Northern Paiute uses clause chaining to express certain temporal relations between clauses, which are conveyed by temporal subordinators such as after and while in English. Rather than a subordination structure, however, I show that clause chaining in Northern Paiute has an underlying coordination structure. I propose that temporal relations between the clauses in a chain arise, in part, from verbal morphology conveying relative tense. In Northern Paiute, relative tense can be bound in a coordination structure, as in an embedded clause in other languages (Ogihara 1994, 1995, 1996, Abusch 1997). In addition, I argue that this semantics is enriched pragmatically to produce a ‘forward-moving’ temporal interpretation characteristic of narrative discourse (Kamp & Rohrer 1983, among others). This in-depth investigation of one language raises questions about the syntax and semantics of clause chaining in other languages.*

Keywords: clause chaining, coordination, tense, narrative progression, Uto-Aztecan

1. Introduction. Languages have a variety of grammatical resources for conveying information about time, including tense, temporal adverbials, and temporal adjunct clauses. Northern Paiute—a Uto-Aztecan language of the Numic branch spoken in the western United States—frequently uses a different device. In clause chaining, two or more clauses convey that some events take place, roughly speaking, at the same time or in a temporal sequence, depending on whether they contain the suffix -na (1a) or the suffix -si (1b).¹

* I am greatly indebted to Grace Dick, Edith McCann, and Madeline Stevens for their patience in teaching me about their language over the years. I am grateful to an anonymous referee and to associate editor William Davies, whose comments greatly improved the article. In addition, I thank Pranav Anand, Adrian Brasoveanu, Donka Farkas, Andrew Garrett, Line Mikkelsen, Sarah Murray, David Pesetsky, Anna Szabolcsi, and Tim Thornes for their insightful questions and comments. I have learned a lot from audience members at the 2012 and 2013 Linguistic Society of America annual meetings in Portland and Boston and at the 18th Workshop on the Structure and Constituency of Languages of the Americas at the University of California, Berkeley, as well as at Rice University, Stony Brook University, the Massachusetts Institute of Technology, and the University of California (Los Angeles, Santa Cruz, and San Diego). Tim Thornes very kindly shared a number of his unpublished texts from the Burns variety of Northern Paiute (cited as Thornes, p.c.). Early work on this project was carried out with Timothy Ho, who compiled raw data and formulated some of the basic generalizations.

The fieldwork for this article was supported by a Jacobs Research Fund Grant (Whatcom Museum Foundation, Bellingham, Washington), Phillips Fund Grant (American Philosophical Society, Philadelphia), and a Grant in Great Basin Studies from the Sven and Astrid Liljeblad Endowment Fund (University of Nevada, Reno). This research was also assisted by a New Faculty Fellowship from the American Council of Learned Societies, funded by the Andrew W. Mellon Foundation, and a Faculty Research Grant awarded by the Committee on Research from the University of California, Santa Cruz.

¹ The data in this article comes primarily from my own fieldwork on the variety of Northern Paiute spoken at Mono Lake in eastern California (Lee Vining, California) and immediately to the north in Bridgeport and Coleville, California, and Sweetwater, Nevada. In addition to the Mono Lake dialect, there are several other closely related dialects spoken across, and immediately adjacent to, the Great Basin. These dialects are all mutually intelligible; the variation among them is primarily phonological and lexical (see Babel et al. 2012 and Babel et al. 2013 for details). To a lesser extent, I have also drawn on data from the Burns, Oregon, variety (Thornes 2003).

Northern Paiute is severely endangered. For all dialects, there are probably no more than 300 fluent speakers today (Golla 2011:174). For the Mono Lake dialect specifically, there are around five speakers, with varying levels of proficiency. The fieldwork data I present here comes entirely from the two oldest, most fluent speakers of the Mono Lake variety. At the time of writing, Edith McCann was ninety years old and Madeline Stevens was ninety-three years old. They learned Northern Paiute as their first language and were introduced

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The temporal interpretation of clause chaining in Northern Paiute

   ‘While you are watching it, while you are stirring it, you look at it every once and a while.’
   (dialogue, MS, BP09-1-44, 7)

b. Yaisimɨ=toogɨ=tɨwau nobiya-u-si, mɨ=toogɨ=tɨwau ptc pl=dog=also pack-pfv-seq pl=dog=also tsa-hibi-ki-u-ga-si, tammi mia-ga-kwi mii.
   ip. fingers-drink-appl-pfv-mot-seq 1pl.incl.nom go-mot-irr quot
   ‘So then, having packed up the dogs, and having made sure those dogs get a drink, so we’d take off.’
   (narrative, Nepa Kennedy, ‘Root-digging time’, Thornes, p.c.)

A clause that contains one of these suffixes, which I call a marked clause, cannot stand on its own. In contrast, the final clause in each chain above, which I call the unmarked clause, is inflected like an independent sentence.²

In many languages, these relations between clauses—temporal simultaneity and sequence—are conveyed by temporal subordinators, such as while and after in English. They create subordination structures that look strikingly similar to clause chaining in Northern Paiute.

(2) a. While the senators were debating the motion, they drank tea.

b. After Ben won the race, he collapsed with exhaustion.

The temporal adjunct clauses either temporally include (2a) or precede (2b) the main clause. In addition, the main clause in each example can stand on its own as an independent sentence, while the clause introduced by the temporal subordinator can only be adjoined.

to English when they started school. Both trace their ancestry to Bridgeport, though they also have family from Mono Lake (Lee Vining) and Sweetwater. There are only a few differences in their speech; these consist entirely of very small lexical differences that reflect minor historical variation among the communities in the Mono Lake dialect area (e.g. tɨba’a ‘pinenut’ in Lee Vining, but tiba elsewhere).

Examples from other sources receive the usual parenthetical citation. Examples from my own fieldwork are annotated with relevant metadata: (i) how the data was collected: in a dialogue, through elicitation, in a narrative, or in a prompted narrative, (ii) the initials of the speaker who uttered the example or provided a judgment for the example (EM or MS), (iii) a number (starting with BP) identifying the source recording for the example, and (iv) the example’s location in the source recording (either a line number in the corresponding transcription of the recording or a timestamp). The source recordings and transcriptions are not available to the public, at the request of the speakers, because they contain culturally sensitive and personal content.


² These are sometimes called ‘medial’ and ‘final’ clauses, respectively (Longacre 2007:399). While this might seem an accurate characterization of the clause chains in 1a–b, the terms adopted in the text are more appropriate for Northern Paiute. The linear order of the marked and unmarked clauses is variable (see §4.2).
Despite this surface resemblance, there is a persistent intuition in the literature that the clauses in a chain stand in a looser relation to each another—‘like beads on a string’ in Foley’s (2010:27) words—that is more characteristic of coordination. Indeed, as I discuss in more detail in §2, clause chaining in Northern Paiute has a coordination structure, as in some other languages (see Roberts 1988 on Amele, Foley 2010 on various Papuan languages, and Nonato 2014 on Kisêdjê).

(3) The syntax of clause chaining in Northern Paiute (preliminary version)

If clause chaining in Northern Paiute has this coordination structure, how does it convey temporal relations between clauses, as temporal subordinators do?

I argue in §3 that the simultaneous suffix -na and the sequential suffix -si realize the T(ense) head inside the marked clause. In terms of their semantics, I propose that they are dedicated markers of relative tense—specifically, what von Stechow (1995:372) calls ‘bound relative tense’. They can only relate the time at which the marked clause is interpreted to a time whose value is provided by linguistic material elsewhere in the sentence. Foley (2010:44f.) suggests something along these lines for several Papuan languages, though he does not show how the semantics of tense gives rise to the temporal interpretation of clause chaining.

In §4, I propose that the simultaneous and sequential suffixes combine compositionally with coordination to produce part of the temporal interpretation of a clause chain. In Northern Paiute, relative tense conveyed by the suffixes is abstracted over in coordination structures, just as relative tense is in embedded clauses in other languages (Ogihara 1994, 1995, 1996, Abusch 1997). This semantic binding establishes a relation of temporal inclusion or temporal precedence between each marked clause and the unmarked clause, deriving the insensitivity of these temporal relations to the linear order of the marked and unmarked clauses.

In Northern Paiute, the marked clauses are also related temporally to one another, though this is not part of the semantic content of a clause chain. I argue in §5 that these temporal relations arise through pragmatic enrichment. In narratives, the clauses in a chain receive the same ‘forward-moving’ interpretation that a sequence of independent sentences does (Kamp & Rohrer 1983, among others). This additional meaning component is sensitive to the linear order of the clauses in a chain, capturing Foley’s intuition that they resemble ‘beads on a string’.

The existing literature on clause chaining consists largely of typological surveys (e.g. Longacre 2007) and comparative work on geographically or genetically related languages (e.g. Foley 2010), or it deals with clause chaining only in connection with another topic (e.g. Finer 1985, Roberts 1988, Broadwell 1997). For this reason, it is difficult right now to determine whether the syntax and semantics I propose for clause chaining in Northern Paiute can be extended to other languages, since they cannot be compared in any really substantive way. But I hope that this in-depth investigation of one language will raise questions about others, leading in the end to a richer theory of clause chaining.
2. The syntax of clause chaining in Northern Paiute. Clause chaining has a remarkably uniform surface profile across languages. In his typological survey, Longacre (2007:398–417) identifies a number of core properties. First, one clause ‘has a verb of distinctive structure that occurs but once in the entire chain, while the other clauses have verbs of different and more restricted structures’ (p. 399). In Northern Paiute, as we have already seen, there is one unmarked clause, accompanied by one or more marked clauses. Second, the temporal relations between clauses are marked by morphology signaling a distinction between (i) temporal simultaneity and (ii) temporal sequence (p. 400). In Northern Paiute, these relations are conveyed by verbal morphology: the simultaneous suffix -na and the sequential suffix -si.

In addition, Longacre observes (p. 399) that clause chaining frequently marks switch reference—that is, whether the subject of one clause is the same as or different from the subject of the following clause. As far as I know, Northern Paiute never realizes switch reference formally (see also Thornes 2003:277f.). But there is no reason to think this is a necessary property of clause chaining. Switch-reference marking can, but need not, appear at a variety of clause junctures, including both unequivocal coordination structures and a variety of subordination structures (see the discussion in McKenzie 2012:79–91).

Moving beyond this surface description, I propose that clause chaining has a coordination structure in Northern Paiute, as noted above. Two or more full clauses, which I assume are TPs, are combined by an asyndetic, or phonologically null, coordinator. (These clauses are headed by T(ense), a label that does not necessarily have any semantic import.)

(4) The syntax of clause chaining in Northern Paiute (preliminary version)

```
    | TP
   /\  &  /
  /   \  /
 TP   TP
 /     /
V{na} {si}
```

I will argue for a clausal asyndetic coordination structure by setting aside three alternative structures. While each of these alternatives may be able to account for some of the properties of clause chaining in Northern Paiute, only a structure like 4 can account for all of them.

In some languages, clause chaining is analyzed as subordination (Finer 1985, Broadwell 1997, 2006). But as I show in §2.1, questions and left-peripheral operators, such as modal clitics and negation, do not treat the marked clause as contained within the unmarked clause in Northern Paiute. In other languages, clause chaining is analyzed as coordination at the level of the verb phrase (Foley 2010, Nonato 2014:45–63). I argue in §2.2, though, that clause chaining in Northern Paiute must coordinate full clauses, because each member of a chain can contain the same left-peripheral elements. Finally, in §2.3, I consider the possibility that the simultaneous and sequential suffixes are themselves coordinators. I conclude, however, that they must be contained within the marked clause, since they select for its contents.

2.1. Clause chains are not subordinated. For several North American languages, Finer (1985) assumes a subordination structure like 5 for clause chaining in order to accommodate his theory of switch-reference marking.
The syntax of clause chaining in Northern Paiute (first alternative)

\[
\begin{array}{c}
TP \\
CP \\
V \{ \text{na, si} \} \\
TP \\
V
\end{array}
\]

The marked clause would have to be adjoined quite high—to the entire unmarked clause—since it precedes everything in the unmarked clause. This alternative subordination structure ends up being quite difficult to distinguish syntactically from the coordination structure in 4. In neither does an expression in the marked clause c-command into the unmarked clause, or vice versa.

Broadwell (1997, 2006) adopts this subordination structure for clause chaining in Choctaw (Muskogean: Southeastern United States), in part because the marked clause cannot contain tense, unlike a true coordination structure. This argument is not relevant for Northern Paiute, since the language lacks absolute tense (Comrie 1985:36): it does not mark the relation between the time at which a clause is interpreted and the utterance time (see also Thornes 2003:396). Below, I offer three other arguments that clause chaining in Northern Paiute does not have the subordination structure in 5.

Before proceeding, let me briefly set aside another, related, alternative. The primary subordination strategy in Northern Paiute is nominalization (see also Thornes 2003:427–47). One nominalizer, the suffix \text{-na}, derives patient nominalizations (6a), object relative clauses (6b), and the complements of perception verbs (6c) (Toosarvandani 2011, 2014b).

\[
\begin{align*}
6 \text{a. } & \text{I=saa-na ne-hu.} \\
& \text{1sg.gen=cook-NMLZ burn-pfv} \\
& \text{‘What I was cooking burned.’} \\
6 \text{b. } & \text{Isu siadami i=bisabi-na wadzi-mia-hu.} \\
& \text{dem.nom girl 1sg.gen=like-NMLZ hide-go-pfv} \\
& \text{‘The girl that I like ran away.’} \\
6 \text{c. } & \text{Nii a=bbauma-winni-na naka.} \\
& \text{1sg.nom 4.gen=rain-PROG-NMLZ hear.ipfv} \\
& \text{‘I hear it raining.’}
\end{align*}
\]

Even though they have the same form, the simultaneous suffix in clause chaining cannot be assimilated to the nominalizer suffix. To begin with, it is in complementary distribution with the sequential suffix, which cannot plausibly be analyzed as a nominalizer. The sequential suffix cannot occur on a verb in argument position (7a), in a relative clause (7b), or on the complement of a perception verb (7c).

\[
\begin{align*}
7 \text{a. } & \text{I=saa-si ne-hu.} \\
& \text{1sg.gen=cook-SEQ burn-pfv} \\
& \text{‘What I was cooking burned.’} \\
7 \text{b. } & \text{Isu siadami i=bisabi-si wadzi-mia-hu.} \\
& \text{dem.nom girl 1sg.gen=like-SEQ hide-go-pfv} \\
& \text{‘The girl that I like ran away.’} \\
7 \text{c. } & \text{Nii a=bbauma-winni-si naka.} \\
& \text{1sg.nom 4.gen=rain-PROG-SEQ hear.ipfv} \\
& \text{‘I hear it raining.’}
\end{align*}
\]

In the appendix, I provide three additional arguments for the simultaneous suffix being distinct from the homophonous nominalizer suffix.
Asymmetrical wh-movement. While extraction is not possible from an adjoined clause, it is possible from the main clause. A wh-phrase, for instance, can raise to precede a temporal adjunct clause.3

(8) What 1, when he was studying for his exam, did John drink t1?

In Choctaw, Broadwell (1997:39) argues that clause chaining has such a subordination structure, because it is possible to extract from the unmarked clause (9a). This contrasts with unambiguous coordination structures, which do not permit such asymmetrical wh-movement (9b).

(9) Choctaw
   a. Katah-oosh 1 John-at taloowa-nah t1 hilhah?
      who-FOC.NOM John-NOM sing.l-Ds dance
      ‘Who 1 did John sing and t1 dance?’
   b. *Katah-oosh 1 John-at taloowa-tok anoti t1 hilha-tok?
      who-FOC.NOM John-NOM sing-pst and dance-pst

(Broadwell 1997:39)

In Northern Paiute, if clause chaining had the alternative subordination structure in 5, it should exhibit the same extraction pattern. But a wh-phrase cannot move across the marked clause.4

(10) *Haga 1 su=miitsi-’yu nana tiba tika-na, su=tiitsi-’yu naatsi’i t1
      who NOM=short-NOM man pinenut eat-sim NOM=little-NOM boy
      mutuhe’e?
      kiss.IPFV
      intended: ‘Who, while the short man was eating pinenuts, did the little boy kiss?’
      (cf. **Who 1 was the short man eating pinenuts, and the little boy kissed t1?’)

(elicitation, EM, BP48-3, 52:50)

The ungrammaticality of 10 does, however, follow from the coordination structure in 4. The asymmetrical movement of a wh-phrase violates the coordinate structure constraint (Ross 1967:161). Interestingly, it is possible to question a constituent inside the marked clause. (This is completely ruled out in temporal adjunct clauses: *What 1 when he was studying for t1
did John drink tea?)

(11) Haga, su=tiitsi-’yu nana t1 mutuhe-na, yaisi su=naatsi’i=i=bin’o tiba
      who NOM=short-NOM man kiss-sim ptc NOM=boy=ptc pinenut
      tika?
      eat.IPFV
      ‘Who is the little man kissing while the boy is eating pinenuts?’
      (cf. **Who 1 is the little man kissing t1, and the boy is eating pinenuts?’)

(elicitation, MS, BP48-3-s, 13)

How is this possible if clause chaining in Northern Paiute has a coordination structure? The wh-phrase in 11 appears to raise out of the first coordinate in violation of the coordinate structure constraint. There is good reason to think, though, that it does not actu-

3 The orthographic commas in 8 belie the fact that the temporal adjunct clause is fully integrated into the sentence. The characteristic intonation of a parenthetical is missing.
4 For reasons of space, I have only included clause chains with the simultaneous suffix in this section. But clause chains with the sequential suffix have exactly the same properties.
ally leave the first coordinate. Northern Paiute only has optional wh-movement to a clause-initial position (12a–b).

(12) a. \( Haga_t \) su=mogo’ni t1 pisapi? 
   \textit{who NOM=woman like.IPfv} 
   ‘Who does the woman like?’ 
   (elicitation, EM, BP44-7, 7:25)

b. Su=mogo’ni \( haga \) pisapi? 
   \textit{NOM=woman who like.IPfv} 
   ‘Who does the woman like?’ 
   (elicitation, EM, BP44-7-s, 5)

This suggests that the wh-phrase in 11 might just raise into the left periphery of the first coordinate. Question semantics would then be contributed by an operator taking scope over both clauses in the chain, perhaps along the lines suggested by Cable (2010). 5

This correctly predicts that a constituent inside the unmarked clause can also undergo wh-movement, as long as it does not leave that clause. 6

(13) 

\[
\begin{array}{c}
\text{CP} \\
\quad [+Q] \\
\quad \text{TP} \\
\quad \text{TP} & \quad \text{TP} \\
\quad \text{DP} \\
\quad \text{wh} \quad \ldots\text{V}\{\text{na}\}
\end{array}
\]

Clause chaining in Northern Paiute cannot have a subordination structure, then, because it does not permit asymmetrical wh-movement from just one clause. This is compatible with it having a coordination structure instead.

Across-the-board wh-movement. While across-the-board extraction is permitted in coordination structures (15a), it is ungrammatical in subordination structures, because the moved element crosses an adjunct island boundary (15b).

5 While this operator is phonologically null in wh-questions, there is an overt question particle in polar questions. It can take scope over an entire clause chain.

6 In a three-clause chain, it should be grammatical for the medial marked clause to contain a wh-phrase at its left edge. And it should be ungrammatical for a wh-phrase to move out of the medial marked clause. Unfortunately, the relevant sentences are quite challenging for speakers to judge because of their length.
The temporal interpretation of clause chaining in Northern Paiute

(15) a. What did the nurse polish t1, and the plumber play t1?
   b. *Who did Max tell t1 after he saw t1?

In Northern Paiute, wh-movement can take place from each clause in a chain.

(16) Himma1 nii t1 tika-na, yaisi su=naatsi’i=bino’o t1 tika?
   what 1SG.NOM eat-SIM PTC NOM=boy=PTC eat.IPfv
   ‘What, while I eat it, does the boy eat, too?’
   (cf. ‘What do I eat t1, and the boy eats t1, too?’) (elicitation, EM, BP39-2-s, 24)

If clause chaining in Northern Paiute had a subordination structure, 16 should be ungrammatical. But this across-the-board wh-movement is completely expected if it has a coordination structure.

Second-position clitics. Another argument that clause chaining in Northern Paiute does not have a subordination structure comes from second-position clitics, which express modality and occur after the first major sentence constituent (Thornes 2003:336–41). The modal clitic =sakwa, for instance, can occur after the subject (17a), a fronted direct object (17b), or a sentence-initial adverb (17c).

(17) a. Hi=sakwa pida.
   2SG.NOM=MOD start.fire
   ‘You should start the fire.’
   (elicitation, EM, BP33-5-s, 47)
   b. Himma=sakwa tammi madabbui.
      thing=MOD 1PL.INCL make
      ‘We might make something.’
      (elicitation, EM, BP34-2-s, 17)
   c. Mu’a=sakwa tammi tib’a hani-gaa-kwi.
      tomorrow=MOD 1PL.INCL pinenut do-MOT-IRR
      ‘Tomorrow, we are going to go get pinenuts.’
      (elicitation, EM, BP33-5-s, 51)

If the marked clause were adjoined to the unmarked clause in first position, as in the alternative subordination structure in 5, modal clitics should follow the marked clause. Instead, they appear after the first constituent inside the unmarked clause, taking scope within that clause. (The sentence in 18 was judged relative to a context in which the marked clause describes an actual situation.)

(18) [Context: The woman is making a fire, but the boy is sitting around doing nothing.]
   Su=mititsi-’yu mogo’ni pida-na, su=naatsi’i=sakwa ka=kutsu
   NOM=short-NOM woman make.fire-SIM NOM=boy=MOD ACC=cow
   patsa.
   kill.IPfv
   ‘While the short woman is starting a fire, the boy should kill the cow.’
   (elicitation, EM, BP50-4, 16:25)

Since the marked clause does not count as the first element, clause chaining in Northern Paiute cannot have a subordination structure. By contrast, the distribution of second-position clitics is compatible with a coordination structure: in 18, the modal clitic appears after the first element inside one coordinate, namely the unmarked clause. (As I show below, second-position clitics can also occur inside the marked clause.)

2.2. Clause chaining coordinates full clauses. Based on the three arguments above, I conclude that clause chaining in Northern Paiute does not have a subordination structure, though this may be appropriate for Choctaw and other languages. This leaves a coordination structure. For various Papuan languages, Foley (2010) proposes that clause chaining coordinates subclausal constituents under a single T head (see also Nonato 2014).
The main argument for this low-coordination structure comes from the absence in the marked clause of functional categories that are found in an independent sentence, such as absolute tense, negation, and illocutionary force (Foley & Van Valin 1984:256–63). Since Northern Paiute does not overtly mark absolute tense, I instead use negation and second-position clitics to show that clause chaining does not have the low-coordination structure in 19.

Negation. In Northern Paiute, negation appears either in sentence-initial position (20a) or following the subject at the left edge of the verb phrase (20b) (Thornes 2003:328).

(20) a. Kai nimmi wiupui-gga yaa.
   NEG 1PL.EXCL.NOM buckberry-have there
   ‘We have no buckberries this time.’ (dialogue, MS, BP23-1-t1, 3)

b. Su=natizuabi kai togi i=ma-nimma.
   NOM=medicine NEG correct 1SG.ACC=CAUS-feel.IPFV
   ‘The medicine doesn’t make me feel quite right.’ (elicitation, Thornes 2003:328)

Assuming that negation adjoins either to TP or to VP—the two positions where it is attested crosslinguistically (Laka 1990:9–85)—it can be used to probe the structure of clause chaining.

Under the alternative low-coordination structure, high negation should be impossible inside the unmarked clause because it would be just a VP. But this is, in fact, possible.

(21) Su=tiitsi'-yu naatsi’i wi-na, kai su=mogo’ni mia-hu.
    NOM=little-NOM boy sleep-SIM NEG NOM=woman go-IPFV
    ‘While the little boy was sleeping, the woman didn’t leave.’
    (elicitation, EM, BP50-4, 17:46)

High negation should not be possible inside the marked clause either, though showing this is a bit more involved. It is clear that kai ‘not’ can occur in sentence-initial position.

(22) Kai su=tiitsi'-yu naatsi’i yaga-na, niি o=ddika-ggi-kwi.
    NEG NOM=little-NOM boy cry-SIM 1SG.NOM 3SG.ACC=eat-APPL-IRR
    ‘When the little boy is not crying, I will feed him.’ (elicitation, EM, BP44-7-s, 2)
    [EM: ‘You’re going to feed him, before he starts to cry.’]

If the clause chain in 22 had a low-coordination structure, high negation should only scope over the entire coordination. But as the speaker’s comments indicate, it can take scope inside the marked clause. This is entirely expected if clause chaining in Northern Paiute coordinates full clauses.

Second-position clitics. Recall from §2.1 that modal clitics occur in second position in Northern Paiute. I assume they occupy C, like the highest verb in a verb-second
Germanic language (Koster 1975, among others). If clause chaining had the alternative low-coordination structure, then modal clitics should not be possible inside the unmarked clause. But as we saw in 18 above, they are possible there.

It is unclear whether a low-coordination structure should also permit a modal clitic inside the marked clause. This depends on whether a modal clitic can be interpreted inside the first VP coordinate, and yet surface in C of the matrix clause. At any rate, it is possible for a modal clitic to appear after the first element of the marked clause.

(23) Su=miitsti-’yu mogo’ni=sakwa pida-na, su=naatsi’i yaisi kutsu nom=short-NOM woman=MOD make.fire-SIM nom=boy ptc cow kill.ipfv

‘The short woman should start a fire, so the boy will kill a cow.’ (elicitation, EM, BP48-6, 17:45)

This distribution for second-position clitics is expected if clause chaining in Northern Paiute coordinates full clauses. While I have been assuming for simplicity that these are TPs, they could also be CPs. There is a position, then, for a modal clitic in both the marked and unmarked clauses.

2.3. Clause chaining is asyndetically coordinated. Northern Paiute does not have overt coordinators, so clause chaining would have to employ asyndetic coordination. Unless, that is, the simultaneous and sequential suffixes were themselves coordinators. They would be terminal nodes in the syntax, but they would attach phonologically to the element on their left.

(24) The syntax of clause chaining in Northern Paiute (third alternative)

With this structure, the marked clause would have no special status: it would be whatever clause happens to occur first. But there is good reason to think that clause chaining in Northern Paiute has an asyndetic coordination structure. The simultaneous and sequential suffixes interact with aspectual morphology inside the marked clause.

In Northern Paiute, verbs cannot appear in a bare form in nonmodal contexts: they must bear some type of aspect morphology (25). By contrast, in the marked clause of a chain, the verb can appear without any aspectual morphology (26).

(25) *Idzi’i su=nana ti=kaadzi madabbiu. yesterday nom=man refl=car fix (elicitation, EM, BP44-4, 3:27)

(26) Su=nana ti=kaadzi madabbiu-na, hubiatu. nom=man refl=car fix-sim sing.ipfv

‘While the man is fixing his car, he is singing.’ (elicitation, EM, BP48-5, 38:03)

If clause chaining had the alternative structure in 24, where the simultaneous and sequential suffixes were simply coordinators, this should be impossible. While the suffixes’ interaction with aspect remains to be explained, I conclude that they are contained inside the marked clause, and consequently that clause chaining in Northern Paiute has an asyndetic coordination structure.
2.4. One last alternative. I have argued that clause chaining in Northern Paiute has a clausal asyndetic coordination structure. Like other coordination structures, clause chaining in Northern Paiute does not permit asymmetrical extraction, a violation of the coordinate structure constraint, though it does allow for across-the-board movement; second-position clitics also do not treat the marked clause like a (subordinated) first element. Moreover, clause chaining in Northern Paiute must coordinate full clauses, as negation and second-position clitics can occur in both the marked and unmarked clauses. Finally, the simultaneous and sequential suffixes cannot themselves be coordinators, since they are located inside the marked clause and are able to select for its contents.

In the preceding discussion, I have assumed a binary distinction between coordination and subordination, into which I have fit clause chaining in Northern Paiute. There is, however, a substantial line of inquiry that allows for clause chaining to instantiate a third, intermediate category between coordination and subordination (Olson 1981, Foley & Van Valin 1984:256–63, Van Valin & La Polla 1997:448–54, Van Valin 2005:183f.). In a cosubordination relation, neither clause is embedded inside the other, as in coordination, but ‘[t]he crucial property distinguishing cosubordination from coordination is operator dependence’ (Van Valin 2005:187). As in subordination, one of the clauses is semantically dependent on the other: in particular, the cosubordinated clauses share a single operator, such as tense, mood, or illocutionary force, taking scope under it altogether.

Within role-and-reference grammar (RRG), the category of cosubordination is often assumed as a theoretical primitive. Foley (2010:40) warns, however, that the relevant notion of semantic dependence ‘remain[s] undertheorized’. While a putative cosubordinated clause may be semantically dependent with respect to one operator, it may not be semantically dependent with respect to another operator. In Tauya (Trans-New Guinea: New Guinea), for instance, clauses in a chain can—though they need not—take scope together in a polar question (27a). This is not the case with other operators: in 27b, only the second clause takes scope under negation.

(27) Tauya
   a. Tepau-fe-pa yate fitau-e-nae?
      break-prf ss go throw-1/2-q
      ‘Did you break it and go away?’
      ‘You broke it, and did you go away?’
      ‘Did you break it? And you went away.’
      (MacDonald 1990:226)
   b. Ne fofo-a-te ya-ni wate φ-tu-e-7a.
      3sg come-3sg-ds 1sg-erg neg 3sg-give-1/2-ind
      ‘He came, and I didn’t give it to him.’
      (MacDonald 1990:233)

There is thus no unified notion of semantic dependence within even one construction in one language, much less across constructions and languages.

For this reason, I do not take clause chaining in Northern Paiute to instantiate a category of cosubordination. It is nonetheless clear that while the clauses in a chain are not embedded inside one another, as in a typical coordination structure, the marked clause is semantically dependent on the unmarked clause in some intuitive way. This underlay the original observation in the introduction that the marked clause in a chain superficially resembles a temporal adjunct clause. The semantics that I propose in the following sections for clause chaining in Northern Paiute can be seen as an attempt to theorize the relevant notion of semantic dependence for this construction in one language without appealing to a primitive category of cosubordination.

3. The temporal contribution of the suffixes. The clausal asyndetic coordination structure for clause chaining in Northern Paiute leaves us with something of a mys-
tery. In general, coordinates must be alike in some sense (see, for instance, Huddleston & Pullum 2002:1323). But the marked clause contains the simultaneous or the sequential suffix, while the unmarked clause does not. I argue that this asymmetry reflects only a superficial difference between the marked and unmarked clauses. The suffixes are members of a syntactic category that is not phonologically overt in the unmarked clause.

It is tempting to treat the simultaneous and sequential suffixes as aspect, since they can appear on verbs in place of aspectual morphology (see §2.3). But they can also cooccur with the progressive and perfective suffixes (28a–b), which are themselves in complementary distribution (29a–b).

(28) a. Su=naatsi'ı ti=kaadzi madabbui-winni-na, yaisi hubiadu-winni.
   NOM=boy REFLEX=car fix-PROG-SIM PTC sing-PROG
   ‘While the boy is fixing his car, he is singing.’
   (elicitation, EM, BP50-1, 9:19)

b. Su=nana ti=kaadzi madabbui-hu-si, yaisi
   NOM=man REFLEX=car fix-PFV-SEQ PTC
   u=ddza-kana-ggi-hu.
   3SG.ACC=IP fingers-grab-APPL-PFV
   ‘After the man fixed his car, he started it.’ (elicitation, EM, BP50-1-s, 1)

   NOM=boy REFLEX=car fix-PROG-PFV
   (elicitation, EM, BP50-1, 34:39)

b. *Su=naatsi'ı ti=kaadzi madabbui-hu-winni.
   NOM=boy REFLEX=car fix-PFV-PROG
   (elicitation, EM, BP50-1, 34:46)

I take the simultaneous and sequential suffixes instead to be members of a syntactic category that selects for aspect. Specifically, I propose that they are members of T.

Among other things, this means that the simultaneous and sequential suffixes can select for overt aspectual morphology like the progressive and perfective suffixes, or they can select for a phonological null member of Asp(ect) that is in complementary distribution with them.

(30) The syntax of clause chaining in Northern Paiute (intermediate version)

In the unmarked clause or in an independent sentence, T is not pronounced, and it must select for an overt member of Asp (perhaps for that reason). Thus, only in the marked clause of a chain can a verb appear without overt aspectual morphology.

Northern Paiute does not have absolute tense—the time at which a clause is interpreted is not related to the utterance time—so it is not surprising that T is phonologically null in the unmarked clause. But why is the T head in marked clauses realized as the simultaneous or sequential suffix? Elaborating on a suggestion by Foley (2010:44f.), I propose that
they are dedicated markers of what von Stechow (1995:372) calls ‘bound relative tense’, or simply relative tense. They can only relate the time of the marked clause to a time whose value is provided by linguistic material elsewhere in the sentence. In other languages, relative tenses appear in embedded clauses, where they relate the time of the embedded clause to the time of the main clause (Ogihara 1994, 1995, 1996, Abusch 1997, and many others). As I discuss later, the simultaneous and sequential suffixes relate the time of the marked clause to the time of the unmarked clause in Northern Paiute.

If a language does not have absolute tense, we might think that it should also lack relative tense. But it is not implausible that a language might have had distinct morphemes dedicated to absolute and relative tense at some point, and then lost just the set conveying absolute tense. Something like this probably happened in Northern Paiute. In Mono, its most closely related sister language, Lamb (1957:282) identifies an absolute tense marker -ti, which ‘[i]ndicates present or near past time’. He also observes (p. 281) that this nonfuture tense suffix is in complementary distribution with the simultaneous and sequential suffixes, demonstrating directly that they are members of T.

Northern Paiute preserves the fossilized remnants of the nonfuture tense suffix. The so-called ‘general tense’ suffix -ti occurs in two morphological environments: (i) after the applicative suffix -ggɨ (Thornes 2003:398) and (ii) after certain motion suffixes, including -dzaga, which indicates random motion (e.g. 1a). While the general tense suffix is neither productive nor semantically contentful, it cannot cooccur with the simultaneous (31a) or the sequential (31b) suffix.

   nom=boy PASS-eat-APPL-TI-SIM cry.IPfv
   ‘While the boy is being fed, he cries.’ (elicitation, EM, BP40-5, 27:11)

b. Su-naatsi’i na-dika-กก(*-ti)-si, yaisi iwi-huka.
   nom=boy PASS-eat-APPL-TI-SEQ sleep-INcep
   ‘After the boy was fed, he fell asleep.’ (elicitation, EM, BP40-5, 29:47)

The distribution of the remnants of absolute tense in Northern Paiute confirms that the simultaneous and sequential suffixes realize the T head in the marked clause.

For now, I focus on the semantics of the simultaneous and sequential suffixes, leaving for later how they combine compositionally with surrounding material to produce the temporal interpretation of a clause chain. To start, in §3.1, I provide some general background on tense and aspect in Northern Paiute. In particular, I demonstrate that the language lacks absolute tense. Then, in §3.2, I turn to the simultaneous suffix, which I argue conveys relative present tense. In contrast, the sequential suffix conveys relative past tense, as I argue in §3.3. Both suffixes can select either for an overt aspectual morpheme or for a null Asp head.

3.1. BACKGROUND ON TENSE AND ASPECT IN NORTHERN PAIUTE. In one common framework for tense and aspect, a sentence is interpreted with respect to three times (Reichenbach 1947, among many others). The event time is the run time of the event described by the sentence. The reference time is the time that the sentence can broadly be said to be ‘about’, relative to which the event time is positioned. The evaluation time is a time that restricts the location of the reference time.

It is possible to treat tense as establishing a relation between the reference time and the evaluation time, while aspect establishes a relation between the reference time and the event time (Klein 1994). For absolute tenses, such as the present or past tense in main clauses in English, the evaluation time is the time of utterance. The absolute pres-
ent tense establishes a relation of overlap between the reference time and utterance time, while the absolute past tense locates the reference time before the utterance time. An absolute future tense would locate the reference time after the utterance time.

Northern Paiute lacks absolute tense altogether, as do Yukatec Maya (Bohnmeyer 2002), Kalaallisut (West Greenlandic; Shaer 2003, Bittner 2005), and Paraguayan Guaraní (Tonhauser 2011). While the sentence in 32a receives a default present interpretation, adding a temporal adverb can result in a past (32b) or future (32c) interpretation.

(32) a. Su=nana ti=kaadzi madabbui-winni.
   nom=man refl=car fix-prog
   ‘The man is fixing his car.’ (elicitation, EM, BP46-3, 33:44)

b. Idzi'i ti=kaadzi madabbui-winni.
   yesterday refl=car fix-prog
   ‘He was fixing his car yesterday.’ (elicitation, EM, BP44-4, 8:00)

c. Mu'a ti=kaadzi madabbui-winni.
   tomorrow refl=car fix-prog
   ‘He will be fixing his car tomorrow.’ (elicitation, EM, BP44-4-s, 8)

Crucially, in 32a–c, the form of the verb does not change; the reference time is constrained entirely by the temporal adverb. Northern Paiute does not even seem to have a covert absolute tense that would restrict temporal interpretation to the nonfuture, as in St’át’imcets (Matthewson 2006).

In many languages without absolute tense, aspect determines a default temporal interpretation. Imperfective aspect, such as the progressive, gives rise to a default present interpretation (32a), and perfective aspect gives rise to a default past interpretation (33a).

(33) a. Su=nana ti=kaadzi madabbui-hu.
   nom=man refl=car fix-pfv
   ‘The man fixed his car.’ (elicitation, EM and MS, BP44-4, 3:55)

b. Mino'o ti=kaadzi madabbui-hu.
   now refl=car fix-pfv
   ‘He just fixed his car now.’ (elicitation, EM, BP50-1-s, 10)

c. Mu'a ti=kaadzi madabbui-hu.
   tomorrow refl=car fix-pfv
   ‘He will fix his car tomorrow.’ (elicitation, EM, BP44-4-s, 6)

Again, this default past interpretation can be overridden by a temporal adverb, such as mino'o ‘now’ (33b) or mu'a ‘tomorrow’ (33c).

Compositionally, the Asp head establishes a relation between the event time and the reference time by taking the VP, which denotes a property of events (type \( \langle s, t \rangle \)), as its argument and returning a property of times (type \( \langle i, t \rangle \)) (Kratzer 1998).

\[ I \text{ assume a type-theoretic, compositional semantics that has a rule of function application for interpreting complex constituents (cf. Heim & Kratzer 1998:49). The truth conditions of a sentence, and the contribution that subparts of a sentence make to them, are represented by a predicate logic metalanguage with the lambda calculus. Constants are bolded. I use } x, y, \text{ and } z \text{ as variables over individuals (type } e); e, e', e'', \text{ and so forth as variables over events (type } s); t, t', t''\text{, and so forth as variables over time intervals (type } i); \text{ and } p, q, \text{ and } r \text{ as variables over truth values (type } t). \text{ The only higher-order variables are } f, g, \text{ and } h, \text{ which range over functions from either individuals, events, or time intervals to truth values.} \]
I assume that every clause in Northern Paiute is headed by T for syntactic reasons: it assigns case to, and agrees with, the subject in its specifier. But since there is no absolute tense, in independent sentences and in the unmarked clause of a chain, the T head does not establish a relation between the reference time and the utterance time. It thus can denote the identify function, which returns the property of times expressed by AspP.

For simplicity, I assume a standard extensional semantics for aspect in Northern Paiute. The progressive suffix returns a property of times that holds of any reference time that is located within a nonfinal subpart \( \langle C_{nf} \rangle \) of the event time, thus describing an event that is ongoing (35).

\[
\text{(35) The semantics of the progressive suffix}
\]
\[
[-\text{winni}] = \lambda f \lambda t \exists e (f(e) \land t \subseteq C_{nf}(e)) \cdot (\langle s, t \rangle, \langle i, t \rangle)
\]

By contrast, as shown in 36, the perfective aspect returns a property of times that is true of any reference time that contains the event time (Kratzer 1998:107). For telic predicates, it will describe an event that culminates within the reference time.

Sentences in Northern Paiute are interpreted relative to a time interval in the context, just as in English (Partee 1973, 1984), so that the final semantic value of a sentence is not a property of times, but a truth value. This time interval is often taken to be introduced by absolute tense (Kratzer 1998). In Northern Paiute, it can instead be introduced by an interpretive rule (cf. Tonhauser 2011:288).

\[
\text{(37) Root clause rule: The final translation of a root clause translated as } \phi \text{ of type } \langle i, t \rangle \text{ is } \phi(t_n).
\]

If a TP denotes a property of times, the root clause rule predicates this property of a time interval whose referent comes from the context \( t_n \), where \( n \) is a numerical index).\(^9\)

While this temporal reference may not be constrained by absolute tense in Northern Paiute, it is by temporal adverbials and other expressions.

3.2. THE SIMULTANEOUS SUFFIX. Moving on to the simultaneous suffix, I propose that it is a relative present tense. As shown in the lexical entry in 38, it takes the property of times expressed by AspP as its argument. The simultaneous suffix requires that this property hold of the reference time \( (t_1) \), and it relates the reference time to the eval-

---

8 More formally, the progressive and perfective suffixes existentially quantify over the VP’s event argument. The run time of this event is given by the temporal trace function \( t \) (Link 1987:250).

9 As an alternative, this definite time interval could be introduced by a time-referring pronoun that adjoins to root clauses, like a topic situation (Kratzer 2014). The property of times expressed by the TP would be predicated of this pronoun to yield a truth value. As far as I can see, this does all the same work the root clause rule does.
The temporal interpretation of clause chaining in Northern Paiute

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(38) The semantics of the simultaneous suffix

\[ [-\text{na}] = \lambda f (f(t_1) \wedge t_0 \subseteq t_1) : \langle \langle i, t \rangle, t \rangle \]

In an absolute tense, the evaluation time invariably refers to the time of utterance. But by hypothesis, the simultaneous suffix is a dedicated marker of relative tense. The evaluation time does not receive an interpretation from the context. It instead receives its value through semantic binding, as I discuss in the next section, and will ultimately be identified with the reference time of the unmarked clause. This establishes the relation of temporal overlap between the two clauses.

In other languages, the reference time introduced by relative tense has been argued to be existentially quantified (see, for example, Ogihara 1995). In Northern Paiute, there is reason to think that the reference time introduced by the simultaneous suffix is referential, as Partee (1973) argues for absolute tense. In 22a, the marked clause contains negation. If its reference time were existentially quantified, this clause would be trivially true: there is always some time interval at which the little boy is not sleeping. Since the marked clause makes an informative contribution, the reference time must instead refer to a time during which the boy is not sleeping. In the lexical entry above, the reference time is thus a free variable \((t_1)\) that finds its value in the context.

This semantics correctly accounts for the meaning of the clause chain in 39a. This sentence was judged true in a context provided by an image from a wordless children’s book (Frog, where are you?, by Mercer Mayer. New York: Dial Books, 1969). In the image, a boy is bathing in a bathtub, while at the same time his dog is watching him.

(39) [Context: The boy is bathing. The dog is sitting and looking at him in the bathtub.]

a. Su=tìitsi-’yu naats’i nabagia-winni-na, su=ddoogga
   NOM=little-NOM boy bathe-PROG-SIM NOM=dog
   u=bbuni-kati.
   3SG.ACC=see-sit.IPFV
   ‘While the little boy is bathing, the dog is sitting and looking at him.’
   (elicitation, EM, BP53-3, 57:25)

b. #Su=tìitsi-’yu naats’i nabagia-hu-si, su=ddoogga
   NOM=little-NOM boy bathe-PFV-SEQ NOM=dog
   u=bbuni-kati.
   3SG.ACC=see-sit.IPFV
   ‘After the little boy bathed, the dog is sitting and looking at him.’
   (elicitation, EM and MS, BP53-3, 1:00:15)

[MS: ‘Nabagiahusi means he’s through bathing.’ … EM: ‘Probably is-saya’e [‘lying’], init?’ MS: ‘Uh huh.’]

When the marked clause instead contains the sequential suffix, the clause chain is judged false in the same context (39b).

As an overt realization of T, the simultaneous suffix selects for Asp in the marked clause. It can appear without any overt aspectual marking (40a) or with the progressive suffix -winni (40b). But it is not compatible with the perfective suffix (40c).

(40) a. Su=nana ti=kaadzi madabbui-na, yai si hubi adu-winni.
   NOM=man REFL=car fix-SIM PTC sing-PROG
   ‘While the man is fixing his car, he is singing.’
   (elicitation, EM, BP52-2, 12:31)
b. Su=naatsi’i ti=kaadzi madabbui-winni-na, yaisi hubiadu-winni.  
   NOM=boy REFL=car fix-PROG-SIM PTC sing-PROG  
   ‘While the boy is fixing his car, he is singing.’  
   (elicitation, EM, BP50-1, 9.19)

   NOM=man REFL=car fix-PFV-SIM PTC sing-PROG  
   (elicitation, EM and MS, BP50-1, 10.15)

I take this to mean that the simultaneous suffix always selects for imperfective aspect, regardless of whether it is overt (40b) or phonologically null. Even when there is no overt aspectual morphology, the simultaneous suffix needs a property of times as its argument. In this case, I assume it selects for an Asp head that is phonologically null.

\[(\emptyset_{\text{PROG}}) = \lambda f \lambda t \exists e (f(e) \land t \subseteq_{\text{gy}} \tau(e)) : \langle\langle s, t\rangle, \langle i, t\rangle\rangle\]

This null Asp head has the same semantics as the progressive suffix (35), locating the reference time within a nonfinal subpart of the event time.

This makes a couple of correct predictions. First, even without any aspectual morphology, the simultaneous suffix is compatible with an assertion of continuation (42), just like the progressive suffix (43).

(42) Su=nnana ti=kaadzi madabbui-na, yaisi tiggwisu u=madabbui-winni.  
   NOM=man REFL=car fix-sim PTC still 3SG.ACC=fix-PROG  
   ‘The man was fixing his car, and he is still fixing it.’  
   (elicitation, EM, BP51-7, 42:10)

(43) Amamu’a su=naatsi’i ti=kaadzi madabbui-winni. Yaisi mino’o tigwisu  
   morning NOM=boy REFL=car fix-PROG PTC now still  
   madabbui-winni. fix-PROG  
   ‘This morning, the boy was fixing his car. He is still fixing it now.’  
   (elicitation, MS, BP46-7, 3:10)

Second, when there is no aspectual morphology, the simultaneous suffix is infelicitous with achievement predicates (45a) and coerces an iterative interpretation with semelfactsives (45b). This again parallels the behavior of the progressive suffix (45a–b). (See Toosarvandani 2014a for a discussion of Aktionsart in Northern Paiute.)

(44) a. #Su=nnana mia-na, hubiatsu.  
   NOM=man go-SIM sing.IPFV  
   intended: ‘While the man is leaving, he is singing.’  
   (elicitation, EM, BP48-5, 21:08)

b. Nii akwissiye-na, su=naatsi’i=duadzu akwissiye-winni.  
   1SG.NOM sneeze-SIM NOM=boy=PTC sneeze-PROG  
   ‘While I am sneezing, the boy is sneezing, too.’  
   (elicitation, EM, BP56-1, 41:03)

[EM: ‘More than once.’]

(45) a. #Su=nnana mia-winni.  
   NOM=man go-PROG  
   intended: ‘The man is leaving.’  
   (elicitation, EM, BP44-7, 1:24:13)

b. Nii akwissiye-winni.  
   1SG.NOM sneeze-PROG  
   ‘I am sneezing (over and over again).’  
   (elicitation, EM, BP45-5, 1:45:04)

[EM: ‘… means you sneeze a lot of times.’]
Crosslinguistically, it is quite common for present tense to be incompatible with an event described from a perfective viewpoint. This restriction is sometimes said to arise because an event that overlaps with the time of utterance ‘by definition … could not be viewed as bounded’ (Bybee et al. 1994:83). If this explanation is correct, it needs to be generalized to account for why the simultaneous suffix only selects for imperfective aspect, which is a relative present tense.

### 3.3. The sequential suffix

I propose that the sequential suffix conveys a relative past tense. Like the simultaneous suffix, it takes the property of times expressed by AspP as its argument, requiring this property to hold of the reference time. But as shown in the lexical entry in 46, the sequential suffix requires the reference time of the marked clause \( t_1 \) to temporally precede the evaluation time \( t_0 \).

(46) The semantics of the sequential suffix

\[ [-\text{sil}] = \lambda f(f(t_1 \land t_1 < t_0) : \langle i, t \rangle, t) \]

Again, the evaluation time is a variable \( t_0 \) that does not receive an interpretation from the context. It receives its value instead through semantic binding from the reference time of the unmarked clause. This establishes a relation of temporal sequence between the marked and unmarked clauses.

As expected, the clause chain in 47a is judged true in a context provided by an image that describes a sequence of events (again from Mercer Mayer’s *Frog, where are you?*). While the boy is asleep in his bed, his pet frog escapes from a jar; only after the boy wakes up does he notice that the frog is gone.

(47) [Context: While the boy is asleep, the frog escapes. After the boy wakes up, he notices the frog is gone.]


\[ \text{NOM}=\text{boy \ wake.up-PFV-SEQ \ REFL=frog \ miss-PFV} \]

‘After the boy woke up, he missed his frog.’

( elicitation, EM, BP53-3, 1:06:10)

b. #Su=naatsi’i tibuni-winni-na, ti=p’a’mogo yaa-hu.

\[ \text{NOM}=\text{boy \ wake.up-PROG-SIM \ REFL=frog \ miss-PFV} \]

intended: ‘While the boy was waking up, he missed his frog.’

( elicitation, EM and MS, BP53-3, 1:07:08)

[EM: ‘Probably would be lying, init? … ’ MS: ‘He’s not quite awake, tibuniwinnina.’ EM: ‘He’s not awake, real awake.’]

By contrast, the parallel clause chain with the simultaneous suffix in 47b is judged false in the same context, since it requires the marked clause to temporally include the unmarked clause.

Unlike the simultaneous suffix, the sequential suffix is compatible with perfective aspect. It can occur with both the progressive suffix -\text{winni} (48b) and the perfective suffix (48c).

(48) a. Su=nana \ ti=kaadzi madabbui-si, yaisi

\[ \text{NOM}=\text{man \ REFL=car \ fix-SEQ \ PTC} \]

u=ddza-kana-ggi-hu.

\[ \text{3SG.ACC}=\text{IP.fingers-grab-APPL-PFV} \]

‘The man fixed his car, and then he started it.’

( elicitation, EM and MS, BP50-1, 5:50)

b. Ti=kaadzi madabbui-winni-si, yaisi sonapina-pinni.

\[ \text{REFL=car \ fix-PROG-SEQ \ PTC \ take.break-STAT} \]

‘He was fixing his car, and then he took a rest.’ ( elicitation, EM, BP50-1-s, 6)
c. Su=nana ti=kaadzi madabbui-hu-si, yaisi
   NOM=man REF=car fix-PFV-SEQ PTC
   u=ddza-kana-ggi-hu.
   3SG.ACC=IP.fingers-grab-APPL-PFV
   ‘The man fixed his car, and then he started it.’ (elicitation, EM, BP50-1-s, 1)

When the sequential suffix appears without aspctual morphology (48a), I assume that it also selects for a phonologically null Asp head. As a default, this has the same semantics as the perfective suffix in 36.

\[(\emptyset_{\text{pfv}}) = \lambda f \lambda t \exists e (f(e) \land \tau(e) \subseteq t) : \langle \langle s, t \rangle, \langle i, t \rangle \rangle \]

Since the marked clause can entail event culmination (e.g. 48a), the reference time must be able to contain the event time.

But the sequential suffix is compatible with an assertion of continuation, even when there is no overt marker of imperfective aspect (50a). This is also possible when the marked clause contains the progressive suffix (50b), but not the perfective suffix (50c).

(50) a. Su=naatsi’i ti=kaadzi madabbui-si, yaisi tiggwisu u=madabbu’i.
   NOM=boy REF=car fix-SEQ PTC still 3SG.ACC=fix.IPfv
   ‘After the boy was fixing his car, he was still fixing it.’
   (elicitation, EM and MS, BP49-3, 1:29:15)

b. Su=naatsi’i ti=kaadzi madabbui-winni-si, yaisi tiggwisu
   NOM=boy REF=car fix-PROG-SEQ PTC still u=madabbu’i.
   3SG.ACC=fix.IPfv
   ‘After the boy was fixing his car, he was still fixing it.’
   (elicitation, EM, BP52-2, 39:15)

c. #Su=naatsi’i ti=kaadzi madabbui-hu-si, yaisi tiggwisu
   NOM=boy REF=car fix-PFV-SEQ PTC still u=madabbu’i.
   3SG.ACC=fix.IPfv
   intended: ‘After the boy was fixing his car, he was still fixing it.’
   (elicitation, EM and MS, BP49-3, 1:16:19)

[EM: ‘No, you can’t say that.’ MS: ‘No, madabbuihusi means he’s done, he’s gone.’]

This suggests that the sequential suffix can select not only for a phonologically null Asp head that conveys perfective aspect (49), but also for one that conveys imperfective aspect (41). In 50a, it selects for the latter, so no contradiction arises.

I have been treating the sequential suffix as a type of tense—rather than aspect—because the marked clause can have both imperfective and perfective interpretations. The combination of past tense and perfective aspect, however, is not that different from perfect aspect, which locates the reference time after the event time (Klein 1994:109). These alternatives can be distinguished, Bohnemeyer (2014) observes, by using temporal adverbials, which constrain the reference time. In 51a, where the marked clause does not contain any aspectual morphology, the reference time located at two o’clock cannot follow the event, which culminates by twelve o’clock.

(51) [Context: The man started fixing his car at nine o’clock; he finished fixing it at twelve o’clock. He drove off at two o’clock.]

a. #Waha-ggwe su=nana ti=kaadzi madabbui-si,
   two-LOC NOM=man REF=car fix-SEQ
u=ddza-mia-ggi-huka.
3sg.acc=ip. fingers-go-appl-incep
intended: ‘At two o’clock, the man finished fixing his car, and then he drove it off.’
[elicitation, EM, BP50-7, 15:40]
[EM: ‘Well, you’re lying … cuz you finished it at twelve o’clock.’]

b. #Waha-ggwe su=nana ti=kaadzi madabbui-hu-si,
   two-loc nom=man refl=car fix-pfv-seq
u=ddza-mia-ggi-huka.
3sg.acc=ip. fingers-go-appl-incep
intended: ‘At two o’clock, the man finished fixing his car, and then he drove it off.’
[elicitation, EM, BP50-7, 14:42]
[EM: ‘Issaya’e [‘Lying’] … because he finished his car at twelve o’clock.’]

This is also true when the sequential suffix selects for the perfective suffix (51b). Since the marked clause never receives a perfect interpretation, the sequential suffix must convey relative past tense.

4. The temporal semantics of clause chaining. How does this semantics for the simultaneous and sequential suffixes give rise to the temporal interpretation of clause chaining? As dedicated markers of relative tense, they introduce a variable for the evaluation time ($t_0$) that does not get its value from the context. It refers neither to the utterance time nor to any other salient time interval, getting its value instead from surrounding linguistic material. This only happens when the evaluation time of the marked clause is bound by an appropriate operator in certain syntactic configurations.¹⁰ Thus, the simultaneous and sequential suffixes can never occur in an independent sentence: the evaluation time would not have a value.

In many languages, relative tenses only occur in embedded clauses, where the evaluation time can get its value from the main clause. In English, for instance, relative tense shows up in the complement clause of propositional attitude verbs, such as think.

(52) He thought [that a burglar attacked him]. (Abusch 1997:4)
The past tense in English is ambiguous between an absolute tense, which locates the reference time before the utterance time, and a relative tense. There is an interpretation for 52 where the evaluation time of the embedded clause is not the utterance time, but

¹⁰ This dependency between the operator and the variable can be implemented formally in different ways, depending on certain theoretical assumptions about semantic composition. If sentences of Northern Paiute are translated into an intermediate logical language, the variable’s lack of reference can be stated there. We might say, for instance, that for any model and any assignment, the denotation of any expression containing a free occurrence of the variable $t_0$ is undefined. The marked clause will not have a semantic value, then, unless this variable is bound.

If there is no intermediate logical language—if natural language expressions are instead interpreted directly as model-theoretic objects—another mechanism must be employed. One possibility is that the dependency between the variable and the operator is established syntactically. For switch-reference marking, McKenzie (2012:190–202) proposes that the expression introducing the operator must agree syntactically with the expression introducing the variable. After copying its index, the operator can bind any variable with that index. Under this view, the obligatory binding relation originates in the binder, rather than the variable.
the reference time of the main clause. That is, the time at which the burglar attacked him precedes the time at which he was thinking.

There is crosslinguistic variation in the environments where relative tenses can occur (see Ogihara & Sharvit 2012 for a survey). In some languages, it is restricted to the complements of propositional attitude verbs, such as in English (Abusch 1997), Hebrew (Hatav 2010), and Russian (Barentsen 1996, Schlenker 2003:70f.). In other languages, relative tense is allowed in additional embedded contexts. In Japanese, the evaluation time of present or past tense inside relative clauses and temporal adjunct clauses can be identified with the reference time of the main clause (Ogihara 1994, 1995, 1996).

\[53\] Japanese

a. Taroo-wa [nai-te i-ru otok]-o mi-ta.
   Taro-top cry-prog-prs man-acc see-pst
   ‘Taro saw a man who was crying (at the time of the meeting).’
   (Ogihara 1996:153)

b. Taroo-wa [nooberu-syoo-o tot-ta otoko]-o sagasi-ta.
   Taro-top Nobel-prize-acc win-pst man-acc seek-pst
   ‘Taro looked for a/the man who won a Nobel prize.’ (Ogihara 1996:159)

In 53a, for example, the reference time of the relative clause is not related to the utterance time, but rather to the reference time of the main clause. The time at which the man was crying overlaps with the time at which Taro saw him.

I propose that coordination is another syntactic environment where relative tense can occur. There is evidence from many languages that coordination structures are not symmetrical: the coordinator forms a constituent with one of the coordinates (see Ross 1967:162–65 and much subsequent work). Clause chaining in Northern Paiute might also have an asymmetrical structure, then.

\[54\] The syntax of clause chaining in Northern Paiute (final version)

I assume the asyndetic coordinator is a head that takes one coordinate as its complement (Munn 1993). The resulting phrase adjoins to the other coordinate, creating a coordinate structure whose category is identical to that of both coordinates.

The simultaneous and sequential suffixes occur in the first coordinate of 54 because the coordinator introduces an operator that binds the evaluation time of the marked clause. This language-specific property of Northern Paiute can be represented as an index on the coordinator (Krater 2009:194). For the purposes of the semantics, this
index is parsed as a $\lambda$-operator, which abstracts over any variable whose index matches its own inside the coordinator’s complement.

(55)

The $\lambda$-operator binds the evaluation time of the marked clause to create a property of (evaluation) times. The asyndetic coordinator can then combine the marked clause with the unmarked clause, which already expresses a property of (reference) times (as discussed in §3.1). As a result, the evaluation time of the marked clause is identified with the reference time of the unmarked clause, and the simultaneous and sequential suffixes end up expressing a temporal relation between the reference times of the marked and unmarked clauses.

More generally, this analysis of clause chaining in Northern Paiute supports a broader typology of lexical items that can introduce a $\lambda$-operator. From the distribution of relative tense, we know that certain content morphemes must be able to come with a binder, for example, propositional attitude verbs (von Stechow 1995). In addition, DPs that have undergone movement (Heim & Kratzer 1998:186) and some functional morphemes (Adger & Ramchand 2005, Kratzer 2009) have been argued to introduce a $\lambda$-operator. To this list, coordinators can be added, and perhaps not just for clause chaining in Northern Paiute. To account for the properties of switch reference in Kiowa, McKenzie (2012:218–28) argues that coordinators, as well as certain subordinators, come with a $\lambda$-operator that binds a variable introduced by switch-reference markers.

In §4.1, I go through a detailed derivation for a basic case of clause chaining in Northern Paiute, showing that the correct truth conditions arise compositionally. This semantics makes a couple of predictions, which I show are borne out. First, it predicts that the meaning of a clause chain should not be affected by the linear order of the clauses, because they are related by semantic binding. Indeed, in §4.2, I show that a marked clause containing the sequential suffix always temporarily precedes the unmarked clause, regardless of whether it precedes or follows it linearly. Second, this semantics provides relatively weak truth conditions for clause chains that contain multiple marked clauses. This is necessary, I argue in §4.3, in order to account for marked clauses that are not themselves temporally related to one another.

4.1. Deriving temporal simultaneity and sequence. I proposed above that the $\lambda$-operator introduced by the asyndetic coordinator binds the evaluation time in the marked clause, abstracting over it to create a property of times. The unmarked clause already expresses a property of times, which in an independent sentence would be directly
predicated of a time interval from the context by the root clause rule. In a clause chain, however, the property of times expressed by the unmarked clause is first combined by the asyndetic coordinator with the property of times expressed by the marked clause.

As shown in the lexical entry in 56, I take the asyndetic coordinator to express a generalized version of logical conjunction (Rooth & Partee 1982). When it combines two properties of times, their conjunction is true of a time just in case each property is individually true of that time.

(56) The semantics of coordination

\[&] = \lambda f \lambda g \lambda t (f(t) \land g(t)) : \langle\langle i, t\rangle, \langle i, t\rangle\rangle\]

Since the marked clause expresses a property of (evaluation) times and the unmarked clause expresses a property of (reference) times, the resulting conjoined property will be true of a time in the context just in case the property expressed by each clause holds of it individually. The evaluation time of the marked clause is consequently identified with the reference time of the unmarked clause, thereby establishing a relation of either temporal simultaneity or sequence between the reference times of the marked and unmarked clauses.

To see this more formally, consider the following clause chain, repeated from 40b above, which contains the simultaneous suffix.

(57) Su=naatsi’i ti=kaadzi madabbui-winni-na, yaisi hubiadu-winni.

nom=boy refl=car fix-prog-sim ptc sing-prog

‘While the boy is fixing his car, he is singing.’ (elicitation, EM, BP50-1, 9:19)

The semantic derivation of 57 is given in Figure 1. The unmarked clause expresses a property of time intervals (\(\mathfrak{i}\)). Before \(\lambda\)-abstraction, the marked clause denotes a truth value (\(\mathfrak{t}\)). Once the evaluation time introduced by the simultaneous suffix is abstracted over, the marked clause also expresses a property of time intervals (\(\mathfrak{z}\)). The asyndetic coordinator combines the marked and unmarked clauses to yield a conjoined property of time intervals (\(\mathfrak{e}\)). Consequently, once the root clause rule has applied, the whole clause chain is true at a time \(t_2\) in the context just in case: (i) \(t_2\) is contained in another time \(t_1\) in the context that is itself contained in a nonfinal segment of the event of the boy fixing his car, and (ii) \(t_2\) is contained in a nonfinal segment of the event of the boy singing (\(\mathfrak{g}\)). In other words, the sentence in 57 is true just in case the two events overlap in time.

The semantic derivation for the following clause chain containing the sequential suffix, repeated from 48a, proceeds in the same way.

(58) Su=nana ti=kaadzi madabbui-hu-si, yaisi

nom=man refl=car fix-pfv-seq ptc

u=dzza-kana-ggi-hu.

3SG.ACC=IP.fingers-grab-appl-pfv

‘The man fixed his car, and then he started it.’ (elicitation, EM, BP50-1-s, 1)

I do not provide a complete semantic derivation for this sentence, but its final translation, after the root clause rule applies, is given in 59.

(59) \(\exists e (\text{fix(his-car)(the-man)}(e) \land \tau(e) \subseteq t_1) \land t_1 < t_2) \land \exists e' (\text{start(his-car)(the-man)}(e') \land \tau(e') \subseteq t_2) \quad [= 58]\)

In prose, the entire clause chain is true at a time \(t_2\) in the context just in case: (i) \(t_2\) is located after a time \(t_1\) in the context that contains the event of the man fixing his car, and (ii) \(t_2\) itself contains the event of the man starting his car. Consequently, the sentence in 58 is true just in case the event described by the marked clause temporally precedes the event described by the unmarked clause.

I have used semantic binding—specifically, abstraction over a variable introduced by the simultaneous or sequential suffix—to identify the evaluation time of the marked
The temporal interpretation of clause chaining in Northern Paiute.

Figure 1. The semantic derivation for the clause chain in 57.
clause with the reference time of the unmarked clause. This mechanism is parallel to the one that McKenzie (2012:218–28) uses to account for switch reference in Kiowa.

(60) Kiowa
John hēbā nau Sam ēm kūfau.
John 3SG.enter.PFV and.3SG Sam 3SG.REFL leave.PFV
‘John entered, and Sam left.’

McKenzie proposes that the coordinator in 60 introduces a λ-operator that binds a variable contributed by the switch-reference marker inside one coordinate. This creates a property that is combined with the property conveyed by the other coordinate. Finally, this conjoined property is predicated of an element in the context. This parallelism is striking, suggesting that similar mechanisms may be responsible for establishing the temporal relations in clause chaining and switch-reference marking. While Northern Paiute does not have switch-reference marking in clause chaining, many other languages do (Longacre 2007:399).

4.2. When the marked clause follows the unmarked clause. This semantics makes an interesting prediction about chains in which the marked clause linearly follows the unmarked clause. In Northern Paiute, this happens not infrequently with both the simultaneous (61a) and the sequential (61b) suffix.

(61) a. Yaisika=gwitua ti=ddzoti’a ddigwa’ni mani-kati, yaa
ptc acc=pail still refl=hat look.like do-sit.pfv there
paa’a-we kati-na.
water-LOC sit-SIM
‘He still has the pail on his head that looks like a hat, while sitting in the water.’

b. Yaisi yaa su=hibbi thidda mia-hu, umi-ma
ptc there nom=thing deer go-pfv 2/3PL.ACC-LOC
sie-hu-si.
get.scared-pfv-seq
‘The deer left, because it got scared of them.’

To account for this variation in the linear position of the marked clause, I propose that asyndetic coordination is structurally ambiguous in Northern Paiute. While the coordinator can form a constituent with the first coordinate, it forms a constituent with the second coordinate in 61a–b. This way, the simultaneous or sequential suffix can be bound in the second coordinate by a λ-operator.
While this kind of structural ambiguity does not seem common, Northern Paiute may not be alone. In Lavukaleve (Central Solomons: Russell Islands), ‘pauses before coordinators are roughly equal in frequency to pauses after the coordinator’ (Terrill 2004: 430). If these pauses correspond to constituency boundaries, then in this language, too, the coordinator can be parsed with either the first or the second coordinate.

Let me briefly consider an alternative. In many languages, a coordinate can be extraposed to the end of the sentence, along with the coordinator (Haspelmath 2004:7f.). If the marked clause in 61a–b was extraposed, it should be an island for extraction. But wh-movement in an across-the-board fashion is possible even when the marked clause follows the unmarked clause.

(63) Himma, su=naatsi’i t1 tika, yaisi su=mogo’ni=bino’o t1 tika-na?
what NOM=boy eat.IPfv PTC NOM=woman=PTC eat-SIM
‘What, while the woman eats it, does the boy eat, too?’
(cf. ‘What, does the boy eat t1, and the woman eat t1, too?’)
( elicitation, EM, BP50-4, 29:14)

With the structure in 62, across-the-board movement is correctly predicted to be possible, since no coordinate has been extraposed.

In addition, if asyndetic coordination in Northern Paiute is structurally ambiguous, we can neatly capture the fact that many languages, including Amele (Trans-New Guinea: New Guinea), do not allow the marked clause to follow the unmarked clause.

(64) Amele
a. Ho busale-ce-b dana age qo-ig-a.
   pig run.out-SEQ.DS-3SG man 3PL hit-3PL-TPAST
   ‘The pig ran out, and the men killed it.’ (Roberts 1988:53)

b. *Dana age qo-ig-a ho busale-ce-b.
   man 3PL hit-3PL-TPAST pig run.out-SEQ.DS-3SG (Roberts 1988:56)

Clause chaining in Amele has a coordination structure (Roberts 1988:53–58). If the language only allows the coordinator to form a constituent with the first coordinate, then the marked clause should only be able to linearly precede the unmarked clause. Besides Northern Paiute, I know of only one other language that allows the marked clause to have a variable order: Mbyá Guarani (Tupí: Brazil; Dooley 2010:93f.). The relative rarity of clause chaining with this property could derive from the relative rarity of coordination structures that are structurally ambiguous.

The semantics that I have proposed assigns the same temporal interpretation to a clause chain whether the marked clause precedes or follows the unmarked clause. The temporal relation between the evaluation time of the marked clause and the reference time of the unmarked clause does not depend in any way on linear order. Indeed, in 61a, the marked clause containing the simultaneous suffix is interpreted as temporally overlapping the unmarked clause. More strikingly, when the marked clause contains the sequential suffix, it still temporally precedes the unmarked clause. In 61b, the event of the deer getting scared (by the boy and dog) precedes the event of it leaving.

Without going through a complete semantic derivation, the clause chain in 61b has the following final translation, after the root clause rule applies.

(65) \exists e (go(the-deer)(e) \land \tau(e) \subseteq t_1) \land (\exists e' (get-scared(the-deer)(e') \land \tau(e') \subseteq t_2) \land t_2 < t_1) \quad \text{[= 61b]}

Even though the marked clause follows the unmarked clause in linear order, the entire sentence is true at a time \( t_1 \) provided by the context just in case: (i) \( t_1 \) contains the event of the deer leaving, and (ii) \( t_1 \) follows a time \( t_2 \) in the context that contains the event of the deer getting scared. That is, it is true just in case the event of the deer getting scared precedes the event of the deer leaving.
This temporal relation between the marked and unmarked clauses is entailed. Clause chains are judged as true only when the event described by a marked clause bearing the sequential suffix precedes the event described by the unmarked clause in time, regardless of whether the marked clause precedes (66a) or follows (66b) in linear order. (Speakers were asked to provide truth-value judgments for the sentences below with respect to the same context as in 47 above.)

(66) [Context: While the boy is asleep, the frog escapes. After the boy wakes up, he notices the frog is gone.]

      NOM=frog hide-go-PFV-SEQ PTC NOM=boy wake.up-PFV  
      ‘After the frog escaped, the boy woke up.’ (elicitation, EM, BP38-2, 17:47)  
   b. Su=naatsi’i tibuni-hu, su=tiitsi’-yu pa’mogo wadzi-mia-hu-si.  
      NOM=boy wake.up-PFV NOM=little-NOM frog hide-go-PFV-SEQ  
      ‘After the little frog escaped, the boy woke up.’ (elicitation, EM, BP42-7-s, 8)  
   c. #Su=naatsi’i tibuni-hu-si, su=pa’mogo wadzi-mia-hu.  
      NOM=boy wake.up-PFV-SEQ NOM=frog hide-go-PFV  
      intended: ‘After the frog escaped, the boy woke up.’ (elicitation, EM and MS, BP38-2, 19:16)  
      [MS: ‘No, that would be after he woke up, but this is when he went to sleep.’]  
   d. #Su=pa’mogo wadzi-mia-hu, su=tiitsi’-yu naatsi’i tibuni-hu-si.  
      NOM=frog hide-go-PFV NOM=little-NOM boy wake.up-PFV-SEQ  
      intended: ‘After the frog escaped, the little boy woke up.’ (elicitation, EM and MS, BP43-4, 22:39)  
      [EM: ‘If he was awake and the frog left, then you could say that.’]  

When the marked clause instead describes the event of the boy waking up—which in the context provided temporally follows the event of the frog escaping—speakers accordingly judged the clause chain as false (66c–d).

4.3. WHEN THERE ARE MULTIPLE MARKED CLAUSES. When there is more than one marked clause with the sequential suffix, speakers often report that they are temporally related not just to the unmarked clause, but also to one another.

(67) a. Nimmi puggu tinoo-ggi-si, u=hibi-ggi-si,  
      1PL.EXCL.NOM horse pack-APPL-SEQ 3SG.ACC=drink-APPL-SEQ  
      mia-hu. go-PFV  
      ‘We packed up the horses, and then we watered them, and then we left.’ (elicitation, EM and MS, BP44-2, 14:20)  
      [MT: ‘What happened first? … ’ EM: ‘Pack the horses. Then you gave them water, and then you left.’]  
   b. Nimmi puggu hibi-ggi-si, u=ddinoo-ggi-si,  
      1PL.EXCL.NOM horse drink-APPL-SEQ 3SG.ACC=pack-APPL-SEQ  
      mia-hu. go-PFV  
      ‘We watered the horses, and then we packed them up, and then we left.’ (elicitation, EM and MS, BP44-2, 16:12)  
      [EM: ‘You fed them first, and then you pack it, and then you … ’]  

In 67a, the event of packing the horses is interpreted as temporally preceding the event of watering them. When the linear order of the two marked clauses is reversed, as in 67b, the temporal relation between them is also reversed.
But with the semantics for clause chaining in Northern Paiute I have proposed, the sentences in 67a and 67b have the same semantic content. To see this, consider their structures in 68a and 68b, respectively.¹¹ These are identical except for the order of the two marked clauses.

In both structures, each marked clause is only related temporally to the unmarked clause. Thus, despite their different forms, the sentences in 67a and 67b, which have the final translations in 69a and 69b, are logically equivalent.

¹¹ There is no other structure for these sentences that allows the evaluation time of both marked clauses to be bound and all three clauses to be combined by asyndetic coordination. Consider, for instance, an alternative structure in which the two marked clauses are first coordinated, and then this coordination structure combines with the unmarked clause: \([TP [\&P [TP [\&P [TP VP-si]] [TP VP-si]]] [TP VP]]\). While the evaluation time in both marked clauses is bound, they will not be able to compose semantically because of a type mismatch. The \&P containing the first marked clause expresses a property of times, while the TP containing the second marked clause denotes a truth value.
Both sentences are true at a time in the context just in case: (i) that time contains the event described by the unmarked clause, and (ii) for each marked clause, that time follows a time that contains the event described by the marked clause. The marked clauses are not related temporally to each another in any way, and so their linear order does not matter.

Setting aside for the moment speakers’ comments about the sentences in 67a–b, this relatively weak semantics is necessary to account for clause chains in which two marked clauses with the sequential suffix overlap in their temporal interpretation.

(70) a. O’o-no yaisi una-tu kwaya mia-si, sogo-mia-si, una-u
    DEM-with PTC DEM-LOC far go-SEQ on.foot go-SEQ DEM.ACC-EMPH
    yaisi uuni-kwai piti-ga na-tihona-di-kwai.
    PTC that.kind-LOC arrive-MOT PASS-dig.roots-NMLZ-LOC

    ‘So then it was that they went far off, going on foot, and arrived there at the root digging place.’
    (narrative, Thornes 2003:486)

b. Yaa hibbi-ggwe-tu paba tiipi hani-si,
    there place-LOC-LOC big earth do-SEQ
    o=wi-taaggi-si, yaisi oi-tu painitsi oi-tu
    3sg.ACC=IP.long-make hole-SEQ PTC there-LOC pinenuts there-LOC
    wokwati-kwi.
    dump-IRR

    ‘At that place, after we dig a lot of dirt and we make a big hole in the ground, then we will dump the pinenuts in there.’
    (elicitation, EM, BP13-4-9, 5)

In 70a, the event of leaving on foot described by the second marked clause overlaps with the event of leaving described by the first marked clause, adding more detail about how that event took place. Similarly, in 70b, the marked clauses do not form a temporal sequence: the second simply contributes additional information about the event described by the first.

The same fact can be shown more directly as well. Speakers judge clause chains like the one in 71a as true, even when the events described by the two marked clauses overlap temporally.

(71) [Context: The boy and girl are at home. Instead of studying, he is playing and she is dancing at the same time. They both stop before their mother comes home.]

a. Su=naatsi’i ti’atia-hu-si, su=tsia’a niga-hu-si, su=mogo’ni
    NOM=boy play-PFV-SEQ NOM=girl dance-PFV-SEQ NOM=woman
    nobi-ggwe iga-hu.
    house-LOC enter-PFV

    ‘After the boy played and the girl danced, the woman came home.’
    (elicitation, EM, BP53-3, 51:12)

    [EM: ‘They probably doing that when the lady was not there … at the same time. Then she came in after they were through.’]

b. Su=tsia’a niga-hu-si, su=naatsi’i ti’atia-hu-si, su=mogo’ni
    NOM=girl dance-PFV-SEQ NOM=boy play-PFV-SEQ NOM=woman
    nobi-ggwe iga-hu.
    house-LOC enter-PFV

    ‘After the girl danced and the boy played, the woman came home.’
    (elicitation, EM, BP53-3, 54:00)

    [EM: ‘They mean the same thing.’]
Importantly, the linear order of the marked clauses does not matter. Speakers judged the clause chain in 71b as true in the same context, since it has the same semantic content as 71a.

The semantics I have proposed for clause chaining in Northern Paiute only establishes a temporal relation between each marked clause and the unmarked clause. This correctly predicts that when there is more than one marked clause containing the sequential suffix, they can overlap temporally, though they must both temporally precede the unmarked clause. There must be more to the meaning of clause chaining in Northern Paiute, since speakers describe additional temporal relations between the marked clauses. In the next section, I argue that these do not arise from the semantics of clause chaining, but from the way that clause chains are interpreted in discourse.

Before moving on, I would like to mention another prediction. In Northern Paiute, clause chains can contain any number and combination of marked clauses. When a marked clause with the simultaneous suffix is interleaved between two marked clauses with the sequential suffix, the chain should only convey that the second marked clause temporally overlaps the unmarked clause. It should not have to temporally overlap either of the other marked clauses. This prediction is unfortunately very difficult to test. The simultaneous suffix selects for the progressive aspect, which conversational participants usually assume describes an event that begins and ends well before and after the time it is asserted of, like a stative predicate (Dowty 1986:48–52). Even if the semantics of clause chaining does not require it, the second marked clause in this chain will likely be interpreted as temporally overlapping the adjacent clauses.

5. Interpreting clause chains in discourse. The semantics of clause chaining in Northern Paiute only establishes a temporal relation between each marked clause and the unmarked clause. Their linear position does not matter for the entailments of the sentence. When there are multiple marked clauses, their linear order also does not matter. Nonetheless, speakers describe additional temporal relations between marked clauses. In each sentence in 72a–b, repeated from 67a–b above, the second marked clause is interpreted as taking place immediately after the first marked clause.

(72) a. Nimmi puggu tinoo-ggi-si, u=hibi-ggi-si,
1PL.EXCL.NOM horse pack-APPL-SEQ 3SG.ACC=drink-APPL-SEQ
mia-hu.
go-PFV
‘We packed up the horses, and then we watered them, and then we left.’ (elicitation, EM, BP44-2, 14:20)
[MT: ‘What happened first? … ’ EM: ‘Pack the horses. Then you gave them water, and then you left.’]

b. Nimmi puggu hibi-ggi-si, u=ddinoo-ggi-si,
1PL.EXCL.NOM horse drink-APPL-SEQ 3SG.ACC=pack-APPL-SEQ
mia-hu.
go-PFV
‘We watered the horses, and then we packed them up, and then we left.’ (elicitation, EM, BP44-2, 16:12)
[EM: ‘You fed them first, and then you pack it, and then you … ’]

Moreover, the unmarked clause is related temporally to the preceding clause in a way that goes beyond its semantics. The event described by the unmarked clause does not just follow the event described by the second marked clause—it takes place immediately after it. These additional temporal relations, which mirror the linear order of
the clauses in the chain, recall the temporal interpretation that sentences receive in narrative discourse.

When a sequence of sentences is understood as a narrative, it is often interpreted as ‘forward moving’ (Kamp & Rohrer 1983, among others). The sentences in 73, which contain telic predicates (achievements or accomplishments) in the perfective aspect, are interpreted as taking place in close temporal succession.

(73) Jameson entered the room. He shut the door. He switched off the light.

Jameson’s switching off the light is interpreted as taking place immediately after his shutting the door, which is itself interpreted as taking place immediately after his entering the room. In Northern Paiute, a sequence of sentences can receive the same forward-moving interpretation.

1pl.excl.acc=horse pack-appl-pfv 3sg.acc=drink-appl-pfv go-pfv
‘We packed the horse. We watered it. We left.’

I propose that the additional temporal relations in the clause chains in 72a–b are produced by the same pragmatic enrichment that produces a forward-moving interpretation for a sequence of independent sentences in narrative discourse.

The question of why some discourses are interpreted as forward-moving narratives, and why some are not, is a complicated one. In §5.1, I simply state some generalizations about how sentences are temporally related to the preceding discourse. For narrative progression to contribute to the temporal interpretation of clause chaining, every clause in a chain must be able to participate. In §5.2, I show that marked clauses are indeed temporally related to the preceding discourse according to the generalizations for narrative progression. Finally, in §5.3, I show that the unmarked clause also obeys these generalizations.

5.1. The role of aspect in narrative progression. Aspect plays a crucial role in narrative progression (Kamp & Rohrer 1983, Partee 1984, Hinrichs 1986). The forward-moving sequence of sentences in 74 is entirely in the perfective aspect. The imperfective aspect does not advance the narrative in the same way. For instance, the second sentence in 75, which is in the progressive aspect, describes the event of the thief fumbling in his bag and is interpreted as temporally overlapping the event of Josephine’s turning around described by the first sentence. Consequently, the third sentence, which describes the event of Josephine firing her gun, is interpreted as taking place immediately after the first sentence.

(75) Josephine turned around. The thief was fumbling in his bag. She fired her gun.

In Northern Paiute, the imperfective aspect similarly does not advance the narrative. In 76, the second sentence, containing the progressive suffix, describes an event of playing that overlaps with the event described by the first sentence. Importantly, as the speaker’s comments indicate, the third sentence is interpreted as taking place immediately after the first sentence.

(76) Su=mogo’ni nobi-ggwe iga-hu. Su=naatsi’i ti’atia-winni. Su=mogo’ni
nom=woman house-loc enter-pfv nom=boy play-prog nom=woman
u=haa-hu.
3sg.acc=scold-pfv
‘The woman came into the house. The boy was playing. The woman scolded him.’
There is one difference in how narrative progression works in the two languages. In English, atelic predicates in the perfective aspect exhibit the same behavior as predicates in the progressive aspect. In Northern Paiute, however, they pattern like telic predicates. In 77, the event of the woman scolding the boy described by the third sentence takes place immediately after the event of the boy playing described by the second sentence.

(77) Su=mogo’ni nobi-ggwe iga-hu. Su=naatsi’iti’atia-hu. Su=mogo’ni
nom=woman house-LOC enter-PFV nom=boy play-PFV nom=woman
u=haa-hu.
3sg.acc=scold-PFV
‘The woman came into the house. The boy finished playing. The woman
scolded him.’ (elicitation, EM, BP53-3, 25:35)

[EM: ‘She bawled him out when he quit playing, I guess.’]

These generalizations about narrative progression in Northern Paiute can be stated precisely in terms of how a sentence is interpreted temporally with respect to the preceding discourse.

(78) Narrative progression in Northern Paiute: For a clause S and for the closest linearly preceding clause in the perfective aspect S’,
(i) if S is in the perfective aspect, S is interpreted as temporally immediately following S’, and
(ii) if S is in the imperfective aspect, S is interpreted as temporally overlapping S’.

Since only perfective sentences advance the narrative, each sentence is interpreted relative to the closest linearly preceding perfective sentence. Thus, when a sentence is in the perfective aspect, it is interpreted as taking place immediately after the closest preceding perfective sentence (e.g. 74 and 77). When a sentence is in the imperfective aspect, it is interpreted as temporally overlapping the closest preceding perfective sentence (e.g. the second sentence in 76).

I do not attempt here to provide a theory of narrative progression. At first glance, it might plausibly arise as a conversational implicature from Grice’s (1975:46) fourth maxim of manner (‘Be orderly’). The hearer infers a forward-moving interpretation for narrative discourse because she assumes that the speaker is obeying the maxim and describing a sequence of events iconically. While seemingly reasonable, there have been no attempts, to my knowledge, to develop a comprehensive theory of narrative progression in a Gricean framework. To be successful, it would have to address how the maxim of manner can make reference to the relevant aspectual distinctions.

There is a substantial line of inquiry on narrative progression within discourse representation theory (DRT; Partee 1984, Kamp & Reyle 1993:521–55, Muskens 1995, Kamp et al. 2011:196–249, Altshuler 2012). Every sentence is interpreted relative to a dynamically updated time interval, with the specific temporal relation depending on aspect. While this relatively simple algorithm can account for narrative progression, there are many nonnarrative discourses that are not interpreted as forward moving. One way of dealing with this challenge might be to incorporate information about world knowledge and/or rhetorical relations (Hobbs 1979, Moens & Steedman 1988, Hobbs et al. 1993, Kehler 2002, Asher & Lascarides 2003). For our purposes, the empirical generalizations above about narrative progression are good enough.

5.2. The marked clause’s relation to the preceding discourse. If narrative progression is responsible for the enriched temporal interpretation of clause chaining,
marked clauses must be related to the preceding discourse in the way described by the generalizations in 78. While independent sentences participate in narrative progression, not all clauses do. In English, for instance, temporal adjunct clauses are not related temporally to the preceding discourse (Partee 1984:257–65, Hinrichs 1986:73–77).

(79) a. Mary turned the corner. While the cars were stopped, she crossed the street.
   b. Mary turned the corner. After John saw her, she crossed the street.

The state of the cars being stopped described by the temporal adjunct clause in 79a does not overlap with, or even immediately follow, the event of Mary turning the corner. Similarly, in 79b, John’s seeing Mary does not have to immediately follow her turning the corner. In both cases, the temporal adjunct clause is interpreted at some subsequent time.

In clause chaining in Northern Paiute, however, the marked clause is temporally related to the preceding discourse in narratives. A marked clause containing the simultaneous suffix, which always selects for imperfective aspect, temporally overlaps the closest preceding perfective clause.

(80) … yaisi su=naatsi'i ti=ddogga-tsi-no ka=pa'mogo yaa-hu. Yaa
   PTC NOM=boy REFL=dog-DIM-with ACC=frog miss-PFV DEM
   na-ggwatima-ggwe-tu kado’o. Moko=sabbi yaa yakwi-gwaddi. Yaisi
   PASS-lock-LOC-LOC nothing=PTC DEM sit.DU.IPFV-DU PTC
   kado’o. Mia-ći amamu’a. Yaisi sida niimma-gwaddi-na, yaa
   nothing go-PRF morning PTC bad feel-DU-SIM DEM
   ti=habinnu-ggwe o=bbuni-ddakwi-gwaddi. REFL=bed-LOC 3SG.ACC=see-sit.DU-DU
   ‘ … the little boy and his dog realized the frog was missing. The place
   where he was locked up was empty. Only the shoes were sitting there.
   There was nothing. It had left in the morning. They were feeling bad,
   sitting there in their bed looking at it.’

In this narrative, which recounts some of the events depicted in Mercer Mayer’s Frog, where are you?, the marked clause describes the state of the boy and his dog feeling bad, which overlaps with the event of their realizing that the frog is missing.

Partee (1984:262) provides an easy way to test whether a sentence is temporally related to the preceding discourse. She observes that the discourse in 81a is ill-formed because the second sentence is interpreted as temporally overlapping the first sentence, even though the state of the room being empty cannot hold at the same time people begin to leave. By contrast, the parallel discourse in 81b is felicitous, because the state of the room being empty is described by a temporal adjunct clause, which is not related temporally to the preceding sentence.

(81) a. #People began to leave. The room was empty. The janitors came in.
   b. People began to leave. When the room was empty, the janitors came in.
   (Partee 1984:262)

This test confirms that marked clauses are temporally related to the preceding discourse. The discourse in 82a is infelicitous because the state of the wood being gone cannot hold at the time that the fire is being made, only at a later time when the fire has burned down to just embers.

(82) a. #Nīi pida-hu. Su=kuna kado’o.
   1SG.NOM make.fire-PFV NOM=wood nothing
   intended: ‘I made a fire. There was no wood.’
   (elicitation, EM and MS, BP44-2, 1:27:50)
b. #Nii pida-hu. Su=kuna kado’o-na, nii ka=kutsu
1SG.NOM make.fire-PVF NOM=wood nothing-SIM 1SG.NOM ACC=meat
tinoho.
roast.PVF
intended: ‘I made a fire. When there was no wood, I was roasting the
meat.’

[EM: ‘Yeah, but how are you gonna be making fire when you got no
wood?’] 

[MS: ‘How did you start the fire if you didn’t have no wood?’]

The parallel clause chain in 82b is also ill-formed. The marked clause is interpreted as
temporally overlapping the preceding sentence, but the wood cannot be gone at the
same time the fire is made.

When a marked clause contains the sequential suffix, it can be interpreted as imme-
diately temporally following the closest preceding perfective clause in narratives. This
happens, in accordance with the generalizations in 78, when the marked clause is in the
perfective aspect.

(83) … yaisi tiwao ka=tì=pìa ti-patsa-kwai-tu mimia-u, ka=kutsu.
PTC also ACC=REFL=friend NSP-kill-LOC-LOC go.DU-PVF ACC=cow
U-ba yaisi pipiti-u-gaa-si, yaisi usu tiwao idza
3SG-LOC PTC arrive.PL-PVF-MOT-SEQ PTC DEM.NOM also coyote
piì owi manai-čaa.
self DEM do-MOT
‘ … and also went to where their friend was killed, the cow. Having ar-
rived beside it, that Coyote, he went and took over.’

(narrative, Thornes 2003:481)

The marked clause describes the event of Coyote and the Porcupine arriving at where
the Cow was killed, which takes place immediately after their leaving.

Partee’s test can again be used to confirm this. The discourse in 84a was judged infe-
lictious in the same context as in 47 above, where the boy does not miss the frog imme-
diately when it escapes, only later after he wakes up.

(84) [Context: While the boy is asleep, the frog escapes. After the boy wakes up,
he notices the frog is gone.]

a. #Su=pa’mogo wadzi-mia-huka. Su=naatsi’i o=yaah-hu.
NOM=frog hide-go-INCEP NOM=boy 3SG.ACC=miss-PVF
intended: ‘The frog started to escape. The boy missed his frog.’

[EM: ‘Tibunihusi, yaisi o=yaahu [‘He wakes up and then he misses
him’].’]

[elicitation, EM and MS, BP43-6, 4:00]

b. #Su=pa’mogo wadzi-mia-huka. Su=tiitsi-yu naatsi’i
NOM=frog hide-go-INCEP NOM=little-NOM boy
o=yaah-hu-sì, sita-hu.
3SG.ACC=miss-PVF-SEQ get.angry-PVF
intended: ‘The frog started to escape. The little boy missed his frog,
and then he got angry.’

[EM: ‘Well I think he was sleep, you know, when the frog left, yeah.
Then, when he woke up, well he missed him and he got mad.’]

The parallel clause chain in 84b is also bad, because the marked clause is interpreted as
taking place immediately after the preceding sentence.

I conclude, then, that the marked clauses in a chain are temporally related to the pre-
ceding discourse according to the generalizations in 78. A marked clause with the si-
multaneous suffix is interpreted as temporally overlapping the closest preceding perfective clause. A marked clause with the sequential suffix is interpreted as taking place immediately after the closest preceding perfective clause when it is in the perfective aspect. When a clause chain contains more than one marked clause, as in 72a–b, they are each temporally related to the preceding discourse. Since the closest preceding perfective clause can be another marked clause, the marked clauses in a chain can have the forward-moving interpretation that is characteristic of narrative discourse.

5.3. The unmarked clause’s relation to the preceding discourse. The unmarked clause in a chain is also temporally related to the preceding discourse in narratives. In 72a–b, for instance, the unmarked clause is interpreted as taking place immediately after the second marked clause. This is confirmed by Partee’s test: the clause chain in 85 is infelicitous in the same context as in 47 above, because the event described by the unmarked clause does not occur immediately after the event described by the marked clause (cf. 84a–b).

(85) [Context: While the boy is asleep, the frog escapes. After the boy wakes up, he notices the frog is gone.]  
#Su=tîtisi'-yu pa’mogo wadzi-mia-huka-si, su=naatsi’i
  NOM=little-NOM frog hide-go-INEPF SEQ NOM=boy
  o=yaa-hu.
  3SG.ACC=miss-PFV
‘The little frog started to escape, and then the boy missed him.’

[MS: ‘Issaya’ e [‘Lying’] … he missed him when he woke up.’]  

This is a stronger meaning than the semantics of clause chaining alone provides. The sequential suffix only conveys that the unmarked clause takes place sometime after the marked clause.

If the unmarked clause participates in narrative progression when it occurs last in a clause chain, it should also do so when it precedes the marked clause. This is indeed the case.

(86) Su=naatsi’i=bino’o ka=ti=ddoogga haa-na, kuyaa
  NOM=boy=PTC ACC=REFL=dog scold-SIM far
  o=ddaya-ggwine-hu tabbu’a. Yaisi ka=ggwitua tggwisu
  3SG.ACC=send-MOT-PFV appear PTC ACC=pail still
  ti=tisoli’a ddiggwa’ni mani-kati, yaa paa’a-we kati-na.
  REFL=hat look.like do-sit.PFV there WATER-LOC sit-SIM
‘The boy is scolding his dog, and it looks like he sends him away. He still has the pail on his head that looks like a hat, while sitting in the water.’

(prompted narrative, MS, BP24-1-t3, 41–42)

(87) Su=ddoogga=bino’o yaa ika tibbi-ma yaa-na’ona-ba-ti
  NOM=dog=PTC DEM.ACC rock-LOC there LOC-LOC-LOC
  mia-hu. Yaisi yaa su=hibbi tihidda mia-hu, unmi-ma
  go-PFV PTC there NOM=deer go-PFV 2/3PL.ACC-LOC
  sie-hu-si.
  get.scared-PFV-SEQ
‘The dog went around the rock. The deer left because it got scared of them.’

(prompted narrative, EM, BP25-2-t1, 92–95)

In 86, repeated from 61a above, the state described by the unmarked clause of the boy continuing to have a bucket on his head overlaps with the event of the boy sending the dog away. Similarly, in 87, the deer’s leaving is interpreted as taking place immediately after the dog’s going around the rock.
Just like a marked clause, then, the unmarked clause in a chain is temporally related to the preceding discourse in narratives. When the marked clause contains the sequential suffix, the unmarked clause can be interpreted as taking place immediately after it, an interpretation that is stronger than what is provided by the semantics of the suffix alone. In addition, when the unmarked clause occurs first in a chain, it is interpreted as either temporally overlapping or immediately following the closest preceding perfective clause. This gives rise to a forward-moving interpretation in narratives across all the clauses in a chain.

**6. Conclusion and future prospects.** The temporal interpretation of clause chaining in Northern Paiute has two components of meaning. First, there is verbal morphology dedicated to conveying relative tense—the simultaneous and sequential suffixes—which establishes a temporal relation between each marked clause in a chain and the unmarked clause. This component is insensitive to linear order and is derived through semantic binding inside the marked clause. The semantics of clause chaining is enriched pragmatically in narrative discourse. This second meaning component is sensitive to linear order, giving rise to a forward-moving temporal interpretation across the clauses in a chain.

We probably cannot, as Foley (2010:48) suggests, ‘assume that clause chaining always corresponds to the same types of structures across languages’. While clause chaining in Northern Paiute has a coordination structure, it likely has a subordination structure in Choctaw and several other North American languages (Finer 1985, Broadwell 1997, 2006). Nonetheless, the surface form of clause chaining is strikingly similar across a number of genetically unrelated and geographically isolated languages. As Longacre (2007:398–417) observes, many languages indicate formally on the marked clause whether it temporally overlaps or precedes the unmarked clause. By treating markers of temporal simultaneity and sequence as dedicated relative tenses, it may be possible to derive this crosslinguistically uniform property of clause chaining, while still leaving room for variation in its syntax.

In Northern Paiute, a relative tense can establish a temporal relation between the clauses in a coordination structure because the coordinator introduces an operator that semantically binds it. If a subordinator had the same property, clause chaining could instead have a subordination structure.
Abstracting over the relative tense inside the subordinate (marked) clause produces a property of times that can combine with the main (unmarked) clause through set intersection (or predicate modification; Heim & Kratzer 1998:65), as long as it is adjoined low enough to combine with another property of times. This is much like the semantic composition of a temporal adjunct clause (see, for instance, von Stechow & Grønn 2013:314).

There is one property of clause chaining that I have for the most part ignored. In many languages, though not in Northern Paiute, clause chaining marks switch reference (Longacre 2007:399), just as coordination and subordination structures do. To account for switch-reference marking in coordination structures, McKenzie (2012) proposes a compositional semantics that parallels the one that I have proposed for clause chaining. This suggests that there may be a more general compositional mechanism operating at clause junctures, which lies behind both the binding of relative tense and switch-reference markers. With further investigation, I hope that a more comprehensive theory of clause chaining will emerge, embedded within a more general understanding of clause combination.

APPENDIX: ON DEVERBAL NOMINALIZATION

There are three arguments that the simultaneous suffix is distinct from a homophonous deverbal nominalizer, whose syntax and semantics I have discussed elsewhere (Toosarvandani 2011, 2014b).

First, the subject of a nominalization created by -na must be realized overtly. A weather verb, such as tiig-gwa ‘snow’, normally takes no subject at all (A1). But in the corresponding nominalization, an expletive—the fourth-person clitic—is obligatory (A2a).

(A1) Tiiggwa-winni.
   snow-PROG
   ‘It’s snowing.’ (elicitation, MS, BP32-4-s, 13)

(A2) a. Nii *(a=)ddiiggwa-winni-na punni.
   1SG.NOM 4GEN+snow-PROG-NMLZ see.IPfv
   ‘I see it snowing.’ (elicitation, EM, BP37-3, 1:14:26)

b. Tiiggwa-na, nii kai pisa ka=poo punni.
   snow-SIM 1SG.NOM NEG good ACC=road see.IPfv
   ‘When it is snowing, I don’t see the road well.’ (elicitation, MS, BP32-4-s, 1)

By contrast, the subject of the marked clause in a clause chain need not be overt (A2b).

Second, the subject of the nominalization bears the genitive case, as in A2a, never the nominative case (A3a).

(A3) a. *Nii saa-na ne-hu.
   1SG.NOM cook-NMLZ burn-IPfv
   intended: ‘What I was cooking burned.’ (elicitation, EM, BP43-2, 11:14)

b. Nii hak-i’-na, nabagi’a.
   1SG.NOM hiccough-SIM bathe.IPfv
   ‘While I was hiccoughing, I swam.’ (elicitation, MS, BP31-5-s, 5)

The subject of the marked clause can, however, bear nominative case (A3b).

Third, as I discuss in §3.2, the simultaneous suffix imposes a number of restrictions on the Aktionsart of the verb. For instance, it is impossible with achievements (A4a), and it forces an iterative interpretation with semelfactives (A4b).

   NOM=man go-SIM sing.IPfv
   intended: ‘When the man was leaving, he was singing.’ (elicitation, EM, BP48-5, 21:08)

b. Su=naatsi’i huni-na, nabagi’a.
   NOM=boy fart-SIM bathe.IPfv
   ‘While the boy is farting, he is taking a bath.’ (elicitation, EM and MS, BP49-5, 1:36:37) [MS: ‘Probably make couple bubbles.’ … MT: ‘Could it have been more than once?’ MS: ‘Yeah, it can be more than one.’ EM: ‘Yeah.’]
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A. Su=mogo’ni i=mia-na punni-’yu.
   nom=woman 1sg.gen=go-sim see.ipfv -ipfv
   ‘The woman sees me leaving.’ (elicitation, EM, BP49-3-s, 4)

B. Su=mogo’ni i=hun ɨ-na naka.
   nom=woman 1sg.gen=fart-nmlz hear
   ‘The woman heard me fart.’ (elicitation, EM, BP48-6, 42:33)

[EM: ‘That’s just once.’]

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University of California, Santa Cruz
Stevenson Academic Services 1156 High Street Santa Cruz, CA 95064 [mtoosarv@ucsc.edu] [Received 15 August 2014; revision invited 13 April 2015; revision received 24 July 2015; accepted 7 January 2016]