Supplemental handout

(*example numbers refer to the poster*)

Computational analysis

(9) **Boolean Monadic Recursive Schemes** (BMRS; Chandlee & Jardine 2021)

a. **Structure-sensitive tier projection** (Mayer & Major 2018, De Santo & Graf 2019)

$\mathcal{T}_{\texttt{fr}}(x) :=$ `IF` $\texttt{syll}(x)$ `THEN`
  `IF` $\texttt{stem}_1(x)$ `THEN` $\top$
  `ELSE`
transparency ⇢ `IF` $/\overset{+}{\texttt{i}}, \overset{+}{\texttt{ə}}/(x)$ `THEN` $\bot$
  `ELSE` $\top$
`ELSE` $\bot$

if x is a vowel, then
  if x is also stem-initial, then x projects to $\mathcal{T}_{\texttt{fr}}$;
  otherwise, (i.e. if x is a vowel but not also stem-initial)
    if x is $/\overset{+}{\texttt{i}}, \overset{+}{\texttt{ə}}/$, then x does not project to $\mathcal{T}_{\texttt{fr}}$;
    otherwise, x projects to $\mathcal{T}_{\texttt{fr}}$; (i.e. if x is a V other than $/\overset{+}{\texttt{i}}, \overset{+}{\texttt{ə}}/$)
otherwise, x does not project to $\mathcal{T}_{\texttt{fr}}$ (i.e. if x is not a vowel)

b. **Spreading and blocking on the projected tier** (Nelson & Baković 2025)

$\phi_{\texttt{fr}}(x) :=$ `IF` $\texttt{stem}_1(x)$ `THEN` $\texttt{fr}(x)$
`ELSE`
  `IF` $\phi_{\texttt{fr}}(p(x))$ `THEN`
opacity ⇢ `IF` $/\bar{\texttt{ɑ}}/(x)$ `THEN` $\texttt{fr}(x)$
    `ELSE` $\top$
  `ELSE` $\phi_{\texttt{fr}}(s(x))$

if x is stem-initial, then x is faithful;
otherwise, (i.e. if x is not stem-initial)
  if x's predecessor is [+fr], then
    if x is also $/\bar{\texttt{ɑ}}/$, then x is faithful;
    otherwise, x is also [+fr]; (i.e. if x is not also $/\bar{\texttt{ɑ}}/$)
  otherwise, x agrees with its successor
(i.e. if x is not stem-initial, nor $/\bar{\texttt{ɑ}}/$, nor preceded by a [+fr] V)

Frontness harmony

(3) Bidirectional spreading of [±fr] from the stem displaces potentially conflicting affix vowel specifications

a. [+fr] spreads R to suffixes

Input	$\overset{+}{\texttt{æ}}$	q	l	–	$\overset{\pm}{\texttt{uy}}$
x	1				2
$\texttt{stem}_1(x)$	⊤				⊥
$\texttt{fr}(x)$	⊤				⋯
$/\bar{\texttt{ɑ}}/(x)$	⊥				⊥
$\phi_{\texttt{fr}}(x)$	⊤				⊤
Output	$\overset{+}{\texttt{æ}}$	q	l	–	$\overset{+}{\texttt{y}}$

'their foot'

b. [−fr] spreads R to suffixes

Input	$\bar{\texttt{ɑ}}$	q	l	–	$\overset{\pm}{\texttt{uy}}$
x	1				2
$\texttt{stem}_1(x)$	⊤				⊥
$\texttt{fr}(x)$	⊥				⋯
$/\bar{\texttt{ɑ}}/(x)$	⊤				⊥
$\phi_{\texttt{fr}}(x)$	⊥				⊥
Output	$\bar{\texttt{ɑ}}$	q	l	–	$\bar{\texttt{u}}$

'their intelligence'

c. [+fr] spreads L to prefixes

Input	b	$\overset{\pm}{\texttt{ɜɛ}}$	–	$\overset{+}{\texttt{æ}}$	q	l
x		1		2		
$\texttt{stem}_1(x)$		⊥		⊤		
$\texttt{fr}(x)$		⋯		⊤		
$/\bar{\texttt{ɑ}}/(x)$		⊥		⊥		
$\phi_{\texttt{fr}}(x)$		⊤		⊤		
Output	b	$\overset{+}{\texttt{ɛ}}$	–	$\overset{+}{\texttt{æ}}$	q	l

'without (a) foot'

d. [−fr] spreads L to prefixes

Input	b	$\overset{\pm}{\texttt{ɜɛ}}$	–	$\bar{\texttt{ɑ}}$	q	l
x		1		2		
$\texttt{stem}_1(x)$		⊥		⊤		
$\texttt{fr}(x)$		⋯		⊥		
$/\bar{\texttt{ɑ}}/(x)$		⊥		⊤		
$\phi_{\texttt{fr}}(x)$		⊤		⊤		
Output	b	$\bar{\texttt{ɜ}}$	–	$\bar{\texttt{ɑ}}$	q	l

'without intelligence'

scan for poster and handout pdfs and more

Opacity and non-derived environment blocking

(7) Opaque (c) and NDE blocking (d) of spreading of [+fr]

a. [−fr] spreads R from /ɑ/

Input	q	**ɑ̄**	ʃ	**o͡ø**	k
x		1		2	
$\texttt{stem}_1(x)$		⊤		⊥	
$\texttt{fr}(x)$		⊥		⋯	
$/\bar{\texttt{a}}/(x)$		⊤		⊥	
$\phi_{\texttt{fr}}(x)$		⊥		⊥	
Output	q	**ɑ̄**	ʃ	**o̅**	k

'spoon'

b. [−fr] spreads R from /æ/→[ɑ]

Input	d	**u̅**	m	**æ̲**	n
x		1		2	
$\texttt{stem}_1(x)$		⊤		⊥	
$\texttt{fr}(x)$		⊥		⊤	
$/\bar{\texttt{a}}/(x)$		⊥		⊥	
$\phi_{\texttt{fr}}(x)$		⊥		⊥	
Output	d	**u̅**	m	**ɑ̅**	n

'rug'

c. [+fr] fails R spread to /ɑ/

Input	d	**y̲**	ʃ	m	**ɑ̅**	n
x		1			2	
$\texttt{stem}_1(x)$		⊤			⊥	
$\texttt{fr}(x)$		⊤			⊥	
$/\bar{\texttt{a}}/(x)$		⊥			⊤	
$\phi_{\texttt{fr}}(x)$		⊤			⊥	
Output	d	**y̲**	ʃ	m	**ɑ̅**	n

'enemy'

d. [−fr] fails L spread in NDE

Input	d	**y̲**	ʃ	m	**ɑ̅**	n
x		1			2	
$\texttt{stem}_1(x)$		⊤			⊥	
$\texttt{fr}(x)$		⊤			⊥	
$/\bar{\texttt{a}}/(x)$		⊥			⊤	
$\phi_{\texttt{fr}}(x)$		⊤			⊥	
Output	d	**y̲**	ʃ	m	**ɑ̅**	n

'enemy'

Transparency

(8) Spreading from the stem, but no blocking

a. [+fr] spreads from /ə/

Input	l	**ə̲**	bː	–	**o͡ø**	x
x		1			2	
$\texttt{stem}_1(x)$		⊤			⊥	
$\texttt{fr}(x)$		⊤			⋯	
$/\bar{\texttt{a}}/(x)$		⊤			⊥	
$\phi_{\texttt{fr}}(x)$		⊤			⊤	
Output	l	**ə̲**	bː	–	**ø̲**	x

'your towel'

b. [−fr] spreads through /ə/

Input	x	**o̅**	r	**ə̲**	z	–	**o͡ø**	x
x		1					2	
$\texttt{stem}_1(x)$		⊤					⊥	
$\texttt{fr}(x)$		⊤					⋯	
$/\bar{\texttt{a}}/(x)$		⊥					⊥	
$\phi_{\texttt{fr}}(x)$		⊤					⊤	
Output	x	**o̅**	r	**ə̲**	z	–	**o̅**	x

'your rooster'

References cited. Chandlee, J. & A. Jardine. 2021. Computational universals in linguistic theory: Using recursive programs for phonological analysis. *Language* 97. • De Santo, A. & T. Graf. 2019. Structure sensitive tier projection: Applications and formal properties. *Formal Grammar* 2019. • Mayer, C. & T. Major. 2018. A challenge for tier-based strict locality from Uyghur backness harmony. *Formal Grammar* 2018. • Nelson, S. & E. Baković. 2025. Feature spreading, redundancy, and blocking. Ms., UIUC and UCSD.