Morphological Agreement in Minimalist Grammars

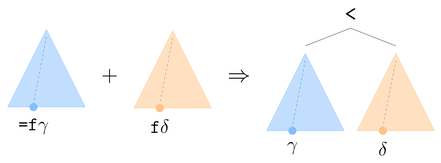
Marina Ermolaeva
University of Chicago

Introduction

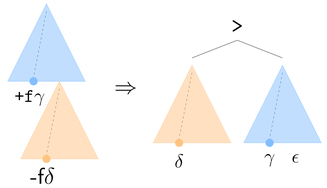
- Minimalist Grammars (MGs, Stabler 1997):
  – natural language syntax as precise grammar fragments
- Agree in Minimalist Syntax (Adger 2010):
  – Merge and Move operate on categorial features and build new structure
  – Agree operates on morphosyntactic features and forms dependencies between elements of the existing structure
- **Goal**: extend MGs with morphological features and operations on them

Minimalist Grammars

- A set of **syntactic features**:
  $Syn = base \cup$ (categories)
  $\{\texttt{=f} \mid \texttt{f} \in base\} \cup$ (selectors)
  $\{\texttt{+f} \mid \texttt{f} \in base\} \cup$ (licensors)
  $\{\texttt{-f} \mid \texttt{f} \in base\} \cup \{\texttt{*f} \mid \texttt{f} \in base\}$ (licensees)
- A set of **lexical items**:
  $Lex \subset \Sigma^* \times Syn^*$, where Σ is a set of phonological units
- Two structure-building operations:



(**merge**)



(**move**)

- **Successive cyclic movement**: *f licensees are *optionally* deleted by **move**
- **Head movement**: omitted for clarity

Shortest Move Constraint (SMC)

- No two subtrees may have the same licensee as the first feature
- More generally: the number of subtrees with unchecked features must be finitely bounded
- **Incompatible with traditional Agree!**

Implementation

- **General idea**: heads exchange information across syntactic dependencies formed by **merge** or **move**
- A set Mor of **morphological features** defined as $\langle name, value \rangle$ pairs
- A set of **annotated syntactic features**:
  $F = Syn \times \{\mathbb{T}, \mathbb{F}\} \times \mathcal{P}(Mor)$
  receiving channel – does it receive features from whatever checks it?
  emitting channel – what does it transmit to whatever checks it?
- Redefined set of **lexical items**: $Lex \subset \mathcal{P}(Mor) \times F^*$

Annotated features: examples + shorthand

$\langle \texttt{n}, \mathbb{T}, \{\langle \texttt{num}, sg\rangle, \langle \texttt{per}, 3\rangle\}\rangle \equiv \texttt{n}^{[\texttt{num}:sg,\texttt{per}:3]\rightarrow}_{\leftarrow}$ (abbreviate channels)

$\langle \texttt{d}, \mathbb{F}, \emptyset\rangle \equiv \texttt{d}$ (omit inactive/empty channels)

How it works

Example grammar

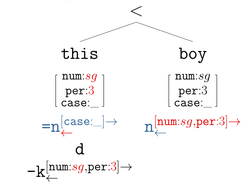
$\texttt{this} := \begin{bmatrix}\texttt{num}:\_\\ \texttt{per}:\_\\ \texttt{case}:\_\end{bmatrix} :: \texttt{=n}^{[\texttt{case}:\_]\rightarrow}_{\leftarrow}\ \texttt{d}\ \texttt{-k}^{[\texttt{num}:\_,\texttt{per}:\_]\rightarrow}_{\leftarrow}$

$\texttt{boy} := \begin{bmatrix}\texttt{num}:sg\\ \texttt{per}:3\\ \texttt{case}:\_\end{bmatrix} :: \texttt{n}^{[\texttt{num}:sg,\texttt{per}:3]\rightarrow}_{\leftarrow}$

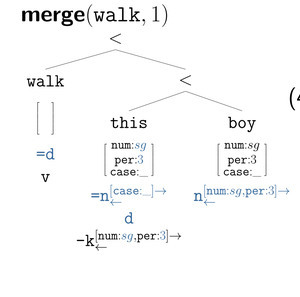
$\texttt{walk} := \begin{bmatrix}\ \end{bmatrix} :: \texttt{=d v}$

$\texttt{PRS} := \begin{bmatrix}\texttt{num}:\_\\ \texttt{per}:\_\end{bmatrix} :: \texttt{=v +k}^{[\texttt{case}:str]\rightarrow}_{\leftarrow}\ \texttt{t}$

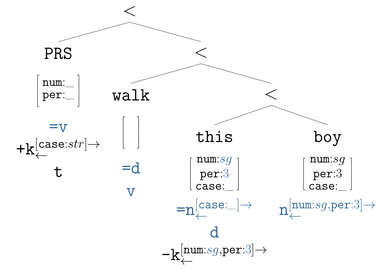
(1) **merge**(this, boy)



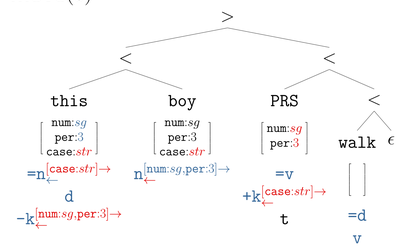
(2) **merge**(walk, 1)



(3) **merge**(PRS, 2)



(4) **move**(3)



MG agreement as Minimalist Agree

- Agreement via the last receiving channel:
  – related to the notion of **closest goal** (Chomsky 2000)
- No agreement in intermediate positions:
  – **freezing effect** of feature checking (Bošković 2008)
- Agree has **no access** to:
  (i) positions licensed by syntactic features without an active receiving channel
  (ii) intermediate positions of movement

Abstract example

$\texttt{A} := [\ ] :: \texttt{a}^{[\phi:u]\rightarrow}$

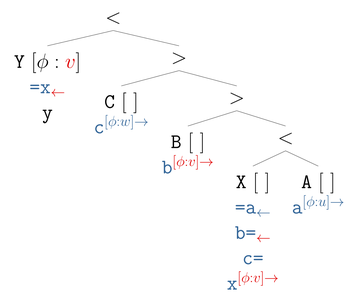
$\texttt{B} := [\ ] :: \texttt{b}^{[\phi:v]\rightarrow}$

$\texttt{C} := [\ ] :: \texttt{c}^{[\phi:w]\rightarrow}$

$\texttt{X} := [\ ] :: \texttt{=a}_{\leftarrow}\ \texttt{b=}_{\leftarrow}\ \texttt{c=}\ \texttt{x}^{[\phi:\_]\rightarrow}$

$\texttt{Y} := [\phi:\_] :: \texttt{=x}_{\leftarrow}\ \texttt{y}$

(5)



References: Adger, David. 2010. A minimalist theory of feature structure. Bošković, Željko. 2008. On successive cyclic movement and the freezing effect of feature checking. Chomsky, Noam. 2000. Minimalist inquiries: The framework. Kučerová, Ivona. 2016. Long-distance agreement in Icelandic: locality restored. Stabler, Edward. 1997. Derivational minimalism.

Case Study: Dative intervention in Icelandic

- Dative experiencers disrupt agreement in number between the verb and the nominative argument:

(6) Það **finnst** / ***finnast** fáum börnum tölvurnar ljótar.
there **find.SG** **find.PL** few children.DAT computers.DEF.NOM ugly.NOM

- Some DPs can undergo Object Shift. Agreement succeeds just in case the dative experiencer has shifted (Kučerová 2016):

(7) Það **finnst** / ??**finnast** fljótt mörgum köttum mýsnar góðar.
there **find.SG** **find.PL** quickly many cats.DAT mice.DEF tasty

(8) Það ??**finnst** / **finnast** mörgum köttum fljótt mýsnar góðar.
there **find.SG** **find.PL** many cats.DAT quickly mice.DEF tasty

Grammar fragment

$\texttt{few children} := [\texttt{num}:pl]\ :: \texttt{d}^{[\texttt{num}:pl]\rightarrow}\ \texttt{-k}^{[\texttt{num}:def]\rightarrow}$ (unshiftable DP)

$\texttt{many cats} := [\texttt{num}:pl]\ :: \texttt{d}^{[\texttt{num}:pl]\rightarrow}\ \texttt{*k}^{[\texttt{num}:def]\rightarrow}$ (shiftable DP)

$\texttt{find} := [\ ] :: \texttt{=sc}_{\leftarrow}\ \texttt{d=}\ \texttt{V}^{[\texttt{num}:\_]\rightarrow}$

$\texttt{SC} := [\ ] :: \texttt{=adj d=}_{\leftarrow}\ \texttt{+k sc}^{[\texttt{num}:\_]\rightarrow}$

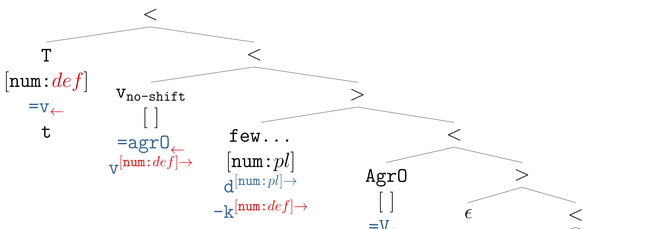
$\texttt{AgrO} := [\ ] :: \texttt{=V}_{\leftarrow}\ \texttt{+k}_{\leftarrow}\ \texttt{agrO}^{[\texttt{num}:\_]\rightarrow}$ (two receiving channels)

$\texttt{v}_{\texttt{shift}} := [\ ] :: \texttt{=agrO}_{\leftarrow}\ \texttt{+k v}^{[\texttt{num}:\_]\rightarrow}$ (Object Shift)

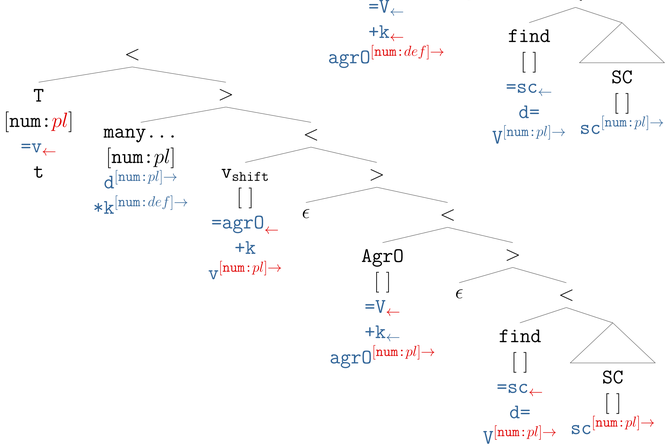
$\texttt{v}_{\texttt{no-shift}} := [\ ] :: \texttt{=agrO}_{\leftarrow}\ \texttt{v}^{[\texttt{num}:\_]\rightarrow}$

$\texttt{T} := [\texttt{num}:\_]\ :: \texttt{=v}_{\leftarrow}\ \texttt{t}$

(9)



(10)



Results

- Modified MG formalism:
  – operates over bundles of morphological features
  – implements agreement in a way compatible with SMC
- Proof of concept:
  – a straightforwardly expressed analysis of Icelandic dative intervention