

# The strict locality and semantics of participant number\*

Emily Drummond

Syntax and Morphology Circle, Stanford University

November 15, 2019

## 1 Introduction

- Participant number refers to verbal marking that tracks the notional number of internal arguments, shown in (1) for Niuean (Tongic).

(1) Niuean (Seiter 1980):

a. Mate tuai a ia.  
die PERF ABS 3SG  
'She is dead.' (SG)

b. **Ma**-mate tuai a laua.  
RED.PL-die PERF ABS 3DU  
'They are dead.' (PL)

c. Kua hala e ia e lā akau.  
PERF cut ERG 3SG ABS branch tree  
'He cut down the branch.' (SG>SG)

d. Kua **ha**-hala e ia e tau lā akau.  
PERF RED.PL-cut ERG 3SG ABS PL branch tree  
'He cut down the branches.' (SG>PL)

- Cross-linguistically, three descriptive generalizations about participant number emerge:

- It may be marked using suppletion, reduplication, or an affix.
- It is restricted to notional (or semantic) number.
- It is restricted to internal arguments.

\*I would like to thank Amy Rose Deal, Peter Jenks, Line Mikkelsen, Andrew Garrett, and Maddy Bossi for their helpful comments on aspects of this work, as well as Nukuoro consultants Johnny Rudolph, Ruth Rudolph, and Mina Lekka. All errors are my own.

- Bobaljik & Harley (2017) provide a morphosyntactic suppletion analysis of participant number, whereby a number feature on an internal argument can condition suppletion of the verb root.

– Suppletion of this type is actually predicted by Bobaljik (2012), who states that suppletion may not cross a maximal projection (XP) boundary (but it can cross an  $X^0$  boundary).

- I show that a suppletion analysis has two main drawbacks:

\* **The “affix problem”**: Affixal participant number requires locally-conditioned affix insertion, which inserts vocabulary in the presence of a feature but does not realize the feature itself.

\* **The “feature problem”**: Barring additional explanation, putting notional number features in the syntax incorrectly predicts that notional and grammatical number should show identical behavior.

▷ I propose that participant number realizes a number node internal to  $V^0$ .

- We can straightforwardly assign a semantics to this node, such as the denotations in (2), which introduce a cardinality presupposition on the first argument that composes with the verb.

$$(2) \begin{aligned} \llbracket \text{SG} \rrbracket &= \lambda P_{\langle e, st \rangle} . \lambda x: |x| = 1. \lambda e. P(x)(e) \\ \llbracket \text{PL} \rrbracket &= \lambda P_{\langle e, st \rangle} . \lambda x: |x| > 1. \lambda e. P(x)(e) \end{aligned}$$

- Like Thornton (2018), I argue that we can maintain an even stricter notion of locality for suppletion, namely that it can only occur within the morphological word (complex  $X^0$ ).

## 2 Participant number

- Participant number is a robust cross-linguistic pattern whereby verbal marking reflects the notional number of thematic arguments (Mel'čuk 1979; Durie 1986; Mithun 1988; Corbett 2000; Veselinova 2006).
- Many participant number systems are only suppletive, where a subset of verbs have distinct forms for singular and plural (and sometimes dual) internal arguments.

– In Hiaki (Uto-Aztecan), the verb suppletes for the number of an intransitive subject (3a-b) or a transitive object (3c-d).

(3) Hiaki (Bobaljik & Harley 2017):

a. Aapo **vuite**.  
3SG run.SG  
'S/he is running.' (SG)

b. Vempo **tenne**.  
3PL run.PL  
'They are running.' (PL)

c. Aapo uka koowi-ta **me'a-k**.  
3SG the.SG pig-ACC.SG kill.SG-PRF  
'She killed the pig.' (SG>SG)

d. Aapo ume kowi-m **sua-k**.  
3SG the.PL pig-PL kill.PL-PRF  
'She killed the pigs.' (SG>PL)

- As we've already seen in (1), participant number can be marked by reduplication as well, as is common across Polynesia. (I assume that reduplication is an underspecified affix, following Marantz 1982.)
- Though rare, it is also possible for participant number to be marked with segmental affixes.

– In Tonkawa (dormant isolate; southern U.S.), singular and plural participant number are marked using *ha-* and *da-*, respectively.

(4) Tonkawa (Hoijer 1933:56–7):

ha-idjona- 'one person goes up'  
ha-glana- 'one person goes down'  
ha-ixena- 'one person goes across'

da-idjona- 'several persons go up'  
da-glana- 'several persons go down'  
da-ixena- 'several persons go across'

– The prefix *iru-* in Karuk (isolate; Northern California) is another potential example, though it only appears with intransitive verbs in corpus data.

(5) Karuk (Ararahih'urípih Corpus):

a. xás u-p-vôon-ishuk  
then 3SG-ITER-crawl-out  
And he crawled back out. (SG)  
Source: Chester Pepper (WB.KL-14)

b. xas kun-p-**iru**-vôon-ishuk  
then 3PL-ITER-PL-crawl-out  
And they came out. (PL)  
Source: Margaret Harrie (DAF-KT-02)

- Cross-linguistically, participant number tracks internal arguments.
  - There is some debate about whether participant number patterns with all intransitives or just unaccusatives, particularly in languages that don't have clear unaccusativity tests.
  - Participant number is generally restricted to a subset of verbs.
  - It is common cross-linguistically for participant number occur with verbs of motion or stance (e.g., lay, walk, dance).
- Indirect and applied objects (introduced by benefactives, causatives, etc.) do not trigger participant number.
  - In Huichol (Uto-Aztecan), participant number continues to track internal arguments even when there are applied arguments as well.

(6) Huichol (Comrie 1982):

a. nee waakana ne-mec-**umi**?ii-ri eeki  
I chicken 1SG.S-2SG.O-kill.SG-BEN you  
'I killed you (sg) the chicken.'

b. nee waakana-ari ne-mec-**uqi**?ii-ri eeki  
I chicken-PL 1SG.S-2SG.O-kill.PL-BEN you  
'I killed you (sg) the chickens.'

- To identify true participant number, we must rule out both event number and number agreement, which can look nearly identical.

## 2.1 Participant number $\neq$ event number

- Event number (or pluractionality) is internal to the verb semantics and denotes plural events.
  - It is closely linked to (but often distinct from) aspect, which can distinguish iterative or habitual events.
  - In Hausa (Chadic), partial reduplication is used to indicate numerous sending events at different times and/or to different places (7),

(7) Hausa (Eulenberg 1971):

- Naa aikee su.  
1SG send 3PL  
'I sent them (once).'
- Naa a”aikee su.  
1SG send.PL 3PL  
'I sent them (multiple times, to multiple places, etc).'

- Event plurality can be distinguished from other types of verbal number by showing that it can appear even when all arguments are syntactically and semantically singular.

- This diagnostic is exemplified in Bole (West Chadic) which allows a singular subject to take both the singular and the pluractional form of the verb *zúru* 'laugh'.

(8) Bole (Ward 2012:2):

- Josh *zúru*-wò.  
Josh laugh-3SG.M.CPLT  
'Josh laughed.'
- Josh *zú-zúru*-wò.  
Josh RED-laugh-3SG.M.CPLT  
'Josh laughed repeatedly.'

- Participant number, on the other hand, is ungrammatical if all arguments are syntactically and semantically singular.
  - In Nukuoro (Polynesian-Outlier), plural verb forms for participant number cannot be used with singular arguments to indicate multiple events.

(9) Nukuoro:

- Au gu **hu**-mai.  
1SG PERF come.SG-VEN  
I came.
- \*Au gu **loo**-mai.  
1SG PERF come.PL-VEN  
Intended: I came (multiple times).

## 2.2 Participant number $\neq$ number agreement

- Number agreement appears when the grammatical number feature of a nominal is reflected on the verb via a long-distance agreement mechanism (e.g., Agree).
- Agreement may track any argument, can show accusative or ergative alignment, and may be suppletive or affixal.
  - The English (Germanic) examples in (10) show number agreement with nominative subjects, which is suppletive for the verb *be* (a-b) and affixal for most other verbs (c-d).

(10) English:

- The boy **is** tall. (SG)
- The boys **are** tall. (PL)
- The girl kill-**s** the pig. (SG>SG)
- The girls kill-**Ø** the pig. (PL>SG)

- Here, I'll show three ways that participant number and agreement are distinct (Durie 1986:357-361):
  1. Participant number can occur even in places where agreement morphology is generally absent (e.g., control, imperatives, adjectives).
  2. Participant number indicates number of the internal argument, regardless of a language's morphological alignment.
  3. When notional and grammatical number conflict, participant number reflects notional number and agreement morphology reflects grammatical number.

### 2.2.1 When agreement is absent

- In contexts where verbal agreement might disappear, such as imperatives, control constructions, and attributive usage, participant number remains.

– In Chickasaw (Muskogean), matrix verbs show agreement (11), but verbs embedded under control predicates and imperative verbs do not. Participant number alternations remain in control (12) and imperative contexts (13).

(11) Chickasaw (Pam Munro, p.c., cited by Durie 1986:361):

a. <b>Malili-li.</b> run.SG-1SG.ACT 'I run.'	b. <b>Kii-tilhaa.</b> 1PL.ACT-run.PL 'We run.'
--	--

(12) a. **Malili** sa-banna.  
run.SG 1SG.STAT-want  
'I want to run.'

b. **Tilhaa** po-banna.  
run.PL 1PL.STAT-want  
'We want to run.'

(13) a. **Malili!**  
run.SG  
'Run!' (1 person)

b. **Tilhaa!**  
run.PL  
'Run!' (>1 person)

- In Kiowa (Tanoan), stative verbs may be used attributively as adjectives, in which case they do not show typical prefixal agreement. They still show participant number suppletion (14).

(14) Kiowa (Watkins 1984, cited by Durie 1986):

a. <b>tàli-kyóy</b> boy-tall.sg '(one) tall boy'	(SG)
b. <b>tàli-kíní</b> boy-tall.NONSG '(two) tall boys'	(DU)
c. <b>tàli-kíní-gò</b> boy-tall.NONSG-PL '(more than two) tall boys'	(PL)

### 2.2.2 Differing alignments

- Participant number is often completely orthogonal to other agreement in the language.

– Hiaki, for example, shows no verbal agreement—number is only marked on the ~15 verbs that supplete for participant number.

– Huichol has a nominative-accusative agreement system, but participant number suppletion has an absolutive pattern (15).

(15) Huichol (Comrie 1982):

a. <b>ne-nua</b> 1SG.S-arrive.SG 'I arrived.'	(SG)
b. <b>tiiri yi-huuta-ti me-niu?aziani</b> children two-SUBJ 3PL.S-arrive.PL 'Two children have arrived.'	(PL)
c. <b>Wan Maria maa-ti me-neci-mieni</b> Juan Maria and-SUBJ 3PL.S-1SG.O-kill.SG 'Juan and Maria are killing me.'	(PL>SG)
d. <b>nee Wan Maria maa-me ne-wa-qiini</b> I Juan Maria and-OBJ 1SG.S-3PL.O-kill.PL 'I am killing Juan and Maria.'	(SG>PL)

### 2.2.3 Conflicting notional and grammatical number

- Number agreement and participant number can be pulled apart when a nominal's grammatical number does not align with its notional number.

– This is testable with idiosyncratic number properties of particular constructions (e.g., numerals, comitatives)...

– ...as well as pluralia/singularia tantum nouns (e.g., English *scissors*).

- In Georgian (Kartvelian), for example, nominal phrases with a numeral are grammatically singular, as reflected by the 3rd person singular aorist suffix *-a*, but still trigger participant number suppletion.

(16) Georgian (Aronson 1989):

a. <b>Čem-i sam-i megobar-i še-mo-vid-a da</b> my-AG three-AG friend.SG-NOM PRV-PRV-enter-AOR.3SG and <b>da-sxd-a.</b> PRV-sit.PL-AOR.3SG 'My three friends entered and sat down.'
--

- Navajo (Na-Dené) has a comitative construction (17a), which places one of the individuals in a *with*-phrase; the verb shows 1SG agreement with the syntactic subject *shí* ‘I’ alongside plural verb suppletion.
- The reverse appears in (17b): the subject ‘one of us’ is grammatically plural (*nihí* ‘we’) but the form of the verb reflects that there is a single semantic participant.

- (17) Navajo (Jeanne, Hale & Pranka 1984):
- a. *Shí ashkii bi-ł yi-sh-’ash.*  
 1SG boy him-with PROG-1SG-walk.DU  
 ‘I am walking with the boy.’
- b. *Nihí la’ di-iid-ááł.*  
 we subset FUT-1NONSG-walk.SG  
 ‘One of us will go.’

- In (18), the Hiaki pluralia tantum noun *veho’ori* ‘lizard(s)’ always takes the plural marker *-m*, but verbal suppletion indicates whether one lizard is intended or multiple. In this case, reduplication marks event number, which is distinct from the participant number suppletion.

- (18) Hiaki (Harley 2014:7):
- a. *Veho’ori-m nas vui-vuite.*  
 lizard-PL around RED<sub>IT</sub>-RUN.SG.PRS  
 ‘The lizard is running around.’ (SG)
- b. *Veho’ori-m nas tet-tenne.*  
 lizard-PL around RED<sub>IT</sub>-RUN.PL.PRS  
 ‘The lizards are running around.’ (PL)

- In Nukuoro, the collective noun *gau* ‘people’ must take the singular determiner, but always refers to three or more people. It must appear with the plural form of the verb.

- (19) Nukuoro:
- a. \**De gau ne hu-mai.*  
 DET.SG people PAST come.SG-ven  
 The people came.
- b. *De gau ne loo-mai.*  
 DET.SG people PAST come.PL-ven  
 The people came.

- These diagnostics show that participant number cares about *notional* number, not the same grammatical number features targeted by Agree.

### 2.3 Interim summary

- Participant number is a distinct phenomenon from both event number and number agreement.
- ▷ We have three desiderata for an analysis of participant number:
- (i) The variety of exponence (suppletion, reduplication, affixation)
  - (ii) The restriction to notional, not grammatical, number
  - (iii) The restriction to internal arguments

## 3 Local suppletion analyses

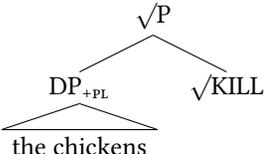
- Bobaljik & Harley (2017) present an analysis of participant number in which the verb undergoes root suppletion conditioned by a number feature on the internal argument (21).

- Crucially, they must postulate that the canonical domain of suppletion is a maximal projection (XP), as formalized in Bobaljik (2012), not simply the morphological word ( $X^0$ ).

(20) Locality of suppletion (Bobaljik 2012):

- a.  $\alpha \dots ]_{X^0} \dots \beta$
- b.  $* \alpha \dots ]_{XP} \dots \beta$

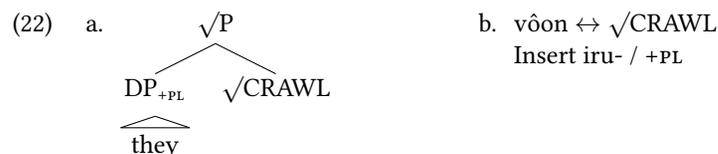
- Assuming that internal arguments are base-generated as sisters to their selecting verb, only internal arguments will be local enough to condition suppletion (satisfying desideratum (iii) above).

- (21) a.  b.  $sua \leftrightarrow \sqrt{KILL} / +PL$   
 $mea \leftrightarrow \sqrt{KILL}$

- Note that to enforce an XP domain for suppletion, the number feature that triggers suppletion must be present on the DP itself and be visible in the morphosyntax.
- While this captures the restriction to internal arguments, I argue that this suppletion analysis does not capture desiderata (i) and (ii), which I will refer to as the “affix problem” and the “feature problem”, respectively.

### 3.1 The “affix problem”

- As we’ve seen, participant number systems can be suppletive or affixal, but Bobaljik & Harley’s (2017) system is built for suppletive participant number as a default.
- We can’t get by *just* with suppletion, given that reduplication must refer to the root to get its phonological material.
- We need to say that affixal participant number is a case of locally-conditioned affix insertion.
  - Vocabulary is inserted in the presence of a feature but does not realize the feature itself.
  - In the toy Karuk example in (22), the prefix *iru-* does not actually realize [+PL], but its insertion is conditioned by the presence of [+PL] on the DP.



- While we can certainly implement this, it goes against one of the core tenets of DM: that morphology realizes syntactic structure.
- Since it introduces another operation into the morphology, a theory with that requires locally-conditioned insertion is more complex than a theory that doesn’t.

### 3.2 The “feature problem”

- Participant number is restricted to notional number, so for Bobaljik & Harley, there must be a notional number feature present in the syntax.
- To capture this, Harley (2014) proposes two sets of number features:
  - \* [±ATOMIC], which corresponds to grammatical (formal) number
  - \* [±AUG], which corresponds to notional (semantic) number
- ▷ The problem is this: in a Minimalist feature theory, we predict that both sets of features would participate in **both** Agree and suppletion.

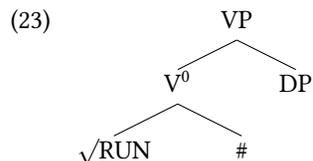
- This is especially true given that, to avoid having suppletion cross an XP boundary, the notional number features must percolate to the head of DP.
- For instance, we predict a participant number system that only tracks grammatical number (which seems to be unattested), as well as a verbal agreement system that only tracks notional number (also unattested?).
- It is much more straightforward to have one set of number features in the syntax, and leave notional number to the semantics.

## 4 Lexical semantic analyses

- Many functional analyses (Mithun 1988, Corbett 2000, Borer 2014, a.o.) argue that “plural suppletion” of a verb actually reflects a different semantic denotation, which only takes a plurality as its internal argument.
  - Suppletive participant number verbs would then be “essentially plural” predicates like English *scatter* and *gather*, which are semantically infelicitous when used with a singular argument.
- Some problems with this approach (as identified by Harley 2014):
  - Often, “essentially plural” predicates show gradient acceptability with small numbers of arguments (e.g., can two people gather?), whereas suppletive plurals show precise contrasts.
  - This analysis proposes that the singular and plural versions of verbs are truly two different verbs (with different denotations), which does not necessarily follow when participant number is marked with reduplication or affixation.

## 5 A compositional semantic analysis

- We can capture all three desiderata by placing participant number on a dedicated number node internal to the verb (also proposed by Thornton 2018), as illustrated in (23).
  - ▷ A verb-internal node allows affixal participant number to realize syntactic structure and avoid ad hoc affix insertion, satisfying desideratum (i).
  - Placing the number node within the verbal head also allows us to maintain **strict locality** of suppletion within the morphological word ( $X^0$ ), rather than the maximal projection (XP).



- I propose that the denotation of the # element introduces a cardinality presupposition on the first argument that composes with the verb (24).

$$(24) \quad \llbracket \text{SG} \rrbracket = \lambda P_{\langle e, \text{st} \rangle} . \lambda x: |x| = 1. \lambda e. P(x)(e)$$

$$\llbracket \text{PL} \rrbracket = \lambda P_{\langle e, \text{st} \rangle} . \lambda x: |x| > 1. \lambda e. P(x)(e)$$

- These denotations essentially run a test on the next individual that combines with the verb, checking that the cardinality of the entity  $x$  equals one or is greater than one.
  - Presupposition ensures that participant number alternations persist under negation, questions, conditionals, etc.
  - ▷ Since the number calculation occurs in the semantics, it is natural that participant number would track notional number, satisfying desideratum (ii).
- Assuming that external arguments are introduced by  $v$  (Kratzer 1996), the functions in (24) are only able to compose with verbs that select for an internal argument.
  - ▷ This need for an internal argument ensures that participant number will never target unergative or transitive subjects, satisfying desideratum (iii).

## 5.1 Mechanics

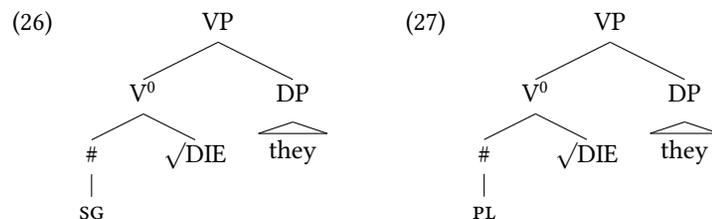
- Let's see how the presuppositional elements actually work to get a participant number alternation, using Niuean as an example.

(25) Niuean (Seiter 1980):

a. Mate tuai a ia.  
die PERF ABS 3SG  
'She is dead.' (SG)

b. **Ma**-mate tuai a laua.  
RED.PL-die PERF ABS 3DU  
'They are dead.' (PL)

- The # elements, one singular and one plural, can be freely combined with any verb regardless of its arguments. (Obviously, lexical items shouldn't be able to "view" other lexical items at the time they Merge into a structure; otherwise, we'd get a look-ahead problem.)
- In other words, the structures in (26) and (27) can **both** be generated in the syntax; it is only in the semantics that a problem will arise.



- The reason why (26) is judged ungrammatical is because there is a presupposition failure—when the singular participant number element composes with the plural internal argument, its presupposition is not met and the utterance is infelicitous.
  - ▷ If participant number is presuppositional, why can't it be cancelled?
    - In order for a presupposition to be cancelled, the utterance needs to be felicitous in an alternative context, which can then be accommodated by the listener.
    - If there is another number marking in the sentence that conflicts with the presuppositional content contributed by #, **there is no alternative context** where that utterance is felicitous.
    - As such, the listener cannot accommodate the utterance by revising their assumed context.
- NB: It is never the case that a language marks participant number on all of its verbs. We can deal with this in two ways:
  - We could say that the piece of functional structure which marks participant number is always present, but is only realized in the context of certain verbs.
  - We could also say that the participant number affix is only present with a subset of verbs based on some lexically-specified selectional restriction.

## 6 Conclusions and open questions

- This talk identified three primary empirical generalizations about participant number, as well as diagnostics for distinguishing participant number from event number and number agreement.
- ▷ A compositional semantic analysis for participant number straightforwardly captures its cross-linguistic properties without overgenerating possible systems.
  - The presence of a number node straightforwardly accounts for affixal participant number as well as suppletion.
  - The presuppositions of this node are generated in the semantics, which accounts for the restriction to notional number.
  - In order to compose, the participant number denotations must only track internal arguments, which compose directly with V.
- This analysis also allows us to strengthen the locality of suppletion to within the complex  $X^0$ , which aligns with Bobaljik's (2012) cross-linguistic findings for comparatives.
- Lingered questions:
  - Is there anything else that we want the # node for?
  - How does participant number interact with mass/count?
  - If the internal argument generalization holds, what does that mean for unaccusativity cross-linguistically?
  - What to do about languages where unergative subjects seem to control participant number, such as Northern Paiute (Toosarvandani 2016)?

## References

- Aronson, Howard. 1989. *Georgian: A reading grammar*. Columbus: Slavica.
- Bobaljik, Jonathan D. 2012. *Universals in Comparative Morphology: Suppletion, superlatives, and the structure of words*. Cambridge: MIT Press.
- Bobaljik, Jonathan D., & Heidi Harley. 2017. Suppletion is local: Evidence from Hiaki. In *The Structure of Words at the Interfaces*. Oxford University Press.
- Comrie, Bernard. 1982. Grammatical relations in Huichol. In *Studies in Transitivity*, 95–115. New York: Academic Press.
- Corbett, Greville G. 2000. *Number*. Cambridge: Cambridge University Press.
- Durie, Mark. 1986. The grammaticization of number as a verbal category. In *Proceedings of BLS 12*, 355–370. BLS Publications.
- Eulenberg, John B. 1971. Conjunction reduction and reduplication in African languages. In *Papers in African Linguistics*, 71–80. Edmonton: Linguistic Research.
- Harley, Heidi. 2014. Hiaki verbal number suppletion really is suppletion. Presented at *Roots IV*, NYU.
- Hoiijer, Harry. 1933–38. Tonkawa: an Indian language of Texas. In *Handbook of American Indian Languages III*, 1–148. New York: Columbia University Press.
- Jeanne, Laverne, Kenneth Hale & Paula Pranka. 1984. Where is suppletion? Paper presented at *GLOW, 1984*.
- Kratzer, Angelika. 1996. Severing the external argument from its verb. In *Phrase Structure and the Lexicon*, 109–137.
- Mel'čuk, Igor' A. 1979. Countability and non-countability. In *Papers from CLS 15*, 220–7. Chicago: CLS.
- Mithun, Marianne. 1988. Lexical categories and the evolution of number marking. In *Theoretical Morphology*, 211–234. New York: Academic Press.
- Seiter, William J. 1980. Studies in Niuean syntax. Ph.D. diss., UCSD.
- Toosarvandani, Maziar. 2016. Vocabulary insertion and locality: Verb suppletion in Northern Paiute. *Proceedings of NELS 46*.
- Thornton, Abigail. 2018. Plural verbs, participant number, and Agree. In *Proceedings of WCCFL 35*, 391–398. Somerville, MA: Cascadia Proceedings Project.
- Veselinova, Ljuba. 2006. *Suppletion in Verb Paradigms: Bits and pieces of the puzzle*. Amsterdam: John Benjamins.
- Ward, Kaeli S. 2012. A micro-typology of pluractionality. Ph.D. diss., UCLA.
- Watkins, Laurel J. 1984. *A Grammar of Kiowa*. Lincoln, London: U. of Nebraska Press.