Cyclicity in Agree: Maximal projections as probes

Emily Clem
University of California, San Diego

eclem@ucsd.edu

University of Southern California
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A typological question

What are the parameters of crosslinguistic variation in switch-reference systems?

Switch-reference crosslinguistically

Switch-reference in Kiowa (Kiowa-Tanoan; Oklahoma; McKenzie 2012)

(1) [Ø-hé:bà=**tsẽ:**] ẽm-sɔ́:
3SG-enter.PF=when.SS 3SG:RFL-sit down.PF
'When she$_i$ came in, she$_i$ sat down.'

(2) [Ø-hé:bà=**ẽ:**] ẽm-sɔ́:
3SG-enter.PF=when.DS 3SG:RFL-sit down.PF
'When she$_i$ came in, she$_j$ sat down.'

Some languages with switch-reference

North America
Lakota (Siouan)
Washo (Isolate)

Africa
Sidaama (Cushitic)
Yemsa (Omotic)

Australia
Wanyi (Garrwan)
Warlpiri (Pama-Nyungan)

South America
Aguaruna (Jivaroan)
Quechua (Quechuan)

Eurasia
Ėven (Tungusic)
Kolyma (Yukaghir)

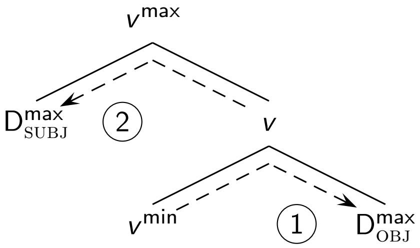
Oceania
Benabena (Gorokan)
Whitesands (Austronesian)

A theoretical question

How are seemingly long-distance dependencies established in syntax, and are they truly non-local?

Cyclic Agree (Rezac, 2003; Béjar and Rezac, 2009)

- A probe first probes its c-command domain
- If the probe remains unsatisfied, when the head reprojects to form an intermediate projection, the probe reprojects as well
- The probe then probes its new, expanded c-command domain (the specifier of the head)

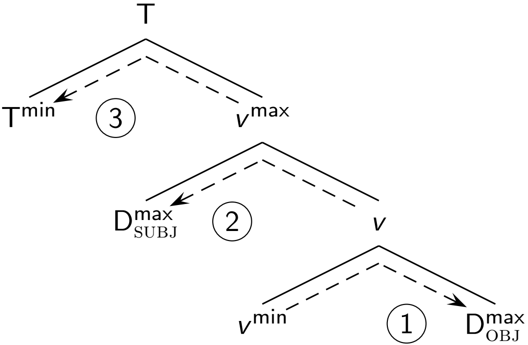


Applications of cyclic expansion

- Cyclic expansion has been leveraged to account for agreement displacement (Rezac, 2003, 2004; Béjar and Rezac, 2009)
    - Agreement that typically cross-references the internal argument can exceptionally cross-reference the external argument
    - If the probe is not satisfied by the IA in its complement, it can agree with the EA in its specifier
- It can also account for Person Case Constraint effects (Walkow, 2013; Ivan, 2018)
    - If a probe located between the DO and IO is satisfied by the DO, it cannot agree with and license the IO

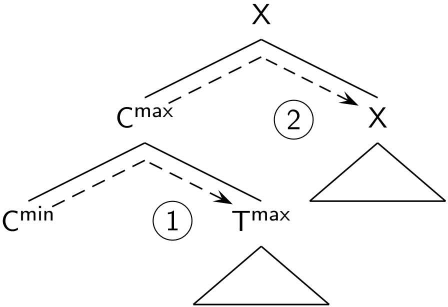
BPS and Cyclic Agree

- In Bare Phrase Structure (BPS), there is no formal distinction between the label of intermediate and maximal projections
- Cyclic Agree and BPS predict that maximal projections should be able to serve as probes
    - This prediction is difficult to test since the c-command domain of X^{max} typically only contains the head that selects it



The claim

- I argue that this prediction of Cyclic Agree and BPS is borne out in a structure involving an agreeing adjunct C



The proposal in a nutshell

- I argue for the existence of this type of structure involving agreeing adjunct C in Amahuaca (Panoan; Peru)
  - Adjunct C^{min} probes DPs in its c-command domain, the adjunct clause
  - Because the probe on C remains unsatisfied, C^{max} also probes its c-command domain, agreeing with matrix DPs

The upshot

The Amahuaca data provide support for a Cyclic Agree model and suggest that cyclic expansion of probes is fully generalizable to maximal projections

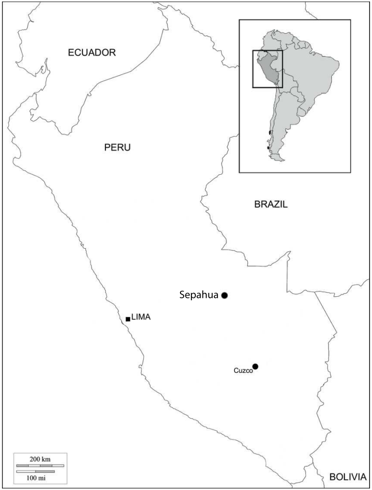
Roadmap

1. Introduction
2. Amahuaca agreeing C
3. The Analysis: Maximal projections as probes
4. Comparison with alternative analyses
5. Predictions and typology

Amahuaca agreeing C

Amahuaca

- Amahuaca is an endangered Panoan language spoken in the Peruvian and Brazilian Amazon



Amahuaca word order

- Amahuaca is mostly head final in the TP domain
- The base SOV order can be obscured by scrambling of arguments and adjuncts
- Matrix C is a second-position clitic that surfaces after the first syntactic constituent

(3) [jaa joni chaita=n]**=mun** nami pi=hi=ki=nu
DEM man tall=ERG=C_{MATRIX} meat bite=IPFV=3.PRES=DECL
'That tall man is eating meat.'

(4) [joni=n xuki jova=hain]**=mun**
man=ERG corn cook=DS.WHILE=C_{MATRIX}
xano vua=xo=nu
woman sing=3.PST=DECL
'While the man cooked corn, the woman sang.'

Amahuaca case

- Amahuaca shows a tripartite case alignment
  - Intransitive subjects are marked **nominative** (**=x**)
  - Transitive subjects are marked **ergative** (**=n**)
  - Objects are unmarked (∅)

(5) **vaku=x**=mun rakuu=xo=nu
child=NOM=C be.afraid=3.PST=DECL
'The **child** was afraid.'

(6) **xano=n**=mun **chopa** patza=hi=ki=nu
woman=ERG=C clothes wash=IPFV=3.PRES=DECL
'The **woman** is washing **clothes**.'

- Differential subject marking causes both intransitive and transitive subjects to sometimes surface in an unmarked form (Clem, 2019)

Temporal adjunct clauses

- In temporal adjunct clauses, the element indicating the temporal relationship between clauses is an enclitic that typically surfaces on the verb of the adjunct clause

(7) [jaa=x$_i$ vua=$\boxed{\textbf{xon}}$]=mun
3SG=NOM sing=SA.AFTER=C$_{\text{MATRIX}}$
xano=n$_i$ xuki jova=xo=nu
woman=ERG corn cook=3.PST=DECL
'After she$_i$ sang, the woman$_i$ cooked corn.'

- I will focus on 'after' clauses, but 'while' and 'before' show similar behavior

Arguments in 'after' clauses

- Amahuaca 'after' clauses are full CPs
- They can include all arguments of the verb, including case-marked subject DPs and object DPs

(8) [**xano=n**$_i$ **chopa** patza=$\boxed{\text{xon}}$]=mun
woman=ERG clothes wash=SA.AFTER=C$_{\text{MATRIX}}$
pro$_i$ hatza jova=hi=ki=nu
manioc cook=IPFV=3.PRES=DECL
'After the woman$_i$ washed clothes, she$_i$ is cooking manioc.

(9) [**kiyoo-vini=x**$_i$ nokoo=$\boxed{\text{xon}}$]=mun
all-EMPH=NOM arrive=SA.AFTER=C$_{\text{MATRIX}}$
pro$_i$ hatza jova=kan=xo=nu
manioc cook=3PL=3.PST=DECL
'After everyone$_i$ arrived, they$_i$ cooked manioc.'

Adjuncts in 'after' clauses

- 'After' clauses can host adjuncts, such as adverbs

(10)

[*pro*$_i$	**koshi**	ka=$\boxed{\text{xon}}$]=mun
	quickly	go=SA.AFTER=C_{MATRIX}

xano=n$_i$	hatza	vana=xo=nu
woman=ERG	manioc	plant=3.PST=DECL

'After she$_i$ went quickly, the woman$_i$ planted manioc.'

(11)

[**moha**	xano=x$_i$	nokoo=$\boxed{\text{xon}}$]=mun
already	woman=NOM	arrive=SA.AFTER=C_{MATRIX}

jato=n$_i$	hatza	xoka=kan=xo=nu
3PL=ERG	manioc	peel=3PL=3.PST=DECL

'After the women$_i$ had already arrived, they$_i$ peeled manioc.'

Nested 'after' clauses

- 'After' clauses are large enough to allow other 'after' clauses to adjoin within them

(12) [[*pro*$_i$ kari choka=$\boxed{\text{xon}}$] *pro*$_i$ hatza xoka=$\boxed{\text{xon}}$]=mun
yam wash=SA.AFTER manioc peel=SA.AFTER=C_{MATRIX}
xano=n$_i$ xuki jova=xo=nu
woman=ERG corn cook=3.PST=DECL
'[After she$_i$ peeled manioc [after she$_i$ washed yams]],
the woman$_i$ cooked corn.'
(or 'The woman washed yams, peeled manioc, and cooked corn.')

Scrambling in ‘after’ clauses

- ‘After’ clauses are typically SOV
- However, ‘after’ clauses allow clause-internal scrambling

(13) ‘After I cooked paca, I peeled manioc.’

a. **SO**V ‘after’ clause

[**hiya=n** **hano** jova=$\boxed{\text{xon}}$]=mun
1SG=ERG paca cook=SA.AFTER=C_{MATRIX}
hun hatza vuro=ku=nu
1SG manioc peel=1.PST=DECL

b. **OS**V ‘after’ clause

[**hano** **hiya=n** jova=$\boxed{\text{xon}}$]=mun
paca 1SG=ERG cook=SA.AFTER=C_{MATRIX}
hun hatza vuro=ku=nu
1SG manioc peel=1.PST=DECL

External syntax of ‘after’ clauses

- ‘After’ clauses typically appear in high peripheral positions
- It is ungrammatical for ‘after’ clauses to appear below aspect marking

(14) ‘After she$_i$ sang, the woman$_i$ is washing manioc.’

a. [*pro*$_i$ vua=$\boxed{\text{xon}}$]=mun
   sing=SA.AFTER=C$_{\text{MATRIX}}$
   xano=n$_i$ hatza choka=**hi**=ki=nu
   woman=ERG manioc wash=IPFV=3.PRES=DECL

b. xano=n$_i$=mun hatza choka=**hi**=ki=nu
   woman=ERG=C$_{\text{MATRIX}}$ manioc wash=IPFV=3.PRES=DECL
   [*pro*$_i$ vua=$\boxed{\text{xon}}$]
   sing=SA.AFTER

c. * xano=n$_i$=mun hatza choka=**hi**
   woman=ERG=C$_{\text{MATRIX}}$ manioc wash=IPFV
   [*pro*$_i$ vua=$\boxed{\text{xon}}$]=ki=nu
   sing=SA.AFTER=3.PRES=DECL

‘After’ clauses vs. relative clauses

- Nominalized internally-headed relative clauses can appear below aspect

(15) Juan$_i$=mun chivan-vo**=hi** [jan$_i$ jono vuchi=ha]=ki=nu
Juan=C chase-AM=IPFV 3SG peccary find=PFV=3.PRES=DECL
‘The peccary that he$_i$ found is chasing Juan$_i$.’

- The positional restriction on ‘after’ clauses is truly syntactic

Condition C

- Even if ‘after’ clauses began low in the structure, they do not reconstruct below matrix arguments for Condition C

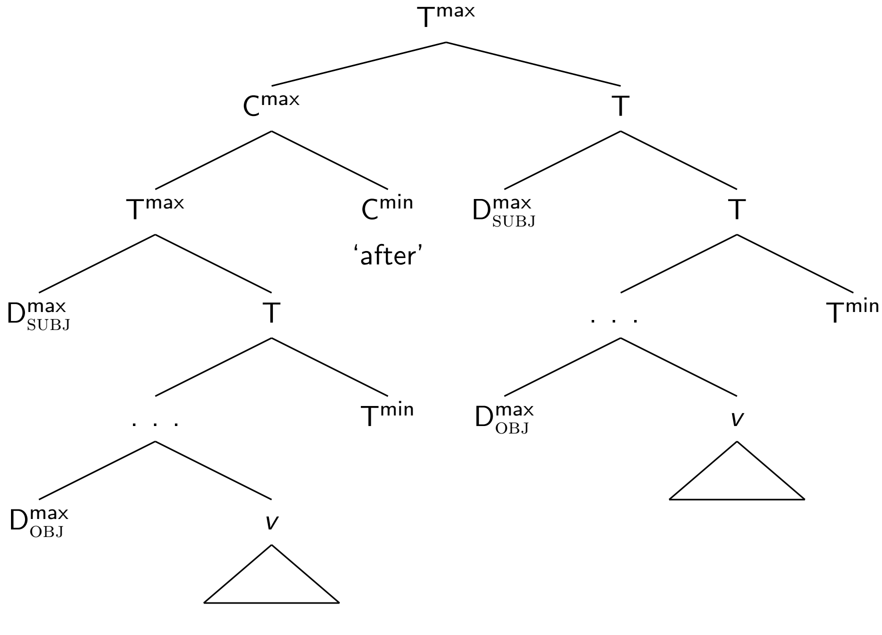
(16) ‘After Maria$_i$ went quickly, she$_i$ washed clothes.’

a. [***pro***$_i$ koshi ka=$\boxed{\text{xon}}$]=mun
quickly go=SA.AFTER=$\mathrm{C}_{\mathrm{MATRIX}}$
Maria=n$_i$ chopa patza=xo=nu
Maria=ERG clothes wash=3.PST=DECL

b. [**Maria**$_i$ koshi ka=$\boxed{\text{xon}}$]=mun
Maria quickly go=SA.AFTER=$\mathrm{C}_{\mathrm{MATRIX}}$
pro$_i$ chopa patza=xo=nu
clothes wash=3.PST=DECL

c. **jaa=n**$_i$=mun [**Maria**$_i$ koshi ka=$\boxed{\text{xon}}$]
3SG=ERG=$\mathrm{C}_{\mathrm{MATRIX}}$ Maria quickly go=SA.AFTER
chopa patza=xo=nu
clothes wash=3.PST=DECL

Structure of 'after' clauses



Agreement in ‘after’ clauses

- There are several forms of the enclitic used to mean ‘after’
  - These morphemes vary depending on coreference relationships between arguments (Sparing-Chávez, 1998, 2012)
  - The choice of morpheme is also sensitive to the abstract case of coreferential arguments

Agreement in 'after' clauses

- In (17), the adjunct clause subject is coreferential with a matrix transitive subject (ERG), and the agreeing adjunct C takes the form *=xon*

(17) [jaa=x$_i$ vua=$\boxed{\textbf{xon}}$]=mun **xano=n$_i$** xuki jova=xo=nu
3SG=NOM sing=SA.AFTER=C$_{\text{MATRIX}}$ woman=ERG corn cook=3.PST=DECL
'After she$_i$ sang, the **woman$_i$** cooked corn.'

- In (18), the adjunct clause subject is coreferential with a matrix intransitive subject (abstract NOM), and the agreeing adjunct C takes the form *=hax*

(18) [jaa=x$_i$ vua=$\boxed{\textbf{hax}}$]=mun **xano$_i$** chirin=xo=nu
3SG=NOM sing=SS.AFTER=C$_{\text{MATRIX}}$ woman dance=3.PST=DECL
'After she$_i$ sang, the **woman$_i$** danced.'

Agreement in 'after' clauses

- In (19), the adjunct clause subject is coreferential with a matrix object (abstract ACC), and the agreeing adjunct C takes the form *=xo*

(19)

[jaa=x$_i$	vua=$\boxed{\textbf{xo}}$]=mun	hinan	**xano$_i$**	chivan-vo=xo=nu
3SG=NOM	sing=SO.AFTER=C$_{\text{MATRIX}}$	dog.ERG	woman	chase-AM=3.PST=DECL

'After she$_i$ sang, the dog chased the **woman$_i$**.'

- In (20), no adjunct clause DP is coreferential with any matrix DP, and adjunct C is spelled out as the default different subject marker *=kun*

(20)

[joni$_i$	vua=$\boxed{\textbf{kun}}$]=mun	xano$_j$	chirin=xo=nu
man	sing=DS.AFTER=C$_{\text{MATRIX}}$	woman	dance=3.PST=DECL

'After the man$_i$ sang, the woman$_j$ danced.'

‘After’ paradigm

- Altogether there are five agreeing ‘after’ enclitics

<table>
<tr><td colspan="2"></td><td colspan="3">Matrix</td></tr>
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<tr><td>A</td></tr>
<tr><td>O</td><td>=ha</td><td colspan="2">=kun (DF)</td></tr>
</table>

Switch-reference as agreement

- From a typological perspective, this phenomenon has been termed ‘switch-reference’ (Jacobsen, 1967)
- Switch-reference is similar to complementizer agreement and can potentially be analyzed as involving an agreeing complementizer (Watanabe, 2000; Arregi and Hanink, 2018)
- The Amahuaca pattern looks like complementizer agreement that is sensitive to referential index and case
- The agreeing complementizer is sensitive to features of DPs in its own clause and the clause to which C^{max} is adjoined

The Analysis: Maximal projections as probes

The proposal

- Cyclic Agree coupled with BPS (Rezac, 2003) predicts that an unsatisfied probe should be able to probe the c-command domain of its maximal projection
- I argue that the pattern of agreeing adjunct C in Amahuaca is derived via this type of cyclic expansion of the probe's domain
- This account of Amahuaca does not require the introduction of any new technology – it relies only on independently supported assumptions

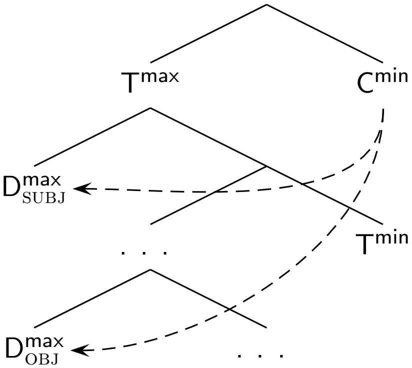
The ingredients

1. Bare Phrase Structure (Chomsky, 1995)
   - There is no formal distinction between intermediate and maximal projections
2. Cyclic expansion (Rezac, 2003, 2004; Béjar and Rezac, 2009)
   - When a label reprojects, an unsatisfied probe associated with it may reproject
   - Probe reprojection serves to expand the c-command domain of the probe and thus the agreement possibilities
3. Probe insatiability (Deal, 2015)
   - A probe's interaction conditions can differ from its satisfaction conditions
   - If a probe lacks satisfaction conditions, it will continue probing all possible goals in its c-command domain until reaching a phase boundary

First cycle Agree

- Adjunct C in Amahuaca is an insatiable probe
- First, C^{min} probes its c-command domain, which contains the subject and object of the adjunct clause
    - Note that evidence from remnant VP-fronting suggests that objects undergo shift to Spec,*v*P (Clem, 2019)

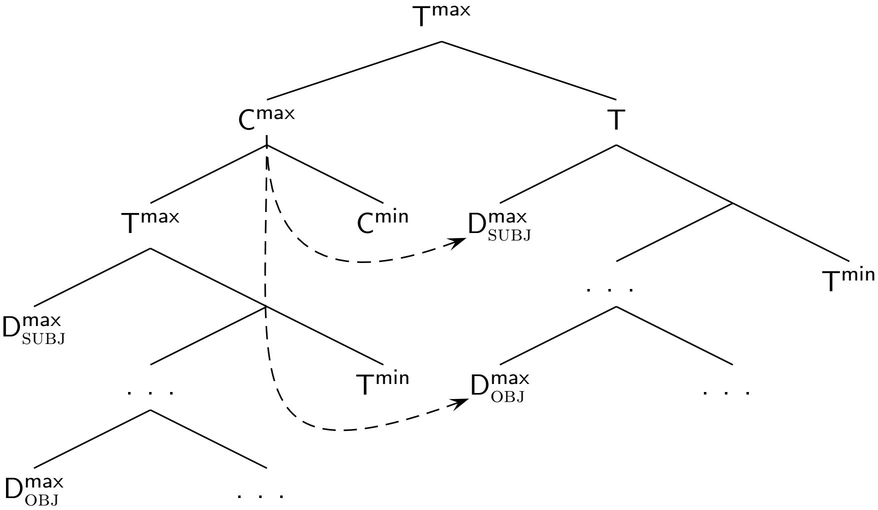
Agreement inside the adjunct clause



Second cycle Agree

- Given that C's probe is insatiable, it remains unsatisfied after probing the c-command domain of C^{min}
- When C reprojects to form a maximal projection, the probe is reprojected as well and can probe again
- The c-command domain of this new segment of C, C^{max}, contains the matrix subject and object, keeping with the evidence from Condition C

Agreement into the matrix clause



Features on C

- The probe on C agrees in:
  - Referential indices (modeled as ϕ-features; Rezac 2004)
  - Abstract case features
- If two DPs that C agrees with share a referential index, one of the coreference markers will be inserted
  - The form of the marker will be determined by the case of the coreferential DPs
- If no DPs share a referential index, the default different subject marker will be inserted

Vocabulary Insertion

- I assume late insertion and standard competition mechanisms of Distributed Morphology (Halle and Marantz, 1993)
- This means that the vocabulary item that matches the largest subset of the features on C will be inserted

Sample 'after' vocabulary items

[[AFTER,[*i*,NOM*]] [*i*,NOM]]	↔	/hax/
[[AFTER,[*i*,NOM*]] [*i*,ERG]]	↔	/xon/
[AFTER]	↔	/kun/

Advantages of the current account

- This account builds on the insight of Watanabe (2000) that switch-reference (SR) shares many similarities with complementizer agreement (CA)
- One advantage of the current account is its simplicity – there are independent arguments for all of the necessary technology
  - Cyclicity in Agree (Rezac, 2003; Béjar and Rezac, 2009)
  - Probe insatiability (Deal, 2015)
  - Treating indices as ϕ-features (Rezac, 2004)
- Additionally, previous accounts of SR and/or CA face empirical challenges given the Amahuaca data

Comparison with alternative analyses

Non-reference-tracking accounts of SR

- Some recent analyses of SR assume that reference tracking is not involved
  - Georgi (2012) argues that same subject marking is a special case of control
  - Keine (2012, 2013) argues that SR reflects coordination height, with same subject clauses being VP coordination
- Both of these accounts predict that a clause bearing a same subject marker should be unable to host an overt subject DP (Clem, 2018)

Subjects in SR clauses

- In Amahuaca, 'after' clauses can host all arguments of the verb overtly, including case-marked subjects

(21)

[moha	**xano=x**$_i$	nokoo=$\boxed{\text{xon}}$]=mun	
already	woman=NOM	arrive=SA.AFTER=C_{MATRIX}	
jato=n$_i$	hatza	xoka=kan=xo=nu	
3PL=ERG	manioc	peel=3PL=3.PST=DECL	

'After the **women**$_i$ had already arrived, **they**$_i$ peeled manioc.'

Accounts of SR parasitic on agreeing T

- Some direct reference-tracking accounts of SR assume that SR is parasitic on agreement on T (Finer, 1984, 1985; Watanabe, 2000; Camacho, 2010)
  - These accounts posit subject agreement on T which is interpreted as SR through some mechanism at the CP level
  - These accounts (sometimes explicitly) rule out object tracking since the probe on T is assumed to only agree with the subject

Object tracking in SR

- These accounts cannot straightforwardly capture the Amahuaca pattern in which C can show agreement with both the matrix and adjunct object

(22)

[jaa=x$_i$	vua=$\boxed{\text{xo}}$]=mun		
3SG=NOM	sing=SO.AFTER=C$_{\text{MATRIX}}$		
hinan	**xano$_i$**	chivan-vo=xo=nu	
dog.ERG	woman	chase-AM=3.PST=DECL	

'After she$_i$ sang, the dog chased the **woman$_i$**.'

(23)

[joni=n	**hino$_i$**	hiin=$\boxed{\text{ha}}$]=mun	
man=ERG	dog	see=OS.AFTER=C$_{\text{MATRIX}}$	
pro$_i$	koshi	ka=hi=ki=nu	
	quickly	go=IPFV=3.PRES=DECL	

'After the man saw the **dog$_i$**, it$_i$ is going quickly.'

Agreeing T

- If we were to allow the probe on T to be insatiable, this could accommodate object tracking
- However, this is hard to reconcile with the attested agreement on Amahuaca T
  - Amahuaca tense markers indicate the person of the subject
  - The person of the object is never indicated on T

(24) hiya=x=mun hun rakuu**=ku**=nu
1SG=NOM=C$_{\text{MATRIX}}$ 1SG be.afraid=1.PST=DECL
'I was afraid.'

(25) vaku=x=mun rakuu**=xo**=nu
child=NOM=C$_{\text{MATRIX}}$ be.afraid=3.PST=DECL
'The child was afraid.'

Separate probes on T and C

- Since Amahuaca T never inflects for object person, the more straightforward assumption is that T and C probe separately (Haegeman and van Koppen, 2012)
    - T's probe is satisfied by any ϕ-features (it always agrees with the highest DP)
    - C's probe has no satisfaction conditions (i.e. it is insatiable; it agrees with all DPs in its c-command domain)

Bound anaphor accounts of CA

- Patterns of upward-oriented CA have been argued to involve local agreement between C and a bound anaphor in its specifier (Diercks, 2013)
- We could imagine that SR as a type of downward-and-upward-oriented CA may involve agreement with a DP argument in the adjunct clause and a bound anaphor in the specifier of the adjunct CP (Baker and Camargo Souza, 2019)
- However, this type of account is inconsistent with the Amahuaca data

Condition C

- There is no distributional evidence that suggests adjunct CPs begin low enough in the structure to allow anaphor binding
- Even if adjunct CPs began low and obligatorily moved higher, they do not reconstruct for Condition C

(26) [Floria=n$_i$ Maria$_j$ hiin=$\boxed{\text{xo}}$]=mun
Floria=ERG Maria see=SO.AFTER=C$_{\text{MATRIX}}$
Maria=n$_j$ Floria$_i$ chivan-vo=xo=nu
Maria=ERG Floria chase-AM=3.PST=DECL
'After Floria$_i$ saw Maria$_j$, Maria$_j$ chased Floria$_i$.'

- If there is no reconstruction for Condition C, it is unclear how there could simultaneously be reconstruction for anaphor binding

Summarizing alternative analyses

- Several features of the Amahuaca system cannot straightforwardly be accounted for by previous analyses
  - The distribution of subject DPs
  - The availability of object tracking
  - The lack of Condition C effects
- The current analysis is able to account for all of these properties without introducing new technology

Predictions and typology

Accounting for subject-only tracking

- SR can be accounted for with existing Agree technology
- One question we might ask is why the majority of languages with SR only allow tracking of subjects
- The current account suggests several possibilities for how such systems could arise
    1. No object shift
    2. Case discriminating probe
    3. Syncretism

No object shift

- In Amahuaca, object shift allows the object to escape the *v*P phase and be accessible to C's probe
- If a language lacks object shift, C will be unable to agree with object DPs, resulting in a subject-only tracking pattern

Case discriminating probe

- It is possible that in a language with accusative alignment the probe on C is case-discriminating (Preminger, 2011), agreeing only with nominative DPs (Arregi and Hanink, 2018)
- This would allow for subject-only tracking even in a language with object shift

Syncretism

- A language could have a probe on C that agrees with objects but lack dedicated morphology to spell out an object coreference relationship
- Evidence that morphological syncretism may be a relevant factor comes from comparing the paradigms of different temporal adjunct Cs in Amahuaca
- Even within a single language, different paradigms have differing degrees of syncretism with respect to the morphology available to indicate object coreference

SR paradigms

'After' series

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<tr><td>O</td><td>=ha</td><td colspan="2">=kun (DF)</td></tr>
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'While' series

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'Before' series

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=xanni</td><td rowspan="2">=xankin</td><td rowspan="2"></td></tr>
<tr><td>A</td></tr>
<tr><td>O</td><td colspan="3">=non (DF)</td></tr>
</table>

Accounting for the typology

- This theory of SR is powerful enough to account for the tracking of objects
    - While object tracking is less common than subject tracking, languages such as those of the Panoan family (like Amahuaca) do allow for object tracking
- At the same time, it suggests several possibilities for how languages could have subject-only tracking
- The fact that there are multiple pathways to a subject-only tracking system suggests that these types of systems should be more commonly attested, as they are

Maximal projections as probes

- Cyclic expansion allows maximal projections to serve as probes
- A question we might ask is why we don't see more instances of maximal projections serving as probes
  - With many common probes (*v*, T, complement C), the c-command domain of the maximal projection only contains the head that selects it
  - With adjunct C, this pattern may actually be quite well attested given that SR systems are relatively common
  - Other agreeing adjuncts, such as Lubukusu agreeing 'how' (Carstens and Diercks, 2013), may also involve a maximal projection that probes through cyclic expansion

Consequences for a theory of Agree

- Despite the appearance of a long-distance dependency, SR can be analyzed as involving only local Agree relationships
- This allows us to preserve a view where Agree is
  1. Always under c-command
  2. Always local

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