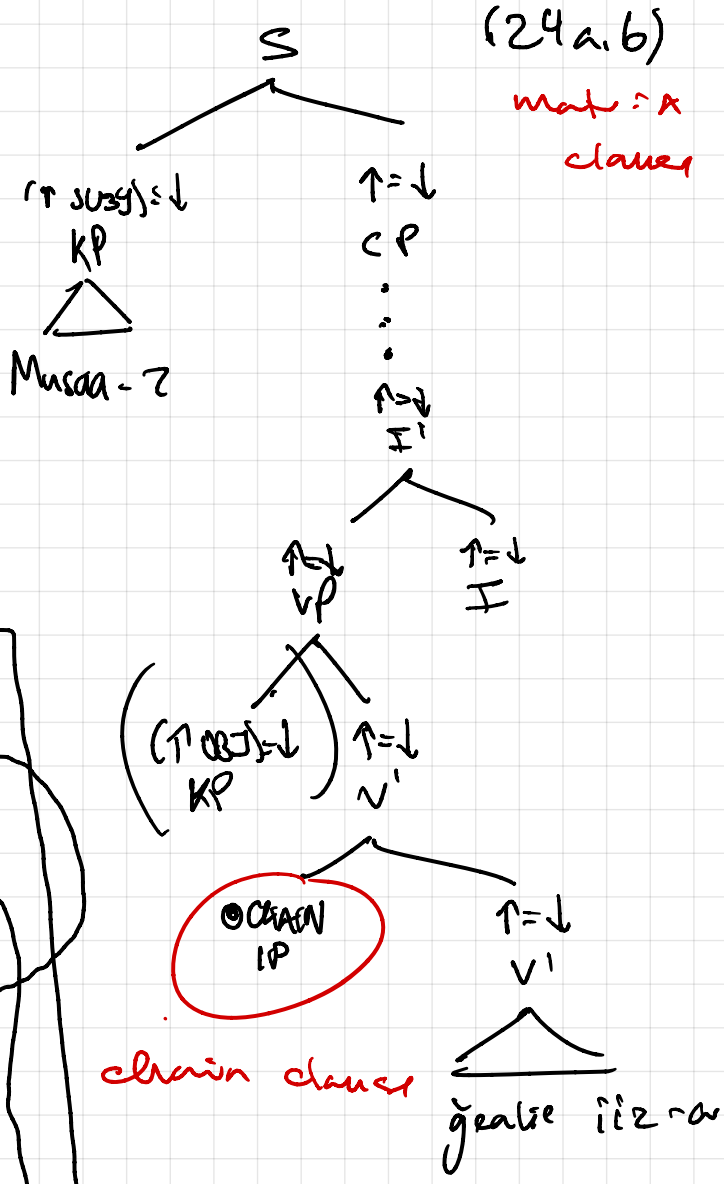
(24) a. muusaa-z gitaar = ʔa ca = loq-až, ğealie iiz-ar.
Musa-ERG guitar = ʔa NEG = play-SCV cigarette smoke-PAST
'Musa smoked a cigarette without playing the guitar.'

b. muusaa-z gitaar ca = ʔa = loq-až, ğealie iiz-ar.
Musa-ERG guitar NEG = ʔa = play-SCV cigarette smoke-PAST
'Musa smoked a cigarette without playing the guitar.'

(25) a. muusaa-z hʕal = ʔa + ca = ğuott-až, ğealie iiz-ar.
Musa-ERG up = ʔa + NEG = stand-SCV cigarette smoke-PAST
'Musa smoked a cigarette without getting up.'

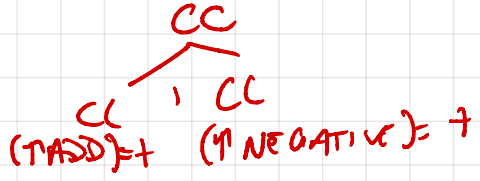
b. muusaa-z hʕal + ca = ʔa = ğuott-až, ğealie iiz-ar.
Musa-ERG up + NEG = ʔa = stand-SCV cigarette smoke-PAST
'Musa smoked a cigarette without getting up.'

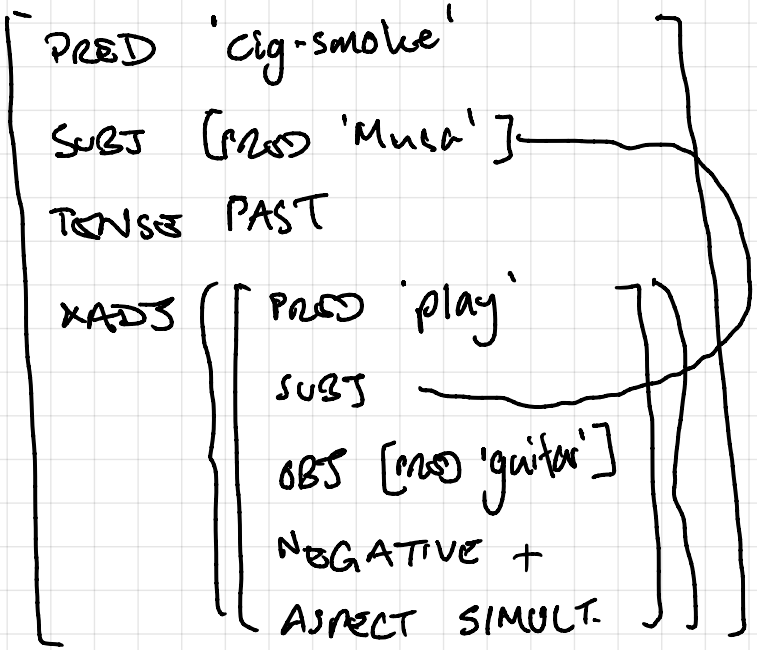
(24a,b)

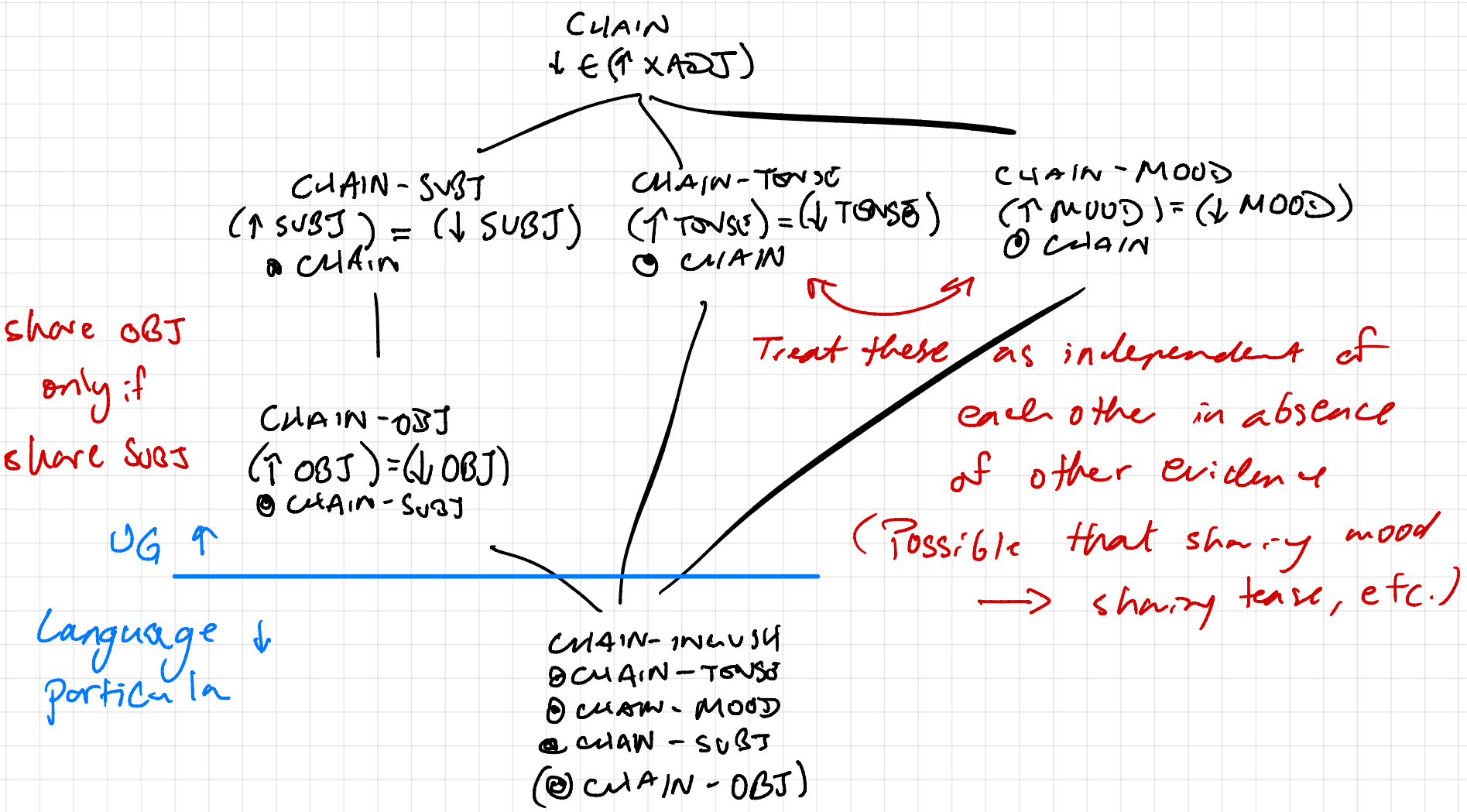


1. ʔa and NEG flip back and forth here
2. Not in comp. dict.
3. ʔa/NEG not focus

∴ This is a clitic cluster






CLAIN
↓ ∈ (↑ XADJ)
CLAIN-SUBJ
(↑ SUBJ) = (↓ SUBJ)
@ CLAIN
CLAIN-TENSE
(↑ TENSE) = (↓ TENSE)
@ CLAIN
CLAIN-MOOD
(↑ MOOD) = (↓ MOOD)
@ CLAIN
share OBJ only if share SUBJ
CLAIN-OBJ
(↑ OBJ) = (↓ OBJ)
@ CLAIN-SUBJ
Treat these as independent of each other in absence of other evidence
(Possible that sharing mood → sharing tense, etc.)
UG ↑
Language Particular ↓
CLAIN-ENGLISH
@ CLAIN-TENSE
@ CLAIN-MOOD
@ CLAIN-SUBJ
(@ CLAIN-OBJ)

Vocabulary

category underspecified

<[_], (↑ ADDITIVE)=+ > → =?a
enclitic

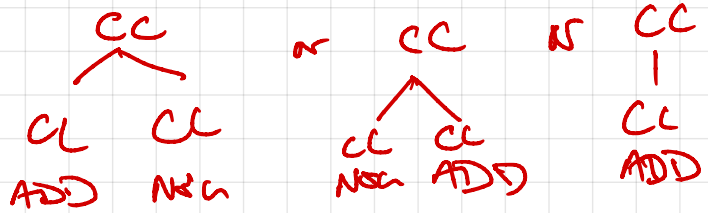
<[Foc], (↑ NSA)=+ > → my=/cy/mycha
proclitic FF FF

FF = free form

<[CL], (↑ NSA)=+ > → ca=
proclitic

<[Neg], (↑ NSA)=+ > → -an2-
affix (prefix or suffix not currently clear)
(part of verbal complex, next to I)

CC → ↑=↓ CL (↑ ADDITIVE)=+ , (↑=↓ CL (↑ NEGATIVE)=+)



Completion

? Foc +N ⇝ my/cy/mycha
∵ Foc ≻c -

Foc +A ⇝ ?a
∵ Neg overspecified
i.e. source ⊏ target ⟶

CL ⇝ ?a
+A ⟶ "

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