Roots don't select, categorial heads do:
lexical-selection of PPs may vary by category

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1 How selection works

(1) Merge(α, β)
For any syntactic objects α, β, where α bears a nonempty selectional list $\ell = <F_1, \ldots, F_n>$ of selectional features, and β bears a categorial feature F' that matches F_1,
call α the head and

  a. let $\alpha = \{\ \gamma, \{\ \alpha{-}\ell, \beta\}\}$ call γ the projection of α, and

  b. if n > 1, let $\ell = \langle F_2, ..., F_n\rangle$, else let $\ell = \emptyset$,   and

  c. let $\gamma = \left[\begin{array}{ll} \text{CAT} & [cat(\alpha)] \\ \text{SEL} & [\ell] \end{array}\right]$

(2) Set F of selectional features = { N, V, P, A, C, *on*, *in*, +wh, -Q, +pl, $\sqrt{\text{RELI}}$, … }
This permits c(ategory)- and l(exical)-selection (Pesetsky 1991)
See Adger 2003, Kobele 2012, Collins and Stabler 2016 for related definitions, and Merchant 2014 for the full system.

- A prima facie surprising claim: all arguments are severed from the root
Borer 2005, Pylkkänen 2008, Adger 2013, Alexiadou 2014, van Craenenbroeck 2014, Lohndal 2014, De Belder and van Craenenbroeck 2015

2 Category-invariant l(exical)-selection

(3) a. They rely **on** oil.
  b. Their reliance **on** oil is well-known.
  c. They are reliant **on** oil.

(4) a. The compound reacted **to** light.
  b. The compound's reaction **to** light was expected.
  c. The compound was reactive **to** light.

(5) a. **in** de liefde geloven   Dutch (Neeleman 1997)
    in the love believe 'believe in love'

  b. het geloof **in** de liefde
    the belief in the love 'the belief in love'

(6) a. Anna glaubt **an** die Logik.   German
    Anna believes on the logic 'Anna believes in logic.'

  b. Annas Glaube **an** die Logik ist unerschütterlich.
    Anna's belief on the logic is unshakable.
    'Anna's belief in logic is unshakable.'

(7) V-N-A tuples with selected Ps (a selection from a database of 1109 so far[1])

V	N	A	P
look, name			after
jeer			at
laugh	laughter		at
wonder	wonder		at
work			at
angle			for
apologize	apology	apologetic	for
atone	atonement		for
blame	blame		for
call	call		for
	craze	crazy	for
		game	for
hope	hope	hopeful	for
long			for
wait	wait		for/on
believe	belief	(cf. *credulous of*)	in
delight	delight		in
trust	trust	trusting	in
look	look		into
check			on
depend	dependence	dependent	on
rely	reliance	reliant	on
appeal	appeal	appealing	to
	audibility	audible	to
confess	confession		to
dedicate	dedication	dedicated	to
object	objection		to
react	reaction	reactive	to
respond	response	responsive	to
	right		to
	sensitivity	sensitive	to
submit	submission	submissive	to
		tantamount	to
	visibility	visible	to
	consciousness	conscious	of
dispose			of
	guilt	guilty	of
	innocence	innocent	of
tire		tired	of
comply	compliance	compliant	with
cope, toy			with
dispense	dispensation		with

- "the fact that selectional restrictions remain in force across the nominal/verbal divide (*study chemistry/student of chemistry*) suggests that whatever low category is sister to the internal

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argument is **not specific to the nominal** extended projection. The acategorial root meets this description perfectly" (Harley 2014:22–23 fn 22, emphasis added).[2]
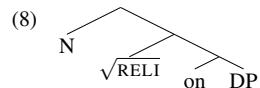
(8)   N as *categorizer* (often written *n*)

(9)   a. $\sqrt{\text{RELI}}$:: [SEL:$\langle$on$\rangle$]   b. N:: [SEL:$\langle\{\sqrt{\text{RELI}}, ... \}\rangle$]

(10)   N $\leftrightarrow$ ance / $\sqrt{\text{RELI}}$ ___

- "These facts are arbitrary." (Pesetsky 1991:10)

(11)   a. a time-sensitive (*to) matter; the matter's time-sensitivity (*to)
      b. a drug-dependent (*on) recovery; his drug-dependence (*on)

(12) $[\![of/in/on/at/...]\!] = \lambda x_\tau[x_\tau]$ (meaningless prepositions denote identity functions)

(13)   a. She envies his accomplishments.
      b. Her envy **of** his accomplishments is understandable.
      c. She is envious **of** his accomplishments.

(14)   a. We appreciate his help.
      b. Our appreciation **of** his help is great.
      c. We are appreciative **of** his help.

(15)   a. Abby fears dark spaces.
      b. Abby's fear **of** dark spaces is well known.
      c. Abby is fearful **of** dark spaces.

(16)   V-N-A tuples with verbal direct objects and N/A *of*-objects

V	N	A	P
appreciate x	appreciation	appreciative	of
arrest x	arrest		of
choose x	choice		of
confirm x	confirmation		of
deny x	denial		of
destroy x	destruction	destructive	of
envy x	envy	envious	of
fear x	fear	fearful	of
indicate x	indication	indicative	of
study x	student		of

3   Category-dependent l(exical)-selection

(17)   a. I oppose (***to**) lower capital gains taxes.
      b. My opposition **to** lower capital gains taxes is well known.
      c. I am very opposed **to** lower capital gains taxes.

[2]And there isn't always a verb in the paradigm, *pace* Alexiadou and Grimshaw 2008; sorry, Artemis!

(18)   a. I desire (***for**) chocolate.
      b. My desire **for** chocolate knows no bounds.
      c. I am desirous **of** chocolate.

(19)   a. Buckley attacked (***on**) liberalism.
      b. Buckley's attack **on** liberalism was scathing.

(20)   a. Sam needs to account **for** his behavior.
      b. Sam's account **of** his behavior was penitent.

(21)   a. Her country abounds **in** mineral wealth.
      b. Her country enjoys an abundance **of** mineral wealth.
      c. Her country is abundant **in/?with** mineral wealth.

(22)   a. She prides herself **on** her thoroughness.
      b. Her pride **in** her thoroughness is understandable.
      c. She is proud **of** her thoroughness.

(23)   a. I rarely concern myself **about/*for/with** his progress.
      b. My rare concern **about/for/with** his progress is understandable.
      c. I am quite unconcerned **about/*for/?with** his progress.

(24)   a.   i. She attempted the hardest problem.
         ii. She attempted to climb the Sears Tower.
         iii. She attempted taking seven courses in one quarter.

(25)   a.   i. Her attempt **of** the hardest problem was inspiring.
         ii. Her attempt to climb the Sears Tower was illegal.
         iii. Her attempt *(**at**) taking seven courses was insane.
         iv. *Her attempt **of** taking seven courses was insane.

(26)   a. Ralph answered (***to**) the question.
      b. Ralph's answer **to** the question was the best one.

(27)   a. The music disrupted her concentration.
      b. The music's disruption **of** her concentration was complete.
      c. The music is disruptive **to** her concentration.

(28)   a. Bernie supports (***for**) tax increases on the wealthy.
      b. Bernie's support **of/for** tax increases on the wealthy is unwavering.
      c. Bernie is supportive **of/*for** tax increases on the wealthy.

(29)   a. Abby is the equivalent **of** three teachers.
      b. Abby is equivalent **to** three teachers.

(30)   a. Sara helped me.
      b. Sara's help **to** me was invaluable. Sara was a great help **to** me.
      c. Sara was very helpful **to** me.

(31)   a. The gang menaced the neighborhood.
      b. The gang's menace **to/*of** the neighborhood was clear.
      c. The gang was (very/un-) menacing **to/*of** the neighborhood.

(32)　a. She sympathizes **with** the refugees/your proposal.

　　b. She has great sympathy **with/*to** the refugees/your proposal.

　　c. She is very sympathetic **to/*with** the refuges/your proposal.

(33)　V-N-A tuples with differing selected Ps or direct objects (134 in database)

V	N	A
abound in/with x	abundance of x	abundant in/?with x
access x	access to x	
account for x	account of x	
answer x	answer to x	
appall x		appalling to x
assault x	assault on x	
astonish x		astonishing to x
attack x	attack on x	
attempt x	attempt at/of x	
benefit x	benefit to x	beneficial to x
concern oneself with x	concern with/for/about x	concerned about x
	contempt for x	contemptuous of x
desire x	desire for x	desirous of x
destroy x	destruction of x	destructive to x
disrupt x	disruption of x	disruptive to/?of x
encounter x	encounter with x	
	equivalent of x	equivalent to x
	faith in x	faithful to x
help x	help to x	helpful to x
oppose x	opposition to x	opposed to x
pride oneself on x	pride in x	proud of x
resemble x	resemblance to x	
support x	support of/for x	supportive of x
	synonym of/for x	synonymous with x
witness x	witness to x	

(34)　The usual geometry cannot be right:
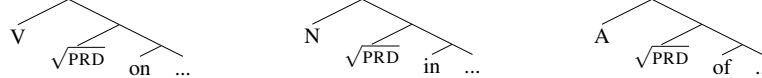
This geometry cannot be saved by analyzing the *on, in, of* alternation as one of contextually triggered allomorphy (idea: roots like $\sqrt{\text{PRD}}$ c-select for an underspecified P, and DM rules spell P out as *on, in, of*):

(35)　P $\leftrightarrow$ in / N $\sqrt{\text{PRD}}$ ___

Problem 1: Many roots are like $\sqrt{\text{OPPOS}}$ where a verbal direct object alternates with a PP complement to an N or A: the following set of selectional features fails to account for the category-sensitivity:

(36)　$\sqrt{\text{OPPOS}}$ $\begin{bmatrix} \text{CAT} & [\sqrt{\ }] \\ \text{SEL} & [\langle\{D, P\}\rangle] \end{bmatrix}$

Problem 2: Allomorphic rules are too late: these alternations feed wh-movement

(37)　The legislature passed the proposal to which we were opposed.

3.1　Solution: Categorizing heads may have two selectional features

Categorizing heads select for some roots and not others: these idiosyncrasies are listed as the set of selectional features that a particular category head takes.

(38)　N_{in} $\begin{bmatrix} \text{CAT} & [\text{N}] \\ \text{SEL} & [\langle\{\sqrt{\text{PRD}}, \sqrt{\text{TRUST}}, \sqrt{\text{FAITH}}, \ldots\}, in\rangle] \end{bmatrix}$

(39)　V_{on} $\begin{bmatrix} \text{CAT} & [\text{V}] \\ \text{SEL} & [\langle\{\sqrt{\text{PRD}}, \sqrt{\text{RELI}}, \ldots\}, on\rangle] \end{bmatrix}$

(40)　A_{of} $\begin{bmatrix} \text{CAT} & [\text{A}] \\ \text{SEL} & [\langle\{\sqrt{\text{PRD}}, \sqrt{\text{DESIR}}, \ldots\}, of\rangle] \end{bmatrix}$

- Merge in (1) applies iteratively: the first selectional feature on the list licenses the construction of the N/V/A + root:

(41)　Merge(N_{in} , $\sqrt{\text{PRD}}$) = N_{in}
　　　　　　$\langle\sqrt{\text{PRD}}, in\rangle$　　　　　　　$\langle in\rangle$

- The second selectional feature on the list licenses the Merger of the PP:

(42)　Merge(N_{in} , in) = N_{in}

- After merger of additional functional heads in the extended projection of N and head movement (additional operations such as Local Dislocation not represented):

(43)
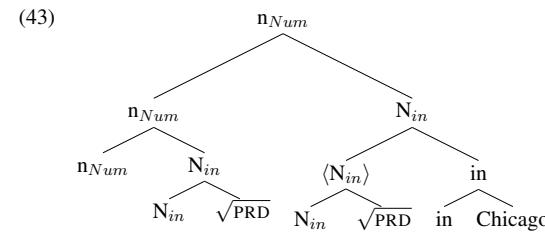
(44)　a. $\sqrt{\text{PRD}} \leftrightarrow$ pride / ___ N　　　　　　　　c. $\sqrt{\text{PRD}} \leftrightarrow$ proud / ___ A

　　b. $\sqrt{\text{PRD}} \leftrightarrow$ pride / ___ V

N node realization is not sensitive to selectional features, only to the list of roots (cf. Alexiadou et al. 2007, Adger 2013):

(45)　*reliance on, abundance in, resemblance to*: N_{on}, N_{in}, N_{to}

(46)　N $\leftrightarrow$ ance / $\{\sqrt{\text{RELI}}, \sqrt{\text{ABOUND}}, \sqrt{\text{RESEMBL}}, \ldots\}$

3.2 The history of *lust*

(47) a. They lust **for/after** chocolate.

b. Their lust **for/*after** chocolate was insatiable.

(48) Relative frequency of verbal *lust for* vs *lust after*:
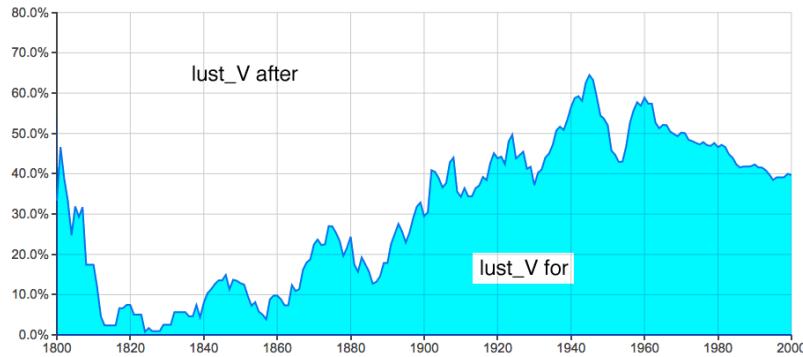
(49) Relative frequency of nominal *lust for* vs *lust after*:
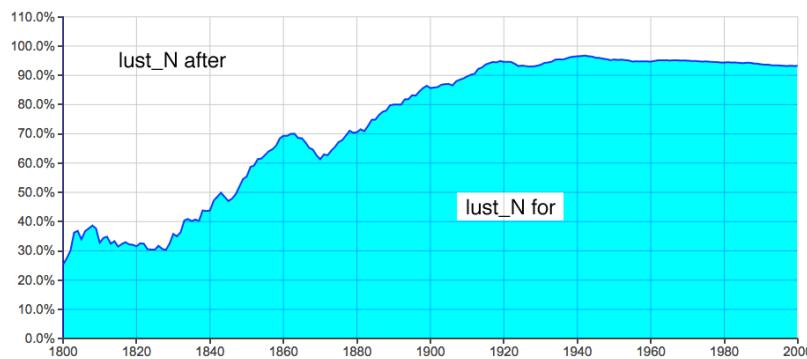
Conclusion: selectional features are **stochastic**

One implementation of a probabilistic CFG ($G = (N, T, S, R, p)$) with subcategorization: p is a parameter for each rule $A \to \beta \in R$, such that for each $A \in N$:

$$\sum_{A \to \beta \in R(A)} p(A \to \beta) = 1$$

(50) $\text{V}_{for} \begin{bmatrix} \text{CAT} & [\text{V}] \\ \text{SEL} & [\langle \{ \sqrt{\text{LUST}}^{0.4r}, \ldots \}, \text{for} \rangle] \end{bmatrix}$

(51) $\text{V}_{after} \begin{bmatrix} \text{CAT} & [\text{V}] \\ \text{SEL} & [\langle \{ \sqrt{\text{LUST}}^{0.6r}, \ldots \}, \text{after} \rangle] \end{bmatrix}$

3.3 Inner vs. outer selection

Inner categorizing heads:

(52) ∅, -al, -ance, -ant/ent, -ed, -ful, -ible, -ing, -ive, -(t)ion, -(u)ous

(53) Prediction: Categorizing heads that take already categorized XPs cannot alter the selectional properties.
-ness, -hood, -ity, -ish, -al, (see Nevins 2015 on *-al* as a root)

(54) a. She exhibits great faith **in** God.

b. She is very faithful **to** God.

c. She exhibits great faithfulness {**to/*in**} God.

(55) a., b., c.
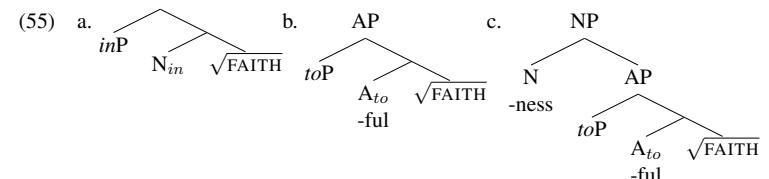
(56) oppose (*to), opposition to, oppositional to, oppositionality to

(57)
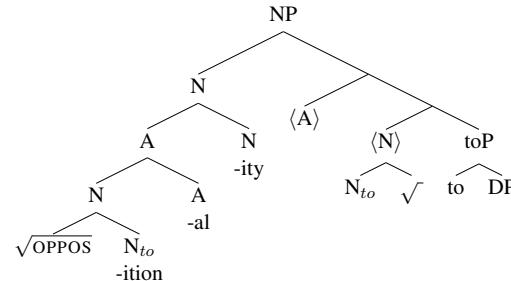
- *-er* attaches to V; therefore, the verbal selectional feature persists:

(58) a. Sam was the first responder to/*of the accident.

b. Abigail is a firm believer in/*of the power of yoga to improve one's life.

c. Conscientious objectors to/*of the war were put in prison.

(59) a. Buckley was the attacker of/*on more than a dozen of the victims.

b. Abby is a supporter of/*for equal rights.

dis- in *distrust* is root-attaching (cf. *disgust*):

(60) a. They trust me. Their trust *of/in me is not misplaced.

b. They distrust me. Their distrust of/*in me is utterly unfounded.

(61)
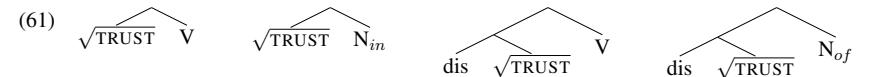
3.4 Neeleman's Generalizations (Neeleman 1997)

3.4.1 There can be at most one idiosyncratic PP per root

This follows if such PPs can only be selected by the categorizing head; additional PPs (e.g., *about*P) and DP arguments are introduced by v (or Appl, or v_{Appl}) heads.

(62) a. Abby talked to Ben about the weather.
     b. Abby reported to Ben on the the weather.
     c. The story/book/article/talk/speech/report was about/on the weather. (Grimshaw and Rosen 1990, Adger 2013:82)
     d. The report was to Ben, not to you.
     e. Abby spilled the beans to Ben about the weather.

(63) a. What blocks *faithful in God to his commands*?

       [tree: toP → (A_{to} → inP → ($\sqrt{\text{FAITH}}$, N_{in}); A_{to})]
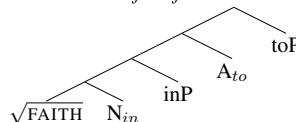
     b. Semantic failure: $[\![\sqrt{\text{FAITH}}]\!] = \lambda x \lambda s[faith(s)(x)] : \langle e, vt\rangle$
       $\lambda x \lambda s[faith(s)(x)]([\![in\ God]\!]) \rightsquigarrow \lambda s[faith(s)(god)] : \langle vt\rangle$
       No way to compose with an additional type e argument: $[\![to\ his\ commands]\!] = his.commands$
       $\langle e\rangle$
       $\lambda s[faith(s)(god)] \circ his.commands \rightsquigarrow \bot$

3.4.2 There are no idiosyncratic PP subjects

(64) a. *In jazz will interest everyone here.
     b. *It would be surprising if on this land abounded (with) high-quality grains.
     c. *It would be surprising for on this land to abound (with) high-quality grains.

An embarrassment of riches (possible reasons): 1. Cf. Ramchand's Generalization (Ramchand 2008)? 2. Agree is blocked by PP? (But both *It was worked on many alternatives* and *There were worked on many alternatives* are bad...) 3. only category heads can l-select; v, etc. (the neo-Davidsonian menagerie of argument-introducing heads) cannot select PP without imposing a θ-requirement on them (e.g., v_{on} in *They embroidered stars on the jacket* is $[\![v_{on}]\!] = \lambda r : r \in LocativeRelations \in [\![on]\!][r]$

3.5 Psych predicates (32 in database)

In case you thought psych predicates (experiencer object verbs) weren't already a big enough problem for the U(T)AH:

(65) a. I anger him. (*He angers at me.)
     b. His anger at me is baffling.
     c. He is angry at me.

(66) a. Jazz interests me. (*I interest in jazz.) (They interested me in jazz.)
   b. My interest in jazz has never flagged.

     c. I am interested in jazz. (?I interested myself in jazz.)

(67) a. Her attitude exasperates me. (*I exasperate with/at her attitude.)
     b. My exasperation with>at her attitude is unappealing.
     c. I'm very exasperated with>at her attitude.

(68) a. That frightens me.
     b. My fright at/?over/*in/about his absence was real.
     c. I am (very/un-) frightened at/?over/*in/about/by his absence.

(69) a. (*His absence remorses me.)(*I remorse (myself) at his absence.)
     b. My remorse at/?over/*in/about his absence was real.
     c. I am quite remorseful at/?over/*in/about his absence.

(70) a. The movie upset me.
     b. (*My upset at the movie was fleeting.) (Cf. The team's úpset of/*at their opponents was amazing.) c. I am very upset at the movie.

3.6 Uniform (category-insensitive) selection

(71) rely on, reliance on, reliant on

- Possibilities:

  1. Some selectional features go on the 'root' after all? (Some nouns come categorized?)

     (72)

       [tree: N → (N → ($\sqrt{\text{OBJECT}}$; N_{to}, $sel : \langle\sqrt{},to\rangle$, -tion); toP)]   [tree: N → (N, opposition, $sel : \langle to\rangle$; toP)]
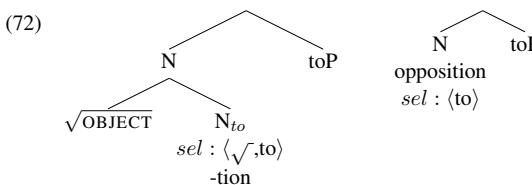
     Worst of all possible worlds? Loses the parallel of *object:ion::opposi:tion*.

  2. There is 'joint selection', with selectional features activated on roots by higher category nodes (cf. V-movement feature on T activated by matrix C in Scandinavian; Case feature on p/P activated by Voice[act] in pseudopassivizing languages)

  3. These cases all involve layered categorizers: additional affixes on low (presumably verbal) categorized stems (so *reliance* and *resemblance* have differing amounts of structure; cf. Bruening 2014, Alexiadou et al. 2015 on adjectival passives):

     (73)

       [tree: NP → (N → ($\sqrt{\text{RELI}}$, V_{on}; -ance); $\langle V\rangle$ → ($\sqrt{}$, V_{on}); onP)]   [tree: NP → ($\sqrt{\text{RESEMBL}}$, N_{to} -ance; toP)]
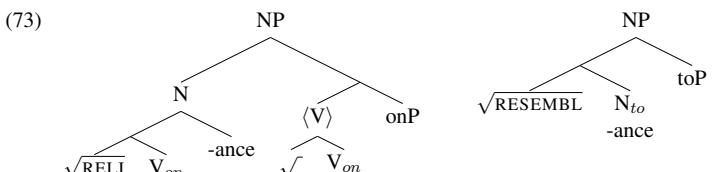
  4. The generalizations (and predictive power) are over larger chunks of structure: spanning (Merchant 2015), fragment grammars (O'Donnell 2015).

(74)
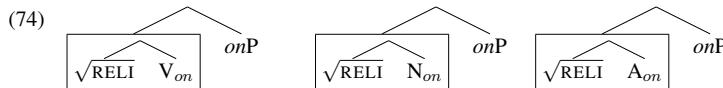
5. In a tradional lexicalist theory, "Regularities involving only selectional features might in principle be stated as redundancy rules of the lexicon" (Chomsky 1970:213)

(75)   a.   V[...X...] $\leftrightarrow$ A[...X...]

     b.   V[...X...] $\leftrightarrow$ N[...X...]

     c.   N[...X...] $\leftrightarrow$ A[...X...]

(76)   Elsewhere case:

$$[...X...]_\alpha \qquad \leftrightarrow \qquad [...X...]_\beta$$
$$[\text{SEL}[< F_1, ..., F_n >]] \qquad [\text{SEL}[< F_1, ..., F_n >]]$$

(77) $V_{on} \begin{bmatrix} \text{CAT} & [\text{V}] \\ \text{SEL} & [\langle \sqrt{\text{RELI}}, \text{on} \rangle] \end{bmatrix} \leftrightarrow A_{on} \begin{bmatrix} \text{CAT} & [\text{A}] \\ \text{SEL} & [\langle \sqrt{\text{RELI}}, \text{on} \rangle] \end{bmatrix}$

3.7   L-selection and 'one'-anaphora

Payne et al. 2013 is wrong: The resolution/inheritance mechanism for *one*-anaphora must have access to the selectional features of (complex) N antecedent:

(78)   a.   Vicious attacks on Bernie are more frequent than tongue-in-cheek ones on Trump.

     b.   Her first objection to the draft was more effective than her second one to the law itself.

4   Conclusions

1. There is *category-sensitive selection*: the lexical category can determine the idiosyncratic, non-semantically predicable preposition that a complement PP is headed by

2. This can be modeled by letting the categorizing heads have selectional features

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