Overview of today’s talk

• **Theoretical focus is Exponence**: The process of replacing morphosyntactic features with phonological features (in a realizational morphological model)
  ◦ E.g. [PLURAL] ↔ /z/ (the latter is the exponent)

• **Guiding question**: What are the architectural restrictions placed on exponence and on individual exponents?
Overview of today’s talk

• A **non-restriction** on conditioning environments of an exponent:
  ◦ For exponents showing suppletive allomorphy, they may be conditioned both by inward phonological material (**uncontroversial**) as well as outward phonological material (**controversial**)
  ◦ Centered around a proposal involving **simultaneous exponence** in the Bantu language Cilungu (**Rolle & Bickmore 2022**)

• A **restriction** on the shape of an exponent:
  ◦ The phonological material of an exponent must be **contiguous** in the input to phonology (**Rolle in preparation**)

• Another **restriction** (in Appendix):
  ◦ Only **input** phonological material can be a conditioning environment, **not output** phonological structure (**Rolle 2021**)

Roadmap

1. Setting the stage: The role of Modularity in shaping a theory of Exponence
2. A Non-Restriction on Exponence
3. A Restriction on Exponence
4. Conclusion
Syntax-Phonology Interface

The role of modularity in model design
Grammatical architecture

• One comprehensive model of grammatical architecture is the **Y-model**, also known as the (inverted) **T-model**

• Our focus today: How syntax translates into phonology – i.e. the **Syntax-Phonology Interface** (i.e. ‘**SynPhoni**’)
Anatomy of a ‘SynPhoni’

Spell-out

Constituency

Precedence

Exponence
SynPhoni’s new appendages

- Scheer (2011:613): “A pervasive effect of the minimalist programme is that a whole lot of phenomena and mechanisms that were held to be syntactic in earlier practice are unloaded from syntax. As indicated by its name, the minimalist logic is indeed ‘to examine every device (principle, idea, etc.) that is employed in characterizing languages to determine to what extent it can be eliminated in favor of a principled account in terms of general conditions of computational efficiency and the interface condition that the [language] organ has to satisfy for it to function at all’ Chomsky (2004:106)”

- How do ‘post-syntactic’ mechanisms and mechanics fit in?
  - Distributed Morphology operations (fusion, fission, obliteration, etc.), prosodic inversion, head movement, ellipsis, …
  - Classical morphological issues: clitic placement, infixation, morphomes, …
Orchestrating a ‘Modular SynPhoni’

• To manage the task: A ‘Modular SynPhoni’ research program

• “A striking fact is that the interface literature itself does not seem to take modularity into account: it is hard to find any explicit reference, and even harder to find modularity-based reasonings. This is unexpected, to put it mildly, since modularity is part and parcel of the generative approach to language” (Scheer 2011:497)

• Strictly using principles of modularity to guide our model
  ◦ Domain specificity
  ◦ Module translation
  ◦ Informational encapsulation

Orchestrating a ‘Modular SynPhoni’

• Key aspect of modularity 1: ‘Domain specificity’
  ◦ Symbolic primitives, constraints, and operations are unique to a module, and are illegible and inapplicable to other modules

Domain specificity: Scheer 2011:523
Orchestrating a ‘Modular SynPhoni’

• Key aspect of modularity 2: Module translation
  ◦ Mapping between modules mediated by list of arbitrary $x \leftrightarrow y$ pairs

• Scheer: “the translational process cannot take place in either morpho-syntax or phonology: the Translator's Office has access to the structure and the labels of both sides”

Orchestrating a ‘Modular SynPhoni’

- Key aspect of modularity 3: ‘Informational encapsulation’
  - One module cannot refer to the contents of another module during its computation (e.g. in its internal input-output mapping procedure)
  - ‘raise a verb if it is [+ROUND]’, ‘harmonize with vowels of [+NEG] verbs’
- Access to other module strictly at spell-out (mediated by vocab.)

Informational encapsulation: Scheer 2011:524; Phonology-free syntax (Zwicky 1986a, 1986b)
Orchestrating a ‘Modular SynPhoni’

- **Less is more**: In line with current minimalist theorizing, the null hypothesis is having the smallest possible number of modules.
- **Precludes an independent morphological module**
  - Against lexicalist theories (e.g. Lexical Morphology and Phonology) and autonomous morphology (e.g. Paradigm Function Morphology, etc.)

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Lexical morphology and phonology (Kiparsky 1982a, 1982b); Paradigm Function Morphology (Stump 2011, 2016); Word & Paradigm Morphology (Blevins 2006, 2016)
Orchestrating a ‘Modular SynPhoni’

• This also precludes the postsyntactic ‘sub-modules’ of Distributed Morphology (Arregi & Nevins 2012:342)
  ◦ “Spellout consists of a set of serially ordered modules” (Hewett 2022)
Orchestrating a ‘Modular SynPhoni’

- **Entails no intermediate representations between modules**: No structure changes between modules (i.e. in ‘Modular No-Man’s-Land’ – Scheer 2011)
- Cf. ‘**Node sprouting**’: Insertion of ‘spurious’ aorist morphology in Western Armenian in non-aorist contexts (Dolatian & Guekguezian 2022:340)
Orchestrating a ‘Modular SynPhoni’

• Once syntactic computation stops, the interface is stuck with the final object, which is a static syntactic representation which cannot be changed (akin to a 2D picture)

• Only the syntactic module (with its modular-internal primitives and principles) could manipulate it further

https://gifs.com/gif/wile-e-coyote-runs-into-wall-vV5p5q
Orchestrating a ‘Modular SynPhoni’

- **No mixed representations**: The contents of an individual representation **cannot** mix primitives from different modules
  - I.e. no representation literally has both syntactic and phonological features (this would violate ‘domain specificity’)
- Cf. standard practice in DM (e.g. Embick’s 2015 textbook)

(6) *played*, before insertion

```
√PLAY  v
    T[+past]
```

(7) *played*, after insertion

```
√PLAY  [v,-Ø]
    T[+past,-ed]
```
Restrictions on Exponence

- Back to the matter at hand: **Restrictions on Exponence**
  - In a Modular SynPhoni, there are no intermediate modules
  - Thus, the mediating static vocabulary take on the most **crucial role**

- **What is a possible vocabulary item?**
  - **Non-restriction:** Phonologically-conditioned suppletive allomorphy
  - **Restriction:** No gapped structures
A non-restriction on exponence

Strict modularity predicts both inward and outward phonological sensitivity (Rolle & Bickmore 2022)
Cyclic vs. simultaneous exponence

• Cyclic exponence:
  ◦ Insertion proceeds **cyclically** (from the inside-out) and **serially** (one item at a time)

• Simultaneous exponence:
  ◦ Insertion is **simultaneous** and **global** (all exponents are available at once)
Cyclic exponence

- **Cyclic exponence** is industry standard in Distributed Morphology

- **Itelmen** (Gouskova & Bobaljik 2020)
  
  \[ t\phi s\check{\eta}i.n \]
  
  /Ø-t\phi l-z-\check{\eta}-in/
  
  2SG-bring-PRES-CL.II-2>3SG
  
  ‘you are bringing it’

- Insert exponents **sequentially** and **inside-out** based on morpho-syntactic hierarchical tree structure

- **Itelmen data** (Bobaljik 2000, Bobaljik and Wurmbrand 2001, repeated as presented in Gouskova & Bobaljik 2020:11)
Cyclic exponence

• However, **violates modularity** by having **mixed representations**
  ◦ Syntactic features and structure in the same representation as phonological features and structure

Mixed Representations


Itelmen data (Bobaljik 2000, Bobaljik and Wurmbrand 2001, repeated as presented in Gouskova & Bobaljik 2020:11)
Simultaneous exponence

• Simultaneous exponence: All exponents are realized at the same time in parallel

• Mixed representations do not arise

Itelmen data (Bobaljik 2000, Bobaljik and Wurmbrand 2001, repeated as presented in Gouskova & Bobaljik 2020:11)
Different predictions

• Cyclic exponence:
  ◦ Under this model, exponence can only be sensitive to phonological structure of what is already inserted, i.e. the inner exponents
  ◦ **Empirical prediction**: Phonologically-conditioned suppletion should show only inward sensitivity cross-linguistically (**typologically true**)  
  ◦ An exponent **restriction**

• Simultaneous exponence:
  ◦ Under this model, exponence can be sensitive to the properties of both inner exponents and outer exponents
  ◦ **Empirical prediction**: Phonologically-conditioned suppletion should show **bidirectional sensitivity** cross-linguistically (both inside-out and outside-in effects)
  ◦ An exponent **non-restriction**

Different predictions

- \( S_n: \)
  
- \( P_1: \) \( \emptyset \) \( t\phi l \) \( z \) \( \check{c}\eta \) \( \text{in} \)

- \( [t\phi s\check{c}\eta \text{in}] \) ‘you are bringing it’

Under cyclic
Under simultaneous
Enter Cilungu

• The Cilungu language provides crucial evidence in favor of simultaneous exponence

• Cilungu [mgr] – Bantu language, Zambia and Tanzania (Zone M14)

• Data from Bickmore (2007, 2014)

• Analysis from Rolle & Bickmore (2022)
Cilungu TAM system

- **Tense/Aspect/Mood (TAM)** expressed as combination of:
  - 1 - 0, 1, or 2 prefixes in pre-radical TAM position
  - 2 - 0 or 1 suffix in post-radical ASP position
  - 3 - Shape of the final vowel (FV)
  - 4 - A floating grammatical tone (GT) which associates to a specific position within the STEM (\(|\Sigma|\)

\[
\begin{array}{cccccccc}
\text{SM} & \text{TAM} & \text{OM} & |_{\Sigma} & \text{ROOT} & \text{-DER} & \text{-ASP} & \text{-FV} & \text{GT} \\
\text{u} & \text{a} & \text{mu} & | & \text{fuk} & \text{-il} & \text{-il} & \text{-e} & \text{H}^2-\text{F} \\
\end{array}
\]

Far Past: ‘he/she harvested for him/her’ (Bickmore 2007:8)

SM = subject marker, TAM = tense/aspect/mood, OM = object marker, DER = derivational extensions, ASP = aspect, FV = final vowel, GT = grammatical tone
Cilungu TAM system

- Far Past TAM GT
- u-a-mu-fuk-il-il-e $\mathbb{H}^2$ → u-a-mu-|fuk-íl-íl-é| → [wààmùfûkíílé]
- 3S.S-REM-3S.O-harvest-APPL-ASP-FV GT
- ‘he/she harvested for him/her’ (Bickmore 2007:8)
Cilungu TAM system

• The four GT contrasts of Cilungu

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ø</td>
<td>No grammatical tone</td>
<td>(V τ τ</td>
<td>Σ τ τ τ τ τ</td>
<td>)</td>
</tr>
<tr>
<td>2</td>
<td>H^F</td>
<td>H on final TBU of stem</td>
<td>(V τ τ</td>
<td>Σ τ τ τ ℹ</td>
<td>)</td>
</tr>
<tr>
<td>3</td>
<td>H^2</td>
<td>H on 2nd TBU of stem</td>
<td>(V τ τ</td>
<td>Σ ℹ ℹ ℹ ℹ</td>
<td>)</td>
</tr>
<tr>
<td>4</td>
<td>H^2-F</td>
<td>H from 2nd to final TBU</td>
<td>(V τ τ</td>
<td>Σ ℹ ℹ ℹ ℹ</td>
<td>)</td>
</tr>
</tbody>
</table>

• [Note: τ = TBU = Tone Bearing Unit, here the mora]
### GT suppletive allomorphy: The target

- **A subset** of TAMs show GT suppletive allomorphy
- **No general phonological rule** can derive these allomorphy patterns
- *(High confidence: Cilungu tonology is meticulously worked out in Bickmore 2007)*

<table>
<thead>
<tr>
<th>TAM name</th>
<th>Prefix</th>
<th>Suffix</th>
<th>FV</th>
<th>GT</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Past Inceptive</em></td>
<td>🌌 aa-</td>
<td>...</td>
<td>-a</td>
<td>Ø</td>
</tr>
<tr>
<td><em>Contrastive Habitual</em></td>
<td>ma-áa-</td>
<td>...</td>
<td>-a</td>
<td>Ø</td>
</tr>
<tr>
<td><em>Potential</em></td>
<td>Ø ngá-</td>
<td>...</td>
<td>-a</td>
<td>🌌F</td>
</tr>
<tr>
<td><em>Far Past</em></td>
<td>a-</td>
<td>... -il</td>
<td>-e</td>
<td>🌌²-F</td>
</tr>
<tr>
<td><em>Far Past Progressive</em></td>
<td>a-</td>
<td>... -ang</td>
<td>-a</td>
<td>🌌²-F</td>
</tr>
<tr>
<td><em>Yesterday Past</em></td>
<td>á-</td>
<td>... -il</td>
<td>-e</td>
<td>🌌F / Ø</td>
</tr>
<tr>
<td><em>Perfect</em></td>
<td>-il</td>
<td>-e</td>
<td>🌌²-F / 🌌²</td>
<td></td>
</tr>
<tr>
<td><em>Recent Past</em></td>
<td>á-cí-</td>
<td>... -il</td>
<td>-e</td>
<td>🌌F / 🌌²</td>
</tr>
</tbody>
</table>

*No GT suppletion*
GT suppletive allomorphy: The target

- Perfect: ...-il-e $H^2_F \sim H^2$
- One GT allomorph appears in context of H-toned subject marker
  - $tú$-ful-il-e $H^2_F \rightarrow tú|ful-ilé|
  - $\text{SM}$-wash-ASP-FV GT [túfúz'ilé] (Bickmore 2007:293)
  - ‘we have washed’
- Another allomorph appears in context of toneless subject marker
  - $a$-ful-il-e $H^2 \rightarrow a|ful-il-e|
  - $\text{SM}$-wash-ASP-FV GT [àfúzílè] (Bickmore 2007:294)
GT suppletive allomorphy: The trigger

- The trigger of allomorphy: **Toneless (Ø) subject markers (SMs)**
  - SMs agree with the subject in noun class (person/number)
  - SMs either have inherent high tone (H) or are toneless (Ø)
- The two phonological classes do **not form natural** morphosyntactic class

<table>
<thead>
<tr>
<th>Classes 1/2:</th>
<th>1SG</th>
<th>2SG</th>
<th><strong>Cl1 (3SG)</strong></th>
<th>1PL</th>
<th>2PL</th>
<th><strong>Cl2 (3PL)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ŋ-</td>
<td>ú-</td>
<td>a- ~ u-</td>
<td>tú-</td>
<td>mú-</td>
<td>yá-</td>
</tr>
<tr>
<td>Other noun classes:</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>gú-</td>
<td>i-</td>
<td>lí-</td>
<td>yá-</td>
<td>cí-</td>
<td>ví-</td>
</tr>
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<td></td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>lú-</td>
<td>ká-</td>
<td>tú-</td>
<td>gú-</td>
<td>kú-</td>
<td>pá-</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>17</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Outward-sensitive suppletion

- Contextual realizational mapping rules, stored in the vocab.:
  - \([\text{ASP:PERFECT}] \leftrightarrow -\text{il} \quad \overline{\text{H}}^2-F \quad / \quad \text{H} \rightarrow [\text{SM}] \quad \_\_
  - \([	ext{ASP:PERFECT}] \leftrightarrow -\text{il} \quad \text{H}^2
  - \text{[T:RECENT]} \leftrightarrow \á- \quad \text{H}^F \quad / \quad \text{H} \rightarrow [\text{SM}] \quad \_\_
  - \text{[T:RECENT]} \leftrightarrow \á- \quad \emptyset

- Because part of environment is phonological, this constitutes **phonologically-conditioned suppletion**
Outward-sensitive suppletion

• Suppletion here is triggered in the context of certain subject markers (SM)

• If SMs manifest AgrS projections (and broadly adopting the syntax at right), then the trigger of suppletion (a SM) is in an outer hierarchical position compared to the target of suppletion (TAM nodes)

Bidirectional conditioning

• There is also evidence for **inward-sensitivity** to phonological properties of exponents in Cilungu

• Allomorph /a-/ CL1 (3S) subject marker (*elsewhere*)
  ◦ a-cí-líi-ful-a [̀acílīfūlà]
  ◦ ‘**he/she** is still washing’ (Bickmore 2007:114)

• Allomorph /u-/ CL1 (3S) iff before exponent of shape /a/
  ◦ u-á-mu-fuk-il-il-e [̀wàmúfúkìlè]
  ◦ ‘**he/she** harvested for him/her’ (Bickmore 2007:8)

• Dissimilative haplology effect
Bidirectional conditioning

• Phonologically-conditioned...
  ◦ Crucially depends on the phonological shape of the following exponent (cannot be known before insertion)

• ...suppletive allomorphy:
  ◦ Triggered by all and only exponents of shape /a/ (not a natural class)
  ◦ Target restricted to SM exponent (other exponents of same shape: no change)

• In total, evidence for bidirectional sensitivity, predicted from simultaneous exponence
  ◦ Outward-sensitivity: Suprasegmental phonology of outer SM exponent can condition suppletive form of inner TAM exponent
  ◦ Inward-sensitivity: Segmental phonology of inner TAM exponent can condition suppletive form of outer SM exponent

A restriction on exponence

The phonological material of an exponent must be contiguous in the input to phonology
Bipartite morphemes

- In many languages, there appear to be single morphemes which are **not contiguous** → Bipartite morphemes
  - Circumfixation: E.g. German *ge-...-t* participles
  - Dakota/Lakota infix-inducing roots (Boas & Deloria 1941, Albright 2000)
  - “Synaffixes”: Combinations of several morphs (Bauer 1988, Hall 2000)
Bipartite morphemes

• Distinct from **Infixation**
  ◦ Example from Nancowry (Radhakrishnan 1981:54-56): -um- causative which follows first vowel in disyllabic stems
  ◦ paloʔ → p-um-loʔ ‘to loosen something’

• Arguably, this is **derived non-contiguiousness**
  ◦ Exponents enter the derivation as contiguous strings
  ◦ I.e. input: /um/+ /paloʔ/ → output: [pumloʔ]

Recent survey of infixation: Kalin (2022)
Circumfixation

• Most famous bipartite morpheme: Circumfixation
  ◦ Surprisingly little cross-linguistic typological and theoretical work done on circumfixes (or other bipartite morphemes for that matter)

• German participle
  ◦ ge-googel-t
  ◦ PTCP-google-PTCP
  ◦ ‘(to have/be) googled’

• In the participle context, the prefix expresses no discernable meaning to the exclusion of suffix, and vice versa
  ◦ *ge-googel or *googel-t

Circumfixation

- Two ways to view circumfixes (and other ‘bipartite morphemes’)
  - 1) One vocabulary item
    - Literal non-contiguous exponence with a ‘gapped’ structure
  - 2) Two or more vocabulary items
    - Involving (i) co-exponence of the same feature [F], (ii) overlapping exponence ([F] and [F,G]), or (iii) separate exponence (only [F] and [G])

VOCABULARY

- Non-contiguous exponence
  - [F] ↔ CV || ... || ge  t
- Co-exponence
  - [F] ↔ CV || ge
- Overlapping exponence
  - [F] ↔ CV || ge
  - [F,G] ↔ CV  || ge
- Separate exponence
  - [F] ↔ CV || ge
  - [G] ↔ CV

I am explicitly not using terms ‘discontinuous exponence’ and ‘multiple exponence’
Circumfixation

• Literature consistent w/ one vocabulary item treatment:
  ◦ Harris’ (2017) book on Multiple Exponence: “A circumfix is a good example of a bipartite morpheme, a single realization of a feature or bundle of features or of a derivational category.” (p. 19; see also Caballero & Harris 2012: 171)
• Tacitly: Kurisu (2001:198, right)
• Overtly: Trommer (2015:100, 2022) and Zingler (2022)
Circumfixation

• Literature consistent w/ two vocabulary items treatment:
  ◦ Bipartite morphemes be treated as formally two (or more) objects from the perspective of morphology: Marušič (2003, to appear); Crysmann & Bonami (2016:347) within Information-based Morphology; Haspelmath (2020), *inter alia*
  ◦ On German *ge-...-t* particular: Drijkoningen (1999), Wiese (2000:89f.), Newell (2008:191); see references therein

• This is the position which I support
Predictions of circumfixes as 2 VI’s

- **Predictions** of treating circumfixes as two (or more) vocabulary items (e.g. as co-exponents)
  - 1) **Insertion**: The conditions governing the (non-)insertion of one co-exponent never affect the (non-)insertion of the other co-exponent
  - 2) **Allomorphy**: Suppletive allomorphy that is triggered by, or targeting, one of the co-exponents never affects the other co-exponent
  - 3) **Derivedness**: When the two co-exponents are incidentally adjacent, they always act as a derived environment with respect to morpho-phonological processes
  - 4) **Minimality**: If there are special minimality-based faithfulness (e.g. don’t delete vowel of 1σ ‘morphemes’), then the co-exponents are evaluated for minimality separately
- In short, **the two exponents do not act as a single morphological unit**
Insertion/allomorphy

• German participles: Regular morphology is a circumfix
  ◦ *ge-spiel-t [ɡəˈʃpilt]
  ◦ PTCP1-play-PTCP2 ‘(have/be) played’

• Irregular suppletive allomorphy
  ◦ *ge-geb-en [ɡəˈɡebən]
  ◦ PTCP1-give-PTCP2 ‘(have/be) given’

• Insertion quirk: Prefix *ge- must be before stress
  ◦ *diagnostizier-t [diagnostɪˈtsiɐt]
  ◦ diagonose-PTCP2 ‘(have/be) diagnosed’
  ◦ *ge-diagnostizier-t *[ɡədiagnostɪˈtsiɐt] ~ *[ɡəˈdiagnostɪˌtsiɐt]
Insertion/allomorphy

• These two morphological quirks – irregular suffixes and stress-dependent prefixes – show a complete lack of interaction

• Drijkoningen (1999:78): “There are simply two affixes... As far as (morpho-) phonology proper is involved, there is no evidence whatsoever for the link between the affixes”
Insertion/allomorphy

• The form of the suffix **never** determines the presence of the prefix (only **stress** determines the presence of the prefix)
  ◦ *sprech-en* \(\rightarrow\) *ge-sproch-en* \([\text{ˈʃpʁɔxən}]\)
  ◦ *sprech-en* \(\rightarrow\) *sproch-en* \([\text{ˈʃpʁɔxən}]\)
  ◦ "sprech-en" → *ge-sproch-en* \([\text{ˈʃpʁɔxən}]\)
  ◦ "sprech-en" → *sproch-en* \([\text{ˈʃpʁɔxən}]\)

• I.e. there is no irregular participle like: *wugg-en* \([\text{'vʊɡən}]\)

• At the same time, **lack** of prefix never causes reversion to default:
  ◦ *ver-sprech-en* \(\rightarrow\) *ver-sproch-en* \([\text{ˈʃpʁɔkəxən}]\)
  ◦ *ver-sprech-en* \(\rightarrow\) *ver-sproch-en* \([\text{ˈʃpʁɔkəxən}]\)
  ◦ "sprech-en" → *sproch-en* \([\text{ˈʃpʁɔkəxən}]\)
  ◦ "sprech-en" → *sproch-en* \([\text{ˈʃpʁɔkəxən}]\)
Insertion/allomorphy

• These facts follow if each exponent is endowed with its own context, i.e. its own subcategorization frame (Kalin & Rolle 2022, *inter alia*)

• German co-exponents
  ◦ $[\text{PTCP}] \leftrightarrow g\sigma / _'\sigma$
  ◦ $[\text{PTCP}] \leftrightarrow \{ -\omega n / \{ \text{ROOT}_{123}, \text{ROOT}_{124}, \ldots \} \_ \} \_ t$
Insertion/allomorphy

• Compare non-contiguous exponence (Zingler 2022)

• \([PTCP] \leftrightarrow\)
  \[\begin{align*}
  1. \text{gə-...-ən} & / _\text{'_σ}_ & \{\text{ROOT}_{123}, \text{ROOT}_{124}, \ldots\}_2 \\
  2. \text{gə-...-t} & / _\text{'_σ}_ \\
  3. \text{ən} & / \{\text{ROOT}_{123}, \text{ROOT}_{124}, \ldots\}_2 \\
  4. \text{-t}
  \end{align*}\]

• Obvious drawback: Duplication of information
• **Non-contiguous exponence** would also predict languages where the circumfix components always co-vary and act as a single unit (i.e. if the prefixal component is absent, then the suffixal one is absent too)

\[ [F] \leftrightarrow \begin{cases} \text{ka} \ldots \text{e} / \text{ROOT}_n \_ \\ -\text{it} \_ \text{elsewhere} \end{cases} \]

or

\[ [F] \leftrightarrow \begin{cases} \text{ka} \ldots \text{e} / \_ \_ \sigma \_ \_ \\ -\text{it} \_ \text{elsewhere} \end{cases} \]

• Such patterns are predicted to be typologically unattested
Extension to grammatical tone

- **Corollary**: Exponence involving non-local ‘floating’ grammatical tone should also involve two insertion rules (with all the same predictions)

- Cilungu perfect aspect:  
  \(-\text{il} \quad \text{H}^2_{-F} \quad \text{iff} \quad H — [SM] \)
  \(-\text{il} \quad \text{H}^2 \quad \text{(elsewhere)}\)

- \([\text{PERFECT}] \leftrightarrow -\text{il}\)

- \([\text{PERFECT}] \leftrightarrow \left\{ \begin{array}{c} \text{H}^2_{-F} / H — [SM] \_ \\ \text{H}^2 \end{array} \right\} \)

- Like with circumfixes, two predictions:
  - Grammatical tone allomorphy/suppletion should not effect co-occurring segmental morphology
  - Segmental allomorphy/suppletion should not effect co-occurring grammatical tone
Restrictions on exponence

• **In total:** The phonological content of the exponent in a $x \leftrightarrow y$ vocabulary item must be a contiguous string
  ◦ I.e. *[ɡə−…−t]* is not a licit exponent in any language

• This can be interpreted as all phonological components of a single exponent requiring **local precedence** or **local association** (i.e. a local relation)

Theory and background on precedence: Papillon 2020
Restrictions on exponence

Precedence relations (i.e. /ət/)

\[ \begin{array}{c|c}
\text{[F]} & \text{v} \\
\hline
\text{c} & \rightarrow \\
\end{array} \]

\[ \begin{array}{c|c}
\text{[F]} & \text{t} \\
\hline
\text{t} & \rightarrow \\
\end{array} \]

No (local) precedence relations (i.e. /ə/ . . ./t/)

\[ \begin{array}{c|c}
\text{[F]} & \text{v} \\
\hline
\text{c} & \rightarrow \\
\end{array} \]

\[ \begin{array}{c|c}
\text{[F]} & \text{t} \\
\hline
\text{t} & \rightarrow \\
\end{array} \]

Co-exponence

\[ \begin{array}{c|c}
\text{[F]} & \text{v} \\
\hline
\text{c} & \rightarrow \\
\end{array} \]

\[ \begin{array}{c|c}
\text{[F]} & \text{t} \\
\hline
\text{t} & \rightarrow \\
\end{array} \]
Restrictions on exponence

Autosegmental association

No precedence relations (lack of association)
Restrictions on exponence

• By way of analogy: An exponent cannot enter phonology with a ‘territorial exclave’
  ◦ Territory that is politically part of a larger country but not physically contiguous with it
Conclusion
Conclusion

1) Our guiding question: What are the architectural restrictions placed on exponence and on individual exponents?

2) Advocated for a non-restriction on conditioning environments of an exponent:
   - Suppletion may be conditioned both by inward phonological material (uncontroversial) as well as outward phonological material (controversial)
   - Centered around a proposal involving simultaneous exponence

3) Also proposed a restriction on the shape of an exponent:
   - The phonological material of an exponent must be contiguous in the input to phonology

4) Ultimately, part of a research program on developing a ‘Modular SynPhoni’
   - Aim is to develop a theory of the Syntax-Phonology Interface in full compliance with the defining principles of modularity, central to Generative Grammar
THANK YOU FOR LISTENING!

For any particular references, please email me:

nicholas.rolle@gmail.com
Appendix

Against phonologically-optimizing suppletive allomorphy (POSA)
Natural vs. unnatural PCSA

- **Natural** phonological distribution:
  - Indefinite *a* vs. *an*
  - Results in **alternations** of consonants and vowels (cross-linguistically preferred)

**More natural**

\[
\begin{align*}
\text{VC} & \quad \text{VCVC} \\
\text{\textit{en}} & \quad \text{æp\textit{e}l} \\
\text{\textit{an}} & \quad \text{\textit{apple}}
\end{align*}
\]

**Cf. less natural**

\[
\begin{align*}
\text{VC} & \quad \text{VCVC} \\
\text{\textit{en}} & \quad \text{æp\textit{e}l} \\
\text{\textit{an}} & \quad \text{\textit{apple}}
\end{align*}
\]

\[
\begin{align*}
\text{v} & \quad \text{CCVC} \\
\text{\textit{e}} & \quad \text{pl\textit{e}m} \\
\text{\textit{a'}} & \quad \text{\textit{plum}}
\end{align*}
\]
Natural vs. unnatural PCSA

- **Unnatural phonological distribution:**
  - Ordinal *-th vs. -eth*
  - Results in **adjacent** consonants and vowels (cross-linguistically **dispreferred**)

<table>
<thead>
<tr>
<th>Unnatural phonological distribution:</th>
<th>Less natural</th>
<th>Cf. more natural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unnatural phonological distribution:</td>
<td>CVCC \ C</td>
<td>CVCCV \ VC</td>
</tr>
<tr>
<td>Ordinal <em>-th vs. -eth</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Results in adjacent consonants and vowels (cross-linguistically dispreferred)</td>
<td>sɪks \ θ</td>
<td>forty \ θ</td>
</tr>
<tr>
<td></td>
<td>'six' 'th'</td>
<td>'forty' 'eth'</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Less natural</th>
<th>Cf. more natural</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVCC \ VC</td>
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</tr>
<tr>
<td></td>
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<td>forty \ θ</td>
</tr>
<tr>
<td>'six' 'eth'</td>
<td>'forty' 'th'</td>
</tr>
</tbody>
</table>
Two opposing camps in literature

- **Optimization camp**: Natural phonological distributions (of the *a/an* type) should be captured by the general phonological grammar
  - Phonology selects the suppletive allomorph which results in the most **optimal output** (i.e. which one ‘sounds’ the best in that context)
  - PCSA happens at the **end** of phonology

- **Subcategorization camp**: All suppletive allomorphy should be captured by **arbitrary subcategorization frames** (both the **natural** *a/an* type and the **unnatural** –*th/-eth* type)
  - E.g. “[INDEF] ↔ ən / _V”
  - Any natural phonological distributions are **incidental**
  - PCSA only happens at the **beginning** of phonology

See Rolle 2021 for extensive references
Lit. supporting Optimization

• These English examples have the confound that the two allomorphs are very similar phonologically

• Best support for Optimization: Languages with phonologically divergent allomorphs – Argued for in numerous languages

  ◦ Mor. Arabic 3SG.MASC -h vs. -u (Mascaró 2007)
  ◦ Dutch PLURAL -en vs. -s (de Belder 2020)
  ◦ Latin PERFECT -s vs. -u (Mester 1994)
  ◦ Tiene STATIVE -Vk vs. -lV- (Yu 2017)
  ◦ Katu NOMINALIZER -an- vs. -r- (Yu 2017)
  ◦ Konni NOUN.CLASS -rl vs. -kU/-kA (Wolff 2008)
  ◦ Udihe PERFECT -ge vs. [+CREAKY] (Nevins 2011)
  ◦ Irish PLURAL -(e)anna vs. -(e)acha (Bennett 2017)
Irish plurals

- At least 26 ways to form plurals (Ó Siadhail 1991:159)

<table>
<thead>
<tr>
<th>Singular</th>
<th>Plural</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>klox</td>
<td>klox-ə</td>
<td>clocha ‘stone(s)’</td>
</tr>
<tr>
<td>bɑːd</td>
<td>bɑːdʲ</td>
<td>báid  ‘boat(s)’</td>
</tr>
<tr>
<td>kapəl</td>
<td>kapʲəl-ə</td>
<td>caiple ‘horse(s)’</td>
</tr>
<tr>
<td>dʲox</td>
<td>dʲox-ənə</td>
<td>deochanna ‘drink(s)’</td>
</tr>
<tr>
<td>si:ɬa:ɬ</td>
<td>si:ɬa:ɬ-axə</td>
<td>suíleálacha ‘ceiling(s)’</td>
</tr>
</tbody>
</table>

Data sources: Ó Siadhail 1995, Bennett 2017
A productive subregularity

• Bennett’s (2017:233) summary of the literature shows that there is a **productive subregularity** in plural formation with the N- and X-allomorphs (e.g. as seen with loanwords from English)

• **N-allomorph**: Occurs with **monosyllabic** nouns
  ◦ *blag* ‘blog’ → *blag*anna ‘blogs’

• **X-allomorph**: Occurs with ** multisyllabic** nouns
  ◦ *acrainm* ‘acronym’ → *acrainm*neacha ‘acronyms’
Arbitrary or optimizing?

• Bennett (2017) argues that this distribution is not arbitrary, and instead explicitly states that its distribution is optimizing.

• In forming his case for optimization, Bennett relies on two phonological claims of Irish:

  1) Word-stress is initial, and forms a left-edge trochaic foot
      • E.g. coiníní ‘rabbits’ /ki:nʲi:nʲi:/ → [ˈki.nʲi:].nʲi:]
      [⟨‘STRONG.WEAK).NEUTRAL⟩

  2) The sequence [ax] is ‘quasi-diphthongal’, and acts as a single heavy unit with respect to the metrical/stress system

Irish plural marking as optimizing

- **Optimization**: The X-form does not appear with 1σ roots in order to avoid a heavy syllable [ax] in the weak position of a foot.

<table>
<thead>
<tr>
<th>1-syllable root</th>
<th>2-syllable root</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Light</strong> syllable in a weak position</td>
<td><strong>Heavy</strong> syllable in a neutral position</td>
</tr>
<tr>
<td><em>lochannaí</em> ‘lakes’</td>
<td><em>carráigeacha</em> ‘rocks’</td>
</tr>
<tr>
<td>(Stockman 1974:361)</td>
<td>(Stockman 1974:334-335)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cf. less optimizing</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heavy</strong> syllable in a weak position</td>
<td><strong>Light</strong> syllable in a neutral position</td>
</tr>
</tbody>
</table>

Transcription based on Achill Irish in County Mayo (see Bennett 2017 for data information)
However, Optimization falls short…

• Bennett’s (2017) Optimization claim:
  ◦ Irish phonology chooses between the X-form and the N-form based on which results in the more phonologically optimal output

• However, this claim falls short based on a number of empirical arguments (based on Irish phonology/morphology) and conceptual arguments (cross-linguistically applicable)

• The argumentation I am now to present is representative of a general approach which argues against a role for Phonological Optimization in suppletive allomorphy selection
  ◦ For full details and argumentation, see Rolle 2021

Arg. 1: Subcategorization needed anyway

- **Subcategorization** is **needed** in all Irish dialects **anyway**, in order to account for the full range of plurality marking.

- For example, plural suffix /-ə/, seen already:
  - `klox klox-ə clocha` ‘stone(s)’

- Subcategorization frame:
  \[
  \text{[PLURAL]} \leftrightarrow -ə / \{\sqrt{\text{STONE}},...\}
  \]

- It is conceptually simpler to have only **one** mechanism for suppletive allomorphy selection (**Subcategorization**) rather than **two** (i.e. **Optimization**, as well).
Arg. 1: Subcategorization needed anyway

- Moreover, in some dialects in fact, the X-form no longer contains the heavy quasi-diphthongal [ax]
- Rather, it contains [əx], which is unambiguously not heavy

<table>
<thead>
<tr>
<th></th>
<th>W. Ulster (N)</th>
<th>Achill (W)</th>
<th>Munster (S)</th>
<th>Connacht (W)</th>
<th>E. Ulster (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-form</td>
<td>-axə</td>
<td>-axə</td>
<td>-axə</td>
<td>-æxə ~ -ɪə</td>
<td>-æxə</td>
</tr>
<tr>
<td>(w/ 1σ+ roots)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optimization</td>
<td>Optimization applicable</td>
<td>Optimization inapplicable</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- In such dialects, optimization is inapplicable, and only the subcategorization analysis is viable
Arg. 2: Exceptions are non-optimizing

• Second, there are certain exceptions involving X-forms
  ◦ Monosyllabic root: \( \varepsilon:n-\text{ax}\varepsilon \rightarrow \left[ \varepsilon:\text{max}\right] \) \( \text{éanacha} \) ‘birds’
• However, there are never exceptions involving N-forms

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>Exceptional</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>X-form</strong></td>
<td>( \sigma-\text{ax}\varepsilon )</td>
<td>( \sigma-\text{ax}\varepsilon )</td>
</tr>
<tr>
<td><strong>N-form</strong></td>
<td>( \sigma-\varepsilon )</td>
<td>*( \sigma-\varepsilon )</td>
</tr>
</tbody>
</table>

• If output phonology dictated allomorphy choice, we would actually **expect** this situation to be **opposite**
Arg. 3: Questionable that [ax] is heavy

- Third, the Optimization analysis crucially relies on the assumption that [ax] is a heavy quasi-diphthongal unit
- The evidence for this comes from stress patterns in only one dialect – Munster Irish – where [ax] ‘attracts’ stress (cf. Irish in general where stress is uniformly word-initial)
  - xʲanigʲ → ['xʲa.nigʲ] cheannaigh ‘(s)he bought’
  - kʲənax → [kʲə.'nax] ceannach ‘buying’
  - bəkax → [bə.'kax] bacach ‘lame’
Arg. 3: Questionable that [ax] is heavy

• However, this **interpretation** of Munster Irish has recently been **questioned**

• Kukhto (2019:1566) states instead that “in words with exceptional stress on /ax/ in the second syllable, the first syllable contains a phonologically reduced vowel /ə/, which blocks the stress and makes it shift to the second syllable”

• This reorients interpretation of words like [bəˈkax] *bacach* ‘lame’:
  ◦ In Munster Irish, [ax] does **not attract** stress but rather the initial weak [ə] **repels** it

• Kukhto provides key arguments involving (1) phonotactic distributions of stressed [ə] and unstressed [ə], and (2) asymmetries in stress retraction possibilities (see also McCabe 2023)

Very recently: “no support for the controversial medium-heavy weight status often attributed in the literature to the sequence /ax/ once certain high-frequency light-/ax/ lexical items are controlled for” – McCabe 2023:iii
Arg. 4: Must assume *ad hoc* phonology

- Finally, the **explanatory power** of the Optimization analysis is that it can reduce allomorph selection to the “general properties of the phonology of Irish”, whereas subcategorization “must recapitulate the same phonological generalization(s) in distinct components of the grammar”, a **duplication problem** (Bennett 2017, 266)

- This, of course, requires that these “same phonological generalizations” be independently needed by the phonology

- For Irish, this involved the constraint against certain **heavy** syllables (e.g. [ax]) in **weak** (footed) positions
  - /lox-axə/ → *[(ˈlo.xax).ə]
Arg. 4: Must assume *ad hoc* phonology

- However, there is **no independent phonological evidence** that this constraint is active in the relevant Irish dialects.

- Such a constraint “No Heavy in Weak Footed Position” is only independently active in the phonology of Conamara Irish (Bennett 2012), a dialect group for which Optimization is **inapplicable** anyway.

- In other words, in the dialects which justify the optimization analysis, the constraint is not otherwise phonologically active.

- In total, even if we were to accept that \([\text{ax}]\) sequences are heavy, the **behavior** of the X-form/N-form does **not** automatically fall out from the **phonology**, undermining the Optimization analysis.
Conclusion: Against POSA

• **Optimization** (supported by Bennett 2017, *inter alia*, and argued **against** here):
  ◦ Phonologically-conditioned suppletive allomorph (POSA) selection happens at the **end** of phonology

• **Subcategorization** (supported by Rolle 2021, *inter alia*, and argued **for** here):
  ◦ Phonologically-conditioned suppletive allomorph selection happens at the **beginning** of phonology only