Agree and Merge repair Labeling

Mariia Privizentseva
Leipzig University

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Introduction

- What derives and restricts the application of syntactic operations (Merge, in particular)?
  - Option 1: Syntactic operations are **triggered,** most commonly by features (Chomsky 1957; 1993. Adger 2003, Müller 2010; Müller 2017, Abels 2012, Collins & Stabler 2016, Zyman 2018).
  - Option 2: Syntactic operations are **free** (Chomsky 1981; 2013; 2015; 2019, Epstein et al. 2014, Ott 2012; 2015, Collins 2017, Safir 2019.)
- In this talk, I will explore the model of syntax that arises if syntactic operations are not triggered, but can in principle apply freely.

Empirical basis: EPP

- Extended projection principle (EPP) – the formal requirement for the specifier position to be filled.
- English is a classic example of languages with EPP: Spec,TP position must be filled by
  - Subject of transitive verbs (1-a,b)
  - Subject of intransitive (unaccusative) verbs (1-c,d)
  - Expletive (1-d)

(1)
a. John does not live in Leipzig.
b. *Does not John live in Leipzig.
c. A train arrived.
d. *Arrived a train.
e. There arrived a train in the station.

Languages without EPP: Russian

- Candidates for having no EPP: Romance languages, Slavic languages, Celtic VSO languages
- I will focus on Russian.
- Russian clearly does not require presence of material in pre-verbal position:

(2) Prišla vesna.
came spring
'The spring came.'

- But there is no agreement on EPP and the position of subjects in Russian (cf. Babyonyshev 1996, Bailyn 2004, Dyakonova 2009, Slioussar 2011).
- A common way-out: (1) Russian allows for null subject that satisfies EPP; (2) EPP is satisfied by verb movement.
- In what follows, I will present three arguments that subject in Russian stay in vP.

No EPP in Russian: Verb-initial order

- First argument comes from the possibility of verb-initial order with unaccusatives (see Babyonyshev 1996). This suggests that the arguments remain in their base positions.

(3) {What is happening?}

a. Zvonit telefon.
rings phone
'The phone is ringing.'

b. ?Zvonit zvonar'.
rings carillonneur
'The carillonneur rings.'

(4)

a. Svistit čajnik.
whistles kettle
'The kettle whistles.'

b. ?Svistit Vanja.
whistles Vanja
'Vanja whistles.'

No EPP in Russian: vP topicalization

- Second argument comes from the fact that subject may be part of the topicalized verbal phrase
- See Abels (2001), Aboh & Dyakonova (2009), Antonenko (2018), Hein (2020) for the discussion of this construction and arguments that it involves constituent movement in Russian.

(5) $[_{\text{vP}}$ Saša sintaksis liubut' $]$ ne liubit.
Sasha syntax love not loves
'Sasha does not love syntax.'
Lit: [[Sasha syntax to love] not loves].

No EPP in Russian: Binding into adjuncts

- Third argument comes from binding into vP-level adjuncts.
- Additional complication: Heavy adjuncts must be displaced to the sentence-final position.

(6) Valja$_i$ igraet na trube [gromko kak ego$_i$/*svoj$_i$ brat].
Valja plays on trumpet loudly as his/*self brother
'Valja plays trumpet loudly as his brother .'

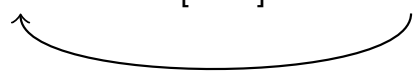
Summary

- Subject in Russian stay low in the verb phrase and languages differ in whether they employ obligatory movement to Spec,TP.
- In the model where Merge is feature-driven, EPP is formalized as a feature—[EPP] or [•D•] on the T head (cf. Alexiadou & Anagnostopoulou 1998).

(7) Feature-driven subject movement

a. $[_{T}\ T_{[\bullet D\bullet]}\ [_{vP}\ DP_{EA}\ vP\ ]\ ]\ ]$

b. $[_{TP}\ DP_{EA}\ [_{T}\ T_{[\bullet D\bullet]}\ [_{vP}\ \sout{DP_{EA}}\ vP\ ]\ ]\ ]$



- Such implementation is neither insightful, no explanatory.
- This makes EPP a perfect candidate for a free Merge system.

Background: Labeling Algorithm

- Merge is not feature-driven, but applies freely, labels are determined by minimal search (Chomsky 2013; 2015).
- Labeling Agorithm (LA) distinguishes two core configurations.

(8) $[_{XP}\ X\ YP\ ]$

- In (8), being an atomic computational item the head labels.

(9) $[_{?}\ XP\ YP\ ]$

- In (9), Minimal search finds the two heads of the merged phrases and does not give an unambiguous result.
- Two ways to determine a label: **Movement** and **Agreement**

(10) Movement for Labeling

$[\ YP\ [_{ZP}\ Z\ [_{XP}\ XP\ \cancel{YP}\ ]\ ]\ ]$

(11) Agreement for Labeling

$[_{\langle 2PL,\ 2PL\rangle}\ [_{XP}\ X_{[*\phi\ :\ \_*]}\ ZP\ ]\ [_{YP}\ Y_{[\phi:2PL]}\ WP\ ]\ ]$

Background: Weak heads

- Chomsky (2015) adds a concept of weak heads to this LA.
- Weak heads cannot provide a label by themselves, but must be **strengthened by the presence of the specifier**.
- This specifier must remain in its position, so that the label of the final projection must be determined via Agree as shown in (12-b).

(12) a. $[_{?}\ X_{weak}\ YP\ ]$
b. $[_{\langle \phi, \phi \rangle}\ ZP\ [_{XP}\ X_{weak}\ YP\ ]\ ]$

Analysis of EPP

- **Languages with EPP** have a weak T head.
- At the CP phase, there are two projections problematic for labeling: α and β in the structure below.

(13) $[_{C}\ C\ [_{\beta}\ T_{weak}\ [_{\alpha}\ DP_{EA}\ [_{v}\ v\ \ldots\ ]\ ]\ ]\ ]$

- Both labeling problems are resolved by movement of DP_{EA}.

(14) $[_{C}\ C\ [_{\langle \phi, \phi \rangle}\ DP_{EA}\ [_{T}\ T_{weak}\ [_{v}\ \cancel{DP_{EA}}\ [_{v}\ v\ \ldots\ ]\ ]\ ]\ ]\ ]$

- **Languages without EPP** differ in that they have a strong, not a weak T head. Strong T can label and does not require strengthening by a specifier.
- The problem of labeling in a lower, vP projection was resolved by movement of the external argument so the analysis thus remains incomplete.

(15) $[_{C}\ C\ [_{T}\ T_{strong}\ [_{??}\ DP_{EA}\ [_{v}\ v\ \ldots\ ]\ ]\ ]\ ]$

Against weak heads

- The core idea behind Chomsky's LA is that labeling applies at Transfer and a label must be determined simply by minimal search.
- However, the actual implementation however includes further non-trivial concepts, most notably the opposition of **weak and strong heads**,
- Some problems with this assumption:
  - The strength of the heads may hardly be determined in a non-stipulative way (see also Müller 2022)
  - Infinitival T: It cannot be strengthened by Agree (Hayashi 2020)
  - Languages without ϕ (e.g., Japanese) (Hayashi 2020)

Proposal

- I will present the analysis of EPP that builds on Chomsky's LA, but differs from the analysis summarized above in that the additional concept of the strength for syntactic heads is not required.
- **The cross-linguistic variation with respect to EPP follows from which syntactic operation applies to repair unlabelable structure in a given language.**
- As Minimalist syntax does not allow for a straightforward implementation of the repair logic, but it can be naturally accounted for under the **Optimality Theory**; see Grimshaw (1997), Pesetsky (1998), Müller (2000), Heck & Müller (2007; 2013), Heck (2008; 2021) among others.

Assumptions

- **Phase-based cyclicity**
  - Following Chomsky (2008; 2013; 2015; 2019), I assume that after the phase is built by external Merge, it is transferred to the interfaces.
  - The majority of the phase-internal operations, including internal Merge, Agree, and Label, apply at Transfer after the full phase is built.
- The operations applying at phase-level are modeled in **Harmonic Serialist version of the Optimality Theory** (see Heck & Müller 2007, McCarthy 2008).
  - The generator is restricted so that the set of outputs is produced by applying at most one operation to the input.
  - Outputs are then evaluated against the constraints and the output with the best constraint profile becomes the input to the next optimization cycle.
  - The derivation terminates when the constraint profile cannot be further improved

Constraints

(16) LABEL:
Every projection present in the input is labeled in the output.

- Labeling applies essentially as suggested by Chomsky (2013).

(17) a. X is a label in {X, YP}.
b. XP is a label in {XP, YP} if YP moved out.
c. $\langle \alpha, \alpha \rangle$ is a label in {XP, YP} if XP and YP agree in $[\alpha]$.

- Economy constraints restrict application of Merge and Agree.

(18) *AGREE:
Agree does not apply.

(19) *MERGE:
Merge does not apply.

- The final constraint restricts movement that could in principle apply unboundedly in this approach.

(20) DOMAIN CONSERVATION (DC):
Syntactic objects without $\bar{\text{A}}$-features are in A-positions.

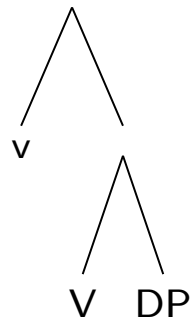
Constraints (2)

(21) Domain Conservation (DC):
Syntactic objects without $\bar{A}$-features are in A-positions.

- While it is not present in the existing literature in the formulation below, there is a clear precedence for it; see, for instance, the Wh-Criterion by Rizzi (1996).
- This constraint makes reference to $\bar{A}$/A-features and $\bar{A}$/A-positions; cf. Chomsky (1981), Mahajan (1990), Webelhuth (1992), Van Urk (2015), and Keine & Bhatt (2019) among others.
- I assume that case and ϕ are A-features, while [wh], [top], [foc], [rel] are $\bar{A}$-features. Note that these features, while being present in syntax, do not trigger syntactic operations directly.
- $\bar{A}$-positions are specifiers of heads that may host $\bar{A}$-features, but do not necessary have them in every single derivation.

Derivations: VP phase

(22) vP phase



(23) vP-level optimization, step 1

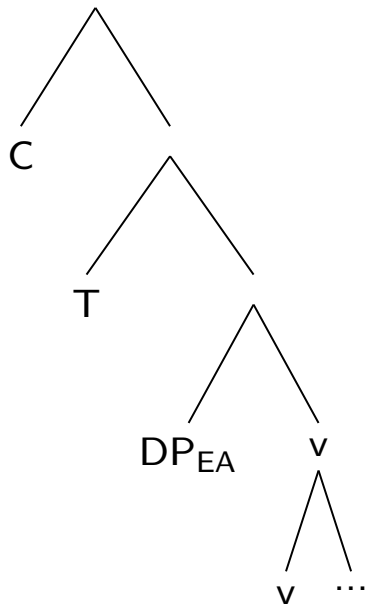
Input: [v [V DP]]	LABEL	DC	*MERGE	*AGREE
O_1: No changes	**			
O_2: DP moves to Spec,VP	*		*	
O_3: V agrees with DP	*			*
☞ O_4: Labeling in VP	*			

(24) vP-level optimization, step 2

Input: [v [$_V$ V DP]]	LABEL	DC	*MERGE	*AGREE
O_{41}: No changes	*			
O_{42}: DP moves to Spec,VP			*	
O_{43}: V agrees with DP				*
☞ O_{44}: Labeling in vP				

Derivations: CP phase – no subject movement

(25) CP phase



(26) Languages without EPP
LABEL ≫ DOMAIN CONSERVATION ≫ *MERGE ≫ *AGREE

Derivations: CP phase – no subject movement

(27) CP-level optimization, step 1

I: [C [T [DP [$_v$ v ...]]]]	Label	DC	*Merge	*Agree
O_1: No changes	***			
O_2: DP moves to Spec,TP	**		*	
O_3: v agrees with DP in ϕ	**			*
☞ O_4: Labeling in TP	**			

(28) CP-level optimization, step 2

I_4: [C [$_T$ T [DP [$_v$ v ...]]]]	Label	DC	*Merge	*Agree
O_{41}: No changes	**			
☞ O_{42}: Labeling in CP	*			
O_{43}: v agrees with DP in ϕ	*			*
O_{44}: DP moves to Spec,TP	*		*	

(29) CP-level optimization, step 3

I_{42}: [$_C$ C [$_T$ T [DP [$_v$ v ...]]]]	Label	DC	*Merge	*Agree
O_{421}: No changes	*			
O_{422}: DP moves to Spec,TP			*	
☞ O_{423}: v agrees with DP in ϕ				*

(30) CP-level optimization, step 4

I_{423}: [$_C$ C [$_T$ T [DP [$_v$ v$_\phi$ ...]]]]	Label	DC	*Merge	*Agree
O_{4231}: No changes	*			
☞ O_{4232}: Labeling by ϕ				

Derivations: CP phase – subject movement

(31) Languages with EPP
LABEL ≫ DOMAIN CONSERVANTION ≫ *AGREE ≫ *MERGE

(32) CP-level optimization, step 3

I: [$_C$ C [$_T$ T [DP [$_v$ v ...]]]]	LABEL	DC	*AGREE	*MERGE
O_1: No changes	*			
☞ O_2: DP moves to Spec,TP				*
O_3: v agrees with DP in ϕ			*	
O_4: DP moves to Spec,CP		*		*

(33) CP-level optimization, step 4

I_2: [$_C$ C [DP [$_T$ T [$_v$ v ...]]]]	LABEL	DC	*AGREE	*MERGE
O_{21}: No changes	*			
O_{22}: DP moves to Spec,CP		*		*
☞ O_{23}: T agrees with DP in ϕ			*	

(34) CP-level optimization, step 5

I_{23}: [$_C$ C [DP [$_T$ T_ϕ [$_v$ ~~DP~~ [$_v$ v ...]]]]	LABEL	DC	*AGREE	*MERGE
O_{231}: No changes	*			
☞ O_{232}: Labeling by ϕ				
O_{234}: DP moves to Spec,CP		*		*

Wh-subjects

- Domain conservation constraint blocks movement to Spec,CP.

(35) Domain Conservation (DC):
Syntactic objects without $\bar{A}$-features are in A-positions.

- If subject has an $\bar{A}$-feature, the approach predicts that it may move to Spec,CP directly.
- This might be a correct prediction (see Alexiadou & Anagnostopoulou 2020 among others).

(36) [$DP_{[wh]}$ [C $C_{[wh]}$ [T T [v ~~$DP_{[wh]}$~~ [v v ...]]]]]

A complication: Expletives and unaccusatives

- The analysis derives obligatory movement of the agrument merged in Spec,vP to Spec,TP.
- As it stands, movement of unaccusative subjects and necessity of expletives is not covered.

(37) a. A train arrived.
b. *Arrived a train.
c. There arrived a train in the station.

- This might be a welcome result for some languages (see Sheehan 2017 on Brazilian Portuguese)
- For other languages, I would like to suggest that subjects of unaccusatives move to Spec,vP because of case filter (Chomsky 1981, Vergnaud 2008/1977).

(38) Case Filter: All nouns have case.

- Subjects on unaccusatives do not receive case at the vP-phase and thus must escape the phasal spell-out by movement to the specifier of the phase head, vP.
- If the Numeration contains an expletive, movement does not apply as the position is already taken (see Richards & Biberauer 2005, Deal 2009, Alexiadou & Schäfer 2011 for low origin of explitives)
- Expletives enter agree relation with the unaccusative subject and this facilitates case assignment later.

Prediction

- Languages with and without subject movement have different loci of verbal agreement.

T as the locus of agreement

- For a number of languages, including English, the T head was assumed to host clausal agreement.

(39) a. John sings.
b. John does not sing.

v as the locus of agreement

- vP was often suggested to host clausal agreement for independent reasons (see Béjar & Rezac 2009, Coon & Keine 2021).
- In Russian, there is evidence that remain low (Bailyn 1995, Dyakonova 2009, Slioussar 2011, Gribanova 2017). It comes from adverb placement.

(40) Oni gromko pojut (??/*gromko) pesnju.
they loudly sing loudly song
'They are loudly singing the song.'

(41) My vnimatel'no pročitali (??/*vnimatel'no) pravila.
we carefully read carefully rules
'We carefully read the rules.'

- Unlike in English, the dependency is not interrupted by potential intermediate heads, such as negation.

(42) Oni ne pojut.
they not sing
'They do not sing.'

Conclusion

- Agree and Merge apply to repair labeling.
- The cross-linguistic variation with respect to subject movement follows from which syntactic operation applies as a basic repair operation in a given language.

(43) Languages with and without subject movement

Subject movement	*Agree ≫ *Merge
No subject movement	*Merge ≫ *Agree

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