

# Inclusiveness in the phonology and the source of the Prosodic Hierarchy

Heather Newell (UQAM) & Craig Sailor (U of Edinburgh)

BCGL 14: Where syntax and phonology meet

December 16-17, 2021

# The issue

- The Prosodic Hierarchy (PH) is known to be of dubious compatibility with a Strictly Modular architecture of grammar (Scheer 2008)
  - Yet two recent approaches to the PH **do attempt to address this**: Selkirk's *MSO-PI-PO model* and Sande et al.'s *Cophonologies by Ph(r)ase*
- Our claim: such approaches move in the right direction, but Modularity problems still arise—notably from **Inclusiveness** (Chomsky 1995)
  - Inclusiveness, a condition on (linguistic) modules, bars the addition of new input items mid-computation
  - These novel attempts to build and/or label the PH within the phonology violates Inclusiveness (at least)
- In keeping with a recent push toward **applying Minimalist principles to the phonology** and its interface with syntax (Samuels 2011, Scheer 2012, Newell & Sailor to appear)

# Outline

- The issue
- Background and assumptions
- What is Inclusiveness?
- How the PH violates Inclusiveness
- Case studies, and how a system without the PH impacts our analyses
  - Ellipsis
  - Intrusive-R
- Conclusions

# Background & assumptions

- *Late Insertion* (Halle and Marantz 1993, et seq.)
  - phonological features are absent from the input to syntax; they are added post-syntactically during Vocabulary Insertion.
- *Strict Modularity* (inc. the feed-forward *inverted-Y* model)
  - the language faculty comprises discrete modules, including at least **distinct syntax and phonology modules** (Chomsky 1965, et seq.; Jackendoff 1997, Scheer 2011, Curtiss 2013, a.o.).

# Properties of modules

- A *module* is a specialized cognitive system dedicated to carrying out a narrowly-construed computation (Fodor 1983)
- Two important properties (see Scheer 2011:§610 for an overview):
  - A. Domain Specificity:** each module works only with its own proprietary alphabet; one module cannot understand the alphabet of another module
    - As a result, intermodular communication is impossible without *Translation*, which must be non-computational, presumably the result of Vocab Insertion (Scheer 2012:§160)
  - B. Encapsulation:** a module's computation is input-bounded; no new input can be added during the course of the computation

# Prior arguments against the PH

- Existing arguments against the PH from a Minimalist perspective:
  - Building bespoke pseudo-syntactic constituents just for use in the phonology is intolerably redundant (Pak 2008, Samuels 2009)
- Existing arguments against the PH from Modularity:
  - From PWd up, the constituents of the PH are *diacritics* (Scheer 2011:§399)
    - Their only job is to sneak non-phonological information into the phonology
  - Mainstream OT implementations only make matters worse:
    - Mapping (e.g. Match) is computed alongside purely phonological processes, requiring syntactic information to be legible within the phonology (against Domain Specificity)
- **Today:** the relevance of Inclusiveness (*qua* Encapsulation) to the PH

What is Inclusiveness?



# Inclusiveness = Encapsulation

- Chomsky (1995:209) proposes Inclusiveness as a condition on **syntax**:
  - “no new objects are added in the course of computation apart from rearrangements of lexical properties (in particular, no indices, bar levels in the sense of X-bar theory, etc...)”
- “In syntax, Encapsulation is called Inclusiveness” (Scheer 2012:§174)
- But Encapsulation is a property of **all** cognitive modules (Fodor 1987)
  - Phonology is a module; ergo, phonology is Encapsulated (Iosad 2017: ch. 2)
- So Inclusiveness holds of the phonological module as well.
  - Problem: “Standard theories take [Inclusiveness] to be **radically false** for the computation to PF” (Chomsky 1995:209).
    - Why? (Partly depends what the “computation to PF” is...)

# How not to define Inclusiveness

- “outputs consist of nothing beyond properties of items of the lexicon (lexical features)” (Chomsky 1995:206)
- **Plainly a contradiction:** nested constituency isn’t a feature of lexical items—it’s a product of the syntactic computation itself, i.e. Merge
  - $\text{Merge}(X, Y) = \{X, Y\}$ , where  $\{X, Y\}$  is **not** a lexical feature of  $X$ , or a lexical feature of  $Y$
  - Merge can add **set membership / recursive hierarchical structure** not present in its own input (indeed, see Chomsky 2001:3 on just what Merge adds to the output beyond lexical properties)
- If the nature of a computation is such that it adds new information by dint of its very application (as Merge does with hierarchy)...
  - ...then **it simply won’t do** to have a definition of Inclusiveness that prohibits addition of any and all new information mid-computation: this actually prohibits Merge.
  - In brief: Inclusiveness must allow for the computation itself to be information-adding.

# How to define Inclusiveness

- Inclusiveness should prohibit addition of *context-dependent* objects that aren't predictable, invariant outputs of the computation
  - The nature of Merge is to add new information to the derivation in the form of hierarchy (set membership), so this must be ruled in...
    - ...but this is predictable and invariant: it's the product of **each iteration** of Merge
  - By contrast, the insertion of traces, indices, bar-levels, etc. would necessarily depend on the context, and thus would not be invariant computational output
    - Their addition wouldn't automatically follow from every iteration of Merge;
    - Rather, the state of the computation would have to be examined mid-stream to see whether insertion was warranted.
- **This** is what Inclusiveness should prohibit.

# Interim summary A: Inclusiveness, revised

- So Inclusiveness **isn't** “radically” violated by the derivation to phonology if:
  - i. Intermodular Translation is non-computational, meaning Inclusiveness doesn't hold of it
  - ii. We update our definition of Inclusiveness to allow qualified information-adding computations (necessary even on syntax-internal grounds)
- Adopting (i) allows Translation (i.e. Vocab Insertion) to be information-adding in a restrictive way, adding only what can be stored in the lexicon / List 2
- Adopting (ii) allows the phonological computation to be information-adding in a restrictive way, i.e. at each iteration (e.g. association lines, syllables, government relations etc.)
  - (So Inclusiveness might not even be violated by the derivation *in* phonology, not just *to* phonology)

# How the Prosodic Hierarchy violates Inclusiveness

# (Not) Inserting the Prosodic Hierarchy

- Most current implementations of the PH as an interface-inserted representational structure are anti-modular (Match, Align, etc. in a single ranking with, ex., \*Coda).
  - We exclude these implementations on Modular grounds.
- Two recent proposals aim for a **Modularity-friendly PH**:
  - **MSO-PI-PO** models, a.k.a. Neo-Selkirkianism
    - (Kratzer & Selkirk 2020, Lee & Selkirk to appear, Elordieta & Selkirk to appear)
  - **Cophonologies by ph(r)ase**
    - (Sande et al. 2020)

# Neo-Selkirkianism

- The MSO-PI stratum:
  - Here we have Match constraints, but they are proposed to not be ranked with purely phonological constraints.
    - Indeed, this is billed as an advantage of the proposal: **segregation of Match from “phonology per se” is meant to be Modularity-friendly**
  - They are, however, ranked with ‘phono-syntactic’ constraints (ex. Destress Given >> Match XP, PPh, Match<sub>LEX</sub> >> Match)
  - There is therefore **computation** at the point of PH-insertion, meaning that it is part of a **Modular vocabulary**.

# Neo-Selkirkianism

- The PI-PO stratum is where the real phonology happens.
  - The PH is part of this computation as well, violating Domain Specificity
    - While Mapping takes place at MSO-PI, constituents of the PH can nevertheless be referenced within PI-PO
  - By its own standard, Neo-Selkirkianism holds that the PH is part of the input vocabulary to the phonological computation;
    - Thus, adding new PH items mid-computation (not from Translation) violates Inclusiveness.
- Conclusion: Neo-Selkirkianism is not a viable Modular implementation of the PH as an interface object.



# Cophonologies by ph(r)ase

- The proposal in a nutshell:
  - There are no Match constraints. The PH is inserted in the phonology proper.
  - Phonological domains are built around the output of a phase.
    - MAXIMIZE PROSODIC DOMAINS  
All phonological content should be parsed into a single prosodic domain (e.g. word, prosodic phrase, intonational phrase). (Sande et al. 2020:1222)
  - Removes Mapping entirely: just encase every Spell-Out domain in a prosodic domain.
- We agree that phonology operates over strings that emerge due to Vocab Insertion upon spell-out of a phase;
- We disagree that the PH may be inserted in the phonology (or referenced in lexical items)

# Cophonologies by ph(r)ase

- Problems with a purely phonological projection of the PH:
  - MAX-PH encases each Spell-Out domain in a prosodic domain, but without labels : **a problem for Inclusiveness.**
    - If the PH is inserted in the phonology (MAX-PH), then the labels of each iteration of MAX-PH are new information that do not emerge predictably from the computation via the re-arrangement of lexical properties.
      - Echewing labeling might help CPbP get around this problem, but
      - CPbP makes crucial reference to the PH in lexical entries, and therefore cannot avoid the labeling problem.
  - As well documented in the literature (e.g. Scheer 2012:§139), it is also true that the PH at the PWd level and above is **not projected by any lower level of representation.**
    - Re-evaluating the PH as a non-interface object requires a fully fleshed out theory of how it might be projected in the phonology, which does not seem plausible.
- Conclusion: CPbP violates Inclusiveness and is not a viable Modular implementation of the PH as an interface object.

# Interim summary B

- No implementation of the PH as an interface object satisfies Modularity (Domain Specificity and/or Inclusiveness)
- The PH is not a phonological object.
- Analyses that use the PH must be rejected in favour of analyses that do not, giving us a tool to adjudicate among competing analyses in the literature.
- Up next: “But don’t we need the PH?”
  - With a couple representative case studies, we hope to show that we don’t.

Case studies, and how a system without the PH impacts our analyses

Ellipsis

# Ellipsis = “deletion at PF”?

- Since Merchant (2001), it is widely held that ellipsis is “**deletion at PF**” (henceforth ***DPF***).
- Follows from Merchant’s [E]-feature:
  - Ellipsis is syntactically licensed when a head bearing [E] undergoes AGREE with a higher ellipsis-licensing head (e.g. VP-ellipsis, licensed by T)
- Beyond syntactic licensing, [E] also has interface properties:
  - a. Carries instructions for LF to impose conditions on identity/recovery (left aside here);
  - b. Carries **instructions for PF to impose *elliptical silence*** (i.e., DPF).
- Let’s unpack what’s meant by (b).

# Deletion at PF (DPF)

- How does DPF actually work? What mechanism(s) might be involved?
  - Surprisingly few attempts to be explicit. To the extent that it is defined at all:
  - **Phonological deletion of a prosodic constituent** mapped from the elided XP
- DPF:  $\phi_{XP} \rightarrow \emptyset / [E] \_\_$  (Merchant 2004:671)
  - “...entirely controlled by the actual phonology...in ways familiar from studies of morphologically determined **syncope** phenomena, here merely applied to a larger prosodic unit.”
  - (See Lipták & Güneş to appear:§2.3.5-6 for similar approaches & references)

# Problems for DPF: size

- **Problem 1:** ellipsis sites can be arbitrarily large (recursive embedding)
  - ...but Susan won't ~~[<sub>VP</sub> tell anyone [<sub>CP</sub> that Pat said [<sub>CP</sub> that we heard [<sub>CP</sub> that...~~
  - DPF = deletion of an arbitrarily-large prosodic unit?
    - “No phonological theory is suited for the manipulation of this kind of object, which phonologists look at like an ant looks at a jumbo jet.” (Scheer 2011:616)
- Even if we grant the PH (which we don't),
  - Do we want to endow phonology with the power to **syncopate strings of unbounded length** just to account for ellipsis?



# Problems for DPF: diacritics

- **Problem 2:** [E]'s PF instructions are *diacritic* (thus anti-modular)
  - According to DPF, [E] smuggles instructions through the syntax into phonology
  - **Instructions:** trigger a phonological deletion rule for purely non-phonological reasons
    - (These instructions are thus clearly not the result of Translation / lexical insertion on [E]: no LI has the ability to trigger such a rule)
- This aspect of [E] clearly violates Modularity (see Scheer 2012:§95 on the anti-modular status of diacritics in general)
  - DPF (*qua* [E])'s anti-modular character is symptomatic of a larger problem:
    - The PH itself is incompatible with a modular architecture.

# Problems for DPF: wrong predictions

- **Problem 3:** DPF incorrectly predicts that elliptical silence arises ‘late’
  - **Observation:** elliptical silence in fact arises ‘early’, at/before Vocab Insertion
- Exhibit A: ellipsis can repair cases of *morphological ineffability* (Merchant 2015, Abels 2019, Mendes & Nevins to appear):
  - (1) When I see him on the street I just stride away, and indeed...
    - a. \*I always have {stridden/strided/...} away.
    - b. I always have [ ~~$\sqrt{\text{STRIDE}}$  away~~].
- The problem in (1a) clearly isn’t phonological, so it can’t be repaired in the phonology.
  - Thus: ellipsis can’t be DPF.

# Problems for DPF: wrong predictions

- **Problem 3:** DPF incorrectly predicts that elliptical silence arises ‘late’
  - **Observation:** elliptical silence in fact arises ‘early’, at/before Vocab Insertion
- Exhibit B: elliptical silence is relevant for allomorph selection (see *Sailor to appear* on ellipsis-tone sandhi interactions in Taiwanese)
- If ellipsis were DPF, the order of operations would have to be:
  - [ Vocab Insertion » Mapping » DPF ]
- But allomorphy is the product of Vocab Insertion, which means...
  - **DPF would always apply too late** to ever bear on allomorphy (counterfeeding)
  - Thus: elliptical silence must arise before Mapping, so cannot involve DPF.

# Ellipsis isn't "deletion at PF"

- In sum, a PH-based account of elliptical silence (e.g. DPF):
  - Forces phonology to work with unboundedly-large objects
  - Allows diacritics to sneak through syntax into phonology to trigger rules
  - Predicts elliptical silence should have no morphophonological effects, contrary to fact
- Conclusion regarding ellipsis and the PH:
  - Ellipsis isn't "deletion at PF".
  - The right theory of elliptical silence should **eschew the PH entirely**.
    - (See Sailor *in progress* for a Modularity-friendly alternative)

Intrusive R

# R, you crazy or not?

- There is a debate in the literature regarding whether R-insertion in certain dialects of English is phonologically natural or not.
  - **Unnatural** (epenthesized via rule) : Halle & Idsardi (1997), Hale & Reiss (2000), (Vaux 2002), Samuels & Vaux (2017), etc...
  - **Natural** (r is a glide derived from the underlying phonology of low, lax vowels) (Broadbent 1991, Gnanadesikan 1997, Ortmann 1998, Gick 1999, Krämer 2005)
- Ex: Broadbent (1991) r-insertion occurs after low lax vowels with an |A| head

2.	a.	[spɑɹɪz]	'spa is'
	b.	[kɔməɹɪn]	'comma in'
	c.	[sɔɹɛd]	'saw Ed'
- **This is related to whether intrusive and linking R are underlying.**
  - Unnatural : no
  - Natural : yes

...

# Functional vs Lexical environments

The basic assumptions of whether R is too marked to be underlying interact with the pattern below:

No intrusive r after function words in non-rhotic American English

- |    |                   |                   |
|----|-------------------|-------------------|
| 3. | a. Didja eat      | *didja r eat      |
|    | b. I wanna eat    | *I wanna r eat    |
|    | c. He went to eat | *he went to r eat |
|    | d. the apples     | *the r apples     |

(Ito & Mester 2009)

# Analyses of Fnc vs Lex environment

McCarthy (1993): Function words are exempt from **the requirement that a PWd end in a C**, as they do not project a PWd.

Ito & Mester (2009):

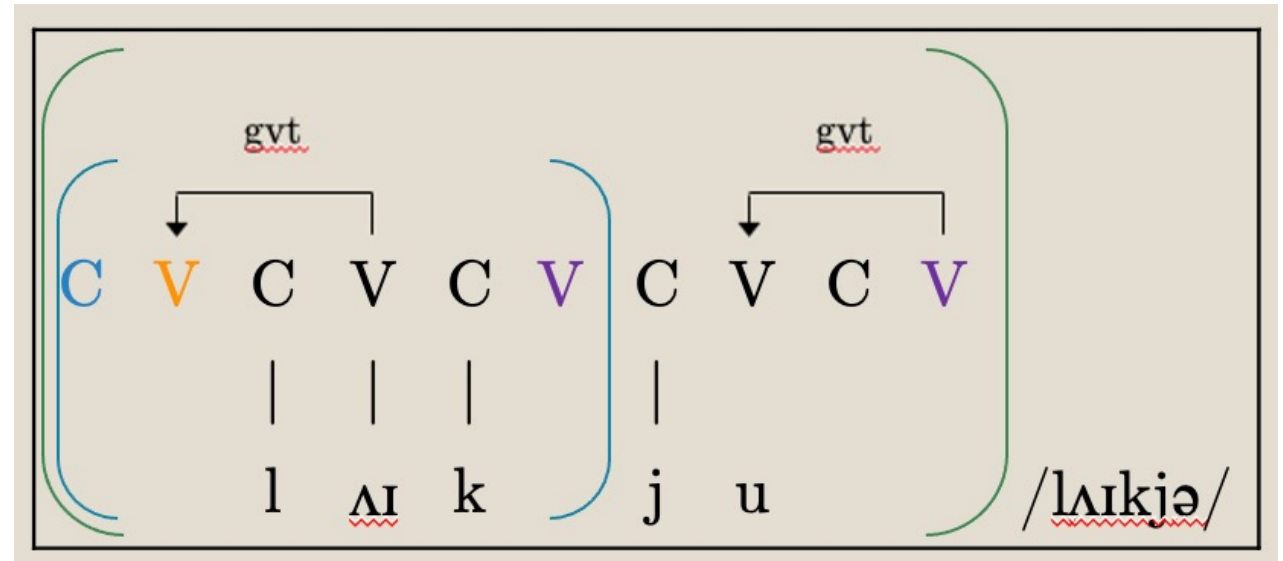
**Major PWds want Onsets.** As Function words are inside the PWd to their right, the Major PWd boundary precedes them, and so R-epenthesis does not occur in a Func-Lex sequence.

4. a. The [**MajPWd** spa] [**MajPWd** r acts] up                      b. [**MajPWd** Didja] [**MinPWd** eat]]



# But, what if there is no Prosodic Hierarchy? Underlying 'R'

- Why function words (usually) don't trigger R-epenthesis
  - **Full forms of *you, to, and the* are [juw] [tuw] and [ðiy].** The schwa-realizations are due to 'reduction' and are not underlying vowels, but the pronunciation of an empty vowel position. If R-insertion is |A|-gliding, then of course it won't be triggered by an empty vowel.
  - **CV unlinked position is pronounced as schwa, but has no underlying features/elements.** It therefore cannot 'glide'



Newell & Scheer 2021

# Underlying 'R'

- But some reduced vowels do trigger R-epenthesis!
  - In Cockney English, one can propose that the **reduced vowel includes default-insertion of |A|**, leading to 'give [jəɹə] job' (give you a job).
  - Empty schwa can have phonetic variation : see the rounding of an 'empty' vowel in Quebecois French.
  - Reduced schwa may also display phonological variation : If an epenthetic vowel contains |A|, it will behave like an underlying |A|-vowel and R-insertion will occur.

# What about linking R?

- As McCarthy (1993) points out, while it is true that in non-rhotic American accents function words reject intrusive r (\*gonna reat), they do not reject linking r, and in fact require it: (for eating [fə ʌi:rɪŋ], \*fo' eating [fə i:rɪŋ]). **It is therefore only the epenthetic nature of intrusive r that excludes it after function word in the onset of a non-maximal  $\omega$ .**
- In other words, all underlying Rs get linked, and non-underlying Rs are just **not there**.
  - Reference to the PWd overcomplicates the analysis.
  - Even if the PH were a licit phonological object, it is not a necessary tool in the analysis of this pattern.

# Intrusive-R is not sensitive to the PH

- In sum, the **exclusion of the PH as a licit phonological object** allows for a **decisive comparison** of alternate theories, here of Intrusive-R.
  - The account that appeals to the PH describes the distribution of Intrusive-R, but does not offer a satisfying explanation of this distribution.
- Conclusion:
  - In the case of R, especially within Element Theory, there is a nice, ‘underlying-R’ account.
  - **Intrusive-R is not sensitive to the PH.**

# Conclusions

# Conclusions

- **Determining the exact status of our representational tools is a crucial task for interface-linguists.**
  - Recent theoretical modifications that aim at saving the PH from criticisms with regards to modularity have not been successful.
    - They violate Inclusiveness.
  - We must reject the PH as a representational tool.
- **Excluding the PH as an analytical tool aids in deciding among proposed explanations.**
- **It's time to re-analyze *all* of the phonological domain data, *again*, paying special attention to the theoretical implications of our representational objects.**
  - #(Chomsky & Halle 1968)
  - PH(Selkirk 1986, Nespor & Vogel 1986)
  - Left-edge CV(Lowenstamm 1999, Scheer 2004, 2009)

# References

- Abels, Klaus. 2019. On “sluicing” with apparent massive pied-piping. *Natural Language & Linguistic Theory* 37:1205–1271.
- Broadbent, J., 1991. Linking and intrusive r in English (Vol. 3, pp. 281-302). *UCL working papers in linguistics*.
- Chomsky, Noam. 1965. *Aspects of the theory of syntax*. MIT Press.
- Chomsky, Noam. 1995. *The minimalist program*. MIT Press.
- Chomsky, Noam. 2007. Approaching UG from below. In *Interfaces + Recursion = Language? Chomsky’s Minimalism and the view from syntax-semantics*, ed. Uli Sauerland and Hans-Martin Gärtner, volume 89 of *Studies in Generative Grammar*, 1–30. Mouton de Gruyter.
- Chomsky, Noam. 2019. Some puzzling foundational issues: The Reading program. *Catalan Journal of Linguistics special issue: Generative Syntax. Questions, Crossroads, and Challenges*: 263–285.
- Chomsky, Noam, Ángel J. Gallego, and Dennis Ott. 2019. Generative grammar and the faculty of language: Insights, questions, and challenges. *Catalan Journal of Linguistics special issue: Generative Syntax. Questions, Crossroads, and Challenges*: 229–261.
- Chomsky, Noam & Morris Halle. 1968. *The sound pattern of English*. Harper and Row.
- Curtiss, Susan. 2013. Revisiting modularity: using language as a window to the mind. In *Rich languages from poor inputs*, ed. Massimo Piattelli-Palmarini and Robert C. Berwick, chapter 5, 68–90. Oxford University Press.
- Elordieta, Gorka, and Elisabeth Selkirk. To appear. Unaccentedness and the formation of prosodic structure in Lekeitio Basque. In *Prosody and prosodic interfaces*, ed. Haruo Kubozono, Junko Ito, and Armin Mester. Oxford University Press.
- Gick, Bryan. 1999. A gesture-based account of intrusive consonants in English. *Phonology* 16: 29-54.
- Gnanadesikan, Amalia. 1997. *Phonology with Ternary Scales*. PhD dissertation, University of Massachusetts, Amherst.

# References

- Hale, Mark & Reiss, Charles. 2000. Phonology as cognition. In *Phonological Knowledge: Conceptual and Empirical Issues*, Noel Burton-Roberts, Philip Carr & Gerald Docherty (eds), 161–184. Oxford: OUP.
- Halle, Morris, and Alec Marantz. 1993. Distributed morphology and the pieces of inflection. In *The view from Building 20*, ed. Ken Hale and Samuel Jay Keyser, 111–176. MIT Press.
- Halle, Morris & Idsardi, William J. 1997a. R, hypercorrection, and the elsewhere condition. In *Derivations and Constraints in Phonology*, Iggy Roca (ed.), 331–348. Oxford: OUP.
- Iosad, Pavel. 2017. A substance-free framework for phonology: An analysis of the Breton dialect of Bothoa. Edinburgh University Press.
- Ito, J. and Mester, A., 2009. The extended prosodic word. In *Phonological domains* (pp. 135-194). De Gruyter Mouton.
- Jackendoff, Ray. 1997. *The architecture of the language faculty*. MIT Press.
- Krämer, M., 2005, June. How crazy is English r-insertion? Or: Can OT account for the ‘unnatural. In *ICLaVE 2005 paper, Workshop on Crazy Rules and Lexical Exceptions*, Amsterdam (Vol. 25).
- Kratzer, Angelika, and Elisabeth Selkirk. 2020. Deconstructing information structure. *Glossa* 5: 113. 1–53.
- Lee, Seunghun, and Elisabeth Selkirk. To appear. A modular theory of the relation between syntactic and phonological constituency. In *Prosody and prosodic interfaces*, ed. Haruo Kubozono, Junko Ito, and Armin Mester. Oxford University Press.
- Lipták, Anikó, and Güliz Günes. To appear. The derivational timing of ellipsis: An overview of theoretical approaches. In *The derivational timing of ellipsis*, ed. Anikó Lipták and Güliz Günes. Oxford University Press. Pre-print available at [lingbuzz/006177](https://lingbuzz/006177).
- Lowenstamm, Jean. 1999. The beginning of the word. *Phonologica* 1996, John Rennison and Klaus Kühnhammer, 153-166. The Hague: Holland Academic Graphics.



# References

- McCarthy, John J. 1993. A case of surface constraint violation. *Canadian Journal of Linguistics* 38: 169–195.
- Mendes, Gesoel, and Andrew Nevins. To appear. Salvation and non-salvation of defectiveness under ellipsis. *Linguistic Inquiry*.
- Merchant, Jason. 2001. *The syntax of silence: Sluicing, islands, and the theory of ellipsis*. Oxford University Press.
- Merchant, Jason. 2004. Fragments and ellipsis. *Linguistics and Philosophy* 27:661–738.
- Merchant, Jason. 2015. On ineffable predicates: Bilingual Greek-English code-switching under ellipsis. *Lingua* 166:199–213.
- Nespor, Marina & Irene Vogel. 1986. *Prosodic Phonology*. Dordrecht, Foris.
- Newell, Heather & Craig Sailor. to appear. Minimalism and the syntax-phonology interface. In *The Cambridge Handbook of Minimalism*, edited by Kleanthes Grohmann & Evelina Leivada. CUP.
- Newell, Heather & Tobias Scheer. 2021. Function Words: Implications for the Syntax-Phonology Interface. Old World Conference in Phonology (OCP). Evissa. Jan.
- Ortman, Albert (1998). Consonant epenthesis: Its distribution and phonological specification. In Wolfgang Kehrein and Richard Wiese (eds.). *Phonology and Morphology of the Germanic Languages*. Tübingen: Niemeyer. 51-76.
- Pak, Marjorie. 2008. *The postsyntactic derivation and its phonological consequences*. Doctoral Dissertation, University of Pennsylvania.

# References

- Sailor, Craig. In progress. Ellipsis in a modular perspective. Ms., University of Edinburgh.
- Sailor, Craig. To appear. The morphophonology of ellipsis: evidence for Segregated Transfer. In *The derivational timing of ellipsis*, ed. Anikó Lipták and Güliz Günes, . Oxford University Press.
- Samuels, Bridget. 2009. The structure of phonological theory. Doctoral Dissertation, Harvard University.
- Samuels, Bridget. 2011. A minimalist program for phonology. In *The Oxford handbook of linguistic minimalism*, ed. Cedric Boeckx, 574–594. Oxford University Press.
- Sande, Hannah, Peter Jenks, and Sharon Inkelas. 2020. Cophonologies by ph(r)ase. *Natural Language & Linguistic Theory* 38:1211–1261.
- Scheer, Tobias 2009. External sandhi: what the initial CV is initial of. *Studia Saggi Linguistici* 47: 43-82
- Scheer, Tobias. 2008. Why the prosodic hierarchy is a diacritic and why the interface must be direct. In *Sounds of silence: empty elements in syntax and phonology*, ed. Jutta M. Hartmann, Veronika Hegedüs, and Henk van Riemsdijk, chapter 5, 145–192. Elsevier.
- Scheer, Tobias 2004. *A lateral theory of phonology. Vol 1: What is CVCV, and why should it be ?* Berlin: Mouton de Gruyter.
- Selkirk, Elizabeth. 1986. On derived domains in sentence phonology. *Phonology* 3: 371-405.
- Uffmann, Christian. 2007. Intrusive [r] and optimal epenthetic consonants. *Language Sciences*, 29(2-3), pp.451-476.
- Vaux, Bert. 2002, September. Consonant epenthesis and the problem of unnatural phonology. In *Yale University Linguistics Colloquium*.
- Vaux, Bert & Bridget Samuels. 2017. Consonant epenthesis and markedness. In Samuels, B.D. ed., *Beyond Markedness in Formal Phonology* (Vol. 241). John Benjamins Publishing Company.
- Wakefield, John C. 2020. *Intonational morphology*. Springer Nature.

# Appendices

# Does phon. violate Inclusiveness prima facie?

- With this revision in place, we can reassess Chomsky's repeated claims that the mapping to SM "radically" violates Inclusiveness...  
(Chomsky 1995:216, 2007:fn. 8, 2019:275)
  - a) "[because] syllabic and intonational structure are not contained in lexical items" (1995:351, fn. 10)
  - b) "...even more so in strong versions of Distributed Morphology that take all phonological features of LIs to be inserted in this mapping" (2007:fn. 8)
- Let's take (b) first. Given that Inclusiveness holds of computations...
  - if lexical insertion is non-computational (Scheer 2012:§169), then Inclusiveness has nothing to say about it, and (b) doesn't attach.

# Does phon. violate Inclusiveness prima facie?

- What about (a)? (addition of syllabic and intonational ‘structure’)
  - If these are also the product of Vocab Insertion (qua Translation), then (a) reduces to (b) as a set of phenomena not subject to Inclusiveness.
    - While this is surely the case for at least some such phenomena (e.g. intonational morphology: Wakefield 2020)...
    - ...others may well be the result of a computation (e.g. some syllabification).
  - However: our revised notion of Inclusiveness only rules out context-dependent additions that aren’t an invariant product of the computation itself
    - Now the question arises: what is the nature of the phonological computation?
    - If (part of) its job is to build syllables (e.g.) based on its input – a job it performs exceptionlessly on each iteration – then Inclusiveness is respected