SPE main stress rule breakdown

Just for fun or reference, here's a breakdown of how the giant SPE English Main Stress Rule was supposed to apply to our examples. (If I try this in class again, I think I'll divide up the sub-rules among you rather than the words!)

$$V \rightarrow [1\ \text{stress}]\ /\ \Big[\ X\_\_C_0 \left(\begin{bmatrix} -\text{tense} \\ \gamma\text{stress} \\ V \end{bmatrix} C_0^1 (\begin{bmatrix} \alpha\text{voc} \\ \alpha\text{cons} \\ -\text{ant} \end{bmatrix}) \right)$$

$$/\ \_\_ \ \Big\langle\ (\begin{Bmatrix} (fik)At \\ [+D]C_0 \end{Bmatrix}) \begin{Bmatrix} <_1+C_0>_1 \begin{bmatrix} -\text{stress} \\ -\text{tense} \\ -\text{cons} \end{bmatrix} [+\text{cons}]_0 \\ <_1 \begin{bmatrix} -\text{seg} \\ <_2-FB>_2 \end{bmatrix} >_1 C_0\ [\beta\text{stress}]\ C_0\ <_2 V_0 C_0>_2 \end{Bmatrix} \Big\rangle\ ]_{<NSP<_1 VA>_1>}$$

Conditions: $\beta = \begin{Bmatrix} 1 \\ 2 \end{Bmatrix}$

$\gamma \leq 2$ [in another version, says γ is 2 or weaker]

X contains no internal #   SPE p. 240

The order in which we expand it should, I think, be this:
1 With the material in the un-subscripted <>

   1.1 with $\begin{Bmatrix} (fik)At \\ [+D]C_0 \end{Bmatrix}$ (I don't think it matters whether we try first the options for this parenthetical material [present; absent] or the options for what's in the curly brackets [top; bottom], and I don't think the expansion conventions say what to do.)

   1.1.1   with the top option in the curly brackets
   1.1.1.1   full version, with successively less of the parenthesized material in the upstairs environment ("WSLOFPMITUE")
   1.1.1.2   without the $<_1>_1$, WSLOFPMITUE
   1.1.2   with the bottom option in the curly brackets
   1.1.2.1   full version, WSLOFPMITUE
   1.1.2.2   without the $<_2>_2$, WSLOFPMITUE
   1.1.2.3   without $<_1>_1$, which I think implies without the $<_2>_2$, WSLOFPMITUE

   1.2 without $\begin{Bmatrix} (fik)At \\ [+D]C_0 \end{Bmatrix}$
   1.2.1   with the top option in the curly brackets
   1.2.1.1   full version, WSLOFPMITUE
   1.2.1.2   without the $<_1>_1$, WSLOFPMITUE
   1.2.2   with the bottom option in the curly brackets
   1.2.2.1   full version, WSLOFPMITUE
   1.2.2.2   without the $<_2>_2$, WSLOFPMITUE
   1.2.2.3   without $<_1>_1$, which I think implies without the $<_2>_2$, WSLOFPMITUE
 2 Without the material in the un-subscripted <>s, WSLOFPMITUE

Recap of remarks, before stepping through these:
- This analysis assumes that English vowels in lexical entries are all [–stress] (so why does the environment mention stress? see 4 below on cyclicity).
- S means 'stem', P means 'prefix'
- [0stress] = stressless; [1stress] = primary-stressed; [2stress] = secondary-stressed; etc. [0stress] is [–stress], and all other values are [+stress].
- I've used capital letters below to indicate "tense" vowels.

1 *With* the material in the big angled brackets

1.1 with $\left\{\begin{array}{l}(fik)At \\ [+D]C_0\end{array}\right\}$

We didn't have any examples of words with the [+D] feature (a hack to deal with certain suffixes) or of words with *(fik)At* and then another suffix, so I'll skip this option and all its subsidiaries.

1.2 without $\left\{\begin{array}{l}(fik)At \\ [+D]C_0\end{array}\right\}$

1.2.1 with the top option in the curly brackets

1.2.1.1 full version

$$V \rightarrow [1\ \text{stress}] \Big/ \Big[\ X\_C_0 \left(\begin{bmatrix}-\text{tense} \\ \gamma\text{stress} \\ V\end{bmatrix} C_0^1 \left(\begin{bmatrix}\alpha\text{voc} \\ \alpha\text{cons} \\ -\text{ant}\end{bmatrix}\right)\right) \Big/ \underline{\quad} +C_0 \begin{bmatrix}-\text{stress} \\ -\text{tense} \\ -\text{cons}\end{bmatrix} [+\text{cons}]_0\ \Big]_{NSPVA}$$

"upstairs"   "downstairs

Conditions: $\gamma \leq 2$ [in another version, says γ is 2 or weaker]
              X contains no internal #

This sub-schema looks for a monosyllabic suffix with a non-tense vowel. The remainder is then plugged into the upstairs, which will stress the penult (second-to-last-syllable) if the ultima (last syllable) is light, and otherwise stresses the ultima.

Full version of upstairs:

$$V \rightarrow [1\ \text{stress}] \Big/ \Big[\ X\_C_0 \begin{bmatrix}-\text{tense} \\ \gamma\text{stress} \\ V\end{bmatrix} C_0^1 \begin{bmatrix}\alpha\text{voc} \\ \alpha\text{cons} \\ -\text{ant}\end{bmatrix} \Big/ \underline{\quad} +C_0 \begin{bmatrix}-\text{stress} \\ -\text{tense} \\ -\text{cons}\end{bmatrix} [+\text{cons}]_0\ \Big]_{NSPVA}$$

Conditions: $\gamma \leq 2$ [in another version, says γ is 2 or weaker]
              X contains no internal #

- **[_A_ vertebr+al]_A_**

First we match to the downstairs environment:

$\underline{\quad}$	+	C_0	$\begin{bmatrix}-\text{stress} \\ -\text{tense} \\ -\text{cons}\end{bmatrix}$	$[+\text{cons}]_0$	$]_{NSPVA}$
|	|	|	|	|	|
[_A_vertebr	+	Ø	a	l	]_A_

Then take **[A vertebr** and match it to the upstairs environment. $\begin{bmatrix} \alpha\text{voc} \\ \alpha\text{cons} \\ -\text{ant} \end{bmatrix}$ matches /r,w,j/ (not /l/),

so the ultima matches <u>here</u> (i.e., counts as light):

$$[\qquad X \qquad \boxed{\underline{}} \quad C_0 \quad \begin{bmatrix} -\text{tense} \\ \gamma\text{stress} \\ V \end{bmatrix} \quad C_0^1 \quad \begin{bmatrix} \alpha\text{voc} \\ \alpha\text{cons} \\ -\text{ant} \end{bmatrix}$$

[A	v	e	rt	e	b	r

=> **vértebral**.

Omitting the inner parenthetical material:

$$V \rightarrow [1\ \text{stress}]\ /\ [\ X\_\_C_0 \begin{bmatrix} -\text{tense} \\ \gamma\text{stress} \\ V \end{bmatrix} C_0^1\ /\ \_\_ +C_0 \begin{bmatrix} -\text{stress} \\ -\text{tense} \\ -\text{cons} \end{bmatrix} [+\text{cons}]_0\ ]_{\text{NSPVA}}$$

Conditions: $\gamma \leq 2$ [in another version, says γ is 2 or weaker]

X contains no internal #

- **[A person+al]A** : again, matches the ligth-syllable specifications

$$\underline{} \quad + \quad C_0 \quad \begin{bmatrix} -\text{stress} \\ -\text{tense} \\ -\text{cons} \end{bmatrix} \quad [+\text{cons}]_0 \quad]_{\text{NSPVA}}$$

[A person	+	Ø	a	l	]A

$$[\qquad X \qquad \boxed{\underline{}} \quad C_0 \quad \begin{bmatrix} -\text{tense} \\ \gamma\text{stress} \\ V \end{bmatrix} \quad C_0^1$$

[A	p	e	rs	o	n

=> **pérsonal**.

Omitting all the parenthetical material:

$$V \rightarrow [1\ \text{stress}]\ /\ [\ X\_\_C_0\ /\ \_\_ +C_0 \begin{bmatrix} -\text{stress} \\ -\text{tense} \\ -\text{cons} \end{bmatrix} [+\text{cons}]_0\ ]_{\text{NSPVA}}$$

Conditions: X contains no internal #

- **[A desIr+ous]A**

$$\underline{} \quad + \quad C_0 \quad \begin{bmatrix} -\text{stress} \\ -\text{tense} \\ -\text{cons} \end{bmatrix} \quad [+\text{cons}]_0 \quad]_{\text{NSPVA}}$$

[A desir	+	Ø	ou	s	]A

Because the last vowel is tense, the longer versions of upstairs don't match (i.e., the ultima is heavy), so we have to use this short version:

$$
\begin{array}{cccc}
[& X & \boxed{\underline{\quad}} & C_0 \\
| & | & | & | \\
[_A & \text{des} & \boxed{I} & \text{r}
\end{array}
$$

=> **desÍrous**.

- **[$_A$ repugn+ant]$_A$**

Just like *desirous*. Here, the reason the short version of the upstairs environment must be used is that there are two consonants (rather than a [+tense] vowel):

$$
\begin{array}{cccccc}
\underline{\quad} & + & C_0 & \begin{bmatrix} -\text{stress} \\ -\text{tense} \\ -\text{cons} \end{bmatrix} & [+\text{cons}]_0 &]_{\text{NSPVA}} \\
| & | & | & | & | & | \\
[_A\text{repugn} & + & \emptyset & \text{a} & \text{nt} &]_A
\end{array}
$$

$$
\begin{array}{cccc}
[& X & \boxed{\underline{\quad}} & C_0 \\
| & | & | & | \\
[_A & \text{rep} & \boxed{u} & \text{gn}
\end{array}
$$

=> **repúgnant**.

1.2.1.2   without the <$_1$>$_1$

$$
V \rightarrow [1\ \text{stress}] \Big/ \Big[\ X\underline{\quad}C_0 \left(\begin{bmatrix} -\text{tense} \\ \gamma\text{stress} \\ V \end{bmatrix} C_0^1 \left(\begin{bmatrix} \alpha\text{voc} \\ \alpha\text{cons} \\ -\text{ant} \end{bmatrix} \right) \right) \Big/ \underline{\quad} \begin{bmatrix} -\text{stress} \\ -\text{tense} \\ -\text{cons} \end{bmatrix} [+\text{cons}]_0\ \Big]_{\text{NSP}}
$$

Conditions: $\gamma \leq 2$ [in another version, says γ is 2 or weaker]
                 X contains no internal #

Now there doesn't need to be a suffix, but only <u>n</u>ouns (and "<u>s</u>tems" and "<u>p</u>refixes") are eligible. If the vowel of the last syllable is [–tense], the final VC* will get stripped off and the remainder sent upstairs, where as before we stress the penult's remainder if the ultima is light, and otherwise the ultima.

Full version of upstairs—I don't think we had any examples

Omitting the inner parenthesized material:

$$
V \rightarrow [1\ \text{stress}] \Big/ \Big[\ X\underline{\quad}C_0 \begin{bmatrix} -\text{tense} \\ \gamma\text{stress} \\ V \end{bmatrix} C_0^1 \Big/ \underline{\quad} \begin{bmatrix} -\text{stress} \\ -\text{tense} \\ -\text{cons} \end{bmatrix} [+\text{cons}]_0\ \Big]_{\text{NSP}}
$$

Conditions: $\gamma \leq 2$ [in another version, says γ is 2 or weaker]
                 X contains no internal #

- **[$_A$ javelin]$_A$**

$$\underline{} \quad \begin{bmatrix} -\text{stress} \\ -\text{tense} \\ -\text{cons} \end{bmatrix} \quad [+\text{cons}]_0 \qquad \big]_{\text{NSP}}$$

$$\begin{array}{cccc} | & | & | & | \\ [_N\ \text{javel} & i & n &]_N \end{array}$$

$$\Big[\qquad X \quad \boxed{\underline{}}\ \ C_0 \quad \begin{bmatrix} -\text{tense} \\ \gamma\text{stress} \\ V \end{bmatrix} \qquad C_0^1$$

$$\begin{array}{cccccc} | & | & | & | & | & | \\ [_A & j & \boxed{a} & v & e & l \end{array}$$

=> **jávelin**.
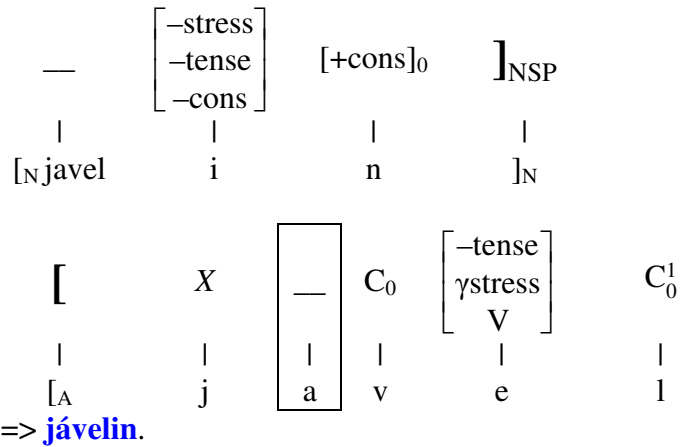
Omitting all the parenthesized material:

$$V \rightarrow [1\ \text{stress}] \Big/ \big[\ X\underline{}C_0 \Big/ \underline{} \begin{bmatrix} -\text{stress} \\ -\text{tense} \\ -\text{cons} \end{bmatrix} [+\text{cons}]_0 \big]_{\text{NSP}}$$

Conditions: $\quad \gamma \leq 2$ [in another version, says γ is 2 or weaker]

$\qquad\qquad\qquad$ X contains no internal #

- **[N arOma]N** : doesn't match the longer version because of its tense vowel

$$\underline{} \quad \begin{bmatrix} -\text{stress} \\ -\text{tense} \\ -\text{cons} \end{bmatrix} \quad [+\text{cons}]_0 \qquad \big]_{\text{NSP}}$$

$$\begin{array}{cccc} | & | & | & | \\ [_N\ \text{arOm} & a & \emptyset &]_N \end{array}$$

$$\Big[\qquad X \quad \boxed{\underline{}}\ \ C_0$$

$$\begin{array}{cccc} | & | & | & | \\ [_A & r & \boxed{O} & m \end{array}$$

=> **aróma**

[N consensus]N : similar, but its reason for not matching the longer version is the /ns/ cluster

[N larynx]N : matches the shorter version because once you strip off *ynx*, there's only one vowel left.

1.2.2   with the bottom option in the curly brackets

Because of the [βstress] (where beta must be 1 or 2), this sub-schema won't apply to any of our simple examples that haven't gone through a round of stressing yet.

2 Without the material in the un-subscripted <>s

In this sub-schema, if all the above has failed, which means we didn't have a word with a monosyllabic non-tense suffix, and we didn't have a noun/stem/prefix with a non-tense final syllable, then we try applying upstairs to the whole word: stress the penult if the ultima is light; otherwise stress the ultima.
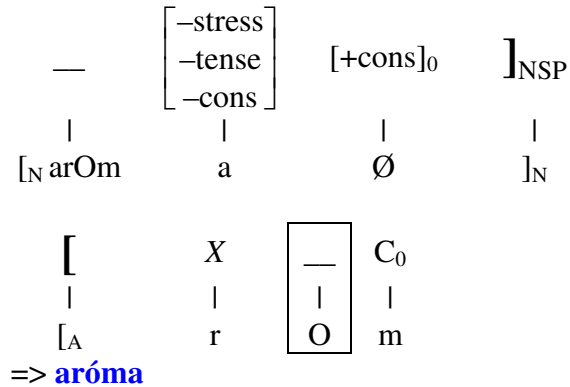
With all the upstairs material: I don't think we had any examples

Omitting the innermost parenthetical:

$$V \rightarrow [1 \text{ stress}] \;/\; \Big[\; X\_\_C_0 \begin{bmatrix} -\text{tense} \\ \gamma\text{stress} \\ V \end{bmatrix} C_0^1 \;/\; \_\_ \;\Big]$$

Conditions: $\gamma \leq 2$ [in another version, says γ is 2 or weaker]

                     X contains no internal #

- **[$_V$ imagine]$_V$**

Downstairs just matches the whole thing except the final bracket:

```
    __              ]
    |               |
[v imagine        ]v
```

$$\Big[\qquad X \qquad \begin{array}{|c|} \hline \_\_ \\ \hline \end{array} \; C_0 \; \Big\| \begin{bmatrix} -\text{tense} \\ \gamma\text{stress} \\ V \end{bmatrix} \Big\| \; C_0^1 \; \Big\|$$

```
  |        |       |    |   |         |
 [A       im       a    g   i         n
=> imágine
```

Omitting all the parenthetical material:

$$V \rightarrow [1 \text{ stress}] \;/\; \Big[\; X\_\_C_0 \;/\; \_\_ \;\Big]$$

Conditions: X contains no internal #

- **[$_V$ mAIntAIn]$_V$** (I won't bother to show the downstairs)

Couldn't match the longer version because of the [+tense] vowel

$$\Big[\qquad X \qquad \begin{array}{|c|} \hline \_\_ \\ \hline \end{array} \; C_0 \; \Big\|$$

```
  |        |       |    |
 [A      mAInt    AI    n
=> maintáin
```

Similarly for **[$_V$ collapse]$_V$ → collápse**, which fails to match the longer version because of its final CC. Also **[$_V$ inter=sect]$_V$ → interséct**.

[$_V$ per=mit]$_V$ → permít has to undergo this version because the only parts of the rule schema that tolerate = are the *X* string at the beginning or the [–seg] in the lower part of the big curly brackets, which has to be followed by an already-stressed syllable. (Only the + boundary has the special property that a rule can match it without mentioning it.)

3 Further complication I: the alternating stress rule

To handle **[$_V$ im=plic+Ate]$_V$**, we first run it through the rule and get **[$_V$ im=plic+Áte]$_V$** (see section 2 above).

Then the Alternating Stress Rule applies...

        $V \rightarrow [1 \text{ stress}] \;/\; \_\_ \; C_0 \; (=) \; C_0VC_0 \; [1 \text{ stress}] \; C_0 \;]_{NAV}$ (SPE p. 240)

...with the convention: when a V is assigned [1stress] by rule, all other nonzero stresses are increased by 1 (p. 64). E.g., primary becomes secondary.

$$\boxed{\begin{array}{c} \underline{} \\ | \\ i \end{array}} \begin{array}{cccccccc} C_0 & = & C_0 & V & C_0 & [1\ stress] & C_0 &]_{NAV} \\ | & | & | & | & | & | & | & | \\ m & = & pl & i & c & \acute{A} & t &]_V \end{array}$$

=> **ímplicÀte**

This second rule won't apply to **[$_V$ inter=séct]$_V$** , though, because the boundary is in the wrong place: there have to be two syllables after the =.

[$_V$ exorcIse]$_V$ works similarly to *implicate*, getting stress on its tense vowel by the main stress rule (→**exorcÍse**). It fails to match the full version of Alternating Stress, but matches the version without the =:

$$\boxed{\begin{array}{c} \underline{} \\ | \\ e \end{array}} \begin{array}{ccccccc} C_0 & C_0 & V & C_0 & [1\ stress] & C_0 &]_{NAV} \\ | & | & | & | & | & | & | \\ \emptyset & x & o & rc & \acute{I} & s &]_V \end{array}$$

=> **éxorcÌse** (acute accent ´: primary stress and grave accent ` : secondary stress)

[$_N$ hurricAne]$_N$ and **[$_N$ chickadEE]$_N$** are similar (**húrricÀne**, **chíckadÈE**).

4 Further complication II: cyclicity

When a word has multiple pairs of [] boundaries, SPE proposes that the list of rules applies cyclically: Take the innermost bracketed string, apply the rules to it, and erase its brackets. Repeat till all brackets gone.

Take **[$_N$ [$_V$ per=mit]$_V$]$_N$**. First, apply the rules to **[$_V$ per=mit]$_V$**, yielding **[$_V$ per=mít]$_V$** (as we saw above). Erasing its brackets we get **per=mít**.

Now replace: **[$_N$ per=mít]$_N$**. Apply the rules to this form now.

It can't match the top option in the big curly brackets, because the last vowel is [+stress]. The bottom option will match, as long as we omit the $<_2>_2$ (since = is [+FB]):

$$\boxed{\begin{aligned} & V \rightarrow [1\ stress] \,\Big/\, \Big[\, X\underline{}C_0 \left(\begin{bmatrix} -tense \\ \gamma stress \\ V \end{bmatrix} C_0^1 \left(\begin{bmatrix} \alpha voc \\ \alpha cons \\ -ant \end{bmatrix} \right) \right) \,\Big/\, \underline{}\ [-seg]\ C_0\ [\beta stress]\ C_0\ ]_{NSPVA} \\[2mm] & \text{Conditions:} \qquad \beta = \begin{Bmatrix} 1 \\ 2 \end{Bmatrix} \\ & \qquad\qquad\qquad \gamma \leq 2 \quad \text{[in another version, says } \gamma \text{ is 2 or weaker]} \\ & \qquad\qquad\qquad X \text{ contains no internal \#} \end{aligned}}$$

Downstairs:

$$\begin{array}{cccccc} \underline{} & [-seg] & C_0 & [\beta stress] & C_0 &]_{NSPVA} \\ | & | & | & | & | & | \\ [_N\, per & = & m & \acute{\imath} & t &]_N \end{array}$$

Upstairs we have to use the short version, since there's only one syllable:

$$\big[\quad X \quad \boxed{\underline{}} \quad C_0$$
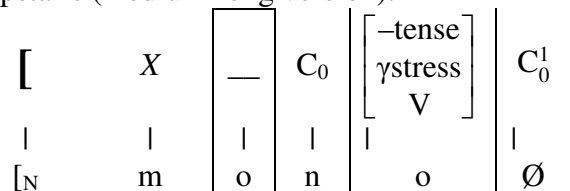
$[_N$	p	e	r
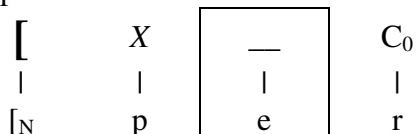
=> **pérmìt** after the same stress-demotion convention as applied with the Alternate Stress Rule (when you add a stress, demote the existing ones). (cf. **Kérmit** with just one stress)

We get something similar for $[_N$ **mono** $[_S$ **graph**$]_S$ $]_N$: **gráph** gets stressed on the first round, so we have $[_N$ **mono gráph** $]_N$, then **mono** gets penultimate stress, since its second syllable is light (and the original stress is demoted):

Downstairs (version without $<_1>_1$ and $<_2>_2$):

$\underline{}$	C_0	[βstress]	C_0	$]_{NSP}$
$[_N$ mono	gr	á	ph	$]_N$
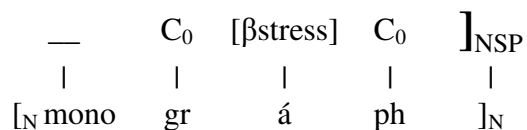
Upstairs (medium-long version):

$$\big[\quad X \quad \boxed{\underline{}} \quad C_0 \quad \begin{bmatrix} -\text{tense} \\ \gamma\text{stress} \\ V \end{bmatrix} \quad C_0^1$$

$[_N$	m	o	n	o	Ø

=> **mónogràph**

I'll leave our other four cyclic cases to your imagination, with the following remarks
- In $[_N$ **mono** $[_N$ **#genes+is#** $]_N$ $]_N$, the #s make no difference on the first cycle, but on the second cycle you'll be starting with $[_N$ **mono #génes+is#** $]_N$. These are the 'internal #'s that one of the rule conditions forbids. => in contrast to **mónogràph**, you get **monogénesis**.
- Watch out for the internal # in $[_N$ $[_V$ **soliloquIz#** $]_V$ **ing** $]_N$ too.
- $[_N$ $[_P$ **parel** $[_S$**le**$]_S$ **lo** $]_P$ $[_S$ **gram** $]_S$ $]_N$ is funny because at a certain point you'll be going into the rule with $[_N$ **parallélo grám** $]_N$. The rule will re-primary stress the *é*, which demotes the stress of *grám* (=> **parallélogràm**). The is unlike what usually happens when a segment is [αF] and a rule tries to make it [αF], so nothing changes. Another reason why stress doesn't look much like a feature...