Being (slightly) stronger:
Lexical stress in Moses Columbian Salish
the assumption of **Gradient Symbolic Representations** predicts the lexical stress system in Moses Columbia Salish as competition between elements with different degrees of activity

the complexity of the lexical stress pattern in Moses Columbia Salish can not follow as competition in a system that only allows a binary distinction into strong-weak

such a representational account correctly predicts that elements with different activity behave **exceptional for more than one process**
1. Gradient Symbolic Representations

2. Case study: Moses Columbia Salish Stress
2.1 Data: Lexical stress in MCS
2.2 Analysis based on gradient activity
2.3 Further evidence: Vowel deletion asymmetries

3. Summary and Conclusion
Gradient Symbolic Representations
symbols in a linguistic representation can have different degrees of presence or numerical activities

this can predict lexical exceptions: elements in the underlying representation of a morpheme can be exceptionally weak

assumption modifying the original GSR-account: output elements can be weakly active as well (Zimmermann, 2017a,b; Faust, 2017; Nformi and Worbs, 2017): GSRO

(no explicit argument for this assumption in the MCS analysis)
Gradient Symbolic Representations and HG

any change in activity is a faithfulness violation

every marked structure M violates a markedness constraint by the number that equals M’s activity

grammatical computation inside Harmonic Grammar

(Legendre et al., 1990; Potts et al., 2010)

(1)

<table>
<thead>
<tr>
<th></th>
<th>*CC]σ</th>
<th>Dep</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. b₁a₁t₁p₀.₅</td>
<td>-0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. b₁a₁t₁</td>
<td></td>
<td>-0.5</td>
<td>-0.5</td>
</tr>
<tr>
<td>c. b₁a₁p₀.₅</td>
<td></td>
<td>-1</td>
<td>-1</td>
</tr>
<tr>
<td>d. b₁a₁t₁∅₁p₀.₅</td>
<td></td>
<td>-1</td>
<td>-2</td>
</tr>
<tr>
<td>e. b₁a₁t₁p₁</td>
<td>-1</td>
<td>-0.5</td>
<td>-4</td>
</tr>
</tbody>
</table>
### Gradience in the output: Predicted typology of exceptions

<table>
<thead>
<tr>
<th><strong>Underlying</strong></th>
<th><strong>Phon.</strong></th>
<th><strong>Output</strong></th>
<th><strong>e.g.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Exceptional repair: Weak element not realized</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A_1 + B_{0.6}$</td>
<td>*AB</td>
<td>$A_1$</td>
<td>Nuuchahnulth unstable C’s (Kim, 2003)</td>
</tr>
<tr>
<td>$A_1 + B_1$</td>
<td></td>
<td>$A_1 B_1$</td>
<td></td>
</tr>
<tr>
<td><strong>2. Exceptional repair: Weak element realized</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A_1 B_{0.6} + A_1$</td>
<td>*AA</td>
<td>$A_1 B_{0.6} A_1$</td>
<td>Catalan exceptional u-realization (Bonet et al., 2007)</td>
</tr>
<tr>
<td>$A_1 B_{0.6} + C_1$</td>
<td></td>
<td>$A_1 C_1$</td>
<td></td>
</tr>
<tr>
<td><strong>3. Exceptional non-trigger: Weak element not repaired</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A_1 + B_{0.6}$</td>
<td>*AB</td>
<td>$A_1 B_{0.6}$</td>
<td>Cl. Manchu exceptional non-triggers for ATR-harmony (Smith, 2017)</td>
</tr>
<tr>
<td>$A_1 + B_1$</td>
<td></td>
<td>$A_1 C_1$</td>
<td></td>
</tr>
<tr>
<td><strong>4. Exceptional non-target: Weak element does not change</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A_1^A + B_{0.6}$</td>
<td>*X^A</td>
<td>$A_1 B_{0.6}$</td>
<td>SMG Mixtec exceptional non-hosts for floating tones; GSRO analysis in (Zimmermann, 2017a,b)</td>
</tr>
<tr>
<td>$A_1^A + B_1$</td>
<td></td>
<td>$A_1 A_1$</td>
<td></td>
</tr>
<tr>
<td><strong>5. Lexical support</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A_1 B_{0.6}$</td>
<td>*Weak!</td>
<td>$A_1$</td>
<td>Japanese Rendaku voicing only if stem and suffix trigger it; GSR analysis in Rosen (2016)</td>
</tr>
<tr>
<td>$A_1 B_{0.6} + B_{0.6}$</td>
<td></td>
<td>$A_1 B_{0.6}$</td>
<td></td>
</tr>
<tr>
<td><strong>6. True competition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A_{0.8} + C_1$</td>
<td>1Elem!</td>
<td>$C_1$</td>
<td>→ MCS case study</td>
</tr>
<tr>
<td>$A_{0.8} + B_{0.6}$</td>
<td></td>
<td>$A_{0.8}$</td>
<td></td>
</tr>
</tbody>
</table>
Argument 1: More than two grades of activity

In most accounts that directly implement some concept of strength, only a binary division into strong and weak is relevant (Inkelas, 2015; Vaxman, 2016a,b; Sande, 2017)

True gradience of activity is argued to account for the stress system of Moses Columbia Salish where feet with 5 different degrees of activity compete for realization.
Argument 2: Exceptionality for more than one process

such a representational account where exceptionality follows from a property of the underlying representation predicts that elements can be exceptional for multiple phonological processes

borne out in the case study of MCS where vowel deletion treats the same morpheme types differently as stress assignment

\[(2)\]

<table>
<thead>
<tr>
<th></th>
<th>Fully active consonant</th>
<th>Exceptional weak consonant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Affix 1: /-k₁/</td>
<td>Affix 2: /-p₀.₅/</td>
</tr>
<tr>
<td>Epenthesis</td>
<td>/b₁a₁t₁-k₁/</td>
<td>/b₁a₁t₁-p₀.₅/</td>
</tr>
<tr>
<td></td>
<td>[batək]</td>
<td>[batp]</td>
</tr>
<tr>
<td>Nasal Ass.</td>
<td>/t₁u₁n₁-k₁-o₁/</td>
<td>/t₁u₁n₁-p₀.₅-o₁/</td>
</tr>
<tr>
<td></td>
<td>[tuŋko]</td>
<td>[tunpo]</td>
</tr>
</tbody>
</table>
Case study: Moses Columbia Salish Stress
Data: Lexical stress in MCS
Moses Columbia Salish
(Kinkade, 1982; Czaykowska-Higgins, 1985, 1993a,b, 2011; Willett, 2003, =MCS)

- a **single main-stressed** syllable in every word
- the default-stress position is the **rightmost** syllable for stems in isolation (3-a+b)
- **prefixes are never stressed**; even if they contain the only full V (3-c)

(3) Default stress (Czaykowska-Higgins, 1993a, 205+225)

a. hananík
   ‘jackrabbit’

b. q’áláχ
   ‘fence’

c. niʔwpwʔpəlqs
   niʔ-wp~wp=lqs
   Loc-RED-hair=nose
   ‘hair in nose’
Vowel epenthesis and deletion

- there is vowel **epenthesis**:
  - e.g. weak CC-roots always have an epenthetic V between stem-C’s
  - e.g. epenthesis before /ʔ/
  - quality predictable: e.g. i/__.j, a/__.ʔ, ə elsewhere,…

(4) nq’ij’apána?
    n-q’j’=ap=an?
    Loc-write=bottom=ear
    ‘branded on the cheek’ (215)

- unstressed V’s are **deleted** if they follow the stressed V

(5) kəʃhújtʕnmcn
    kəʃ-ʔuʃ=tʃin-min-t-ʃi-n
    unrealized-irritate=mouth-relational-TR-2SG.O-1SG.S
    ‘I’m going to bother you (by mouth)’ (202)

(stem=underlined)
Lexically determined stress in Salish

- hierarchy of stress-preferences based on a lexical two-way-distinction for stems and affixes into:
  - dominant ‘D’ and recessive ‘R’ suffixes
  - strong ‘S’ and weak ‘W’ stems

\[ \rightarrow \text{D-Sfx} \gg \text{S-stem} \gg \{\text{R-Sfx, W-stem}\} \]

- very similar systems in all Interior Salishan languages except Lillooet (Idsardi, 1991; Czaykowska-Higgins and Kinkade, 1998; Revithiadou, 1999)
Lexically determined stress in MCS

(6)  

a. \( p'i\text{st}l'a\text{?}k\text{ft} \)  

\( p'i\text{st}l'?=ak\text{ft} \)  

big.PL=hand  

‘big hands’ (229)  

b. \( Satf'Im'x\text{\u00e1}x^w \)  

\( Satf'-?im'x-mix \)  

\( IPFV\text{-move}-IPFV \)  

‘he’s moving’ (208)  

c. \( Satf'Im'x\text{\u00e1}x^w \)  

\( ka?-p'iq=t\text{\u00f8}in-t\text{\u00f8}ut-mix \)  

unrealized-cook=food-REFL-IPFV  

‘he’s going to cook’ (209)
Further distinction for stems: E-stems

- E-stems are stressed if directly followed by one D-suffix
- but loose stress to a D-suffix if at least one other suffix intervenes

(7)

a. japk\textsuperscript{\textit{w}}\textsuperscript{-}ánk\textsuperscript{\textit{n}}
   jap-k\textsuperscript{\textit{w}}an=ak\textsuperscript{\textit{t}}-n-t-ø-n
   Loc-grab=hand-CTRL-Tr-3.O-1Sg.S
   ‘I grab so. by the hand’ (229)

b. kl\textsuperscript{\textit{k}}\textsuperscript{-}ntf\textsuperscript{\textit{\textendash}n}ák\textsuperscript{\textit{n}}
   kl-k\textsuperscript{\textit{w}}an=t\textsuperscript{\textit{f}}in=ak\textsuperscript{\textit{t}}-n-t-ø-n
   Loc-grab=mouth=hand-CTRL-Tr-3.O-1Sg.S
   ‘I grab so. by wrist’ (231)

c. xatm\textsuperscript{\textit{f}}\textsuperscript{-}tfút
   xat-min-ftu-tfut
   raise-relational-CAUS-REFL
   ‘he’s raising up’ (271)
### Lexically determined stress: Interim summary

#### (8)

<table>
<thead>
<tr>
<th></th>
<th>S</th>
<th>W</th>
<th>SE</th>
<th>WE</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Š(-R)-R</td>
<td>W(-R)-́R</td>
<td>ŠÉ(-R)-R</td>
<td>WÉ-R</td>
</tr>
<tr>
<td>b.</td>
<td>S-́D</td>
<td>W-́D</td>
<td>ŠÉ-́D</td>
<td>WÉ-D</td>
</tr>
<tr>
<td>c.</td>
<td>S-́D-R(-R)</td>
<td>W-́D-R(-R)</td>
<td>ŠÉ-D-R(-R)</td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>S-D(-D)-́D</td>
<td>W-D(-D)-́D</td>
<td>ŠE-D(-D)-́D</td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td></td>
<td></td>
<td>ŠE-R-́D</td>
<td></td>
</tr>
</tbody>
</table>

Asymmetry: Intervening suffix between E-stem and D or not

- hierarchy: \( \text{SE/WE} \sim D \gg S \gg \{R, W\} \)
- multiple suffixes of the type that should be stressed: the **rightmost** one receives stress
Additional suffix-type $R^*$: Stress-attracting $R$-suffixes

Two suffixes behave like $R$-suffixes except that they **attract stress even though they are not the rightmost** in a sequence of $R$-suffixes.

\[(9)\] 
\[\begin{align*} 
\text{a. } & k^w_úlnmn \\
& k^wULn-min-t-Ø-n \\
& \text{borrow-relational-CTR-TR-3.O-1SG.S} \\
& \text{‘I’m borrowing it’ (251)} \\
\text{b. } & ñq̄naʔdímn̄fn \\
& ñq̄n=anʔ=qin-min-t-ñi-n \\
& \text{hear=ear=head-relational-TR-2SG.O-1SG.S} \\
& \text{‘I heard about you’ (251)} \\
\text{c. } & ǰrmíšťm \\
& ǰRMíSŤtu-Ø-n \\
& \text{push-relational-CAUS-3.O-1PL.S} \\
& \text{‘We push him’ (252)} 
\end{align*}\]
Additional suffix-type D*: Stress-attracting D-suffixes

- D*-suffixes behave like D-suffixes except that they are stressed when adjacent to an SE/WE-stem

(10)  
(a) ptχuʃútiʃaʔʃn  
ptiχuʃ=utjʔ-ʃtu-ø-n  
spit=?-Caus-3.O-1Sg.S  
‘I spitted on them’ (270)  

(b) wakʷtuɬn  
wakʷ-tuɬ-t-ø-n  
hide-redirective-Tr-3.O-1Sg.S  
‘I hid it from s.o.’ (256)  

(c) tʼəɬwilʼx  
tʼɬ-wilʼx  
dirty-inch  
‘sth. used until it got dirty’ (256)
## Lexically determined stress: Summary

<table>
<thead>
<tr>
<th></th>
<th>S</th>
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<th>WE</th>
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<tr>
<td>a.</td>
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<tr>
<td>b.</td>
<td>S-́D</td>
<td>W-́D</td>
<td>SÉ-D</td>
<td>WÉ-D</td>
</tr>
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<td>c.</td>
<td>S-́D-R(-R)</td>
<td>W-́D-R(-R)</td>
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<td></td>
</tr>
<tr>
<td>d.</td>
<td>S-D(-D)-́D</td>
<td>W-D(-D)-́D</td>
<td>SE-D(-D)-́D</td>
<td>WE-D(-D)-́D</td>
</tr>
<tr>
<td>e.</td>
<td></td>
<td></td>
<td>SE-R-́D</td>
<td></td>
</tr>
<tr>
<td>f.</td>
<td>Š-R*</td>
<td>W-́R*</td>
<td></td>
<td>(D, R, R*)</td>
</tr>
<tr>
<td>g.</td>
<td></td>
<td>W-́R*-R</td>
<td>SÉ-D-R*(-R)</td>
<td></td>
</tr>
<tr>
<td>h.</td>
<td></td>
<td>W(-D)-́D*-R*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i.</td>
<td></td>
<td>W-R*-́D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>j.</td>
<td></td>
<td></td>
<td>SE-́D*</td>
<td>WE-́D*</td>
</tr>
<tr>
<td>k.</td>
<td></td>
<td></td>
<td>SE-D-́D*</td>
<td></td>
</tr>
<tr>
<td>l.</td>
<td>S-́D*-R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>m.</td>
<td></td>
<td></td>
<td>SE-́D*-R*</td>
<td>(D, R, D*, R*)</td>
</tr>
</tbody>
</table>

**D* vs. D and R* vs. R**

Eva Zimmermann (Leipzig University)
Summary: The challenges

- lexical stress system with a **preference hierarchy:**
  \[ D^* \gg SE/WE \sim D \gg S \gg R^* \gg \{R, W\} \]

- an apparent **locality threshold** for E-stems: only stressed if no D-suffix follows separated by at least one other suffix
A cyclic account in Czaykowska-Higgins (1993a)

- A cyclic account inside the metrical framework of Halle and Vergnaud (1987a,b)
- Crucial contrast: cyclic (=D) vs. non-cyclic (=R) suffixes: the former trigger stress deletion and new assignment of stress
- Different stress rules assigning left- or rightmost stress
- E-stems assign extrametricality to an adjacent morphemes
- R*- and D*-suffixes are lexically accented
analysis in a system where conflicts between lexical accents are resolved with reference to morphological structure: the accent of the morphological head wins (HdFAITH ≫ FAITH)

asymmetry for suffixes then follow from their different morphological structure (=lexical suffixes are part of a compound or predicate structure)

not the aim to derive all the data we saw, including ‘exceptions’/small classes of only a few morphemes

full set of data impossible to derive since it is again a binary division: morphological head vs. non-head
Analysis based on gradient activity
The analysis in a nutshell: Competition

morphemes have **no or underlying feet of different strengths** in their underlying representation

(difference between strong/weak stems = underlying V/only epenthetic V)

(12)

<table>
<thead>
<tr>
<th>Fully active φ</th>
<th>← Weaker φ →</th>
<th>No φ</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE/WE</td>
<td>D*</td>
<td>D</td>
</tr>
<tr>
<td>φ₁</td>
<td>φ₀.9</td>
<td>φ₀.8</td>
</tr>
<tr>
<td>D*</td>
<td>D</td>
<td>S</td>
</tr>
<tr>
<td>φ₀.6</td>
<td>R*</td>
<td>R</td>
</tr>
<tr>
<td>φ₀.4</td>
<td>R/W</td>
<td>W</td>
</tr>
</tbody>
</table>
The analysis in a nutshell: Competition

- morphemes have **no or underlying feet of different strengths** in their underlying representation (difference between strong/weak stems = underlying V/only epenthetic V)

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<tr>
<td>φ₁</td>
<td>φ₁</td>
<td>φ₀₉</td>
</tr>
<tr>
<td>SE</td>
<td>D*</td>
<td>D</td>
</tr>
<tr>
<td>WE</td>
<td>φ₀₉</td>
<td>φ₀₈</td>
</tr>
</tbody>
</table>

- competition for φ-realization: **most active one is preferably realized**

(13) **Max-φ:**
Assign a violation mark for every input φ without an output correspondent.
Two other (opposing) stress preferences

(14)  a. $V_{STEM}$ (‘Stress the stem-vowel!’)
   Assign a violation mark for every main-stressed vowel that is not preceded and followed by stem-segments.

   b. $RM_{COL}$ (‘Stress is rightmost!’)
   Assign a violation mark for every morphemic colour $\alpha$ that intervenes between the right word edge and the stressed vowel that is not of morphemic colour $\alpha$.

   c. $RM_{V}$ (‘Stress is rightmost!’)
   Assign a violation mark for every $V^*$ that intervenes between the right word edge and the stressed vowel that is not of morphemic colour $\alpha$.

   ➞ two versions of RIGHTMOST: asymmetry between R- and D-suffixes and abundant V-deletion in Salish

   (*Underlying vowel. Modelled in containment theory (Prince and Smolensky, 1993; Zimmermann, 2017c)).
Two other (opposing) stress preferences

(14) a. $\hat{V}_{STEM}$ (‘Stress the **stem-vowel**!’)
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$\Rightarrow$ two versions of **RIGHTMOST**: asymmetry between R- and D-suffixes and abundant V-deletion in Salish

(*Underlying vowel. Modelled in containment theory (Prince and Smolensky, 1993; Zimmermann, 2017c)).

$\Rightarrow$ **gang-effect in HG for E-stems**: stems are preferably stressed but stress can’t be too far away from the right word-edge
Realization of the only underlying $\varphi$

(15)

<table>
<thead>
<tr>
<th>$\varphi_{0.8}$</th>
<th>Max-$\varphi$</th>
<th>$\dot{V}_{STEM}$</th>
<th>$RM_V$</th>
<th>$RM_{COL}$</th>
<th>Dep-$\varphi$</th>
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<tbody>
<tr>
<td>W</td>
<td>100</td>
<td>30</td>
<td>30</td>
<td>16</td>
<td>5</td>
</tr>
</tbody>
</table>

<p>| | | | | | | |</p>
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</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>W</td>
<td>D</td>
<td>R</td>
<td>$\varphi_1$</td>
<td>-0.8</td>
<td>-1</td>
</tr>
<tr>
<td>b.</td>
<td>W</td>
<td>D</td>
<td>R</td>
<td>$\varphi_{0.8}$</td>
<td>-1</td>
<td>-1</td>
</tr>
<tr>
<td>c.</td>
<td>W</td>
<td>D</td>
<td>R</td>
<td>$\varphi_1$</td>
<td>-0.8</td>
<td>-1</td>
</tr>
</tbody>
</table>

(epenthetic=grey background)
Preservation of the $\phi$ with the highest activity

(16)

<table>
<thead>
<tr>
<th>$\phi$</th>
<th>$\phi$</th>
<th>$\phi$</th>
<th>Max-(\phi)</th>
<th>$\dot{V}_{STEM}$</th>
<th>$RM_v$</th>
<th>$RM_{COL}$</th>
<th>Dep-(\phi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.6</td>
<td>0.9</td>
<td>0.4</td>
<td>100</td>
<td>30</td>
<td>30</td>
<td>16</td>
<td>5</td>
</tr>
</tbody>
</table>

a. S D* R* $\phi$ 0.4  
-1.5  -1  -180

b. S D* R$^*$ $\phi$ 0.9  
-1 -1 -1 -146

c. S D* R$^*$ $\phi$ 0.6  
-1.3 -1 -2 -192
E-stems: A gang effect

- Stress on an **E-stem** is more preferred than stress on a D-suffix by both Max-ϕ and \( \dot{V}_{STEM} \).
- If, however, more than one suffix intervenes between an E-stem and a D-suffix, stress would be too far away from the right edge and is realized on the **D-suffix** instead.

→ A gang-effect in HG

\[
\begin{align*}
\text{...has a higher weight than...} & \\
0.2 \times \text{Max-ϕ} + \dot{V}_{STEM} & \gg \text{RM}_{COL} + \text{RM}_{V} \\
\text{and} & \\
2 \times \text{RM}_{COL} + \text{RM}_{V} & \gg 0.2 \times \text{Max-ϕ} + \dot{V}_{STEM}
\end{align*}
\]

Cf. (17) and (18)
Gang effect I: Stress on E-stem with one D-suffix

(17)

<table>
<thead>
<tr>
<th>φ₁</th>
<th>φ₀.₈</th>
<th>Max-φ</th>
<th>VSTEM</th>
<th>RMᵥ</th>
<th>RMᵥ</th>
<th>Dep-φ</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE</td>
<td>D</td>
<td>100</td>
<td>30</td>
<td>30</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>a.</td>
<td>φ₀.₈</td>
<td>-1</td>
<td>-1</td>
<td></td>
<td></td>
<td>-130</td>
</tr>
<tr>
<td>b.</td>
<td>φ₁</td>
<td>-0.8</td>
<td>-1</td>
<td>-1</td>
<td></td>
<td>-126</td>
</tr>
</tbody>
</table>
Case study: Moses Columbia Salish Stress
Analysis based on gradient activity

Gang effect II: Stress on D-suffix if more suffixes intervene

(18)

<table>
<thead>
<tr>
<th>$\varphi_1$</th>
<th>$\varphi_{0.8}$</th>
<th>$\varphi_{0.8}$</th>
<th>Max-$\varphi$</th>
<th>$\dot{V}_{STEM}$</th>
<th>$RM_{COL}$</th>
<th>$RM_{V}$</th>
<th>Dep-$\varphi$</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE</td>
<td>R</td>
<td>D</td>
<td>100</td>
<td>30</td>
<td>30</td>
<td>16</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>$\varphi_1$</th>
<th>$\varphi_{0.8}$</th>
<th>$\varphi_{0.8}$</th>
<th>Max-$\varphi$</th>
<th>$\dot{V}_{STEM}$</th>
<th>$RM_{COL}$</th>
<th>$RM_{V}$</th>
<th>Dep-$\varphi$</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>SE</td>
<td>R</td>
<td>D</td>
<td>-1</td>
<td>-1</td>
<td></td>
<td></td>
<td>-130</td>
</tr>
<tr>
<td>b.</td>
<td>SE</td>
<td>R</td>
<td>D</td>
<td>-1.8</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
<td>-261</td>
</tr>
<tr>
<td>c.</td>
<td>SE</td>
<td>R</td>
<td>D</td>
<td>-0.8</td>
<td></td>
<td>-1</td>
<td>-2</td>
<td>-142</td>
</tr>
</tbody>
</table>
Interim Summary

The representations (19) predict the position of main stress: Underlying feet of different activity compete for stress realization.

(19)

<table>
<thead>
<tr>
<th>Fully active $\varphi$</th>
<th>← Weaker $\varphi$ →</th>
<th>No $\varphi$</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE/WE</td>
<td>D*</td>
<td>R/W</td>
</tr>
<tr>
<td>$\varphi_1$</td>
<td>$\varphi_1$</td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>$\varphi_0.9$</td>
<td>R*</td>
</tr>
<tr>
<td></td>
<td>D*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>W</td>
</tr>
</tbody>
</table>
Interim Summary

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(19)

<table>
<thead>
<tr>
<th>Fully active $\varphi$</th>
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</thead>
<tbody>
<tr>
<td>SE/WE</td>
<td>D*</td>
<td>R/W</td>
</tr>
<tr>
<td>$\varphi_1$</td>
<td>$\varphi_1$</td>
<td></td>
</tr>
<tr>
<td>SE</td>
<td>$\varphi_{0.9}$ D*</td>
<td>R/W</td>
</tr>
<tr>
<td>WE</td>
<td>$\varphi_{0.8}$ D</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\varphi_{0.6}$ S</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\varphi_{0.4}$ R*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>W</td>
</tr>
</tbody>
</table>

- This representational account predicts exceptional behaviour of weakly active elements for more than one process:

  - Evidence from facts about vowel deletion/secondary stress that these is indeed the case.
Further evidence: Vowel deletion asymmetries
unstressed V’s are sometimes **deleted if they precede the stressed V**

- the unstressed V of a D-suffix is deleted between an SE-stem and a stressed D-suffix (20-a)
- but the unstressed V of a D-suffix is only variably/for some speakers deleted between a W-stem and a stressed D-suffix (20-b)

(20)  
a. kˡtˡ’awlqʷqnákʃtm
    kˡ-tˡ’aw=alqʷ=qin=akʃt-m
    Loc-wash=pole=TOP=arm-MID
    ‘wash wrists’ (246)  

b. kjər’jər’qnalqʷákʃtn
    k-ʃr’~ʃr’=qin=alqʷ=akʃt-n-t-ø-n
    Loc-RedP~roll=Top=pole=arm-CTR-TR-3.O-1SG.S
    ‘roll up sleeves’ (245)
Secondary stress

optional secondary stress can be found on:

- stem vowels
- suffix vowels preceding the main stress

→ in the context where vowel deletion applies optionally

(21)  
(a) niʔk’əmàn’kàkst  
niʔ-k’m=ank=akst  
Loc-surface.of=flat=hand  
‘palm of hand’ (246) 

(b) nməq’wàpánaʔ  
n-mq’w=ap=anʔ  
Loc-bulge=base=ear  
‘bulge on side of face’ (249)
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   n-ʔməʔw=ap=anʔ
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   ‘bulge on side of face’ (249)

→ secondary stress is what saves those vowels from deletion!
Account: Second foot blocks vowel deletion

- Suffix-vowels without main stress can optionally be realized if they are integrated into a foot (=secondary stress)

\[(22)\]

Underlying form

Option 1: D-Vowel realization

Option 2: D-Vowel deletion
Possibility of a second foot in a word

- implicit assumption so far: feet compete for realization since only a single foot is possible (consequence from, for example, ER-L/R (McCarthy, 2003))

- if the responsible constraint is (at least optionally) lower-weighted **two feet in a word are possible**:
  - avoids vowel deletion of unstressed affix-V
  - is better for Max-φ because more feet are realized
  - but is only possible if the secondary-stress φ is not stronger than the main-stress φ (**ASYMMETRICSTRENGTHφ**)
  - and **maximally two feet** in a word are possible
Possibility of a second foot in a word

(23) \[ \text{SE-D-D} \quad \text{W-D-(C-)D} \]

1. Underlying

<table>
<thead>
<tr>
<th></th>
<th>SE-D-D</th>
<th>W-D-(C-)D</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \varphi_1 )</td>
<td>( \varphi_{0.8} )</td>
<td>( \varphi_{0.8} )</td>
</tr>
<tr>
<td>( \sigma )</td>
<td>( \sigma )</td>
<td>( \sigma )</td>
</tr>
<tr>
<td>( x'wir )</td>
<td>( ak\text{\textacute{f}}t )</td>
<td>( atkw )</td>
</tr>
<tr>
<td>( k'w'? )</td>
<td>( ak\text{\textacute{f}}t )</td>
<td>( n )</td>
</tr>
</tbody>
</table>

2. Option 1: D-Vowel deletion

<table>
<thead>
<tr>
<th></th>
<th>SE-D-D</th>
<th>W-D-(C-)D</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \varphi_1 )</td>
<td>( \varphi_{0.8} )</td>
<td>( \varphi_{0.8} )</td>
</tr>
<tr>
<td>( \sigma )</td>
<td>( \sigma )</td>
<td>( \sigma )</td>
</tr>
<tr>
<td>( x'wirk\text{\textacute{f}} )</td>
<td>( tatk^w )</td>
<td>( k'w\text{\textacute{a}}? )</td>
</tr>
<tr>
<td>( k'w\text{\textacute{a}}? )</td>
<td>( k\text{\textacute{f}}nt\text{\textacute{f}}ut )</td>
<td></td>
</tr>
</tbody>
</table>

- \( \smiley \) Stronger (stem)-foot realized as secondary stress
- \( \smiley \) Only other foot realized as secondary stress

3. Option 2: D-Vowel realization

<table>
<thead>
<tr>
<th></th>
<th>SE-D-D</th>
<th>W-D-(C-)D</th>
</tr>
</thead>
<tbody>
<tr>
<td>( * )</td>
<td>( \varphi_{0.8} )</td>
<td>( \varphi_{0.8} )</td>
</tr>
<tr>
<td>( \sigma )</td>
<td>( \sigma )</td>
<td>( \sigma )</td>
</tr>
<tr>
<td>( x'wi )</td>
<td>( rak\text{\textacute{f}} )</td>
<td>( tatk^w )</td>
</tr>
<tr>
<td>( k'w\text{\textacute{a}} )</td>
<td>( ?ak\text{\textacute{f}} )</td>
<td></td>
</tr>
<tr>
<td>( nt\text{\textacute{f}}ut )</td>
<td>( nt\text{\textacute{f}}ut )</td>
<td></td>
</tr>
</tbody>
</table>

- \( \frown \) Weaker (affix)-foot realized as secondary stress
- \( \frown \) Stronger (stem)-foot realized as secondary stress
Only the stronger foot can become a secondary stress:

* a second foot can ‘save’ a D-suffix-V following a W-stem but not one following an SE-stem: being able to save a suffix-vowel from deletion is not a good enough reason to realize the weaker $\phi$

(24)

<table>
<thead>
<tr>
<th>$\sigma$</th>
<th>$\phi_{0.8}$</th>
<th>$\phi_{0.8}$</th>
<th>Max-$\phi$</th>
<th>Max-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>x’wir</td>
<td>ak$\sigma$t</td>
<td>atk$^w$</td>
<td>100</td>
<td>10</td>
</tr>
</tbody>
</table>

| a. $\phi_{1}$ | $\sigma$ | $\phi_{0.8}$ | $\sigma$ | Max-$\phi$ | Max-V | -0.8 | -1 | -90 |
|---------------|----------|--------------|----------|------------|-------|
| x’wirk$^f$   | tatk$^w$ |             |          |            |       |

| b. $\sigma$ | $\phi_{0.8}$ | $\sigma$ | $\phi_{0.8}$ | Max-$\phi$ | Max-V | -1 | -100 |
|-------------|--------------|----------|--------------|------------|-------|
| x’wi        | rak$^f$     | tatk$^w$ |             |            |       |
Only the stronger foot can become a secondary stress

- a second foot can ‘save’ a D-suffix-V following a W-stem but not one following an SE-stem: being able to save a suffix-vowel from deletion is not a good enough reason to realize the weaker $\varphi$

(24)

$\begin{array}{ccc} 
\varphi_1 & \varphi_{0.8} & \varphi_{0.8} \\
\sigma & \sigma & \sigma \\
x^wir & akft & atkw \\
\end{array}$  

$\begin{array}{ccc} 
\text{Max-$\varphi$} & \text{Max-V} \\
100 & 10 \\
\end{array}$

$\begin{array}{ccc} 
\varphi_1 & \varphi_{0.8} \\
\sigma & \sigma \\
x^wirkf & atkw \\
\end{array}$  

-0.8  
-1  
-90

$\begin{array}{ccc} 
\varphi_{0.8} & \varphi_{0.8} \\
\sigma & \sigma \\
x^wi & rakf & atkw \\
\end{array}$  

-1  
-100

→ again, simple competition about which $\varphi$ is realized; only in another domain (=secondary stress and avoidance of vowel deletion)
Summary and Conclusion
Summary

Lexical stress system in MCS follows from assuming **6 different types of underlying foot structure** for morphemes:

- Position of main stress follows from competition about \( \varphi \)-realization
- Exceptionality of E-stems is a threshold-effect in HG
Summary

_lexical stress system in MCS follows from assuming 6 different types of underlying foot structure for morphemes
• position of main stress follows from competition about φ-realization
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this representational account also predict exceptional behaviour for vowel deletion: exceptionality for multiple processes

 (=argument against lexically indexed constraints (e.g. Alderete, 2001; Pater, 2009; Finley, 2009): It is a coincidence that at least two different constraints are indexed to the same class of (exceptional) morphemes)
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(=argument against lexically indexed constraints (e.g. Alderete, 2001; Pater, 2009; Finley, 2009): It is a coincidence that at least two different constraints are indexed to the same class of (exceptional) morphemes)

the argument for GSR(O) is strengthened in showing that this predicted type of exceptionality is borne out as well
Gradience in the output: Predicted typology of exceptions

<table>
<thead>
<tr>
<th>Underlying</th>
<th>Phon.</th>
<th>Output</th>
<th>e.g.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Exceptional repair: Weak element not realized</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A_1 + B_{0.6}$</td>
<td>*AB</td>
<td>$A_1$</td>
<td>Nuuchahnulth unstable C’s (Kim, 2003)</td>
</tr>
<tr>
<td>$A_1 + B_1$</td>
<td></td>
<td>$A_1B_1$</td>
<td></td>
</tr>
<tr>
<td>2. Exceptional repair: Weak element realized</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A_1 B_{0.6} + A_1$</td>
<td>*AA</td>
<td>$A_1 B_{0.6}A_1$</td>
<td>Catalan exceptional u-realization (Bonet et al., 2007)</td>
</tr>
<tr>
<td>$A_1 B_{0.6} + C_1$</td>
<td></td>
<td>$A_1 C_1$</td>
<td></td>
</tr>
<tr>
<td>3. Exceptional non-trigger: Weak element not repaired</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A_1 + B_{0.6}$</td>
<td>*AB</td>
<td>$A_1 B_{0.6}$</td>
<td>Cl. Manchu exceptional non-triggers for ATR-harmony (Smith, 2017)</td>
</tr>
<tr>
<td>$A_1 + B_1$</td>
<td></td>
<td>$A_1 C_1$</td>
<td></td>
</tr>
<tr>
<td>4. Exceptional non-target: Weak element does not change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A_1^A + B_{0.6}$</td>
<td>*X$^A$</td>
<td>$A_1 B_{0.6}$</td>
<td>SMG Mixtec exceptional non-hosts for floating tones; GSRO analysis in (Zimmermann, 2017a,b)</td>
</tr>
<tr>
<td>$A_1^A + B_1$</td>
<td></td>
<td>$A_1 A_1$</td>
<td></td>
</tr>
<tr>
<td>5. Lexical support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A_1 B_{0.6}$</td>
<td>*Weak!</td>
<td>$A_1$</td>
<td>Japanese Rendaku voicing only if stem and suffix trigger it; GSR analysis in Rosen (2016)</td>
</tr>
<tr>
<td>$A_1 B_{0.6} + B_{0.6}$</td>
<td></td>
<td>$A_1 B_{0.6}$</td>
<td></td>
</tr>
<tr>
<td>6. True competition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$A_{0.8} + C_1$</td>
<td>1Elem!</td>
<td>$C_1$</td>
<td>$\rightarrow$ MCS case study</td>
</tr>
<tr>
<td>$A_{0.8} + B_{0.6}$</td>
<td></td>
<td>$A_0.8$</td>
<td></td>
</tr>
</tbody>
</table>
References


Coelho, Gail (2002), ‘Primary word stress in Thompson River Salish’, Ms, ROA 000569.


Kim, Eun-Sook (2003), *Theoretical issues in Nuu-chah-nulth phonology and morphology (British Columbia)*, UMI, Ann Arbor, MI.


McCarthy, John (2003), ‘Ot constraints are categorical’, *Phonology* 20, 75–138.


Willett, Marie Louise (2003), A grammatical sketch of Nxa’amxcin (Moses-Columbia Salish), PhD thesis, University of Victoria.


if a root only contains epenthetic vowels, the leftmost is stressed

(not uncommon in Interior Salishan, a similar pattern in Thompson River Salish (Thompson and Thompson, 1992; Coelho, 2002))

(25) Leftmost stress in epenthesis-only words

a. sq’íj’q’íjs
   s-q’j-q’j-s
   NMLZ-write-characteristics-Poss
   ‘his/its/her writing’ (222)

b. k’óməlqstxən
   k’m=lqst=xn
   surface.of=shin=leg
   ‘lower leg’ (222)
apparent conflicting directionality follows from **contrast between coloured/epenthetic material**: There is a preference for stems to be stressed and RM\textsubscript{V} does not count epenthetic vowels

\begin{equation}
RM\textsubscript{V}:
\text{Assign a violation mark for every non-epenthetic vowel that intervenes between the right word edge and a stressed vowel.}
\end{equation}
Conflicting directionality

in the absence of underlying stress, default rightmost stress is predicted (27-a)

if there are no underlying vowels, leftmost stress on the stem is predicted since \( \hat{V}_{STEM} \) prefers leftmost stress and no violations of \( RM_V \) are induced by potentially following epenthetic vowels (27-b)

additionally, epentheses ‘inside’ affix material is worse than epentheses ‘inside’ stem material [2ex]

(27) ‘Conflicting Directionality’ = the invisibility of epenthetic vowels

\[
\begin{array}{c}
\text{...has a higher weight than...} \\
\hat{V}_{STEM} + \text{*EP}_{AFFX} \quad \gg \quad 2 \times \text{RM}_{COL} \\
\end{array}
\]

(28)
**Summary and Conclusion**

**W and R: no underlying vowels**

(28)

<table>
<thead>
<tr>
<th></th>
<th>MAX-φ</th>
<th>$\hat{V}_{STEM}$</th>
<th>RM$_V$</th>
<th>RM$_{COL}$</th>
<th>*E$_{PA}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>100</td>
<td>30</td>
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</tr>
<tr>
<td>b.</td>
<td>-2</td>
<td>-1</td>
<td>-1</td>
<td>-35</td>
<td></td>
</tr>
</tbody>
</table>

Eva Zimmermann (Leipzig University)

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