Ojibwe agreement in a representational, morpheme-based framework

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Our project

- We are developing a theoretical framework that augments the modular, constraint-based approach to syntax of Lexical-Functional Grammar (LFG; Bresnan et al. 2016) with the realizational, morpheme-based approach to word-formation of Distributed Morphology (DM; Halle and Marantz 1993)

- The resulting framework, known as Lexical-Realizational Functional Grammar (L_RFG), will be ideally suited to model Canadian Indigenous languages, which are characterized by *polysynthesis* and *nonconfigurationality*

- In this poster we summarize the framework, and demonstrate it with an analysis of Ojibwe inflection

The framework

- L_RFG is similar to mainstream LFG, with changes to the c-structure and its relationship with words/morphemes
- The terminal nodes of c-structures *are not words*, but instead are (abstract) bundles of f-descriptions
  - The c-structure is mapped to a v(ocabulary)-structure, a linearized structure in which vocabulary items (VIs) *expone* the features in the terminal nodes
  - Formally, v-structure is a list of strings
  - This v-structure then maps to the phonological form
  - The relationship between terminal nodes and VIs is many-to-one, using the mechanism of *post-linearization spanning* (Haugen and Siddiqi 2016) (i.e., one VI may expone features of multiple terminal nodes)
  - The result is similar to the Lexical Sharing model of Wescoat (2002, 2005), but maintains the complex internal structures of words as part of syntax

Conditions on Exponence

1. **Elsewhere Condition:** insert the VI that matches the largest possible subset of features

2. **Feature Discharge:** any remaining (un-exponed) features are ignored for the purposes of mapping

3. **No Multiple Exponence:** a given feature in the c-structure may be exponed by only one VI

4. **No Crossing Lines:** linear precedence relations in v-structure must match those of the c-structure

5. **Minimize Exponence:** use the smallest possible number of VIs

6. **Minimize Spanning:** map multiple nodes to a single VI *only if* there is no combination of VIs that would expone a larger number of features

Ojibwe: Background

- Ojibwe exhibits many of the features that we hope to be able to model:
    - **Nonconfigurationality** – word order is very free (i.e., determined by discourse and pragmatic, rather than syntactic, factors)
    - **Polysynthesis** – complex verb morphology with extensive head-marking
    - A **direct-inverse-based agreement system** cross-referencing all core arguments
    - Various morphological processes, including verbal reflexives, noun incorporation, applicatives, various kinds of (anti)passives, and more
- Note: When we say that Ojibwe is "nonconfigurational", we do not intend to claim that word order is completely free. We are using the term in the LFG sense (Bresnan et al. 2016), meaning that word order and phrase structure are not used to distinguish grammatical functions like subject and object. Instead, word order is determined by a combination of factors, including obviation and information structure; see Dahlstrom (2017) for extensive discussion and references.

A note on the data used

- The data and analysis in this poster is meant to be widely applicable across the different varieties that linguists consider to be part of the Ojibwe language, including both Nishnaabemwin and Anishinaabemowin dialects (such as Algonquin).

- The data are taken mainly from paradigms in Valentine's (2001) grammar of Nishnaabemwin, as well as those in Oxford's (2019) study of Algonquin.
  - We include vowels that are omitted in the syncopated (Nishnaabemwin) dialects, and word-final /n/, which is often dropped; we are essentially presenting the underlying forms of the morphemes and inflected verbs, though their pronunciation varies widely from one variety to the next.
  - Where Valentine's (2001) grammar presents inflected forms that differ between dialects, we consider those that are consistent with the data in Oxford (2019). For instance, for verbs with 1pl agents and 2sg/pl patients, we present the forms with the /-imin/ morpheme found in Algonquin (Oxford 2019) and Walpole Island (Valentine 2001), rather than the more innovative impersonal forms found in other Nishnaabemwin dialects.

Ojibwe primer: Prominence, animacy, and obviation

- Ojibwe grammar has many features that are mostly shared with the other Algonquian languages, but fairly uncommon outside the family:
  - Typical **polysynthetic** morphosyntactic features, including nonconfigurationality, extensive head-marking, and various kinds of incorporation
  - Agreement morphology determined by a **prominence hierarchy**, which involves:
    - A system of grammatical gender based on **animacy**
    - A system of **obviation** distinguishing clause-mate third-person animate arguments
  - A **direct-inverse** system that indicates the relationship between thematic roles and the person hierarchy
  - Two separate inflectional paradigms: **independent order**, found in most matrix clauses, and **conjunct order**, found in subordinate clauses and certain matrix clause contexts
  - Separate (derivational) verb classes based on (i) transitivity and (ii) the animacy of the object (if transitive) or subject (if intransitive)

Animacy

- Ojibwe grammatical gender is based on animacy (**animate** vs. **inanimate**)

- All nouns referring to notionally/semantically animate entities are grammatically animate; however, notionally inanimate nouns may be of either gender

- Animacy (of the subject or object) determines the verb final suffix (i.e., verb class, *v*) that is used, among other things

Obviation

- Obviation distinguishes third-person animate clausemates: in any clause, one third-person animate argument is **proximate**, and the rest are **obviative**

- The choice of which argument is proximate is mainly based on (poorly-understood) pragmatic/discourse factors

- Obviation is marked on nouns and is distinguished in verb agreement

- Obviative nouns are unspecified for number (except in isolated inflectional contexts), and can be interpreted as singular or plural

The prominence/person hierarchy

- The distribution of agreement affixes, and the choice of direct or inverse morphology, is based on arguments' relative positions in a **prominence/person hierarchy**

- This ranks arguments in terms of person, obviation and animacy

- The hierarchy is as follows (Valentine 2001, p. 268; abbreviations largely follow common Algonquianist practice):

(1)   *Prominence Hierarchy*
    2   2nd person
    1   1st person
    X   Unspecified actor
    3   3rd person animate proximate
    3'   3rd person animate obviative
    0   3rd person inanimate

- Note: The "unspecified actor" form occurs in verb forms with a passive-like meaning, where the agent argument is existentially bound and otherwise absent. The morphology treats this form as a part of the prominence hierarchy ranked between 1 and 3. However, this form introduces further complications into the paradigm which we will mostly set aside in this presentation.

- Note: While the ranking of 2 above 1 determines the insertion of the person prefix and the distribution of direct and inverse marking (at least on the view of Rhodes 1994, 2010, adopted here; see discussion below), there are other areas of the grammar where 1 appears to be ranked above 2, for instance when determining the insertion of certain agreement morphemes
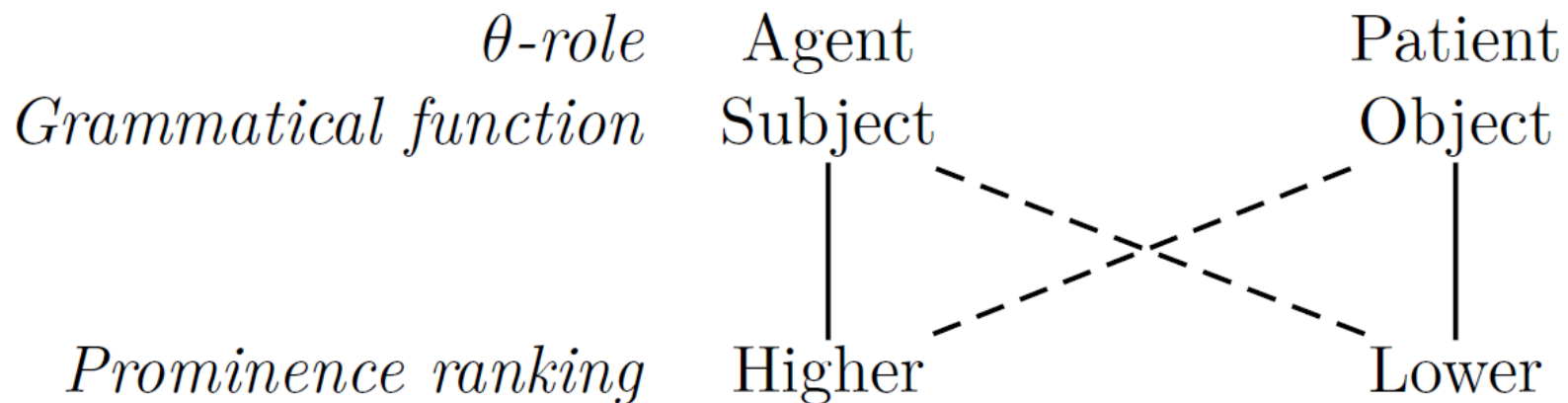
Direct/inverse marking

- In transitive clauses, the relationship between the two arguments' relative ranking in the prominence hierarchy and their thematic roles is tracked by the **direct/inverse** morpheme, known as a Theme Sign (analyzed as Voice; e.g., Oxford 2014, 2019):
  - When the agent is the higher-ranked argument and the patient is lower, the verb is marked as **direct**
  - When the patient is the higher-ranked argument and the agent is lower, the verb is marked as **inverse**
  - Note: Following common practice, we are using the term "agent" to refer to agent-like roles, including causes and many experiencers – i.e., the agent proto-role in the sense of Dowty (1991). Similarly, the term "patient" is used for the proto-role that includes patients, recipients, themes, and so on.

- The theoretical status of inversion in Ojibwe is still under debate. One question involves the relationship between inversion and the grammatical functions of subject and object

- Note: While it has been claimed that there is syntactic evidence for the GFs-as-θ-roles analysis (e.g., Dahlstrom 2014; Alsina and Vigo 2017; Oxford 2019), the evidence largely relies on judgements that vary between Algonquian languages, and even between dialects or individual speakers of Ojibwe, as pointed out by Rhodes (1994, p. 443). It is possible that languages differ as to which is the proper analysis, as is claimed by McGinnis (1999); Alsina and Vigo (2017).

GFs-as-θ-roles analysis

- For some researchers, the agent is always the subject and the patient is always the object (e.g., Valentine 2001; Dahlstrom 2014; Oxford 2019)
  - **Direct:** subject is higher-ranked, object is lower-ranked
  - **Inverse:** subject is lower-ranked, object is higher-ranked
  - Thus, in the diagram below, the solid lines represent the correspondences in a direct form, and the dashed lines the correspondences in inverse

(2) **GFs-as-θ-roles analysis**

θ-role	Agent	Patient
Grammatical function	Subject	Object
Prominence ranking	Higher	Lower

GFs-as-prominence analysis

- For others, the higher-ranked argument is always the subject and the lower-ranked argument is always the object (e.g., Rhodes 1994, 2010)
  - **Direct:** subject is agent, object is patient
  - **Inverse:** subject is patient, object is agent
  - Thus, in the diagram below, the solid lines represent the correspondences in a direct form, and the dashed lines the correspondences in inverse
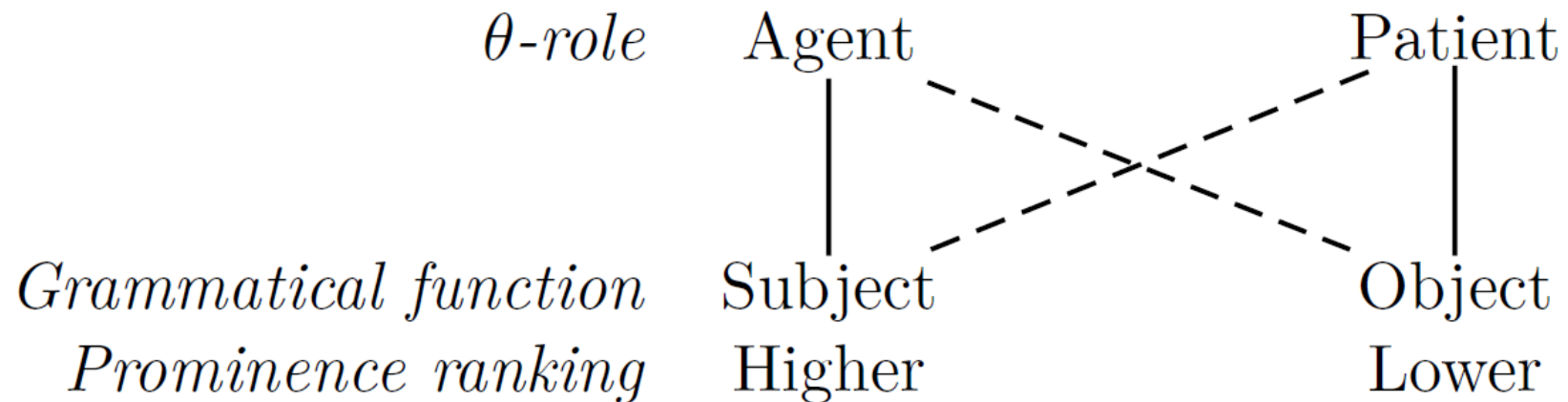
(3) **GFs-as-prominence analysis**

θ-role	Agent	Patient
Grammatical function	Subject	Object
Prominence ranking	Higher	Lower

Our choice of analysis

- We adopt the **GFs-as-prominence analysis**, where the grammatical functions are defined in terms of the prominence hierarchy
  - This allows us to treat direct/inverse marking as determining the mapping between f-structural objects (grammatical functions) and s-structural objects (thematic argument roles)
  - It also means that the subject and object have consistent (word-internal) c-structural positions, as with the clausal structure in configurational languages; the alternative would be to have specific positions for the higher and lower arguments, which is more difficult to model
- This can be captured with a language-specific well-formedness constraint on f-structures, stating that if a subject and object are present, the value of the object person feature must properly subsume that of the subject's person feature:
  $$[(\uparrow \text{SUBJ}) \ \& \ (\uparrow \text{OBJ})] \Rightarrow [(\uparrow \text{OBJ PERS}) \sqsubset (\uparrow \text{SUBJ PERS})]$$
  - Due to the template specifications in (7), this ensures that the subject will be higher-ranked than the object on the prominence hierarchy
  - This also has the consequence that the subject of a transitive verb must be animate, which holds for Ojibwe (Valentine 2001, p. 305)
  - It has the further consequence that a transitive verb cannot have a subject and object with identical features for person, number, animacy and obviation, which also holds (Valentine 2001, p. 273) – such an event can only be expressed using a reflexive or reciprocal form, which are both grammatically intransitive in Ojibwe

Data under consideration

- While we intend to eventually provide an account for the entire Ojibwe agreement system in L_RFG terms, the goals for this study are more modest

- Here we restrict our analysis to instances where all arguments are animate, and the verb appears in a matrix clause context; i.e., *(in)transitive animate verbs* in the *independent order*

- We provide f-descriptions for the set of inflectional morphemes that appear with these verbs, and illustrate by providing c-, f-, and v-structures for some representative examples

Analysis: Ojibwe inflection

- The following are the c-, f-, and v-structures (s-structures are omitted) for a representative example, which was constructed based on the paradigms in Valentine (2001) (more can be found in the appendix)

- Note that, while we have included templates in the c-structure of the tree, as usual in LFG they are to be interpreted as the full bundle of features abbreviated by the template

- The c-structure in (6) gives the expanded form of (5)

- Thus, while the description for the Cl*s* node in (5) is written in the c-structure as (4a), it should be read as in (4b):

(4) a. $(\uparrow \text{PRED}) = \text{'pro'}$
      $@\text{PLURAL}(\uparrow)$
      $@\text{INCLUSIVE}(\uparrow)$

    b. $(\uparrow \text{PRED}) = \text{'pro'}$
      $(\uparrow \text{NUM}) = \text{PL}$
      $(\uparrow \text{PERS SPEAK}) = +$
      $(\uparrow \text{PERS HEAR}) = +$
      $(\uparrow \text{PERS PART}) = +$
      $(\uparrow \text{PERS LOCAL}) = +$
      $(\uparrow \text{PERS PROX}) = +$
      $(\uparrow \text{PERS ANIM}) = +$
      $(\uparrow \text{PERS ENT}) = +$

Example structure (with templates)

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

TP

(↑ SUBJ) = ↓
Cl$_S$

(↑ PRED) = 'pro'
@INCLUSIVE(↑)
@PLURAL(↑)

↑ = ↓
T'

↑ = ↓
T

(↑ TENSE) = PST

φ

↑ = ↓
AgrP

↑ = ↓
Agr'

(↑ OBJ) = ↓
Cl$_O$

(↑ PRED) = 'pro'
@PROXIMATE(↑)
@PLURAL(↑)

↑ = ↓
VoiceP

↑ = ↓
Agr

@INCLUSIVE(↑ SUBJ)
@PLURAL(↑ SUBJ)
@PROXIMATE(↑ OBJ)
@PLURAL(↑ OBJ)

↑ = ↓
vP

↑ = ↓
Voice

@INVERSE

↑ = ↓
√

↑ = ↓
v

(↑ PRED) = 'see'

@VTA

$$\begin{bmatrix} \text{PRED} & \text{'see'} \\ \text{TENSE} & \text{PST} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{NUM} & \text{PL} \\ \text{PERS} & \begin{bmatrix} \text{SPEAK} & + \\ \text{HEAR} & + \\ \text{PART} & + \\ \text{LOCAL} & + \\ \text{PROX} & + \\ \text{ANIM} & + \\ \text{ENT} & + \end{bmatrix} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{NUM} & \text{PL} \\ \text{PERS} & \begin{bmatrix} \text{PROX} & + \\ \text{ANIM} & + \\ \text{ENT} & + \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

ν   ν   ν   ν   ν   ν   ν   ν

gi- gii- waab -am -igw -naan -ag

Example structure (full feature structures)

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

TP

(↑ SUBJ) = ↓
Cl$_S$

(↑ PRED) = 'pro'
(↑ NUM) = PL
(↑ PERS SPEAK) = +
(↑ PERS HEAR) = +
(↑ PERS PART) = +
(↑ PERS LOCAL) = +
(↑ PERS PROX) = +
(↑ PERS ANIM) = +
(↑ PERS ENT) = +

↑ = ↓
T'

↑ = ↓
T

(↑ TENSE) = PST

↑ = ↓
AgrP

↑ = ↓
Agr'

↑ = ↓
VoiceP

↑ = ↓
vP

↑ = ↓
√

(↑ PRED) = 'see'
ν

↑ = ↓
v

(↑$_\sigma$ ARG$_1$)
(↑$_\sigma$ ARG$_2$)
{(↑ OBJ ANIM) = + | ¬(↑ OBJ)}

↑ = ↓
Voice

@MAP(SUBJ,ARG$_2$)
@MAP(OBJ,ARG$_1$)

↑ = ↓
Agr

(↑ SUBJ NUM) = PL
(↑ SUBJ PERS SPEAK) = +
(↑ SUBJ PERS HEAR) = +
(↑ SUBJ PERS PART) = +
(↑ SUBJ PERS LOCAL) = +
(↑ SUBJ PERS PROX) = +
(↑ SUBJ PERS ANIM) = +
(↑ SUBJ PERS ENT) = +
(↑ OBJ NUM) = PL
(↑ OBJ PERS PROX) = +
(↑ OBJ PERS ANIM) = +
(↑ OBJ PERS ENT) = +

(↑ OBJ) = ↓
Cl$_O$

(↑ PRED) = 'pro'
(↑ NUM) = PL (↑ PERS PROX) = +
(↑ PERS ANIM) = +
(↑ PERS ENT) = +

φ
φ
φ
ν
ν
ν
ν
ν
ν
ν
ν

gi- gii- waab -am -igw -naan -ag

$$\begin{bmatrix} \text{PRED} & \text{'see'} \\ \text{TENSE} & \text{PST} \\ \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{NUM} & \text{PL} \\ \text{PERS} & \begin{bmatrix} \text{SPEAK} & + \\ \text{HEAR} & + \\ \text{PART} & + \\ \text{LOCAL} & + \\ \text{PROX} & + \\ \text{ANIM} & + \\ \text{ENT} & + \end{bmatrix} \end{bmatrix} \\ \text{OBJ} & \begin{bmatrix} \text{PRED} & \text{'pro'} \\ \text{NUM} & \text{PL} \\ \text{PERS} & \begin{bmatrix} \text{PROX} & + \\ \text{ANIM} & + \\ \text{ENT} & + \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

Templates used

- We make use of the LFG mechanism of *templates* (Dalrymple et al. 2004; Asudeh et al. 2013) to encode bundles of grammatical descriptions that get expressed in the language

- Following Bejar and Rezac (2009); Oxford (2014), among others, we assume that the person and animacy features are decomposed into a number of privative features

- Instead of the feature geometries used by the above authors, in our system the implicational relationships between the features are encoded in a set of templates, providing a way to represent the prominence hierarchy (1) in the LFG formalism

- Note: The symbol '@' signifies calling or invoking a template; e.g., the template animate(f) calls the template entity(f), and therefore all the features included within that template (i.e., (f pers entity) = +).

Person and number templates

- Note that, as mentioned above, the ranking of 2 > 1 shown in (1) does not apply to all lexical items; thus, the templates in (7) allow either 1 or 2 to be at the top of the hierarchy, depending on whether @SPEAKER or @HEARER is used
- The first set of templates encodes the hierarchy; the second singles out particular points on the hierarchy

(7) *Person and number templates*

Template	*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) = + @LOCAL(f)	1 and/or 2
LOCAL(f)	(f PERS LOCAL) = + @PROXIMATE(f)	Unspecified actor and above
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)
IMPERSONAL(f)	¬(f PERS PART) @LOCAL(f)	Unspecified actor only
NONLOCAL(f)	¬(f PERS LOCAL) @PROXIMATE(f)	3 only
OBVIATIVE(f)	¬(f PERS PROX) (f OBV) = + @ANIMATE(f)	3' only
INANIMATE(f)	¬(f PERS ANIM) @ENTITY(f)	0 only
PLURAL(f)	(f NUM) = PL	
SINGULAR(f)	(f NUM) = SG	

Templates for verb classes and Voice

- We are assuming a mapping theory similar to that of Findlay (2016), in which arguments are represented in the s-structure (as underspecified, ordered argument roles) and associated by mapping rules with grammatical functions in the f-structure

- However, this system requires modifications to account for the fact that in Ojibwe, the more- and less-prominent arguments are always subject and object (respectively); the details are outside the scope of this presentation, as are the definitions of many of the templates involved

- @VTA states that there are two core arguments (which, all else being equal, map to subject and object), and that the object (if present) is animate, although further valency-changing operations such as the reflexive can remove the object argument

- @VAI is similar, but intransitive

- @DIRECT maps the subject function to ARG_1 in s-structure, which is the agent-like argument, and the object to ARG_2, the patient; vice versa for @INVERSE

- @REFLEXIVE ensures that no grammatical function maps to ARG_2 (Ojibwe reflexives are morphosyntactically intransitive), and that the referential index of ARG_2 has an antecedence relationship with that of ARG_1 (see Dalrymple et al. 2018 on reflexive binding in LFG)

(8) *Templates for verb classes and Voice*

Template	Description	Explanation
VTA	$(\uparrow_\sigma \text{ARG}_1)$ $(\uparrow_\sigma \text{ARG}_2)$	Two semantic arguments
	$\{(\uparrow \text{OBJ ANIM}) = + \mid \neg(\uparrow \text{OBJ})\}$	Object animate if present
VAI	$(\uparrow_\sigma \text{ARG}_1)$	One semantic argument
	$(\uparrow \text{SUBJ ANIM}) = +$	Subject animate
DIRECT	$@\text{MAP}(\text{SUBJ},\text{ARG}_1)$	Subject $\mapsto$ agent
	$@\text{MAP}(\text{OBJ},\text{ARG}_2)$	Object $\mapsto$ patient
INVERSE	$@\text{MAP}(\text{SUBJ},\text{ARG}_2)$	Subject $\mapsto$ patient
	$@\text{MAP}(\text{OBJ},\text{ARG}_1)$	Object $\mapsto$ agent
REFLEXIVE	$@\text{NOMAP}(\text{ARG}_2)$	No object is present
	$\Re(\text{ARG}_2 \text{ INDEX}) = (\text{ARG}_1 \text{ INDEX})$	Reflexive antecedence relation

Note: Here and elsewhere we are using the traditional Algonquianist abbreviations for the verb classes: VTA = transitive animate, VTI = transitive inanimate, VAI = intransitive animate, VII = intransitive inanimate. As mentioned above, for reasons of space we are omitting the two verb classes that involve inanimate arguments (VTI and VII).

Vocabulary items

- There are four categories of morpheme that are involved in inflection: the subject proclitic and object enclitic, an agreement morpheme that usually agrees with the subject (but occasionally with the object), and a Voice morpheme that encodes direct and inverse marking, reflexivity, and certain other features.

- We treat the VIs as a mapping from a double, consisting of a syntactic category and a bundle of grammatical descriptions, to a phonemic form (rendered here in standard orthography)

- The order of morphemes in an Ojibwe transitive independent-order verb is as follows (the material enclosed in brackets comprises the verb stem, the rest is inflection; preverbal material is omitted):

$$(9) \quad \text{Clitic}_{subj} - \text{Tense} - [\text{Root} - v] - \text{Voice} - \text{Agr} - \text{Clitic}_{obj}$$

Agreement inflection: Cl$_S$ (subject clitics)

- These are considered to be subject clitics, appearing in Spec-TP, although they are unspecified for number

- As is often the case with clitics, these may appear with or without overt arguments, and so the PRED features are optional (Bresnan et al. 2016); the same holds for the object clitics in (11)

- The 3rd-person clitic *o-* is unlike the others in that it only appears with transitive verbs; this is indicated by the inside-out constraint ((SUBJ ↑) OBJ), which requires that the f-structure containing the subject clitic includes an OBJ feature

(10) $\left\langle \text{Cl}_S, \left\{ \begin{array}{l} ((\uparrow \text{PRED}) = \text{`pro'}) \\ @\text{HEARER}(\uparrow) \end{array} \right\} \right\rangle \mapsto gi\text{-}$

$\left\langle \text{Cl}_S, \left\{ \begin{array}{l} ((\uparrow \text{PRED}) = \text{`pro'}) \\ @\text{PARTICIPANT}(\uparrow) \end{array} \right\} \right\rangle \mapsto ni\text{-}$

$\left\langle \text{Cl}_S, \left\{ \begin{array}{l} ((\uparrow \text{PRED}) = \text{`pro'}) \\ @\text{PROXIMATE}(\uparrow) \\ ((\text{SUBJ} \uparrow) \text{OBJ}) \end{array} \right\} \right\rangle \mapsto o\text{-}$

Agreement inflection: Cl_O (object clitics)

- These are considered object clitics, specified as objects in Spec-AgrP, although they are only present if object is 3rd person and plural or obviative

- For motivation for the analysis of these morphemes as enclitics in Algonquian, see Oxford (2014, pp. 203–210)

- Note that the vowels in these are subject to a fair bit of allophonic variation

$$(11) \quad \left\langle \ Cl_O, \ \left\{ \begin{array}{l} ((\uparrow \text{ PRED}) = \text{`pro'}) \\ @\text{NONLOCAL}(\uparrow) \\ @\text{PLURAL}(\uparrow) \end{array} \right\} \right\rangle \quad \mapsto \quad \text{-}ag$$

$$\left\langle \ Cl_O, \ \left\{ \begin{array}{l} ((\uparrow \text{ PRED}) = \text{`pro'}) \\ @\text{OBVIATIVE}(\uparrow) \end{array} \right\} \right\rangle \quad \mapsto \quad \text{-}an$$

Agreement inflection: Agr

- The notation GF$_\alpha$ appearing with *-imin* is intended as a variable for either subject or object; thus, *-imin* appears if *either the subject or object* is 1st-person plural, which (since 2 outranks 1 in determining subjecthood) means that it marks the object in transitive forms and subject in intransitives

- The VIs *-imin* and *-im* are specified as appearing either in local contexts (both arguments are specified as ($\uparrow$ PERS LOCAL) = +) or intransitives; likewise, *-wag* and *-wan* are specified as appearing only in intransitives

- In transitive, non-local contexts (one or both arguments are not ($\uparrow$ PERS LOCAL) = +), the morphemes *-naan* and *-waa* appear

$$(12) \quad \left\langle \text{Agr}, \left\{ \begin{array}{l} \text{@SPEAKER}(\uparrow \text{GF}_\alpha) \\ \text{@PLURAL}(\uparrow \text{GF}_\alpha) \\ \{(\uparrow \text{OBJ PERS LOCAL}) \mid \neg(\uparrow \text{OBJ})\} \end{array} \right\} \right\rangle \mapsto \textit{-imin}$$

$$\left\langle \text{Agr}, \left\{ \begin{array}{l} \text{@PARTICIPANT}(\uparrow \text{SUBJ}) \\ \text{@PLURAL}(\uparrow \text{SUBJ}) \\ \{(\uparrow \text{OBJ PERS LOCAL}) \mid \neg(\uparrow \text{OBJ})\} \end{array} \right\} \right\rangle \mapsto \textit{-im}$$

$$\left\langle \text{Agr}, \left\{ \begin{array}{l} \text{@SPEAKER}(\uparrow \text{SUBJ}) \\ \text{@PLURAL}(\uparrow \text{SUBJ}) \end{array} \right\} \right\rangle \mapsto \textit{-naan}$$

$$\left\langle \text{Agr}, \left\{ \begin{array}{l} \text{@PROXIMATE}(\uparrow \text{SUBJ}) \\ \text{@PLURAL}(\uparrow \text{SUBJ}) \end{array} \right\} \right\rangle \mapsto \textit{-waa}$$

$$\left\langle \text{Agr}, \left\{ \begin{array}{l} \text{@PROXIMATE}(\uparrow \text{SUBJ}) \\ \text{@PLURAL}(\uparrow \text{SUBJ}) \\ \neg(\uparrow \text{OBJ}) \end{array} \right\} \right\rangle \mapsto \textit{-wag}$$

$$\left\langle \text{Agr}, \left\{ \begin{array}{l} \text{@OBVIATIVE}(\uparrow \text{SUBJ}) \\ \neg(\uparrow \text{OBJ}) \end{array} \right\} \right\rangle \mapsto \textit{-wan}$$

Agreement inflection: Voice (theme signs and reflexive)

- There are two each of the direct and inverse theme signs (with animate arguments): one that appears when both arguments are participants (i.e., @PARTICIPANT(↑ OBJ)), and one when the object is not a participant (i.e., @ANIMATE(↑ OBJ))
- There are further theme signs for inanimate arguments and unspecified actors, which we are disregarding here
- In ordinary intransitive contexts (i.e., in the absence of reflexives and other valency-reducing Voice morphemes), the Voice head is absent

$$(13) \quad \langle \text{Voice}, \; \left\{ \begin{array}{l} \text{@DIRECT} \\ \text{@PARTICIPANT}(\uparrow \text{ OBJ}) \end{array} \right\} \rangle \quad \mapsto \quad \text{-}i$$

$$\langle \text{Voice}, \; \left\{ \begin{array}{l} \text{@DIRECT} \\ \text{@ANIMATE}(\uparrow \text{ OBJ}) \end{array} \right\} \rangle \quad \mapsto \quad \text{-}aa$$

$$\langle \text{Voice}, \; \left\{ \begin{array}{l} \text{@INVERSE} \\ \text{@PARTICIPANT}(\uparrow \text{ OBJ}) \end{array} \right\} \rangle \quad \mapsto \quad \text{-}in$$

$$\langle \text{Voice}, \; \left\{ \begin{array}{l} \text{@INVERSE} \\ \text{@ANIMATE}(\uparrow \text{ OBJ}) \end{array} \right\} \rangle \quad \mapsto \quad \text{-}igw$$

$$\langle \text{Voice}, \; \left\{ \text{@REFLEXIVE} \right\} \rangle \quad \mapsto \quad \text{-}idizo$$

Other VIs used

- In addition to the agreement morphemes listed above, the following morphemes appear in the above examples and the Appendix
- For most verbs in Ojibwe, the verb root and the v morpheme indicating the verb class are separate morphemes, as with *waab* and *–am*
- However, the verb meaning 'eat' has suppletive forms for the three compatible verb classes (i.e., depending on transitivity and animacy of the object): *amw* 'eat.VTA', *miij* 'eat.VTI', *wiisini* 'eat.VAI'
- This is analyzed as the verb exponing a span including both the root and v
- We see the intransitive form *wiisini* in (20) below

$$(14) \quad \langle \text{ T}, \quad \left\{ (\uparrow \text{TENSE}) = \text{PST} \right\} \rangle \quad \mapsto \quad gii\text{-}$$

$$\langle \sqrt{}, \quad \left\{ (\uparrow \text{PRED}) = \text{'see'} \right\} \rangle \quad \mapsto \quad waab$$

$$\langle \sqrt{}, \quad \left\{ (\uparrow \text{PRED}) = \text{'arrive'} \right\} \rangle \quad \mapsto \quad dago$$

$$\langle \text{ v}, \quad \left\{ @\text{VTA} \right\} \rangle \quad \mapsto \quad \text{-}am$$

$$\langle \text{ v}, \quad \left\{ @\text{VAI} \right\} \rangle \quad \mapsto \quad \text{-}shin$$

$$\langle \sqrt{}, \quad \left\{ \begin{array}{l} (\uparrow \text{PRED}) = \text{'eat'} \\ @\text{VAI} \end{array} \right\} \rangle \quad \mapsto \quad wiisini$$

Future research

- The following are phenomena that we will need to explain in the present framework, but haven't yet:
  - Morphosyntactic effects attributed to Head Movement
  - *Do*-support and affix hopping (multiple exponence)
  - Clitics vs. affixes; positioning of "special clitics"
  - Directionality of words vs. phrases
  - Productivity and blocking
  - "Derivational" meaning (beyond changes in category)
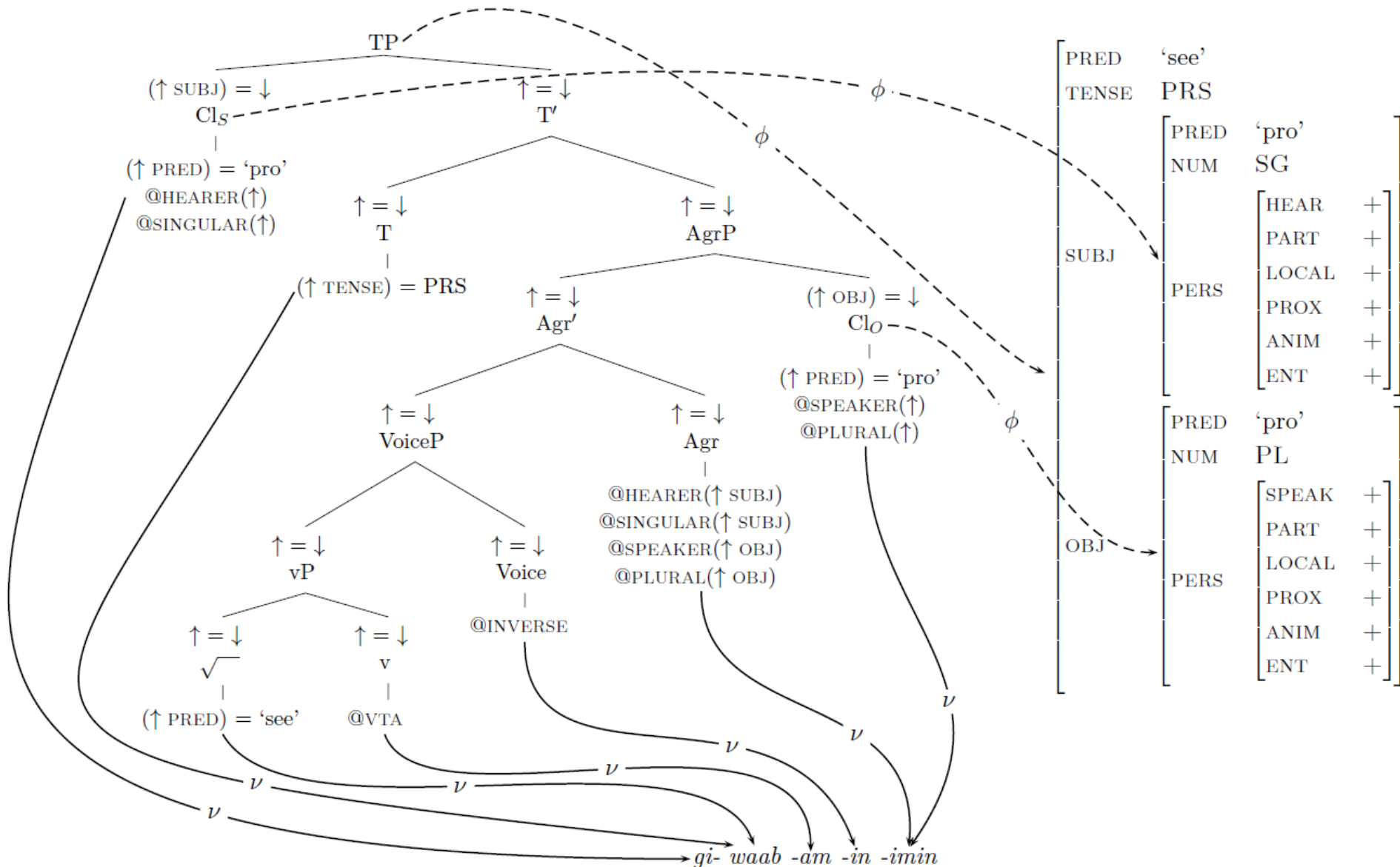 - Contents and distribution of feature bundles
  - Idioms

Appendix: More examples

(15)   ni- waab -am -aa
        1   see   VTA DIR
        'I see him/her.'
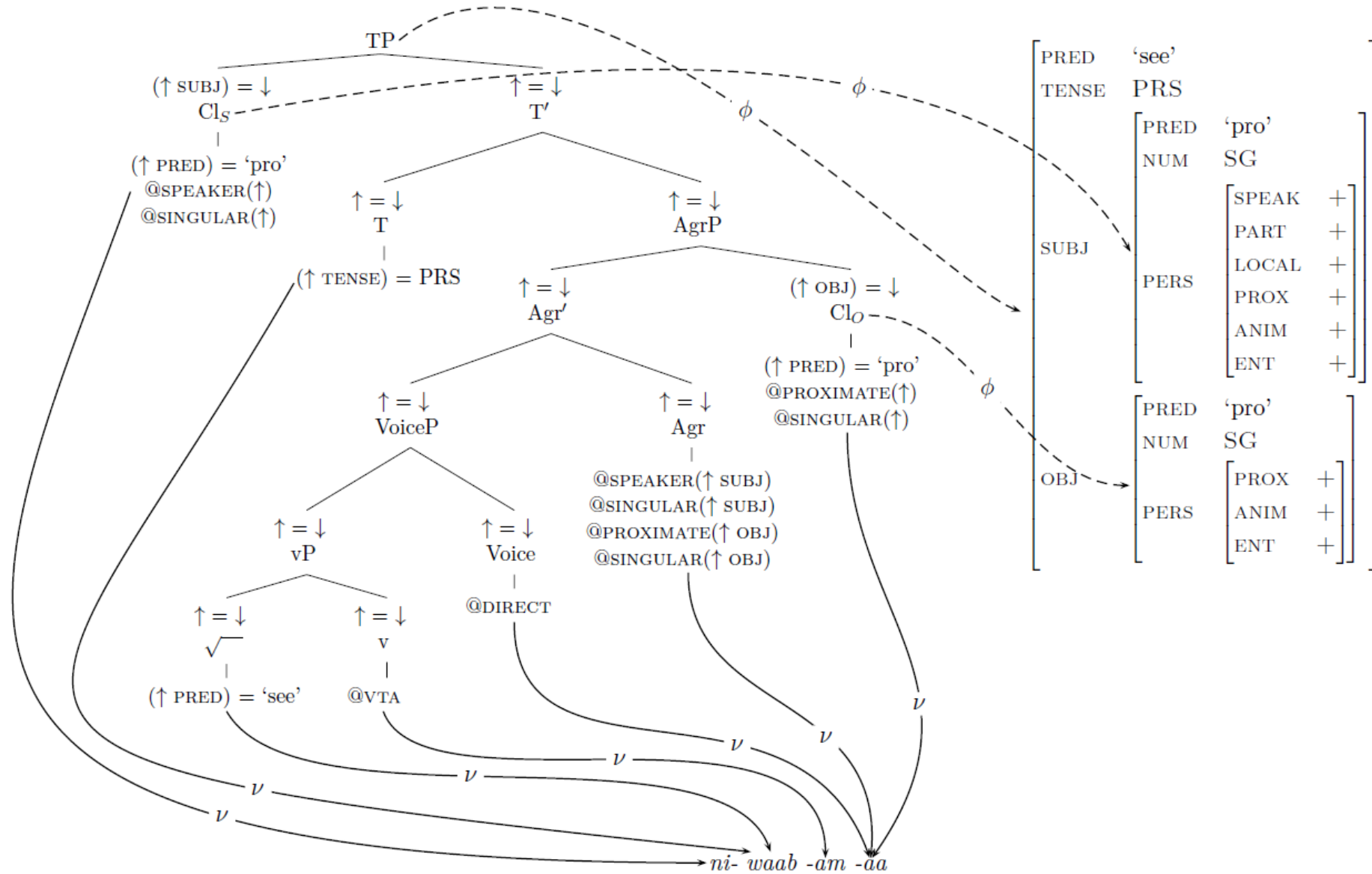
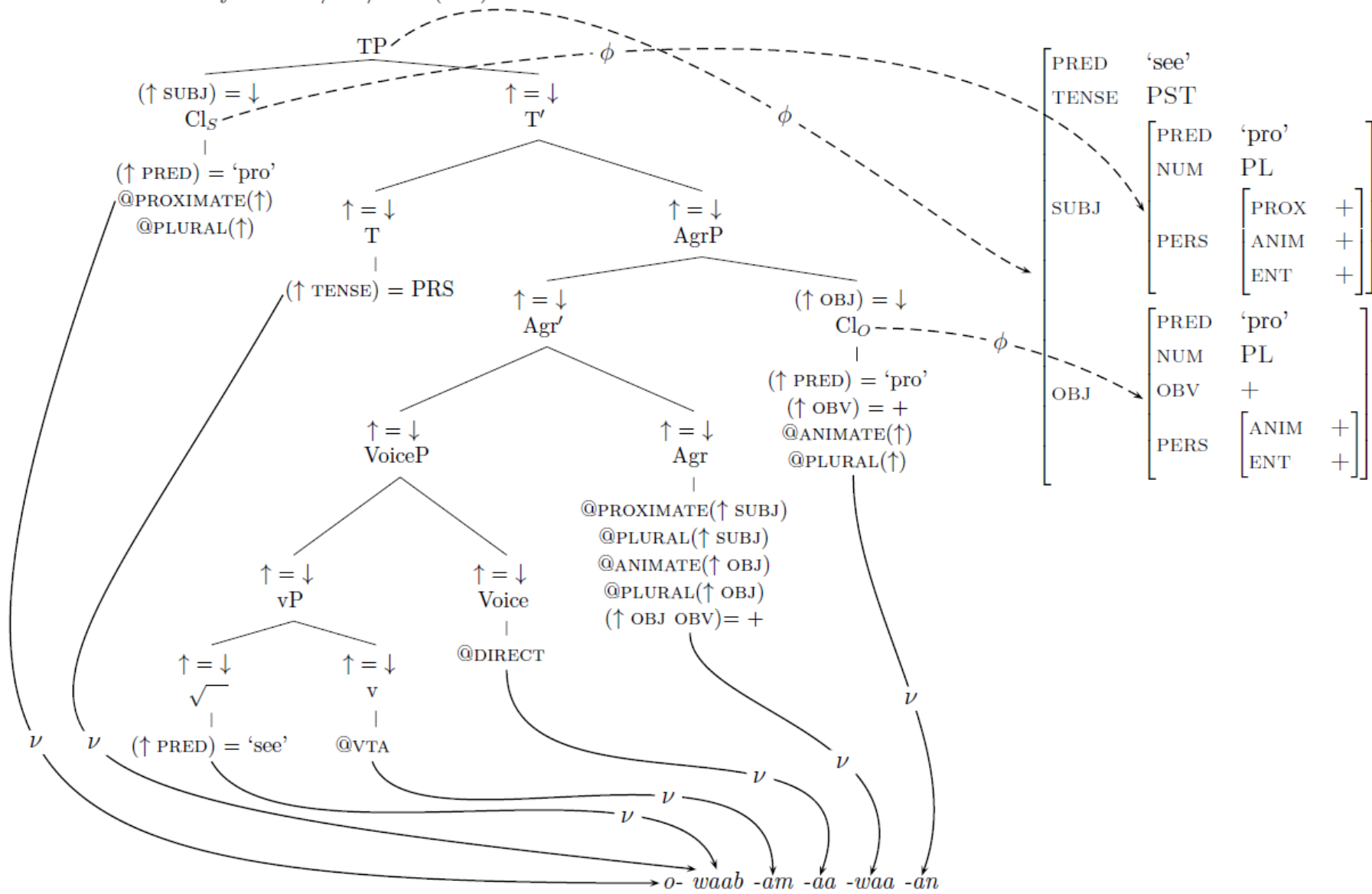# Appendix: More examples

(16)   gi- waab -am -in -imin
       2   see   VTA INV 1PL
       'We(excl) see you.'[8]

Note: In this sentence, the 2nd person argument's number is ambiguous; we take this to mean that the number is fully specified in the c- and f-structures, but the singular and plural forms map to identical v-structures. Here we provide the structures for the singular reading.

Appendix: More examples

(17) o- waab -am -aa -waa -an
      3 see   VTA DIR 3PL OBV
      'They see him/her/them(obv).'[9]

For obviative arguments the number is ambiguous between singular and plural (except in certain contexts), but we assume it is specified in the c- and f-structures. Here we specify it as plural.

Appendix: More examples

(18)   gi- waab -am -idizo -im
       2   see   VTA REFL 2PL
       'You(pl) see yourselves.'[10]

As mentioned above, the @REFLEXIVE template ensures that the form is morpho-syntactically intransitive (i.e., no obj in f-structure), and that the patient is interpreted as co-indexed with the agent. However, the latter property is modelled in the s-structure, which is not shown here.

Appendix: More examples

(19) ni- gii- dago -shin -imin
    1   PST see   VAI 1PL
    'We(excl) arrived.'

Appendix: More examples

(20)   gii- wiisini -wag
        PST see.VAI 3PL
        'They ate.'
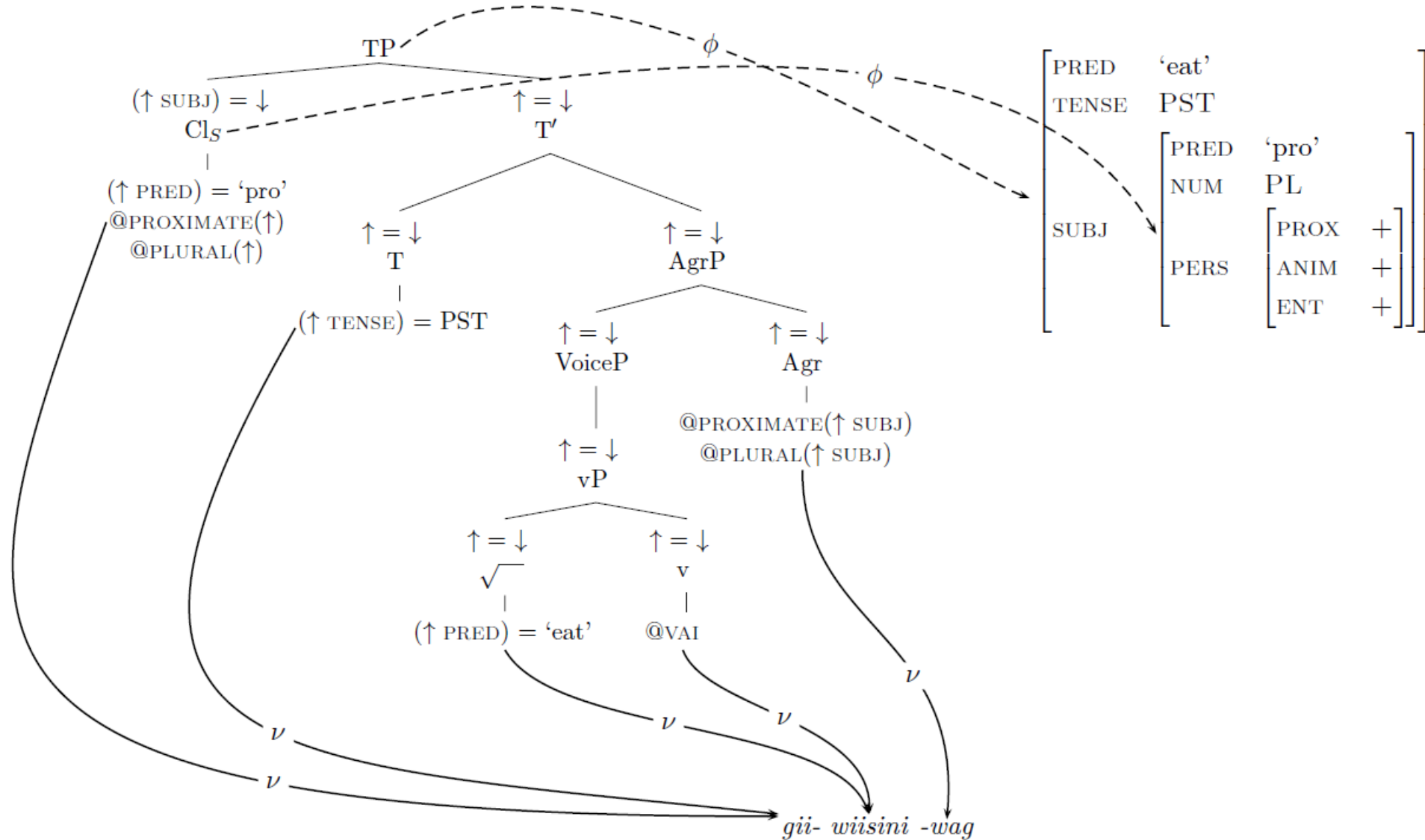
Acknowledgements

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