Stress variation in English complex words
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Part 1 (Stress in monomorphemic words)
Stress variation in English complex words

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Features that intervene in stress assignment:
- Foot structure
- Syllabic weight
- Extrametricality
Stress variation in English complex words

Part 1 (Stress in monomorphemic words)
Features that intervene in stress assignment:
- Foot structure
- Syllabic weight
- Extrametricality

Part 2 (Stress variation in complex words)
Stress variation in English complex words

Part 1 (Stress in monomorphemic words)
Features that intervene in stress assignment:
- Foot structure
- Syllabic weight
- Extrametricality

Part 2 (Stress variation in complex words)
- Across-type variation
- Within-type variation (case study: -(at)ory)
Part 1:
Stress in monomorphemic words
Lexical stress in English

- Please, take a look at the following words. Do you think English has a systematic way to assign stress to words in isolation?
Lexical stress in English

- Please, take a look at the following words. Do you think English has a systematic way to assign stress to words in isolation?

consider  maintain  extreme  obey  
corrupt    asterisk  consensus  promise (N)  
vulgar     metropolis  breakfast  promise (V)  
synopsis  sincere  handsome  torment (N)  
adapt      common  contradict  torment (V)
English stress rules

What do we need to know to apply the stress rules of English?

- (1) The notion of foot
- (2) The notion of syllabic weight
- (3) The notion of extrametricality
The prosodic hierarchy

- The **Prosodic Hierarchy** describes a series of increasingly smaller constituents of a prosodic utterance, each nested within the next highest constituent. (e.g. Selkirk 1984)

- According to the **culminative property**, each constituent can have no more than one head.
The prosodic hierarchy

Phonological word

( ba la lái ka )
The prosodic hierarchy

Phonological word

Foot         Foot

( bà    la ) ( lái    ka )
The prosodic hierarchy

![Diagram](image.png)
The prosodic hierarchy

\[ \sigma \]

\( s \quad t \quad r \quad a \quad i \quad k \quad s \)
The prosodic hierarchy

Onset
s t r

Rhyme
a i k

σ

s
The prosodic hierarchy

Onset: s, t, r
Rhyme: a, i
Coda: k, s
The prosodic hierarchy

σ

Onset

Rhyme

Nucleus

Coda

s

tr

a

i

k

s
The prosodic hierarchy

- Every unit of weight in the rhyme is called a **mora** (\(\mu\)).
The prosodic hierarchy

- Long vowels consist of two moras.
The prosodic hierarchy

- Phonological word ($\omega$)
  - Foot ($\Sigma$)
    - Syllable ($\sigma$)
      - Mora ($\mu$)
(1) Types of feet

A foot ($\Sigma$) consists of a stressed syllable together with any adjacent unstressed syllables (if there are any) either on the left, or on the right.
(1) Types of feet

- Left-headed binary foot (*trochee*)
(1) Types of feet

- Left-headed binary foot (*trochee*)

```
  F
 /--
 |   
 (bú  sy)
```
(1) Types of feet

- Left-headed binary foot (trochee)

F

(bú sy)

- Right-headed binary foot (iamb)
(1) Types of feet

- Left-headed binary foot (trochee)
  
  \[
  \text{F} \\
  \text{(bú sy)}
  \]

- Right-headed binary foot (iamb)
  
  \[
  \text{F} \\
  \text{(Pa rí)}
  \]
(1) Types of feet

- A foot without unstressed syllables may form a trochee or an iamb, provided that it consists of a heavy syllable.

\[ F \]

*(strike)*
(1) Types of feet

- A foot without unstressed syllables may form a trochee or an iamb, provided that it consists of a heavy syllable.

\[
\begin{array}{c}
F \\
\text{(strike)}
\end{array}
\]

- Otherwise, a foot without unstressed syllables is left unparsed (degenerate foot).
(2) Syllabic weight

English distinguishes between two types of syllables, light and heavy.
(2) Syllabic weight

English distinguishes between two types of syllables, **light** and **heavy**.

- **Light syllables** consist of a short vowel in the nucleus and no coda.

```
Rhyme
  / \      /
Nucleus Coda
  \   /
    w  I  d  ə ʊ
```
(2) Syllabic weight

English distinguishes between two types of syllables, **light** and **heavy**.

- **Heavy syllables** consist of a long vowel or diphthong in the nucleus or a coda.
(2) Syllabic weight

- **Light syllables** consist of a short vowel in the nucleus and no coda.

- **Heavy syllables** consist of a long vowel or diphthong in the nucleus or a coda.
(2) Syllabic weight

- **Light syllables** consist of a short vowel in the nucleus and no coda (i.e. **only one mora**).

- **Heavy syllables** consist of a long vowel or diphthong in the nucleus or a coda (i.e. **at least two moras**).
(2) Syllabic weight

- How many **moras** (or morae) do the syllables in the following words have?

<table>
<thead>
<tr>
<th>May</th>
<th>busy</th>
</tr>
</thead>
<tbody>
<tr>
<td>strength</td>
<td>widow</td>
</tr>
<tr>
<td>lion</td>
<td>window</td>
</tr>
<tr>
<td>I</td>
<td>umbrella</td>
</tr>
</tbody>
</table>
(2) Syllabic weight

- How many **moras** (or morae) do the syllables in the following words have?

  meɪ
  strɛŋθ
  laɪən
  aɪ
  bi.zi
  wi.deʊ
  wi.n.deʊ
  ʌm.bɛ.lə
(3) Extrametricality

- Extrametrical elements are systematically ignored with regards to stress assignment (Liberman 1975).
(3) Extrametricality

- **Extrametrical** elements are systematically ignored with regards to stress assignment. (Liberman 1975).

- An extrametrical element must be *peripheral* in its domain (i.e. it can only mark the left or rightmost element of a syllable, foot, word, etc).
(3) Extrametricality

- Final syllable extrametricality:
(3) Extrametricality

- Final **syllable** extrametricality:

\[
\sigma \quad \sigma \quad <\sigma>
\]

\[
\text{címene ma}
\]
(3) Extrametricality

- Final **syllable** extrametricality:
(3) Extrametricality

- Final **syllable** extrametricality:
The English Stress Rule
(for nouns)
Based on Hayes (1982, 1995)
The English Stress Rule
(for nouns)
Based on Hayes (1982, 1995)

(1) **Final syllables** are extrametrical.
The English Stress Rule
(for nouns)
Based on Hayes (1982, 1995)

(1) Final syllables are extrametrical.

(2) Word structure:
   - Construct a left-headed binary foot (a trochee) over the right edge of the word.
The English Stress Rule
(for nouns)
Based on Hayes (1982, 1995)

(1) Final syllables are extrametrical.

(2) Word structure:
- Construct a left-headed binary foot (a trochee) over the right edge of the word.

(3) Syllable structure:
- If the last syllable is heavy, align the head of the foot on that syllable.
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

ə  ɹɛdʒɛn  əpɛ

agenda
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

ə  dʒɛn  <də>

agenda
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

\[ \text{agenda} \]
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

\[
F
\]
\[
\left.
\begin{array}{c}
\varepsilon

dʒɛn
\end{array}
\right)
\left<d\varepsilon\right>
\]

agenda
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

\[ bæ \quad lɛ \quad lai \quad kɛ \]

*balalaika*
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

\[
\text{balalaika}
\]
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

\[\text{bæ \ love \ lai \ } <kə>\]

\textit{balalaika}
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

\[ \text{F} \]
\[ \begin{array}{cccc}
\text{bæ} & \text{le} & (\text{lai}) & <\text{kə}>
\end{array} \]

\[ \text{balalaika} \]
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

\[ \text{ə} \quad \text{me} \quad \text{rɪ} \quad \text{kə} \]

America
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

ə me rɪ <kə>

America
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

\[
F
\]

\[
\begin{array}{c}
\text{ə (me rɪ) }<k\emptyset> \\
\end{array}
\]

America
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

\[\text{cinema}\]
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

\[ \text{cinema} \]
(1) Final syllables are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

```
F
  \_/ 
 (si  un) <me>
```

cinema
- What about verbs?

ə plai əb zə:v
apply observe

ɛ dɪt ɪ mæ dʒɪn
edit observe
The English Stress Rule
(for **verbs** and **adjectives**) Based on Hayes (1982, 1995)

(1) **Final consonants** are extrametrical.

(2) **Word structure:**
- Construct a left-headed binary foot over the right edge of the word.

(3) **Syllable structure:**
- If the last syllable is heavy, align the head of the foot on that syllable.
- What about **verbs**?

ə plai
apply

əb z3ːv
observe

ɛ dɪt
edit

ɪ mæ dʒɪn
observe
- What about verbs?

apply
observe

edit
imagine
- What about verbs?

ə plai əb zə: <v> ə plai əb zə: <v>
aply observe

ə plai əb zə: <v> ə plai əb zə: <v>
edi imagine

ə plai əb zə: <v> ə plai əb zə: <v>
edi imagine
- What about **verbs**?

\[
\begin{align*}
F & \\
\varepsilon & (\text{plai}) & \varepsilon b & \text{z3}: <v> \\
\text{apply} & & \text{observe} \\
\varepsilon & \text{d3} <t> & \text{i mæ} & \text{dʒi} <n> \\
\text{edit} & & \text{imagine}
\end{align*}
\]
- What about verbs?

F

ə (plai) əb z3ː <v>
apply observe

ə dɪ <t>
edit

ɪ mæ dʒɪ <n>
imagine
- What about **verbs**?

<table>
<thead>
<tr>
<th></th>
<th>apply</th>
<th>observe</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>ə (plai)</td>
<td>əb (z3:)&lt;v&gt;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>edit</th>
<th>imagine</th>
</tr>
</thead>
<tbody>
<tr>
<td>ɛ dɪ &lt;t&gt;</td>
<td>ɪ mæ dʒɪ &lt;n&gt;</td>
<td></td>
</tr>
</tbody>
</table>
- What about verbs?

apply

observe

edit

imagine
- What about **verbs**?

- **apply**
- **observe**
- **edit**
- **imagine**
The English Stress Rule
(examples from Spencer 1996)

consider  maintain  extreme  obey
corrupt    asterisk  consensus  promise (N)
vulgar     metropolis  breakfast  promise (N)
synopsis  sincere  handsome  torment (N)
adapt     common  contradict  torment (V)
The English Stress Rule

kənsɪdər
kərʌpt
vʌlgə
sɪndɪs
ədæpt
The English Stress Rule

(1) Either final syllables (of nouns) or final consonants (of verbs and adjectives) are **extrametrical**.

kənsɪdə (verb)
kərʌp (verb or adjective)
vlgə (adjective)
sɪnəp (noun)
ədæp (verb)
The English Stress Rule

(1) Either final syllables (of nouns) or final consonants (of verbs and adjectives) are extrametrical.

(2) Construct a left-headed binary foot over the right edge of the word.

(3) If the last syllable is heavy, align the head of the foot on that syllable.

kən(ˈsi.ðə) (light last syllable)
kə(ˈrʌp)<t> (heavy last syllable)
(ˈvʌl.gə) (light last syllable)
sɪ(ˈnæp)<sis> (heavy last syllable)
ə(ˈdæp)<t> (heavy last syllable)
The English Stress Rule

meɪn(ˈteɪn) ɪk(ˈstriː)<m> ə(ˈbeɪ)
(ˈæ. stə)<risk> kən(ˈsɛn)<səs> (ˈprə)<mis>
mi(ˈtrə. pə)<lɪs> (ˈbrɛk)<fəst> (ˈprə.mɪ)<s>
sɪn(ˈsiə) (ˈhænd. sə)<m> (ˈtɔː)<ment>
(ˈkə. mə)<n> kɒn.trə(dɪk)<t> ˈtɔː(ˈmɛn)<t>
The English Stress Rule
Are there any English words whose stress cannot be generated by this algorithm?
The English Stress Rule

Are there any English words whose stress cannot be generated by this algorithm?

- Many lexical exceptions.
The English Stress Rule

Are there any English words whose stress cannot be generated by this algorithm?

- Many lexical exceptions.

- Experiments with nonce words (e.g. Domah, Plag and Carroll 2014) suggest that English stress does not follow deterministic rules.
The English Stress Rule

Are there any English words whose stress cannot be generated by this algorithm?

- Many lexical exceptions.

- Experiments with nonce words (e.g. Domah, Plag and Carroll 2014) suggest that English stress does not follow deterministic rules.

- Nevertheless, they show that the interaction of **syllabic weight** and **extrametricality** at the word level plays an important role in stress assignment.
Part 2:
Stress variation in complex words
Across-type variation

Some English words whose stress cannot be generated by the proposed stress rules:

- original
- medieval
- primitive
- significant
- reluctant
- engineer
- racketeer
- referee
- employee
- questionnaire
- interesting
- contrariwise
Across-type variation

Some English words whose stress cannot be generated by the proposed stress rules:

original  engineer  interesting
medieval  racketeer  contrariwise
primitive  referee
significant  employee
reluctant  questionnaire
Across-type variation

- Stress-bearing suffixes:

  engineer
  racketeer
  referee
  employee
  questionnaire
Across-type variation

- Stress-bearing suffixes:

  engi(néer)
  racke(téer)
  ref(e)re
  emplo(yée)
  question(náire)
Across-type variation

- Extrametrical suffixes:

  original
  medieval
  primitive
  significant
  reluctant
Across-type variation

- Extrametrical suffixes:

  origin<al>
  academic<al>
  primit<ive>
  signific<ant>
  reluct<ant>
Across-type variation

- Extrametrical suffixes:

  o.rí.gi.n<al>
  a.ca.de.mi.c<al>
  pri.mi.t<ive>
  sig.ni.fi.c<ant>
  re.luc.t<ant>
Across-type variation

- Extrametrical suffixes:

  o(rí.gi)n<al>
  a.ca.de.mi.c<al>
  pri.mi.t<ive>
  sig.ni.fi.c<ant>
  re.luc.t<ant>
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(prí.mi)t<ive>
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  (prí.mi)t<ive>
  sig(ní.fi)c<ant>
  re.luc.t<ant>
Across-type variation

- Extrametrical suffixes:

  o(rí.gi)n<al>
  a.ca(dé.mi)c<al>
  (prí.mi)t<ive>
  sig(ní.fi)c<ant>
  re(lúc)t<ant>
Across-type variation

- Stress-shifting suffixes cause a change of the stress from one syllable in the base to a different one in the derivative.

(Kiparsky 1982)
Across-type variation

- **Stress-shifting suffixes** cause a change of the stress from one syllable in the base to a different one in the derivative.

- The stress rule applies to each successive morphological domain in a **cyclic** fashion. (Kiparsky 1982)
Across-type variation

- **Stress-shifting suffixes** cause a change of the stress from one syllable in the base to a different one in the derivative.

product
Across-type variation

- **Stress-shifting suffixes** cause a change of the stress from one syllable in the base to a different one in the derivative.

(pró)<duct>
Across-type variation

- **Stress-shifting suffixes** cause a change of the stress from one syllable in the base to a different one in the derivative.

(pró)<duct> → productive
Across-type variation

- **Stress-shifting suffixes** cause a change of the stress from one syllable in the base to a different one in the derivative.

(pró)<duct> → pro(dúc)t<ive>
Across-type variation

- Stress-shifting suffixes cause a change of the stress from one syllable in the base to a different one in the derivative.

(pró)<duct> → pro(dúc)t<ive> → productivity
Across-type variation

- Stress-shifting suffixes cause a change of the stress from one syllable in the base to a different one in the derivative.

(pró)<duct> → pro(dúc)t<ive> → produc(tí.vi)<ty>
Across-type variation

- **Stress-shifting suffixes** cause a change of the stress from one syllable in the base to a different one in the derivative.

(pró)<duct> → pro(dúc)t<ive> → produc(tí.vi)<ty>

engine
Across-type variation

- **Stress-shifting suffixes** cause a change of the stress from one syllable in the base to a different one in the derivative.

\[(pró)<duct> \rightarrow pro(dúc)t<ive> \rightarrow produc(tí.vi)<ty>\]

\[(én)<gine>\]
Across-type variation

- **Stress-shifting suffixes** cause a change of the stress from one syllable in the base to a different one in the derivative.

(pró)<duct> → pro(dúc)t<ive> → produc(tí.vi)<ty>

(én)<gine> → engineer
Across-type variation

- **Stress-shifting suffixes** cause a change of the stress from one syllable in the base to a different one in the derivative.

\[(pró)<duct> \rightarrow pro(dúc)t<ive> \rightarrow produc(tí.vi)<ty>\]

\[(én)<gine> \rightarrow engi(néer)\]
Across-type variation

- **Stress-preserving suffixes** keep the same stressed syllable in the base and in the derivative.
Across-type variation

- **Stress-preserving suffixes** keep the same stressed syllable in the base and in the derivative.

- Stress rules do *not* apply cyclically.
Across-type variation

- Stress-preserving suffixes keep the same stressed syllable in the base and in the derivative.

- Stress rules do *not* apply cyclically.

intrîst
interest
Across-type variation

- **Stress-preserving suffixes** keep the same stressed syllable in the base and in the derivative.

- Stress rules do *not* apply cyclically.

(ˈɪn)<trɪst>
*interest*
Across-type variation

- Stress-preserving suffixes keep the same stressed syllable in the base and in the derivative.

- Stress rules do not apply cyclically.

(ˈɪn)<trɪst> → ɪntrɪstɪŋ

interest → interesting
Across-type variation

- **Stress-preserving suffixes** keep the same stressed syllable in the base and in the derivative.

- Stress rules do *not* apply cyclically.

\[(ˈɪn)<\text{trɪst}> \rightarrow *\text{ɪn(ˈtrɪs.tɪ)}<\text{ŋ}>\]

*interest* \rightarrow *interesting*
Across-type variation

- **Stress-preserving suffixes** keep the same stressed syllable in the base and in the derivative.

- **Stress rules do not** apply cyclically.

(ˈɪn)<trɪst> → *ɪn(ˈtrɪs)t<ɪŋ>

*interest* → *interesting*
Across-type variation

- **Stress-preserving suffixes** keep the same stressed syllable in the base and in the derivative.

- Stress rules do *not* apply cyclically.

\[(ˈɪn)<\text{tríst}>\]

*interest*

= cyclic domain
Across-type variation

- **Stress-preserving suffixes** keep the same stressed syllable in the base and in the derivative.

- Stress rules do *not* apply cyclically.

\[
\text{[(ˈɪn)<trɪst>]} \quad \text{ɪŋ}]_\beta
\]

*interesting*

= cyclic domain

\(\beta\) = non-cyclic domain
Across-type variation

- Stress-preserving suffixes keep the same stressed syllable in the base and in the derivative.
- Stress rules do not apply.
- Stress-preserving suffixes attach to free bases.
Across-type variation

- Stress-preserving suffixes keep the same stressed syllable in the base and in the derivative.

- Stress rules do not apply.

- Stress-preserving suffixes attach to free bases.

- More productive than stress-shifting suffixes.
Within-type variation

- Some suffixes seem to belong to both the categories of stress-shifting and stress-preserving suffixes.
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

- Case study: **-(at)ory**
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

- Case study: **-(at)ory**

  - Production experiment held in Cambridge.
  - 31 University students.
  - 25 sentences with **-(at)ory** derivatives.
  - Part of the project PROS 1, directed by Pr. Dr. Sabine Arndt-Lappe (DFG Research Unit FOR 2373 Spoken Morphology).
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

- Most common variation patterns:

invéstig[ə]tory
congrátul[ə]tory
célebr[ə]tory
círcul[ə]tory
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

- Most common variation patterns:

  invéstig[ə]tory  ~ invéstig[eɪ]tory
  congrá tul[ ]tory  ~ congrá tul[eɪ]tory
  cé lebr[ə]tory  ~ cé lebr[eɪ]tory
  círcul[ə]tory  ~ círcul[eɪ]tory
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

- Most common variation patterns:

congrá tul[ ]tory ~congrá tul[eɪ]tory ~congratul[éi]tory
Within-type variation

- Some suffixes seem to belong to both the categories of stress-shifting and stress-preserving suffixes.

- Which is the base word?

investigate → invéstig[ə]tory~invéstig[ei]tory
congratulate → congrátul[ə]tory~congrátul[ei]tory
célebrate → célebr[ə]tory~célebr[ei]tory
circulate → círcul[ə]tory~círcul[ei]tory
Within-type variation
- Some suffixes seem to belong to both the categories of stress-shifting and stress-preserving suffixes.

- Which is the base word?

investigate → invéstig[ə]tory~invéstig[eɪ]tory
congratulate → congrátul[ə]tory~congrátul[eɪ]tory
célébrate → célebr[ə]tory~célebr[eɪ]tory
círculate → círcul[ə]tory~círcul[eɪ]tory
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

- Which is the base word?

investig[éI]tion → investig[éI]tory
congratul[éI]tion → congratul[éI]tory
celebr[éI]tion → celebr[éI]tory
circul[éI]tion → circul[éI]tory
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

- **ory extrametricality?**

investig[éɪ]t<ion> → investig[éɪ]tory
congratul[éɪ]t<ion>→ congratul[éɪ]tory
celebr[éɪ]t<ion> → celebr[éɪ]tory
circul[éɪ]t<ion> → circul[éɪ]tory
Within-type variation

- Some suffixes seem to belong to both the categories of stress-shifting and stress-preserving suffixes.

-ory extrametricality?

investi(g[éI])t<ion> → investig[éI]tory
congratu(l[éI])t<ion> → congratul[éI]tory
cele(br[éI])t<ion> → celebr[éI]tory
circu(l[éI])t<ion> → circul[éI]tory
Within-type variation

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-ory extrametricality?

investi(g[éI])t<ion> → investig[éI]t<ory>
congratu(l[éI])t<ion> → congratul[éI]t<ory>
cele(br[éI])t<ion> → celebr[éI]t<ory>
circu(l[éI])t<ion> → circul[éI]t<ory>
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

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investi(g[éI])t<ion> → investi(g[éI])t<ory>
congratu(l[éI])t<ion> → congratu(l[éI])t<ory>
cele(br[éI])t<ion>  →  cele(br[éI])t<ory>
circu(l[éI])t<ion>  →  circu(l[éI])t<ory>
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

**-ory extrametricality?**

investigate → investig[ə]tory
congratulate → congratul[ə]tory
célébrate → celebr[ə]tory
circulate → circul[ə]tory
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

**-ory extrametricality?**

<table>
<thead>
<tr>
<th>Suffix</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>investig&lt;ate&gt;</td>
<td>investig[ə]tory</td>
</tr>
<tr>
<td>congrátul&lt;ate&gt;</td>
<td>congratul[ə]tory</td>
</tr>
<tr>
<td>célebr&lt;ate&gt;</td>
<td>celebr[ə]tory</td>
</tr>
<tr>
<td>circul&lt;ate&gt;</td>
<td>circul[ə]tory</td>
</tr>
</tbody>
</table>
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

**-ory extrametricality?**

\[\text{in(vé.s.ti)g<ate>} \rightarrow \text{investig[ə]tory}\]
\[\text{con(grá.tu)l<ate>} \rightarrow \text{congratul[ə]tory}\]
\[\text{(cé.le)br<ate>} \rightarrow \text{celebr[ə]tory}\]
\[\text{(cí.r.cu)l<ate>} \rightarrow \text{circul[ə]tory}\]
Within-type variation
- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

- **-ory extrametricality?**

\[
\begin{align*}
\text{in(vé.s.ti)g<ate>} & \rightarrow \text{investig[ə]t<ory>} \\
\text{con(grá.tu)l<ate>} & \rightarrow \text{congratul[ə]t<ory>} \\
\text{(cé.le)br<ate>} & \rightarrow \text{celebr[ə]t<ory>} \\
\text{(cí.r.cu)l<ate>} & \rightarrow \text{circul[ə]t<ory>}
\end{align*}
\]
Within-type variation

- Some suffixes seem to belong to both the categories of stress-shifting and stress-preserving suffixes.

-ory extrametricality?

\[
\begin{align*}
\text{in(vé.s.ti)g} & \rightarrow \text{*inves(tí.g[ə])t<ory>}
\text{con(grá.tu)l} & \rightarrow \text{*congra(tú.l[ə])t<ory>}
\text{(cé.le)br} & \rightarrow \text{*ce(lé.br[ə])t<ory>}
\text{(cí.r.cu)l} & \rightarrow \text{*cir(cú.l[ə])t<ory>}
\end{align*}
\]
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

**-ory extrametricality?**

\[
\begin{align*}
in(vés.ti)g\langle atē\rangle & \rightarrow \text{investig}[eɪ]t\langle ory\rangle \\
con(grá.tu)l\langle atē\rangle & \rightarrow \text{congratul}[eɪ]t\langle ory\rangle \\
(cé.le)br\langle atē\rangle & \rightarrow \text{celebr}[eɪ]t\langle ory\rangle \\
(cír.cu)l\langle atē\rangle & \rightarrow \text{circul}[eɪ]t\langle ory\rangle
\end{align*}
\]
Within-type variation

- Some suffixes seem to belong to both the categories of **stress-shifting** and **stress-preserving** suffixes.

**-ory extrametricality?**

\[
\begin{align*}
\text{in(vés.ti)g<ate}> & \rightarrow \text{investi(g[é])t<ory>}
\text{con(grá.tu)l<ate}> & \rightarrow \text{congratu(l[é])t<ory>}
\text{(cé.le)br<ate}> & \rightarrow \text{cele(br[é])t<ory>}
\text{(cí.r. cu)l<ate}> & \rightarrow \text{circu(l[é])t<ory>}
\end{align*}
\]
Within-type variation

-ory extrametricality?

- Correct prediction for 'N → Adj' derivations: (congratulát-ion → congratu(l[éi])t<ory>
Within-type variation

- **ory** extrametricality?

- **Correct** prediction for 'N → Adj' derivations:
  (congratulát-ion → congratu(l[éi])t<ory>

- **Wrong** prediction for 'V → Adj' derivations:
  (congrátul-ate → congratu(l[éi])t<ory>
  (congrátul-ate → *congra(tú.l[ə])t<ory>
Within-type variation

Our proposal:
-atory suffixation + foot extrametricality
Within-type variation

**Vowel deletion** in the allomorph as a strategy to improve foot structure while preserving as much segmental material as possible.
Within-type variation

- Empirical evidence for *-atory* suffixation:

About 20 instances of **r-intrusion** by 10 different speakers.
Within-type variation
- Empirical evidence for -atory suffixation:

About 20 instances of r-intrusion by 10 different speakers.

[30_21] retaliatory  retal[ə]-r-[ə]tory
[28_10] regulatory  regul[ə]-r-[ə]try
[12_15] conciliatory  concili[ə]-r[ei]try
[5_12] participatory  particip[ə]-r-tory
[9_13] participatory  particip[ə]-r-try
Within-type variation

- Empirical evidence for -atory suffixation:

A few other production “errors”.

[25_17] accusatory accusat-[ə]tory
[5_19] contributory contribute-[ə]tory
Within-type variation

- Default stress or stress preservation?

hallúcinate → hallúcinatory
partícipate → partícipatory
Within-type variation

- Default stress or stress preservation?

hallúcinate → hallúcinatory
partícipate → partícipatory

revéal → révelatory
respíre → réspiratory
Within-type variation

- Default stress or stress preservation?

hallúcinate → hallúcinatory
partícipate → partícipatory

révéal → révelatory
respíre → réspiratory

ámbulatory
labórátory~láboratory
Within-type variation

- Default stress or stress preservation?

hallúcinate → hal.lú.ci.na.to.ry
partícipate → par.tí.ci.pa.to.ry

revéal → ré.ve.la.to.ry
respíre → rés.pi.ra.to.ry

ám.bu.la.to.ry
labóraryor~lá.bo.ra.to.ry
Within-type variation

- Default stress or stress preservation?

hallúcinate  →  hal.lú.ci.n<a.to.ry>
partícipate  →  par.tí.ci.p<a.to.ry>

revéal     →  ré.ve.l<a.to.ry>
respíre     →  rés.pi.r<a.to.ry>

ám. bu.l<a.to.ry>
labórary~lá.bo.r<a.to.ry>
Within-type variation

- Default stress or stress preservation?

hallúcinate → hal(lú.ci)n<a.to.ry>
partícipate → par(tí.ci)p<a.to.ry>
revéal → (ré.ve)l<a.to.ry>
respíre → (rés.pi)r<a.to.ry>
(ám.bu)l<a.to.ry>
labóraloratory~(lá.bo)r<a.to.ry>
Within-type variation

(in)(vés.ti)g<at.r>  (cás.ti)g<at.r>
(con)(grá.tu)l<at.r>  (ós.ci)l<at.r>
(cír.cu)l<at.r>  (lí.ti)g<at.r>
(cé.le)br<at.r>  ha(lú.ci)n<at.r>
(ré.gu)l<at.r>  (an)(tí.ci)p<at.r>
(par)(tí.ci)p<at.r>  (rés.pi)r<at.r>
(ar)(tí.cu)l<at.r>  (ré.ve)l<at.r>
(dis)(crí.mi)n<at.r>  (com)(pén)s<at.r>
Within-type variation

- Exceptions to the default pattern:

inflámatory
Within-type variation

- Exceptions to the default pattern:

infláatory (unstressable suffix?)
Within-type variation

- **Exceptions** to the default pattern:

  inflámatory (unstressable suffix?)

  oblígatory
Within-type variation

- Exceptions to the default pattern:

  inflámatory  (unstressable suffix?)
  oblígatory   (high frequency word?)
Within-type variation

- Proposal for -atory suffixation:
Within-type variation

- Psycholinguistic evidence:

Flapping/glottalization supports the existence of recursive feet like (a(to.ry)).
Within-type variation

- Psycholinguistic evidence:

Flapping/glottalization supports the existence of recursive feet like *(a(to.ry))*.

- Flapping/glottalization can only happen in non-prominent positions within the foot (Withgott 1982, Davis 2004).
Within-type variation

- T-flapping is **allowed in non-prominent** positions:

\[
\begin{array}{c}
\omega \\
\downarrow \\
\Sigma' \\
\downarrow \\
\Sigma^0 \\
\downarrow \\
\sigma_s \quad \sigma_w \quad \sigma \\
\end{array}
\]

cá  pi  <tal>
Within-type variation

- T-flapping is **allowed in non-prominent** positions:

\[
\begin{align*}
\omega & \quad \Sigma' \\
\Sigma^0 & \quad \Sigma \\
\sigma_s & \quad \sigma_w & \quad \sigma \\
cá & \quad pi & \quad <tal> \\
\end{align*}
\]

\[
\begin{align*}
\omega & \quad \Sigma' \\
\Sigma^0 & \quad \Sigma \\
\sigma_s & \quad \sigma_w & \quad \sigma & \quad \sigma_s & \quad \sigma_w \\
cà & \quad pi & \quad ta & \quad lís & \quad ti<c> \\
\end{align*}
\]
Within-type variation

- T-flapping is *not* allowed in prominent positions:
Within-type variation

- T-flapping is **not** allowed in prominent positions:
Within-type variation

- T-flapping is *not* allowed in prominent positions:
Within-type variation

- If verb forms ending in -ate were the bases for -(at)ory words, then -at- and -ory could not be part of the same foot.
Within-type variation

- If verb forms ending in -ate were the bases for -(at)ory words, then -at- and -ory could not be part of the same foot.

- Therefore, final foot extrametricality would only affect -ory.
Within-type variation

- If verb forms ending in *-ate* were the bases for *-(at)ory* words, then *-at-* and *-ory* could not be part of the same foot.

- Therefore, final foot extrametricality would only affect *-ory*.

\[
\begin{align*}
((c\acute{a}.p\acute{i})t<al>) & \rightarrow ((c\acute{a}.p\acute{i}ta)(l\acute{i}s.ti<c>)) \\
((c\acute{e}.le)br[eIT]) & \rightarrow ((c\acute{e}.le)br[\underline{\alpha}])<(to.ry)> \\
& \rightarrow ((c\acute{e}.le))br[\underline{eI}]<(to.ry)> 
\end{align*}
\]
Within-type variation

- The algorithm could not assign the attested patterns:
Within-type variation

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Within-type variation

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Within-type variation

- The algorithm could not assign the attested patterns:
**Within-type variation**

- The algorithm could not assign the attested patterns:
Within-type variation

- The algorithm could not assign the attested patterns:
Within-type variation

- The 'V → Adj' derivation is possible only if -ory attaches to the base in a non-cyclic fashion.
Within-type variation

- The 'V → Adj' derivation is possible only if -ory attaches to the base in a non-cyclic fashion.
Within-type variation

- The 'V → Adj' derivation is possible only if -ory attaches to the base in a non-cyclic fashion.
Within-type variation

- But what would then be the explanation for the stress pattern of derivatives that don't have a verb form ending in -ate?
Within-type variation

- The *célebratory* pattern is more likely explained as having the default foot structure:

\[(mè.di)(te(rrá.nea<n>) = (cé.le)<(br[ə](to.ry))>\]
Within-type variation

- The *célebratory* pattern is more likely explained as having the default foot structure:

(mè.di)(te(rrá.nea<n>) = (cé.le)<(br[ə](to.ry)))>

- The chances to obtain the -[ə]tory or the -[ei]tory form may depend on the relative frequency of the -atory adjective with respect to the -(at)ion noun.

(mì.li)(tá.ry) → (mì.li)(ta(rís.ti<c>)
(cè.le)(br[ei]<tion>) → (cé.le)<(br[ei](to.ry)))>
Within-type variation

- Default foot structure:
Within-type variation

-(at)ion derivation:
Within-type variation

-(at)ion derivation:
Within-type variation

-(at)ion derivation:
Within-type variation

-(at)ion derivation:
Within-type variation

-(at)ion derivation:
Within-type variation

- The possibility to obtain either the form with default stress and diphthong preservation or the form with stress in the suffix may depend on the interaction of **extrameticrality** with **syllabic weight**.

\[(cé.le)\langle(br[eɪ](to.ry))\rangle \sim (cè.le)((br[éɪ])<to.ry>)\]
The typology of stress in -atory derivatives

(1) Monomorphemic: célèbr[ə]tory

(2) -ation-derived:

(a) Extrametricality > > Syllabic weight: célèbr[eɪ]tory

(b) Syllabic weight > Extrametricality: célèbr[éɪ]tory
References


