

Quantifier unification: Bipartite universal quantification in Tswefap
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1 Overview

Universal quantification in Tswefap is bipartite, involving the contribution of two independent words *ndòhk* and *awagha*:

- Unlike other bipartite quantification systems described for St’át’imcets (Matthewson, 2001) or Mandarin (Cheng, 2009), **both parts are quantifiers with (nearly) identical semantics, that share a restrictor.**
- In order for this structure to be interpretable, I propose a new compositional argument-sharing operation, QUANTIFIER UNIFICATION, akin to PREDICATE MODIFICATION (Heim & Kratzer, 1998) or EVENT IDENTIFICATION (Kratzer, 1996), that unifies the quantificational operators and shares arguments between them.
- The apparent redundancy of using two near-identical quantifiers is necessitated by the fact that neither *ndòhk* or *awagha* are ideal for use as the single quantifier in a clause, while their co-occurrence ameliorates the issues they have independently.

2 Language background

- Tswefap is a Bamileke (<Grassfields Bantu) language of Cameroon, spoken by around 20,000 people mainly in the village of Batoufam (Tsw: Pa’ Tswefap), but also in larger cities of Cameroon.
- There’s a grammar written by a native speaker (Gueche Fotso, 2013), though it includes very little discussion of quantification.
- The data in this handout come from my 2016-2017 elicitations with Guy Tchatchouang, a native speaker from Douala, Cameroon who lives now in the San Francisco Bay Area.

2.1 Linguistic facts

- Like other Grassfields languages: Highly isolating morphology

- Grammatical tone. In the realm of quantification though, tone does not co-vary with any semantic variables as far as I can tell (unlike, say, in tense/aspect where tone changes co-vary with tense changes)
- Basic word order: S Aux V O Adv

2.2 Quantifiers

D-quantifiers	Adverbial(?) Quantifiers	Verbal Quantifiers
ndòhk ‘all’ mbeh wie ... loh ‘every’	awagha ‘all’ tchoh’sseh ‘many, a lot’	 njop ‘a lot’
ncheh ‘some’ sop ‘no’		

3 Universal quantification in Tswefap

The basic pattern of universal quantification in Tswefap is shown in (1).

- (1) **ndòhk** mveuk **awagha** à khéu
 all dog all ASP run
 ‘All the dogs ran.’ (GT, 9/7/2016)

Though generally *ndòhk* and *awagha* co-occur, it is possible to have each occur on its own. *Awagha* can do this freely, though sentences with just *awagha* are dispreferred compared to ones with both *ndòhk* and *awagha*:

- (2) #mveuk **awagha** à khéu
 dog all ASP run
 ‘All the dogs ran.’ (GT, 9/7/2016)

ndòhk, if alone, requires its complement to be modified in some way:

- (3) ***ndòhk** mveuk à khéu
 all dog ASP run
 Intended: ‘All the dogs ran.’ (GT, 9/7/2016)
- (4) **ndòhk** tehtu pfwoh à yoh mveuk
 all short children ASP see dog
 ‘All the short children saw the dog.’ (GT, 9/29/2016)

3.1 Properties of *ndòhk*

- Always at left edge of NP

- Restrictions on NP complement:

- If noun has a suppletive plural form, the suppletive form must be used.

- (5) a. *ndòhk nwe awagha à yoh mveuk
 all child all ASP see dog
 Intended: ‘All the children saw the dog.’ (9/15/2017)
- b. ndòhk pfohw awagha a yoh mveuk
 all children all ASP see dog
 ‘All the children saw the dog.’ (9/15/2017)

- Nouns with non-suppletive plurals can be used with or without a plural prefix *pe-*, but must be semantically plural:

- (6) ndòhk pe-mveuk awagha à keundeuk
 all PL-dog all ASP run
 ‘All the dogs ran.’

- Licensed by modification:

- Unmodified

- (7) *ndòhk pfohnkhèu à yoh mveuk
 all children ASP see dog
 Intended: ‘All the children saw the dog.’ (GT, 9/29/2016)

- Adjective

- (8) ndòhk tehtu pfohw à yoh mveuk
 all short children ASP see dog
 ‘All the short children saw the dog.’ (GT, 9/29/2016)

- Numeral

- (9) ndòhk pfohnkheu pe-teh à keundeuk
 all children LNK-3 ASP run
 ‘All three children saw the dog.’ (GT, 11/23/2016)

- Demonstrative

- (10) ndòhk pfohw poh à keundeuk
 all children those ASP run
 ‘All those children saw the dog.’ (GT, 11/23/2016)

- Possessor

- (11) ndòhk pfohw fe le roptse te’
 all children sibling ASP talk much
 ‘All my sibling’s children talked a lot.’ (GT, 12/1/2016)

- Restrictive relative clause

- (12) ndòhk pfohw yi wup à yoh mveuk a keundeuk
 all children REL they ASP see dog ASP run
 ‘All the children who saw the dog ran.’ (GT, 12/1/2016)

- “Unrestrictive” relative clause

- (13) ndòhk mveuk yi wup nòp a mé n-keundeuk
 all dog REL they animal REL ASP ASP-run
 ‘All the dogs, which are animals, are running.’ (12/1/2016)
 (Note: no identifiable prosodic or syntactic difference between restrictive and unrestrictive relative clauses)

3.2 Properties of *awagha*

- Generally appears at right edge of NP:

- (14) a. ndòhk foh awagha pu nwe à ghehtse zhwetseuk
 all chief all and child ASP share food
 ‘All the chiefs and the child shared the food.’ (5/5/2017)
- b. *ndòhk foh pu nwe awagha à ghehtse zhwetseuk
 all chief and child all ASP share food
 Intended: ‘All the chiefs and the child shared food’ (5/5/2017)
- c. ndòhk foh pu pfohnkheu awagha à ghehtse zhwetseuk
 all chief and children all shared food
 ‘All the chiefs and children shared the food’ (5/5/2017)

- ...but can also float:

- (15) mveuk à khéu awagha
 dog ASP run all
 ‘All the dogs ran.’ (GT, 9/7/2016)

- “Adverbial” interpretations (though not unselective! cf. Lewis 1975):

- (16) a. mveuk à keundeuk awagha zhuge
 dog ASP run all yesterday
 ‘The dog ran all the distance yesterday.’ (GT, 9/7/2016)

- b. *ndòhk mveuk à keundeuk awagha zhuge*
 all dog ASP run all yesterday
 ‘All the dogs ran yesterday.’ (GT, 9/7/2016)

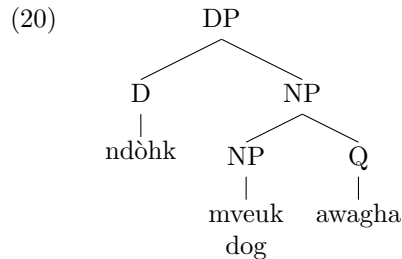
- (17) *pfóhnikheu á keundeuk awagha*
 children ASP run all
 ‘All the children ran.’ (GT, 11/23/2016)
 ‘The children ran the entire distance.’
 ‘The children ran the entire time.’

- Can take singleton-denoting nouns as restrictor:

- (18) *Erik à yoh San Francisco awagha*
 E. ASP see S. F. all
 ‘Erik saw San Francisco completely.’

- (19) *Idiom: yoh NAME awagha*
 see NAME all
 ‘see NAME naked.’

3.3 Proposed structure



- *ndòhk* as D: *ndòhk* imposes plural requirement on the noun, indicating the noun is its complement.
- Assuming that the mechanism for licensing by modification is syntactic in nature, *awagha* should be a constituent with the noun like the other modifiers that license *ndòhk*. (Though see Dayal 2004)
- Note: In adverbial uses like in (16) and (17), *awagha* would not be a constituent with the noun unless it is quantifying over it.

4 Truth conditions and scope

In each condition (both *ndòhk* and *awagha*, just *awagha*, and just *ndòhk*), the scopal possibilities and truth conditions are the same (in the relevant respects):

- (21) *nch eh pfoh à tseuk ndòhk mangulu awagha*
 some children ASP eat all mango all
 ‘Some children ate all the mangos.’ (GT, 2/23/2016)
 $\checkmark \exists > \forall$ = One group of children eats all the mangos.
 $\checkmark \forall > \exists$ = Each mango eaten by a different group of children.

- (22) *nch eh pfoh à tseuk mangulu awagha*
 some children ASP eat mango all
 ‘Some children ate all the mangos.’ (GT, 2/23/2017)
 $\checkmark \exists > \forall$ = One group of children eats all the mangos.
 $\checkmark \forall > \exists$ = Each mango eaten by a different group of children.

- (23) *nch eh pfoh à tseuk ndòhk mangulu n-khoh'oh*
 some children ASP all mango CNS-be.small
 ‘Some children ate all the small mangos.’ (GT, 2/23/2017)
 $\checkmark \exists > \forall$ = One group of children eats all the mangos.
 $\checkmark \forall > \exists$ = Each mango eaten by a different group of children.

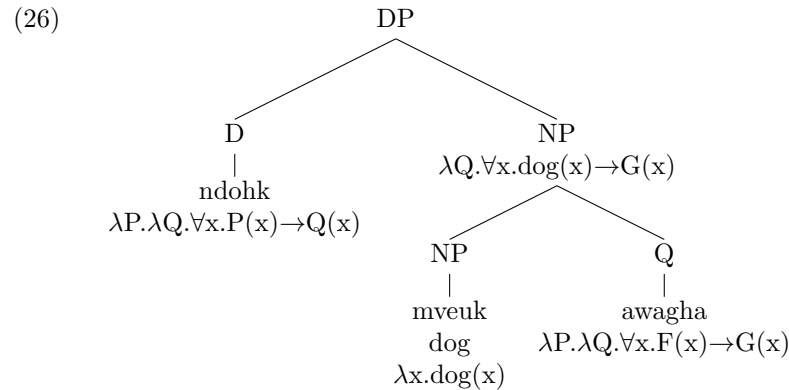
5 Quantifier unification

- Based on the scopal facts, it appears that *ndòhk* and *awagha* both have the standard denotation for a universal quantifier:

- (24) a. $\llbracket \text{ndòhk} \rrbracket$: $\lambda P. \lambda Q. \forall x. P(x) \rightarrow Q(x)$
 b. $\llbracket \text{awagha} \rrbracket$: $\lambda P. \lambda Q. \forall x. P(x) \rightarrow Q(x)$

- Furthermore, it appears that the construction with both of them has this standard semantics as well. How do we get from two denotations like (24) to one?

- (25) QUANTIFIER UNIFICATION: If α is a branching node and $\{\beta, \gamma\}$ the set of its daughters, and $\llbracket \beta \rrbracket$ is of type $\langle \langle \langle e, t \rangle, t \rangle, \langle e, t \rangle, t \rangle \rangle$ and has a denotation of the form $\lambda P. \lambda Q. \delta x. P(x) \dots Q(x)$ and $\llbracket \gamma \rrbracket$ is of type $\langle \langle \langle e, t \rangle, t \rangle \rangle$ and has a denotation of the type $\lambda G. \delta x. F(x) \dots G(x)$. In this case, $\llbracket \alpha \rrbracket = \lambda Q. \delta x. F(x) \dots Q(x)$



- Doesn't this just make *ndohk* vacuous?
 - If part of the meaning of *ndohk* is also that it presupposes that the set denoted by its restrictor is not a singleton set, that presupposition clearly carries over into the *ndohk...awagha* construction (see 5a)
 - So, QUANTIFIER UNIFICATION must also carry over the presuppositions from its two inputs - and in that way *ndohk* is not just made vacuous.

6 Quantifier concord?

- Negative concord: single interpretation of negation, multiple words/morphemes appear to express it (Giannakidou, 2006)
- Is the Tsweap pattern quantifier concord?
 - Maybe not. The independence of *ndohk* and *awagha* don't seem to match the pattern Giannakidou (2006) calls “negative concord proper” - where there's a clear sentential negator and one or more other words that sometimes appear in negative contexts but do not clearly contribute negative semantics.
- One single null quantifier associating with different positions (a la Fox & Johnson 2016)? One would have to come up with compelling conditions for why *awagha* doesn't always appear - they do not appear to be clear syntactic reasons for it not to.

7 Why the redundancy?

- Say you're a Tsweap speaker, and you want to say something equivalent to “I ate all the mangos.”
 - You can't just say *ndohk*, since it has this extra restriction that you would then need to modify *mangulu* ‘mango.’ But, you don't want to modify it; you ate all the mangos, not just the small ones (for example)
 - There's also *awagha*, but it has issues too. What if your listener thinks you only ate a single mango entirely, or for the entire time? It's too ambiguous.
 - But wait! *Awagha* is a modifier. If you use it with the noun, you can use then *ndohk*, and in fact, using *ndohk* will also disambiguate *awagha* (16b), and you also don't have to add in any extra meaning than you originally wanted.

References

- Cheng, Lisa Lai-Shen. 2009. On *Every* type of quantificational expression in Chinese. In Anastasia Giannakidou & Monika Rathert (eds.), *Quantification, definiteness, and nominalization*, 53–75. Oxford University Press.
- Dayal, Veneeta. 2004. Licensing by modification .
- Fox, Danny & Kyle Johnson. 2016. Qr is restrictor sharing. In *Proceedings of the 33rd west coast conference on formal linguistics*, .
- Giannakidou, Anastasia. 2006. N-words and negative concord. In *Blackwell companion to syntax*, vol. III, chap. 45, 327–391.
- Gueche Fotso, Hugues Carlos. 2013. *A descriptive grammar of Batoufam*: The University of Yaounde I dissertation.
- Heim, Irene & Angelika Kratzer. 1998. *Semantics in generative grammar*. Blackwell.
- Kratzer, Angelika. 1996. Severing the external argument from its verb. In Johan Rooryck & Laurie Zaring (eds.), *Phrase structure and the lexicon*, Springer.
- Lewis, David. 1975. Adverbs of quantification. In *Formal semantics of natural language*, .
- Matthewson, Lisa. 2001. Quantification and the nature of crosslinguistic variation. *Natural Language Semantics* 9. 145–189.