Current models of Agree

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1 Aims of syntactic theory

- To know a language is to store a set of simplex lexical items and to master the rules for combining them.
- Studying combinatorics: questions from the bottom up

(1) For an individual natural language: why types of combinatoric rules are necessary to describe the structures of this language?

(2) What types of combinatoric rules exist in natural language in general? To the extent that there is variation across the combinatoric rules of different languages, how is this variation constrained?

(3) Why should this set of combinatoric rules, and not some other set, be characteristic of natural language?

- Levels of success for a grammatical description (Chomsky 1964, 1965, 2004)

  a. Observational adequacy: accurate presentation of observed, primary data
  b. Descriptive adequacy: explanation of the observed, primary data by reference to generalizations which represent a speaker's linguistic competence
  c. Explanatory adequacy: explanation of speakers' linguistic competence by reference to generalizations which represent laws of language in general
  d. "Beyond" explanatory adequacy: explanation of laws of language in general by reference to generalizations which represent laws of some distinct, more comprehensive type (cognition, evolution, etc.)

- Aspects of answers (level c and lower): asymmetry and locality

  – Natural language combinatorics are strongly asymmetric – we might describe them as *dependencies*
  – Some dependencies traditionally of interest to syntacticians:
    * selection/subcategorization [head-head]
    * movement [moving element-trace]
    * binding [binder-bindee]
    * case [assigner-assignee]
    * subject-verb agreement, ϕ-agreement [DP-verb]

  - Dependencies of all these types consistently show locality constraints – they do not hold over unbounded amounts of structure
  - Major question: Can we split syntactic dependencies into "more local" and "less local" classes? If so, how, and why?

- A central hypothesis of the last two decades of generative syntax:

  The split between "more local" vs. "less local" is reflected in two basic, abstract, universal operations (representative of the laws of language, again level c)

  1. Merge: the source of extremely local, head to head dependency. Example: selection of a DP object by *discover*
  2. Agree: the source of "long distance dependency"

- The analytical claim here is that *all long-distance dependencies can be treated with the same operation* – Agree is a name for that hypothetical operation, whenever it may apply

- Central research question: can we state a single algorithm that covers all cases of long-distance dependency?

- Roadmap

§2 A sketch of the standard algorithm (Chomsky 2000, 2001)

§3 Amendments and debates

1. A more fine-grained approach to features; relativized probing
2. Failure to value
3. Questions of directionality

§4 A way forward

A new etiology for agreement, and an interaction/satisfaction algorithm for Agree

2 The Agree algorithm: a starting place

- Generalizing across ϕ-agreement and A' movement, we start with some moves familiar from Chomsky (2000, 2001):

  – Motivations of Agree: removal of uninterpretable features
  "The empirical facts make it clear that there are (LF-)uninterpretable inflectional features that enter into agreement relations with interpretable inflectional features. . . . The obvious conclusion, which we adopt, is that the agreement relation removes the uninterpretable features from the narrow syntax, allowing derivations to converge at LF while remaining intact for the phonological component" (DbP p 5)

  – Agree as **match - copy - delete**

    (4) Agree holds between a probe and a goal when
    a. The probe c-commands the goal
    b. The probe bears uF: features that are uninterpretable and unvalued.[1]
    c. The uF of the probe matches with iF of the goal
    d. The goal is the closest element bearing iF to the probe
    e. The goal is active: it also has u features (uF′)

[1] "The natural principle is that the uninterpretable features, and only these, enter the derivation without values, and are distinguished from interpretable features by virtue of this property." Chomsky 2001 (DbP) p 5

(5) Outcome of Agree between uF and iF

a. F's value is copied to the probe from the goal

b. Spell-out applies "shortly after" valuation: uninterpretable features are deleted

– The particular choice of uF provides for relativitization – capturing minimality

(6) In wh: superiority

a. Who do you think _ gave a cookie to who/Karen?

b. Who do you think Karen/*who gave a cookie to _?

(7) In ϕ: agreement only with the highest possible controller
Agreement in Hindi-Urdu (Bhatt 2005): only non-case-marked arguments can agree

a. **Rahul** kitaab paṛh-taa thaa
Rahul.M book.F read-Hab.MSg be.Pst.MSg
Rahul used to read (a/the) book. (with F agreement: *)

b. Rahul-ne **kitaab** paṛh-ii thii
Rahul-Erg book.F read-Pfv.F be.Pst.FSg
Rahul had read the book. (with M agreement: *)

3 Amendments and debates

3.1 A more fine-grained approach to features

- Béjar (2003): T has various features, e.g. those to do with tense and selecting a V-projection, in addition to $u\phi$-features. We take for granted that $[u\phi]$ probes; the rest do not.

- Given this, why should we say that the individual features making up ϕ are less autonomous that T features or selectional features?

- Empirical consequences of "unbundling" ϕ

(8) Georgian agreement generalizations
   a. Person agreement is with the DO unless the DO is 3rd person, in which case person agreement is with the SU.
   b. Number agreement is with the SU unless the SU is singular, in which case a plural (non-3rd person) DO controls number agreement.

(9) <π,SU>, <#,SU> v-xedav-t
1-see-PL
'We see him.'

(10) <π,DO>, <#,DO> g-xedav-t
2-see-PL
'I see you(Pl).'

(11) <π,DO>, <#,SU> g-xedav-t
2-see-PL
'We see you(sg).'

  - Person probe on v, number probe on T

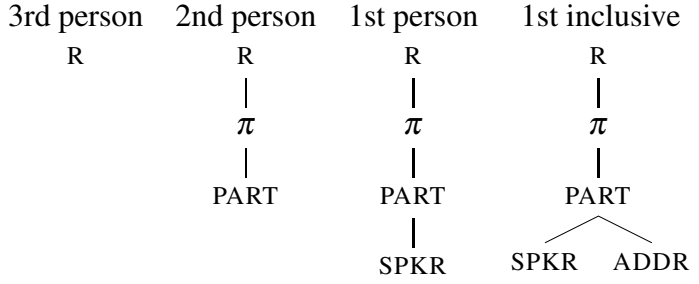
- What is a person probe? The cut in Georgian is between participants and non-participants (3rd person). If all that matters in Georgian is the feature [PART(ICIPANT)], then:
  - The probe has [uPART]
  - A local person argument has [iPART] (and is therefore a possible goal)
  - Valuation: [PART] is copied to the probe
  - Agreement with any participant DP, whether 1st or 2nd person, should be identical
  - > Not quite right. 1st person and 2nd person arguments are distinguished.

- Béjar's (2003) response distinguishes *matching* and *valuing*:

  > "This means that the probe is matching on the basis of [PARTICIPANT], but it is Agreeing/valuing with more than just the one feature; it doesn't only agree with [PARTICIPANT], it also agrees with [± SPEAKER]."

- Béjar: this happens because [SPKR] *entails* [PART]

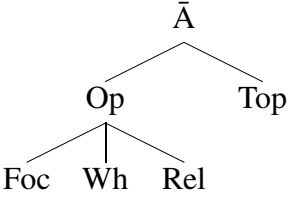
(12) Person representations (Béjar 2003)



  - Feature geometries are representations of entailment relations, *not syntactic objects*
  - Not created by Merge
  - Notice the (perhaps surprising) directionality: [PART] must be copied to the probe, and rather than bringing along those features that are entailed by it (higher), Agree brings along those features that entail it (lower)

- This is a different use of feature geometry than in the A' literature, where the central issue is *intervention* (Starke 2001, Boeckx and Jeong 2002, Abels 2012, Aravind 2017, i.a.)

(13) An example A' geometry (Aravind 2017)



(14) Focus and wh intervene for each other in Italian (data from Abels 2012)

a. * A chi pensi che QUESTO abbiano detto?
to whom you.think that THIS they.have said

b. * QUESTO mi domando a chi hanno detto.
THIS I.wonder to whom they.have said

c. ✗ [uOp] [Ā – Op – Foc] [Ā – Op – Wh]

d. ✗ [uOp] [Ā – Op – Wh] [Ā – Op – Foc]

(15) ...but topic and focus don't (data from Abels 2012)

a. A Gianni, credo che QUESTO gli dovremmo dire.
to Gianni I.believe that THIS to.him we.should say

b. QUESTO credo che, a Gianni, gli dovremmo dire.
THIS I.believe that to Gianni to.him we.should say

c. ✓ [uTop] [$\bar{A}$ – Op – Foc] [$\bar{A}$ – Top]

d. ✓ [uOp] [$\bar{A}$ – Top] [$\bar{A}$ – Op – Foc]

- Additional challenge: an entailment condition on what features are transferred to the probe is not general enough (unless we posit some strange feature geometries)
  - *Wh*-agreement in Abaza: A' ergatives control a special, *sui generis* agreement form

(16) Ergative agreement (O'Herin 2002)

	1	2F	2M	3F	3M	3I	$\bar{A}$
SG	s-	b-	w-	l-	y-	a-	z-
PL	h-	ʃ^{w}-	ʃ^{w}-	r-	r-	r-	z-

(17) S-k^{j}tap dəzda y-na-z-ax^{w}?
1S-book who 3SG.INAN.ABS-PV-ERG.WH-take
Who took my book? (O'Herin 2002, 252)

- The agreement slot for ergatives (between preverbs and the root) is always controlled by the ergative, regardless of its features – the relevant probe seems to bear [uϕ]
- Capturing copying of $\bar{\text{A}}$ features to this probe in Béjar's (2003) system requires an unusual geometry:

  (18) Feature (sub) geometry needed for wh-agreement?

  $$\begin{array}{c} \phi \\ | \\ \bar{\text{A}} \end{array}$$

- Substantive claim here: $\bar{\text{A}}$ features entail ϕ features
- Challenges from wh-adverbs, PPs, etc – $\bar{\text{A}}$ features and ϕ-features generally seem to distribute independently

- Conclusions and remaining questions
  - The probe can be valued for features it was not specifically relativized to (i.e. didn't start with the uninterpretable version of) – "overagreement" wrt uF (Deal 2020)
  - That geometries should constrain intervention is well-established; it remains unclear what role they play in overagreement contexts (and why this would be the case – why does agreement with [PART] bring along [SPKR], as opposed to [π], or nothing?)

3.2 Failure to value

- What happens when there is no goal with iF accessible to a probe with uF?
- Expectation: Agree doesn't happen, therefore uF remains at the interface, causing a crash
  - Preminger (2011, 2014): uF as a "derivational time-bomb"
- Empirical challenges: default agreement, e.g. in Hindi-Urdu (Bhatt 2005) – "underagreement" wrt uϕ

(19) Hindi-Urdu agreement algorithm
  a. If the subject lacks overt case, it controls agreement.
  b. Else, if the object lacks overt case, it controls agreement.
  c. Else, agreement takes a default form. (here, and typically, M.SG)

(20) Rahul kitaab paṛh-taa thaa
Rahul.M book.F read-Hab.MSg be.Pst.MSg
Rahul used to read (a/the) book.

(21) Rahul-ne kitaab paṛh-ii thii
Rahul-Erg book.F read-Pfv.F be.Pst.FSg
Rahul had read the book.

(22) Rahul-ne kitaab-ko paṛh-aa thaa
Rahul-Erg book-Acc read-Pfv.MSg be.Pst.MSg
Rahul had read the book.

- A theory with articulated probes à la Béjar has the challenge of "failed agreement" in spades:
  - a [uPART] probe fails when there is no participant argument
  - a [uPL] probe fails when there is no plural argument
- Béjar (2003, p 77, emphasis added): "A probe must be valued and deleted *if it can be* before the tree is extended. Failure to do so *when a controller could have been found in the domain of the probe* is what crashes a derivation."

> Such patterns raise the question of why Agree exists

- Some cases of uF aren't matched-valued-deleted under Agree, and this situation causes no LF problem.
- So, why would *any* uF cause an LF problem, thereby motivating Agree?

- Options:

  1. Introduce an alternative way that uF can be deleted, without Agree
  2. Find an alternative grounding for Agree other than removal of uninterpretable features

- Fleshing out option #1: Béjar's (2003) *partial default agreement* (PDA)

  - triggered upon failure of value – either a probe is halted by an intervener (which matches but doesn't value), or exhausts its search domain without finding a match
  - structural change: deletion of all but the root of the probe
  - "An uninterpretable [F] that has failed to find a controller on all cycles is invariably marked for partial default agreement. In effect, partial default agreement serves as a diacritic 'telling' the derivation that an attempt to find a controller was made. . . . I assume that default agreement is impossible in the absence of this diacritic."

- In practice much of the literature esp. since Preminger (2011, 2014) has continued to appeal to uninterpretability but added a stipulation that Agree can fail. This suggests a mechanism like PDA is lurking in the background.

- The result: a uF-driven model in name only?
  - There is no principled reason why a uF deletion operation would have to be conditioned by failure to value – a simple deletion operation would seem to be the preferred route to deletion of uF. It's simpler than Agree, which also involves valuing (Pesetsky and Torrego 2007)
  - If uF can be deleted without Agree, then Agree is no longer motivated by the need to remove uF – a deletion operation could (and arguably should be) be invoked instead.
  - So we're back to the beginning: why does natural language have Agree?
- Fleshing out option #2: Agree without uninterpretability
  a. The interaction/satisfaction model – more on that below
  b. Preminger (2014):
     * Probe features are unvalued but not uninterpretable –uninterpretability plays no role in the system
     * Rather than simply Merge+Agree, a range of rule types, with much of the action found in rule ordering (like TG!) – replacing ϕ-Agree:

       (23) FIND(f)
       Given an unvalued feature f on a head H^0, look for an XP bearing a valued instance of f and assign that value to H^0.

∗ Why does natural language have this rule type?

- Theoretical consequence: whatever the motivation for Agree might be, uninterpretable features are not enough.

3.3 Questions of directionality

- The directionality of movement is well-established: the movement-driving head must c-command the element to be moved

(24) a. Anusha will tell Becca that Caleb, she met _.
b. ✓ [Anusha will tell Becca [that F [she met Caleb]]]

(25) a. * Anusha will tell _ that Becca, she met Caleb.
b. ✗ [Anusha will tell Becca [that F she met Caleb]]

  - Ban on syntactic lowering
  - The ban can't be explained purely semantically if there is a possibility of reconstruction via "copy neglect" – i.e. the semantic component ignores the movement (see recent discussion in Keine and Poole 2018)
  - Nor can it be explained phonologically if there is a possibility of pronouncing the lower copy in a movement chain (Bobaljik 2002 and many since)

- If movement consists of Agree + Merge, a syntactic explanation must be in terms of these operations – at least one of the steps in (26) is illicit

  (26) Two steps in a derivation for syntactic lowering
  a. (Upward) Agree:
  [Anusha will tell Becca [that F she met Caleb]]
  b. (Downward) Merge:
  [Anusha will tell Becca [that **Becca** F she met Caleb]]

- The standard view: no upward Agree – ✗(26a)
  - Agree in (26a) would be countercyclic; ϕ-Agree doesn't work like this. The probe must c-command the goal.
    - Examples: LDA in Hindi-Urdu; C agreement in Sahaptian (see Bárány and van der Wal to appear and refs. there)
    - Agree under c-command with cyclic expansion: intermediate (and maximal) projections may host probes which agree with/into their sisters, a further case of Agree under c-command (Rezac 2003, Béjar and Rezac 2009, Clem 2019c, Keine and Dash to appear)
  - The cyclicity of Agree suffices to rule out lowering. Any Agree triggered by a probe must be handled before other independent Merge.

- Upward (or "Reverse") Agree theories: no downward Merge – ✗(26b)

  - Suppose we use interpretability as a guide to locating probes vs. goals. Then a pattern like negative concord calls for the opposite of ϕ-Agree (Zeijlstra 2004, 2008, Penka 2011): upward Agree ("reverse Agree")

    (27) Negative concord in Italian (Zeijlstra 2008)

    a. [iNeg] c-commands [uNeg]:

    Non ha telefonato nessuno
    NEG has called nobody
    [iNeg] [uNeg]
    Nobody called.

    b. Island effects:

    * Gianni non labora [per guadagnare niente argente]
    Gianni NEG works [to earn no money]
    [iNeg] [uNeg]
    Intended: Gianni doesn't work in order to earn any money.

    * Other phenomena analyzed with upward Agree: switch reference (Baker and Camargo Souza 2020, Arregi and Hanink to appear; cf. Clem 2019c); inflection doubling (Wurmbrand 2012, Bjorkman 2016); some ϕ-agreement (Bjorkman and Zeijlstra 2019 though see Bárány and van der Wal to appear)

- If Upward Agree is possible, the ban on syntactic lowering must come from a constraint on Merge.
- Agree is allowed to be countercyclic but Merge isn't.

  Why would this be?

- Theoretical consequences: a challenge to the view that (a) there is just one way to build long-distance dependencies and that (b) all syntactic operations are strictly cyclic.
- Two costly choices:

  1. Multiple routes to long-distance dependency:

     There are dependencies in grammar that generally resemble Agree (operating at a distance, island sensitive) but which aren't actually Agree – more primitive operations are needed than just Merge and Agree
  2. Not all operations are strictly cyclic:

     Agree can obtain countercyclically, but Merge can't. (Yes to Upward Agree, No to Downward Merge)

4 A way forward

- The most central issue is failure to value: *uninterpretable features are not enough to motivate Agree*
  - Empirically: (if uF exists,) there's some other way to remove it without copying/valuing
  - Conceptually: why would a system that aimed to delete uF have a copying/valuing step?
- Do we need to talk of 'uninterpretable features' at all – *qua* elements that must be removed from LFs for semantic interpretation?? A more holistic perspective on language design:
  - It is very easy (and the normal practice of semanticists) to design a semantic system that ignores certain syntactic objects
  - Those objects are either (a) uninterpret**ed** but cause no problem or (b) interpreted as identity functions
  - Compare phonology: prosody reflects only some constituent boundaries – e.g. Match Theory (Selkirk 2011) ignores intermediate projections, collapsing the spec/complement distinction

- A more straightforward approach: Agree exists to create redundancy.

  Redundancy is a useful property for language to have *because it is a system used for communication*

  - Syntax feeds PF structures, which are used in communication
  - Redundancy in communication is useful for information transfer in view of noise

- Merge and Agree represent two functions for which Language is well adapted:

  - Merge facilitates recursive cognition / higher-order thought
  - Agree facilitates communication – collaboration and social organization

- An approach to agreement that starts here: *interaction/satisfaction*

  (Deal 2015, 2020, Baier 2018, 2019, Halpert 2019, Clem 2019a,c,d, Oxford 2020, Roversi 2020, Branan and Erlewine 2020, Scott 2021, Alam and Kumaran 2021)

- Redundancy is adaptive only in moderation (like many things – e.g. blood pressure!). Language shows us two types of limits on redundancy:

  - Probes copy back certain features and ignore others – e.g. a probe on T generally ignores features on Asp (e.g. [PERF],[PROG]) while copying features from DPs.

    We must specify the features that a probe **interacts** with (i.e. copies to itself)

  - Probes oftentimes are limited to copying features from just one goal – e.g. in many languages, a probe on T interacts with the subject's features only.

    To capture cases where a probe fails to agree with all interaction features in its domain, we must specify at least an optional feature that **satisfies** the probe (i.e. halts further probing)

- Minimal specification of a probe: [INT:α,SAT:β]

  - All features in set α will be copied to the probe.

    E.g. INT:Φ (whole ϕ-set) $\rightarrow$ any ϕ-feature will be copied to the probe.

  - Copying β back to the probe halts further probing of additional goals.

    E.g. SAT:ADDR $\rightarrow$ feature copying stops once a 2nd person goal is Agreed with

> The puzzles of the previous section dissolve...

- Overagreement: whenever the interaction condition is wider than the satisfaction condition, overagreement results.
  - Georgian person agreement: *v* probe, cyclic expansion

    (28) Generalization: Person agreement is with the DO unless the DO is 3rd person, in which case person agreement is with the SU.

    (29) *v* probe: [INT:{PART,SPKR,ADDR}, SAT:PART]
  - Abaza wh-agreement (Baier 2018, 2019):

    (30) ergative probe: [INT:$\Phi \cup \{\bar{A}\}$, SAT:ϕ]
  - The use of a feature geometry to describe feature sets is optional and simply captures that features are a natural class (e.g. {PART,SPKR,ADDR})

- Underagreement / "failure to value":
  - The algorithm for Agree involves inspecting objects $X_1 \ldots X_n$ in the domain of the probe (the order of search structurally determined):

    (31) *A general Agree algorithm with int/sat*
    For every target X_i in the domain of probe P:
    a. Does X_i contain interaction features?
       i. No: continue to step b
       ii. Yes: make those features redundant (copy them to P)
    b. Does X_i contain the satisfaction feature?
       i. No: continue to target X_j
       ii. Yes: EXIT

    * No cause for crashes if both answers are consistently 'no'
    * "Failed Agreement" in Preminger's (2014) sense = cases where the probe runs out of potential targets (or hits its satisfaction condition) without ever locating an X_i with interaction features

- Directionality: notions of interpretability no longer determine probe vs. goal status
  - Negative concord (NC) as purely downward Agree

    (32) Non ha mai letto niente. 'He never read anything.' (Italian)
    NEG has never read nothing.

  - The head hosting clausal negation (Neg^0) in NC languages is an insatiable probe: [INT:NW, SAT: –] (where NW is a feature borne by all n-words)
    - Other cases of insatiable probing: Clem 2019d, Deal 2020
  - The morphology of Agree is special on the goal: n-word morphology reflects Agree with Neg^0
    - Other cases of Agree morphologically affecting the goal: Deal 2010, Clem 2019b, Colley and Privoznov 2020
  - N-words require semantic negation not as checkers of a [uNeg] feature, but as a source of the agreement that gives rise to their distinctive morphology. No Agree with $Neg^0 \rightarrow$ no pronunciation as a n-word. *It's the morphology that's "licensed", not the semantics.*
  - Locality effects follow from the general locality of Agree

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