

L_RFG:

Implementing realizational morphosyntax in a constraint-based framework*

Ash Asudeh^{1,2} · Michael Everdell³ · Paul B. Melchin¹ · Dan Siddiqi¹

¹ School of Linguistics and Language Studies, Carleton University

² Department of Linguistics, University of Rochester

³ Department of Linguistics, The University of Texas at Austin

University of Edinburgh

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1 Our project

- We are developing a theoretical framework that couples 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, which we call Lexical-Realizational Functional Grammar (L_RFG; Melchin et al. 2020, Asudeh et al. 2021), is particularly well-suited to model North American Indigenous languages, which are characterized by *polysynthesis* and *nonconfigurationality*.
- In this talk we will summarize the framework, and demonstrate it with an analysis of Anishinaabemowin/Ojibwe inflection.
- The talk will proceed as follows:
 - Section 2 outlines the L_RFG framework, comparing and contrasting it to standard LFG and providing details on the exponence function.
 - Section 3 provides a brief introduction to Ojibwe, and a background on relevant aspects of the language's morphosyntax.
 - Section 4 provides a demonstration of our analysis, including the structures of a representative example sentence, as well as presentation and discussion of the templates used and specifications of the Vocabulary Items needed for animate agreement in Ojibwe and for the examples in the handout.
 - Section 5 indicates some directions for future research.
 - The three appendices provide further demonstrations of the framework. Appendix A provides structures for two additional Ojibwe examples, demonstrating most of the Ojibwe agreement morphology under discussion. Appendix B provides additional discussion of Ojibwe conjunct-order agreement. Appendix C sketches an application of the framework to the Uto-Aztecan language O'dam.

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2 The framework

2.1 Motivation

- L_RFG is the offspring of an unlikely marriage between Distributed Morphology as a theory of morphological realization and Lexical-Functional Grammar as a theory of syntax and grammatical architecture.
- L_RFG combines the strengths of the two frameworks:
 1. Like LFG, it is a declarative, representational and constraint-based theory (without the bottom-up, phase-based derivations of Minimalism) that is ideally suited to modelling nonconfigurationality.
 2. Like DM, it provides a realizational, morpheme-based view of word-formation and is good at modelling complex morphological structures including those found in polysynthetic languages, such as many North American Indigenous languages.
- Additionally, because the realizational module, v(ocabulary)-structure, has access to prosodic structure, L_RFG has the potential to give non-transderivational (computationally simpler) prosodic explanations for morpheme alignment and surface form phenomena that are typically alternatively analyzed in transderivational harmonic approaches to the morphology-phonology interfaces such as Optimality Theory (Prince and Smolensky 1993, 2004).

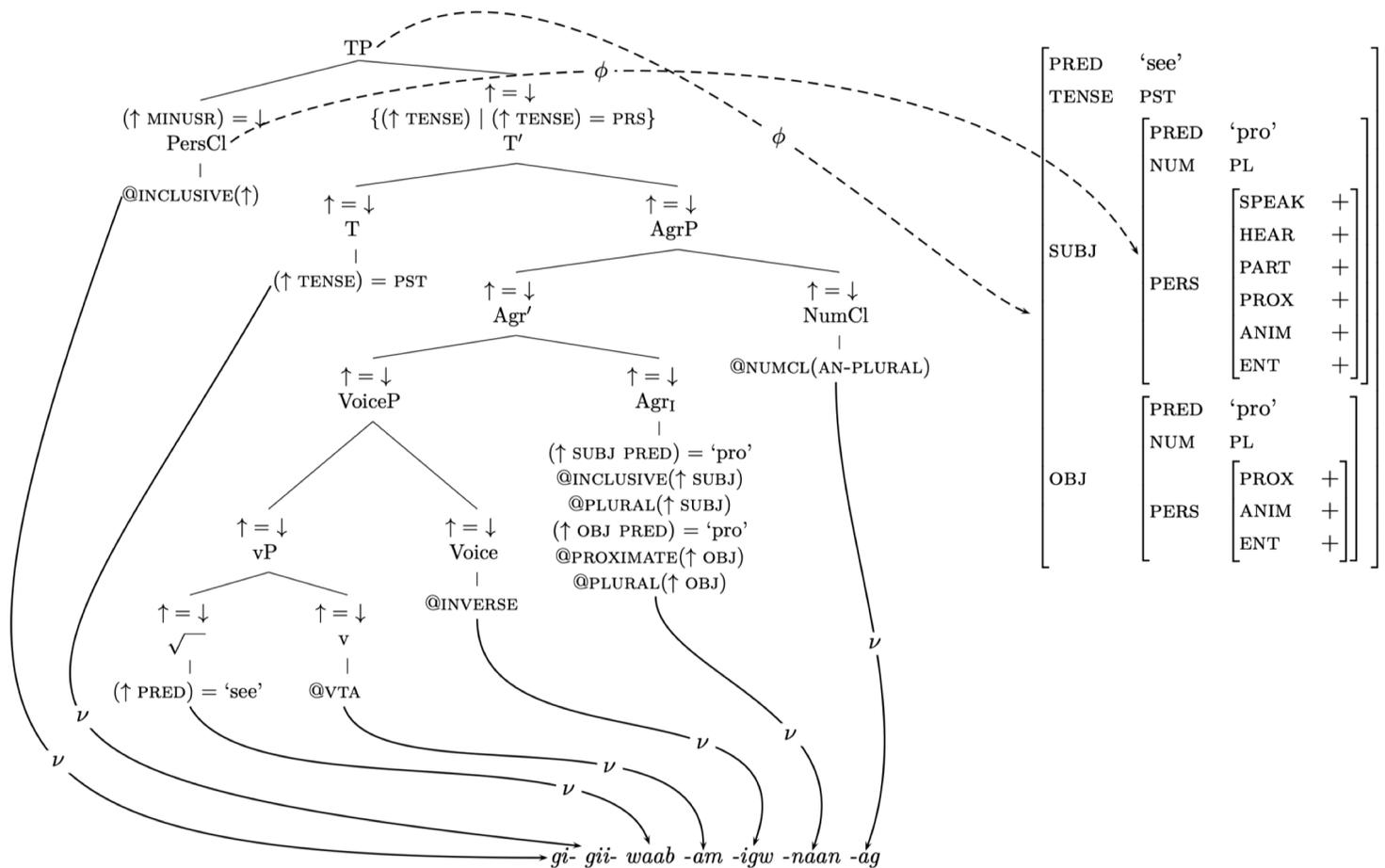
2.2 Comparison with standard LFG

- L_RFG is similar to standard LFG, with changes to the c-structure and its relationship with morphosyntactic elements.
- The terminal nodes of c-structures *are not words*, but instead are f-descriptions (sets of f-structure equations and constraints)
- The c-structure is mapped to a v(ocabulary)-structure, a linearized structure in which vocabulary items (VIs) *expose* (i.e., realize) the features in the terminal nodes, via a correspondence function, ν .
- Formally, v-structure is a list, each member of which is a feature structure defining morphophonological properties relevant to the linear placement and metrical properties of the item.
 - This includes the phonemes/segments, as well as the metrical frame which determines syllable structure, affix/clitic status, and so on.
 - Thus, the v-structure roughly corresponds to the p(honological)-form portion of a lexical entry in the metrical theory of Bögel (2015).¹
- In this talk, only the strings themselves are relevant, so we make some simplifying assumptions:
 1. We represent the output of the exponence function, ν , simply as a string, not a full VI structure.
 2. We show alignment informally using the standard notational convention of adding a dash to the left or right of the string.
 3. We do not show the $o \circ \rho$ -mapping (see Figure 1 below), but instead let the phonological forms stand in for the VI strings (i.e., we conflate the two for simplicity/presentational purposes).

¹We would like to thank Tina Bögel for her insightful comments on this point at the LFG20 conference, and in extensive discussion afterwards. The details of the interaction between v-structure and the phonological string, in particular the effects of the metrical properties of VIs on mismatches in ordering between c-structure and the p-string, are currently being worked out and will be presented in future work in the L_RFG framework.

- In sum, vocabulary structure is a morphophonological structure that maps to phonological form via prosodic structure.
- Here is an example from Ojibwe (details to follow in Section 4) to demonstrate the basics of an L_RFG analysis.

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



- We complete the v-structure mappings by introducing a new phonological correspondence function, o , which maps from prosodic structure to phonological strings, and treating the ρ mapping as a mapping from vocabulary items to prosodic structures.
- In other words, the output of ρ is the prosodic structure and the output of o is the final result of phonological processes, a set of strings that are based on the prosodic well-formedness conditions of VIs.
- The morphology is responsible for the input to phonology, but phonology does whatever phonology does to create the output, which is not part of morphology per se.
- Given the set of VIs, V , and a set of prosodic structures, P :

(2) $\rho : V \rightarrow P$

- The o correspondence function takes the output of this ρ correspondence function as its input and so maps to the phonological string (o 's output) from the prosodic structure that corresponds to the vocabulary item.
- Thus, in this framework, v-structure precedes the phonological string in the Correspondence Architecture (see, e.g., Asudeh 2012: 53), resulting in the revised architecture in Figure 1.
- The output of the grammar, $\langle \Gamma_1, \Gamma_2 \rangle$, for any particular set of input formatives, is a form–meaning pair where the form incorporates prosody (still fed by constituent structure) and the meaning incorporates information structure (still fed by semantic structure).²

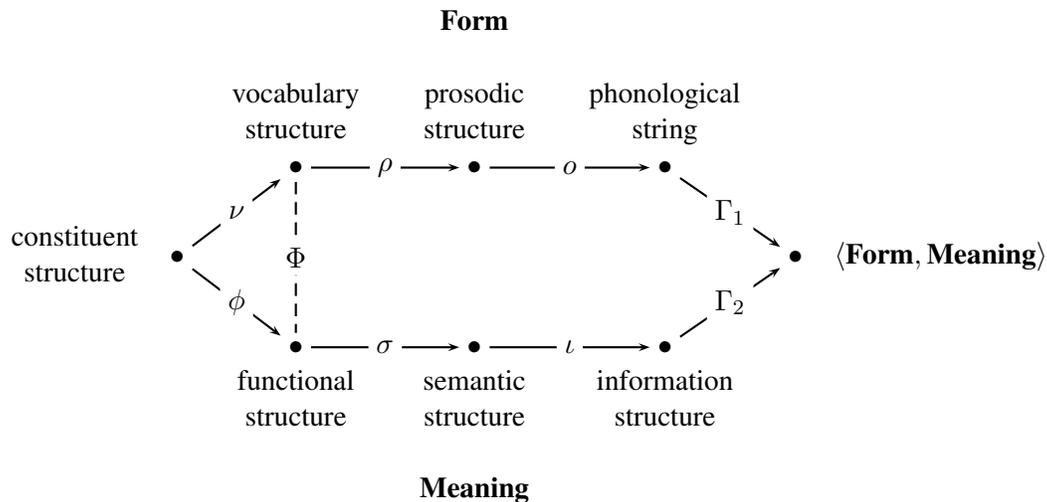


Figure 1: Correspondence Architecture

- The relationship between terminal nodes and VIs is many-to-one, using the mechanism of *Spanning* (Haugen and Siddiqi 2016, Merchant 2015, Ramchand 2008, Svenonius 2016); i.e. one VI may realize features of multiple terminal nodes.
- The result is similar to the Lexical Sharing model proposed for LFG by Wescot (2002, 2005, 2007), but maintains the complex internal structures of words as part of syntax.

²Note that the *set* of all grammatical form–meaning pairs may have a given form recurring in several pairs, if it is ambiguous, or a given meaning recurring in several pairs, if it is expressible in alternative ways.

2.3 L_RFG as a daughter framework of LFG

- The obvious point of contrast between L_RFG and LFG concerns the Lexicalist Hypothesis (Chomsky 1970, Lapointe 1980):

(3) *Lexicalist Hypothesis*
No syntactic rule can refer to elements of morphological structure. (Lapointe 1980: 8)

- In LFG this is captured in the *Lexical Integrity Principle*, through formulations like the following:

(4) *Lexical Integrity*
Morphologically complete words are leaves of the c-structure tree, and each leaf corresponds to one and only one c-structure node. (Bresnan et al. 2016: 92)

- This statement has two parts:

1. L_RFG *upholds* the part that states that “each leaf corresponds to one and only one c-structure node”.
 - This may contrast with Lexical Sharing (Wescoat 2002, 2005, 2007), in which portmanteau forms like *du* (‘of.DEF.MASC.SG’) in French appear to correspond to more than one c-structure node. We need to look under the hood carefully, though, to see what the formal definition of Lexical Sharing is rather than simply going by its graphical representation, which may be misleading. We haven’t done this work yet.
2. L_RFG *rejects* the part that states that “morphologically complete words are leaves of the c-structure tree”.
 - Clearly, the c-structure leaves/terminals in L_RFG are not “morphologically complete words”. The c-structure leaves/terminals are feature bundles that *map* to form, but the form itself is not part of the terminal node.

- However, notice that the notion *morphologically complete word* is left unanalyzed in the definition in (4).

- In fact, it is far from clear that “morphologically complete word” is a coherent notion (see, for example, Anderson 1982).

- The essential problem is that there are multiple relevant notions of wordhood, and they don’t align on a single type of object that we can point to and unambiguously and confidently call a word (Di Sciullo and Williams 1987).³ In fact, there can be mismatches between the phonological, syntactic, and semantic aspects of words (Marantz 1997).

1. Portmanteau words are examples of things that are phonologically simple but semantically and syntactically complex.

(5) Tu bois **du** lait. French
you drink of.DEF.MASC.SG lait
‘You drink/are drinking milk.’

(6) **Imma** go. English dialect
1SG.FUT.PROX go
‘I’m about to go.’

³This is a long and broad discussion that we cannot possibly do justice to here.

2. Idiomatic expressions are phonologically and syntactically complex, but not necessarily semantically complex, and never in a way that maps entirely transparently to their phonology and syntax.

(7) I read **the shit out of** this book.

INTENSIFIER

‘I thoroughly read this book.’

3. Units of syntax can be phonologically or semantically dependent on their contexts.

(8) Je l’ai vu.

I 3SG.saw

‘I saw it.’

French clitic

(9) **The cat’s** been let out of the bag.

- L_RFG thus countenances three criteria for wordhood:

1. A word as an unanalyzed phonological string (phonological criterion)
2. A word as a lexicalized string with a non-compositional meaning (semantic criterion)
3. A word as a syntactic atom (syntactic criterion)

- L_RFG thus assumes that there are three notions of wordhood that sometimes happen to align, but can diverge, i.e., there are mismatches between the three types of wordhood.

- With its focus on mismatches, L_RFG is therefore strongly in the spirit of LFG.

- L_RFG uses the standard *co-description* mechanism of LFG (for recent exposition, see Dalrymple et al. 2019) to simultaneously state the phonological, syntactic and semantic aspects of formatives.

- Here are some possible points of comfort for an LFGer gazing on L_RFG’s familiar yet alien landscape:

1. L_RFG could be considered to be offering a morphological theory for LFG that had previously been captured by somewhat ad hoc devices like phrase structure rules for word formation; see, e.g., the discussions of Japanese and West Greenlandic in Bresnan et al. (2016). In other words, LFG owes some kind of theory of word structure, which has generally been lacking until recently (see, e.g., Dalrymple 2015, Dalrymple et al. 2019), and L_RFG seeks to pay that debt.
2. The Vocabulary Items of L_RFG contain much the same information as LFG’s lexical entries, but without the commitment that morphophonological form is bundled as part of the lexical entry. It should be easy to specify an algorithm for translating L_RFG’s VIs into LFG lexical entries.
3. Related to the first two points, if one were to want to maintain some version of the Lexicalist Hypothesis, one could view L_RFG as offering a microscopic view of the structure of “words”, in particular major categories like verb and noun. For example, the TP node in (1) in some sense *is* the verb, but the L_RFG c-structure shows its internal structure. A standard LFG c-structure for example (1) would instead look like the following (setting the f-description aside). Isn’t it normal science to examine things at a smaller and smaller scale?

(10)

$$\begin{array}{c}
 S \\
 | \\
 \uparrow = \downarrow \\
 V \\
 | \\
 \text{gigiwaabamigwnaanag}
 \end{array}$$

2.4 L_RFG's exponence function: ν

- The exponence function ν maps from a pair of arguments to a VI, the exponence of the arguments.
 - The first argument is a list of pre-terminal categories, typically of length 1, which are taken in the linear order they appear in the tree.
 - The second argument is itself a function, Φ , which maps an f-description to the set of f-structures that satisfy the description; i.e. $\Phi(d \in D) = \{f \in F \mid f \models d\}$, where D is the set of valid f-descriptions and F is the set of f-structures.⁴
 - In sum, ν maps **from** a pair whose first argument is a list of c-structure pre-terminal categories and whose second argument is a set of f-structures **to** a structured expression as described above.

- **Conditions on exponence:**

- Let V be the range of the exponence function ν , the set of VIs (structured expressions); then the following condition on exponence holds.⁵

(11) Given $\alpha \in A$ and $\beta \in B$, where $A, B \subseteq V$, and a function $\llbracket \cdot \rrbracket_p$ that returns the conventionalized presuppositions of a given expression,

$$\text{If } \bigcup_{a \in A} \llbracket a \rrbracket_p = \bigcup_{b \in B} \llbracket b \rrbracket_p$$

Then **MostInformative**(α, β)

- The conventionalized presuppositions of an expression are the set of presuppositions lexically triggered by the expression (Keenan 1971, Beaver 2001, Beaver and Geurts 2014). Presuppositions are propositions. Propositions are sets of possible worlds. Therefore, $\llbracket \cdot \rrbracket_p$ returns a set of sets of possible worlds.
- The antecedent of the conditional in (11) therefore collects the conventionalized presuppositions of its arguments in two sets and tests whether the sets are equal.
- **MostInformative**(α, β) returns whichever of α, β has the most specific f-structure in the set of f-structures returned by Φ applied to the unions of α/β 's collected f-descriptions. Formally:

$$\text{MostInformative}(\alpha, \beta) = \begin{cases} \alpha & \text{if } \exists f \forall g. f \in \pi_2(\nu^{-1}(\alpha)) \wedge g \in \pi_2(\nu^{-1}(\beta)) \wedge g \sqsubset f \\ \beta & \text{if } \exists f \forall g. f \in \pi_2(\nu^{-1}(\beta)) \wedge g \in \pi_2(\nu^{-1}(\alpha)) \wedge g \sqsubset f \\ \perp & \text{otherwise} \end{cases}$$

- Thus, the condition in (11) amounts to a combination of the elsewhere condition/subset principle and an economy constraint that enforces spanning when possible.

⁴We thank Ron Kaplan (p.c.) for discussion of this point. Any remaining errors are our own.

⁵One difference between our proposal and the Lexical Sharing of Wescoat (2002, 2005, 2007) is the notion, which we'll call *Pac-Man Spanning*, that VIs can span any number of adjacent preterminal nodes, so long as the conventionalized presuppositions of the expounded expressions are held constant.

3 Ojibwe: Background

3.1 Why look at Ojibwe?

- 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)⁶
 - 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

3.2 Ojibwe primer: Prominence, animacy and obviation

- Ojibwe grammar has many features that are mostly shared with the other Algonquian languages, but some of which are 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)
- Some of these properties warrant some further discussion.
- **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**.

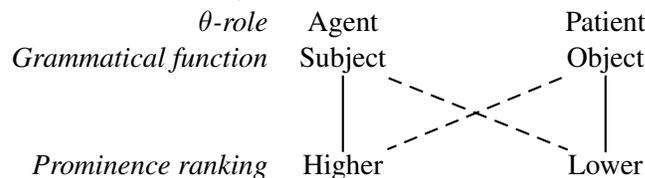
⁶When we say that Ojibwe is “nonconfigurational”, we do not intend to claim that word order is completely free. We are using the term in the LFG sense (Bresnan et al. 2016), meaning that word order and phrase structure are not used to distinguish grammatical functions like subject and object. Instead, word order is determined by a combination of factors, including obviation and information structure; see Dahlstrom (2017) for extensive discussion and references.

- The choice of which argument is proximate is mainly based on (currently 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 (adapted from Valentine 2001: 268; abbreviations largely follow common Algonquianist practice):⁷
- (12) *Prominence Hierarchy*
- | | |
|----|------------------------------|
| 2 | 2nd person |
| 1 | 1st person |
| 3 | 3rd person animate proximate |
| 3' | 3rd person animate obviative |
| 0 | 3rd person inanimate |
- It should be noted that, while the ranking of 2 above 1 determines the insertion of the person prefix (at least on the view of Rhodes 1994, Rhodes and Valentine 2015, 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, and others where they appear to be equally ranked (see Section 4.2 and Appendix A).
- **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**.⁸
 - When the patient is the higher-ranked argument and the agent is lower, the verb is marked as **inverse**.
 - 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.
 - For some, 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

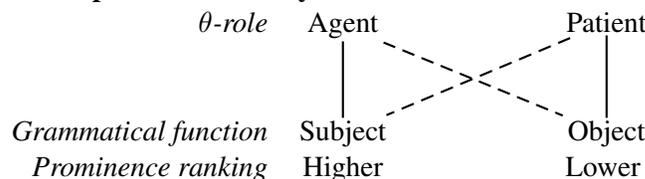
⁷Contra Valentine (2001), we do not include the “unspecified actor” form in the prominence hierarchy; instead, we analyze these forms as instances of a short passive. See Section 4.2.5 for discussion.

⁸Following 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.

- In the diagram below, the solid lines represent the correspondences in a direct form, and the dashed lines the correspondences in inverse.

(13) **GFs-as- θ -roles 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
 - In the diagram below, the solid lines again represent the correspondences in a direct form, and the dashed lines the correspondences in inverse.

(14) **GFs-as-prominence analysis**

- We adopt the **GFs-as-prominence analysis** (14), where the grammatical functions are defined in terms of the prominence hierarchy.⁹
 - This allows us to treat direct/inverse marking as determining the mapping between grammatical functions in the f-structure and thematic argument roles in the semantic structure (Asudeh and Giorgolo 2012, Asudeh et al. 2014).
 - 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.
 - See Section 4.2 for a formalization of this analysis.

3.3 Data under consideration

- The data and analysis in this talk is meant to range over and cover the different varieties that linguists consider to be part of the Ojibwe language, including both Nishnaabemwin (such as Odawa) and Anishinaabemowin dialects (such as Southwestern Ojibwe and Algonquin).
- The data are taken mainly from Nichols's (1980) grammar of Southwestern Ojibwe, corroborated with the paradigms in Jones (1977) (Algonquin) and Valentine (2001) (Nishnaabemwin).

⁹While 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, 443). It is possible that languages differ as to which is the proper analysis, as is claimed by McGinnis (1999), Alsina and Vigo (2017).

- 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 the inflectional morphemes themselves differ between dialects, we have done our best to present the more conservative forms, consulting the analysis of Proto-Algonquian in Oxford (2014). There are notes on instances of variation in Section 4.
- The current analysis accounts for the full verbal agreement system, including agreement for subjects, primary and secondary objects (SUBJ, OBJ, and OBJ_θ, respectively), both animate and inanimate, in both the independent and conjunct orders.
- We provide the templates (Dalrymple et al. 2004, Asudeh et al. 2013) that are invoked in the analysis, VIs for the set of inflectional morphemes that appear with these verbs, and illustrate by providing c-, f-, and (abbreviated) v-structures for some representative examples.

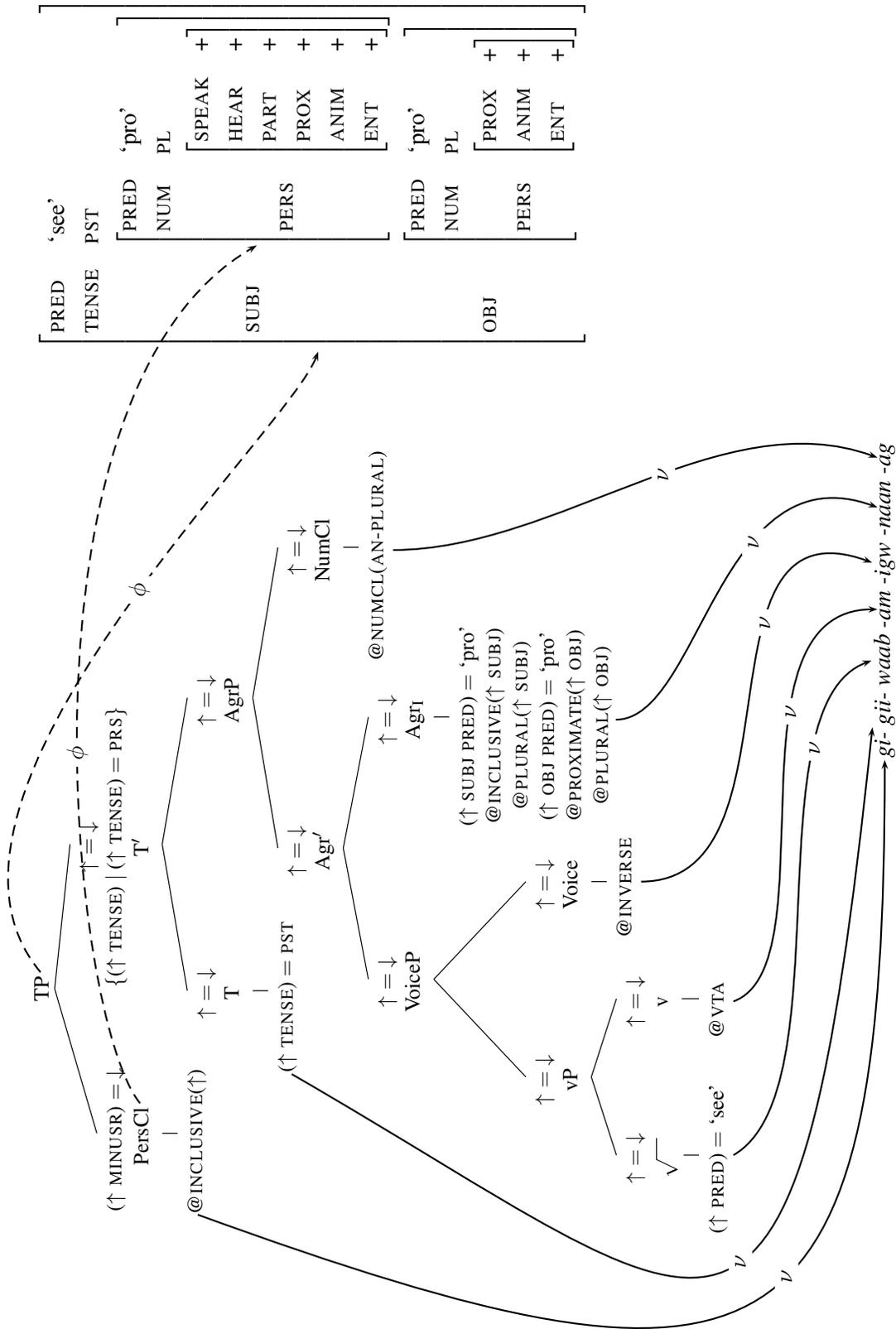
4 Analysis: Ojibwe inflection

4.1 Example structure

- The following are the c-, f-, and v-structures for a representative example, which was constructed based on the paradigms in Valentine (2001) (more can be found in Appendix A).
- 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.
 - In other words, the semantics of template invocation is just substitution (Dalrymple et al. 2004).
 - The c-structure in (17) gives the expanded form of (16), with all templatic information provided by substitution.
 - Thus, while the description for the PersCl node in (16) is written in the c-structure as (15a), it should be read as in (15b):

- (15) a. @PLURAL(↑)
 @INCLUSIVE(↑)
 b. (↑ NUM) = PL
 (↑ PERS SPEAK) = +
 (↑ PERS HEAR) = +
 (↑ PERS PART) = +
 (↑ PERS PROX) = +
 (↑ PERS ANIM) = +
 (↑ PERS ENT) = +

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



4.2 Templates

- As noted above, 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.
- The templates involved in our analysis can be divided into five groups: those encoding general constraints, those encoding the prominence hierarchy (person/gender), those encoding obviation and number, those encoding verb classes, and those encoding the mapping between grammatical function and argument structure (direction, argument suppression).

4.2.1 Constraints

- Here we provide templates for constraints that determine the distribution of animacy, person, and alignment across grammatical functions and contexts.
- The first two constraints hold in all contexts.¹⁰

- The first constraint, which we call the **Transitive Subject Constraint**, ensures that the subject of a clause with an object (either OBJ or OBJ_θ, i.e. PLUSO) must be animate; inanimate subjects are possible only in inanimate clauses (Rhodes 1990, 2010, Valentine 2001):

$$(18) \quad \textit{Transitive Subject Constraint} \\ @TSC := [(\uparrow \text{SUBJ}) \& (\uparrow \text{PLUSO})] \Rightarrow [(\uparrow \text{SUBJ ANIM}) = +]$$

- This ensures that transitives with an inanimate ARG₁ are inverse, regardless of context (independent or conjunct).¹¹
- It also correctly ensures that verbs with a secondary object (OBJ_θ) must have an animate subject (in Algonquianist terms, correctly predicts that there are AI+O verbs, but no II+O verbs).

- The second constraint, which we call the **Participant Argument Constraint**, ensures that 1st and 2nd person (i.e., participant) pronominals are possible only as subjects and (direct/primary) objects; secondary objects and obliques must be 3rd person (Rhodes 1990, 2010, Valentine 2001):

$$(19) \quad \textit{Participant Argument Constraint} \\ @PAC := \neg(\uparrow \text{PLUSR PERS PART})$$

- We assume these two constraints are called by the c-structure rule introducing the root node, grouped together in the following template:

$$(20) \quad @ROOT \quad := \quad @TSC \\ \quad \quad \quad @PAC$$

¹⁰These constraints use the Kibort-Findlay version of Lexical Mapping Theory Bresnan and Kanerva (1989), Bresnan and Moshi (1990), Bresnan and Zaenen (1990), which encodes the [±r] and [±o] features of LMT in explicit disjunctions of grammatical functions. For example, the two [−r] grammatical functions, SUBJ and OBJ, are captured by MINUSR, which is defined as follows: MINUSR = {SUBJ|OBJ}; see Findlay (2016, 2020) for further details and references.

¹¹This is already ruled out in independent contexts by (21), but not conjunct contexts with a participant ARG₂.

- The last constraints, the **Prominence Constraints**, capture the different distributions of direct and inverse Voice heads in the independent and conjunct orders:

(21) *Independent Prominence Constraint*

$$\text{@IPC} := [(\uparrow \text{SUBJ}) \& (\uparrow \text{OBJ})] \Rightarrow \{[(\uparrow \text{SUBJ PERS PART}) = + \& (\uparrow \text{OBJ PERS PART}) = +] \mid [(\uparrow \text{OBJ PERS}) \sqsubset (\uparrow \text{SUBJ PERS})]\}$$

(22) *Conjunct Prominence Constraint*

$$\text{@CPC} := [(\uparrow \text{SUBJ}) \& (\uparrow \text{OBJ})] \Rightarrow \{[(\uparrow \{\text{SUBJ|OBJ}\} \text{PERS PART}) = + \mid [(\uparrow \text{OBJ PERS}) \sqsubset (\uparrow \text{SUBJ PERS})]]\}$$

- In independent forms, the subject always outranks the object (i.e., the object's PERS features properly subsume those of the subject) unless both the subject and object are participants.
- In conjunct forms, the subject always outranks the object unless either the subject or object is a participant.
- We assume that these constraints are specified by the different versions of Agr(P) found in the independent and conjunct orders.
- The contrast between independent and conjunct order can be captured in templates, defined to a first approximation below in (25).

4.2.2 Prominence templates

- Following Bejar and Rezac (2009) and 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 without stipulating independent structures beyond those already provided by the LFG framework.

(23) *Prominence hierarchy templates*

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

4.2.3 Number and obviation templates

- We use the following templates to encode singular and plural number, and combinations of number, animacy, and obviation that are encoded in the verbal agreement system.

(24) *Number and obviation templates*

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

4.2.4 Verb class and order templates

- Traditionally, Algonquianists group verbs into four classes, depending on transitivity and the animacy of one argument: VAI (intransitive, animate subject), VII (intransitive, inanimate subject), VTA (transitive, animate object), and VTI (transitive, inanimate object).
- However, Piggott (1979, 1989) argues that VAI and VTI verb finals (i.e., *v* heads) should be conflated, and we follow him here, leaving us with three verb class templates.¹²
- The templates for verbal order (independent vs. conjunct) given here are very tentative, subject to revision to capture the subtleties of the distribution of the two orders.

(25) *Verb class and order templates*

<i>Template</i>	<i>Description</i>	<i>Explanation</i>
VTA	(↑ _σ ARG ₁) (↑ _σ ARG ₂)	Two semantic arguments
VTI-VAI	(↑ _σ ARG ₁) @ANIMATE(↑ SUBJ) ¬(↑ OBJ PERS ANIM)	At least one semantic argument Subject is animate No animate object
VII	(↑ _σ ARG ₁) ¬(↑ SUBJ PERS ANIM)	At least one semantic argument Subject is inanimate
INDEP-ORDER(<i>f</i>)	@IPC ¬(GF <i>f</i>)	Indep. Prominence Constraint Cannot be embedded
CONJ-ORDER(<i>f</i>)	@CPC (GF <i>f</i>)	Conj. Prominence Constraint Must be embedded

¹²Will Oxford (p.c.) has suggested an alternative analysis of these forms, which we pursue in ongoing work.

4.2.5 Argument structure templates

- The following templates determine the mapping between grammatical functions (in the f-structure) and argument roles (in the s-structure):

(26) *Templates for argument mapping*

<i>Template</i>	<i>Description</i>	<i>Explanation</i>
DIRECT	@MAP(SUBJ,ARG ₁) @MAP(OBJ,ARG ₂)	Subject ↦ agent Object ↦ patient
INVERSE	@MAP(SUBJ,ARG ₂) @MAP(OBJ,ARG ₁)	Subject ↦ patient Object ↦ agent
REFLEXIVE	@SUPPRESS(ARG ₂ ,BIND(ARG ₁))	Intransitive, binding relationship
SHORT-PASSIVE	@SUPPRESS(ARG ₁ ,CLOSE-OFF)	Intransitive, agent existentially bound

- **Notes:**

- We adopt certain templates from the account of lexical mapping in Findlay (2016, 2020):
 - @MAP(x,y) indicates that grammatical function x maps to argument role y.
 - @SUPPRESS(x,y) indicates that argument role x receives no mapping; y is a template indicating how role x is interpreted.
 - @BIND(z) indicates that argument role z is reflexively bound (by role x indicated in the @SUPPRESS template); Findlay (2020) encodes this reflexive binding in a meaning constructor associated with the @BIND template.
 - @CLOSE-OFF indicates that argument role x (indicated in the @SUPPRESS template) is existentially bound.
- Thus, @REFLEXIVE indicates that the ARG₂ role is not associated with a grammatical function, but is coreferential with ARG₁.

4.3 Vocabulary Items

- Here we list the VIs involved in Ojibwe agreement inflection.

4.3.1 Voice heads

- With the exception of the reflexive morpheme (which is traditionally called a verb final), these are traditionally referred to as “theme signs”.
- The main voice heads involved in the agreement system are given below:

(27) *Voice heads*

a. Direct Voice heads

$$\langle [\text{Voice}], \Phi \left\{ \begin{array}{l} @DIRECT \\ @ADDRESSEE(\uparrow \text{OBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} -in$$

$$\langle [\text{Voice}], \Phi \left\{ \begin{array}{l} @DIRECT \\ @PARTICIPANT(\uparrow \text{OBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} -i$$

$$\langle [\text{Voice}], \Phi \left\{ \begin{array}{l} @DIRECT \\ \neg(\uparrow \text{OBJ PERS ANIM}) \\ (\uparrow_{\sigma} \text{ARG}_2) \end{array} \right\} \rangle \xrightarrow{\nu} -am, -oo, -i$$

b. Passive Voice heads

$$\langle [\text{Voice}], \Phi \left\{ \begin{array}{l} @SHORT-PASSIVE \\ @PARTICIPANT(\uparrow \text{SUBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} -igoo$$

$$\langle [\text{Voice}], \Phi \left\{ \begin{array}{l} @SHORT-PASSIVE \\ @ANIMATE(\uparrow \text{SUBJ}) \\ @CONJ-ORDER(\uparrow) \end{array} \right\} \rangle \xrightarrow{\nu} -in$$

c. Other Voice heads

$$\langle [\text{Voice}], \Phi \left\{ @ANIMATE((\uparrow_{\sigma} \text{ARG}_2)_{\sigma-1}) \right\} \rangle \xrightarrow{\nu} -aa$$

$$\langle [\text{Voice}], \Phi \left\{ @INVERSE \right\} \rangle \xrightarrow{\nu} -igw$$

$$\langle [\text{Voice}], \Phi \left\{ @REFLEXIVE \right\} \rangle \xrightarrow{\nu} -idizo$$

4.3.2 Agr heads

- This is the category traditionally referred to as “central agreement suffixes”.
- They are divided into two sets: one found in independent-order contexts (30), and one found in conjunct-order contexts (31).
 - We analyze these as two separate syntactic categories, called by c-structure rules to head the AgrP projection.
 - Specifically, they are called by an Agr' rule defined as follows:

$$(28) \quad \text{Agr}' \rightarrow \text{VoiceP} \left\{ \begin{array}{l} \text{Agr}_I \quad \mid \quad \text{Agr}_C \\ @INDEP-ORDER(\uparrow) \quad \mid \quad @CONJ-ORDER(\uparrow) \end{array} \right\}$$

- Many of the independent Agr forms have separate allomorphs that arise when (a) there is a PLUSO element present, but (b) there is no animate OBJ present.

- In other words, it surfaces in transitives with an inanimate object, or in non-ditransitive contexts with a OBJ_θ .
- This phenomenon is known as *n-registration* (Rhodes 1990), since the relevant morphemes contain /n/ and it registers a certain argument structure configuration.
- The distribution of the n-registration Agr VIs can be characterized by the following template encoding the relevant constraints:

$$(29) \quad @NREG \quad := \quad (\uparrow \text{ PLUSO}) \\ \quad \quad \quad \quad \quad \quad \neg(\uparrow \text{ OBJ PERS ANIM})$$

- For clarity, the VIs for Agr_I are divided into two groups: those without @NREG in (30a) and those with @NREG in (30b).

(30) *Independent Agr forms*

a. Non-@NREG forms

$$\langle [\text{Agr}_I], \Phi \left\{ \begin{array}{l} (\uparrow \text{ MINUSR}) = \%GF \\ @\text{SPEAKER}(\%GF) \\ @\text{PLURAL}(\%GF) \\ \{(\uparrow \text{ OBJ PERS PART}) \mid \neg(\uparrow \text{ OBJ})\} \end{array} \right\} \rangle \xrightarrow{\nu} \text{-min}$$

$$\langle [\text{Agr}_I], \Phi \left\{ \begin{array}{l} (\uparrow \text{ MINUSR}) = \%GF \\ @\text{PARTICIPANT}(\%GF) \\ @\text{PLURAL}(\%GF) \\ \{(\uparrow \text{ OBJ PERS PART}) \mid \neg(\uparrow \text{ OBJ})\} \end{array} \right\} \rangle \xrightarrow{\nu} \text{-m}$$

$$\langle [\text{Agr}_I], \Phi \left\{ \begin{array}{l} \neg(\uparrow \text{ SUBJ PERS PART}) \\ \neg(\uparrow \text{ PLUSO}) \end{array} \right\} \rangle \xrightarrow{\nu} \text{-w}$$

$$\langle [\text{Agr}_I], \Phi \left\{ \begin{array}{l} @\text{SPEAKER}(\uparrow \text{ SUBJ}) \\ @\text{PLURAL}(\uparrow \text{ SUBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} \text{-naan}$$

$$\langle [\text{Agr}_I], \Phi \left\{ \begin{array}{l} @\text{PROXIMATE}(\uparrow \text{ SUBJ}) \\ @\text{PLURAL}(\uparrow \text{ SUBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} \text{-waa}$$

$$\langle [\text{Agr}_I], \Phi \left\{ \begin{array}{l} (\uparrow \text{ SUBJ OBV}) = + \\ \{ \neg(\uparrow \text{ SUBJ PERS ANIM}) \mid \\ (\uparrow \text{ OBJ}) \\ \neg(\uparrow \text{ OBJ PERS PROX}) \} \end{array} \right\} \rangle \xrightarrow{\nu} \text{-ini}$$

$$\langle [\text{Agr}_I], \Phi \left\{ @\text{SHORT-PASSIVE} \right\} \rangle \xrightarrow{\nu} \text{-m}$$

b. @NREG forms

$$\langle [\text{Agr}_I], \Phi \left\{ \begin{array}{l} @PROXIMATE(\uparrow \text{SUBJ}) \\ @PLURAL(\uparrow \text{SUBJ}) \\ @NREG \end{array} \right\} \rangle \xrightarrow{\nu} -naawaa$$

$$\langle [\text{Agr}_I], \Phi \left\{ \begin{array}{l} @ANIMATE(\uparrow \text{OBJ}_\theta) \\ @SINGULAR(\uparrow \text{OBJ}_\theta) \\ @NREG \end{array} \right\} \rangle \xrightarrow{\nu} -nan$$

$$\langle [\text{Agr}_I], \Phi \{ @NREG \} \rangle \xrightarrow{\nu} -n$$

- The conjunct Agr forms can be sorted into four groups: those that realize just the subject (31a); those that realize just one MINUSR function, but unspecified for which (31b);¹³ those that realize both arguments (31c); and the passive form, which realizes neither argument (31d).¹⁴

(31) *Conjunct Agr forms*

a. Marking just subject

$$\langle [\text{Agr}_C], \Phi \left\{ \begin{array}{l} @SPEAKER(\uparrow \text{SUBJ}) \\ @SINGULAR(\uparrow \text{SUBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} -aan$$

$$\langle [\text{Agr}_C], \Phi \left\{ \begin{array}{l} @PARTICIPANT(\uparrow \text{SUBJ}) \\ @SINGULAR(\uparrow \text{SUBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} -an$$

$$\langle [\text{Agr}_C], \Phi \left\{ \begin{array}{l} @PROXIMATE(\uparrow \text{SUBJ}) \\ @SINGULAR(\uparrow \text{SUBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} -d$$

$$\langle [\text{Agr}_C], \Phi \left\{ \begin{array}{l} @PROXIMATE(\uparrow \text{SUBJ}) \\ @PLURAL(\uparrow \text{SUBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} -waad$$

$$\langle [\text{Agr}_C], \Phi \{ @OBVIATIVE(\uparrow \text{SUBJ}) \} \rangle \xrightarrow{\nu} -nid$$

$$\langle [\text{Agr}_C], \Phi \{ @ENTITY(\uparrow \text{SUBJ}) \} \rangle \xrightarrow{\nu} -g$$

$$\langle [\text{Agr}_C], \Phi \left\{ \begin{array}{l} @OBVIATIVE(\uparrow \text{SUBJ}) \\ (\uparrow \text{SUBJ OBV}) = + \end{array} \right\} \rangle \xrightarrow{\nu} -nig$$

¹³Note that, while they realize features of only one argument, the forms in (31a) and (31b) can appear in transitive forms, as long as there is no compatible form in (31c) realizing features of both.

¹⁴Here we omit an additional morpheme that appears in most instances where there is a 3rd-person plural argument, *-waa*; see Appendix B for discussion of this morpheme.

b. Marking one MINUSR

$$\langle [\text{AgrC}], \Phi \left\{ \begin{array}{l} (\uparrow \text{MINUSR}) = \%GF \\ @\text{SPEAKER}(\%GF) \\ @\text{PLURAL}(\%GF) \end{array} \right\} \rangle \xrightarrow{\nu} \text{-aang}$$

$$\langle [\text{AgrC}], \Phi \left\{ \begin{array}{l} (\uparrow \text{MINUSR}) = \%GF \\ @\text{INCLUSIVE}(\%GF) \\ @\text{PLURAL}(\%GF) \end{array} \right\} \rangle \xrightarrow{\nu} \text{-ang}$$

$$\langle [\text{AgrC}], \Phi \left\{ \begin{array}{l} (\uparrow \text{MINUSR}) = \%GF \\ @\text{PARTICIPANT}(\%GF) \\ @\text{PLURAL}(\%GF) \end{array} \right\} \rangle \xrightarrow{\nu} \text{-eg}$$

c. Marking both MINUSR

$$\langle [\text{AgrC}], \Phi \left\{ \begin{array}{l} @\text{SPEAKER}(\uparrow \text{SUBJ}) \\ @\text{SINGULAR}(\uparrow \text{SUBJ}) \\ @\text{ANIMATE}(\uparrow \text{OBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} \text{-ag}$$

$$\langle [\text{AgrC}], \Phi \left\{ \begin{array}{l} @\text{PARTICIPANT}(\uparrow \text{SUBJ}) \\ @\text{SINGULAR}(\uparrow \text{SUBJ}) \\ @\text{ANIMATE}(\uparrow \text{OBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} \text{-ad}$$

$$\langle [\text{AgrC}], \Phi \left\{ \begin{array}{l} @\text{SPEAKER}(\uparrow \text{SUBJ}) \\ @\text{PLURAL}(\uparrow \text{SUBJ}) \\ @\text{ANIMATE}(\uparrow \text{OBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} \text{-angid}$$

$$\langle [\text{AgrC}], \Phi \left\{ \begin{array}{l} @\text{ANIMATE}(\uparrow \text{SUBJ}) \\ @\text{SPEAKER}(\uparrow \text{OBJ}) \\ @\text{PLURAL}(\uparrow \text{OBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} \text{-amind}$$

$$\langle [\text{AgrC}], \Phi \left\{ \begin{array}{l} @\text{ANIMATE}(\uparrow \text{SUBJ}) \\ @\text{PARTICIPANT}(\uparrow \text{OBJ}) \\ @\text{SINGULAR}(\uparrow \text{OBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} \text{-g}$$

$$\langle [\text{AgrC}], \Phi \left\{ \begin{array}{l} @\text{SPEAKER}(\uparrow \text{SUBJ}) \\ @\text{SINGULAR}(\uparrow \text{SUBJ}) \\ @\text{PARTICIPANT}(\uparrow \text{OBJ}) \\ @\text{PLURAL}(\uparrow \text{OBJ}) \end{array} \right\} \rangle \xrightarrow{\nu} \text{-agog}$$

d. Unspecified actor

$$\langle [\text{AgrC}], \Phi \{ @\text{SHORT-PASSIVE} \} \rangle \xrightarrow{\nu} \text{-ng}$$

4.3.3 Agreement clitics

- Ojibwe has two sets of agreement clitics that appear *only in independent-order contexts*: a set of proclitics that index the person of (usually) the subject, and a set of enclitics that index number and obviation of third-person arguments (usually the object) in certain contexts.
- The person proclitics (category PersCl) are introduced in Spec-TP in a node annotated (\uparrow MINUSR) = \downarrow ; it indexes the person of either SUBJ or OBJ, whichever is higher on the relevant prominence hierarchy (here using the feature HEAR rather than SPEAK for the highest point in the hierarchy, meaning 2nd person outranks 1st person).

$$(32) \quad \textit{Person proclitics}$$

$$\langle [\text{PersCl}], \Phi \{ @\text{HEARER}(\uparrow) \} \rangle \xrightarrow{\nu} gi-$$

$$\langle [\text{PersCl}], \Phi \{ @\text{PARTICIPANT}(\uparrow) \} \rangle \xrightarrow{\nu} ni-$$

$$\langle [\text{PersCl}], \Phi \left\{ \begin{array}{l} @\text{ANIMATE}(\uparrow) \\ ((\text{SUBJ } \uparrow) \text{ PLUSO}) \end{array} \right\} \rangle \xrightarrow{\nu} o-$$

- The number enclitics appear on a node in the specifier of AgrP,¹⁵ which is annotated $\uparrow = \downarrow$; the @NUMCL template indicates which grammatical function's features are being specified, as defined in (34).

$$(33) \quad \textit{Number/obviation enclitics}$$

$$\langle [\text{NumCl}], \Phi \{ @\text{NUMCL}(\text{AN-PLURAL}) \} \rangle \xrightarrow{\nu} -ag$$

$$\langle [\text{NumCl}], \Phi \{ @\text{NUMCL}(\text{INAN-PLURAL}) \} \rangle \xrightarrow{\nu} -an$$

$$\langle [\text{NumCl}], \Phi \{ @\text{NUMCL}(\text{OBVIATIVE}) \} \rangle \xrightarrow{\nu} -an$$

- **Notes:**

- These morphemes mark number/obviation of OBJ if there is an OBJ present; of OBJ_θ if there is an OBJ_θ but no OBJ; and of SUBJ if there is neither PLUSO function present.
- This is encoded in the @NUMCL template, defined as follows:

$$(34) \quad @\text{NUMCL}(\text{template}) := \left\{ \begin{array}{l} [(\uparrow \text{ OBJ}) \ \& \ @\text{template}(\uparrow \text{ OBJ})] \ | \\ [\neg(\uparrow \text{ OBJ}) \ \& \ @\text{template}(\uparrow \text{ OBJ}_\theta)] \ | \\ [\neg(\uparrow \text{ PLUSO}) \ \& \ @\text{template}(\uparrow \text{ SUBJ})] \} \end{array} \right.$$

- Alternatively, the context could be specified in the VIs themselves.
- In all cases, they only index features of third-person arguments.
- Homophonous morphemes are used to mark animate plural, inanimate plural, and (animate) obviation in nouns as well, though it's unclear if we will be able to use the same VIs for this context.

¹⁵In a fuller exposition of Ojibwe verbal inflection, which includes negation and modality, this will be revised so that these enclitics appear in spec-ModP, as they follow the modal suffixes. However, since we are omitting modal suffixes in this analysis, we will leave them here for now.

4.3.4 Other VIs used

- In addition to the agreement morphemes listed above, the following morphemes appear in the examples in Section 4.1 and Appendix A.

$$(35) \quad \langle [T], \quad \Phi\{ (\uparrow \text{TENSE}) = \text{PST} \} \rangle \xrightarrow{\nu} \text{gii-}$$

$$\langle [\sqrt{\quad}], \quad \Phi\{ (\uparrow \text{PRED}) = \text{'see'} \} \rangle \xrightarrow{\nu} \text{waab}$$

$$\langle [v], \quad \Phi\{ @\text{VTA} \} \rangle \xrightarrow{\nu} \text{-am}$$

$$\langle [\sqrt{\quad}, v], \quad \Phi\left\{ \begin{array}{l} (\uparrow \text{PRED}) = \text{'eat'} \\ @\text{VTI-VAI} \end{array} \right\} \rangle \xrightarrow{\nu} \text{wiisini}$$

- 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’, *mij* ‘eat.VTI’, *wiisini* ‘eat.VAI’.
- This is analyzed as the verb expounding a span including both $\sqrt{\quad}$ and *v*.
- We see the intransitive form *wiisini* in (37) below.

5 Future research

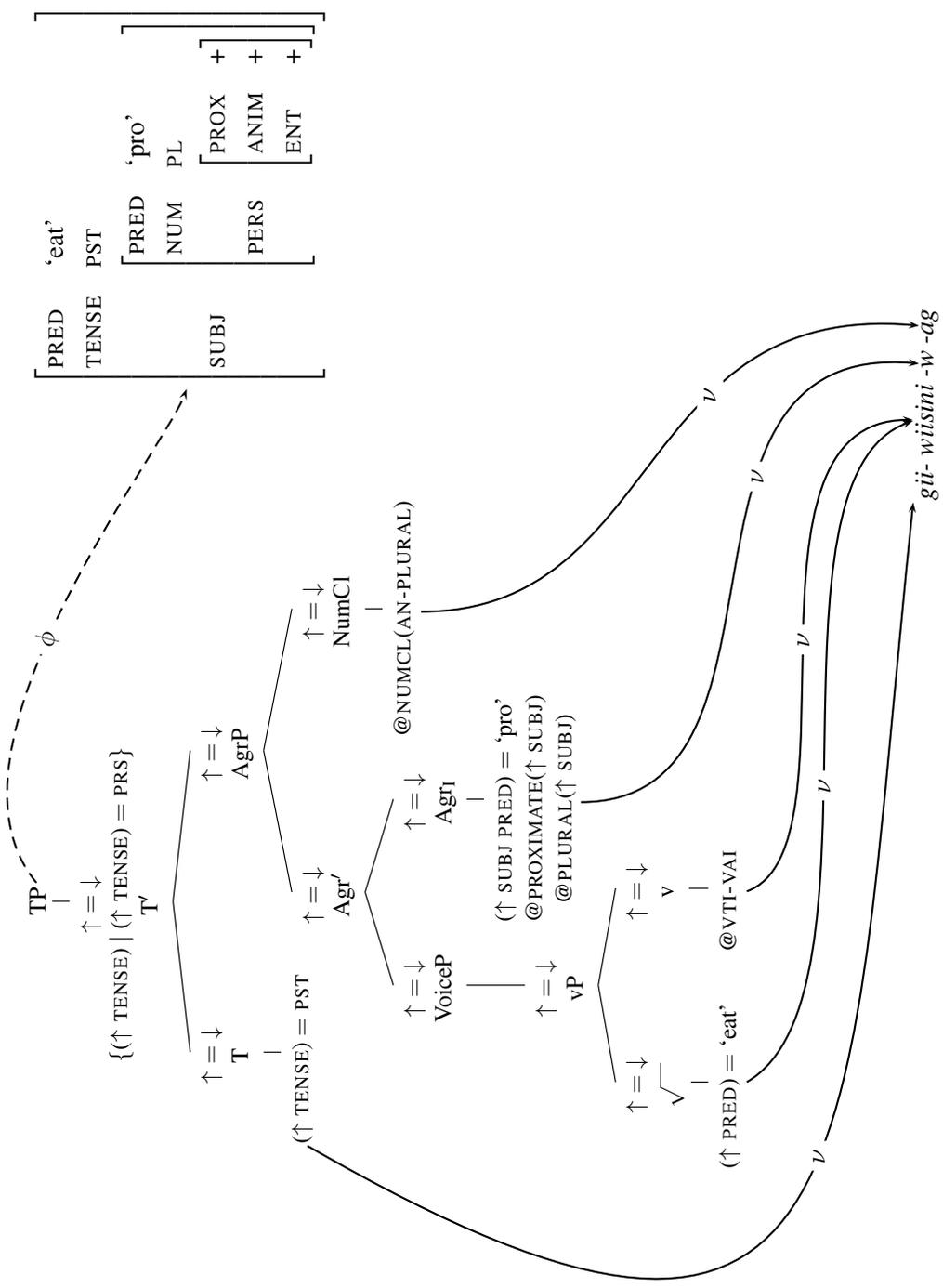
- We are currently in discussions with other researchers about phenomena that are otherwise difficult to account for, but which seem amenable to an L_RFG-style analysis, including:
 - Bronwyn Bjorkman’s work on clitic-induced doubling in Ingush (Nakh-Dagestanian) and Breton (Celtic)
 - Oleg Belyaev’s work on case inflection in Ossetic (Iranian)
- We also aim to develop an L_RFG analysis of Archi, as per the challenge set out in Bond et al. (2016).
- Another line of future research involves developing a more complete theory of portmanteaux, to facilitate analyses of more fusional languages (e.g., English, French).

Appendices

A More Ojibwe examples

- Here we show two additional representative Ojibwe examples, demonstrating most of the templates and VIs introduced in Section 4

(37) *gii-wiisini -w-ag*
 PST eat.VAI 3 PL
 'They ate.'



B On conjunct order agreement

- In the account of conjunct-order Agr heads given in Section 4.3.2, we omitted an additional morpheme that follows the Agr_C heads in most instances when there is a 3rd-person animate plural argument, namely the suffix *-waa*.
- We are not yet sure how to analyze this morpheme, but our current tentative analysis involves splitting conjunct Agr agreement into two separate agreement heads:

- The first, which we call Agr_C, is realized in all conjunct-order forms, and indicates agreement with one or both of the core MINUSR arguments (subject and object; conjunct-order forms never show @NREG agreement or indicate OBJ_θ in any way); this includes the forms given in (31).
- The second, which we call $\hat{\text{Agr}}_{C2}$, has only one realization, *-waa*, and indicates agreement with a 3rd-person animate plural core argument.
- As indicated by the “roof” notation (\hat{X}), $\hat{\text{Agr}}_{C2}$ is a non-projecting head (Toivonen 2001, 2003); we analyze it as forming a complex head with the Agr_C head (see Oxford 2018 for an analogous analysis in a Minimalist DM framework, using fission), captured by the following c-structure rule:

$$(38) \quad \text{Agr}_C \rightarrow \text{Agr}_C (\hat{\text{Agr}}_{C2})$$

- In addition to *-waa*, there is a spanned, portmanteau VI *-waad* which spans the Agr_C and $\hat{\text{Agr}}_{C2}$ heads in (many) instances where the subject is 3rd-person animate plural form (currently listed in (31a) as realizing only Agr_C).
- However, this analysis has a few problems:
 - The rule in (38) in its current form is recursive, and therefore overgenerates, predicting it should be possible to have any number of *-waa* morphemes present indexing the same argument (this is obviously not the case). We are not currently sure how to fix this.
 - There is a homophonous *-waa* morpheme in the independent-order Agr category (Agr_I); ideally this state of affairs should be avoided by positing a single, underspecified *-waa* morpheme. However, we are not sure if the two can be unified. (Furthermore, it may be that the two differ in their allomorphic properties, in which they should in fact be considered separate morphemes. We are still looking into this.)

- Everdell and Melchin (2021) show that the Controlled complement clauses and Non-controlled complement clauses differ in their representation within the argument structure of the matrix verb.
- Quantifiers in the preverbal position of the matrix verb treat the entirety of a controlled complement clause as an extension of the matrix verb's argument structure, the subject, eventuality, and the non-controlled object are all quantifiable from the matrix preverbal position, as in (4).
- In contrast, only the eventuality of a non-controlled complement clause is quantifiable from the matrix preverbal position, the dependents of the subordinate verb are not, as in (5).

(4) **Controlled complement clause**

- a. Gok jiñ-chia-pi-ch na=ñ jup duñi-a' gu tacos
two 1SG.OBJ-send-2SG.SBJ-PFV SUB=1SG.SBJ IT do-IRR DET tacos
'You wanted me to make two tacos'
- b. Dilh jam-chia-mi-t na=pim bopooy-a' jix=io'm
only 2PL.OBJ-send-3PL.SBJ-PFV SUB=2PL.SBJ run.PL-IRR COP=very
- '**Only they** told you.PL to run faster'
 - 'They told **only you all** (as opposed to anyone else) to run faster'
 - 'They told you all **to only run** faster (as opposed to do anything else faster)'

(5) **Non-controlled complement clause**

- Bix jix=Ø-mat-iñ na=m jaroi' mii-'ñ gu ku'a'
all COP=3SG.OBJ-know-1SG.SBJ SUB=3PL.SBJ someone burn-APPL DET firewood
- 'I know who.PL **completely burned the firewood**'
 - *I know who.PL burned **all of the firewood**.
 - *I know **all of them** who burned the firewood.

- Everdell and Melchin (2021) argue that this is because the two types of complement clauses have different representations within the argument structure of the matrix verb.
- Controlled complement clauses are true clausal complements of the matrix verb, while Non-controlled complements are represented as a nominal with an eventuality referent, and their dependents are introduced through an adjunct headless relative clause.
- In a broad sense the behavior we need to capture is:
 1. Quantifiers in the preverbal position are interpreted the same as DP and PP quantifiers, but there are differences in what they can target.
 2. While they seem to make an argument-adjunct distinction, this distinction does not entirely correlate with what is indexed, some indexed things cannot be targeted and some non-indexable things can be targeted.
 3. Locatives and temporals can never be targeted by preverbal quantifiers, even if a locative is entailed. Some quantifiers must be in the preverbal position in order to target the predicate's degree, this is in contrast to degree modifiers which always target the degree regardless of their position
- Using the parent frameworks LFG and Minimalist DM does not offer satisfying treatments.
- In LFG preverbal quantifiers would simply quantify anything with an f-structural QUANT feature, which could only be assigned to the set of argument functions of the verb (i.e. SUBJ, OBJ, COMP, etc.) and not the ADJ set.

- This treatment fully captures the data, but offers no explanation of how the QUANT feature gets assigned and any apparent arguments that cannot be quantified must be stipulated to reject to QUANT feature.
- A Minimalist DM explanation can also capture the data but runs into problems with other argumenthood tests, namely applicative promotion.
- Arguments must be split into two groups, low and high, and existential closure must occur in two places, before the insertion of the verb root and after the insertion of the preverbal quantifier.
- Low arguments would be ones that are entailed but cannot be quantified preverbally, like entailed locatives. They would be generated low enough that they are closed off before the insertion of the eventuality but would still add to the entailments.
- High arguments would be all of the more canonical subjects and verbs, a radically Neo-Davidsonian view without evidence from other parts of the grammar, such as the binding effects in Wood (2014). This severing would be required so that Low arguments could contribute their entailments without being open to quantification.
- This solution interferes with the behavior of applicatives which García Salido and Everdell (2020), Everdell and García Salido (2021) show are dependent on the argument structure of the verbs they attach to, similar to Jerro (2016).
- While the parent frameworks of L_RFG can certainly capture the argument-adjunct distinction in O'dam as delineated by preverbal quantifiers, L_RFG has the ability to offer a more satisfying analysis.

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