

# Collateral Feature Discharge

Daniela Henze & Eva Zimmermann

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## Blocking of expected markers

(1) *Potawatomi verbal agreement*

(Hockett 1939)

	1pe	1pi	2p	3p	obv	-anim
1p			-men* <b>-m</b>	-men* <b>-k</b>	-men* <b>-n</b>	-men* <b>-n</b>
2p	-men* <b>-m</b>			-wa-k	-wa-n <sub>1</sub>	-wa-n <sub>2</sub>
3p	-nan-k	-nan-k	-wa-k		-wa-n <sub>1</sub>	-wa-n <sub>2</sub>

(2) *Vocabulary Items*

-nan ⇔ +1,+pl / \_\_ [ A, +3 ]

-men ⇔ +1,+pl

-k ⇔ +3,+pl

-n<sub>1</sub> ⇔ +obv-n<sub>2</sub> ⇔ -anim,+pl

-m ⇔ +2,+pl

# Theoretical Implementation for blocking

## One possibility: Impoverishment

- in some realizational theories, Vocabulary Items (VIs) realize the morphosyntactic features the syntax provides
- prior to insertion, these features can be manipulated: features can be deleted in the presence of other features
  - (Bonet 1991, Halle & Marantz 1993, Bonet 1995, Noyer 1996, Halle 1997)

## Theoretical Implementation for blocking

## (3) Impoverishment rules in Potawatomi

- |    |       |   |                    |   |                      |
|----|-------|---|--------------------|---|----------------------|
| a. | +pl   | ⇒ | ∅ / __[ A,+1,+pl ] | } | Agr <sub>P</sub> ⇒ ∅ |
| b. | +obv  | ⇒ | ∅ / __[ A,+1,+pl ] |   |                      |
| c. | -anim | ⇒ | ∅ / __[ A,+1,+pl ] |   |                      |
| d. | +pl   | ⇒ | ∅ / __[ P,+1,+pl ] |   |                      |

	1p	2p	3p	obv	-anim
1p		-men* <b>-m</b> [+2,+pl]	-men* <b>-k</b> [+3,+pl]	-men* <b>-n</b> [+obv]	-men* <b>-n</b> [-anim]
2p	-men* <b>-m</b> [+2,+pl]				
3p	-nan-k				

# Main Claim

Impoverishment is a quite powerful and stipulated mechanism and should be avoided.

We rather argue that **morphological deletion generally follows from marker insertion**. The markers themselves are responsible for the blocking of other markers:

- 1 markers that **do not** trigger blocking
- 2 markers that **do** trigger blocking

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# Distributed Morphology – A realizational theory

Halle & Marantz 1993

- framework: Distributed Morphology
- VIs are inserted to **realize** the morphosyntactic features the syntax provides
- VIs can be **underspecified** and are inserted if their features are a proper **subset** of the morphosyntactic feature context (Halle 1997)
- if more than one VI matches a context, the more **specific** marker is chosen

## Fission as Feature Discharge (Noyer 1992)

- a marker is inserted and its substantial features are discharged and become **inaccessible** for any further insertion
- this allows insertion of more than one marker into one head:  
'insertion as long as possible'
- insertion process stops when there are no features left or no VIs which match

### (4) *Fission as Feature Discharge (Noyer 1992)*

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 (i) and (ii) hold:

- (i)  $\alpha - \beta$  is available for further vocabulary insertion.
- (ii)  $\beta$  is not available for further insertion.



## Potawatomi – Markers that do not trigger blocking

head:

insertion of:

resulting structure:

$$\begin{bmatrix} A, -1, -2, +3, +pl \\ P, +1, -2, -3, +pl \end{bmatrix}$$

$$-nan \leftrightarrow [+1, +pl]$$

$$\begin{bmatrix} A, -1, -2, +3, +pl \\ P, \cancel{+1}, -2, -3, \cancel{+pl} \end{bmatrix}$$

$$\begin{bmatrix} A, -1, -2, +3, +pl \\ P, +1, -2, -3, +pl \end{bmatrix}$$

$$-k \leftrightarrow [+3, +pl]$$

$$\begin{bmatrix} A, -1, -2, \cancel{+3}, \cancel{+pl} \\ P, +1, -2, -3, +pl \end{bmatrix}$$

$$-nan-k$$

## Markers with a CFD-property

- a second type of VI
- they discharge more than the features which are necessary for their insertion
  - = VI with the property of **Collateral Feature Discharge** (CFD)
  - = VIs that trigger blocking

## Potawatomi revisited

A \ P	1pe	1pi	2p	3p	obv	-anim p
1p			-men	-men	-men	-men
2p	-men			-wa-k	-wa-n <sub>1</sub>	-wa-n <sub>2</sub>
3p	-nan-k	-nan-k	-wa-k		-wa-n <sub>1</sub>	-wa-n <sub>2</sub>

- two markers for [+1,+pl]: *-nan* and *-men*
- blocking effect is marker specific
- happens only after *-men*
- assumption: discharges more than its substantial features = CFD

# Potawatomi – Markers that do trigger blocking

head:

$$\begin{bmatrix} A, +1, -2, -3, +pl \\ P, -1, -2, +3, +pl \end{bmatrix}$$

$$\begin{bmatrix} A, +1, -2, -3, +pl \\ P, -1, -2, +3, +pl \end{bmatrix}$$

insertion of:

$$-men_{cfd} \leftrightarrow [+1, +pl]$$

**-men**

resulting structure:

$$\begin{bmatrix} \del{A, +1, -2, -3, +pl} \\ \del{P, -1, -2, +3, +pl} \end{bmatrix}$$

## Alternative: Impoverishment

head:

$$\begin{bmatrix} A, +1, -2, -3, +pl \\ P, -1, -2, +3, +pl \end{bmatrix}$$

insertion of:

*-men*  $\leftrightarrow$  [+1, +pl]

resulting structure:

$$\begin{bmatrix} A, \cancel{+1}, -2, -3, \cancel{+pl} \\ P, -1, -2 \end{bmatrix}$$

- 4 different rules would be needed to account for all contexts where *-men* appears
- would always delete different morphosyntactic features

## CFDs in Potawatomi

- allows to capture the **marker-sensitivity** of the blocking
  - ➔ its the presence of *-men* rather than the context [+1,+pl] that triggers blocking (*-nan* is followed by other markers)
- allows to get rid of (stipulated and numerous) impoverishment rules
- a comparable pattern of blocking can be found in most Algonquian languages

# Predictions

More than the substantial features of a marker are inaccessible for further insertion:

- 1 all remaining features are inaccessible
- 2 only a certain class(es) of features

# Prediction I: Remaining Feature Discharge



## All remaining features are inaccessible

- a CFD-marker is inserted and **all features** (on all heads) that are not realized up to this point become **inaccessible** for any further insertion

head:

insertion of:

resulting structure:

$$\begin{bmatrix} -F_1, +F_2, -F_3 \\ +F_1, -F_2, -F_3 \end{bmatrix} \quad -aff_{CFD} \leftrightarrow [+F_1] \quad \begin{bmatrix} \cancel{-F_1}, \cancel{+F_2}, \cancel{-F_3} \\ \cancel{+F_1}, \cancel{-F_2}, \cancel{-F_3} \end{bmatrix}$$

# Example: verbal agreement in Tangut

## (5) *Tangut verbal agreement*

(van Driem 1991&1993; Kepping 1994)

A\P	1s	1pl	2s	2pl	3s	3pl	intr		
1s			-na	-na	-ŋa	-ŋa	-ŋa		
1pl			-na	-na	-ni	-ni	-ni	-ŋa	[+1]
2s	-ŋa	-ŋa			-na	-na	-na	-na	[+2]
2pl	-ŋa	-ŋa			-ni	-ni	-ni	-ni	[A, -3, +pl]
3s	-ŋa	-ŋa	-na	-na					
3pl	-ŋa	-ŋa	-na	-na					

# Insertion & standard feature discharge: a misprediction

## (6) *Expected Tangut paradigm*

*	1s	1pl	2s	2pl	3s	3pl	intr
1s			-na-ŋa	-na-ŋa	-ŋa	-ŋa	-ŋa
1pl			-na-ni-ŋa	-na-ni-ŋa	-ni-ŋa	-ni-ŋa	-ni-ŋa
2s	-ŋa-na	-ŋa-na			-na	-na	-na
2pl	-ŋa-ni-na	-ŋa-ni-na			-ni-na	-ni-na	-ni-na
3s	-ŋa	-ŋa	-na	-na			
3pl	-ŋa	-ŋa	-na	-na			

➔ Generalization: only **one verbal agreement marker** is added to a stem

## Analysis for Tangut agreement: CFDs

- the three agreement markers are CFDs and make all remaining features inaccessible
- insertion into the object head precedes insertion into the subject head
  - since there is no agreement marker for third person, agreement with the agent occurs in contexts with a third person patient

### (7) *Tangut transitive verbal paradigm*

	1s	1pl	2s	2pl	3s	3pl
1s			P	P	A	A
1pl			P	P	A	A
2s	P	P			A	A
2pl	P	P			A	A
3s	P	P	P	P		
3pl	P	P	P	P		

$-\eta_{\text{CFD}}$  [+1]  
 $-\text{na}_{\text{CFD}}$  [+2]  
 $-\text{ni}_{\text{CFD}}$  [A, -3, +pl]

# CFDs in Tangut: Example (1pl – 2sg)

heads:

$$\begin{bmatrix} P, -1, +2, -pl \\ A, +1, -2, +pl \end{bmatrix}$$

insertion of:

$$-na_{CFD} \leftrightarrow [+2]$$

resulting structure:

$$\begin{bmatrix} \underline{P, -1, +2, -pl} \\ \underline{A, +1, -2, +pl} \end{bmatrix}$$

## Alternative I: Templatic Morphology (e.g. Stump 1996)

- an ordered sequence of fixed positions is assumed and affixes are marked for the slot in which they can appear
- only one affix per slot is allowed  
(Anderson 1992, Halle&Marantz 1993, Stump 2001)
- in Tangut, only one slot for agreement suffixes exists

### *Discussion*

- the assumption of templates and arbitrary slots lacks any independent explanation for the ordering/blocking of affixes
- the preferable alternative is a hierarchy-governed-insertion approach where one general hierarchy of morpho-syntactic features predicts the order (and specificity) of morphemes  
(e.g. Noyer 1992)

## Alternative II: Feature Discharge $\neq$ Fission

- return to the original assumption in Halle & Marantz (1993) where only one affix could be inserted into a single agreement head
- if both heads fused into a single one, it follows that only one affix is possible

### *Discussion*

- the clear cases where more than one affix is inserted must be analysed as special cases where the agreement head is split up
  - ➔ Fission is a special operation that only applies language-specific and only in certain contexts rather than a universal part of the morphological component

## Prediction II: Categorical Feature Discharge

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## Certain Feature Classes are inaccessible

- a CFD-marker is inserted and features belonging to a certain feature class become inaccessible for any further insertion

head:

insertion of:

resulting structure:

$$\begin{bmatrix} \pm C_1, \pm P_1, \pm N_1 \\ \pm C_2, \pm P_2, \pm N_2 \end{bmatrix}$$

$$-aff_{CFD} \leftrightarrow [N_1]$$

$$\begin{bmatrix} \pm C_1, \pm P_1, \cancel{\pm N_1} \\ \pm C_2, \pm P_2, \cancel{\pm N_2} \end{bmatrix}$$

## Verbal agreement in Kulung (Tolsma 2006)

### (8) *Transitive agreement*

A \ P	1s	1de	1pe	2d	2p	3s
1pe				-ci	-ni	-ci-u-ka
2p	-o:-ni	-ci-ka	-i-ka			-ni-u-am
3	-o:	-ci-ka	-i-ka	-ci	-ni	-e-ci

### (9) *Vocabulary Items (number marking)*

-o: ⇔ +1,+sg

-ci ⇔ -sg

-i ⇔ +1,+pl

-ni ⇔ +2,+pl

## Verbal agreement in Kulung (Tolsma 2006)

(10) *Paradigm with expected markers*

A\P	1s	1de	1pe	2d	2p	3s
1pe				-ci- <b>*i</b>	-ni- <b>*i</b>	-ci-u-ka
2p	-o:-ni	-ci- <b>*ni</b> -ka	-i- <b>*ni</b> -ka			-ni-u-am
3	-o:	-ci-ka	-i-ka	-ci	-ni	-e-ci

(11) *Vocabulary Items (number marking)*

-o: ⇔ +1,+sg

-ci ⇔ -sg

-i ⇔ +1,+pl

-ni ⇔ +2,+pl

➔ Generalization: only **one number marker** (for non-singular) is possible

## Analysis for blocking in Kulung: CFDs

- the non-singular markers in Kulung are CFDs and block the insertion of subsequent markers since they make more than their substantial features inaccessible
  - but not all features are inaccessible for further insertion, only further number markers
- ➔ **relativized CFDs** making certain features/feature classes unavailable

# Number CFDs in Kulung: Example (1pl – 2pl)

head:

insertion of:

resulting structure:

$$\begin{bmatrix} A, -1, +2, -3, -sg, +pl \\ P, +1, -2, -3, -sg, +pl \end{bmatrix}$$

$$-i_{Num} \leftrightarrow [+1, +pl]$$

$$\begin{bmatrix} A, -1, +2, -3, \cancel{-sg}, \cancel{+pl} \\ P, \cancel{+1}, -2, -3, \cancel{-sg}, \cancel{+pl} \end{bmatrix}$$

$$*-ci \leftrightarrow [-sg]$$

$$*-ni \leftrightarrow [+2, +pl]$$

$$\begin{bmatrix} A, -1, +2, -3, -sg, +pl \\ P, +1, -2, -3, -sg, +pl \end{bmatrix}$$

$$-ka \leftrightarrow [-2, -3]$$

$$\begin{bmatrix} A, -1, +2, -3, -sg, +pl \\ P, +1, \cancel{-2}, \cancel{-3}, -sg, +pl \end{bmatrix}$$

**-i-ka**

# Summary

We argued for a special property of markers: ‘Collateral Feature Discharge’, A marker with this property not only discharges the substantial features it is specified for but makes additional features inaccessible for further insertion:

- all remaining features (e.g. in Tangut or Potawatomi)
- only features of a certain class (e.g. in Kulung)

This derives **marker-sensitive blocking effects** (e.g. Potawatomi), **1-slot effects** (e.g. Tangut) and **category-sensitive blocking effects** (e.g. Kulung) with a single extension of known concepts and without using the powerful mechanism of Impoverishment rules.

## What types of CFDs are possible?

The most restrictive assumption about possible CFDs:

- CFDs either discharge all remaining features or all features of a certain class
- Categorical CFDs only apply to the morpho-syntactic category they realize  
(e.g. number markers block other number markers in Kulung)

➔ If one wants to get rid of impoverishment rules and attribute all the morphological blocking effects to the presence of CFDs, this is presumably too restrictive.

## CFDs vs. Impoverishment

But even the introduction of 'one-feature'-CFDs or categorial CFDs that discharge features they are not specified for, leaves CFDs as the more restrictive mechanism:

- CFDs are the more restrictive mechanism: all features in all contexts could be impoverished, CFDs hinge on the presence of another marker
- it allows to get rid of another stipulation: 1-Slot-restriction
- more plausible from a viewpoint of learnability



Migwe'c!  
Thank you!

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# Prediction III: Exceptional Feature Discharge

# German Past syncretism

## (12) *Non-Past vs. Past agreement in German*

Non-Past		Past	
1s	glaub -e	1s	glaub -te
2s	glaub -st	2s	glaub -te-st
3s	glaub -t	3s	glaub -te

## (13) *Vocabulary Items*

-e	⇔	+1
-st	⇔	+2
-t	⇔	-1, -2
-te	⇔	+past

# German Past Syncretism

- the past marker *-te* is a CFD marker which makes the feature  $\pm 1$  inaccessible
- so only the second person marker *-st* can appear after *-te*

# German Past Syncretism

head:

insertion of:

resulting structure:

[ +past, -1, -2 ]

-te<sub>CFD</sub> ↔ [+past]

[ ~~+past~~, ~~-1~~, -2 ]

**-te**

## (14) *Vocabulary Items*

-te<sub>CFD</sub> ↔ +past

-e ↔ +1

-st ↔ +2

-t ↔ -1, -2

# German Past Syncretism

head:

insertion of:

resulting structure:

[ +past, -1, +2 ]     $-te_{CFD} \leftrightarrow [+past]$     [ ~~+past~~, ~~-1~~, +2 ]

[ +past, -1, +2 ]     $-st \leftrightarrow [+2]$     [ +past, -1, ~~+2~~ ]

**-te-st**

## (15) *Vocabulary Items*

$-te_{CFD} \leftrightarrow +past$

$-e \leftrightarrow +1$

$-st \leftrightarrow +2$

$-t \leftrightarrow -1, -2$