Class 1: Fundamentals of Distributed Morphology

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1 What is morphology?

- Morphology is the structure of words: identification and classification of morphemes.

Morphology

The study of the form and structure of words (and how they are built)

- Two kinds of morphological processes: inflection vs. derivation.

Inflection

Morphological marking that reflects features of a given syntactic context
('creates different forms of the same word')

(1) a. This dog like -s treats.
b. I have work -ed here for years.

Derivation

Morphological marking that signals a change in meaning or syntactic function
('creates new words from existing ones')

(2) a. The invent -ion of the motor car.
b. This machine pur -ifies the water.

- Many morphological theories do not give unified treatments of inflection and derivation (though DM does).
- We will focus mostly on inflectional morphology here.

2 Theories of inflectional morphology

Question

What could a theory of inflectional morphology look like?

Stump (2001: §1) proposes the following taxonomy:

(3)

	incremental	**realizational**
lexical	Minimalist Morphology (Wunderlich and Fabri 1995)	Distributed Morphology (Halle and Marantz 1993)
inferential	Articulated Morphology (Steele 1995)	Paradigm Function Morphology (Stump 2001)

Incremental vs. realizational ('Do morphosyntactic features come from morphemes?')

- In an *incremental* theory, the inflected form of a given word only acquires its morphosyntactic features by virtue of its inflection.
- In a *realizational* theory, the word is already associated with these features, and the job of inflection is to express (or realize) them.

Lexical vs. inferential ('Are morphemes independent lexical items?')

- In a *lexical* theory, the morphological exponents (e.g. the affixes added to a stem) have a similar status to stems: they are stored as individual lexical items in their own right.
- In an *inferential* theory, morphemes such as *-s* do not exist as morphological 'pieces'. Instead, inflected forms are derived by (or 'inferred' from) rules or constraints.

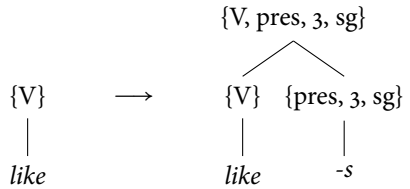
2.1 A lexical-incremental approach

- Let us consider how to do English present tense inflection in a lexical-incremental theory such as Lieber (1992).

(4) a. The root *like* is associated with the category feature V: LIKE$_{[V]}$
b. The suffix *-s* is associated with the features for tense and agreement: *-s*$_{[PRES, 3, SING]}$

- The these two elements are combined by rules of morphology:

(5)



- Importantly, the root *like* only acquires the relevant features by virtue of suffixation.

2.2 An inferential-incremental approach

- In an inferential-incremental approach, the lexeme only acquires features by virtue of inflection.
- However, being inferential, it would also have to reject the idea of lexically-stored morphemes (i.e. there is no piece *-s* in the grammar).
- In principle, one can countenance a rule that takes a root and simulatenously adds both an inflectional marker and the features associated with that marker (Steele 1995).

(6) LIKE ⟶ *likes*$_{\{3, sg, pres\}}$

- It is sometimes assumed that this view is contradictory if incremental is taken to mean 'morphemes contribute morphosyntactic features' but inferential means 'there are no lexically-stored morphemes'.

2.3 An inferential-realizational approach

- Examples of inferential-realization approaches are A-Morphous Morphology (Anderson 1992) and Paradigm Function Morphology (Stump 2001).
- In such a theory, lexemes are paired with full a morphosyntactic context (inflection is not information-increasing), but morphemes have no special status in the grammar.
- Instead, a lexeme is mapped to its inflected forms depending on the features of its syntactic context:

(7) ⟨LIKE, {3, sg, pres}⟩ ⟶ ⟨*likes*, {3, sg, pres}⟩

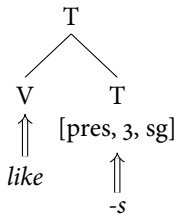
- Morphemes such as *-s* do not exist in this kind of theory. Instead, they exist only as epiphenomena of rules such as (8).

(8) X ⟶ X*s*, where X is a verb with the features {3,sg, pres}

2.4 A lexical-realizational approach

- The most well-known lexical-realization approach is Distributed Morphology.
- In DM, complex words are built by rules of syntax that arrange abstract syntactic elements.
- Morphological forms are then inserted into this syntactic structure after it has been built:

(9)



- This is therefore a *realizational* approach. The morphosyntactic context (the features) are already present independent of inflection (unlike in incremental approaches).
- It is *lexical* because morphemes such as *-s* have an independent status in the theory.

2.5 Arguments for realizational over incremental approaches

2.5.1 Extended exponence

- Stump (2001) argues that cases of so-called 'extended exponence' are problematic for incremental approaches. Example from Nyanja (Bantu; Malawi):

(10) a. ci-lombo ci-kula
CLASS:7-weed CLASS:7-grow
'A weed grows.'
b. ci-manga ca-bwino
CLASS:7-maize CLASS:7-good
'good maize'
c. ci-pewa ca-ci-kulu
CLASS:7-hat CLASS:7-CLASS:7-large
'a large hat'

- There are two different kinds of class marker *ci-* and *ca-*.
- On an incremental theory, these morphemes add the feature [class 7] (essentially gender) to the word.
- Cases such as (10c) are unexpected. If the noun already has its class specification by virtue of *ci-*, then why would *ca-* ever be added?

2.5.2 Underdetermination of context

- Consider the following data from Sora (Austroasiatic) from Stewart and Stump (2007: 389):

(11) *Singular affirmative paradigm for Sora* de *'get up'*:

	Nonpast	Past
1st person	de-te-n-ay	de-le-n-ay
2nd person	de-te-n	de-le-n
3rd person	de-te-n	de-le-n

NB: *-n* is a conjungation class marker

- The information that the verb bears 1st person features is contributed by *-ay*.
- How is 2nd/3rd person encoded?
- If a word only acquires its morphosyntactic properties by virtue of affixation, then we require some null affixation process for all features that aren't overtly expressed.

2.6 Arguments for lexical over inferential approaches

2.6.1 Locality effects

- It has been argued that allomorphy is subject to locality conditions.
- Consider the following forms of the Latin verb for 'love' (Embick 2010: 71):

(12)

	Perfect (ind.)	Perfect (subj.)	Pluperfect (ind.)	Future perfect
1sg	amā-v-**ī**	amā-ve-ri-m	amā-ve-ra-m	amā-ve-r-ō
2sg	amā-v-**istī**	amā-ve-rĭ-s	amā-ve-rā-s	amā-ve-rĭ-s
3sg	amā-vi-t	amā-ve-ri-t	amā-ve-ra-t	amā-ve-ri-t
1pl	amā-vi-mus	amā-ve-rī-mus	amā-ve-rā-mus	amā-ve-rĭ-mus
2pl	amā-v-**istis**	amā-ve-rĭ-tis	amā-ve-rā-tis	amā-ve-rĭ-tis
3pl	amā-v-**ērunt**	amā-ve-ri-nt	amā-ve-ra-nt	amā-ve-ri-nt

- This has been argued to motivate a more general condition on allomorphy: intervening morphemes block suppletion.
- If morphemes do not exist as such, then this generalization is no longer tenable.

2.6.2 Stranded affix scenarios

- In some syntactic configurations, we can end up with an affix that becomes 'stranded'.
- The classic example is *do*-support in English, a classic analysis going back to Chomsky (1957) treats the verbal inflection in English as independent from the verb.
- *-ed* combines with the verb when it is adjacent to it (13a).
- If some syntactic process disrupts this adjacency, e.g. VP fronting (13b) or VP ellipsis (13c), then a dummy verb *do* is inserted to fix it.

(13) a. I -ed [$_{VP}$ play chess]

b. I said I would play chess today, and [$_{VP}$ play chess] I ⇑ *do* -ed ——$_{VP}$

c. I said I would play chess today, and I ⇑ *do* -ed [$_{VP}$ ~~play chess~~]

- This analysis requires that *-ed* exists as an independent syntactic 'piece' and is therefore incompatible with strictly inferential approaches to inflection.

3 Distributed Morphology

Key properties of DM

- It is a *lexical* theory – morphemes are independent 'pieces' of structure.
- It is a *realizational* theory – morphology expresses rather than contributes morphosyntactic features.
- It is *syntacticocentric* – Words are built in the same way as phrases, by the rules of syntax ('syntax all the way down').
- It assumes *Late Insertion* of forms – Morphological realization is post-syntactic.

3.1 Why 'distributed'?

- Why is the theory called *Distributed* Morphology?
- This has to do with how the traditional properties of morphemes are captured in the theory.
- Properties of morphemes:
  - *Pronunciation* – the relevant form of the morpheme: /-s/, /-z/, /-əz/, etc.
  - *Meaning* – the interpretation of the suffix: e.g. 'V*s* implies a Ving event that takes place at the utterance time (or habitually)'.
  - *Distribution* – the syntactic contexts in which the morpheme (or words suffixed with it) may occur, e.g. *-s* is restricted to clauses in the present tense and with a syntactic subject bearing the features 3rd singular.

    (14) The machine need __ to be repaired by 3pm

- In a lexical-incremental theory (where morphemes have an independent status and directly contribute the features they express), these properties of *-s* must all be listed in its lexical entry:

(15)

-s

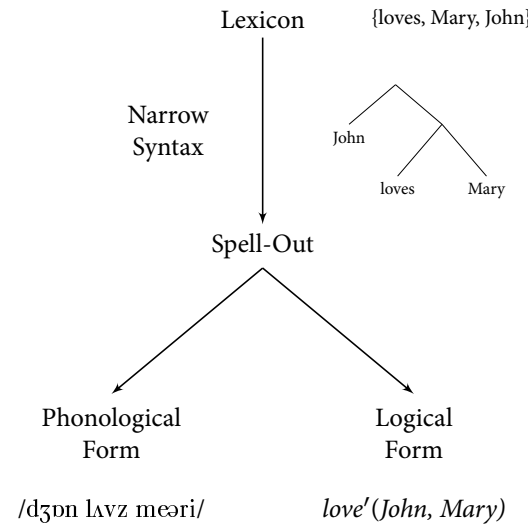
PHON:	/-z/, /-s/ after [−voice], /-əz/ after [sibilant]
MORPH:	stem = V
SYN:	PRESENT, SUBJECT = 3RD SG
SEM:	Ving event takes place at UT/habitually

- In DM, however, these properties are 'distributed' across different modules of grammar rather than being listed under a single entry in the lexicon.

3.2 The Y-Model

- The standard architecture of the grammar since Chomsky (1995) is the (inverted) 'Y-model':

(16)

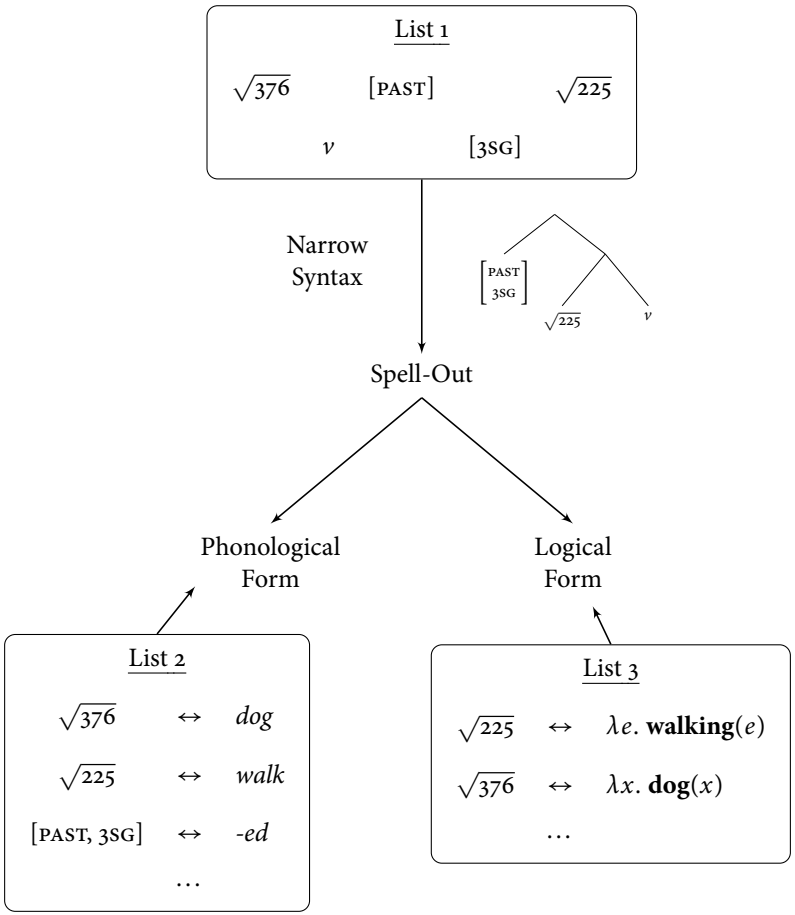


- Note that the Y-model is compatible with a pre-syntactic approach to morphology in which words enter the syntax with phonological content.
- In DM, however, the concept of Late Insertion is adopted.
- The syntactic, phonological and semantic properties of morphemes are distributed across three lists:

The three lists in DM

- List 1: Abstract morphemes (feature bundles, abstract roots, categorizing heads)
- List 2: Phonological forms (Vocabulary Items)
- List 3: Encyclopedia (Semantic denotations)

(17)



3.3 List 1: Roots and abstract morphemes

- List 1 contains the primitives of syntactic computation: sets of features (18) or feature bundles (19) (sometimes called *abstract or functional morphemes*):

(18) a. [PAST]
b. [SINGULAR]
c. [3(rd person)]
d. [CATEGORY: T]

(19) T
$\begin{bmatrix} \text{PAST} \\ 3 \\ \text{SG} \end{bmatrix}$

- In addition, DM assumes that (open class) lexical items constitute abstract roots ($\sqrt{\text{ROOT}}$).
- Roots are just placeholders for a given lexeme. This is emphasized by assigning them arbitrary numerical indices (20),
- In practice, this will become tedious, however. A more reader-friendly way is in (21).

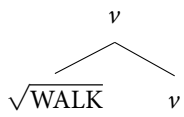
(20) a. $\sqrt{225}$
b. $\sqrt{953}$
c. …

(21) a. $\sqrt{\text{WALK}}$
b. $\sqrt{\text{SING}}$
c. …

- These roots are not specified for a syntactic category. This is provided by a *categorizing head* that is merged as the sister of that root:

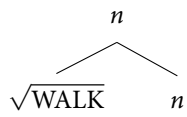
(22) *Categorizing heads*
a. *v* = marks a root as verbal
b. *n* = marks a root as nominal
c. *a* = marks a root as adjectival

(23)



e.g. 'walk to school'

(24)



e.g. 'a long walk'

3.4 List 2: Vocabulary Items

- The phonological form of a morpheme is specified by a list of *Vocabulary Items*.
- Vocabulary Items have the following format (insertion context is optional):

(25) Morphosyntactic features ↔ Phonological form / ___ Insertion context

- The choice of which VI is inserted follows two main principles (definitions from Embick and Noyer 2007: 298):

Subset Principle

The phonological exponent of a Vocabulary Item is inserted into a position if the item matches all or a subset of the features specified in that position. Insertion does not take place if the Vocabulary Item contains features not present in the morpheme.

Specificity

Where several Vocabulary Items meet the conditions for insertion, the item matching the greatest number of features (or the context) is chosen.

- Consider the following forms:

(26)

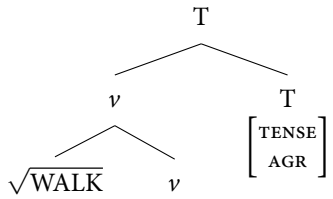
	SG	PL
1	walk-ed	walk-ed
2	walk-ed	walk-ed
3	walk-ed	walk-ed

(27)

	SG	PL
1	walk-Ø	walk-Ø
2	walk-Ø	walk-Ø
3	walk-s	walk-Ø

- A finite verb in English has the following structure:

(28)

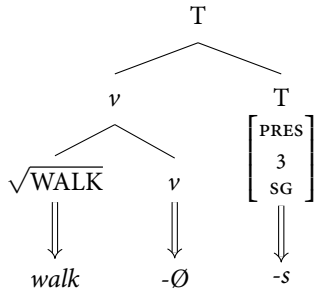


- A subset of possible Vocabulary Items:

(29)
a. [PRES, 3, SG] ↔ *-s*
b. [PAST] ↔ *-ed*
c. [ ] ↔ *-Ø*

(30)
a. √WALK ↔ *walk*
b. √DOG ↔ *dog*
c. √BE ↔ *be*

(31)



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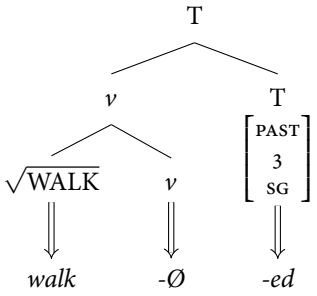


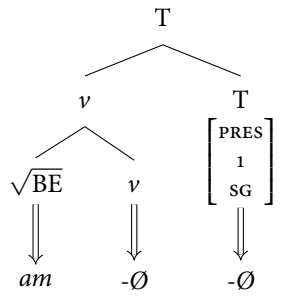
- Given the Subset Principle, a VI can mention fewer features than its insertion context. We can say that it is *underspecified* (for a particular feature).
- A VI can also realize no features at all (the empty set). We can call this the *Elsewhere* form. This item will be eligible for insertion in all contexts.
- There can also be multiple stem forms (*suppletion*).
- Consider the irregular forms of *be*:

(33)

	SG	PL
1	am	are
2	are	are
3	is	are

(34)
a. √BE ↔ *am* / ___ [PRES, 1, SG]
b. √BE ↔ *is* / ___ [PRES, 3, SG]
c. √BE ↔ *are* / ___ [PRES]
d. √BE ↔ *be*

(35)



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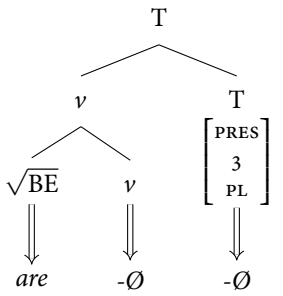
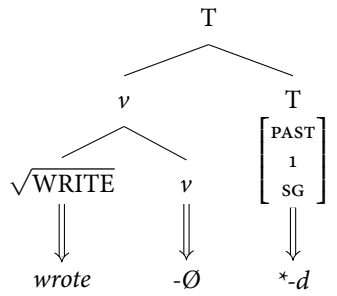


- With irregular stems, we sometimes don't find the regular form of T (e.g. *-ed* in the past tense).

(37) *



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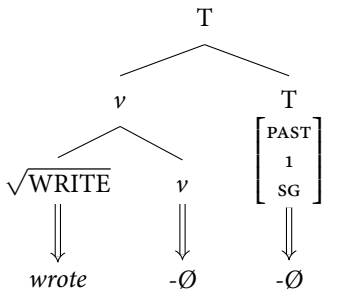
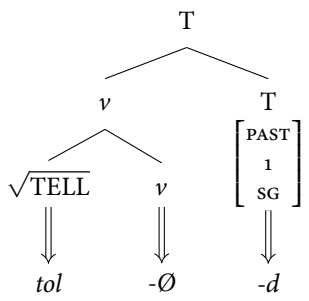


- With some irregular stems, we need to have a special zero past tense suffix (39b).

(39)
a. [PRES, 3SG] ↔ *-s*
b. [PAST] ↔ *-Ø* / ___ {√WRITE, √BREAK, …}
c. [PAST] ↔ *-ed*
d. [ ] ↔ *-Ø*

- Not always the case, e.g. *tell* ~ *tol-d*:

(40)



a. $\sqrt{\text{TELL}}$ ↔ *tol-* / ___ [PAST]
b. $\sqrt{\text{TELL}}$ ↔ *tell*

- $\sqrt{\text{TELL}}$ does not belong to the list of roots mentioned by (39b).

3.5 List 3: Meanings

- The third list pairs morphemes with their semantic denotations:

(41)
a. $\sqrt{\text{WALK}}$ ↔ $\lambda e.$ **walking**(e)
b. $\sqrt{\text{DOG}}$ ↔ $\lambda x.$ **dog**(x)
c. $\sqrt{\text{BE}}$ ↔ $\lambda f.\, f$
d. …

- We will not go into semantic details here, however.
- Late Insertion of meaning as well as form opens up the possibility of context-specific meanings (examples below from Harley 2014):

(42)
a. $\sqrt{\text{THROW}}$ ↔ $\lambda e.$ **vomit**(e) / [___ [v]] [up]
b. $\sqrt{\text{THROW}}$ ↔ $\lambda x.$ **throw**(x) / ___ [n]
c. $\sqrt{\text{THROW}}$ ↔ $\lambda e.$ **throwing**(e)

- In particular, this can give us a handle on idiomatic meanings like *to throw up* = 'to vomit'.
- Furthermore, there are certain words that only appear in idiomatic expressions, e.g. *to be in cahoots with someone* = 'to be engaged in a conspiracy with someone'.

(43) $\sqrt{\text{CAHOOT}}$ ↔ 'a conspiracy' / [in] [[___ [n]] [PL]]

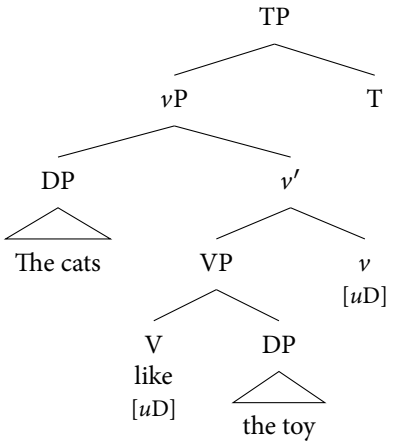
- There is no context-free (Elsewhere) Encyclopedia entry for this root.

(44) *We uncovered their secret cahoots (≠ 'We uncovered their secret conspiracy')

4 Syntax

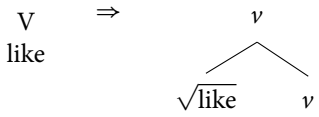
- Standard clause structure in Minimalist syntax (see e.g. Adger 2003):

(45)



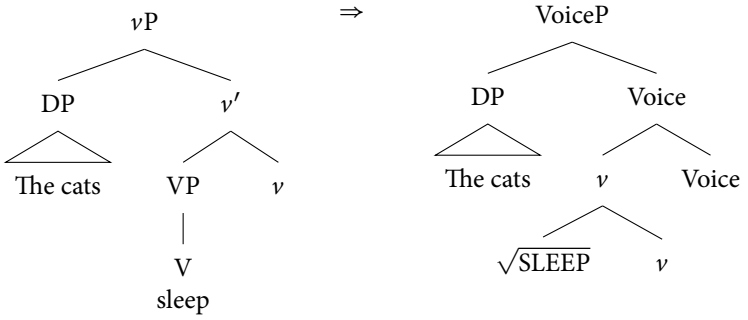
- With acategorial roots, V is replaced by v+$\sqrt{\text{ROOT}}$:

(46)



- Since v replaces V, we need another label for the head introducing the external argument:

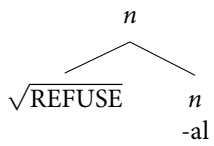
(47)



4.1 Derivation

- What is the structure of the traditional process of derivation? ($\text{refuse}_V \rightarrow \text{refusal}_N$)
- Do we attach the categorizing head directly to the root (48) or do we first derive a verb and then a noun (49)?

(48)



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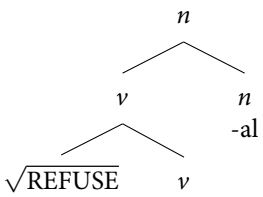


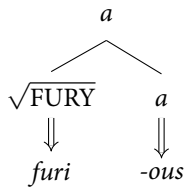
- We probably have to assume that both options are possible in principle.
- Case study (deadjectival nouns in English):

(50)

noun	*adjective with* -ous	*-ity*	*-ness*
	curious	curiosity	curiousness
	precious	preciosity	preciousness
	tenacious	tenacity	tenaciousness
	atrocious	atrocity	atrociousness
glory	glorious	*gloriosity	gloriousness
fury	furious	*furiosity	furiousness
space	spacious	*spaciosity	spaciousness
grace	gracious	*graciosity	graciousness

- Observation (Aronoff 1976): *-ity* forms are blocked if adjective is derived from a noun.
- Ingredients of a DM analysis (Embick and Marantz 2008):
  - The *-ous* must be a morphological 'piece' if derivable from a noun.

(51)



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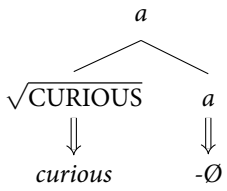

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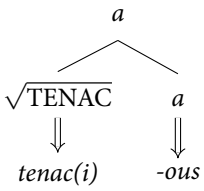


  - Adjectives not derivable from nouns can either take *-ous* or have it as part of their stem.
  - The suffix *-ity* directly attaches to roots not derivable from nouns.
  - The suffix *-ness* attaches to adjectives derived by *a* = *-ous* (never directly to roots).

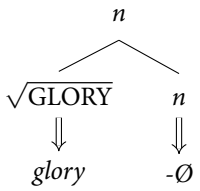
(54)
a. *n* ↔ *-ity* / ___ {√CURIOUS, √PRECIOUS, √ATROC, …}
b. *n* ↔ *-ness* / [… [$_a$ -ous]] ___
c. *n* ↔ -Ø

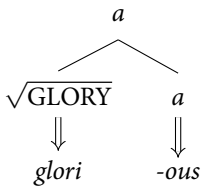
  - Adjectives that take *-ity* in addition to *-ous* have a special null form of *a*:

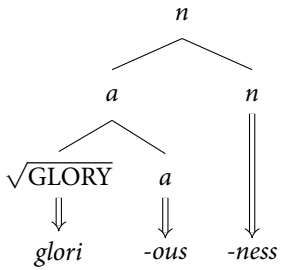
(55)
a. *a* ↔ -Ø / ___ {√CURIOUS, √PRECIOUS. . .}
b. *a* ↔ *-ous*

  - Adjectives that drop *-ous* with *-ity* (e.g. *atrocious*) are not listed in (55a).
- The **gloriosity* gap follows because can *n* attach to the root to form a noun (and must be therefore be null):

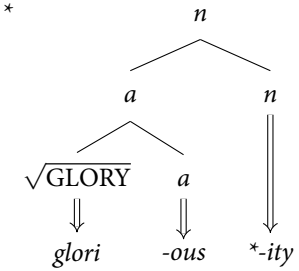
(56)





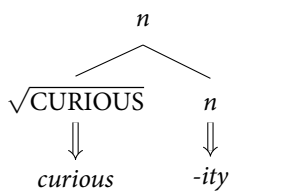


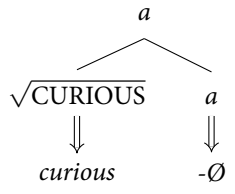
*

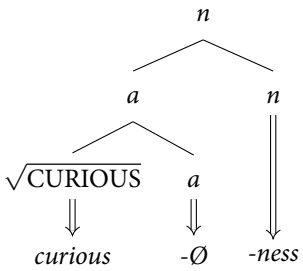


- Roots that are not independently possible nouns as take *-ity* when *n* attaches directly to them:

(57)



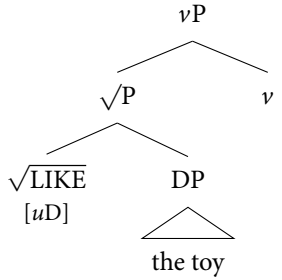




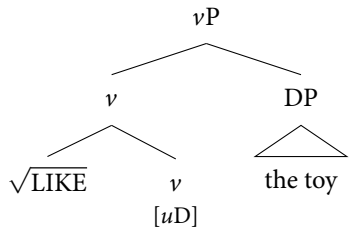
4.2 Selection

- What about internal arguments of the verb?

(58) *Root selects*



(59) *Categorial head selects*



- Argument in favour of categorial heads selecting: *l(exical)-selection* (Merchant 2019).
- Some roots show uniform behaviour across different categories:

(60) a. They rely **on** our help. ($\sqrt{\text{RELY}}$ = verb)
b. Their reliance **on** our help is well-known. ($\sqrt{\text{RELY}}$ = noun)
c. They are reliant **on** our help. ($\sqrt{\text{RELY}}$ = adjective)

- Others do not, however:

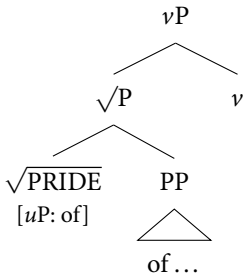
(61) a. They pride themselves **on** their cooking. ($\sqrt{\text{PRIDE}}$ = verb)
b. Their pride **in/*on/*of** their cooking is well-known. ($\sqrt{\text{PRIDE}}$ = noun)
c. They are proud **of/*in/*on** their cooking. ($\sqrt{\text{PRIDE}}$ = adjective)

(62)

verb	*noun*	*adjective*
apologize for	apology for	apologetic for
rely on	reliance on	reliant on
comply with	compliance with	compliant with
pride (onself) on	pride in	proud of
support	support of/for	supportive of/*for
sympathize with	sympathy with	sympathetic to
oppose	opposition to	opposed to
destroy	destruction of	destructive to

- Problem? If the root selects the argument, then what stops a categorizing head from combining with the 'wrong' $\sqrt{\text{P}}$?

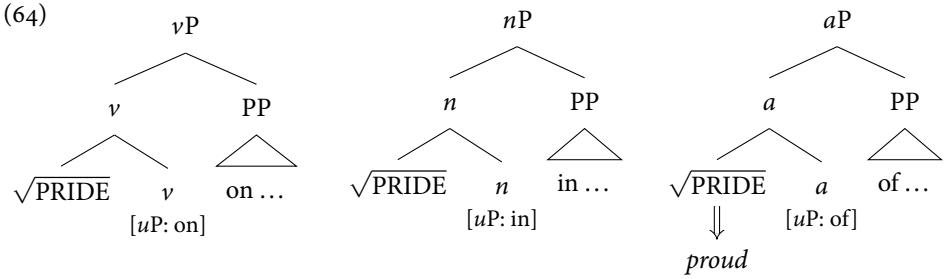
(63) a. *They pride themselves **of** their cooking.



b. *They are proud **in** their cooking.

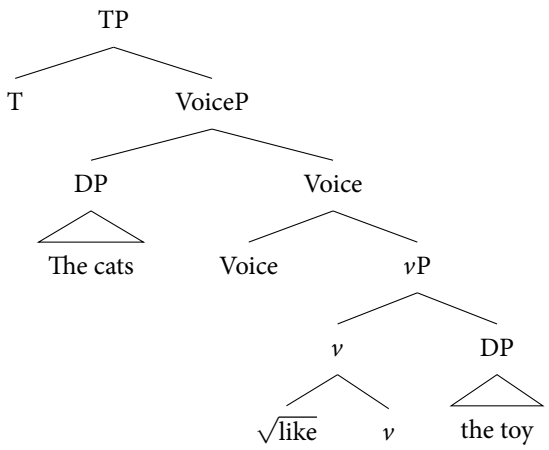
- If the category-defining head itself is responsible for selection, this problem can be avoided.

(64)



- The advantage is that they we do not need more than one lexical entry for the root.
- With this in mind, the basic structure of an English sentence where internal arguments are selected by the categorizing head would be:

(65)



- If overt tense/agreement inflection (e.g. *-s*) sits in T, how do we form words (complex heads)?
- We will follow up on this question in the next class.

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