

Class 6

Bracketing Paradoxes and Level Ordering

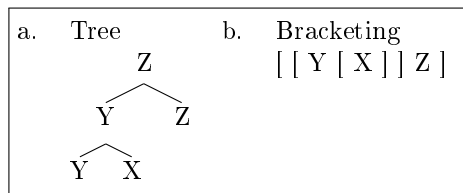
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1 Bracketing paradoxes

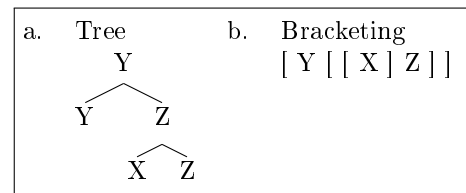
- Let's start by considering again a containment structure like the one Bobaljik (2012) uses to motivate the "Containment-Suppletion Hypothesis", modified slightly as (1.i):

(1) Containment structure:

i. Parse A



ii. Parse B



- Given the order of elements Y-X-Z, there is at least one additional structural parse consistent with that order (1.ii), where X combines first with Z rather than Y.
 - The *a priori* availability of these distinct parses has given rise in the literature to the idea of "Bracketing Paradoxes" (2):
- (2) **Bracketing paradox:**
 A word where (morpho)syntactic/semantic considerations point to one constituent structure (i.e. bracketing) but (morpho)phonological considerations point towards opposite structure.

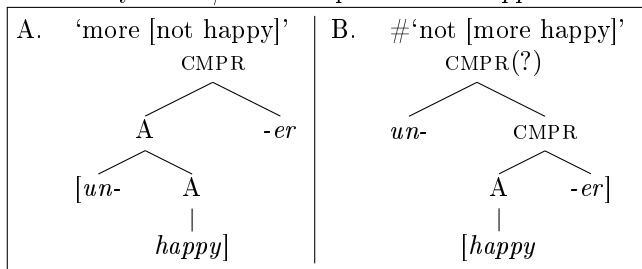
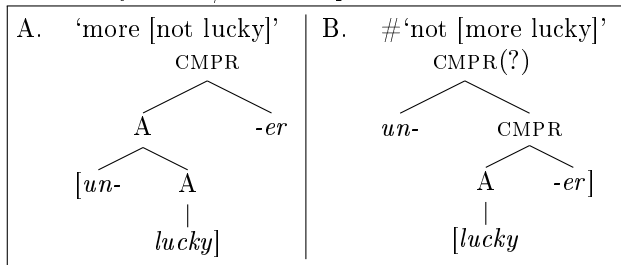
- The concept was first introduced as such by Allen (1978) and Pesetsky (1979).
- See Newell (2019, 2021) for a recent historical survey and a new type of analysis.

★ Today I'll focus on three types of bracketing paradoxes that have been claimed to exist in English.

- As Newell alludes to, it's not at all clear that "bracketing paradoxes" form a natural class of phenomena.
 - So we shouldn't necessarily expect that they should all have the same kind of solution.
- She also points out that some/all of these are only paradoxes given other theoretical assumptions.
 - Therefore, one way to dispense with the "paradoxes" is to adjust our basic assumptions, rather than come up with special mechanisms to shoehorn them into the theory.

2 Negative comparatives: *un-ADJ-er*

- The first thing that always comes to mind when talking about bracketing paradoxes are words containing both the negative prefix *un-* and the comparative suffix *-er*, e.g. *unhappier* (3) and *unluckier* (4).
 - cf. two papers from the 1990's: Sproat (1992) *Unhappier Is Not a "Bracketing Paradox"* vs. Kang (1993) *Unhappier Is Really a "Bracketing Paradox"*

(3) Possible syntactic/semantic parses of *unhappier*(4) Possible syntactic/semantic parses of *unluckier*

- These words always mean 'more [not ADJ]' (Parse A), never 'not [more ADJ]' (Parse B).
- The structure in Parse A accords not only with the semantics but also with the syntactic selectional restrictions of the morphemes.
 - This *un-* prefix selects adjectives and creates an adjective.
 - The comparative suffix *-er* selects adjectives and creates a comparative adjective.
- Parse A works no matter what we assume about the category derived by *-er*, but Parse B will only work if the thing derived by *-er* is a standard-issue adjective (which it probably isn't).

2.1 So what's the problem?

- The received wisdom is that there are phonological restrictions on what types of bases can make a synthetic comparative, i.e. suffix *-er*.
 - See Bauer, Lieber, & Plag (2013:Ch. 6.6), following Aronoff (1976:92), Rowicka (1988), and others.
 - * But see Graziano-King & Cairns (2005) for a claim that what is actually important is frequency and semantic type.
- What is (claimed to be) relevant here: you can't add *-er* to a base containing more than two syllables:

(5) Base types for synthetic vs. periphrastic comparatives

Base type	Example Base	Synthetic	Periphrastic
$\leq 2\sigma$	<i>stupid</i>	✓ <i>stupid-er</i>	? <i>more stupid</i>
$> 2\sigma$	<i>intelligent</i>	* <i>intelligent-er</i>	✓ <i>more intelligent</i>

- This condition is not fully sufficient (there's many more factors determining whether $\leq 2\sigma$ -bases take *-er*), but the ban on longer bases is largely correct.

★ So, here's the (alleged) problem:

- If we take Parse A, the base that *-er* is attaching to is $>2\sigma$, i.e. *unhappy* [ʌn.hæ.pi] or *unlucky* [ʌn.l.ki], and thus should not allow *-er* suffixation.
- But if we took Parse B, where *-er* attaches to the adjective, then the base would be $\leq 2\sigma$, i.e. *happy* [hæ.pi] or *lucky* [l.ki], and thus should allow *-er* suffixation.

→ The logic of the paradox: the semantics and the morphosyntactic selection requirements favor Parse A, but the morphological or morphophonological selection requirements favor Parse B.

2.2 Towards a solution

• Most analyses propose some sort of operation/rule that changes one structure into the other at some point in the derivation (see Newell 2019 for a summary).

★ But I think everyone's been missing something really obvious:

- All $\leq 2\sigma$ -bases ending in *(-)y* [(-)i] take *-er* (whether or not that ending is a suffix).
- And, crucially, there's a well-agreed upon exception to the $>2\sigma$ restriction:
 - Longer adjectives that end in (the suffix?) *-y* take *-er* (6).
 - (Maybe also those ending in *-ly* (7)?)

(6) Longer adjectives in *-y* that take *-er* (Rowicka 1988:141–142)

- a. *slippery* → *slipperier*
- b. *shadowy* → *shadowier*
- c. *finicky* → *finickier*
- d. *fidgety* → *fidgetier*

(7) Longer adjectives in *-ly* that (maybe) take *-er*

- a. *heavenly* → ?*heavenlier*
- b. *gentlemanly* → ?*gentlemanlier*

- As far as I can tell, all the supposed *un-ADJ-er* bracketing paradox forms end in *-y*.
 - This could be encoded as a phonological restriction, along the lines of the syllable count restriction.
 - Or as a morphological restriction saying that *-er* can always attach to the adjective-forming *-y* suffix (à la Fabb 1988).

→ Either way, *unhappy*, *unlucky*, etc. then **don't** contradict the morpho(phono)logical selectional requirements of *-er*, and there is no paradox: **we have Parse A all the way down.**

3 “Level ordering” paradoxes: *ungrammaticality*

- The second type of paradox is another one which is primarily a theory-internal problem.

3.1 Level ordering

• In Lexical Phonology and Morphology (LPM; Pesetsky 1979, Kiparsky 1982, Mohanan 1982, et seq.), following earlier work by Siegel (1974) and Allen (1978), affixes are divided up into two types:

(8) Types of affixes in LPM

- a. **Level 1 affixes:** “stem affixes”, attach earlier in the derivation
-al, *-(i)an*, *-ate*, *-ic*, *-(t)ion*, *-ity*, *-ive*, *-ous*, *-y* (N), etc.
- b. **Level 2 affixes:** “word affixes”, attach later in the derivation
-er (agentive), *-ful*, *-hood*, *-ism*, *-ist*, *-less*, *-like*, *-ly*, *-ness*, *-y* (Adj), etc.

- The two sets of affixes are said to map onto clear distinctions in a number of areas:

3.1.1 Non-phonological distinctions between Level 1 and Level 2

1. BASES OF AFFIXATION

- Level 1 affixes can attach to free-standing words and **bound roots**: *prolif-ic*, *frag-ment*, *ed-ible*
- Level 2 affixes attach only to free-standing words; i.e. no words like **prolif-y* or **frag-ness*

2. ORDER OF AFFIXATION

- Level 1 affixes can attach to a constituent headed by another Level 1 affix (9a).
- Level 2 affixes can attach to a constituent headed by another Level 2 affix (9d).
- Level 2 affixes can attach to a constituent headed by a Level 1 affix (9b).
- **But:** Level 1 affixes **cannot** attach to a constituent headed by a Level 2 affix (9c).

(9) Affix ordering

a.	✓	[[[Base] 1] 1] (1>1):	<i>curi-os₁-ity₁</i>
b.	✓	[[[Base] 1] 2] (1>2):	<i>myst-ic₁-ism₂</i>
c.	✗	[[[Base] 2] 1] (2>1):	<i>*affix-less₂-ity₁</i>
d.	✓	[[[Base] 2] 2] (2>2):	<i>affix-less₂-ness₂</i>

* **N.B.:** No (obvious) difference in syntactic categories between the affixes in the different levels, so this seems to be a truly morpho(phono)logical restriction (if true).

3. PRODUCTIVITY

- Level 1 affixes are generally lexically restricted; Level 2 are fairly/fully productive.
- Even clearer: inflectional suffixes (*-s*, *-ed*, *-ing*) are completely productive and leave virtually all stem properties intact (i.e. clearly Level 2).

4. SEMANTIC TRANSPARENCY

- Level 1 affixes may yield semantically opaque derivatives.
- Level 2 are relatively transparent.

3.1.2 Phonological distinctions between Level 1 and Level 2

1. STRESS ATTRACTION

- Level 1 affixes (really, suffixes) attract stress, i.e. pull it to the right (10).
 - ◊ Stress in the derivatives is equivalent to stress in monomorphemic words:
 - ▷ Stress the penult if the final is heavy,
 - ▷ Stress the antepenult if the final and penult are light.

(10) Stress attraction in Level 1

	1ST/2ND SYLL STRESS IN BASE		2ND/3RD SYLL STRESS IN DERIVATIVE		
a.	<i>phóneme</i> [fóʊ.nim]	→	<i>phoném-ic</i> [fə.ní.mɪk]	(*phónem-ic	[fóʊ.ni.mɪk])
b.	<i>sýllable</i> [sí.lə.bl]	→	<i>sylláb-ic</i> [sə.læ̃.bɪk]	(*sýllab-ic	[sí.lə.bɪk])
		→	<i>sylláb-ify</i> [sə.læ̃.bə.fai]	(*sýllab-ify	[sí.lə.bə.fai])
c.	<i>prósody</i> [prá.zə.ri]	→	<i>prosód-ic</i> [prə.zá.rɪk]	(*prósod-ic	[prá.zə.rɪk])
		→	<i>prosód-ify</i> [prə.zá.rə.fai]	(*prósod-ify	[prá.zə.rə.fai])
d.	<i>prodúctive</i> [prə.dák.tɪv]	→	<i>productív-ity</i> [pròʊ.dʌk.tí.vɪ.tɪ]	(*prodúctiv-ity	[prə.dák.tɪ.vɪ.tɪ]
	...óH/...óLL IN BASE		...óH/...óLL IN DERIVATIVE		

- Level 2 affixes always maintain the stress properties of their base, even if this results in an otherwise bad stress pattern (i.e. further back than ... $\acute{\sigma}$ H or ... $\acute{\sigma}$ LL). Compare:
 - ◊ Level 1 *-ity* (A → N): *productív-ity* [pròv.dak.tí.ví.ri] (... $\acute{\sigma}$ LL)
 - ◊ Level 2 *-ness* (A → N): *prodúctive-ness* [prò.dák.tív.nís] (... $\acute{\sigma}$ H, *... $\acute{\sigma}$ H)

2. TRISYLLABIC SHORTENING/“LAXING”

- Level 1 suffixes cause underlyingly long/tense diphthongs in certain positions in the base to shorten to their “vowel shift correspondents” (11).
 - ▷ (One exception: *obese* [oubi:siri] (*[oubesiri]).)
- ◊ Similar dispreference for long vowels seen in monomorphemic words.
 - ▷ (Though there are some exceptions, e.g. *D[ou]berman*.)

(11) Trisyllabic shortening with Level 1

BASE			DERIVATIVE				
[aɪ]	<i>divine</i>	[dəváiɪn]	→	[ɪ]	<i>divinity</i>	[dəvíniri]	(*[dəváiɪriri])
[i:]	<i>serene</i>	[sərí:n]	→	[ɛ]	<i>serenity</i>	[səréɪniri]	(*[sərí:niriri])
[eɪ]	<i>profane</i>	[proféɪn]	→	[æ]	<i>profanity</i>	[prɒufæɪniri]	(*[prɒuféɪriri])
[oʊ]	<i>verbose</i>	[vərbóʊs]	→	[a]	<i>verbosity</i>	[vərbásiri]	(*[vərbóʊsiriri])
[aʊ]	<i>profound</i>	[prɒfáʊnd]	→	[ʌ]	<i>profundity</i>	[prɒufʌndiri]	(*[prɒfáʊndiriri])

- Level 2 affixes never trigger this kind of shortening (12):

(12) No shortening with Level 2

BASE		DERIVATIVE	
a.	<i>time</i> [táɪm]	→	<i>time-less-ness</i> [táɪmlɪsnɪs] (*[tíɪmlɪsnɪs])
b.	<i>hope</i> [hóʊp]	→	<i>hope-ful-ly</i> [hóʊpfəli] (*[háɪpfəli])

3. FINAL CLUSTERS

- Level 2 affixes reduce root-final clusters that are illicit in word-final position (13b), just like roots do in actual word-final position (13a).
- Level 1 affixes, on the other hand, protect those illicit final clusters (13c).

(13) Treatment of root-final clusters in derivatives

	a. BASE	b. LEVEL 2 DERIVATIVE	c. LEVEL 1 DERIVATIVE
/mn/	<i>column</i> [káləɪm]	<i>column-like</i> [káləɪmləɪk]	<i>column-ar</i> [kaláɪmnər]
	<i>autumn</i> [ótəɪm]	<i>autumn-y</i> [ótəɪmi]	<i>autumn-al</i> [otáɪmnəl]
/mb/	<i>bomb</i> [báɪm]	<i>bomb-er</i> [bámər]	<i>bomb-ard</i> [bəmbárd]
/gn/	<i>resign</i> [rizáɪn]	<i>resign-ing</i> [rizáɪnɪŋ]	<i>resign-ation</i> [rèziɪgnéɪʃən]

4. NASAL ASSIMILATION

- Level 1 nasal-final prefixes (e.g., negative *in-*) undergo place assimilation to a base-initial consonant (14a).
- Level 2 nasal-final prefixes (e.g., negative *un-*) **don't** undergo place assimilation (14b).

(14) Nasal place (non-)assimilation in prefixes

INITIAL-C PLACE	a. LEVEL 1 /in-/	b. LEVEL 2 /un-/
Bilabial	<i>i[m]possible</i>	<i>u[n]productive</i>
Labiodental	<i>i[n̥]fallible</i>	<i>u[n]fortunate</i>
Velar	<i>i[ŋ]credible</i>	<i>u[n]coordinated</i>

5. IRREGULAR ALTERNATIONS

- A number of irregular/restricted morphophonological alternations are triggered only by Level 1 affixes (15).
 - ◊ These include velar softening (15a,b), palatalization (15b–d), and assibilation (15a,e–g).

(15) Morphologically restricted alternations

a.	<i>opa</i> [k]ue	→	<i>opa</i> [s]ity
b.	<i>analo</i> [g](ue)	→	<i>analo</i> [dʒ]y
c.	<i>permi</i> [t]	→	<i>permi</i> [ʃ]ion
d.	<i>allu</i> [d]e	→	<i>allú</i> [ʒ]ion
e.	<i>permi</i> [t]	→	<i>permi</i> [s]ive
f.	<i>pira</i> [t]e	→	<i>pira</i> [s]y
g.	<i>elu</i> [d]e	→	<i>elu</i> [s]ive

- Level 2 affixes never trigger these alternations, **or any other alternations**:

(16) No alternations with Level 2 affixes

- | | | | |
|----|------------------|---|-----------------------------|
| a. | <i>do</i> [g] | ↔ | * <i>do</i> [dʒ]-y (dimin.) |
| b. | <i>nu</i> [d]e | ↔ | * <i>nu</i> [s]-ist |
| c. | <i>rabbi</i> [t] | ↔ | * <i>rabbi</i> [s]-y (Adj) |

- Level 1 affixes can also trigger more suppletion-y, lexically idiosyncratic adjustments.
- Level 2 affixes always use the default allomorph.

(17) Suppletive allomorphy with Level 1

	ROOT	LEVEL 2 AFFIXATION	LEVEL 1 AFFIXATION
a.	<i>assume</i>	<i>assum-ing</i>	<i>assump-tion</i>
b.	<i>destroy</i>	<i>destroy-ing</i>	<i>destruc-tion</i>
c.	<i>conjoin</i>	<i>conjoin-ing</i>	<i>conjug-tion</i>
d.	<i>maintain</i>	<i>maintain-ing</i>	<i>mainten-ance</i>
e.	<i>giant</i>	<i>giant-ish</i>	<i>gigant-ic</i>

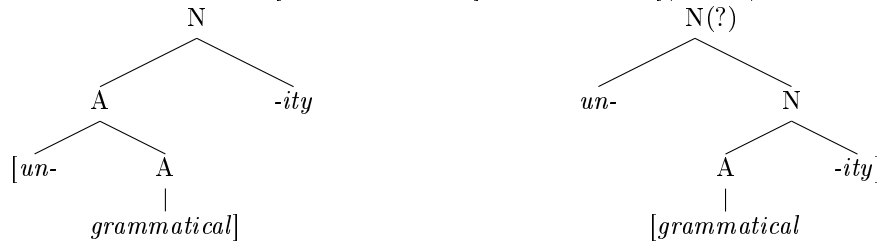
3.1.3 Local take-aways

- There is clearly a ton of evidence for this breakdown into two groups, and it really does hold up pretty well to scrutiny.
 - However, there are some affixes, e.g. *-ize* and *-able*, that take some properties from Level 1 and others from Level 2.
 - This suggests that our model needs to be even more fine-grained than just a two-way distinction.
- Putting these potential problems aside for now, if we more or less buy into level ordering, the important point for bracketing paradoxes is:

(18) *Level 1 affixes combine with the stem before Level 2 affixes do.*

3.2 The problem: they don't

- (19) Possible syntactic/semantic parses of *ungrammaticality*
 A. 'the property of being [not grammatical]' B. #'not [(having) the property of being grammatical]'



- In words like *ungrammaticality*, the semantics and the syntactic selectional requirements prefer attaching *un-* (a “Level 2” affix) before attaching *-ity* (a “Level 1” affix), i.e. Parse A.
 - Adhering to Level Ordering would lead us to Parse B.
- This problem is specific to theories that strongly adhere to level ordering.
 - ★ But not all theories of the phonology-morphology interface build in level ordering in this way:
- Fabb (1988): ordering properties purportedly derived by level ordering are insufficient to capture the distribution of affix combinations in English, and that level ordering does not add additional explanatory value beyond his proposal to encode it with affix specific attachment requirements.
- Stanton & Steriade (2014) et seq. capture the phonological properties with (clustered) affix-specific constraint rankings, which better captures the actual behavior (which doesn't fall so neatly into two groups).

→ So, if you don't buy full-on level ordering, there is no paradox.

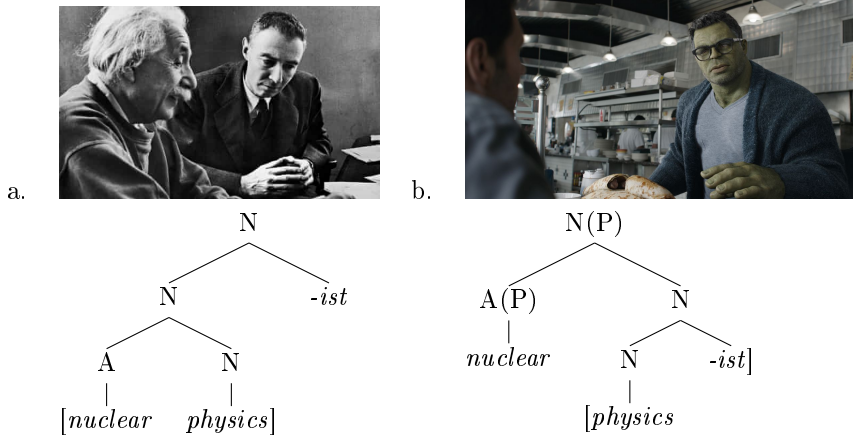
4 Compounds: *nuclear physicist*

- The kind of bracketing paradox that I think is actually interesting is the kind involving compounds:
 - In a word(?) / phrase like *political scientist* (20) or *nuclear physicist* (21) there are two possible readings:

- (20) Possible syntactic/semantic parses of *political scientist*
 A. 'a person who studies [political science]' B. 'a political [person who studies science]'



(21) Possible syntactic/semantic parses of *nuclear physicist*



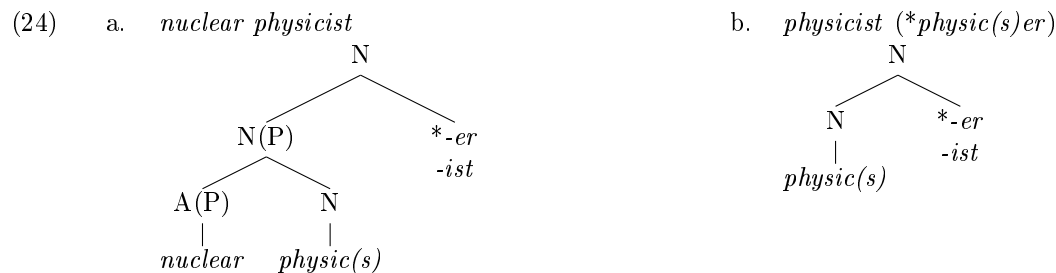
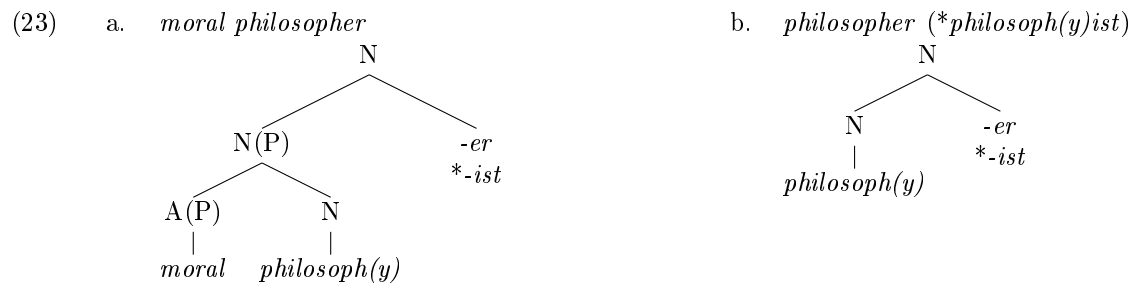
• Many others examples (see, e.g., Beard 1991, Liberman & Sproat 1992, Cetnarowska 2019), including:

- (22) a. *theoretical linguist*
 b. *criminal lawyer*
 c. *moral philosopher*
 d. *discrete mathematician*
 e. *stand-up comedian*

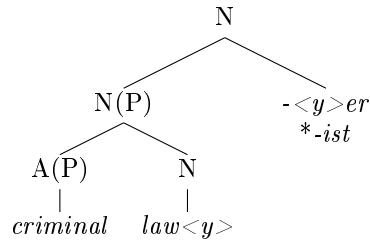
• When the semantics point to Parse B, there's no problem.
 ◦ However, when the semantics point to Parse A...

4.1 What's at issue here?

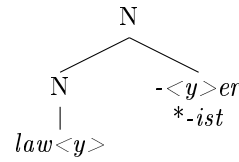
- Parse A involves the nominalizing affix attaching to a compound (or maybe it's a phrase too).
 → Nevertheless, the specific nominalizing affix *always* matches the one that would be selected for the righthand member in isolation (23–25b).
- Also, the allomorphy of the root under suffixation is always the same too:
 ◦ *philosoph-y* → *philosoph-*, *physic-s* → *physic-*, *law-* → *lawy-*



(25) a. *criminal lawyer* (cf. *criminal law*)

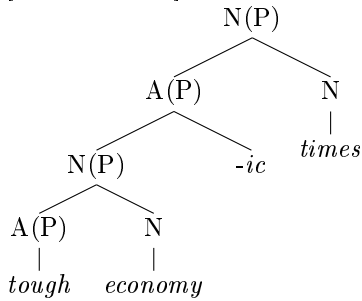


b. *lawyer* (**lawyer*, **law(y)ist*)



• And here's something similar that I've seen out in the wild:

(26) [*tough econom*]*ic times* (**tough econom*{-ous,-ish,-ic(-)al} *times*)



◦ This is additionally weird because it is clearly affixation to a phrase and not a word.

- These are bracketing paradoxes because the suffix+head noun looks morphologically like a unit to the exclusion of the first compound member (as it truly is in Parse B), but the semantics point to Parse A.
 - Also, the suffix can affect stress on the second member but never the first, but this probably just because of the way stress attraction works (it's local).

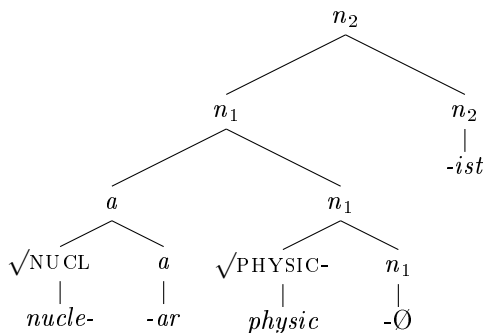
(27) *discrète mathématiques* → *discrète mathématique-ian*

- More interesting for our purposes: the allomorphy relations between the head noun and the nominalizing affix (or adjectivizing affix for *economic*) are not disrupted by the extra layer of structure in between them.

4.2 What do we need to say?

- We probably want to assume an articulated structure something like (28), following recent work by (and summarized in) Harðarson (2020).
 - *n* and *a* are categorizing heads, that turn roots into nouns and adjectives, respectively.

(28) Structure of *nuclear physicist*



- Harðarson (2020) deals with compound structures just like these in Icelandic and other languages.
 - If I understand correctly, he argues that pretty much everything can condition allomorphy of everything else, contra Bobaljik (2012) and other similar proposals.
- That does seem to be necessary in order to get things right with traditional structurally-conditioned allomorphy.
 - n_2 needs to be able to see all the way to the bottom to see $\sqrt{\text{PHYSIC}}$, in order to be spelled out as *-ist* and not, e.g., *-er*.
 - It's less problematic to say that n_1 can see n_2 since n_1 's highest segment) is sister to n_2 .
- ★ In any event, this approach would need to say that the contents of n_1 have not been (fully) spelled out before n_2 is visible.

- We could consider alternatives like Deal & Wolf (2017), where all members of the same spell out domain can interact transparently.
 - This could make available a *linear* analysis, where choice between synonymous nominalizers is handled using something like PRIORITY (cf. Bonet, Lloret, & Mascaró 2007, Mascaró 2007) coupled with Base-Derivative faithfulness (Benua 1997) with Lexical Conservatism (Steriade 1997).
- If all of the allomorphs are available in the phonology, faithfulness to the existence of *physicist* could select *-ist* over *-er*.

4.3 Some other structures

- Here are some other structures which are at least superficially similar where irregular/suppletive allomorphy gets blocked:
 - (29) a. *fly out* (v.) → ✓ *flied out* ~ (?) *flew out* (in baseball)
 - b. *grandstand* (v.) → *grandstanded* ~ ?* *grandstood*
 - c. *toothbrush* (n.) (**teethbrush*)
- All of these instances have to do with regular inflection, rather than nominalization, which is (more) derivational. So perhaps derivational allomorphy can see further down than inflectional allomorphy.
- ...But that kind of runs counter to what Bobaljik (2015), Smith et al. (2019) say about contextual conditioning in suppletion:
 - Phase head-y things like nominalizers block contextual allomorphy but inflection-y things like Tense and Number allow allomorphy at longer distances.
- Harðarson (2020) rightly points out that compounds are an important piece of the puzzle.

5 Conclusions

- Compound bracketing paradoxes are really important for understanding the “ins and outs of contextual allomorphy”.
- Level ordering bracketing paradoxes bear on (at least) the theory of affix ordering, because they are problematic for stratal approaches to affix order.
- Comparative paradoxes aren't really paradoxes, but they do raise interesting questions about head movement, blocking, and filters...

References

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