1. morphology
   • the prototypical morphological operation is affixation to a base.
   • usually the process applies independently of the phonology of the base:
     be-ing, hit-ing, comput-ing, backtrack-ing, prefix-ing.

2. but sometimes the base must have certain phonological properties

   a. size requirements
      • English comparative affixes to “short” bases: red-er, yellow-er, *corrupt-er,”beautiful-er
      • how is “size” measured?

   b. truncations for hypocoristics
      • Pámela > Pam; Elízabeth -> Liz; Samántha -> Sam; proféssor -> prof; professional > pro
      • how small can the truncate be?
      • what portion of the base is truncated: Samántha > Sam, Elízabeth > *Zab

   c. infixation of affix inside base:

   Tagalog     um-aral    ‘teach’
     aral     um-abot    ‘reach’
     abot     s-um-alat   ‘write’
     salat    s-um-ulat   ‘read’
     sulat    pr-um-eno   ‘brake’
     preno    gr-um-adwet ‘graduate’

   • where is the infix positioned?

   d. reduplication: some portion of the base is copied to mark the morphological category

<table>
<thead>
<tr>
<th>Ilokano</th>
<th>verb</th>
<th>reduplicated verb</th>
<th>no of copied phonemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>basa</td>
<td>bas-basa</td>
<td>‘read’</td>
<td>3</td>
</tr>
<tr>
<td>adal</td>
<td>ad-adal</td>
<td>‘study’</td>
<td>2</td>
</tr>
<tr>
<td>da.it</td>
<td>da-dait</td>
<td>‘sew’</td>
<td>2</td>
</tr>
<tr>
<td>takder</td>
<td>tak-takder</td>
<td>‘stand’</td>
<td>3</td>
</tr>
<tr>
<td>trabaho</td>
<td>trab-trabaho</td>
<td>‘work’</td>
<td>4</td>
</tr>
</tbody>
</table>

   • what is the size and shape of the reduplicant?
   • which phonemes of the base map to the reduplicant?

3. possible answers
   • string transformations (e.g. Chomsky 1951); now regarded as too powerful
   • prosodic units (mora, syllable, foot)
• Moravscik’s (1978) generalization: survey of reduplication in 200+ languages; reduplication never clearly copies a syllable; a paradigm like the following is systematically missing:

\[
\begin{array}{ccc}
ta.pa & ta.ta.pa \\
ta:.pa & ta:.ta:pa \\
tap.ta & tap.tap.ta \\
\end{array}
\]

• Templates: reduplication is not copying prosodic constituents of the base but affixation of abstract phonological categories, which are then filled by copying segments from the base;

• Marantz 1982: reduplication specifies an affix characterized in C-V templatic terms plus a rule copying phonemes of the base and mapping them to the affixal template in a phoneme-driven fashion:

\[
\begin{array}{ccc}
CVC-CVCV & UR \\
| | | | b a s a \\
\end{array}
\]

\[
\begin{array}{ccc}
CVC-CVCV & copy phonemes of base \\
| | | b a s a \\
\end{array}
\]

\[
\begin{array}{ccc}
CVC-CVCV & map phonemes to CV slots \\
| | | | | b a s a \\
\end{array}
\]

and delete unmapped segments


• templates for reduplication and truncation are specified in terms of **natural** units of prosody (mora, syll, foot)

• Prosodic Hierarchy: phoneme -> Mora -> Syllable -> Foot -> Prosodic Word

\[
\begin{array}{ccc}
PW & PW \\
| & / \ \\
F & F F \\
/ \ / \ & / \ |
\end{array}
\]

\[
\begin{array}{ccc}
s s s s & s s s s \\
/ \ / \ / \ & / \ / \ / |
\end{array}
\]

\[
\begin{array}{ccc}
p a m e l a & e l i z a b e th \\
\end{array}
\]

• truncation minimizes the word while still satisfying requirement that it be a Prosodic Word: project through the Foot category

• common reduplication templates: light syllable, maximal syllable, foot
5. Problem of “transfer” (Levin 1983, Clements 1985)

Mokilese

poki  pok-poki  ‘beat’
wadek  wad-wadek  ‘read’
pa  paa-pa  ‘weave’
di.ar  dii-di.ar  ‘find’
kookɔ  koo-kookɔ  ‘grind coconut’
caak  caa-caak  ‘bend’

• template is bimoraic syllable: [µµ].
• but reduplicant must remember how second mora is filled


• reduplication is full copy of base
• template is output target to which reduplicant is reduced
• Moravscik’s (1978) generalization?

5. more examples

• Sanskrit light syllable reduplication

  root  perfect  ‘fly, fall’
  pat  pa-pat-a  ‘fly, fall’
  prath  pa-prath-a  ‘spread’
  mna:  ma-mna:-u  ‘note’

• Japanese hypocoristics: bimoraic trochee: H, LL

  name  diminutive
  ti  tii-tyan
  yoosuke  yoo-tyan
  taizoo  tai-tyan
  kinsuke  kin-tyan
  taroo  taro-tyan
  wasaburoo  waa-tyan, wasa-tyan, sabu-tyan

• Yupik vocatives: iambic: H, LH

  name  vocatives
  øŋukagnaq  øŋ  øŋuk
  nipigak  nup  nupix
  kalixtuq  kal  kalik
  qaatungaq  qat  qatun
• Ilokano: red = maximal syllable

<table>
<thead>
<tr>
<th>verb</th>
<th>reduplicated verb</th>
<th>no of copied phonemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>basa</td>
<td>bas-basa</td>
<td>‘read’</td>
</tr>
<tr>
<td>adal</td>
<td>ad-adal</td>
<td>‘study’</td>
</tr>
<tr>
<td>da.it</td>
<td>da-dait</td>
<td>‘sew’</td>
</tr>
<tr>
<td>takder</td>
<td>tak-takder</td>
<td>‘stand’</td>
</tr>
<tr>
<td>trabaho</td>
<td>trab-trabaho</td>
<td>‘work’</td>
</tr>
</tbody>
</table>

6. OT translation

• Templates are not stipulated but ideally emerge from the constraint hierarchy; various proposals
• Copying operation formalized as a correspondence (faithfulness) relation between template and base
• Maximizing template: penalizes lack of correspondence between template and base
• Directionality: Anchor (alignment) constraints tell where copying begins
• Truncatum and base word form a paradigm
• TETU (The emergence of the unmarked); since B-T correspondence is an Output-Output relation and B-R correspondence is a syntagmatic (string-internal) relation both differ from Input-Output correspondence and hence can have different ranking of F to M: IO-F » M » BT-F

7. Correspondence Constraints (McCarthy & Prince 1995)

MAX Every element of S1 has a correspondent in S2.
DEP Every element of S2 has a correspondent in S1.
IDENT(F) Correspondent segments have identical values for the feature F.
CONTIGUITY
  a. I-CONTIG (“No Skipping”) The portion of S1 standing in correspondence forms a contiguous string.
  b. O-CONTIG (“No Intrusion”) The portion of S2 standing in correspondence forms a contiguous string.
{RIGHT, LEFT)-ANCHOR(S1, S2) Any element at the designated periphery of S1 has a correspondent at the designated periphery of S2.
LINEARITY — “No Metathesis” S1 is consistent with the precedence structure of S2, and vice versa.
UNIFORMITY — “No Coalescence” No element of S2 has multiple correspondents in S1.
INTEGRITY — “No Breaking” No element of S1 has multiple correspondents in S2.


<table>
<thead>
<tr>
<th>Type A</th>
<th>Base</th>
<th>Truncate</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Francésca</td>
<td>Fráncie</td>
</tr>
<tr>
<td></td>
<td>Alessandra</td>
<td>Ale</td>
</tr>
<tr>
<td></td>
<td>Simónia</td>
<td>Simo</td>
</tr>
<tr>
<td></td>
<td>Cellília</td>
<td>Céci</td>
</tr>
<tr>
<td></td>
<td>Robêrto</td>
<td>Rôbe</td>
</tr>
</tbody>
</table>

8. Analysis (following in part Alber 2009)

• Template is single bimoraic trochee (same foot as in IO): Trochaic » Iambic
• All-Feet-Left, Parse-syll, Ft-Bin » Max-BT will restrict truncate to disyllable
• Anchor-Left » Anchor-Right, Anchor-Stressed Syll
<table>
<thead>
<tr>
<th>/Simón/a/</th>
<th>FOOT-FORM</th>
<th>ANCHOR-LEFT</th>
<th>MAX-BT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Simo</td>
<td></td>
<td></td>
<td>na</td>
</tr>
<tr>
<td>b. Simona</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Mína</td>
<td></td>
<td>*!</td>
<td>si</td>
</tr>
<tr>
<td>d. Simon</td>
<td>*!</td>
<td></td>
<td>a</td>
</tr>
</tbody>
</table>

Tetu effects

- Sonority-driven preference for stressed open mid vowels (Kenstowicz 2010): *{e,ó} » *{ɛ,ɔ}  

<table>
<thead>
<tr>
<th>/Roberto/</th>
<th>*(e,ó)</th>
<th>ID-BT[ATR]</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Róbe</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>b. Róbe</td>
<td>*!</td>
<td>*</td>
</tr>
</tbody>
</table>

9. Type B

<table>
<thead>
<tr>
<th>Base</th>
<th>Truncate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Francésca</td>
<td>Césca</td>
</tr>
<tr>
<td>Nicóla</td>
<td>Cíla</td>
</tr>
<tr>
<td>Annibale</td>
<td>Níba*</td>
</tr>
<tr>
<td>Doménico</td>
<td>Méni*</td>
</tr>
<tr>
<td>Cristóforo</td>
<td>Stófo*</td>
</tr>
<tr>
<td>Agostíno</td>
<td>Stíno*</td>
</tr>
<tr>
<td>Luígi</td>
<td>Gigi</td>
</tr>
<tr>
<td>Guglielmo</td>
<td>Mímo</td>
</tr>
<tr>
<td>Filippo</td>
<td>Pippo</td>
</tr>
</tbody>
</table>

Align-Str-Syll » Align-Left

<table>
<thead>
<tr>
<th>/Nicóla/</th>
<th>Align-Str-Syll</th>
<th>ALIGN-LEFT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cíla</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>b. Nico</td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

Contiguity » Align-Right

<table>
<thead>
<tr>
<th>/Doménico/</th>
<th>Contiguity</th>
<th>ALIGN-RIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Méni</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>b. Meco</td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

Max-BT » Align-Str-Syll

<table>
<thead>
<tr>
<th>/Agostíno/</th>
<th>Max-BT</th>
<th>ALIGN-STR-SYLL</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Stíno</td>
<td>Ago</td>
<td>s</td>
</tr>
<tr>
<td>b. Tíno</td>
<td>Agos!</td>
<td></td>
</tr>
</tbody>
</table>

Onset » BT-Dep

<table>
<thead>
<tr>
<th>/Luígi/</th>
<th>Onset</th>
<th>BT-DEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Gigi</td>
<td>Ago</td>
<td>*</td>
</tr>
</tbody>
</table>

* found on internet
10. remarks

- In a survey of truncation in c. 80 languages Alber finds that truncation templates typically anchor to the first syllable or the stressed syllable (two salient positions in lexical access)
- Fixed ranking of Anchor-Left, Anchor-Stress » Anchor-Right
- Anchor constraints must be gradient alignment constraints since like reduplication they can be displaced from left edge of word for prosodic reasons; cf. Russian Antonina » Tón-a where Onset » Anchor(Align)-Left
- Alber proposes using lower ranked Anchor Right in place of Max since if the latter counts segments then we (apparently falsely) predict a bimoraic syllable template seeking out the largest phoneme-wise string under a Max-BT » Anchor-Left ranking: Carmélą > Carm but Petrosílla > Tros
- Under Anchor-Left » Anchor-Right » Max-BT, the parse will not displace from left edge; but Anchor-R will still maximize template (consistent with the dominating metrical size-re Restrictor constraints)

11. isolated violations of Contiguity to satisfy Anchor-Left and Anchor-Right (Thornton)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Robérito</td>
<td>Róbo</td>
<td></td>
</tr>
<tr>
<td>Beatríce</td>
<td>Bíce</td>
<td></td>
</tr>
<tr>
<td>benzína</td>
<td>bénza</td>
<td></td>
</tr>
</tbody>
</table>