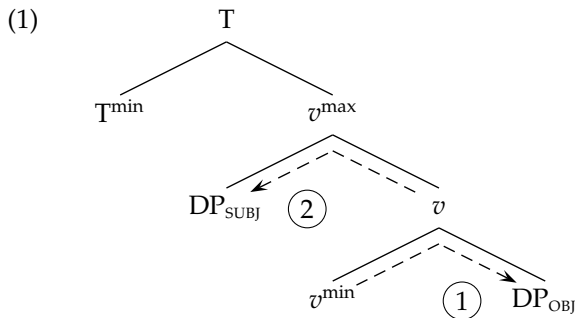


Cyclic expansion in Agree: Maximal projections as probes*

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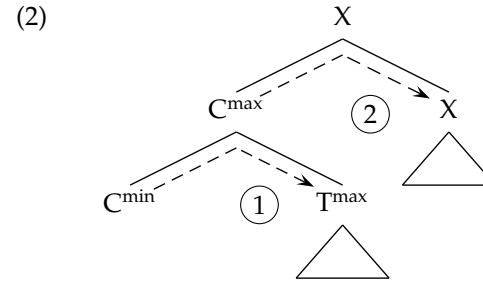
1 Introduction

- 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
- This prediction is difficult to test, given that the c-command domain of X^{\max} will typically only contain the head that selects it

- In this talk, I argue that this prediction is borne out in the type of structure in (2)



- Specifically, I argue for the existence of this structure in Amahuaca (Panoan; Peru) with an agreeing adjunct C
 - 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
- Thus, 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: Alternative analyses
- §5: Predictions and typology

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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
 - Head and dependent marking
 - Tripartite alignment with ergative, nominative, and accusative case

- In temporal adjunct clauses in Amahuaca the element indicating the temporal relationship between clauses is an enclitic that typically surfaces on the verb¹

(3) [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 that can contain all arguments of the verb, including case-marked subjects, (4); adverbs, (5); and other adjunct clauses, (6)

(4) [xano=n_i chopa patza=xon]=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.’

¹The following abbreviations are used in glossing: 1 = first person, 3 = third person, AM = associated motion, C = complementizer, DECL = declarative, DS = different subject, ERG = ergative, 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.

(5) [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.’

(6) [[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.’

- ‘After’ clauses also allow clause-internal scrambling

(7) ‘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=xon]=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)

(8) '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 [*pro*_i
woman=ERG=C_{MATRIX} manioc wash=IPFV
vua=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

(9) 'After Maria_i went quickly, she_i washed clothes.'

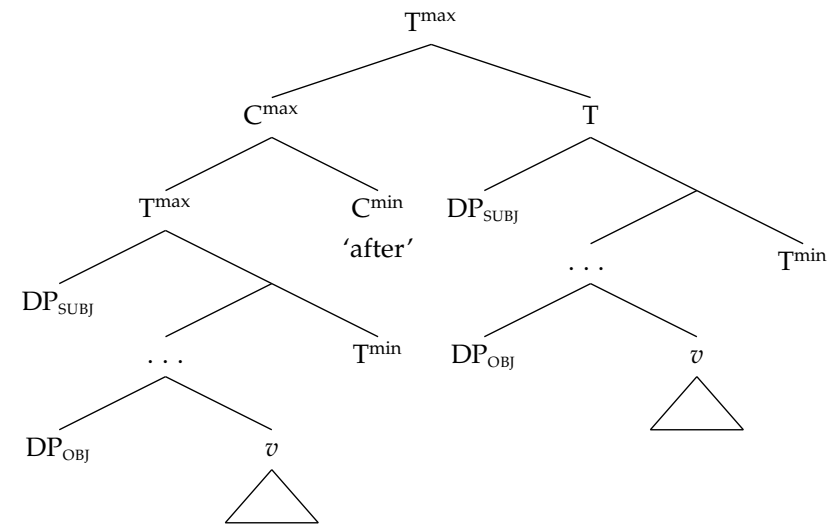
a. [*pro*_i koshi ka=xon]=mun Maria=*n*_i chopa
quickly go=SA.AFTER=C_{MATRIX} Maria=ERG clothes
patza=xo=nu
wash=3.PST=DECL

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 (10)

(10)



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 grammatical function of the relevant arguments
 - In (11), the subject of the adjunct clause is coreferential with a matrix transitive subject (S=A), and the agreeing adjunct C takes the form =xon

(11) [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 (12), the subject of the adjunct clause is coreferential with a matrix intransitive subject (S=S), and the agreeing adjunct C takes the form =*hax*

(12) [jaa= x_i vua=hax]=mun xano_i chirin=xo=nu
 3SG=NOM sing=SS.AFTER=C_{MATRIX} woman dance=3.PST=DECL
 ‘After she_i sang, the woman_i danced.’

- In (13), the subject of the adjunct clause is coreferential with a matrix object (S=O), and the agreeing adjunct C takes the form =*xo*

(13) [jaa= x_i vua=xo]=mun hinan 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.’

- In (14), no adjunct clause DP is coreferential with any matrix DP, and adjunct C is spelled out as the different subject marker =*kun*

(14) [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 (15)

(15) ‘After’ markers

		Matrix		
		S	A	O
Adjunct	S	= <i>hax</i>	= <i>xon</i>	= <i>xo</i>
	A			
	O	= <i>ha</i>	= <i>kun</i>	

- From a typological perspective, this phenomenon has been termed ‘switch-reference’ (Jacobsen, 1967)
- It has been noted that switch-reference shares many similarities with complementizer agreement and can potentially be analyzed as involving an agreeing complementizer (Watanabe, 2000; Arregi and Hanink, 2018)

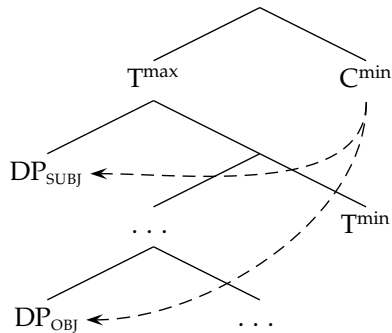
- The Amahuaca pattern looks like complementizer agreement that is sensitive to referential index and case
- Interestingly, the agreeing complementizer is sensitive to features of DPs in its own clause and the clause to which C^{max} is adjoined

3 The analysis: Maximal projections as probes

- 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

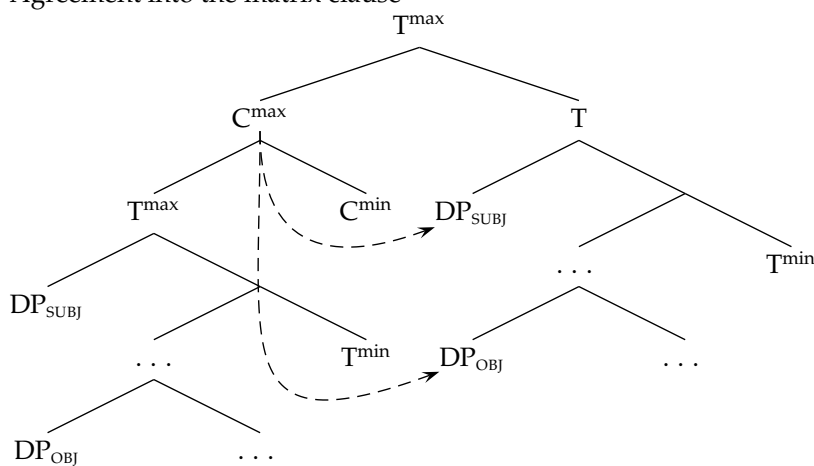
- Note that evidence from remnant VP-fronting suggests that objects undergo shift to Spec,*v*P (Clem, 2018b)

(16) 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

(17) 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 (18)²

(18) 'After' vocabulary items

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

4 Alternative analyses

- The account outlined here 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

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.

4.1 Non-reference-tracking accounts of SR

- Some recent analyses of SR assume that reference tracking is not directly 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

(19) [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

(20) [jaa=x_i vua=xo]=mun hinan 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.’

(21) [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.’

- 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 person 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

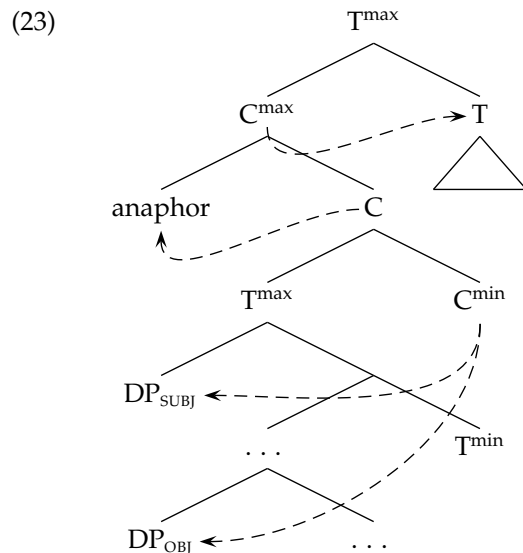
4.3 Bound anaphor accounts of CA

- 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, (22)
- If there is no reconstruction for Condition C, it is unclear how there could simultaneously be reconstruction for anaphor binding

(22) [Floria= n_i Maria $_j$ hiin= $\overline{[xO]}$]=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 $_i$.'

- 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 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 vP 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

(24) a. 'After' series

		Matrix		
		S	A	O
Adjunct	S	= <i>hax</i>	= <i>xon</i>	= <i>xo</i>
	A			
	O	= <i>ha</i>	= <i>kun</i>	

b. 'While' series

		Matrix		
		S	A	O
Adjunct	S	= <i>hi</i>	= <i>kin</i>	= <i>haito</i>
	A			
	O	= <i>hain</i>		

c. 'Before' series

		Matrix		
		S	A	O
Adjunct	S	= <i>katzi/</i>	= <i>xankin</i>	
	A	= <i>xanni</i>		
	O	= <i>non</i>		

➤ Probe reprojection is fully generalizable even to maximal projections

- 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

References

- Arregi, Karlos, and Emily Hanink. 2018. Switch reference in Washo as multiple subject agreement. To appear in the Proceedings of NELS48.
- Béjar, Susana, and Milan Rezac. 2009. Cyclic Agree. *Linguistic Inquiry* 40:35–73.

Camacho, José. 2010. On case concord: The syntax of switch-reference clauses. *Natural Language & Linguistic Theory* 28:239–274.

Chomsky, Noam. 1995. *The minimalist program*. Cambridge, MA: MIT Press.

Clem, Emily. 2018a. Against non-reference-tracking theories of switch-reference. *Proceedings of the Linguistic Society of America* 3:29:1–9.

Clem, Emily. 2018b. Amahuaca ergative as agreement with multiple heads To appear, *Natural Language & Linguistic Theory*.

Deal, Amy Rose. 2015. Interaction and satisfaction in ϕ -agreement. Talk handout.

Diercks, Michael. 2013. Indirect agree in Lubukusu complementizer agreement. *Natural Language & Linguistic Theory* 31:357–407.

Finer, Daniel L. 1984. The formal grammar of switch-reference. Doctoral Dissertation, University of Massachusetts, Amherst.

Finer, Daniel L. 1985. The syntax of switch-reference. *Linguistic Inquiry* 16:35–55.

Georgi, Doreen. 2012. Switch-reference by movement. In *Perspectives on switch-reference: Local modeling and empirical distribution*, ed. Philipp Weisser, 1–40. Leipzig: Institute für Linguistik, Universität Leipzig.

Haegeman, Liliane, and Marjo van Koppen. 2012. Complementizer agreement and the relation between C⁰ and T⁰. *Linguistic Inquiry* 43:441–454.

Jacobsen, William H. 1967. Switch-reference in Hokan-Coahuiltecan. In *Studies in South-Western ethnolinguistics*, ed. Dell H. Hymes and William E. Bittle, 238–263. The Hague: Mouton.

Keine, Stefan. 2012. Switch-reference as coordination. In *Perspectives on switch-reference: Local modeling and empirical distribution*, ed. Philipp Weisser, 107–164. Leipzig: Institute für Linguistik, Universität Leipzig.

Keine, Stefan. 2013. Deconstructing switch-reference. *Natural Language & Linguistic Theory* 31:767–826.

Rezac, Milan. 2003. The fine structure of cyclic Agree. *Syntax* 6:156–182.

Rezac, Milan. 2004. Elements of cyclic syntax: Agree and merge. Doctoral Dissertation, University of Toronto.

Sparing-Chávez, Margarethe. 1998. Interclausal reference in Amahuaca. In *Handbook of Amazonian languages*, ed. Desmond C. Derbyshire and Geoffrey K. Pullum, volume 4, 443–485. Berlin: Mouton de Gruyter.

Sparing-Chávez, Margarethe. 2012. *Aspects of Amahuaca grammar: An endangered language of the Amazon basin*. Dallas: SIL International.

Watanabe, Akira. 2000. Feature copying and binding: Evidence from complementizer agreement and switch reference. *Syntax* 3:159–181.