

# Hierarchy-governed Insertion and CFD markers in Potawatomi

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## Abstract

Potawatomi, a Central Algonquian language, shows cross-referencing of subject and object on the verb. In this paper we want to argue that the order of agreement suffixes is governed by a hierarchy 1 >> 2 >> 3. Additionally, we will introduce a new type of vocabulary item, called 'remaining-feature-discharge' (CFD) marker, which is able to discharge more than its substantial features. Both approaches are implemented in Distributed Morphology (Halle and Marantz, 1993).

## 1. Introduction

Almost all Algonquian languages show cross-referencing of subject and object on the verb and a direction marking system. One member of this family is analysed in many morphological theories, namely Potawatomi, a Central Algonquian language<sup>1</sup>. All the analyses proposed up to now have mostly dealt with one or the other aspect of the verbal agreement system in this language – the only exception is the full analysis made by Stump (2001). In this paper we want to propose a new theoretical concept inside the framework of Distributed Morphology (Halle and Marantz, 1993) namely “collateral feature discharge” markers, short CFD. This assumption allows a DM-analysis that derives all the important paradigms of the complex verbal inflectional system

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\*For valuable comments and discussion we are grateful to Jochen Trommer and Sebastian Bank. Special thanks to Sebastian Bank for his Python Program for DM-analysis which was a great help in testing the correctness of our analysis. This research was supported by a DFG grant to the project *Micro- and Macro-variation: Hierarchy Effects in Kiranti and Broader Algie* (TR 521-3).

<sup>1</sup>In Anderson's A-morphous Morphology (Anderson, 1992), in a Distributed Morphology approach in Halle and Marantz (1993), in an analysis in Wunderlich's Minimalist Morphology framework in Wunderlich (1996), in a paper proposing Articulated Morphology (Steele, 1995) and in Paradigm Function Morphology (Stump, 2001).

in Potawatomi. Another theoretical concept that is crucial in the analysis we propose is *hierarchy-governed insertion of affixes* that makes any assumptions about associations of affixes to fixed affix slots unnecessary. We will proceed as follows: We will begin with a short overview over the verbal inflectional system in section 3 before we turn to the concrete analysis for Potawatomi where we will focus on hierarchy-governed insertion in 3.2 and “collateral feature discharge” markers in 3.3. Since a general account for the verbal inflectional system necessarily involves quite a lot of markers, we will give the detailed lists for those in the Appendix and will concentrate on their special behaviour and additional mechanisms in the main text.

## 2. The Mysterious Behaviour of *-mun*

It was mentioned above that in Potawatomi as in nearly all other Algonquian languages both arguments in a transitive context are crossreferenced on the verb. There is only one exception where agreement with one argument fails to occur, namely cells where a suffix *-mun*, which marks a first person plural argument, appears. For example in 2pl→1pe contexts, only the suffixes *-y-mun* can be found whereas the former is an accusative marker and *-mun* marks the plurality of the object. But interestingly, no marker that agrees with the second person plural of the subject appears in such a context.

One solution could be to attribute this behaviour to the input that is realized by morphological insertion. In the framework of Distributed Morphology (henceforth DM) one can assume that only one marker can be inserted in first person plural morphemes. If the agreement heads for subject and object are fused into one complex head, all other markers that could realize features of subject or object are blocked and *-mun* is the only agreement suffix. However, there are in fact markers that precede *-mun* and these would be blocked too in such an approach. A further objection against such an input solution is that it would be generally impossible to crossreference both subject and object in first person plural contexts. But in a third person subject and first person plural object context it is indeed possible to reference both arguments on the verb. What's remarkable there is that another suffix is used for first person plural, namely *-nan*. So it doesn't seem to be the first person plural context which is responsible for the mysterious behaviour of *-mun*.

Approaches other than DM attributed this surface characteristic to underlying zero affixes in the slots following *-mun*. Anderson, in his A-morphous morphology, makes use of a zero word formation rule (WFR) of the form shown in (1). It is to be found in every rule block whose WFR should be disabled.

- (1) *No other markers after -mun in Anderson's system*
- $$\left[ \begin{array}{l} +\text{Verb} \\ +\text{me} [ ] \\ +\text{pl} \end{array} \right] /X\text{mun}/ \rightarrow /X\text{mun}/$$

This rule obviously has no phonological effect since it adds or changes no phonological content. It simply says that in the context of first person plural, the phonological representation generated by WFR so far remains identical and its effect is therefore simply to block all other available rules for the context where *-mun* appears.

Stump (2001) does not discuss the behaviour of *-mun* explicitly, but his approach is similar to Anderson (1992): He adds a realization rule in the following blocks which are phonological empty, i.e. zero morphemes, that apply in all instances where *-mun* is inserted.

All these theories fail more or less in attributing the behaviour of *-mun* to a lexical property of this specific morpheme and not to the first person plural context which causes the blocking. Remember that the first person plural marker *-nan* does not show a comparable behaviour.

In this paper we want to propose a theory that argues for another type of vocabulary items that can explain the behaviour seen for *-mun*.

### 3. Introducing the Verbal Agreement System in Potawatomi

Before we come to an overview of the verbal agreement system and inflectional categories in Potawatomi, some general things about stems have to be said. Verbal stems as well as nominals are inherently marked for animacy. So verbs can only combine with a subject (when intransitive) or an object (when transitive) which have the same value for this feature. This system results in four paradigm types: intransitive with inanimate or animate subject and transitives with inanimate or animate object. Notice that animacy is a grammatical category and cannot be mapped one to one to the semantics. Paradigms of

all stem types are to be found in the Appendix A. In the following we will mainly focus on animate stems. But everything that will be said for these will hold also – with slight differences, since there are some additional affixes – for inanimate paradigms. Nearly all Algonquian languages show different sets of verb paradigms depending on the clausal type in which the verb is used. There are three of these different orders, or ‘modes’: independent, conjunct and imperative.<sup>2</sup> Usually, the same set of marker is used in all paradigms of one order. Verbs in Potawatomi agree with their arguments in person, number and obviation and are inflected for case. ‘Obviative’ is a discourse related category that is relevant whenever two third persons are involved in one discourse context. One of them is always more salient in the discourse than the other one – often referred to as the proximate argument. The non-salient argument receives the +obviative marking: a system that can be found in almost all Algonquian languages. First person plural forms differentiate between inclusive (speaker and addressee) and exclusive (speaker without addressee). However, these are only distinguished through the prefixes and the difference is not marked in the suffixes. In (2) we summarize all the inflectional categories and their decomposition in binary features that are relevant in the Potawatomi verbal system.

(2) *Categories and their decomposition*

category	binary features
1s	+1,-2,-3,-pl, -obv, +anim
1pe	+1,-2,-3,+pl, -obv, +anim
1pi	+1,+2,-3,+pl, -obv, +anim
2s	-1,+2,-3,-pl, -obv, +anim
2p	-1,+2,-3,+pl, -obv, +anim
3s	-1,-2,+3,-pl, -obv, +anim
3p	-1,-2,+3,+pl, -obv, +anim
3s,inanim	-1,-2,+3,-pl, -obv, -anim
3p,inanim	-1,-2,+3,+pl, -obv, -anim
obv	-1,-2,+3, +obv

Regarding the system of agreement in the suffixes, it’s important to see that in transitive animate indicative forms (cf. paradigm of *wapm* A.2), Potawatomi verbs can show up to three agreement suffixes whenever actor and object are

<sup>2</sup>In this article we will mainly focus on the independent and the conjunct order.

plural, e.g.  $\Sigma$ -*uko-nan-k* for 3p  $\rightarrow$  1pe. The ordering of these is in all contexts the same. The table in (3) gives an overview of the occurring markers and their relative order, here shown as affix slots.

(3) *Slots of the IO verbal agreement system in Potawatomi*<sup>3</sup>

Cl <sub>1</sub>	$\Sigma$	Sf <sub>1</sub>	Sf <sub>2</sub>	Sf <sub>3</sub>	Sf <sub>4</sub>
<i>k-</i>		<i>-uko</i>	<i>-mun</i>	<i>-wa</i>	<i>-k</i>
<i>n-</i>		<i>-a</i>	<i>-nan</i>	<i>-m</i>	<i>-n<sub>3</sub></i>
<i>w-</i>		<i>-Un</i>			
		<i>-y</i>			

This illustration should make clear that e.g. all suffixes in slot Sf<sub>1</sub> – when present – will always precede the other affixes and that affixes in the same slot cannot cooccur.

In the first slot we find markers which give information towards the direction of the action: who acts on who/what? The markers *-uko* and *-a* appear with third person arguments and *-Un* and *-y* only when none of the arguments is third. What's the exact distribution of them will be discussed in section 3.2.2. Notice that this position is empty in all intransitive contexts, since there is no other participant involved.

In the second slot the affixes *-mun* and *-nan* are to be found, which mark both first person plural. The special issue about *-mun* is that it is never followed by any suffix. In section 3.3.1 this behaviour will be explained in more detail. The next slot is filled with plural marking affixes for second and non-first person (*-m* and *-wa*), the former has a limited distribution (only in 1s contexts and in intransitive forms) which prevents that it is followed by any other suffix. The last slot shows the third person plural marker *-k* and an obviation marker *-n<sub>3</sub>*. So there are at most three exponents of agreement in a suffix string. The question we want to address in the following sections is how the special distribution of *-mun* can be explained and how this specific ordering of suffixes emerges.

<sup>3</sup>Note the marker *-n<sub>3</sub>*: its index simply indicates that there are more homonymous markers, cf. the list of all markers in the Appendix.

## 3.1. Distributed Morphology

DM as originally proposed in Halle and Marantz (1993) is a post-syntactic theory of morphology assuming that the syntax provides terminal elements ('heads') that consist of fully-specified feature bundles into which the morphology inserts 'vocabulary items', that is pairings of phonological representation and morphological features. These vocabulary items (or simplified: inflectional markers in our context) may be *underspecified*, that is in contrast to syntactic heads they must not contain a full feature specification for every relevant morphological feature. But the syntactic context for insertion may be manipulated through *impoverishment*, an operation that deletes certain morpho-syntactic features in a certain context. The potentially underspecified morphological markers are then inserted into the syntactic contexts in accordance with the Subset Principle (4) demanding that the features of the inserted marker must be a subset of the features of the head.

- (4) *Subset Principle* Halle (1997)  
 A vocabulary item V is inserted into a functional morpheme M iff a. and b. hold:
- a. The morpho-syntactic features of V are a subset of the morpho-syntactic features of M.
  - b. V is the most specific vocabulary item that satisfies a.

We assume in accordance with Müller (2005) that the concept of specificity of morphological markers referred to in (4-b) is not only determined by the number of morphological features a marker is specified for but that the ranking of feature classes is inherently more important according to a language-specific hierarchy.

- (5) *Specificity* (Müller, 2005, 31)  
 A vocabulary item  $V_i$  is more specific than a vocabulary item  $V_j$  iff there is a class of features F such that a. and b. hold.
- a.  $V_i$  bears more features belonging to F than  $V_j$  does.
  - b. There is no higher-ranked class of features F' such that  $V_i$  and  $V_j$  have a different number of features in F'.

This concept of specificity referring to (hierarchical) quality of features is nearly always sufficient to decide competition between markers. However, a situation may arise where two vocabulary items are specified for exactly the same number of features in every ranked class of features. We will assume that in such a case, specificity will decide in favour of the marker that has more *positive feature values* for the hierarchically highest ranked feature, i.e. ‘+’ >> ‘-’. If the competition is still not resolved, the number of context features is taken into account as well. Those are irrelevant (their quality as well as their quantity) up to this point in the calculation. The concept of specificity can therefore be summarized as consisting of three hierarchies:

- (6) *Calculating Specificity*
  - a. language-specific hierarchy of feature classes
  - b. ‘+’ >> ‘-’
  - c. number of substantial features >> number of context features

We will illustrate this with a short example in (7): In a language that ranks number features above person features, a marker realizing more number features than another one will always be inserted first. If two markers have the same number of those and also the same number of person features, the one with more *positive* number features is inserted. If this does not decide competition, the one with more positive values for its person features will be regarded as more specific and if this is still no sufficient criterion, the number of context features will decide. This is summarized in (7).

- (7) *Abstract example for specificity in a language: number features >> person features*

competing markers		more specific:	since:
/-an/ ↔ +pl, +2, +1 / ___[+3]		<b>an</b>	number >> person
/-ib/ ↔ -3, +2, +1 / ___[+3]			
/-an/ ↔ +pl, +2, +1 / ___[+3]		<b>an</b>	‘+’ >> ‘-’
/-ut/ ↔ -pl, +2, -3 / ___[+3]			
/-an/ ↔ +pl, +2, +1 / ___[+3]		<b>an</b>	/an/ has more context features
/-os/ ↔ +pl, +2, +1			

The original idea in Halle and Marantz (1993) is that “terminal elements [...] consist of complexes of grammatical features [that] are supplied with phonological features only after Vocabulary insertion” (Halle and Marantz, 1993, 114). From this it follows naturally that only one vocabulary item can be inserted into one syntactic head and that there is a strict one-to-one mapping between terminal elements in the syntax and vocabulary items inserted by the morphology.

A departure from this original one-to-one mapping between syntactic heads and vocabulary items is derivable in a framework assuming the notion of *fission*, that is splitting of the feature bundle of one syntactic head into different heads (Noyer (1992), Frampton (2003), Müller (2005)). A version of fission that implements a concept of insertion as feature discharging is given in (8). After insertion of a marker, the features the inserted marker was specified for are unavailable for further insertion, they are *discharged*. Subsequent insertion of other vocabulary items, however, is very well possible as long as their featural specification is still met.

- (8) *Fission* (Müller, 2005)  
 If insertion of a vocabulary item  $V$  with the morpho-syntactic features  $\beta$  takes place into a fissioned morpheme  $M$  with the morpho-syntactic features  $\alpha$ , then  $\alpha$  is split up into  $\beta$  and  $\alpha-\beta$ , such that a, and b. hold:
- a.  $\alpha-\beta$  is available for further vocabulary insertion.
  - b.  $\beta$  is not available for further vocabulary insertion.

We claim now that vocabulary items and their lexical representation decide whether they are inserted according to one or the other concept of insertion. Whether a marker realizes only the features it is specified for or whether it makes all the features of a head unavailable for further insertion is a lexical property of markers. We will call the latter type of markers in the following “collateral feature discharge” markers (henceforth CFD) and assume that this new type of marker additionally consumes collateral features, i.e. features that are not necessary for its insertion. The insertion of markers therefore follows the fission concept of “insertion as long as possible” except for the case that a lexically marked CFD marker is inserted making all remaining features

unaccessible for further insertion.<sup>4</sup> It has to be emphasized that these markers lead not always to a classical one-to-one relation between syntactic heads and vocabulary items in the sense of Halle and Marantz (1993) since the whole head becomes unavailable for further insertion *after insertion* of an CFD marker. It could therefore very well be the case (and will be shown for Potawatomi below) that some vocabulary item is inserted prior to such an CFD marker.

The notation that distinguishes the different markers as well as a short abstract example is given in (9): the feature specification of CFD markers is notated in square brackets whereas the features of a “standard” marker are just listed after the double arrow separating features and phonological representation of vocabulary items in DM. In the abstract example (9) the insertion of a vocabulary item specified simply for *-pl* makes only this one feature unavailable<sup>5</sup> for further insertion and would for example very well allow insertion of an affix marking (+1). The CFD marker specified for [*-pl...*] on the other hand blocks any further insertion.

(9) *The two realizational concepts*

	Vocabulary Item		full-specified head		resulting head
a.	/-bu/ ↔ -pl	→	[+1,-2,-3,-pl]	→	[+1,-2,-3, <del>pl</del> ]
b.	/-li/ ↔ [-pl...]	→	[+1,-2,-3,-pl]	→	[ <del>+1</del> , <del>-2</del> , <del>-3</del> , <del>pl</del> ]

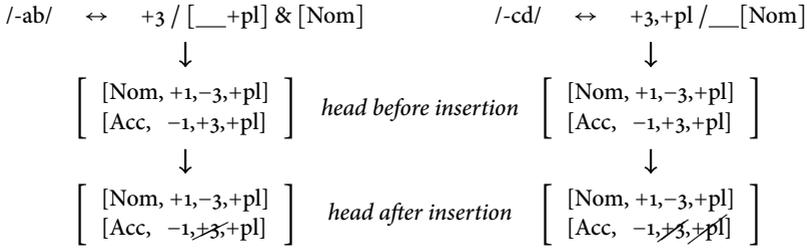
The features a marker is specified for that are discharged after insertion will be termed ‘substantial’ features throughout the following – in contrast to context features that must be present for the insertion of a marker but are still present afterwards. Those context features must be distinguished, too: in those that specify features that must be present on the same head as the one into which the marker is inserted, i.e. +*pl* in the left example in (10), and in those context

<sup>4</sup>For reasons of space we won’t discuss the possibility that CFD markers can discharge smaller sets of collateral features as well, e.g. only features of a certain category or even a single feature. Such a relativized CFD marker would not block insertion of any other marker but only insertion of certain markers. This could explain blocking effects that are standardly derived through impoverishment rules in DM – a challenging question is whether all instances for featural impoverishment could be attributed to such blocking after insertion of a CFD marker.

<sup>5</sup>Unavailable features are marked in grey in the following.

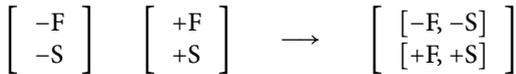
features that must be present on the other head, i.e. Nom in the right example in (10).

(10) *Context and substantial features: hypothetical example*



Another central assumption in our analysis is *fusion*, that is an operation merging two heads into one (Halle and Marantz, 1993). Fusion applies in Potawatomi and merges both argument heads into one complex head: this will allow that all features of subject and object are available at the same time and that insertion of markers strictly follows specificity and takes place regardless of whether the features realize object or subject features. It has to be noted, though that although all the features of subject and object are present on one head, they are still structured according to their original affiliation to one or the other head. An abstract example for such an embedded structure after fusion is given in (11): no insertion of a marker specified for +F, -S is possible since these two features do not belong to one head.

(11) *Abstract example for fusion of two agreement heads*



3.2. Hierarchy-governed Insertion of Markers

A verb of the IO can show up to three agreement suffixes whenever subject and object are plural and these affixes will always appear in a specific order. For illustration find an extract of a transitive animate paradigm in table (12).<sup>6</sup>

<sup>6</sup>What has to be mentioned here are the ‘prefixes’ preceding the verbal stems: *n-* for first person, *k-* for second and *w-* for third persons. They do not show up in other orders.

- (i) a. *Extract of the paradigm of the intransitive verb kaskumi ‘to start running’*
- |     |               |
|-----|---------------|
| 1pe | n=kaskumi-mUn |
| 1pi | k=kaskumi-mUn |
| 2p  | k=kaskumi-m   |
- b. *Extract of the paradigm of the TI verb wapUt ‘to see something’*
- |    |            |
|----|------------|
|    | 3s,-anim   |
| 3s | w=wapt-a-n |

A few things have to be pointed out. *First*, there can only be one prefix. *Second*, in first person inclusive forms the same affix as for second person is used. The same is true for transitive context where first acts on second or vice versa. This led to the often cited assumption of a 2 >> 1 >> 3 hierarchy (Macaulay, 2007; Wunderlich, 1996). Since only one prefix can precede each verbal stem, there has to be some mechanism that decides which one is chosen when there are two arguments in transitive forms that could possibly be marked on the verb. Assuming such a hierarchy resolves this conflict: it is always the prefix chosen which realizes features that are higher on the hierarchy. So in a case where second person acts on first person, the prefix for second person is chosen, since it is higher on the hierarchy. *Third*, the third person prefix *w-* only appears in a context with two third persons (cf. 3 → 3 in TA paradigm in A.2), this is why it does not show up in intransitive forms. *Fourth*, between these prefixes and the verbal stem certain preverbs or particles may appear which are used to signal many kinds of meanings.

- (ii) *Example for the usage of preverbs* (Hockett, 1948)
- |              |                            |
|--------------|----------------------------|
| n=nUs-a      | n=tep-nUs-a                |
| 1=to.kill-3  | 1=succeed.in-to.kill-3     |
| ‘I kill him’ | ‘I succeed in killing him’ |

This is why Halle and Marantz (1993) argue that these supposedly prefixes are better analysed as proclitics, which are not even part of the verb: “They need not appear immediately before the verb stem or even as part of the same phonological word as the verb”. This seems a very striking observation and in the following we will adopt this assumption and talk of clitics rather than prefixes. Additionally this is also the reason why these clitics won’t show up in our analysis. They behave dissimilar to the rest of the agreement system and for reasons of space we will concentrate on the suffixes in the following.

(12) *Extract of a transitive animate paradigm*

s/o	2s	2p	3s	3p
2s			k-wapm-a	k-wapm-a-k
2p			k-wapm-a-wa	k-wapm-a-wa-k
3s	k-wapm-uko	k-wapm-uko-wa		
3p	k-wapm-uko-k	k-wapm-uko-wa-k		

The only affixes that change when the argument roles are changed are those in  $Sf_1$  (here *-uko* and *-a*, remember the slots in table (3)). The others are the same and at the same place. In  $3p \leftrightarrow 2p$  contexts *-wa* precedes *-k* in both cases, although it marks once the plurality of the subject and in the other case plurality of the object. A widespread formal explanation for this feature in the Algonquian verbal agreement system is that it is an instance of ‘template morphology’ (e.g. Stump, 1996), that means that there exists an ordered sequence of fixed positions in which only certain affixes can appear (Anderson, 1992; Halle and Marantz, 1993; Stump, 2001). This derives the ordering of different markers to each other as well as the fact that some markers can never cooccur. They are assumed to be marked for insertion into the same slot and since only one affix is allowed in one slot, the language must decide between the affixes specified for this position.

In our work we want to get rid of these stipulated assumptions. We will show that the same effect can be generated much easier through a hierarchy-governed-insertion approach (e.g. Noyer (1992)) and simultaneously accounts for the underlying organization of suffixes in this language. At first the different markers and their specifications will be presented using as example the transitive animate paradigm of the IO. The evidence for the assumption of a hierarchy will then be used to demonstrate the hierarchy-governed insertion.

### 3.2.1. *Suffixes of the Transitive Animate Paradigm in the IO*

As previously mentioned, in the transitive animate paradigm the stem *wapm* is always followed by one of the markers of slot  $Sf_1$ . In the example above this is *-a* or *-uko*. The other two possible affixes are *-Un* and *-y* as can be seen in the full paradigm in (13).

(13) *The verb wapm ‘to see’* (Hockett, 1939; Anderson, 1992)

TRANSITIVE ANIMATE (TA)				
s/o	1s	1pe	2s	2p
1s			k-wapm-Un	k-wapm-Un-m
1pe			k-wapm-Un-mun	k-wapm-Un-mun
2s	k-wapm	k-wapm-y-mun		
2p	k-wapm-m	k-wapm-y-mun		
3s	n-wapm-uko	n-wapm-uko-nan	k-wapm-uko	k-wapm-uko-wa
3p	n-wapm-uko-k	n-wapm-uko-nan-k	k-wapm-uko-k	k-wapm-uko-wa-k

s/o	3s	3p	obv
1s	n-wapm-a	n-wapm-a-k	n-wapm-a-n <sub>3</sub>
1pe	n-wapm-a-mun	n-wapm-a-mun	n-wapm-a-mun
1pi	k-wapm-a-mun	k-wapm-a-mun	k-wapm-a-mun
2s	k-wapm-a	k-wapm-a-k	k-wapm-a-n <sub>3</sub>
2p	k-wapm-a-wa	k-wapm-a-wa-k	k-wapm-a-wa-n <sub>3</sub>
3s			w-wapm-a-n <sub>3</sub>
3p			w-wapm-a-wa-n <sub>3</sub>
obv	w-wapm-uko-n <sub>3</sub>	w-wapm-uko-wa-n <sub>3</sub>	

These four affixes have a striking distribution in the Independent Order (IO)<sup>7</sup> that is summarized in (14) where the arrows indicate the direction of the action, i.e. 1 → 2, means first person acts on second.

(14) *Contexts of the Sf<sub>1</sub> marker*

	Context			Context	
	S	O		S	O
<i>Un</i>	1	→ 2	<i>y</i>	2	→ 1
<i>a</i> (direct)	1,2	→ 3,obv	<i>uko</i> (inverse)	3,obv	→ 1,2
	3	→ obv		obv	→ 3

Especially the distribution of *-a* and *-uko* gave often reason for assuming hierachies of the sort 1, 2 >> 3 >> obviative and specifying the markers themselves as ‘direct’ and ‘inverse’ (Rhodes, 1976; Klaiman, 1993; Wunderlich, 1996) whereas a ‘direct’ marker always appears when a higher person on this hierarchy acts on one that’s lower and an ‘inverse’ marker when a person lower on the hierarchy

<sup>7</sup>It was already mentioned that there are different conjugations in Potawatomi. One of them is the independent order (IO). It is “used for statements and for some questions in ordinary conversation” (Hockett, 1948).

acts on one that's higher. The former can be exemplified through the suffix *-a* which occurs when a first/second person acts upon a third/obviative or when a third person upon an obviative. *-uko* on the other hand stands for the 'inverse' scenario and appears when a third acts upon a first or second or an obviative on a third person. These distributions are summarized in (15). Notice that there are no forms for obviative acting on first or second in Potawatomi otherwise *-uko* would be found in these cells, too.

(15) *The distribution of -a and -uko in the transitive animate paradigm*

s/o	1	2	3	obv
1			a	a
2			a	a
3	uko	uko	-	a
obv	-	-	uko	-

The other two occurring markers are *-Un* and *-y*. They only appear in  $1 \leftrightarrow 2$  contexts, which are often referred to as local forms. Whether they are integrated in the direction marking system varies in the existing analyses. Halle and Marantz (1993) do not integrate them but Wunderlich (1996) does. However he takes *-y* as direct and *-Un* as inverse marker, since he assumes a hierarchy  $2 \gg 1 \gg 3 \gg$  obviative for the direction marking system.

(16) *-Un and -y in the transitive animate paradigm.*

s/o	1	2
1	-	Un
2	y	-

Notice that it is not necessary to see *-y* as the 'direct' case and that it would be very well plausible to set it as 'inverse' marker and to assume the reverse hierarchy of  $1 \gg 2$ . We will come back later to this question.

Generally it is not really clear how to integrate 'inverse' and 'direct' in a DM like system. Instead of trying so and perhaps assuming special features like ( $\pm$ inverse) and ( $\pm$ direct), we propose that these affixes are simply case markers inserted to realize the subject- or objecthood of one of the arguments. The

arguments for the hierarchy based on the assumption of a direction marking system then play no role here anymore.

The following feature specifications for *-a* and *-uko* (17) mean that the former is an object agreement marker which occurs with non-first and non-second objects.<sup>8</sup> So *-a* indicates that there is a third person object. The affix *-uko* is a subject agreement marking suffix for third person subjects (non-first & non-second). It has the context features *-obv*, *+anim* which means that there must be another head with these features on it. This accounts for the observation that the affix only occurs with transitive forms, and only with animate objects which are not marked for obviation. Compared to *-a*, *-uko* indicates a third person transitive agent.

- (17) *Vocabulary Items for -a and -uko*  
 /-uko/ ↔ Nom, -1,-2 / \_\_[-obv, +anim]  
 /-a/ ↔ Acc, -1,-2 / \_\_[-obv]

The specifications for the local forms are given in (18). Both affixes can only be inserted when the subject is non-third person, since in these contexts *-uko* is the only marker to be found. *-y* is used when the object is not second person, i.e. third or first person. For third person objects there is the marker *-a* which is more specific, so *-y* will never be inserted in third person object contexts, but in such with a first person object. The vocabulary item *-Un* has no person specification and is more or less a default marker for agreement. When none of the specifications of the other items matches the context, *-Un* is inserted.

- (18) *Vocabulary Items for -Un and -y*  
 /-y/ ↔ Acc, -2 / \_\_[Nom,-3]  
 /-Un/ ↔ Acc / \_\_[Nom,-3]

To sum up so far: we proposed that the often assumed direction marking system can be interpreted as a system of agreement markers realizing features

<sup>8</sup>Because of the assumption of feature discharging (cf. section (8)) and multiple insertion, it is sometimes inevitable to use at first glance unintuitive feature specifications. All theme markers have for example negative person features like *-1,-2*, although they obviously mean a third person. But the feature *+3* must be available for other suffixes, in this case, the suffix *-k* ↔ *+3,+pl*, which will be inserted later on. Perhaps this might be against intuition but is unescapable with the given assumptions in section 3.1.

of one or the other head and that four affixes appear in a position right after the stem that all bear a CASE feature in their specification.

The affixes which follow these case markers are *-nan* and *-mun* (Sf<sub>2</sub>). Both bear the feature +1 in their specifications, since they mark plurality of a first person argument. But the first one has a more limited distribution – it occurs only when the subject is third person.

(19) *Vocabulary items for -nan and -mun*

/-nan/	↔	+1,+pl	/ __[Nom,+3]
/-mun/	↔	+1,+pl	

The next group consists of *-wa* and *-m* (Sf<sub>3</sub>). The latter, marking a second person plural, never cooccurs with one of the other markers, so on the first glance it's not really clear which position (slot) it takes. We will come back to this point later.

(20) *Vocabulary items for -wa and -m*

/-wa/	↔	-1,+pl	/ __[+3]
/-m/	↔	+2,+pl	

The suffix *-wa* has the specification -1, since it marks second and third person plural. But it is only used for second person plural when the other argument is third person.

There are only two possible affixes which can follow these (Sf<sub>4</sub>). The first is *-k* which is a third person plural marker. The other one is *-n<sub>3</sub>*<sup>9</sup> and marks obviation (cf. section 3). Both never cooccur. In contexts where this would be the case, i.e. 3p ↔ obv *-wa* marks the plurality of third person and not *-k*.

(21) *Vocabulary items for -k and -n*

/-k/	↔	+3,+pl
/-n/	↔	+obv

<sup>9</sup>-n<sub>2</sub> and -n<sub>1</sub> ~ -na are disregarded for the moment.

3.2.2. *The Hierarchy*

The distribution and specifications of the markers shown in the previous section are crucial for the next step. When combining all these groups of markers and highlighting the shared features they are specified for, the following picture arises<sup>10</sup>.

(22) *Affixes and specifications in the independent order*

a.	/-uko/	Nom, -1,-2	/ ___[Acc,-obv,+anim]	
	/-a/	Acc, -1,-2	/ ___[-obv]	
	/-y/	Acc, -2	/ ___[Nom,-3]	CASE
	/-Un/	Acc	/ ___[Nom,-3]	
-----				
b. i.	/-nan/	+1,+pl	/ ___[Nom,+3]	
	/-mun/	+1,+pl		1
ii.	/-wa/	-1,+pl	/ ___[+3]	
-----				
c.	/-m/	+2,+pl		2
-----				
d.	/-k/	+3,+pl,-obv		3
-----				
e.	/-n/	+obv		obv

The important generalizations regarding the linear order of these suffixes are, *first* that case affixes always precede those for person, e.g. *-uko-nan-k* (3pl → 1pe). And *second*, that person affixes specified for first person precede those specified for third person, e.g. *-wa-k* (3pl → 2pl). There are no ordering relations between second and first or second and third person markers, simply because those markers never cooccur. But still we can say something about their

<sup>10</sup>Note that it is crucial to bear in mind that we are always talking about being ‘specified’ for some feature, i.e. having a ‘+’ or ‘-’ value for it.

hierarchical relationship since we can find some blocking relations between them. Have a look at the local forms shown in (23).

(23) *Local forms*

s/o	1s	1pe	2s	2p
1s			k-wapm-Un	k-wapm-Un-m
1pe			k-wapm-Un-mun	k-wapm-Un-mun
2s	k-wapm	k-wapm-y-mun		
2p	k-wapm-y-m	k-wapm-y-mun		

In  $1p \leftrightarrow 2p$  forms only the suffix for first person plural *-mun* shows up. The concrete reason and theoretical implementation for this behaviour will be discussed in section 3.3.1. For now it is enough to notice that first person ranks out second person: There are two arguments present and both could be marked by a person marker on their own and the first person marker is obviously inserted prior to the second person marker<sup>11</sup>. This follows naturally if the hierarchy  $1 \gg 2$  is active in Potawatomi. We therefore assume that the order and insertion of suffixes in Potawatomi is governed by the hierarchy  $CASE \gg 1 \gg 2 \gg 3$ . This means that out of the pool of possible affixes in a given context, the affix which realizes a feature highest on the hierarchy is inserted prior to the other ones.

This hierarchy is in contrast to the hierarchy  $2 \gg 1 \gg 3$  that is often assumed for Algonquian<sup>12</sup>. The latter hierarchy may describe the observations made for the clitics (c.f. footnote 6), but concerning the order in the suffix-string and the blocking of affixes, only ranking first person over second is empirically correct.

### 3.2.3. *Hierarchy-governed Insertion*

The observation that suffixes in Potawatomi follow a hierarchy can easily be integrated in the theory of Distributed Morphology. The only important extra assumption is the concept of specificity we introduced in section 3.1. It ensures that vocabulary items which bear a feature belonging to a feature class that is

<sup>11</sup>The remaining mystery we will address in section 3.3.1 is only why the second person marker is not inserted afterwards.

<sup>12</sup>E.g. in Dechaine (1999). But cf. Zúñiga (2008) for discussion of how many and which hierarchies are active in Algonquian languages.

ranked high in the hierarchy (regardless whether it is specified for ‘+’ or ‘–’), are more specific and taken into account first in the insertion process before another item that is only specified for features that are in a lower-ranked feature class. Relating this to the proposed hierarchy means that vocabulary items which contain a CASE feature in their specifications are the most specific items of all and are inserted prior to other possible vocabulary items.

A further technical assumption was already explained in section 3.1, but will be repeated here for convenience. We assumed that insertion of vocabulary items is not head-bounded but that fusion merges both agreement heads in one complex head: [Nom ...] [Acc...] → [ [Nom ...] [Acc...]]. This ensures that feature specifications of all heads are visible at the same time and that the vocabulary item which realizes the highest feature on the given hierarchy is inserted regardless on which head it is. Afterwards, there is only one head left with all features on it. Assumptions concerning insertion of vocabulary items like multiple insertion in one head and discharging of features were already discussed in section 3.1. In the following, this and the hierarchy governed insertion will be exemplified.

We take the 3p → 1pe context as example. As can be seen in table (13) the form there is:<sup>13</sup>

- (24) n-wapm-uko-nan-k  
 1-see-NOM.3-1P-3P  
 ‘they see us(excl.)’

The only operation that takes place before vocabulary insertion is fusion of both agreement heads into one. The full specifications of both agreement heads are given in (25).

---

<sup>13</sup>How the insertion for the clitics works exactly won’t be addressed here. There seems to be another hierarchy at work there.

## (25) Full specification of the agreement heads

$\left[ \begin{array}{l} \text{Nom} \\ -1, -2, +3 \\ +\text{pl} \\ +\text{anim} \\ -\text{obv} \end{array} \right]$	$\left[ \begin{array}{l} \text{Acc} \\ +1, -2, -3 \\ +\text{pl} \\ +\text{anim} \\ -\text{obv} \end{array} \right]$
---	---

After fusion, the vocabulary items are checked for whether their feature specification would qualify for insertion into this head. According to the assumed concept of specificity that relies on feature quality, the consideration of markers for insertion starts with those realizing features ordered highest on the hierarchy: CASE in Potawatomi. From the four possible vocabulary items specified for case (22), only *-uko* meets the feature specifications of the head. There is no competition with one of the other three affixes which denotes the feature CASE. This marker is therefore inserted and the features it realizes Nom, -1, -2 become unavailable for further insertion afterwards.

## (26) a. matching vocabulary items

(i) /-uko/ ↔ Nom, -1, -2 / \_\_[Acc]

## b. insertion and feature discharging

**uko** +  $\left[ \begin{array}{l} [\text{Nom}, -1, -2, +3, +\text{pl}, -\text{obv}, +\text{anim}] \\ [\text{Acc}, +1, -2, -3, +\text{pl}, -\text{obv}, +\text{anim}] \end{array} \right]$

After insertion of *-uko*, the markers specified for first person (22) are considered, since they realize the next higher feature on the hierarchy. There are two possible items which would match: *-nan* and *-mun*. In this case *-nan* is added, since it has additional context features which make it more specific than *-mun*. The context features say that it is only possible to insert *-nan* when the other argument is a third person subject. This is the case here.

## (27) a. matching vocabulary items

(i) /-nan/ ↔ +1, +pl / \_\_[Nom, +3]

(ii) /-mun/ ↔ +1, +pl

b. *insertion and feature discharging*

$$uko + nan + \left[ \begin{array}{l} [\text{Nom}, -1, -2, +3, +\text{pl}, -\text{obv}, +\text{anim}] \\ [\text{Acc}, +1, -2, -3, +\text{pl}, -\text{obv}, +\text{anim}] \end{array} \right]$$

Notice that after inserting *-nan* there is no way to insert *-mun*, too. The required context isn't available anymore, since inserting *-nan* discharged the features +1,+pl.

The last affix which can match the remaining feature specifications after insertion of *-nan* is *-k* for third person plural. In this derivation no further affix is possible after this insertion, since there are no appropriate features left.

(28) a. *matching vocabulary items*

(i) /-k/ ↔ +3,+pl

b. *insertion and feature discharging*

$$uko + nan + k + \left[ \begin{array}{l} \text{Nom}, -1, -2, +3, +\text{pl}, -\text{obv}, +\text{anim} \\ \text{Acc}, +1, -2, -3, +\text{pl}, -\text{obv}, +\text{anim} \end{array} \right]$$

This shows that there is an underlying order between the affix slots – they are not just arbitrarily concatenated. The hierarchy is what governs the order and the appearance of the suffixes, i.e. the most specific marker precedes always the lesser specific ones. Although the CO behaves in some respects very differently, the hierarchy-governed insertion principle can also be found there (cf. section 3.3.2).

That only one affix per slot can appear follows from the assumption of discharging of features. There can't be two suffixes marking first person not because they are in the same slot, but rather because inserting one of them discharges the features that would be necessary for the other one. This seems to be a quite natural process: One marker is inserted to realize certain features it is specified for and insertion of another marker which realizes similar features would be redundant.

## 3.3. CFD Markers

Recall from section 3.1 the assumption that every vocabulary item in our approach is lexically marked for one of two different realizational properties, either:

1. it realizes the substantial features it is explicitly specified for and leaves all other features on the head available for further insertion (fission in e.g. Noyer (1992)),

or

2. it discharges all features remaining on the (complex) head and therefore makes any further insertion impossible (one-to-one mapping in e.g. Halle and Marantz (1993)).

The latter are CFD markers and their feature specification is notated in square brackets. Below we will discuss the CFD markers of Potawatomi. Interestingly, only plural markers show this behaviour: the first person plural marker *-mun* that occurs only in the IO and some plural markers in the CO. We will discuss both instances in the following subsections.

3.3.1. *The Plural Marker -mun*

Now we finally turn to the at the beginning introduced mysterious behaviour of the *-mun*-marker. This marker only occurs in the IO in Potawatomi and its distribution is summarized in (29). It occurs if a first person plural is involved, regardless whether this is the agent or the patient.

(29) *Distribution of -mun* (Hockett, 1939; Anderson, 1992)

s/o	1pe	2s/p	3s	3p	obv
1pe		k-Σ-Un-mun	n-Σ-a-mun	n-Σ-a-mun	n-Σ-a-mun
1pi			k-Σ-a-mun	k-Σ-a-mun	k-Σ-a-mun
2s	k-Σ-y-mun		k-Σ-a	k-Σ-a-k	k-Σ-a-n
2p	k-Σ-y-mun		k-Σ-a-wa	k-Σ-a-wa-k	k-Σ-a-wa-n

The above mentioned striking observation now is that *-mun* never precedes any other marker. This would be quite unexpected if vocabulary items could

be inserted as long as their feature specification is met since there are indeed markers whose feature specification should be available after the insertion of *-mun*. Consider one brief example in the context  $1pe \rightarrow 2pl$ . Recall from above that *-m* was characterized as expressing second person plural in the Potawatomi IO, unspecified for thematic role.

- (30) *Vocabulary Item for -m*  
 /-m/ ↔ +2,+pl

In a context with a first person plural subject and a second person plural object, one would expect both plural markers, namely *-mun* + *-m*, whereas *-mun* marks plurality of the agent and *-m* the plurality of the patient. But only *-mun* surfaces and the plural marker *-m* seems to be blocked by the presence of *-mun*. This behaviour of *-mun* can be seen throughout the whole paradigm: *-mun* blocks any other marker after it. Assuming that *-mun* is an CFD marker with the feature specification [+1,+pl,...] derives this pattern quite easily: insertion of *-mun* makes all remaining features of the head unavailable for further insertion. Given the assumption that the features of both arguments are fused into one head, no insertion for any head is possible anymore.

Consider the illustrations for this example below for clarification. First, fusion applies and all features specifying agent and patient are merged into one complex head.

- (31) *Example: 1pe → 2pl*
- $$\left[ \begin{array}{l} [\text{Nom}, +1, -2, -3, +\text{pl}, -\text{obv}, +\text{anim}] \\ [\text{Acc}, -1, +2, -3, +\text{pl}, -\text{obv}, +\text{anim}] \end{array} \right]$$

After fusion, the vocabulary items are checked for whether their feature specification would qualify for insertion into this head. The consideration of markers starts with markers realizing CASE. There is only one case marker listed in the lexicon whose feature specification is met<sup>14</sup> in such a context, namely *-Un* marking simply the objecthood of an argument in the context of a non-third person agent. This marker is therefore inserted and the accusative-features it realizes become unavailable for further insertion.

<sup>14</sup>Cf. Appendix B.1 for detailed feature specifications of all markers.

- (32) a. *matching vocabulary items*  
 (i) /-Un/ ↔ Acc / \_\_\_[Nom, -3]
- b. *insertion and feature discharging*
- $$\text{Un} + \left[ \begin{array}{l} \text{Nom, } +1, -2, -3, +\text{pl}, -\text{obv}, +\text{anim} \\ \text{Acc, } -1, +2, -3, +\text{pl}, -\text{obv}, +\text{anim} \end{array} \right]$$

Now all markers realizing the feature next highest on the hierarchy are considered: those with a specification for first person. The only vocabulary item that matches the feature specification of one of the arguments is *-mun* expressing first person plural. And since it is an CFD marker, no further insertion is possible afterwards: all features are made unavailable.

- (33) a. *matching vocabulary items*  
 (i) /-mun/ ↔ [+1, +pl ...]
- b. *insertion and feature discharging*
- $$\text{Un} + \text{mun} + \left[ \begin{array}{l} \text{Nom, } +1, -2, -3, +\text{pl}, -\text{obv}, +\text{anim} \\ \text{Acc, } -1, +2, -3, +\text{pl}, -\text{obv}, +\text{anim} \end{array} \right]$$

Note that it is crucial at this point again to order first person above second person in the hierarchy. The reverse ranking<sup>15</sup> would mispredict  $\Sigma$ -*Un-m-mun* since the second person plural marker *-m* would be inserted before *-mun* (and the head would be made unavailable for further insertion afterwards).

### 3.3.2. Plural Marking in the CO

The agreement system in CO, which is “the most customary formation in story telling and other hearsay narration” (Hockett, 1948), turns out to behave in some instances very dissimilar to the concepts shown so far. In Appendix A examples of all four paradigm types are given.

The suffixes are completely different to the ones seen in the IO even if there are apparent resemblances like *-wa*, which appears in non-first person plural contexts in the IO, but in the CO it seems to be limited to third person plurals.

<sup>15</sup>Adopted widely for Algonquian, but cf. chapter 3.2.2 for discussion.

The markers in slot  $Sf_1$  do not show up anywhere in the transitive inanimate forms and in the animate paradigm only *-a*, *-Un* and *-y* can be found (still with a distribution unlike the one in the IO). Therefore we assume that the different orders are provided with different sets of agreement marker. All bear the feature ( $\pm$ conjunct) and thus are marked for belonging to one of the orders.

Formal analyses for Algonquian languages often exclude the paradigms of the CO, since they are much more intransparent than their IO counterpart. In contrast, the formal mechanisms we assumed up to now, derive the CO as well. Although we won't discuss all its markers in detail, they are listed in the Appendix. In this section we will discuss additional mechanisms necessary for the derivation of the CO.

In the following, it will become clear that some markers specified for +pl and +conjunct are CFD markers. The first relevant generalization about the distribution of plural marking in the CO is the fact that although there are quite a lot of different plural markers (10 in total, cf. the list in the Appendix), only one can occur in every inflected form. In a context where both arguments are plural, specificity decides which argument receives a plural marking and no additional marking is possible afterwards. Consider a short exemplification of this for a context with a second person plural subject and a first person plural object. First person plural is marked in the CO with the affix *-ak*. This can be seen in the first table in (36) where the forms for 1pe agent and second person patient and the reverse forms with second person agent and 1pe patient are given. As can be seen here, *-ak* is unspecified for thematic role, simply marking plurality<sup>16</sup> since it occurs in all these contexts.

- (34) *Vocabulary Item -ak*  
 /-ak/ ↔ +1,+pl / [\_\_\_-2]

Second person plural is marked in the CO by different suffixes depending on the subject or object status of the argument. As can be seen in (36-b), an agent in the second person plural is expressed by *-ek* leading to the vocabulary entry in (35).

<sup>16</sup>In addition, the marker requires a context feature  $-2$  that must be present on the same head since it only occurs in the first person exclusive and never in the inclusive.

(35) *Vocabulary Item -ek*  
 /-ek/ ↔ -1,+2,+pl / [\_\_Nom]

(36) a. *-ak marking first person plural*

s/o	1pe	2s	2p
1pe		Σ-Un-ak	Σ-Un-ak
2s	Σ-y-ak		
2p	Σ-y-ak		

b. *-ek marking second person plural agent*

s/o	1s	3s
2p	Σ-y-ek	Σ-ek

In a context where both these markers are expected, i.e. a context where 2p acts upon 1pe, however, only Σ-y-ak can be found rather than \*Σ-y-ak-ek.<sup>17</sup>

(37) *Only one plural marking in Potawatomi: 1 >> 2* (Anderson, 1992; Hockett, 1939)

s/o	1s	1pe
2p	<b>-ek</b> [-1,+2,+pl...]	<b>-ak</b> [+1,+pl...]

And this constellation can not only be found with *-ek* but apparently with all plural markers in Potawatomi as is summarized in (38) where all instances of plural affixes are marked in boldface: two plural markers do never cooccur.

<sup>17</sup>Recall the specificity-calculating algorithm (6) that is important right now: both markers have a value for the feature that is second highest on the hierarchy – first person – but none for the feature that is highest. The decision between both markers in favour for *-ek* follows from the fact that *-ek* is specified for +1 and *-ak* for –1 and the assumption that the positive value outranks the negative.

(38) *Distribution of plural markers in the Potawatomi conjunct order*

s/o	1sg	1pe	1pi	2s	2p	3s	3p
1sg				$\Sigma$ -Un-an	$\Sigma$ -Un-an-ko	$\Sigma$ -k	$\Sigma$ -k-wa
1pe				$\Sigma$ -n-ak	$\Sigma$ -n-ak	$\Sigma$ -ko	$\Sigma$ -ko
1pi						$\Sigma$ -at	$\Sigma$ -at
2s	$\Sigma$ -y-En	$\Sigma$ -y-ak				$\Sigma$ -t	$\Sigma$ -t-wa
2p	$\Sigma$ -y-ek	$\Sigma$ -y-ak				$\Sigma$ -ek	$\Sigma$ -kwa
3s	$\Sigma$ -t	$\Sigma$ -y-EmEt	$\Sigma$ -n-ko	$\Sigma$ -k	$\Sigma$ -n-ak		
3p	$\Sigma$ -wa-t	$\Sigma$ -y-EmEt	$\Sigma$ -n-ko	$\Sigma$ -k-wa	$\Sigma$ -n-ak		

Not only plural markers are prohibited to follow another plural marker, other markers are as well, e.g. the second person singular marker *-En* in 2sg → 1pe. This observation that a majority of plural markers block the insertion of any other marker is theoretically implemented through specifying them as CFD markers. There is only one exception of a plural marker preceding other affixes, namely the third person plural marker *-wa* that is followed by the morphemes *-t* and *-ot* as can be seen in (39).

(39) *Markers following the plural marker -wa*

s/o	1s	3p	obv
3p	$\Sigma$ -wa-t		$\Sigma$ -a-wa-ot
obv		$\Sigma$ -k-wa-ot	

Both these markers realize features lower on the hierarchy – namely +3 and +obv – and their insertion after *-wa* is expected. *-wa* in contrast to nearly all other plural markers therefore cannot discharge all features that remain on the head it is inserted to but only discharges its substantial features if it is inserted.<sup>18</sup>

The final insertion step in our 2p → 1pe example above would therefore be as is in (40). Note that once again, the hierarchy is crucial deciding that *-ak* is

<sup>18</sup>For some plural markers, it is simply impossible to tell whether they have the CFD-property or not: no other marker would be expected to occur after them so one cannot determine whether one would have been possible. We will simply list those markers as non-CFD markers. These are: *-ek*, *-ək* and *-En<sub>2</sub>*. And one other marker gives clear evidence for its status: that *-ko<sub>2</sub>* cannot be an CFD marker can be seen in the inanimate transitive paradigm where it is followed by *-En<sub>2</sub>*.

inserted first making insertion of *-ek* impossible. Notice that a former insertion of *-y* already discharged  $\text{Acc}, -2, -3$ .

- (40) a. *matching vocabulary items*  
 (i)  $/\text{-ak}_1/ \leftrightarrow [+1, +\text{pl} \dots]$   
 (ii)  $/\text{-ek}/ \leftrightarrow [-1, +2, +\text{pl} \dots]$
- b. *insertion and discharging of features*
- $$y + \text{ak} + \left[ \begin{array}{l} \text{Nom}, -1, +2, -3, +\text{pl} \\ \text{Acc}, \cancel{-1}, -2, -3, +\text{pl} \end{array} \right]$$

Alternative explanations for the absence of two plural markers in the CO can hardly be compared with our account, since only Stump's analysis derives the markers in the CO and he assumes zero affixation. But it is clear that the impoverishment rule that solves the *-mun*-behaviour in the DM-account of Halle and Marantz (1993) cannot account for this similar phenomenon found in all conjunct plural markers. Additional impoverishment rules would be necessary. Such a system of impoverishment rules is given in (41) where the first three rules apply in the CO as well as in the IO and the last one only in the IO. The rules (41-a-c) ensure that neither plural nor singular (blocking of  $+2, -\text{pl}$  *-En* in the CO) is marked after insertion of any plural marker in the IO or CO. (41-a+b) are the most specific impoverishment rules and will always apply first if their context is met. The less specific impoverishment rule (41-c) now impoverishes all plural features in the context of second person plural, that is blocks insertion of a third person plural marker after insertion of a second person plural marker. In the independent order, an additional rule (41-d) blocks the insertion of an obviative marker after a plural marker. The obvious alternative for the derivation of the pattern in the independent order seems to be an obliteration rule deleting the whole agreement head of the other argument<sup>19</sup> in the presence of *-mun*'s insertion context. But this apparently simpler solution assuming only one rule is highly problematic, since the insertion into the other head is only impossible *after* insertion of *-mun*. Deletion of the whole head prior to any insertion would therefore – contrary to fact – block all case markers in the presence of *mun* as well.

<sup>19</sup>If one wants to depart from the assumptions in Halle and Marantz (1993) stipulating different heads for different agreement features of the same head.

(41) *Alternative: impoverishment rules to account for Potawatomi*

- a. +pl → ∅ / \_\_ [+1, -3, +pl]
- b. -pl → ∅ / \_\_ [+1, -3, +pl]
- c. +pl → ∅ / \_\_ [+2, +pl]
- d. +obv → ∅ / \_\_ [+pl] -conj

Note that these rules that are per se independent from each other derive the clear hierarchical effect of 1 >> 2 >> 3. Nothing at all correlates these rules to the hierarchy that would simply be an accidental effect of arbitrary rules in such a system. In our account, the hierarchy effect follows naturally from assumptions about specificity and insertion and attributed both blocking-phenomena in the plural contexts in the independent and conjunct order to the fact that markers specify their realizational property.

#### 4. Remarks on the Insertion and Realization of the VIs

In the Independent Order, the markers and their specifications we presented (cf. the final list in the Appendix) in addition to the insertion principles we assumed, generate the final surface pattern without difficulty. Only one exception can be found in the 2 → 1s context that lacks any case marker although everything said until now would predict one, namely -y. To account for this observation the impoverishment rule in (42) is assumed.

(42) *Impoverishment in 2 → 1s forms*

- Acc → ∅ / [Nom, +2] [\_\_ +1, -pl]

The derivation of the conjunct order surface forms, however, presents far more difficulties. We weren't dealing with the conjunct order markers in a very detailed way in the preceding sections and only discussed its plural marking behaviour in section 3.3.2 – nevertheless the same system of hierarchy-governed insertion and CFD markers can predict the correct conjunct order as well. It only inserts a quite different – and far more complex – set of affixes than the independent order. The complete list of vocabulary items and impoverishment

rules necessary to derive the conjunct order is given in the Appendix B.2<sup>20</sup>. We won't discuss all these affixes and their distribution now but will briefly illustrate the difficulties that arise in predicting the correct surface forms.

In (43), the conjunct order paradigm for a transitive animate verb is given as our DM system and marker entries predict it. We listed the underlying forms in the first line and their corresponding surface forms in the second line in the table (43) and it becomes clear that in order to explain the concrete surface patterns some final remarks are needed.

(43) *Alternations in the Conjunct Order surface forms*

s/o	1sg	1pe	1pi	2sg	2pl
1sg				miN-n-an minnan	miN-n-an-ko minəŋko
1pe				miN-n-ak minnak	miN-n-ak minnak
2sg	miN-y-En mišyən	miN-y-ak mišyak			
2pl	miN-y-ek mišyek	miN-y-ak mišyak			
3sg	miN-t mišət	miN-y-EmEt mišyəmət	miN-n-ko minnək	miN-n-k minək	miN-n-ak minnak
3pl	miN-wa-t mišwat	miN-y-EmEt mišyəmət	miN-n-ko minək	miN-n-k-wa minkwa	miN-n-ak minnak
obv					

<sup>20</sup>We admit that the list of vocabulary entries is quite long and contains some homonymous markers – on certain interpretations of economy and descriptive adequacy an undesired result. On the other hand, we avoided numerous stipulated impoverishment rules – the assumption of more of those would obviously avoid quite some marker entries. The decision between those different possible analyses is a quite general one that recurs to the general understanding of theoretical economy and plausibility.

s/o	3sg	3pl	obv
1sg	miN-k minək	miN-k-wa minkwa	
1pe	miN-ko minko	miN-ko minko	
1pi	miN-at minat	miN-at minat	
2sg	miN-t minət	miN-t-wa mintwa	
2pl	miN-ek minek	miN-kwa minkwa	
3sg			miN-a-ot minat
3pl			miN-a-wa-ot minawat
obv	miN-k-ot minkot	miN-k-wa-ot minkwaot	

The phonological descriptions and verbal paradigms given in the sources are quite minimal, so phonological processes e.g. triggered by a stem can therefore hardly be justified. In (44), all phonological changes that apply in the derivation of the surface forms are listed<sup>21</sup>.

(44) *Phonological changes*

context	underlying	surface
<i>1. ə-insertion to avoid C-clusters</i>		
3sg → 1sg	š <sub>Σ</sub> -t	-šət
3sg → 2sg	-n-k	-nək
1sg → 3sg	-n-k	-nək
2sg → 3sg	-n-t	-nət
<i>2. Vowel reduction</i>		
1sg → 2pl	-an-ko	-ənko
<i>3. Avoidance of a vowel-cluster through deletion</i>		
3sg → obv	-a-ot	-at
3pl → obv	-a-wa-ot	-awat
<i>4. Final V-deletion (+ə-insertion, cf. 2.)</i>		
3 → 1pi	-n-ko	-nək

<sup>21</sup>We will remain silent about the stem alternation in the following.

There are quite a lot of markers specified for the conjunct order in Potawatomi, many of them phonologically quite similar or even homonymous. One observation that would allow to reduce the marker inventory presented here, is the distribution of markers with the phonological representation *-t* and *-k*, summarized as voiceless stop *-P* in the paradigm in (45).

(45) *A voiceless stop unspecified for place as third person marker*

s/o	1sg	1pe	1pi	2sg	2pl
1sg				miN-n-an	miN-n-an-ko
1pe				miN-n-ak	miN-n-ak
1pi					
2sg	miN-y-En	miN-y-ak			
2pl	miN-y-ek	miN-y-ak			
3sg	miN-P	miN-y-EmEt	miN-n-ko	miN-n-P	miN-n-ak
3pl	miN-wa-P	miN-y-EmEt	miN-n-ko	miN-n-P-wa	miN-n-ak

	3sg	3pl	obv
1sg	miN-P	miN-P-wa	
1pe	miN-ko	miN-ko	
1pi	miN-at	miN-at	
2sg	miN-P	miN-P-wa	
2pl	miN-ek	miN-kwa	
3sg			miN-a-ot
3pl			miN-a-wa-ot
obv	miN-P-ot	miN-P-wa-ot	

It is clear that this unspecified stop only occurs in forms involving a third person. A feature specification that is unspecific enough to describe this marker but still block it in contexts where it does not occur (e.g. in the inanimate paradigm), would be:

$$P \rightarrow -1, -2 / [ \_ \_ +anim ] [ +anim ]$$

Such an assumption would reduce the marker inventory from five *-k/-t*-markers to only one lexical entry. This hypothesized stop would lack an overt realization in some forms since it would be deleted in the context of another following or preceding voiceless stop, e.g. 3 → 1pi *miN-∅-ko*. The concrete surface realization of this unspecified marker as either dorsal *-k* or coronal *-t* follows an interesting contrastive pattern: that is, the marker is realized as a stop with another place

feature in the reverse combination involving the same person features. For example, coronal *-t* surfaces in 2sg → 3 and in the reverse pattern 3 → 2sg, dorsal *-k* is realized.

(46) *Realization of P as either k or t*

	1sg	2sg	3sg	3pl
1sg			DORSAL	DORSAL
2sg			CORONAL	CORONAL
3sg	CORONAL	DORSAL		
3pl	CORONAL	DORSAL		
obv			DORSAL	DORSAL

Different mechanisms are able to account for this behaviour, e.g. the assumption of one of these stops as the underlying variant and a morphemic floating feature consisting only of a place feature that changes the feature specification of the sound in some contexts. Or some principle of paradigmatic contrast stating that forms involving the same persons must not receive the same overt realization of an unspecified stop. But for reasons of space, we will leave this tentative hypotheses aside.

## 5. Conclusion

In the preceding sections we introduced the quite complex verbal agreement system in Potawatomi in the conjunct and independent order. In contrast to some previous theoretical accounts to the verbal inflection system, our analysis derives the whole verbal agreement system (4 paradigms in two distinct orders) in a DM system. We argued that Potawatomi is a straightforward example for hierarchy-governed insertion based on the hierarchy: CASE >> 1 >> 2 >> 3 >> obviative. The second theoretical main ingredient was the assumption of so called CFD markers, that is markers that specify their realizational properties: inserted markers either discharge the substantial features they are specified for or all remaining features. The comparison with related languages led to some interesting conclusions of an Algonquian-wide cooccurrence restriction for plural markers that is best captured through those CFD markers and developed into quite different shapes in the different languages. Especially a closer

examination of the plural marking pattern in Menomini led to some interesting insights about the different shapes of the ‘One-plural-marker’ tendency we identified and might be evidence for a relativized concept of CFD markers that only discharge all remaining features of a certain kind.

## A. Paradigms

The following paradigms are taken from Hockett (1939). Capital letters are used to indicate that the accordant vowels can be dropped under certain phonological conditions (cf. Hockett, 1939).

### A.1. Inanimate Stems

#### *Independent Order*

INTRANSITIVE INANIM. (II) – <i>wawyeya</i> ‘to be round’	
–anim	
3s	wawyeya
3p	wawyeya-ton
obv	wawyeya-nən

TRANSITIVE INANIMATE (TI) – <i>wapUt</i> ‘to see’		
	3s –anim	3p –anim
1s	n-wapt-a-n <sub>1</sub>	n-wapt-a-n <sub>1</sub> -n <sub>2</sub>
1pe	n-wapt-a-mun	n-wapt-a-mun
1pi	k-wapt-a-mun	k-wapt-a-mun
2s	k-wapt-a-n <sub>1</sub>	k-wapt-a-n <sub>1</sub> -nn <sub>2</sub>
2p	k-wapt-a-na <sub>1</sub> -wa	k-wapt-a-na <sub>1</sub> -wa-nn <sub>2</sub>
3s	w-wapt-a-n <sub>1</sub>	w-wapt-a-n <sub>1</sub> -nn <sub>2</sub>
3p	w-wapt-a-na <sub>1</sub> -wa	w-wapt-a-na <sub>1</sub> -wa-nn <sub>2</sub>

#### *Conjunct Order*

INTRANSITIVE INANIM. (II) – <i>wawyeya</i> ‘to be round’	
–anim	
3s	wawyeya-k
3p	wawyeya-k
obv	wawyeya-nənək

TRANSITIVE INANIMATE (TI) – *nenem* ‘to think of something’

s/o	3s –anim	3p –anim
1s	nentəm-an	nentəm-an-ən
1pe	nentəm-ak	nentəm-ak
1pi	nentəm-ko	nentəm-ko-ən
2s	nentəm-ən	nentəm-ən-ən
2p	nentəm-ek	nentəm-ek
3s	nentə-k	nentə-k
3p	nentəm-wa-t	nentəm-wa-t

## A.2. Animate Stems

*Independent Order*INTRANSITIVE ANIMATE (AI) – *kaskumi* ‘to start running’

+anim	
1s	n-kaskumi
1pe	n-kaskumi-mUn
1pi	k-kaskumi-mUn
2s	k-kaskumi
2p	k-kaskumi-m
3s	kaskumi
3p	kaskumi-k
obv	kaskumi-n <sub>3</sub>

TRANSITIVE ANIMATE (TA) – *wapm* ‘to see’

s/o	1s	1pe	2s	2p
1s			k-wapm-Un	k-wapm-Un-m
1pe			k-wapm-Un-mun	k-wapm-Un-mun
2s	k-wapm	k-wapm-y-mun		
2p	k-wapm-m	k-wapm-y-mun		
3s	n-wapm-uko	n-wapm-uko-nan	k-wapm-uko	k-wapm-uko-wa
3p	n-wapm-uko-k	n-wapm-uko-nan-k	k-wapm-uko-k	k-wapm-uko-wa-k

s/o	3s	3p	obv
1s	n-wapm-a	n-wapm-a-k	n-wapm-a-n <sub>3</sub>
1pe	n-wapm-a-mun	n-wapm-a-mun	n-wapm-a-mun
1pi	k-wapm-a-mun	k-wapm-a-mun	k-wapm-a-mun
2s	k-wapm-a	k-wapm-a-k	k-wapm-a-n <sub>3</sub>
2p	k-wapm-a-wa	k-wapm-a-wa-k	k-wapm-a-wa-n <sub>3</sub>
3s			w-wapm-a-n <sub>3</sub>
3p			w-wapm-a-wa-n <sub>3</sub>
obv	w-wapm-uko-n <sub>3</sub>	w-wapm-uko-wa-n <sub>3</sub>	

### Conjunct Order

#### INTRANSITIVE ANIMATE (AI) – *nenem* ‘to think’

+anim	
1s	nentəm-an
1pe	nentəm-ak
1pi	nentəm-ko
2s	nentəm-ən
2p	nentəm-ek
3s	nentə-k
3p	nentəm-wa-t

#### TRANSITIVE ANIMATE (TA) – *miN* ‘to give’

s/o	1s	1pe	1pi	2s	2p
1s				min-n-an	min-n-ən-ko
1pe				min-n-ak	min-n-ak
2s	miš-y-ən	miš-y-ak			
2p	miš-y-ek	miš-y-ak			
3s	miš-ət	miš-y-əmət	min-n-ək	min-ək	min-n-ak
3p	miš-wa-Ut	miš-y-əmət	min-n-ək	min-k-wa	min-n-ak
obv					

s/o	3s	3p	obv
1s	min-ək	min-k-wa	
1pe	min-ko	min-ko	
1pi	min-at	min-at	
2s	min-ət	min-t-wa	
2p	min-ek	min-kwa	
3s			min-a-t
3p			min-a-wa-t
obv	min-k-ot	min-k-wa-t	

## B. Vocabulary Items and Impoverishment Rules

In this Appendix, all vocabulary items and impoverishment rules necessary to derive all the eight paradigms introduced in section 1 (namely TI, II, TA, AI in the CO and the IO) are given. Most of the markers were already introduced in the discussions above.

### B.1. Independent Order

#### Vocabulary Items

/-ton/	↔	Nom,+3,+pl,-obv,-anim	
/-nən/	↔	Nom,+3,+obv,-anim	
/-uko/	↔	Nom,-1,-2	/ __[-obv,+anim]
/-a/	↔	Acc,-1,-2	/ __[-obv]
/-y/	↔	Acc,-2	/ __[Nom,-3]
/-Un/	↔	Acc	/ __[Nom,-3]
/-nan/	↔	+1,+pl	/ __[Nom,+3]
/-mun/	↔	[+1,+pl...]	
/-wa/	↔	-1,+pl	/ __[+3]
/-m/	↔	+2,+pl	
/-k/	↔	+3,+pl,-obv	/ __[+anim]
/-n <sub>1</sub> /	↔	+pl,-anim	/ __[+anim]
/-n <sub>2</sub> /	↔	+anim	/ __[-anim]
/-n <sub>3</sub> /	↔	+obv	

#### Impoverishment

*Impoverishment in 2* → *1s forms*

Acc → ∅ / [Nom, +2] [\_\_+1,-pl]

## B.2. Conjunct Order

## Vocabulary Items

/-at/	↔	[Nom,+1,+2,+pl...]	/ __[+3,+anim]
/-an/	↔	Nom,+1,-pl	
/-kwa/	↔	[Nom,-1,+2,-3,+pl...]	/ __[+3,+pl,+anim]
/-En <sub>1</sub> /	↔	+2,-pl	/ [__Nom]
/-a/	↔	Nom,+3	/ __[+obv]
/-t <sub>1</sub> /	↔	Nom,-1,-2,-obv	/ [__+anim] & [+1,-pl]
/-k <sub>2</sub> /	↔	Nom,-1,-2,-obv	/ [__+anim] & [+2,-pl]
/-t <sub>3</sub> /	↔	Nom,-1,-2	/ __[+VAI]
/-y/	↔	Acc,-3,-2	
/-n <sub>1</sub> /	↔	Acc,-3	
/-ko <sub>1</sub> /	↔	[+1,-2,-3,+pl...]	/ __[Acc,+3,+anim]
/-EmEt/	↔	[+1,+pl...]	/ [__ -2] & [Nom,+3]
/-ak <sub>1</sub> /	↔	[+1,+pl...]	/ [__ -2]
/-ak <sub>2</sub> /	↔	[-1,+2,+pl...]	/ __[Nom,+3]
/-ek/	↔	-1,+2,+pl	/ [__Nom]
/-ko <sub>2</sub> /	↔	+2,+pl	
/-ək/	↔	[+1,+pl...]	/ __[Acc,+3]
/-En <sub>2</sub> /	↔	+3,+pl,-anim	/ __[Nom,-3]
/-wa/	↔	+3,+pl,+anim	
/-k <sub>1</sub> /	↔	-1,-2,-obv	/ [__+anim] & [+1,-pl]
/-t <sub>2</sub> /	↔	-1,-2,-obv	/ [__+anim] & [+2,-pl]
/-ot/	↔	+obv	/ __[+3,+anim]
/-n <sub>2</sub> /	↔	+obv	

## Impoverishment

*Absence of case marker y in 3* → 1s

Acc → ∅ / [\_\_+1,-pl] [+3,+anim]

*Absence of case marker  $n_1$  in 3 → 2s forms*

Acc → ∅ / [ \_\_\_ +2, -pl ] [ +3 ]

*No an or En<sub>1</sub> in 1s/2s → 3 respectively*

Nom → ∅ / [ \_\_\_ -pl ] [ +3, -obv, +anim ]

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