Switch-reference as multiple agreement with cyclic expansion*

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1 Introduction

- Switch-reference (SR; Jacobsen 1967) offers an interesting puzzle from the perspective of locality in syntactic operations
 - An element indicates (non-)coreference of arguments in two different clauses
 - This marker thus reflects features of DPs in its own clause and in the clause to which it attaches¹
- (1) $[jaa=x_i \quad vua=(kin)]=mun \quad xano=n_i \quad xuki$ $3SG=NOM sing=SA.WHILE=C_{MATRIX} woman=ERG corn$ jova=xo=nucook=3.PST=DECL

'While she_i sings, the woman_i cooks corn.'

(2) $[joni_i vua=hain]=mun xano=n_j xuki man sing=DS.WHILE=C_{MATRIX} woman=ERG corn jova=xo=nu cook=3.PST=DECL$

'While the man_i sings, the woman_j cooks corn'

• One of the simplest ways to capture this type of pattern is to assume that the covarying head agrees directly with both relevant arguments (Arregi and Hanink, 2018)

- This raises questions about the directionality and locality of Agree
 - Is Agree upward, downward, or both?
 - How can an element in an adjunct clause Agree into another clause?
- ► I argue that we can provide an Agree-based account of SR while maintaining that Agree is always under c-command and is always local
- Cyclic Agree (Rezac, 2003, 2004; 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)
 - A classic example of this is with agreeing *v*



- Under the assumptions of Bare Phrase Structure (BPS), there is no formal distinction between the label of intermediate and maximal projections
- The prediction of a Cyclic Agree model coupled with BPS is that maximal projections should be able to serve as probes
- I argue that, not only is this prediction borne out, but it provides a straightforward way to account for SR in the type of structure in (4)

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¹The following abbreviations are used in glossing: 1 = first person, 3 = third person, AM = associated motion, C = complementizer, DECL = declarative, DS = different subject, EMPH = emphatic, ERG = ergative, GEN = genitive, IPFV = imperfective, NOM = nominative, OS = object coreferential with intransitive subject, PL = plural, PRES = present, PST = past, SA = subject coreferential with transitive subject, SG = singular, SO = subject coreferential with object, SS = subject coreferential with intransitive subject, TR = transitive.



- Specifically, I argue for the existence of this structure in Amahuaca (Panoan; Peru) where the SR marker is an agreeing adjunct C
 - Adjunct $C^{\min}\xspace$ probes DPs in its c-command domain, the adjunct clause
 - Because the probe on C remains unsatisfied, C^{max} also probes its ccommand domain, agreeing with matrix DPs
- ► Thus, the Amahuaca data provide support for multiple Agree via cyclic expansion and suggest that maximal projections can serve as probes
- Roadmap:
 - §1: Introduction
 - §2: Amahuaca agreeing C
 - §3: Multiple agreement with cyclic expansion
 - §4: Alternative analyses
 - §5: Two types of multiple agreement
 - §6: Predictions and typology

2 Amahuaca agreeing C

- Amahuaca is an endangered Panoan language spoken in the Peruvian and Brazilian Amazon
 - Mostly head final, with a head-initial matrix C

- SOV word order with scrambling of arguments and adjuncts
- Head and dependent marking
- Tripartite alignment with ergative, nominative, and accusative case
- All data were collected during my fieldwork in Sepahua, Peru over four field trips
- In temporal adjunct clauses in Amahuaca the element indicating the temporal relationship between clauses is an enclitic that typically surfaces on the verb
- (5) [jaa=x_i vua=xon]=mun xano=n_i xuki 3SG=NOM sing=SA.AFTER=C_{MATRIX} woman=ERG corn jova=xo=nu cook=3.PST=DECL 'After she_i sang, the woman_i cooked corn.'
- For simplicity, the focus on this talk will be on 'after' clauses, but 'while' and 'before' show similar behavior

2.1 Internal syntax of 'after' clauses

- Amahuaca 'after' clauses are full CPs, large enough to contain all arguments of the verbs, as well as adjuncts
 - They can contain ergative, (6), and nominative, (7), subjects, as well as objects
- (6) **[xano=n**_i chopa patza=<u>xon</u>] =mun *pro*_i hatza woman=ERG clothes wash=SA.AFTER =C_{MATRIX} manioc jova=hi=ki=nu cook=IPFV=3.PRES=DECL

'After the woman $_i$ washed clothes, she $_i$ is cooking manioc.

(7) [kiyoo-vi=nix_i nokoo=xon]] =mun pro_i hatza all-EMPH=NOM arrive=SA.AFTER =C_{MATRIX} manioc jova=kan=xo=nu cook=3PL=3.PST=DECL
'After everyone_i arrived, they_i cooked manioc.'

- They can contain adverbs
- (8) [*pro_i* koshi ka=[xon]] =mun xano=n_i hatza quickly go=SA.AFTER =C_{MATRIX} woman=ERG manioc vana=xo=nu plant=3.PST=DECL

'After she_i went quickly, the woman_i planted manioc.'

(9) [moha xano= x_i nokoo=xon] =mun jato= n_i hatza already woman=NOM arrive=SA.AFTER = C_{MATRIX} 3PL=ERG yuca xoka=kan=xo=nu pool=3PL=3 PST=DECL

peel=3PL=3.PST=DECL

'After the women_i had already arrived, they_i peeled yuca.'

- They can contain other adjunct CPs
- (10) $[[pro_i \text{ kari choka}=xon]] pro_i \text{ hatza xoka}=xon]] = mun$ $yam wash=SA.AFTER manioc peel=SA.AFTER = <math>C_{MATRIX}$ 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.'

(alternatively, 'The woman washed yams, peeled manioc, and cooked corn.') $% \left(\left({{{\left({{{\left({{{\left({{{\left({{{c}}} \right)}} \right)_{i}}} \right)}_{i}}}} \right)_{i}} \right)_{i}} \right)$

- 'After' clauses also allow clause-internal scrambling
- (11) 'After I cooked paca, I peeled manioc.'
 - a. SOV 'after' clause

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

b. OSV 'after' clause

[hano hiya=n jova=<u>xon</u>] =mun hun hatza paca 1SG=ERG cook=SA.AFTER =C_{MATRIX} 1SG manioc vuro=ku=nu peel=1.PST=DECL

2.2 External syntax of 'after' clauses

- 'After' clauses typically appear in high peripheral positions
- It is ungrammatical for 'after' clauses to appear below aspect marking (Note that nominalized internally-headed relative clauses can appear in this position)
- (12) 'After she_{*i*} sang, the woman_{*i*} is washing manioc.'
 - a. $[pro_i vua=xon] = mun xano=n_i hatza sing=SA.AFTER=C_{MATRIX} woman=ERG manioc choka=hi=ki=nu wash=IPFV=3.PRES=DECL$
 - b. xano=n_i=mun hatza choka=hi=ki=nu [pro_i woman=ERG=C_{MATRIX} manioc wash=IPFV=3.PRES=DECL vua=<u>xon</u>] sing=SA.AFTER
 - c. * xano= n_i =mun hatza choka=hi [pro_i woman=ERG= C_{MATRIX} manioc wash=IPFV vua= \overline{xon}]=ki=nu sing=SA.AFTER=3.PRES=DECL
- 'After' clauses do not reconstruct below matrix arguments for Condition C: regardless of the relative position of matrix and adjunct material, a Condition C violation is never triggered
- (13) 'After Maria_i went quickly, she_i washed clothes.'
 - a. [*pro_i* koshi ka=xon]=mun Maria=n_i chopa quickly go=SA.AFTER=C_{MATRIX} Maria=ERG clothes patza=xo=nu wash=3.PST=DECL
 - b. [Maria_i koshi ka=xon]=mun pro_i chopa Maria quickly go=SA.AFTER=C_{MATRIX} clothes patza=xo=nu wash=3.PST=DECL
 - c. $jaa=n_i=mun$ [Maria_i koshi ka=xon] chopa $3SG=ERG=C_{MATRIX}$ Maria quickly go=SA.AFTER clothes patza=xo=nu wash=3.PST=DECL

• The proposed syntax for these 'after' clauses is as given in (14)



2.3 Agreement in 'after' clauses

- There are several different forms of the enclitic used to mean 'after'
 - These morphemes vary depending on coreference relationships between arguments (Sparing-Chávez, 1998, 2012)
 - If there is coreference between an argument in the adjunct clause and one in the matrix clause, the form of the morpheme is sensitive to the abstract case of the relevant arguments
 - In (15), the adjunct clause subject is coreferential with a matrix transitive subject (ERG), and the agreeing adjunct C takes the form =*xon*
- (15) [jaa=x_i vua=xon]=mun xano=n_i xuki 3SG=NOM sing=SA.AFTER=C_{MATRIX} woman=ERG corn jova=xo=nu cook=3.PST=DECL

'After she_{*i*} sang, the woman_{*i*} cooked corn.'

- In (16), the adjunct clause subject is coreferential with a matrix intransitive subject (abstract NOM), and the agreeing adjunct C takes the form =*hax*
- (16) $[jaa=x_i \quad vua=hax]=mun \quad xano_i \quad chirin=xo=nu$ 3SG=NOM sing=SS.AFTER=C_{MATRIX} woman dance=3.PST=DECL 'After she_i sang, the woman_i danced.'
 - In (17), the adjunct clause subject is coreferential with a matrix object (abstract ACC), and the agreeing adjunct C takes the form =*xo*
- (17) $[jaa=x_i \quad vua=[xo]]=mun \quad hinan \quad xano_i$ $3SG=NOM \quad sing=SO.AFTER=C_{MATRIX} \quad dog.ERG \quad woman \quad chivan-vo=xo=nu \quad chase-AM=3.PST=DECL \quad 'After she_i \quad sang, the dog \ chased \ the \ woman_i.'$
 - In (18), no adjunct clause DP is coreferential with any matrix DP, and adjunct C is spelled out as the different subject marker =kun
- (18) [joni_{*i*} vua=kun]=mun xano_{*j*} chirin=xo=nu man sing=DS.AFTER= C_{MATRIX} woman dance=3.PST=DECL 'After the man_{*i*} sang, the woman_{*j*} danced.'
- The full paradigm of 'after' morphemes is given in (19)
- (19) 'After' markers

		Matrix		
		S	А	0
nct	S	-har	-ron	-ro
ljur	А	-nux	-2011	-20
Ac	0	=ha	=kun	

- It has been noted that SR shares many similarities with 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 abstract case

➤ Interestingly, the agreeing complementizer is sensitive to features of DPs in its own clause and the clause to which C^{max} is adjoined

3 Multiple agreement with cyclic expansion

- 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
- 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
- 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, vP (Clem, 2018b)

(20) Agreement inside the adjunct clause



- 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
- (21) Agreement into the matrix clause



- 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
- Sample vocabulary items are given in (22)²
- (22) 'After' vocabulary items $\begin{bmatrix} [AFTER,[i,NOM^*]] [i,NOM] \end{bmatrix} \leftrightarrow /hax/$ $\begin{bmatrix} [AFTER,[i,NOM^*]] [i,ERG] \end{bmatrix} \leftrightarrow /xon/$ $\begin{bmatrix} AFTER \end{bmatrix} \leftrightarrow /kun/$

4 Alternative analyses

- The account outlined here builds on the insight of Watanabe (2000) that 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

4.1 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, 2018a)
- In Amahuaca, 'after' clauses can host all arguments of the verb overtly, including case-marked subjects
- (23) [moha xano=x_i nokoo=xon]=mun jato=n_i hatza already woman=NOM arrive=SA.AFTER=C_{MATRIX} 3PL=ERG yuca xoka=kan=xo=nu peel=3PL=3.PST=DECL 'After the women_i arrived, they_i peeled yuca.'

4.2 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
- These accounts cannot straightforwardly capture the Amahuaca pattern in which C can show agreement with both the matrix and adjunct object
- (24) $[jaa=x_i \quad vua=xo]=mun \quad hinan \quad xano_i$ 3SG=NOM sing=SO.AFTER=C_{MATRIX} dog.ERG woman chivan-vo=xo=nu chase-AM=3.PST=DECL 'After she_i sang, the dog chased the woman_i.'
- (25) [joni=n hino_i hiin=ha]=mun pro_i koshi man=ERG dog see=OS.AFTER=C_{MATRIX} quickly ka=hi=ki=nu go=IPFV=3.PRES=DECL 'After the man saw the dog_i, it_i is running.'

²What I label here NOM* is a feature that is common to all embedded subjects, nominative or ergative. Given independent evidence from case assignment in Amahuaca (Clem, 2018b), a good candidate for this feature is a [T] feature that indicates agreement with 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
- 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)
- An additional issue with the accounts of Finer (1984, 1985) and Watanabe (2000) is that they require a mechanism of binding between matrix and adjunct C which is otherwise unnecessary

4.3 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
- However, this type of account is inconsistent with the Amahuaca data
 - There is no distributional evidence that suggests adjunct CPs begin low enough in the structure to allow binding of an anaphor
 - Even if adjunct CPs began low and obligatorily moved higher, they do not reconstruct for Condition C, (26)

(26) [Floria=n_i Maria_j hiin=xo]=mun Maria=n_j Floria_i Floria=ERG Maria see=SO.AFTER=C_{MATRIX} Maria=ERG Floria chivan-vo=xo=nu 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
- An additional potential issue with this style of account lies in the nature of the agreement relationship between C and the anaphor
 - If the anaphor is in Spec,CP, purely downward Agree requires some additional mechanism to derive Spec-Head agreement
 - One proposal for how to subsume Spec-Head agreement under a general theory of downward Agree is through cyclic expansion
 - If Cyclic Agree is assumed, we would need some stipulation to rule out the possibility of adjunct C^{max} continuing to probe



5 Two types of multiple agreement

- The type of multiple agreement (MA) active in deriving the basic pattern of SR marking is what I will call 'Type 1 MA'
 - Type 1 MA: A single probe interacts with multiple goals
 - In the case of Amahuaca , the probe on adjunct C interacts with DP goals in its own clause and in the clause to which it is adjoined
- The Amahuaca SR systems also provides evidence for a second type of MA, Type 2 MA
 - Type 2 MA: A single goal interacts with multiple probes
- There are two phenomena that provide evidence for Type 2 MA in Amahuaca
 - ϕ -agreement on T
 - Nested SR clauses

5.1 MA in *\phi*-agreement on T

- Amahuaca matrix T shows ϕ -agreement controlled by the subject
- (28) hiya=x=mun hun rakuu<u>=ku</u>=nu 1SG=NOM=C_{MATRIX} 1SG be.afraid=1.PST=DECL 'I was afraid.'
- (29) vaku=x=mun rakuu<u>=xo</u>=nu child=NOM=C_{MATRIX} be.afraid=3.PST=DECL 'The child was afraid.'
- An argument that is cross-referenced by SR morphology can also serve as the controller for $\phi\text{-}agreement$ on T
- (30) [hiya=n hano jova=xon]=mun hun hatza 1SG=ERG paca cook=SA.AFTER=C_{MATRIX} 1SG manioc vuro=ku=nu peel=1.PST=DECL 'After I cooked paca, I peeled manioc.'

- (31) [Maria_i koshi ka=xon]=mun pro_i chopa Maria quickly go=SA.AFTER=C_{MATRIX} clothes patza=xo=nu wash=3.PST=DECL 'After Maria_i went quickly, she_i washed clothes.'
- ➤ This suggests the same DP can be targeted by multiple probes for Agree

5.2 MA in nested SR clause

- SR adjunct clauses in Amahuaca can appear in 'clause chains', with no grammatical limit on the number of clauses
- When multiple adjunct clauses occur with a single main clause, they can exhibit a stacked, (32), or nested, (33), structure





- In (34), the two adjunct clauses are stacked, and the SR marker cross-references the matrix subject in both adjunct clauses
- (34) [hiya= n_i hatza vana=kin]=mun [Maria= n_j hun 1SG=ERG manioc plant=SA.WHILE= C_{MATRIX} Maria=ERG 1SG.GEN vaku jiri=kun] hiya= n_i rivi jan vaku jiri=hi child feed=DS.AFTER 1SG=ERG also 3SG.GEN child feed=IPFV hun=ka=nu 1SG=1.PRES=DECL

'[While I plant manioc] I, too, am feeding her kids, [after Maria fed my kids].'

(alternatively, 'Maria fed my kids, so while I plant manioc, I, too, am feeding her kids.')

- In (35), the two adjunct clauses are nested
 - The SR marker in the lower adjunct clause cross-references the subject of the higher adjunct clause
 - The SR marker in the higher adjunct clause cross-references the subject of the matrix clause
- (35) [[hiya=n_i hun hatza vana=hain] Maria=n_j hun vaku 1SG=ERG 1SG manioc plant=DS.WHILE Maria=ERG 1SG.GEN child jiri=kun]=mun hiya=n_i rivi jan vaku jiri=hi feed=DS.AFTER=C_{MATRIX} 1SG=ERG also 3SG.GEN child feed=IPFV hun=ka=nu 1SG=1.PRES=DECL

'[After Maria fed my kids [while I planted manioc]], I, too, am feed-

ing her kids.' (alternatively, 'While I planted manioc, Maria fed my kids, so I, too,

- am feeding her kids.')
- In nested same-subject structures, the subject of the higher adjunct clause will be a goal of Agree for the C that is adjoined to its clause as well as for the C of its own clause

(36) [[pro_i kari choka=xon] pro_i hatza xoka=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.'

(alternatively, 'The woman washed yams, peeled manioc, and cooked corn.')



➤ Thus, the ability of SR clauses to occur in nested structures is a further piece of evidence for Type 2 MA

6 Predictions and typology

- ► 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

- 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
- 2. Case discriminating probe
 - It is possible that in a language with accusative alignment the probe on C is case-discriminating, agreeing only with nominative DPs
 - This would allow for subject-only tracking even in a language with object shift
- 3. Syncretism
 - It is possible that 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
- (38) a. 'After' series

		Matrix		
		S	А	0
ljunct	S	=hax	=xon	=x0
	А			
Ac	0	=ha	=kun	

b. 'While' series

		Matrix		
		S	А	0
nct	S	_hi	_kin	-haito
ljur	А	-111	-κιπ	-111110
Ac	0	=hain		

c. 'Before' series

		Matrix		
		S	А	0
nct	S	=katzi/	-vankin	
ljur	А	=xanni	<i>—</i> липкт	
Ac	0	=non		

- ► 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, which usually will not have the correct type of features
 - With adjunct C, this pattern may actually be quite well attested given that SR systems are relatively common

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