CONVERGENT GRAMMAR

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The handout for this lecture is available at:

`http://www.ling.ohio-state.edu/~pollard/cvg/day2ho.pdf`

DAY TWO: SO-CALLED OVERT MOVEMENT

- Overview
- Topicalization
- Where Traces Can Be ('ECP')
- *Tough*
- Nested Dependency Condition (NDC)
- Parasitic Gaps
- Across-the-Board Condition (ATB)

(1) **The Pretheoretical Term 'Overt Movement'**

- Here, by **overt movement**, we mean the class of phenomena that have been discussed over the past half-century under such rubrics as **extraction** and Ā**-movement**.
- Thus it refers to phenomena such as those discussed by Chomsky (1977) 'On wh-movement' or by Levine and Hukari 2006 (*The Unity of Unbounded Dependency Constructions*).
- So phenomena that have been discussed under the rubrics of **head movement** (e.g. verb inflection, subject-auxiliary inversion) and NP**-movement**/A**-movement** (e.g. passive, raising to subject) are excluded.
- In English, there are both finite and infinitive overt movement constructions, but for expository simplicity, here we consider only the finite constructions.

(2) **Some Examples of Overt Movement**

a. JOHN$_i$, Fido bit t$_i$. [Topicalization]

b. I wonder [who$_i$ Fido bit t$_i$]. [Indirect Question]

c. Who$_i$ did Fido bite t$_i$? [Direct Question]

d. The neighbor [who$_i$ Fido bit t$_i$] was John. [Relative Clause]

e. Felix bit [who(ever)$_i$ Fido bit t$_i$]. [Free Relative]

f. It was John [who$_i$ Fido bit t$_i$]. [Cleft]

g. [Who$_i$ Fido bit t$_i$] was John. [Plain Pseudocleft]

h. [Who$_i$ Fido bit t$_i$] was he bit John. [Amalgamated Pseudocleft]

i. [[The more cats]$_i$ Fido bit t_i], [[the more dogs]$_j$ Felix scratched t$_j$]. [Left and right sides of Correlative Comparatives]

In all these examples, the expression on the left periphery that is coindexed with the trace is called the **filler**, or **extractee**, or **dislocated expression**.

(3) **Main Features of CVG Analysis of Overt Movement**

- We treat traces as ordinary variables in the syntactic logic.
- Unlike TG traces, they do not arise from movement or copying.
- Our Schema G for overt movement phenomena is a generalized ND formulation of Gazdar's (1979) linking schemata, which employed **derived categories** such as S/NP (here / is *not* the Lambek /).
- HPSG generalized Gazdars's / to the list-valued SLASH feature, and HPSG's Filler-Head Schema schematized over Gazdar's linking schemata.
- But HPSG's feature-structure encoding obscured the logic behind Gazdar's schemata.
- In CVG, the counterpart of the category under Gazdar's / is just the ND **variable context** .
- In short: Gazdar's / wasn't a connective; it was $\vdash$.

SYNTAX OF TOPICALIZATION

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(4) **The Category T of Topicalized Sentences**

a. $*$ Kim wondered whether BAGELS, Kim liked.

b. $*$ The fact that BAGELS, Kim likes is inexplicable.

c. $*$ Our town was so snooty that CROISSANTS, the cops ate.

Conclusion: T $\neq$ S.

(5) **Topicalization is Unbounded**

a. BAGELS, she likes.

b. BAGELS, I think she likes.

c. BAGELS, I don't think he even suggested she likes.

(6) **Topicalization Requires a Gap**

a. $*$ Bagels, Kim likes muffins.

b. $*$ Bagels, Kim likes the pumpernickel ones from Cup o' Joe.

Note: gapless constructions that superficially resemble topicalization—**left dislocation constructions**—have a different discourse function (of establishing a new topic).

(7) **Topicalization can Involve Multiple Gaps**

a. Bagels$_i$, we eat t$_i$ right from the bag without bothering to toast t$_i$.

b. [These reports]$_i$, we can file t$_i$ immediately after photocopying t$_i$.

c. [Kim and Sandy]$_i$, we should ask some former students of t$_i$ to nominate t$_i$ for a teaching award.

d. [Kim and Sandy]$_i$, some former students of t$_i$ nominated t$_i$ for a teaching award.

(8) **If One Conjunct has a Gap, they all do**

a. Nixon$_i$, we collect photos of t$_i$ and books about t$_i$.

b. $*$ Nixon$_i$, we collect photos of t$_i$ and books about Agnew.

c. $*$ Nixon$_i$, we collect photos of Agnew and books about t$_i$.

(9) **Topicalization is Category-Sensitive**

a. SHE/∗ HER, I firmly believe would make an excellent candidate.

b. HER/∗ SHE, I would never vote for t_i.

c. On/∗ About/∗ To FIDO, you can depend.

(10) **Topicalization Gap can be a Subject (modulo '*that*-trace effect'**

a. Bagels, I believe Kim said were too salty for her diet.

b. $*$ Bagels, I believe Kim said that were too salty for her diet.

c. ? Bagels, I believe Kim said that, unless they came from Trader Joe's, were too salty for her diet.

d. $*$ Fido, I wonder whether bit Felix.

(11) **Topicalization Gap can be a Complement**

a. Bagels, Kim likes.

b. That decrepit old carpet, not even a cockroach would sleep under.

c. Fido, you can depend on.

d. On Fido, you can depend.

e. That snow is white, no sane person would dispute.

(12) **Topicalization Gap can be a VP Right Modifier**

a. On Tuesday, I don't think we should meet.

b. While the prospectives are in town , I don't think we should meet.

c. Without an agenda, I don't think we should meet.

d. To handle such a trivial matter, I don't think we should meet.

(13) **Topicalized Phrase cannot be a Dummy**

a. ∗ It, Kim thinks is obvious that snow is white.

b. ∗ It, I don't believe for a minute will rain.

c. ∗ There, Sandy claimed was a unicorn in the vestibule.

(14) **Where Topicalization Gaps Cannot be (1/2)**

a. $*$ All$_i$, I never claimed Kim likes t$_i$ cats. [Det of NP]

b. $*$ Six feet$_i$, Kim isn't t$_i$ tall. [Deg of AP]

c. $*$ Cats$_i$, I never claimed Kim likes all t$_i$. [N of NP]

d. $*$ Tall$_i$, Kim isn't six feet t$_i$. [Head of AP]

e. $*$ Whether$_i$, I wonder t$_i$ snow is white. [Complementizer]

f. $*$ That$_i$, I realize t$_i$ snow is white. [Complementizer]

g. $*$ [Snow is white]$_i$, I wonder whether t$_i$. [Sister of Complementizer]

h. $*$ [Snow is white]$_i$, I realize that t$_i$. [Sister of Complemntizer]

(15) **Where Topicalization Gaps Cannot be (2/2)**

a. $*$ Aardvarks$_i$, we collect t$_i$ and books about t$_i$. [Conjunct]

b. $*$ Aardvarks$_i$, we collect books about t$_i$ and t$_i$. [Conjunct]

c. $*$ Probably$_i$, I believe Kim will t$_i$ come. [Left modifier of VP]

d. $*$ Yellow$_i$, I like t$_i$ cats, [Left modifer of N]

e. $*$ [That purr audibly]$_i$, I like cats t$_i$. [Right modifier of N]

f. $*$ Cats$_i$, I like yellow t$_i$. [Modified head]

g. $*$ Cats$_i$, I like t$_i$ that purr audibly. [Modified head]

h. $*$ Left$_i$, I think Kim probably t$_i$. [Modified]

i. $*$ Meet$_i$, I would prefer that we t$_i$ next Friday. [Modified head]

j. $*$ Left$_i$, I believe Kim t$_i$. [Functor of Subject]

k. $*$ Invite$_i$, I think we should t$_i$ Sandy. [Functor of Complement]

(16) **A New Gramfun for Phrasal Affixation**

- We add to the inventory of gramfuns the name AFFIX (abbr. A), mnemonic for '(phrasal) affixation'.
- Correspondingly, we add a new 'flavor' of Modus Ponens to the syntactic (and interface) schemata ($\multimap_{\mathrm{A}}$-Elimination).
- This is used to analyze intonationally realized phrasal affixes, Japanese and Korean case markers, Chinese sentence particles, English possessive *-'s*, etc.

(17) **Topicalization is an Affix**

- Syntactically, we analyze topicalization as a phrasal affix top, which is phonologically realized as a 'B' (L+H*) pitch accent on (the phonological realization of) its argument.
- Categorially, top is a functor that converts the phrase it affixes to, of category A, into an operator of category $A^{\mathrm{T}}_{\mathrm{S}}$:

  $\vdash \mathsf{top} : A \multimap_{\mathrm{A}} A^{\mathrm{T}}_{\mathrm{S}}$

(18) **Operizers**

- We call a functional term whose result category is an operator category an **operizer**.
- This is the CVG counterpart of the TG notion of a "trigger" of overt movement.
- We will be seeing a great many more operizers!

(19) **Analysis of a Topicalized Sentence**

$\vdash$ ((Sandy top $^{\mathrm{A}}$)$_t$($^{\mathrm{S}}$ Kim (likes t $^{\mathrm{C}}$))) : T

a. In no respect was the topicalized phrase moved or copied from the trace position.

b. The topicalized phrase is not "adjoined", nor does it occupy a position analogous to 'Spec of CP'.

c. Instead, top converts Sandy into an operator that scopes over the 'gappy' S, binding its NP trace and producing a T.

d. This is typical of how 'overt movement' works in CVG.

WHERE CAN TRACES BE?

(20) **How to Constrain where Traces can be?**

How can we account for the severe restrictions on the distribution of traces illustrated in (14) and (15)?

- The need to deal with this question provides one (of many) motivations for distinguishing the grammatical functions—not merely the directions as in standard CG—of syntactic arguments.
- Roughly, trace distribution in English is as follows:
  - traces can be subjects
  - traces can be complements
  - traces can be right modifiers of VPs
  - and those are the only options.
- But our current grammar, as in ordinary ND, allows variables at any leaf of a proof tree: they can be premisses of any rule.

(21) **Schema T (Trace Schema) Reviewed**

$t : A \vdash t : A$ (t fresh)

- This is just the usual ND schema for positing hypotheses/variables.
- There is nothing to prevent an instance of it from instantiating any premiss of any inference rule.
- In short, traces can be anywhere.

(22) **More Grammatical Functions**

Recall that so far we have the following gramfuns, each with its own 'flavor' of implication and corresponding Modus Ponens schema:

- $\multimap_{\mathrm{S}}$ (subject)
- $\multimap_{\mathrm{C}}$ (complement)
- $\multimap_{\mathrm{A}}$ (affixee of phrasal affix)

Essentially following HPSG, we add the following:

- $\multimap_{\mathrm{SP}}$ (specifiee, e.g. of determiner or degree specifier)
- $\multimap_{\mathrm{M}}$ (marked phrase, e.g. by a complementizer)
- $\multimap_{\mathrm{RM}}$ (head modified on the right)
- $\multimap_{\mathrm{LM}}$ (head modified on the left)
- $\multimap_{\mathrm{R}}$ (right conjunct)
- $\multimap_{\mathrm{L}}$ (left conjunct)

(23) **Replacements for Trace Schema T**

Complement Trace Schema ($\mathbf{T_c}$):

If $\Gamma \vdash f : A \multimap_{\mathrm{C}} B$,
then $\Gamma; t : A \vdash (\mathsf{ct}(f)\ t\ ^{\mathrm{C}}) : B$ (t fresh)

Right Modifier Trace Schema ($\mathbf{T_{rm}}$):

If $\Gamma \vdash f : \mathrm{VP}$, then
$\Gamma; t : \mathrm{VP} \multimap_{\mathrm{RM}} \mathrm{VP} \vdash (^{\mathrm{RM}}\ \mathsf{mt}(f)\ t) : \mathrm{VP}$ (t fresh)
(where 'VP' abbreviates $A \multimap_{\mathrm{S}} B$)

Subject Trace Schema ($\mathbf{T_s}$):

If $\Gamma \vdash f : A \multimap_{\mathrm{S}} B$,
then $t : A; \Gamma \vdash (^{\mathrm{S}}\ t\ \mathsf{st}(f)) : B$ (t fresh)

(24) **Hypothetical Reasoning in NL is Tightly Constrained**

- Unlike 'normal' logics such as ML, our syntactic logic places severe restrictions on where hypotheses can be posited and discharged.
- The three trace schemata restrict the positing of traces to compleement, subject, or (generalized) VP-right modifier 'positions'.

  Collectively, these play the same role as the Empty Category Principle (ECP) in GB, or the Trace Principle in HPSG.
- Since Schema G is the only schema that binds traces, it follows that a syntactic hypothesis can be withdrawn only if there is a syntactic operator to bind it.
- But we are not out of the woods yet.

(25) **The *That*-Trace Effect**

a. Fido, Mary thinks John likes `t`.

b. Fido, Mary thinks that John likes `t`.

c. Fido, Mary thinks `t` likes John.

d. *Fido, Mary thinks that `t` likes John.

Unfortunately, the Subject Trace Schema as it stands licenses (d): all it knows is that subjects can be traces; it can't stop them from being just to the right of complementizer *that*.

(26) **Gazdar's Analysis of *That*-Trace**

- Gazdar's (1981) analysis of the *that*-trace effect assumed that there are **no subject traces**.
- Instead, he proposed that every verb that selects a sentential complement has a homophonous counterpart that selects a finite VP complement, but which 'sends up' a SLASH value just as if its complement were a sentence with a subject trace.
- The device that accomplished this was the Finite VP Metarule (FVPM).
- Descendants of FVPM were GPSG's Slash Termination Metarule 2 (STM2) and HPSG's Subject Extraction Lexical Rule (SELR).
- Let's try to replace our overgenerating Subject Trace Schema with one one that acts more like FVPM.

(27) **Subject Trace Schema, Version 2 ($\mathbf{T_{s2}}$)**

If $\Gamma \vdash f : A \multimap_{\mathrm{C}} B$,
then $t : C; \Gamma \vdash \mathsf{st}(f) : (C \multimap_{\mathrm{S}} A) \multimap_{\mathrm{C}} B$

- The term constructor st is essentially a lexical rule that converts a sentence-seeker into a VP-seeker.
- This seems to do the trick, but it is disconcerting that there is no free occurrence of t in the proof term!
- Should we care?
- Just in case we should, let's try again.

(28) **Subject Trace Schema, Version 3 ($\mathbf{T_{s3}}$)**

If $\Gamma \vdash f : A \multimap_{\mathrm{C}} B$ and $\Gamma' \vdash a : C \multimap_{\mathrm{S}} A$,
then $\Gamma; t : C; \Gamma' \vdash (\mathsf{st}(f)\ (^{\mathrm{S}}\ t\ a)\ ^{\mathrm{C}}) : B$

- This says: (only) complements can have trace subjects. (But not, e.g. sentential subjects, or sentences marked by compementizers.)
- This also seems to do the trick, and now t is free in the proof term.
- But we are **still** not out of the woods.

(29) **What about Subject Questions?**

- Our current Subject Trace Schema ($\mathrm{T_{S3}}$) only allows subject traces in sentences which themselves are complements.
- But what about, e.g. *Who left?*
- With our first version of the Subject Trace Schema ($\mathrm{T_S}$), this sentence received the analysis:

  $\vdash (\mathsf{who}_{\mathsf{fill}\ t}(^{\mathrm{S}}t\ \mathsf{left})) : Q$
- Now it receives no analysis at all!
- We cannot analyze *who* as in situ (as Gazdar proposed), because (as we'll see later) in-situ *wh*-expressions in English can only take scope at a question where an 'overtly moved' (i.e. not in situ) *wh*-expression has already taken scope.

(30) **Subject Operator Schema (SO)**

If $\Gamma \vdash a : A^C_B$ and $\Gamma' \vdash f : A \multimap_{\mathrm{s}} B$,
then $\Gamma; \Gamma' : \mathsf{so}(a, f) : C$.

- Here so is a new term constructor that lets an operator combine with a 'VP ' (i.e. an $A \multimap_{\mathrm{s}} B$) as if the latter were a B with an unbound trace.
- So the analysis of *Who left?* is:

  $\vdash \mathsf{so}(\mathsf{who}_{\mathsf{fill}}, \mathsf{left}) : Q$
- In common with Gazdar's analysis, a subject question is traceless.

SYNTAX OF *TOUGH*

(31) ***Tough*-Movement is Unbounded**

a. Kim$_i$ is easy to like t$_i$.

b. Kim$_i$ is easy to get people to like t$_i$.

c. Kim$_i$ will be easy to persuade people to vote for t$_i$.

d. ? Kim$_i$ will be easy to persuade students to get their parents to vote for t$_i$.

(32) ***Tough*-Movement Balks at Finite Clause Boundaries**

a. *Kim$_i$ was easy to persuade me (that) I should vote for t$_i$.

b. *Dick$_i$ will be hard to prove t$_i$ authorized Valerie's outing.

(33) ***Tough*-Movement Requires a Gap**

a. $*$ Kim is easy to like Sandy.

b. $*$ Kim will be easy to persuade people to vote for Sandy.

(34) ***Tough*-Movement can Involve Multiple Gaps**

a. Kim$_i$ is easy to detest t$_i$ after talking to t$_i$ for five minutes.

b. Kim$_i$ will be hard to persuade former students of t$_i$ to nominate t$_i$.

(35) **If One Conjunct has a Gap, they all do**

a. Kim$_i$ was easy to accomodate t$_i$ and entertain t$_i$.

b. $*$ Kim$_i$ was easy to accomodate t$_i$ and entertain her ferret.

c. $*$ Kim$_i$ was easy to accomodate her ferret and entertain t$_i$.

(36) ***Tough*-Movement 'Moves' Complements**

a. Felix is easy to like.

b. Felix is easy to depend on.

c. Fido is hard to sleep near.

d. That snow is white is hard to prove.

e. Whether snow is white is hard to settle definitively.

(37) PP**s do not *Tough*-Move (except maybe referential ones)**

a. ? After Iraq is hard to imagine.

b. $*$ On Felix is easy to depend.

c. $*$ Near Fido is hard to sleep.

(38) ***Tough*-Gap cannot be a VP Right Modifier**

a. ∗ On Tuesday is hard to meet.

b. ∗ While the prospectives are in town is hard to meet.

c. ∗ Without an agenda is hard to meet.

(39) ***Tough*-Moved Expresssion cannot be a Dummy**

a. ∗ It is easy to be obvious that snow is white.

b. ∗ It is easy to rain.

c. ∗ There is easy to be a unicorn the vestibule.

(40) **Where *Tough*-Gaps Cannot be (1/2)**

a. $*$ All$_i$ is easy to like t$_i$ cats. [Det of NP]

b. $*$ Six feet$_i$ is easy to be t$_i$ tall. [Deg of AP]

c. $*$ Cats$_i$ are easy to like all t$_i$. [N of NP]

d. $*$ Tall$_i$ is easy to be six feet t$_i$. [Head of AP]

e. $*$ Whether$_i$ is easy to wonder t$_i$ snow is white. [Complementizer]

f. $*$ That$_i$ is easy to realize t$_i$ snow is white. [Complementizer]

g. $*$ [Snow is white]$_i$ is easy to wonder whether t$_i$. [Sister of Complementizer]

h. $*$ [Snow is white]$_i$ is easy to realize that t$_i$. [Sister of Complementizer]

(41) **Where *Tough*-Gaps Cannot be (2/2)**

a. $*$ Aardvarks$_i$ are hard to collect t$_i$ and books about t$_i$. [Conjunct]

b. $*$ Aardvarks$_i$ are hard to collect books about t$_i$ and t$_i$. [Conjunct]

c. $*$ Yellow$_i$ is hard to like t$_i$ cats, [Left modifer of N]

d. $*$ [That purr audibly]$_i$ is hard to like cats t$_i$. [Right modifier of N]

e. $*$ Cats$_i$ are hard to like yellow t$_i$. [Modified head]

f. $*$ Meet$_i$ is hard to prefer to t$_i$ next Friday. [Modified head]

g. $*$ Left$_i$ is hard to believe that Kim t$_i$. [Functor of Subject]

h. $*$ Like$_i$ is hard to t$_i$ Sandy. [Functor of Complement]

(42) **Violins and Sonatas**

a. [This violin]$_i$, even [the most challenging sonatas]$_j$ are easy to play t$_j$ on t$_i$.

b. $*$ [This sonata]$_j$, even [the most exquisitely crafted violin]$_i$ is hard t$_j$ to play on t$_i$.

(43) **Problems and People**

a. [Which problems]$_i$ don't you know who$_j$ to talk to t$_j$ about t$_i$?

b. $*$ [Which people]$_j$ don't you know what$_i$ to talk to t$_j$ about t$_i$?

Note: These are not *tough*-examples, but they show that whatever is going on in (42) is not specific to *tough*.

(44) **More Basic Categories**

On (nonpredicative *on*-PP)

Adj (small clause headed by predicate adjective)

Inf (small clause headed by infinitive *to*)

Bse (small clause headed by base-form verb)

(45) **More Words**

$\vdash \mathsf{is} : (\mathrm{NP} \multimap_{\mathrm{S}} \mathrm{Adj}) \multimap_{\mathrm{C}} (\mathrm{NP} \multimap_{\mathrm{S}} \mathrm{S})$

$\vdash \mathsf{easy} : \mathrm{NP}^{\mathrm{NP}\multimap_{\mathrm{S}}\mathrm{Adj}}_{\mathrm{NP}\multimap_{\mathrm{S}}\mathrm{Inf}}$

$\vdash \mathsf{to} : (A \multimap_{\mathrm{S}} \mathrm{Bse}) \multimap_{\mathrm{C}} (A \multimap_{\mathrm{S}} \mathrm{Inf})$

$\vdash \mathsf{play} : \mathrm{NP} \multimap_{\mathrm{C}} \mathrm{On} \multimap_{\mathrm{C}} \mathrm{NP} \multimap_{\mathrm{S}} \mathrm{Bse}$

$\vdash \mathsf{on} : \mathrm{NP} \multimap_{\mathrm{C}} \mathrm{On}$

Note that *easy* is an operator that binds an NP trace in an infinitive VP and returns a predicative adjective phrase.

For simplicity we disregard the optional (experiencer) *for*-phrase.

(46) **A 'Tough-Movement' Example**

John is easy to like.

$\vdash ({}^{\mathrm{S}}\ \mathsf{John}\ (\mathsf{is}\ (\mathsf{easy}_t(\mathsf{to}\ (\mathsf{like}\ t\ {}^{\mathrm{C}})\ {}^{\mathrm{C}}))\ {}^{\mathrm{C}})) : \mathrm{S}$

THE NESTED DEPENDENCY CONSTRAINT

(47) **Violins and Sonatas Revisited**

My violin, your sonata is easy to play on.

$\vdash (\mathsf{top}\ (\mathsf{my\ violin}\ ^{\mathrm{SP}})\ ^{\mathrm{A}})_t$

$(^{\mathrm{S}}\ (\mathsf{your\ sonata}\ ^{\mathrm{SP}})(\mathsf{is}\ (\mathsf{easy}_u(\mathsf{to}\ ((\mathsf{play}\ u\ ^{\mathrm{C}})(\mathsf{on}\ t\ ^{\mathrm{C}})\ ^{\mathrm{C}})\ ^{\mathrm{C}}))\ ^{\mathrm{C}})) :$
T

(48) **Nested Dependencies Constraint (NDC)**

a. [This violin]$_i$, even [the most challenging sonatas]$_j$ are easy to play t_j on t_i.

b. $*$ [This sonata]$_j$, even [the most exquisitely crafted violin]$_i$ is hard t_j to play on t_i.

c. [Which problems]$_i$ don't you know who$_j$ to talk to t_j about t_i?

d. $*$ [Which people]$_j$ don't you know what$_i$ to talk to t_j about t_i?

(49) **The NDC Explained**

- Recall that when we introduced ND with ML, we assumed the context was a **set** of variables.
- But for English syntax, we assume the context is a (nonrepeating) **list** of traces.
- Schema G ensures that a syntactic operator always binds the left-most trace.

PARASITIC GAPS

(50) **Background for So-Called Parasitic Gaps (1/3)**

- In the 1970's and 1980's it was falsely believed that overt movement from within a non-complement was ungrammatical.
  a. Here's a guidebook you shouldn't go to London without reading `t`.
  b. Norwegians are one ethnic group that jokes about `t` don't seem to upset anyone.
- However, it is true that sentences with such gaps seem better if they contain a 'coindexed' gap that **is** in a complement:
  a. Here's a guidebook you shouldn't just throw away `t` without reading `t`.
  b. Norwegians are one ethnic group that jokes about `t` don't seem to offend `t`.

(51) **Background for So-Called Parasitic Gaps (2/3)**

- A related belief, also false, was that, except for accross-the-board (ATB) extraction from coordinate structures, **all** cases of 'coindexed' gaps in the same sentence were of the kind in (50), where one gap (the 'host') is 'normal', and the other gap (the 'parasite') is only possible because the coindexed host gap 'licenses' it.
- Hence the name 'parasitic gap'.
- The following relative clauses show this belief was false:

  a. who we sent pictures of `t` to `t`
  b. who we consider `t` smarter than most contemporaries of `t`
  c. who we advised `t` that the FBI was about to arrest `t`
  d. who we advised `t` `t` was about to be be fired
  e. who we regaled `t` with lewd songs about `t`
  f. who we bribed former allies of `t` to betray `t`

(52) **Toward So-Called Parasitic Gaps (3/3)**

- Generally following the HPSG analysis, we assume that the term 'parasitic gap' is misleading, and that in general two trace 'positions' can be bound by the same operator.
- But our only trace-binding Mechanism is Schema G, which binds only one trace.
- And our three trace schemata always introduce fresh variables.
- And our contexts are nonrepeating lists of variables.
- So we need a way to collapse two variables of the same type in a context into one variable.
- Luckily, standard proof theory provides just what we need.

(53) **Schema TC (Trace Contraction)**

If $t : A; u : A; \Gamma \vdash b[t, u] : B$,
then $t : A; \Gamma \vdash b[t, t] : B$

Alternatively, we can follow the (usual) convention of making the availability of Contraction implicit, by allowing Schema G to (merge and) bind more than one variable.

THE ACROSS-THE-BOARD CONDITION

(54) **Background for ATB Extraction**

With well-known pragmatically marked exceptions, etxraction out of a coordinate structure is possible only if 'the same thing' is extracted from each conjunct:

a. Kim$_i$ was easy to accomodate t$_i$ and entertain t$_i$.

b. $*$ Kim$_i$ was easy to accomodate t$_i$ and entertain her ferret.

c. $*$ Kim$_i$ was easy to accomodate her ferret and entertain t$_i$.

d. Nixon$_i$, we collect photos of t$_i$ and books about t$_i$.

e. $*$ Nixon$_i$, we collect photos of t$_i$ and books about Agnew.

f. $*$ Nixon$_i$, we collect photos of Agnew and books about t$_i$.

(55) **Binary Coordination of Like Conjuncts**

a. We assume the conjunction forms a constituent with the right conjunct:

$\vdash \mathsf{and}_A : A \multimap_{\mathrm{R}} A \multimap_{\mathrm{L}} A$

b. Coordinate structures are formed by Schemas $\mathrm{M_R}$ and $\mathrm{M_L}$:

Right Conjunct Modus Ponens ($\mathbf{M_r}$) :
If $\vdash f : A \multimap_{\mathrm{R}} B$ and $\Gamma \vdash a : A$,
then $\Gamma \vdash (f\ a\ ^{\mathrm{R}}) : B$

Left Conjunct Modus Ponens ($\mathbf{M_l}$) :
If $\Gamma \vdash a : A$ and $\Gamma \vdash f : A \multimap_{\mathrm{L}} B$,
then $\Gamma \vdash (^{\mathrm{L}}\ a\ f) : B$

c. The key point is that $\multimap_{\mathrm{L}}$ is an **additive** connective: both premisses and the conclusion have the same context:

$t : \mathrm{NP} \vdash (^{\mathrm{L}}\ (\mathsf{read}\ t\ ^{\mathrm{C}})(\mathsf{and}\ (\mathsf{disliked}\ t\ ^{\mathrm{C}})\ ^{\mathrm{R}})) : \mathrm{NP} \multimap_{\mathrm{S}} \mathrm{S}$