**Domains and Interaction of Plurality in Navajo**

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LING 720  
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Roadmap:  
§1: Pluractionality as pluralization of event arguments (Lasersohn 1995)  
§2: Crash course in Navajo (Athabaskan); loci of verbal plurality marking  
• Number-marking verb stems  
§3: Hi- seriative prefix: time as a parameter  
§4: Conclusions  
• Future puzzle: Da- plural number prefix: pluralizer of events or entities?

1.0 Introduction

(1) \[ V \text{-PA}(E) \iff \forall e, e' \in E \ [P(e) \land \neg f(e) \lor f(e')] \land |(E)| > n \]

a: Pluractionality markers (PA) encode existence of multiple events (sum: E), not the plurality of the verb’s arguments. The cardinality of this plural event exceeds \( n \), which is determined contextually or on a language-by-language basis (Lasersohn 1995: 241).

b: \( P \) is a variable ranging over properties of events. \( P \) is used instead of \( V \) because pluractional markers can encode both repeated and repetitive action.

- *Repeated action*: “multiple events of the type denoted by the verb”  
  - \( P = V \)

- *Repetitive action*: “multiple [subevents] of a different type, but which sum up to form a single token of the event type corresponding to the verb.” (Lasersohn 1995: 244)
  - \( P \) is fixed lexically.
  - The availability of a repetitive reading of the pluractional marker is a line along with languages can vary.

c: Events \( e, e' \) within \( X \) do not overlap (\( \lor \)). Events are distinguished by a parameter \( f \).

- Events can be distributed to “different times, locations, or participants” (Lasersohn 1995: 251).
• Given the different settings theoretically available to the pluractional marker – both cross-linguistically and within a single language – it is not surprise that pluractional morphology gives rise to a large number of interpretations, across languages and within languages.

• Thompson (2009) discusses a pluractional marker in Halkomelem (Salishan)
  
  o Descriptively, the pluractional marker can represent “plural ‘actions’, ‘subjects’, or ‘objects’ in the case of a transitive verb” (2009: 1)

  (2) \( \text{yáleq} \text{-et-es te theqát} \)  
  \( \text{fall.pl-TR-3S DET tree} \)  
  (Thompson 2009: 1)  
  
  a) ‘He felled all the trees’  
  b) ‘He felled all the trees (with one swing)’  
  c) ‘They felled the trees’  
  d) ‘He felled the same (magic) tree over and over’  
  e) ‘They felled the tree’

Navajo:

• In Navajo, there are also several (or, many) prefixes that appear related to pluractionality.

• However, the semantic contribution of each morpheme appears to be more constrained than Halkomelem reduplication.
  
  o This paper explores the semantics of one of these morphemes (\( \text{hi-} \) ‘time’) in depth and considers its interaction with number-marking on the verb, a number distinction not discussed in relation to pluractionality for other languages.

• Descriptively, it appears that each morpheme relates to one of the parameters of event separation discussed by Lasersohn (TIME, SPACE-TIME, PARTICIPANT).
  
  o Is this an accurate characterization of the semantics of these markers?
2.0 Crash course in Navajo: Loci of verbal plurality marking

• Some loci of verbal number marking are shown in the simplified verb template below:

\[
\begin{array}{cccccccc}
\text{Template:} & 0 & 1 & 2 & 3 & 4 & \ldots & 8 & 9 & 10 \\
\text{na} & \text{hi} & \text{da} & \text{object} & \text{subject} & \text{valence} & \text{stem} \\
\end{array}
\]

• There are contrasting singular vs. plural subject and object marker forms for 1\textsuperscript{st} and 2\textsuperscript{nd} person, but not for 3\textsuperscript{rd}.

2.1 Number is (partially) General

• The bare forms of the majority of nouns and many verbs in Navajo have general number. Unmarked forms are not obligatorily interpreted as singular or plural.
  
  o Universality of Cumulativity (Krifka 1986) as developed by Kratzer (2005).

• **Nouns:** A single form mósí can refer to either a single cat or a plurality of cats.

\[
\text{(4) mósí} \quad \text{‘cat, cats’} \quad \{a, b, c, a+b, b+c, a+c, a+b+c}\]

• **Verbs:** A single form of the verb stem (-kaal) can be used with either plural or singular objects.

\[
\{<a,e_1>, <b+c,e_2>, <a+b+c,e_1+e_2>\}
\]

\[
\text{(5) a. ’il ’adaalkaali tsincheeshjií’ baa’iilkaal} \\
\text{‘I drove the nail into the board.’} \quad \text{(Young and Morgan 1980: g160)}
\]

\[
\text{b. ’Atiingi tsin ’iilkaal} \\
\text{‘We drove pegs into the roadway.’} \quad \text{(Young and Morgan 1987: d483)}
\]

• Singular or plural-marked DPs (see §1.3.1) can be used with verbs of the same form:

\[
\text{(6) a. ’Ashkii naalnish} \\
\text{boy(sg) 3S-work} \\
\text{‘The boy is working.’}
\]

\[
\text{b. ‘Ashiiké naalnish} \\
\text{boy(pl) 3S-work} \\
\text{‘The boys (dual) are working.’}
\]
2.2 Non-general number in Navajo

• Nouns:

• A very small number of nouns ([+human]) can be marked as plural with ablaut.

(7)  a. ‘ashkii ‘boy’  \{a, b, c\}
     b. ‘ashiiké ‘boys’  \{a, b, c, a+b, b+c, a+c, a+b+c\}

• A few other [-human] nouns can be marked as plural with the ‘distributive plural marker’ *da*-

  o *da*- has a much richer life as a verbal marker.

(8)  a. tó ‘water’
     b. daató ‘distributive plural bodies of water’  (YM 1980: g158)

• Verbs:

• Information about number can be conveyed through two primary means that interact:

  o Verb stems specified for number (this section)
  o Pluractionality markers (§3-end)

• Certain verb stems are marked as singular (1), dual (2), or plural (>2)

  o The number restriction applies to the absolutive (internal) argument only.

    • I assume Kratzer’s (1996) implementation of neo-Davidsonian event semantics, where a light verb introduces the external argument.

(9)  ‘Ashiiké tsiyaagi neezhtéézh
     boy.PL tree-under-LOC 3S-lie.DL
     ‘The two boys lay down under a tree.’  (YM 1987: g134)

---

1 This is one set of number-marking verb stems. Other stems distinguish singular (1) from non-singular (>1).
While the absolute number of verb stems in Navajo that distinguish number is small (see Table A), these stems can combine with many derivational prefixes (and are somewhat semantically light, e.g., ‘go, walk’) such that a rather large number of verbs can be said to distinguish number in the stem.

**Table A: Number-marking verb stems**

<table>
<thead>
<tr>
<th>SINGULAR</th>
<th>DUAL</th>
<th>PLURAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Go, walk</td>
<td>(a) Go, walk</td>
<td>(a) Go, walk</td>
</tr>
<tr>
<td>(b) Lie down</td>
<td>(b) Lie down</td>
<td>(b) Lie down</td>
</tr>
<tr>
<td>(c) Sit down</td>
<td>(c) Sit down</td>
<td>(c) Sit down</td>
</tr>
<tr>
<td>(d) Run</td>
<td>(d) Run</td>
<td>(d) Run</td>
</tr>
<tr>
<td>Øyá</td>
<td>Ø'áázh</td>
<td>(d)kai, l-dee’</td>
</tr>
<tr>
<td>ni-Øtį́</td>
<td>Øtéczh</td>
<td>ni-Øjéč’</td>
</tr>
<tr>
<td>Ødá</td>
<td>ni-Øké</td>
<td>di-ni-Øbin</td>
</tr>
<tr>
<td>lwod</td>
<td>'ahi-ni-lcháá’</td>
<td>Øjéč’</td>
</tr>
<tr>
<td>2. Sing. obj.</td>
<td>2. Dual obj.</td>
<td>2. Plur. obj.</td>
</tr>
<tr>
<td>(a) Make walk</td>
<td>(a) Walk</td>
<td>Obj-kai</td>
</tr>
<tr>
<td>(b) Make lay</td>
<td>(b) Lay</td>
<td>Obj-ni-lječ’</td>
</tr>
<tr>
<td>(c) Make sit</td>
<td>(c) Seat</td>
<td>Obj-di-ni-lbin</td>
</tr>
<tr>
<td>(d) Make run</td>
<td>(d) Kill</td>
<td>l-tseed</td>
</tr>
<tr>
<td>(e) Kill</td>
<td>Obj-sá</td>
<td></td>
</tr>
<tr>
<td>Obj-ni-lį́</td>
<td>Obj-ni-ltéczh</td>
<td></td>
</tr>
<tr>
<td>Obj-hi-l(l)wod</td>
<td>Obj-ni-lké</td>
<td></td>
</tr>
<tr>
<td>si-lhi</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I assume that number-marking stems are a subclass of the famous ‘classificatory handling verbs’ found across Athabaskan languages. These stems seem to impose presuppositions on the entities in their domain, but consider the nature of their substance (and, sometimes, number) rather than number alone: [Øtleeh] ‘to handle mushy matter’, [Øjááh] ‘to handle plural objects (discernible number of large objects)’, [Ønií] ‘to move, handle plural objects (profusion of small objects)’.

(10)  

\[ \lambda V_a \lambda x \lambda e. \text{AT}(e) \land |\{ z : z \leq x & \text{AT}(z) \}| = 1 . V(e)(x) \]

\[ \lambda V_a \lambda x \lambda e. \text{AT}(e) \land |\{ z : z \leq x & \text{AT}(z) \}| = 2 . V(e)(x) \]

\[ \lambda V_a \lambda x \lambda e. \text{AT}(e) \land |\{ z : z \leq x & \text{AT}(z) \}| > 2 . V(e)(x) \]

(11)  


b. \([\text{walk}] = \{<\text{Meg}, e_1>, <\text{Charles}, e_2>, <\text{Sandy}+\text{Dennys}, e_3>,\]
\[<\text{Meg}+\text{Charles}, e_1+e_2>, \ldots <\text{Meg}+\text{Charles}+\text{Sandy}+\text{Dennys}, e_1+e_2+e_3>\}\n
c. \([\text{walk-SG}] = \{<\text{Meg}, e_1>, <\text{Charles}, e_2>\}\n
d. \([\text{walk-DL}] = \{<\text{Sandy}+\text{Dennys}, e_3>\}\n
---

2 I assume that number-marking stems are a subclass of the famous ‘classificatory handling verbs’ found across Athabaskan languages. These stems seem to impose presuppositions on the entities in their domain, but consider the nature of their substance (and, sometimes, number) rather than number alone: [Øtleeh] ‘to handle mushy matter’, [Øjááh] ‘to handle plural objects (discernible number of large objects)’, [Ønií] ‘to move, handle plural objects (profusion of small objects)’.
• I take number-marking stems to relate to atomic events. Translations in Young and Morgan (1980, 1987) emphasize the ‘collective’ nature of these events:

(12) Hooghan bich’į’ n-éii-kah
    hogan 3O-toward 1plS-walk.pl
    ‘We (3+) are walking back toward the hogan in a group.’ (YM 1980: g160)

• We will see that this contrasts with other methods of encoding plurality of actors, where the events in which the actors participate are suggested (by translations and speaker judgments) to be at least somewhat separated and less collective.

  o hi- seriative prefix, ‘one at a time’ (§3)
  o na- spatial distributive prefix, ‘here and there’ (not discussed)
  o da- plural participant prefix (Appendix)

3.0 Hi- seriative prefix: time as a parameter of pluractionality

• Young and Morgan (1980: 194): “hi- is a seriative prefix denoting that the action of the verb is segmented, either in the sense that it is repeated three or more times in series, or that it is performed by three or more actors, one following or succeeding the other.”

• I posit that hi- is a pluractionality marker that requires events be distinguished from each other by times (τ).

(13) \[[hi-V]\] = \[\forall e, e' \in E \ [P(e) \land \neg \tau(e) \lor \tau(e')] \land |E| > 2\]

a: Multiple events (totaling > 2) (§3.1)

b: Subevents (events in P add up to an event of V) or events (P = V) (§3.2, §3.3)

c: e and e’ cannot overlap in terms of time (τ) (§3.1, §3.3)

3.1 Plural events can lead to a plural entity interpretation

\[
[[hi-V]] = \forall e.e' \in E [P(e) \land \neg \tau(e) \lor \tau(e')] \land |E| > 2
\]

- Multiple events of cardinality > 2
- Relevant parameter for distinguishing events is time (\(\tau\))

While \(hi\)- only deals in pluralization of events, it can give rise (though doesn’t have to) to a reading in which plural entities are involved.

When used with stems not indicating number, \(hi\)- forces a plural reading of the absolutive argument where multiple events involving (at least) one entity each happened in succession.

\[(14)\] łééchq’i gah yiln̄ēdeel

dog rabbit 3O-with-SER-3S-handle.ropelike.object
‘(One) dog is catching rabbits, one at a time.’ (Newbold 2002: 18)

The ‘one at a time’ reading in (14) is the reading the Young and Morgan (1980, 1987) favor in translations even where verb stems are not marked for SG.

However, the tendency for the ‘one at a time’ reading should not be overstated. It seems that plural entities can be associated with each event (first ‘reading’ for (15b)).

- The crucial point is that there must be multiple flying events occurring at different times.

\[(15)\] a. Tsídii tsé’áá̂dêj’ ch’ídaast’ā

bird cave-from da-3S-fly.out.of
‘The (pl) birds flew out of the cave (as an entire flock acting in unison).’

---

\(4\) In (15a,b), the verbs are marked with \(da\)-. I return to this prefix in §4. Most simply, seems to indicate a plurality of entities. It doesn’t have to be present for a plural entity interpretation to arise, however. See (14). Newbold (2002) suggests it can always be deleted.
b. Tsídii tsé’áádéé’ ch’ídahaust’a’
   bird cave-from da-SER-3S-fly.out.of
   ‘A succession of birds flew out of the cave, the birds flew out of the cave one after another.’ (YM 1980: 194)

• Where nouns can be marked with number, they must be marked as plural if the verb is marked with hi- and no other relevant prefix.

(16) a. ‘ashkii yah’ee’na’
   boy-SG 3S-crawls.in
   ‘The boy is crawling in.’

b. ‘ashiiké yah ‘ahees’na’
   boy-PL SER-3S-crawls.in
   ‘The boys crawled in one after another.’

c. * ‘ashkii yah ‘ahees’na’
   (‘The boy crawled in, over and over.’) (Newbold 2002: 16)

• We do not want to encode a multiple participant requirement into the semantics of hi-.

   o In the presence of certain other prefixes, (e.g., reversionary REVERS (17a)) or where the events are clearly delimited (17b), a singular noun can be used with hi-.

(17) a. ‘ashkii yázhí ’ólta’déé yóó ’anáhalyeed
   boy little school-from REVERS-SER-3S-run.away
   ‘The little boy keeps running away (back) from school.’ (YM 1980: 171)

b. ‘Ashdladigo ncheshniísh
   five-o'clock TERM-SER-1sgS-work
   ‘I (usually) quit working at five o’clock.’ (YMM 1992: 445)
3.2 Interaction of *hi*- and number-marking verb stems

\[ [[hi-V]] = \forall e,e' \in E \left[ P(e) \land \neg \tau(e) \lor \tau(e') \right] \land |(E)| > 2 \]

- \( P \) is not necessarily equal to \( V \): *hi*- can range over subevents.

• When stems are *SG*-marked the only possible reading is one where one entity is associated with each event.

(18) Hooghandéé’ tózis t’óó ’ahayóí ch’íhé’á.

hogan-from bottle very SER-3O-1sgS-carry.out.SG.obj
‘I carried a lot of bottles out of the hogan, one after another.’

(YM 1980: 194-195)

• When stems are *PL*-marked, each act of carrying can either be associated with one atomic entity (‘split reading of the plural stem’) or with one plural entity.

(19) Tózis t’óó ’ahayóí ch’ídayííznil.

bottle very da-SER-3O-3S-carry.out.PL.obj
a. ‘They carried a lot of bottles out, one after another.’

b. ‘They carried a lot of bottles out, one plural quantity of bottles after another.’

(YM 1980: 195)

• In §2.2, we took *PL*-marked stems to relate plural entities to atomic events.

• If we take *hi*- to operate over plural events, then only (20b) should be available: there is a plurality of events, each event associated with a plurality of bottles.

• If *hi*- can operate over plural subevents of the *PL*-marked verb stem, then each subevent can consist of moving one bottle but, collectively, >2 bottles will be moved.

• This works out well for *PL*-marked verbs given what *hi*- requires >2 events or subevents to be in the extension of the verb.

\[ ^5 \text{ I would be interested to know whether the reading ‘I carried a single bottle out of the hogan, over and over’ is possible.} \]
If there are >2 subevents of bottle-moving (each subevent consists of the moving of one bottle), the >2 bottles will be moved in total.

Given the semantics of hi- and the assumption of subevents, the semantics of the plural stem (>2 entities per atomic event) will be satisfied.

This predicts that for a DL (dual) stem, a split subevent reading will not be possible: the total number of subevents would total 2, not >2 as required by hi-).

I suspect this is true (I have never seen it attested) but it needs to be investigated.

### 3.3 Hi- and subevents – inherently segmented actions

\[
[[hi-V]] = \forall e,e' \in E \left[ P(e) \land \neg \tau(e) \lor \tau(e') \right] \land |E| > 2
\]

• P is not necessarily equal to V: hi- can range over subevents.
  • Relevant parameter for distinguishing events is time (τ)

‘Inherently segmented actions’ with hi- evidence that we want hi- to have access to subevents, not just full events.  

(20)  
  a. hi$h$hchééh
      SER-1sgS-hobble
      ‘I hop, hobble’ (YM 1987: g84)

  b. ‘iyeests’ih (= ‘a-hi-yists’ih)
      SER-1sgS-pinch.with.nails
      ‘I’m going along on tiptoes’ (YM 1980: g195)

Inherently segmented actions do not give rise to plural entity interpretations

One groove is chiseled out but chiseling a single groove requires multiple subevents of pounding or digging.

---

6 It may be the case that these stems have to appear in the Progressive mode (YM 1980: 195).
(21) Bee hahalzhishí bee tsineheshjíi’ haháñe’
chisel 3O-with plank SER-3O-1sgS-pound.out
‘I chiseled out a groove in the plank by pounding on the chisel.’ (YM 1980: 393)

• The same verb can mean ‘to toss out.’ Here, a plural interpretation of the direct object must arise, as before.
  o An event of ‘tossing out’ does not consist of multiple, clearly discernible subevents.

(22) Niiyahdéé’ shínaaí bich’í’ naayízií hahashne’
cellar.from 1poss-older.brother 3O-to squash SER-3O-1sgS-toss.out
‘I am tossing squashes up one after another to my older brother from the root cellar.’ (adapt. YM 1980: 393)

• We can put the data above together with observations from PL stems with a ‘one at a time’ reading, which also made use of subevents.

• Not just any event denoted by a verb V can give rise to a subevent interpretation. There must be some way of dividing and distinguishing subevents from each other in a principled manner.
  o ‘Inherent seriative’ uses of hi- don’t require multiple entities (as shown by (20) and (21)) so it can’t be the case that the relevant parameter for splitting up events into subevents is ‘participant.’
  o The relevant parameter is, again, time (τ). If separate portions of an event can be differentiated in terms of small actions with different values for τ (for ‘tiptoe,’ the time of each subevent of touching the ground with a toe), then these portions count as subevents accessible to hi-.

• If an event is relatively ‘seamless’ (tossing something up and out), then it is unclear how to divide this event into subevents except where multiple entities entity, in the case of split readings of plural stems (20a).7
  o The subevents are then forced to take place at different times (in succession).

7 I am assuming that each act of tossing a squash out is an atomic event (so the only true cases of subevent readings of hi- are the ‘inherent seriatives’ and the split plurality readings (20a)), but nothing hinges on this.
4.0 Conclusions and Summary

• I argued that the seriative prefix in Navajo (hi-) is an instantiation of Lasersohn’s (1995) pluractionality marker.

\[(\text{hi-V}) = \forall e,e' \in E \ [P(e) \land \neg \tau(e) \lor \tau(e')] \land |E| > 2\]

\[a \quad b \quad c \quad a\]

**a:** Multiple events (totaling \(> 2\)) (§3.1)

**b:** Subevents (events in P add up to an event of V) or events (P = V) (§3.2, §3.3)

**c:** e and e’ cannot overlap in terms of time (\(\tau\)) (§3.1, §3.3)

• Since hi- only allows readings in which (sub)events do not overlap in time, we don’t expect – and did not find – all readings attributed to the pluractional marker in Halkomelem.

(24) \(\text{yáleq’et-es te theqát fall.pl-TR-3S DET tree}\) (Thompson 2009: 1)

a) ‘He felled all the trees’
b) ‘He felled all the trees (with one swing)’
c) ‘They felled the trees’
d) ‘He felled the same (magic) tree over and over’
e) ‘They felled the tree’

• Readings (b) and (e) are definitely absent from hi-marked verbs: no separation of (sub)events by time.

  o Reading (c) is absent if the felling of the trees all happened at the same time.

• Halkomelem has readings (b), (c), and (e) because it allows ‘participant’ to not only be sufficient to allow splitting of subevents (as in Navajo, see §3.3)) but to also be the parameter in the non-overlap condition \(\neg f(e) \lor f(e’)\].

• If Navajo encodes with hi- that ‘time’ is the parameter in the non-overlap condition, does it also have a morpheme to encode that ‘participant’ is the parameter in the non-overlap condition?

  o See Appendix for tentative ideas about a candidate, da-.
5.0 References


Appendix: da-

• If Navajo encodes with *hi* that ‘time’ is the parameter in the non-overlap condition, does it also have a morpheme to encode that ‘participant’ is the parameter in the non-overlap condition?

• Possibly. I think that this may be the function of *da*- , a morpheme that occurs in verbs where at least one argument (usually the subject) is interpreted as plural.

  (25)  ‘Akałii béégashii nídeis’ah
        cowboy cow        *da*-3S-skin
        ‘The cowboys skinned the cow(s).’  (Yazzie et al. 2000: 142)

• When minimal pairs are presented together, the *da*-marked verb introduces a ‘distributive’ (or, ‘play with the boys individually’ / subevents of playing, distinguished by the boy).

  o As shown by (25), however, the primary contribution of *da*- relates to participants, not time.
(26)  a. ’Ashkii yázhí bił naashné
    boy-sg little 3O-with 1sgS-play
    ‘I play with the little boy.’

    b. ’Ashiiké yázhí bił naashné
    boy-pl little 3O-with 1sgS-play
    ‘I play with the little boys (collectively).’

    c. ’Ashiiké yázhí bił ndaashné
    boy-pl little 3O-with da-1sgS-play
    ‘I play with the little boys (with each of >2, in a distributive sense).’

(Yazzie et al. 2000)

• PL-marked stems with da- can also receive a ‘split plurality’ interpretation (27b,c).

(27)  a. ’Atiingóó yiijah
    road-along 3S-run.pl
    ‘We (3+) are running along the road.’

    b. ’Atiingóó deiniijeh
    road-along da-3S-run.pl
    ‘We (3+) are running along the road (as a group).’

    c. Same as (b)
    ‘We (3+) are running along the road (as individuals).’

    d. Same as (b)
    ‘We (3+) are running along the road (in 3+ groups).’

(YM 1980: 161)

• In contrast with hi-, however, there is no requirement that the subevents (each associated with one entity) differ substantially in terms of time (or space).

  o Obviously, it is not possible for two people to run at the exact same location in time and space…but the ‘loose group’ or ‘as individuals’ interpretations suggest that it is principally the ability to distinguish individuals from each other that matters.

• The challenge of identifying ‘participant’ as a parameter completely independent from ‘time’ or ‘space time’ led Cusic (1981) to not identify ‘participant’ as a possible parameter of nn-overlap at all.

  o Lasersohn (1995) uses ‘participant’, but notes: “If several different individuals independently perform some action, the action will normally be performed at several separate times or locations, simply because different individuals cannot simultaneously occupy the same space” (1995: 250).