Syntax in Phonology? C-Command Over Strings

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NECphon 2017
October 21, 2017

You can get the slides here under “News”
Take-Home Message

A cross-module restriction on well-formedness conditions:

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<th>Phonology</th>
<th>Syntax</th>
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<td>bounded</td>
<td>intervocalic voicing</td>
<td>subcategorization</td>
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<tr>
<td>unbounded</td>
<td>sibilant harmony</td>
<td>movement</td>
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<tr>
<td>$b + u$</td>
<td>non-final RHOL</td>
<td>c-command</td>
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<tr>
<td>$b + u + b$</td>
<td>*first-last harmony</td>
<td>*sibling of c-commandee</td>
</tr>
</tbody>
</table>

The Main Conjecture: Ban on Improper Locality

Once unbounded, always unbounded.

This talk is mostly about the phonology column.
Methodology

- Only **phonotactics** considered (no input-output mappings)
- **Subregular** phonology as measuring rod for complexity

1. define different classes of grammars
2. organize these classes into an expressivity hierarchy
3. needed level of expressivity?
Methodology

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- **Subregular** phonology as measuring rod for complexity

1. define different classes of grammars
2. organize these classes into an expressivity hierarchy
3. needed level of expressivity?
Outline

1. Strictly Piecewise (SP)

2. Interval-Based Strictly Piecewise (IBSP)

3. Phonological Interactions of Local and Non-Local Information

4. Limitation to “String c-command”
Unbounded Phenomena in Phonology

1 Samala Sibilant Harmony
Sibilants must not disagree in anteriority.
(Applegate 1972)

(1) a. * hasxintilawaʃ
b. * hafyntilawas
c. hafyntilawaʃ

2 Unbounded Tone Plateauing in Luganda (UTP)
No L may occur within an interval spanned by H.
(Hyman 2011)

(2) a. LHLLLLLL
b. LLLLLLHL
c. * LHLLLLHL
d. LHHHHHHHL
Each phenomenon can be represented by a collection of finitely many forbidden subsequences.

<table>
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<tr>
<th>Phenomenon</th>
<th>Constraint</th>
<th>Forbidden Subsequences</th>
</tr>
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<tbody>
<tr>
<td>Sibilant harmony</td>
<td>$^[\alpha \text{ ant}] \cdots [\neg \alpha \text{ ant}]$</td>
<td>s$f$, f$s$</td>
</tr>
<tr>
<td>UTP</td>
<td>$^*\text{HLH}$</td>
<td>HLH</td>
</tr>
</tbody>
</table>

A well-formedness condition is strictly piecewise (SP) iff it is equivalent to a finite list of forbidden subsequences.
Blocking Effects are Beyond SP

- SP conditions have no notion of locality at all.
- Blocking is a simple form of locality, and hence beyond SP.

Latin L-Dissimilation (Simplified; (Stanton 2016))

- /l/ in morpheme /-alis/ becomes /r/ if stem contains /l/
  (3) a. *lupanalis
      b. lupanaris
- blocked by intervening /r/
  (4) a. fulguralis
      b. *fulguraritis
- Problem for SP: forbidding l···l for (3a) also rules out (4a)
Locality Domains are Beyond SP

- There is also a problem with the SP account of UTP.
- \( ^*H \cdots L \cdots H \) bans any \( L \) between \( H \), no matter what.
- But tone processes are known to also apply across words.
- Unless we limit representations to single words, \( ^*H \cdots L \cdots H \) overapplies.

(5)  
\[
\begin{align*}
\text{a.} & \quad ^*LHLLLHLL \\
\text{b.} & \quad LHLSLHLL
\end{align*}
\]

- The word boundary \( $ \) should block tone plateauing, but blocking effects are not SP.
The central problem of SP is the lack of locality domains. 

**Danger**: arbitrary domains push SP to DBSP ⇒ too powerful

**Restricted version**: SP limited to specific intervals

### Interval-Based Strictly Piecewise (IBSP)

1. Finite list of forbidden subsequences
2. Application domain, encoded as $k$-val
3-val for UTP

- Forbidden subsequence: *HLH
- Locality domain:
  - spans between two $,
  - and no other $ occurs between them.
- Represented as a 3-val:
3-val for UTP

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3-val for UTP

- Forbidden subsequence: *HLH
- Locality domain:
  - spans between two $,
  - and no other $ occurs between them.
- Represented as a 3-val:

![Diagram showing a 3-val representation with left and right edges and fillers]
3-val for UTP

- Forbidden subsequence: *HLH
- Locality domain:
  - spans between two $,
  - and no other $ occurs between them.
- Represented as a 3-val:

![Diagram showing a 3-val representation with fillers, open slots, left edge, and right edge.]
Restricting *HLH with the $\kappa$-Val

- *HLH applies only to segments in a matching interval

$$\neg$$

* $\text{\$ L H L L L H L L \$}$

- If both H are in different words, the 3-val cannot match.

$\text{\$ L H L L \$ H L L L \$}$
Restricting *HLH with the $k$-Val

*HLH applies only to segments in a matching interval

If both H are in different words, the 3-val cannot match.
Restricting *HLH with the $k$-Val

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- *HLH applies only to segments in a matching interval

- If both H are in different words, the 3-val cannot match.
Restricting $^*\text{HLH}$ with the $k$-Val

- $^*\text{HLH}$ applies only to segments in a matching interval

- If both H are in different words, the 3-val cannot match.
Restricting *HLH with the $k$-Val

- *HLH applies only to segments in a matching interval

If both H are in different words, the 3-val cannot match.

\[ \begin{array}{c}
\$ \quad \text{L} \quad \text{H} \quad \text{L} \quad \text{L} \quad \text{H} \quad \text{L} \quad \text{L} \quad \$ \\
\end{array} \]
Restricting *HLH with the $k$-Val

- *HLH applies only to segments in a matching interval

- If both H are in different words, the 3-val cannot match.

```
$ L H L L L L H L L L L L
```

```
$ L H L L L $ H L L L $ 
```
Restricting *HLH with the $k$-Val

*HLH applies only to segments in a matching interval

If both H are in different words, the 3-val cannot match.
Restricting *HLH with the $k$-Val

*HLH applies only to segments in a matching interval

If both H are in different words, the 3-val cannot match.
Restricting $^{*}$HLH with the $k$-Val

- $^{*}$HLH applies only to segments in a matching interval

- If both $H$ are in different words, the 3-val cannot match.
Restricting *HLH with the $k$-Val

- *HLH applies only to segments in a matching interval

![Diagram showing the restriction of HLH with the k-Val]

- If both H are in different words, the 3-val cannot match.

![Another diagram showing the scenario where both H are in different words]
R-Blocking for Latin L-Dissimilation

- A simple constraint: *l
- With a peculiar domain:

* $lupaalis$

$fulguralis$
R-Blocking for Latin L-Dissimilation

- A simple constraint: *l
- With a peculiar domain:

* $\text{lupanal}$

$\text{fulguralis}$
R-Blocking for Latin L-Dissimilation

- A simple constraint: *l
- With a peculiar domain:

\[ \neg \$, \neg r \]

\[ * \$ l u p a n a l i s \$ \]

\[ \$ f u l g u r a l i s \$ \]
R-Blocking for Latin L-Dissimilation

- A simple constraint: *l
- With a peculiar domain:

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$\text{fulguralis}$
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\neg\$, \neg r
\]

\[
* \text{ Lupanalis }
\]

\[
\text{ Fulguralis }
\]
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- A simple constraint: $^*l$
- With a peculiar domain:

$$^*\text{lupanalis}$$

$$\text{fulguralis}$$
R-Blocking for Latin L-Dissimilation

- A simple constraint: *l
- With a peculiar domain:

* $\text{I}_\text{upanalis}$

$\text{fulguralis}$
R-Blocking for Latin L-Dissimilation

- A simple constraint: *l
- With a peculiar domain:

$\neg$, $\neg r$

* $l u p a n a l i s$

$fulguralis$
R-Blocking for Latin L-Dissimilation

- A simple constraint: *l
- With a peculiar domain:

\[
l \neg \$, \neg r
\]

\[
* \$ l u p a n a l i s \$ \]

\[
\$ f u l g u r a l i s \$ \]
R-Blocking for Latin L-Dissimilation

- A simple constraint: \( *l \)
- With a peculiar domain:

\[
\neg\$, \neg r
\]

\[
* \$ l u p a n a l i s \$
\]

\[
$ f u l g u r a l i s $
\]
Local Constraints are IBSP

- Local constraints are IBSP conditions without fillers.
- **Example:** intervocalic voicing
  - **Forbidden:** [-voiced]
  - **Domain:** between vowels, with no fillers

\[
\begin{array}{c}
\neg $, \neg V, \neg C \\
\end{array}
\]

\[
\begin{array}{c}
V \\
\end{array} \quad \begin{array}{c}
\text{not allowed} \\
\end{array} 
\begin{array}{c}
V \\
\end{array}
\]

\[
\begin{array}{c}
* $ c o g e $ k i p a n $ \\
$ c o g e $ k i b a n $ \\
\end{array}
\]
Local Constraints are IBSP

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\[
\neg$, $\neg V$, $\neg C
\]

\[
V
\]

\[
\neg$, $\neg V$, $\neg C
\]

\[
V
\]

\[
* \$ c o g e $ k i p a n $\]

\[
\$ c o g e $ k i b a n $\]
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\[ \neg \$, \neg V, \neg C \]

\[ V \quad \text{[red]} \quad \text{blue} \quad V \]

\[ * \$ c o g e \$ k i p a n \$ \]

\[ \$ c o g e \$ k i b a n \$ \]
Local Constraints are IBSP

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- **Example**: intervocalic voicing
  - **Forbidden**: [-voiced]
  - **Domain**: between vowels, with no fillers

```
* $c o g e$ k i p a n $  
$ c o g e$ k i b a n $  
```

V ¬$, ¬V, ¬C V
Local Constraints are IBSP

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- **Example:** intervocalic voicing
  - **Forbidden:** [-voiced]
  - **Domain:** between vowels, with no fillers

\[-, \neg V, \neg C\]

\* $c o g e k i p a n$

$ c o g e k i b a n$
Local Constraints are IBSP

- Local constraints are IBSP conditions without fillers.
- **Example**: intervocalic voicing
  - **Forbidden**: [-voiced]
  - **Domain**: between vowels, with no fillers

\[
\neg$, $\neg V$, $\neg C
\]

\[
V \quad \text{[Blue]} \quad V
\]

\[
\ast \enspace \text{c o g e k i p a n}\n\]

\[
\text{c o g e k i b a n}\n\]
Local Constraints are IBSP

- Local constraints are IBSP conditions without fillers.
- **Example:** intervocalic voicing
  - **Forbidden:** [-voiced]
  - **Domain:** between vowels, with no fillers

```
*$coge$kipan$
```

```
$coge$kipaban$
```
Prediction: Local and Non-Local Do Not Mix

- All $k$-vals follow the same base template:

- To enforce adjacency, we have to ban all potential fillers.
- But without fillers, we get **adjacency across the board**!

- **IBSP Prediction:** Local and non-local do not mix.
Non-Local Local Phenomena Exist!

- The IBSP prediction is **false**!
- Some phenomena combine local and non-local information:
  1. non-local blocking of local dissimilation (Samala) (Applegate 1972; McMullin 2016)
  2. non-final RHOL (Eastern Cheremis, Dongolese Nubian) (Hayes 1995; Baek 2017)
  3. non-local trigger of ternary spreading (Copperbelt Bemba) (Bickmore and Kula 2013; Jardine 2016)

- **Conclusion:** IBSP needs a more fine-grained notion of $k$-val.
Non-Local Blocking of Local Dissimilation

1 Local Dissimilation in Samala... [sn], [sl], [st] are forbidden...

2 ...With Non-Local Blocking
...unless there is another [s] later on in the same word

* $ s n a n ? $
$ s n e t u s $
Non-Local Blocking of Local Dissimilation

1 Local Dissimilation in Samala...
   [sn], [sl], [st] are forbidden...

2 ...With Non-Local Blocking
   ...unless there is another [s] later on in the same word

   *n
   *l
   *t

   * $ s n a n ? $
   $ s n e t u s $
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1. Local Dissimilation in Samala... [sn], [sl], [st] are forbidden...

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```
\*n  \*l  \*t
s

\* $ sn an ? $  $ sn et us $  
```
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   ...unless there is another [s] later on in the same word

* n
* l
* t

*s n a n ? $ $ s n e t u s $
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1. Local Dissimilation in Samala... [sn], [sl], [st] are forbidden...

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* $s\ n\ a\ n\ ?\ s$

$\ s\ n\ e\ t\ u\ s\ $
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...unless there is another [s] later on in the same word
Non-Local Blocking of Local Dissimilation

1 Local Dissimilation in Samala... [sn], [sl], [st] are forbidden...

2 ...With Non-Local Blocking... unless there is another [s] later on in the same word

\[ *n \]
\[ *\] (green)
\[ *t \]
\[ none \]
\[ \neg s \]
\[ $ \]

\[ * $ snan? $ \]
\[ $ snetus $ \]
Non-Local Blocking of Local Dissimilation

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2 ... With Non-Local Blocking
...unless there is another [s] later on in the same word
Non-Local Blocking of Local Dissimilation

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   [sn], [sl], [st] are forbidden...

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   ...unless there is another [s] later on in the same word
Non-Local Blocking of Local Dissimilation

1 Local Dissimilation in Samala... [sn], [sl], [st] are forbidden...

2 ...With Non-Local Blocking
   ...unless there is another [s] later on in the same word

\[
\begin{array}{c}
  *n \\
  *l \\
  *t \\
  \text{none} \\
  \neg s \\
  s \\
  | \\
  t \\
  \text{\$} \\
\end{array}
\]

\[
\begin{array}{cccccc}
  * \$ & s & n & a & n & ? & \$ \\
  \$ & s & n & e & t & u & s & \$ \\
\end{array}
\]
Non-Local Blocking of Local Dissimilation

1 Local Dissimilation in Samala...
   [sn], [sl], [st] are forbidden...

2 ...With Non-Local Blocking
   ...unless there is another [s] later on in the same word
Non-Local Blocking of Local Dissimilation

1. Local Dissimilation in Samala...
   [sn], [sl], [st] are forbidden...

2. ...With Non-Local Blocking
   ...unless there is another [s] later on in the same word
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

$\ast \ \text{none} \ast$
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

*\text{XHX}
*\text{XLX}
*\text{XXX}
\(X \in \{H,L\}\)

* $\text{L L H H H}$
* $\text{L L H H H}$
* $\text{L L H H H}$
* $\text{L L H H H}$
* $\text{L L H H H}$
$\text{L L H H H}$
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

\[(X \in \{H,L\})\]

\[\begin{align*}
* \hat{X}H & \hat{X} & \hat{X} & \hat{X} \\
* \hat{X}L & \hat{X} & \hat{X} & \hat{X} \\
* \hat{X} \hat{X} & \hat{X} & \hat{X} & \hat{X} \\
\end{align*}\]
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

\( *\acute{X}HX \)
\( *X\acute{L}X \)
\( *XX\acute{X} \)

\( (X \in \{H,L\}) \)
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

*(X) (X \in \{H, L\})
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

\( \begin{align*}
\text{*} & \text{XX} \text{X} \\
\text{*} & \text{XX} \text{X} \\
\text{*} & \text{XX} \text{X} \\
\text{(X} & \in \{H,L\}\text{)}
\end{align*} \)
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

\( \ast \text{XH}X \)
\( \ast \text{X} \text{L}X \)
\( \ast \text{XX} \text{X} \)

(\( X \in \lbrace H, L \rbrace \))
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

\( X \in \{H,L\} \)

\[
\begin{align*}
\ast XHX \\
\ast X\acute{L}X \\
\ast XXXX
\end{align*}
\]
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
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\[(X \in \{H,L\})\]
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

$\text{\*XHX}$  
$\text{\*XLX}$  
$\text{\*XXX}$  

($X \in \{H,L\}$)
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

*(XHX
*XŁX
*XXX

(X ∈ {H,L})
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
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\[(X \in \{H,L\})\]
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
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(X ∈ {H,L})
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

$\text{*XHX}$
$\text{*XŁX}$
$\text{*XXXX}$
($X \in \{H,L\}$)
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

\[ *(\text{XHX}) \]
\[ *(\text{XŁX}) \]
\[ *(\text{XXX}) \]

\( (\text{X} \in \{\text{H,L}\}) \)
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

\(X \in \{H, L\}\)
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

$\text{*(X)H}$

$\text{*(X)L}$

$\text{*(X)X}$

($X \in \{H,L\}$)
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (first) syllable.

\[ \begin{align*}
*\text{XHX} \\
*\text{X}\text{LX} \\
*\text{XXX}\text{X} \\
(X \in \{H,L\})
\end{align*} \]
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1. Stress the rightmost non-final heavy syllable, if it exists.
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\( \text{STEM} \in \{\text{H}, \text{L}\} \)

- *\( \text{XHX} \)
- *\( \text{Xlx} \)
- *\( \text{XXX} \)

\( \text{STEM} \in \{\text{H}, \text{L}\} \)
Non-Final RHOL

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2. Otherwise, stress the leftmost (=first) syllable.

\[(X \in \{H,L\})\]
Non-Final RHOL

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\[(X \in \{H,L\})\]
Non-Final RHOL

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\((X \in \{H, L\})\)
Non-Final RHOL

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2. Otherwise, stress the leftmost (=first) syllable.

\[
\begin{align*}
\ast & \dot{X}H X \\
\ast & X \acute{L} X \\
\ast & X X \acute{X} \\
(X \in \{H,L\})
\end{align*}
\]
Non-Final RHOL

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\((X \in \{H,L\})\)
Non-Final RHOL

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\[
\begin{align*}
\ast \acute{X} \acute{H} X \\
\ast X \acute{L} X \\
\ast X X \acute{X}
\end{align*}
\]
\((X \in \{H, L\})\)
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

\[(X \in \{H, L\})\]
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

(X ∈ {H,L})
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (first) syllable.

\(^*\text{XHX}\)
\(^*\text{XLX}\)
\(^*\text{XX\dot{X}}\)

\((X \in \{H,L\})\)
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

\[(X \in \{H,L\})\]
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

\[(X \in \{H,L\})\]
Non-Final RHOL

1. Stress the rightmost non-final heavy syllable, if it exists.
2. Otherwise, stress the leftmost (=first) syllable.

\[(X \in \{H, L\})\]
Bounded Tone Spreading

1 Unbounded Tone Spreading in Copper Belt Bemba... H spreads all the way to the right edge,...

2... With a Non-Local Inhibitor
...but only 2 syllables if there is an H later on.

* $ H \ L \ L \ L \ L \ L \ H $ 
* $ H \ h \ L \ L \ L \ L \ H $ 
* $ H \ h \ h \ h \ h \ h \ L \ H $ 
* $ H \ h \ h \ h \ h \ L \ L \ H $ 
$ H \ h \ h \ L \ L \ L \ H $
Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba...**
   H spreads all the way to the right edge,...

2. **...With a Non-Local Inhibitor**
   ...but only 2 syllables if there is an H later on.

\[
\begin{align*}
&\text{*LXX} \\
&\text{*XLX} \\
&\text{*hhh}
\end{align*}
\]

\[(X \in \{H,L,h\})\]

\[
\begin{align*}
&\text{* } \$ \text{ H L L L L L L H } \$ \\
&\text{* } \$ \text{ H h L L L L L H } \$ \\
&\text{* } \$ \text{ H h h h h h L H } \$ \\
&\text{* } \$ \text{ H h h L h L H } \$ \\
&\$ \text{ H h h L L L L H } \$
\end{align*}
\]
Bounded Tone Spreading

1 Unbounded Tone Spreading in Copper Belt Bemba...
   H spreads all the way to the right edge, ...
2 ...With a Non-Local Inhibitor
   ...but only 2 syllables if there is an H later on.

\[
\begin{align*}
    & \text{H} \quad \text{none} \quad \overline{-S,-H} \\
    & \text{*LXX} \\
    & \text{*XLX} \\
    & \text{*hhh} \\
    \end{align*}
\]

\[
(X \in \{H,L,h\})
\]

\[
\begin{align*}
    & * \; H \; L \; L \; L \; L \; L \; H \; $ \\
    & * \; H \; h \; L \; L \; L \; L \; H \; $ \\
    & * \; H \; h \; h \; h \; h \; L \; H \; $ \\
    & * \; H \; h \; h \; L \; h \; L \; H \; $ \\
    & * \; H \; h \; h \; L \; L \; L \; L \; H \; $ \\
    \end{align*}
\]
Bounded Tone Spreading

1. Unbounded Tone Spreading in Copper Belt Bemba... H spreads all the way to the right edge, ...

2. ...With a Non-Local Inhibitor ...but only 2 syllables if there is an H later on.

\[
\begin{align*}
\text{LXX} & \quad \text{none} \quad \overline{H}\overline{H} \\
\text{XLX} & \quad \text{H} \\
\text{hhh} & \quad \overline{H}
\end{align*}
\]

\[(X \in \{H,L,h\})\]
Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba...**
   H spreads all the way to the right edge,...

2. **...With a Non-Local Inhibitor**
   ...but only 2 syllables if there is an H later on.

\[
\begin{align*}
*LXX & \quad \text{none} & \quad \neg $,-H \\
*XLX & \quad H & \quad H \\
*hhh & \quad H & \quad H \\
\end{align*}
\]

\[X \in \{H,L,h\}\]
Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba...**
   H spreads all the way to the right edge,...

2. **...With a Non-Local Inhibitor**
   ...but only 2 syllables if there is an H later on.

\[(X \in \{H,L,h\})\]

```
* LXX
* XLX
* hhh

(X \in \{H,L,h\})
```

```
* $ H L L L L L H $ 
* $ H h L L L L H $ 
* $ H h h h h h L H $ 
* $ H h h L h L H $ 
* $ H h h L L L L H $ 
```
Bounded Tone Spreading

1 Unbounded Tone Spreading in Copper Belt Bemba...
   H spreads all the way to the right edge,...

2 ...With a Non-Local Inhibitor
   ...but only 2 syllables if there is an H later on.

\[
\begin{align*}
*LXX & \quad \text{none} & \quad -\$, \$ \\
*XLX & \quad H \quad \text{none} & \quad -\$, \$ \\
*hhh & \quad H \quad \text{none} & \quad -\$, \$ \\
\end{align*}
\]

\[X \in \{H,L,h\}\]
Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba...**
   H spreads all the way to the right edge,...

2. **...With a Non-Local Inhibitor**
   ...but only 2 syllables if there is an H later on.

\[(X \in \{H,L,h\})\]

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>*$LXX$</td>
<td>none</td>
<td>$-$, $-H$</td>
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<td>H</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>*$XLX$</td>
<td></td>
<td></td>
<td>none</td>
<td></td>
<td></td>
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<td>H</td>
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<tr>
<td>*$hhh$</td>
<td></td>
<td></td>
<td></td>
<td>none</td>
<td></td>
<td></td>
<td></td>
<td>H</td>
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</tr>
</tbody>
</table>

* $H$ $L$ $L$ $L$ $L$ $L$ $H$ $\$ |
* $H$ $h$ $L$ $L$ $L$ $L$ $H$ $\$ |
* $H$ $h$ $h$ $h$ $h$ $h$ $h$ $L$ $H$ $\$ |
* $H$ $h$ $h$ $h$ $L$ $h$ $L$ $H$ $\$ |
* $H$ $h$ $h$ $h$ $h$ $L$ $h$ $L$ $H$ $\$ |
* $H$ $h$ $h$ $h$ $h$ $h$ $L$ $L$ $L$ $H$ $\$ |
**Bounded Tone Spreading**

1. **Unbounded Tone Spreading in Copper Belt Bemba...**
   H spreads all the way to the right edge,...

2. **...With a Non-Local Inhibitor**
   ...but only 2 syllables if there is an H later on.

\[(X \in \{H,L,h\})\]

\[
\begin{align*}
* \text{LXX} & : & \text{none} \\
* \text{XLX} & : & \neg \$, \neg H \\
* \text{hhh} & :
\end{align*}
\]
Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba**...
   H spreads all the way to the right edge,...

2. **...With a Non-Local Inhibitor**
   ...but only 2 syllables if there is an H later on.

\[(X \in \{H, L, h\})\]

\[
\begin{align*}
* & LXX \quad \text{none} \quad \neg \$ \neg H \\
* & XLX \\
* & hhh \\
\end{align*}
\]
Bounded Tone Spreading

1 Unbounded Tone Spreading in Copper Belt Bemba... 
   H spreads all the way to the right edge,...

2 ...With a Non-Local Inhibitor 
   ...but only 2 syllables if there is an H later on.

\[
\begin{align*}
LXX & \quad \text{none} \\
XLX & \\
hhh & \\
\end{align*}
\]
\[
(X \in \{H,L,h\})
\]
Bounded Tone Spreading

1 Unbounded Tone Spreading in Copper Belt Bemba...
   H spreads all the way to the right edge, ...

2 ...With a Non-Local Inhibitor
   ...but only 2 syllables if there is an H later on.

\[ (*LXX, *XLX, *hhh) \]
\[ (X \in \{H,L,h\}) \]
Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba**
   H spreads all the way to the right edge...

2. **...With a Non-Local Inhibitor**
   ...but only 2 syllables if there is an H later on.

\[
\begin{array}{c}
\LXX
\XLX
\hhh
\end{array}
\]

\[X \in \{H,L,h\}\]

\[
\begin{array}{cccccccc}
\text{H} & \text{none} & \text{H} \\
\text{H} & \text{H} & \text{H} \\
\text{H} & \text{H} & \text{H} \\
\end{array}
\]

\[
\begin{array}{cccccccc}
\text{H} & \text{L} & \text{L} & \text{L} & \text{L} & \text{H} & \text{H} \\
\text{H} & \text{h} & \text{L} & \text{L} & \text{L} & \text{H} & \text{H} \\
\text{h} & \text{h} & \text{h} & \text{h} & \text{h} & \text{L} & \text{H} \\
\text{H} & \text{h} & \text{h} & \text{L} & \text{L} & \text{L} & \text{L} & \text{H} \\
\text{H} & \text{h} & \text{h} & \text{L} & \text{L} & \text{L} & \text{L} & \text{H} \\
\end{array}
\]
Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba...**
   H spreads all the way to the right edge, ...

2. **...With a Non-Local Inhibitor**
   ...but only 2 syllables if there is an H later on.

\[
\begin{align*}
\text{*LXX} & & \text{none} & & \text{−S, −H} \\
\text{*XLX} & & \text{H} & & \text{H} \\
\text{*hhh} & & \text{H} & & \text{H}
\end{align*}
\]

\((X \in \{H,L,h\})\)

\[
\begin{align*}
\text{* } & $ & H & L & L & L & L & H & $ \\
\text{* } & $ & H & h & L & L & L & H & $ \\
\text{* } & $ & H & h & h & h & L & H & $ \\
\text{* } & $ & H & h & h & h & L & L & H & $ \\
\text{* } & $ & H & h & h & h & L & L & H & $ \\
\text{∗} & $ & H & h & h & L & L & L & H & $ \\
\text{∗} & $ & H & h & h & L & L & L & H & $ \\
\text{∗} & $ & H & h & h & L & L & L & H & $ \\
\end{align*}
\]
### Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba...**
   
   H spreads all the way to the right edge,...

2. **...With a Non-Local Inhibitor**
   
   ...but only 2 syllables if there is an H later on.

\[ (X \in \{H,L,h\}) \]

\[
\begin{array}{cccccccc}
\text{none} & \text{−$,−H$} & H \\
H & & & & & & & \\
\end{array}
\]

\[
\begin{array}{cccccccc}
LXX & * & XLX & * & hhh & \\
\end{array}
\]

\[
\begin{array}{cccccccc}
* & $ & H & L & L & L & L & H & $ \\
* & $ & H & h & L & L & L & H & $ \\
* & $ & H & h & h & h & h & L & H & $ \\
* & $ & H & h & h & L & h & L & H & $ \\
$ & $ & H & h & h & L & L & L & H & $ \\
\end{array}
\]
Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba**...  
   H spreads all the way to the right edge,...

2. **...With a Non-Local Inhibitor**  
   ...but only 2 syllables if there is an H later on.

- *LXX
- *XLX
- *hhh

\( X \in \{H, L, h\} \)
**Bounded Tone Spreading**

1. **Unbounded Tone Spreading in Copper Belt Bemba...**
   H spreads all the way to the right edge, ...

2. **...With a Non-Local Inhibitor**
   ...but only 2 syllables if there is an H later on.

\[
\begin{align*}
\text{*LXX} & \quad \text{H} & \quad \text{none} & \quad \text{\textdagger$,$\textdagger H} \\
\text{*XLX} & \quad \text{H} & \quad \text{none} & \quad \text{\textdagger$,$\textdagger H} \\
\text{*hhh} & \quad \text{H} & \quad \text{none} & \quad \text{\textdagger$,$\textdagger H} \\
\end{align*}
\]

\[
(X \in \{H,L,h\})
\]

\[
\begin{align*}
\text{* $} & \quad \text{H} & \quad \text{L} & \quad \text{L} & \quad \text{L} & \quad \text{L} & \quad \text{H} & \quad $ \\
\text{* $} & \quad \text{H} & \quad \text{h} & \quad \text{L} & \quad \text{L} & \quad \text{L} & \quad \text{H} & \quad $ \\
\text{* $} & \quad \text{H} & \quad \text{h} & \quad \text{h} & \quad \text{h} & \quad \text{h} & \quad \text{h} & \quad \text{L} & \quad \text{L} & \quad \text{H} & \quad $ \\
\text{* $} & \quad \text{H} & \quad \text{h} & \quad \text{h} & \quad \text{h} & \quad \text{L} & \quad \text{h} & \quad \text{L} & \quad \text{H} & \quad $ \\
\text{$} & \quad \text{H} & \quad \text{h} & \quad \text{h} & \quad \text{h} & \quad \text{h} & \quad \text{L} & \quad \text{L} & \quad \text{L} & \quad \text{H} & \quad $ \\
\end{align*}
\]
Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba...**
   H spreads all the way to the right edge,...

2. **...With a Non-Local Inhibitor**
   ...but only 2 syllables if there is an H later on.

\[ \text{H} \quad \text{none} \quad \text{\neg$\neg$,$\neg$H} \]

\[ (X \in \{\text{H,L,h}\}) \]

\[
\begin{align*}
* \text{LXX} \\
* \text{XLX} \\
* \text{hhh}
\end{align*}
\]
Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba...**
   H spreads all the way to the right edge,...

2. **...With a Non-Local Inhibitor**
   ...but only 2 syllables if there is an H later on.

\[
\begin{align*}
\text{*LXX} & \quad \text{none} & \quad \text{\neg$,$\neg H} \\
\text{*XLX} & \\
\text{*hhh}
\end{align*}
\]

\[(X \in \{H,L,h\})\]

\[
\begin{align*}
\text{* $ H L L L L L H$} & \\
\text{* $ H h L L L H$} & \\
\text{* $ H h h h h L H$} & \\
\text{* $ H h h h L h L H$} & \\
\text{$ L h L L H$} & \\
\text{$ L h L L H$}
\end{align*}
\]
Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba...**
   
   H spreads all the way to the right edge,...

2. **...With a Non-Local Inhibitor**
   
   ...but only 2 syllables if there is an H later on.

\[
\begin{align*}
&\text{*LXX} \\
&\text{*XLX} \\
&\text{*hhh}
\end{align*}
\]

\[
(X \in \{H,L,h\})
\]
Bounded Tone Spreading

1. Unbounded Tone Spreading in Copper Belt Bemba...
   H spreads all the way to the right edge, ...

2. ...With a Non-Local Inhibitor
   ...but only 2 syllables if there is an H later on.

(X ∈ {H,L,h})
Bounded Tone Spreading

1 Unbounded Tone Spreading in Copper Belt Bemba... H spreads all the way to the right edge,...

2 ...With a Non-Local Inhibitor... but only 2 syllables if there is an H later on.

\[(X \in \{H,L,h\})\]
Bounded Tone Spreading

1. **Unbounded Tone Spreading in Copper Belt Bemba**
   
   H spreads all the way to the right edge,

2. **With a Non-Local Inhibitor**
   
   ...but only 2 syllables if there is an H later on.

\[
\begin{align*}
*LXX & & \text{none} & & \neg\$,\neg H \\
*XLX & & H & & H \\
*hhh & & H & & H \\
(X \in \{H,L,h\})
\end{align*}
\]
Bounded Tone Spreading

1. Unbounded Tone Spreading in Copper Belt Bemba...
   H spreads all the way to the right edge, ...

2. ...With a Non-Local Inhibitor
   ...but only 2 syllables if there is an H later on.

\[(X \in \{H, L, h}\)]
Danger, Will Robinson! Overgeneration!

- IBSP needs more fine-grained intervals.
- But this easily leads to typological overgeneration.
Danger, Will Robinson! Overgeneration!

- IBSP needs more fine-grained intervals.
- But this easily leads to typological overgeneration.

\[ {}^*Sf \]

\[ {}^*fs \]
Danger, Will Robinson! Overgeneration!

- IBSP needs more fine-grained intervals.
- But this easily leads to typological overgeneration.
Danger, Will Robinson! Overgeneration!

- IBSP needs more fine-grained intervals.
- But this easily leads to typological overgeneration.

This produces First-Last harmony (FLH), which is unattested.
Proposal: \( k \)-Vals Must be c-Command-Like

- What separates FLH from the attested cases?
- \( k \)-val for FLH relaxes locality, then tightens it again (local + non-local + local)
- Attested cases are of the form
  - local + non-local, or
  - non-local + local
- This is similar to \textit{c-command}.

\textbf{c-Command as Local + Non-Local}

\( x \) \textit{c-commands} \( y \) (in a strictly binary branching tree) iff

\begin{align*}
\text{local} \; x & \; \text{has a sister} \; z, \; \text{and} \\
\text{non-local} \; z & \; \text{reflexively dominates} \; y.
\end{align*}
Deepening the Connection: Monotonicity

Ban On Improper Locality

Within a $k$-val, the degree of locality must be

- monotonically increasing, or
- monotonically decreasing.

- **Monotonicity in syntax**
  - Subcategorization $< A$-Move $< A'$-Move
  - Once you’ve undergone a higher operation, you can’t participate in lower ones anymore.

- **Monotonicity in morphology**
  - $^*$ABA follows from monotonicity.

- **Monotonicity in semantics**
  - Everywhere...
Summary

- SP bans subsequences \(\Rightarrow\) no locality at all
- Adding locality domains to SP greatly increases its power.
- But IBSP with simple \(k\)-vals is still too weak.
- Adding c-command-like locality domains
  - grants enough expressivity
  - while avoiding overgeneration.

Main Predictions

- \(*\text{local} + \text{non-local} + \text{local} (\ast LNL)\)
  No unbounded dependency between local “clusters”
- \(*\text{non-local} + \text{local} + \text{non-local} (\ast NLN)\)
  No local “cluster” within interval dependency
Next Steps

1. Test the predictions against the full typology.
2. Explore the syntax column.
3. Go beyond monotonicity in deriving the limitation.


Stanton, Juliet. 2016. Latin -alis/-aris and segmental blocking in dissimilation. Ms., MIT.