Noname manuscript No.
(will be inserted by the editor)

Tonal marking of absolutive case in Samoan

AUTHOR

Received: date / Accepted: date

Abstract Samoan is an ergative-marking, non-tonal Polynesian language in which ergative case is marked segmentally, but absolutive case has been said to be unmarked. This paper shows that in fact, absolutive case is marked by a high edge tone realized at the right edge of the word preceding the absolutive argument. The presence and exponence of the edge tone case head is puzzling since Samoan is non-tonal, and since the location of the case head on the word preceding the absolutive argument can be seen as introducing a syntax-phonology boundary paradox. Nevertheless, it is shown that an absolutive edge tone is supported by converging evidence from the phonetic and phonological analysis of intonational patterns in the spoken utterances of a systematically varied set of syntactic structures. On the basis of this evidence, it is also argued that inflectional morphology must be the source of the absolutive high tone, and not phonological phrasing, syntactic constituency, nor information structural properties. The paper closes by introducing preliminary evidence suggesting that the puzzle of the absolutive high may be readily understandable, when deconstructed as the result of a constellation of commmon linguistic patterns and processes.

Keywords Samoan; prosody; intonation; syntax-phonology interface; Austronesian; Polynesian; tone; phonetics; case; morphology; ergativity

> "...when you have eliminated the impossible, whatever remains, however improbable, must be the truth..."
>
> — Sir Arthur Conan Doyle, The Sign of the Four

F. Author
first address
Tel.: +123-45-678910
Fax: +123-45-678910
E-mail: fauthor@example.com

1 Introduction

Tones have been attributed to many sources. Some might come from the lexical representation of morphemes, like in ma˥ 'mother' vs. ma˧˩ 'horse' in Mandarin, or lexical accent assignment in Serbo-Croatian or Tokyo Japanese. Some might come from inflectional morphology, spelling out case, gender, number, person, and tense-aspect morphemes, e.g. Maasai: èlʊ̀kʊ̀nyá 'head.NOM' vs. èlʊ́kʊ́nyá 'head.ACC' (Hyman 2011). Some tones might have their source in pragmatics, like the superhigh utterance-final tone in English that indicates a polar interrogative (Pierrehumbert and Hirschberg 1990), the low-high rise focus morpheme in dialects of Swedish (Bruce 1977; Riad 2006), or the (rise-fall)-rise contour in English indicating contrastive topic (Jackendoff 1972, Büring 2003, Constant 2014, i.a.). Syntactic structure might also be a source of tones. For example, Odden (1987, p. 21) claims that a H tone is inserted between daughters of a maximal projection in Kimatuumbi. And some theories of syntax-prosody mapping posit an isomorphism between syntactic and prosodic constituents that can place tones at constituent edges (Selkirk 1986; Nespor and Vogel 1986; Hayes 1989; Steedman 1991; Wagner 2010; Selkirk 2011). Even truth-conditional semantics might be a source of tones: in Catalan, information-seeking polar interrogatives have a higher high leading tone than confirmation-seeking ones (del Mar Vanrell et al. 2013). Finally, some tones might be introduced in the phonological grammar (Selkirk 2003), such as the rising pitch accent associated with predictable primary stress in Egyptian Arabic (Hellmuth 2009, 2006), the low-high rise at the end of each accentual phrase in Korean (Jun 1998, 2000) or the low-high pitch contour over Calcutta and Bangladeshi Bengali accentual phrases (Hayes and Lahiri 1991; Khan 2008, 2014).

This paper argues that the ergative-marking Austronesian language Samoan has a high edge tone that occurs on the last mora of the word preceding an absolutive argument, and that the source of this tone is inflectional morphology and not lexical representations, pragmatics, syntactic constituency, semantics, or phonology. In short, the claim is that Samoan has an absolutive high edge tone case morpheme.

This claim is surprising for two reasons. First, Samoan isn't a tone language. Pitch patterns in Samoan have never been described as either distinguishing word meaning or morphosyntactic relations, other than the contrast in force between declaratives and interrogatives (e.g. Mosel and Hovdhaugen (1992, p. 40–43)). In fact, only 15/1236 (1.2%) of Austronesian languages are reported to have lexical tone (Remijsen 2001, p. 474). A number of these lexical tonal languages are in contact with non-Austronesian languages, and none of them are in the Polynesian family like Samoan. No Austronesian languages, to my knowledge, have been described as having pitch patterns that signal a particular morphosyntactic relationship such as tense, number, or case. Second, if the absolutive case head is indeed a edge tone, then that raises the possibility that an absolutive argument induces a prosodic boundary. Why should that be, when boundary tones do not obligatorily appear before erga-

tive arguments? Why the asymmetry? Moreover, the segmental case markers in Samoan are prepositional. But the proposed absolutive high tone is realized on the final mora of the word preceding the absolutive argument: it's not internal to the absolutive argument itself. Thus, while any reasonable syntactic theory would group the absolutive case head with the following DP, the absolutive case head might be grouped prosodically to what linearly precedes it. Positing that absolutive case in Samoan is spelled-out as a high edge tone thus raises serious puzzles.

Nevertheless, I show that a converging body of evidence from the phonetic and phonological analysis of intonational patterns in the spoken utterances of a systematically varied set of syntactic structures leads to the conclusion that inflectional morphology must be the source of the absolutive high tone. While the presence and exponence of the absolutive high in Samoan may seem surprising, I also discuss preliminary hypotheses that suggest that it may readily understandable, when deconstructed as the result of a constellation of commmon linguistic patterns and processes.

The basic distribution of the proposed absolutive high edge tone, indicated as **H-**, alongside the distribution of some of Samoan's segmental case markers, is given in (1). Ergative case is marked with the preposition [e] and oblique case (what Mosel and Hovdhaugen (1992, p. 143) call locative-directional) is marked with the preposition [i]. Bracketing indicates syntactic and not prosodic grouping.

(1) Basic syntactic distribution of absolutive high edge tone

- a. Transitive sentences
  - i. V [*e* S] [**H-** O]
  - ii. V [**H-** O] [*e* S]
- b. Intransitive sentences
  - i. V [**H-** S] ([*i* DP])
  - ii. V ([*i* DP]) [**H-** S]
- c. Nominal phrases: distribution as in (1a, b)
  - i. Specific/non-specific nominals
  - ii. Common/proper nominals
  - iii. Postverbal pronominals
  - iv. Nominalizations
- d. Pseudo-noun incorporation
  - i. [V O] [**H-** S]

The systematic appearance of high tones before absolutive arguments has a range of implications. By observing where the absolutive H- occurs, absolutive

case can be diagnosed.[1] This means that what formerly has been described as unmarked case in Samoan can be partitioned into structures where an argument checks absolutive case, and structures where an argument does not. This pays dividends in testing hypotheses about Austronesian syntax, e.g. in the structure of pseudo noun incorporation. Another point of interest for the syntax of ergativity is the effect of an overt marker of absolutive case in the acquisition of case marking. Because the ergative case marker *e* is typically dropped in casual and familial speech, Ochs (1986, 1982b,a) have raised the puzzle of how Samoan children can acquire the case system without any apparent case marking in the input. Perhaps prosodic information in the input may be informative.

The Samoan tonal absolutive case morpheme also raises issues about the role of tone in grammar. Samoan offers a case study for the homophony of tones coming from different sources. There are multiple high edge tones in Samoan, which seem to have different sources. The exponence of absolutive case as an edge tone raises questions about how inflectional tonal morphemes affect prosodic constituency and syntax-prosody mapping.

The rest of this paper is organized as follows: §2 presents background on the Samoan language and Samoan prosody; §3 describes the design and procedure in elicitations and data analysis. Then, §4 presents distributional data on where the absolutive H- appears in the syntactic structures in (1). I then turn to diagnosing the source of the absolutive high in §5, rejecting phonological grammar and syntactic constituency as well as pragmatics as potential sources. In §6, I confront the puzzles raised by proposing that the absolutive high is a tonal morpheme. I hypothesize that the absolutive high results from tonal reassociation of the pitch accent on the absolutive particle *ia* and raise hypotheses about how the absolutive H- interacts with prosodic constituency. §7 concludes.

2 Language background

Samoan is an Austronesian language from the Independent State of Samoa and the (U.S.) Territory of American Samoa, with about 413,000 speakers in all countries (Lewis et al. 2014). It is in the Polynesian family in the Samoic-Outlier branch (Pawley 1966, 1967), which has a number of ergative-marking languages, including Samoan.

2.1 Segmental phonology and word stress

All Samoan examples in this paper are given using the IPA symbols and appear in square brackets when in-line in the text. In-line in the text, I occasionally

[1] The proper syntactic treatment of case in Samoan and other ergative languages remains controversial, e.g. Chung (1978); Legate (2008); Koopman (2012); Collins (2014, To appear, b), but those structural issues will be largely orthogonal to the discussions in this paper.

use Samoan orthography (always italicized), where [ŋ] is written as *g*, length as a macron, e.g. *ā*, and [ʔ] as ‘.

The inventory of phonotactically licit syllable shapes in Samoan is limited to those in which every consonant is followed by a vowel: monomoraic [(C)V], and bimoraic [(C)V:] and [(C)VV]. The basic footing pattern, as observed in monomorphemes, consists of a moraic trochee at the right edge of the word (Zuraw et al. 2014). Primary stress is on the final vowel if it's long, and otherwise on the penultimate vowel. Stress assignment in longer monomorphemic words suggests that secondary stress preferentially occurs on a moraic trochee at the left edge. Monomoraic suffixes such as [-ŋa] are included in the domain of footing with the stem, i.e. in the same prosodic word, but some bimoraic suffixes such as [-ina] aren't. Stems in compounds and prefixes are also in separate footing domains.

Primary stress is consistently phonetically realized with increased relative amplitude, longer duration, and a pitch accent rise in fundamental frequency—the rate of repetition of cycles in the acoustic waveform from the rate of vocal fold vibration, and the primary acoustic correlate of the auditory percept of pitch, abbreviated as f0 in the rest of this paper. However, the presence of pitch accents associated with secondary stress is inconsistent.

2.2 Case-marking and word order

Samoan has default VSO word order and marks ergative case on the subject of a verb-initial transitive sentence with the preposition [e] (2a).[2] Absolutive case on the direct object of a transitive sentence and the subject of an intransitive sentence (2b) is said to be unmarked (Chung 1978: p. 54–56; Ochs 1982: p. 649; Collins 2014: p. 94). The intransitive sentence (2b) also illustrates the prepositional element [i] as a marker of oblique case. This preposition marks stative agents (see (Chung 1978, p. 29)), indirect objects, locatives, temporal expressions, sources, and goals (Mosel and Hovdhaugen 1992, p. 144). Before pronouns and proper names, *iā* [ja:] rather than [i] marks oblique case.

(2) Case-marking in transitive and intransitive sentences

a. Transitive sentence

na lalaŋa *(e) le malini **H-** le
PAST weave ERG DET.SPEC.SG marine ABS DET.SPEC.SG
mamanu.
design

‘The marine wove the design.’

b. Intransitive sentence

[2] All sentences are from elicitations with my primary consultant, and in sections where noted, from my other consultants as well.

na ŋalue **H-** le malini (i le
PAST work ABS DET.SPEC.SG marine OBL DET.SPEC.SG
mamanu).
design

'The marine worked (on the design).'

Case-marking exponence in Samoan is affected by register and word order. Samoan is well-known for having two distinct registers: *tautaula lelei* 'good language'—used in literary contexts and and Westernized institutional contexts like in church and school, as well as with foreigners, and *tautaula leaga* 'bad language'—used in traditional ceremonies and meetings, as well as between family members and between friends (Shore 1977, 1980; Duranti 1981, p. 165–168; Ochs 1988, p. 196; Duranti 1990, p. 4–5; Mosel and Hovdhaugen 1992, p. 7–11). One of the most striking contrasts between the two registers is in the segmental phonology: /t/ and /k/ → /k/ and /n/ and /ŋ/ → /ŋ/ from *tautaula lelei* to *tautala leaga*.

The segmental ergative case marker *e* is rarely used in *tautala leaga* (Mosel and Hovdhaugen 1992, p. 9). Ochs (1982a) found that the frequency of use of the ergative case marker *e* is quite variable across social contexts: in utterances with postverbal agents, in a corpus of adult Samoan speech, the presence of *e* ranged from 20% between family members to 75% in informal interactions between male non-family members and in discussion between titled men in formal village meetings (Ochs 1982a, Table 1). Ochs (1982a) also found substantial variability in word order choices in adult speech: 34.7% of the utterances were VSO order, 36.0% VOS order, 20.0% SVO order, and 9.3% OVS order (see Ochs (1982a, Table 12)). I focus on studying verb-initial sentences in this paper, but I'll report here that in non verb-initial sentences, neither the ergative nor the absolutive case marker can appear, as exemplified in the transitive and intransitive sentence in (3), cf. (2). An H- does always appear between the fronted argument and the predicate.

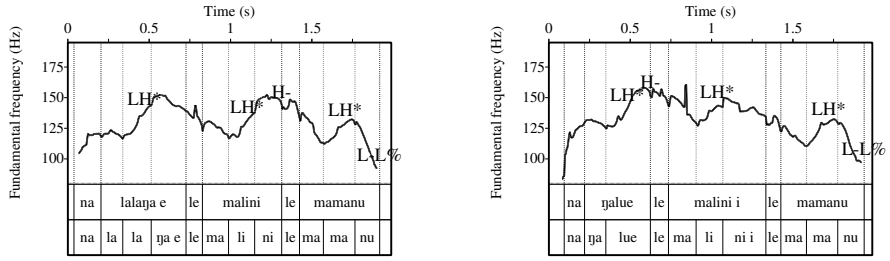
(3) No segmental case marking in non verb-initial word order

a. ʔo *e le malini **H-** na lalaŋa le
TOPIC *ERG/ DET.SPEC.SG marine **H-** PAST weave DET.SPEC.SG
mamanu.
design

'The marine wove the design.'

b. ʔo *e le malini **H-** na ŋalue (i
TOPIC *ERG DET.SPEC.SG marine **H-** PAST work (OBL
le mamanu).
DET.SPEC.SG design)

'The marine worked on the design.'



(a) Transitive declarative

(b) Intransitive declarative

Fig. 1 F0 contours in basic VS(O) declaratives. Pitch accent rises (LH*) occur over primary stressed syllables. An H- occurs before the absolutive object in Fig. 1a and before the absolutive subject in Fig. 1b.

2.3 Overview of intonational system

Let's turn to the intonation of the basic declaratives I have introduced so far (see also Orfitelli and Yu (2009); Calhoun (2015)). Figure 1 compares the f0 contours for the transitive sentence in (2a) vs. the intransitive sentence in (2b). Each primary stress is tonally marked with a rising pitch accent annotated as LH*. The pitch accent realizations seen here are representative. The low target "L" typically appears to be aligned to the beginning of the stressed mora. The high "H" peak of the pitch accent is reached in the syllable following the stressed syllable it's associated with. This phenomena of PEAK DELAY is observed cross-linguistically (Silverman and Pierrehumbert 1990; Xu 1999, 2001; Myers 2003), and can also be observed in many other f0 contours in this paper, e.g. Figures 8b, c; 6a, b, c). A high edge tone, H-, occurs in both declaratives, though in different locations. The f0 contour over a word can be seen to continue to rise and stay high in the syllable following the stressed syllable when an H- is present at the end of the word. The end of the declaratives fall to a low boundary tone, annotated as L-L%. Note also that f0 rises over the (stressless) TAM *na* 'PAST' even though it's followed by an unstressed syllable. The slope of this f0 rise appears to vary quite freely, but a rise is typically present.

2.3.1 Sentence-medial high edge tones

There are multiple sentence medial high edge-aligned tones in Samoan. I introduce most of them here in Figure 2, which shows the f0 contour for (4). This includes the H- that always appear in coordination, preceding the conjunction [ma] (glossed as CONJ), the H- that always appears between a fronted non-pronominal DP argument and the predicate (glossed as FRONT), the absolutive H-, and the H- that always delineates members of a list (glossed as LIST). There is one other H- that appears sporadically that I haven't shown here, which is the H- introduced at the end of prosodic phrases, whose presence depends on the speaker's choice of prosodic phrasing and hesitations. I

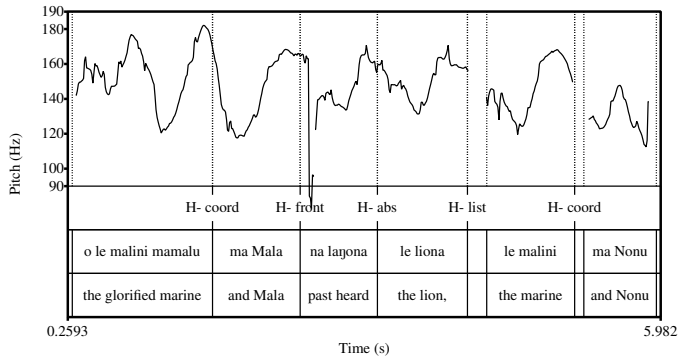


Fig. 2 An f0 contour demonstrating most of the H-'s in Samoan. The gaps in the annotation indicate silence. While the f0 contour for both coordination highs in this utterance appear to fall slightly after peaking, I don't find the fall at all perceptually salient–it may appear due to a drop in subglottal pressure.

discuss this H- in §5.1. In this particular utterance, there is a lot of lengthening where H-'s occur in Figure 2, though curiously not before the absolutive. The precipitous dip in the f0 contour immediately after the fronted DP is due to glottalization preceding [na]. The gaps in the transcription indicate silences, which also end with some glottalization.

(4) ʔo le malini mamalu **H-** ma Mala **H-** na
TOPIC DET.SPEC.SG marine glorified CONJ CONJ Mala FRONT PAST
laŋona **H-** le liona, **H-** le manini **H-** ma
hear ABS DET.SPEC.SG lion LIST DET.SPEC.SG fish CONJ CONJ
Nonu.
Nonu
'The glorified marine and Mala heard the lion, the fish, and Nonu.'

3 Materials and methods

All data referred to in this paper were elicited and recorded from my consultants' speech. Information about the consultants is given in §3.1. Information about elicitation procedures is provided in §3.2, and the methods used for phonetic and phonological analysis of the data are explicated in §3.3.

3.1 Consultants

Data were collected in the Los Angeles area in one- to two-hour sessions from September 2007 to December 2014 with one main consultant, aged 19 when I started working with him, who was born and raised in Upolu and had moved

to the Los Angeles area four years previously. Data were also elicited and recorded from four consultants in Apia, Samoa in November 2011, and an additional female consultant in her 50s in the Los Angeles area in January 2012. The additional consultant in Los Angeles had been in the United States for 27 years, but regularly spent an extended part of the year in Samoa. The consultants in Samoa included three men, aged 21 to 23, and one woman aged 46 from the capital city of Apia and other areas of Upolu.[3] Data were also elicited and recorded in Auckland, New Zealand in July 2015 from two additional female speakers. One (f03) was 48 and had grown up in Apia and moved to New Zealand from there in 2009; the other (f05) was aged 19 and had grown up in Savai'i and been in New Zealand since age 10. All of them spoke primarily Samoan in daily life and were literate in Samoan, but also spoke English as a second language with some fluency. English was used as the contact language.

In addition to these six consultants, four other consultants were recorded in Apia, but their data aren't included in this paper. This is because their utterances were rife with prosodic breaks—typically after every single argument, regardless of the sentence—and/or often disfluent.[4] Because I thought the prevalance of prosodic breaks might be due to consultants speaking in a style of dictation, I asked later consultants to speak as if they were speaking to a friend or family member in a conversation, and all included data were recorded under these conditions. One consultant responded to the instructions by producing speech with the segmental mergers characteristics of *tautala leaga* (see §2.2), but all other consultants produced speech with the segmental characteristics of *tautala lelei*, and no consultants dropped case markers. For one consultant, recordings were made both in the style of how one would speak in church as well as to a sibling; since no detectable differences in prosodic patterns occurred between these two styles, the data from the two styles for this consultant were combined.

3.2 Elicitation procedures

Procedures for elicitations with the primary consultant are described below in §3.2.1, and procedures for the other consultants are described in §3.2.2. Technical details of recording are in §3.2.3.

3.2.1 Primary consultant

Elicitation sessions with the primary consultant and also f03 in Auckland involved either (i) developing and/or checking words and sentences to be

[3] The work here all concerns Samoan as spoken in Samoa, and not Samoan spoken in American Samoa. Mosel and Hovdhaugen (1992, p. 8) wrote: "Today we find a very marked difference in intonation between the two variants [from Samoa vs. American Samoa]".

[4] Two other consultants listened to samples of these discarded recordings and commented that the sentences were uttered as extremely broken up read speech, nothing like what would occur in conversations.

recorded, or (ii) recording sessions. In sessions involving the development of stimuli, the consultant was asked to help construct Samoan sentences either from some starting scenario or from an English sentence, to judge whether Samoan sentences from the literature or constructed by the author were licit, and to provide alternative ways to construct sentences, if any. During recording sessions, elicitation items were presented individually written on slides on a computer screen, and they were elicited in randomized order. The consultant was asked to read each sentence twice. All data in this paper from the primary consultant was elicited in *tautala lelei*. No systematic discourse context was provided for recording sessions: sentences were elicited "out-of-the-blue" unless pronouns or *pro*-drop was present, in which case a context was provided with a referent.[5]

3.2.2 Other consultants

Since there was only a limited time to work with the other consultants, the elicitation procedure was necessarily different than for the primary consultant: these other consultants weren't used to the fieldwork elicitation context. The stimuli consisted of mostly sonorant sounds, sometimes at the expense of plausibility of the sentences. Thus, recording sessions were preceded by an explanation that some of the sentences might be strange—like something out of a fairy tale—e.g., stories about different animals living together in a house. Consultants were also given the opportunity to skim through the sentences prior to recording for familiarization. The consultants were also told to flag any sentences that they thought didn't sound like Samoan, but like a foreigner trying to speak Samoan. Finally, consultants were asked to speak as if they were speaking to a friend to avoid heavily phrased, dictation-style reading (see §3.1). One speaker responded to this instruction by speaking with segmental characteristics of *tautala leaga*, with [t] → [k] and [n] → [ŋ].

Elicitation items were presented individually written on slides on a computer screen, and they were elicited in randomized order. The consultant was asked to read each sentence twice. If the consultant flagged a sentence, then the consultant was reminded that some sentences might make sense only in a fairy tale, and sometimes a richer background context for the sentence was explicated. If the consultant still found the sentence problematic, then he/she was asked to repair it, and a note was made that the sentence wasn't licit for the consultant. This happened with scrambled word order for one consultant in particular, who repaired the sentences by putting them in VSO word order. No systematic discourse context was provided for recording sessions: sentences were elicited "out-of-the-blue". The consultants' understanding of the sentence meaning was also often checked as sentences were recorded, especially for more complex sentences.

[5] Data from systematic manipulation of discourse context is discussed in §5.3; to preview, the presence of the absolutive H- is insensitive to these manipulations.

3.2.3 Recordings

All recordings were made directly to a computer through a head-mounted microphone (Shure SM10A), whose signal ran through a Shure X2u pre-amplifier and A-D device; recordings in Auckland were made to a Marantz PMD661 MKII. Recordings were made at a sampling rate of 22,050 Hz with 16-bit precision. Recording sessions in Los Angeles were made in either a sound-attenuated booth or a quiet room, and recordings in Auckland were made in a quiet room. Recordings in Apia, Samoa were also made in a quiet room insofar as possible; sometimes sudden torrential downpours produced substantial background noise.

3.3 Analysis

3.3.1 Data processing

All sound files were segmented and annotated using Praat (Boersma and Weenink 2012). Each sentence was segmented by word and syllable and transcribed intonationally by the author. F0 extraction was performed using Praat's autocorrelation algorithm, as implemented in VoiceSauce v1.19 (Shue et al. 2011), software for automatic voice quality analysis, with the floor and ceiling values for candidate f0 set to 40 Hz and 300 Hz, respectively, and default settings for other parameters. For the f0 contours plotted throughout the paper, f0 values were averaged over 10 uniformly time slices over each syllable for each utterance, e.g. the first f0 value was the average f0 over the first tenth of the syllable. Converting the time scale from absolute time in seconds to time in syllables allowed trends in the shape of f0 contours to be captured without the noise introduced by variable speech rates.

All further data processing and analysis was performed in R (R Core Team 2014). For the most part, this consisted of averaging f0 contours across sentences and/or across speakers.

All plots were created using the ggplot2 package (Wickham 2009). In every plot showing f0 contours over a string that includes non-absolutive case markers, these case markers are included as part of the final syllable of the preceding word. The rationale for this is that these monomoraic, vocalic case markers were very difficult to segment from the preceding vowel.[6] Gray ribbons flanking lines in any plot of f0 contours show ±1SE.

[6] Data from additional utterances elicited in *tautala leaga* with case markers dropped, not discussed in this paper, show that the absence of any segmental case markers in an utterance has no effect on the presence of the absolutive H- or the characteristics of its realization. Thus, the absolutive H- isn't some phenomenon that is a side effect of including non-absolutive case markers as part of the preceding word in plots of f0 contours.

3.3.2 Minimal comparisons

One strategy for detection of H-'s in f0 contours used throughout analysis was to rely on comparisons of f0 contours within minimal sets. What this means is that rather than rely on intonational transcriptions of individual utterances to tally up where H-'s were present or absent in each utterance, the evidence for presence or absence of H-'s came from comparisons of f0 contours from multiple utterances. For example, in §4.1, an H- before the direct object was diagnosed in the f0 contour in a transitive VSO sentence, by comparison with the f0 contour in minimally different transitive VOS sentences and intransitive VS sentences (§4.2).

The advantage of using minimal comparisons to diagnose H-'s is that the comparisons help control for allophonic variation in the realization of H-'s. One factor conditioning allophonic variation is tonal crowding, which occurs when there is close spacing between neighboring tonal events (Bruce 1977, Pierrehumbert 1980, Gordon 2000, Arvaniti, Ladd and Mennen 2006, Gordon 2014, et seq.). In some cases, tonal crowding can even result in the neutralization of tonal distinctions which would be present if there were more segmental material available between the crowded tones (Pierrehumbert 1980, p. 112-113). With minimal comparisons, even for sentences with substantial tonal crowding around the site of the H-, one still might be able to diagnose an absolutive H- in transitive sentences if there is a distinct contrast in f0 contour shape between different sentences where case is systematically varied. However, in the examination of the f0 contour for just a single utterance at a time, judging the presence or absence of an H- might be quite difficult and subjective.

4 Basic evidence for the absolutive high

This section presents evidence for the distribution of a high edge tone summarized in (1). §4.1 shows that in verb-initial sentences, the high tone always occurs before the object in transitive sentences, and §4.2 shows that it always occurs before the subject in intransitive sentences. §4.3 shows that this distribution of the high tone also holds for a range of nominal phrases: specific or non-specific, common or proper, pronominals, and nominalizations. §4.4 shows that an H- always occurs before the subject in pseudo noun incorporation; however, no H- appears before the pseudo-incorporated object. Finally, I close the section by presenting evidence that the absolutive high is a tone attracted to an edge rather than a head (§4.5).

4.1 Transitive sentences

In transitive sentences, an H- always precedes the absolutive argument. This distribution is summarized in (5).

(5) Distribution of absolutive H- in transitive sentences

a. V [*e* S] [**H-** O]

b. V [**H-** O] [*e* S]

I present evidence for this distribution from manipulating word order (VSO, VOS) in a set of transitive sentences exemplified in (6a), shown with VSO order.[7] An example of VOS order for (6a) is given in (6b). In VSO order, the first argument takes ergative case; in VOS order, it takes absolutive case.

(6) a. na tatala-(ina) e le tama **H-** le
PAST open-(INA) ERG DET.SPEC.SG boy ABS DET.SPEC.SG
faitotoʔa
door
'The boy opened the door.'

b. na tatala-(ina) **H-** le faitotoʔa e le
past open-(INA) ABS DET.SPEC.SG door ERG DET.SPEC.SG
tama
boy
'The boy opened the door.'

One other factor I varied was whether or not the "transitive" *-Cia* suffix form *-ina* was present on the verb. Cook (1999) states that this suffix may be present if word order in a transitive sentence is inverted, with the absolutive object first, while Chung (1978, p. 55) states that VOS and VSO order are about equally common in frequency when the *-Cia* suffix is present. My primary consultant was happy to suffix a transitive verb with *-ina* regardless of the word order in the transitive sentence. The purpose of including the *-ina* suffix was to add additional (sonorant) segmental material before the first argument and thus make the phonetic contrast between the presence and absence of an H- there easier to discern.

Figure 3 summarizes the effect of word order on the f0 contour over the verb and the first argument for the sentences in (6a).[8] These f0 contour data show that an H- always appears before the absolutive object and never before the ergative subject—regardless of word order, and regardless of whether or not *-ina* is present.[9] Figure 3a and 3b show the contrast in f0 contours over the verb induced by the case of the first argument. Figure 3a shows the f0 contour over the last two syllables in the (unsuffixed) verb and ergative case marker if present, e.g. *tala (e)* for *tatala* 'open', and the determiner *le* in the first argument. Figure 3b shows the f0 contour over the stem-final vowel of the

[7] The full list of sentences is in Appendix §A.1.

[8] The large jumps in the f0 contour in the penult in Figures 3a and 3c are due to segmental perturbations from the obstruents in 6a ([t,p,ʔ]). The f0 jump in 3a is particularly dramatic when the first argument is absolutive because of the subsequent f0 rise to the H-. These f0 perturbations illustrate why sonorants are used in intonational fieldwork.

[9] The number of syllables in the arguments and verbs in this stimulus set wasn't constant. But differences in prosodic length cannot account for the f0 patterns in Figure 3—the same pattern of contrast between VSO and VOS orders was observed individually for each item.

verb and the *-ina* suffix (and the ergative case marker, if present), e.g. *a-ina (e)* for *tatala-ina*, and the determiner *le* in the first argument. Whether or not the verb stem was suffixed with *-ina*, f0 over the final syllable of the verb was 20-30 Hz higher if the case of the first argument was absolutive (VOS order). This f0 difference persisted into the determiner *le* in the first argument following the verb. Figure 3c shows how the case of the second argument affects the f0 contours over the last two syllables of the first argument and the determiner in the second argument, e.g. *tama le* for (6a). F0 on the ultima of the 1st argument was also about 20 Hz higher when the case of the second argument was absolutive (VSO) rather than ergative (VOS); this f0 difference persisted into the determiner *le* of the second argument as well.

In summary, this section has shown that in transitive sentences, an H- always precedes the absolutive argument. Though not shown here, this distribution also occurs in imperatives. In addition, the data in this section show that the realization of the H- can extend from the word preceding an absolutive argument into the absolutive argument itself. At this point, the effect of case on the presence of the H- is confounded with the effect of grammatical role and word order: we could also posit the following alternative hypotheses in (7).

(7) Alternative hypotheses about transitive sentence data in §4.1

   a. An H- always precedes the object and not the subject.

   b. The presence of the H- is conditioned by word order, i.e., an H- precedes the second argument in VSO order, and the first argument in VOS order.

But in the following section on intransitive sentences (§4.2), I show that the statement that an H- always precedes the object but not the subject is false, and in §5.2.1, I show that the presence of the H- is insensitive to word order in verb-initial sentences.

4.2 Intransitive sentences

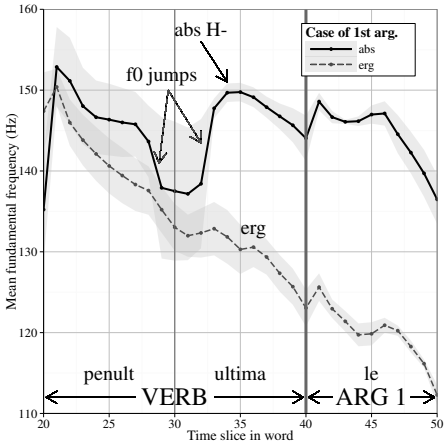
In intransitive sentences, an H- always precedes the absolutive subject, as I demonstrate below. This distribution is summarized in (8).

(8) Distribution of absolutive H- in intransitive sentences

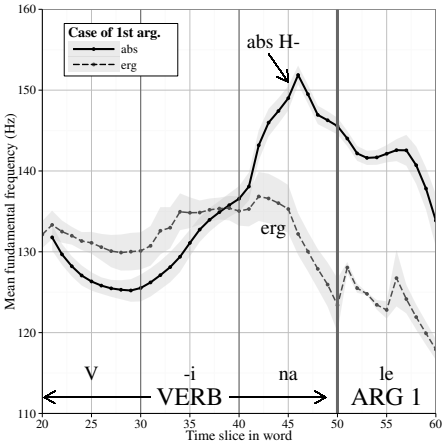
   a. V [**H-** S] ([*i* DP])

   b. V ([*i* DP]) [**H-** S]

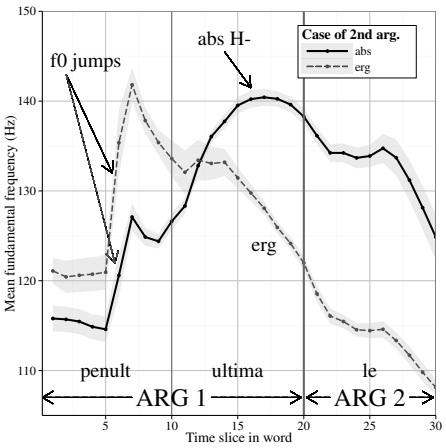
§4.1 already demonstrated that an H- does not occur between the verb and an immediately following ergative subject in a transitive sentence. Thus, the f0 contour over the verb in a VSO transitive sentence can serve as a baseline for how the f0 contour looks without an H- present, compared to when the H- is present in an intransitive sentence (9).



(a) Verb not suffixed with *-ina* and following *le*



(b) Verb suffixed with *-ina* and following *le*



(c) 1st argument and following *le*

Fig. 3 Comparison of mean f0 contours for words in transitive sentences for VSO order (ergative subject first) vs. VOS order (absolutive object first). The large jumps in the f0 contour over the labeled penultimate syllables are due to segmental perturbations from obstruents.

(9) Is there an H- between the verb and the immediately following argument?

a. Transitive baseline: V [*e* S] [**H-** O]

b. Intransitive: V [**H-?** S] [*i* DP]

I compared the f0 contours on the verb between the intransitive sentences like in (10) and their nearly string-identical transitive baseline counterparts.[10] These transitive counterparts replaced the intransitive verb [manoŋi] 'to be

[10] The full stimulus set is given in Appendix §A.2. These sentences were designed to examine how tonal crowding affects phonetic realization of the H-.

smelly/fragrant' with the transitive verb [laŋona] 'to hear', changed the absolutive subject to an ergative subject, and changed the ergative object to an absolutive object, e.g. (11) is the transitive counterpart to (10).

(10) na manoŋi **H-** le manu i le maile i
PAST smelly ABS DET.SPEC.SG bird OBL DET.SPEC.SG dog obl
le afiafi.
DET.SPEC.SG evening
'The bird was smelly to the dog in the evening.'

(11) na laŋona e le manu **H-** le maile i
PAST hear ERG DET.SPEC.SG bird ABS DET.SPEC.SG dog OBL
le afiafi.
DET.SPEC.SG evening
'The bird heard the dog in the evening.'

Figure 4 shows a clear difference between the mean f0 contour over transitive verb [laŋona] and the mean f0 contour over intransitive verb [manoŋi]. The f0 contour rises over the stressed second syllable (labeled S2) of both verbs. However, the f0 contour over [laŋona] drops in the third syllable (labeled S3), while the f0 contour over [manoŋi] continues to rise and stay high. Thus, Figure 4 shows that, unlike verbs before ergative subjects, verbs before absolutive subjects have an H- realized over the last syllable. In §5.2.1, I also show that an H- precedes an absolutive subject even if the subject is preceded by an oblique PP.

An H- also occurs at the right edge of weather verbs (Mosel and Hovdhaugen 1992, p. 107), as shown in (12).

(12) a. na {timu / vevela} **H-** Apia
PAST {rain / hot} ABS Apia
'It rained in Apia / It was hot in Apia.'

b. na {timu / vevela} **H-** le Aso Sā
PAST {rain / hot} ABS DET.SPEC.SG day sacred
'It rained on Sunday / It was hot on Sunday.'

4.3 Nominal phrases

Thus far, I have only presented distributional data for the absolutive H- with specific and common nominal phrases that are singular or plural, such as *le manu* 'the bird' or *manu* 'the birds'. What about other types of nominal phrases? As a case in point, Niuean case-marks different types of nominal phrases differently (Massam 2001, p. 156: (2)):

(13) Niuean case marking (Massam 2001, p. 156: (2))

	ERG	ABS
Proper/pronoun	*e*	*a*
Common	*he*	*e*

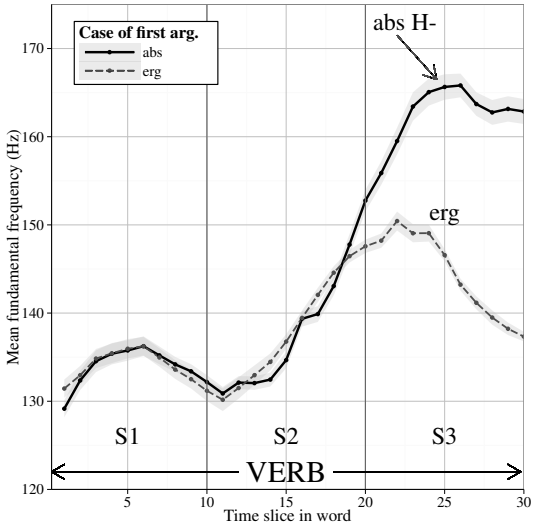


Fig. 4 A comparison of the mean f0 contour over the verb for the intransitive sentences in 10 vs. their transitive counterparts. When the subject immediately following the verb is absolutive, the f0 contour rises in the 3rd syllable 'S3' to the absolutive high. When the subject immediately following the verb is ergative, the f0 contour falls in the 3rd syllable 'S3'.

In this section, I provide data on the distribution of the H- in a variety of nominal phrases from Mosel and Hovdhaugen (1992, Ch. 6). I show that the presence of the absolutive H- is insensitive to whether the nominal phrase is specific or non-specific or proper or common (§4.3.1), pronominal or non-pronominal, (§4.3.2), or nominalized (§4.3.3).

4.3.1 Specificity

I found that the absolutive high appears before both specific (14, 15) and non-specific (16, 17) nominals. I established the presence of the absolutive H- by comparing pitch tracks between sentences where I systematically varied specificity of objects in transitives and PP objects in intransitives, organized into minimal comparisons (§3.3.2). The data set was recorded from two consultants in Auckland, who were provided a context for each sentence (shown below; the contexts for the intransitive sentences aren't given because of lack of space). In the examples given below, (14-17), the object is always underlined and H-'s preceding the object are bolded. The presence of an H- before proper names as absolutive arguments in the intransitive sentences also shows that absolutive H-'s occur before proper as well as common nouns.

(14) Specific, singular *le*

a. Context: Moana asked Manogi to pick the ripest melon at the market and bring it home.

e leʔi momoli e Manoŋi **H-** le meleni i le fale.
'Manogi didn't bring the melon home yet.'

b. cf. intransitive e leʔi ŋalue H- Melani i le mamanu i le fale.
'Melani didn't work on the design yet'.

(15) Specific, plural ∅

a. Context: Moana asked Manogi to pick the biggest three melons at the market and bring them home.

e leʔi momoli e Manoŋi **H-** meleni i le fale.
'Manogi didn't bring the melons home yet.'

b. cf. intransitive e leʔi ŋalue H- Melani i mamanu i le fale.
'Melani didn't work on the designs yet.'

(16) Nonspecific, singular *se*

a. Context: Moana asked Manogi to pick any melon at the market and bring it home.

e leʔi momoli e Manoŋi **H-** se meleni i le fale.
'Manogi didn't bring any melon home yet.'

b. cf. intransitive e leʔi ŋalue H- Melani i se mamanu i le fale.
'Melani didn't work on any design yet.'

(17) Nonspecific, plural *ni*

a. Context: Moana asked Manogi to pick some melons at the market and bring them home.

e leʔi momoli e Manoŋi **H-** ni meleni i le fale.
'Manogi didn't bring any melons home yet.'

b. cf. intransitive e leʔi ŋalue H- Melani i ni mamanu i le fale.
'Melani didn't work on any designs yet.'

4.3.2 Pronouns

In this section, I show that postverbal pronouns (which are free-standing) must be preceded by an absolutive H- (18a, 19a). In addition, I show that a postverbal pronoun can host an absolutive H- marking an immediately following absolutive argument (18b). As for preverbal pronouns, Mosel and Hovdhaugen (1992, p. 374) writes that they are unmarked. It's difficult to collect empirical evidence on whether or not an H- precedes preverbal pronominal clitics, though. They immediately follow TAM markers, e.g. *na ia* 'PAST 3.SG', with one exceptional TAM particle *te* that they immediately precede, e.g. *ʻou te* '1.SG GENR'. Therefore, at most, preverbal pronouns are preceded in the sentence by a TAM marker. All singular and dual preverbal pronouns are monosyllabic and/or have initial primary stress, while all plural preverbal pronouns have initial secondary stress. Thus, if TAM markers do show a pitch rise over the final syllable, it cannot be determined if the rise is due to an H- and/or due to a pitch accent on the initial syllable in the pronoun. Besides, as

I mention in §2.3, a rise in f0 typically occurs over the TAM marker anyway, even if it's immediately followed by an unstressed syllable. And in many cases the f0 contour over the TAM could be perturbed due to a glottal stops: 8 of the 11 TAM markers listed on (Mosel and Hovdhaugen 1992, p. 140) have glottal stops.

(18) Absolutive H- and pronouns: transitive sentences

a. H- precedes a postverbal absolutive pronoun

na laŋona e Mamanu **H-** maːʔua
PAST hear ERG Mamanu ABS 1.DU.EXC

'Mamanu heard us two.'

b. H- can be hosted on a postverbal pronoun

na lalaŋa e maːʔua **H-** mamanu
PAST weave ERG 1.DU.EXC ABS design

'We two wove the designs.'

c. No case marking on preverbal pronominal clitic [maː]

na *e maː {lalaŋa-ina / lalaŋaː} **H-** mamanu[11]
'We two wove the designs.'

(19) Absolutive H- and pronouns: intransitive sentences

a. H- precedes a postverbal absolutive pronoun

na manoŋi **H-** maːʔua i le liona
PAST smelly ABS 1.DU.EXC OBL DET.SPEC.SG lion

'We two stank to the lion.'

b. Oblique case marker *iaː* [jaː] before pronoun

na manogi **H-** le malini jaː maːʔua
PAST smelly ABS DET.SPEC.SG marine OBL 1.DU.EXC

'The marine stank to us two.'

c. No case marking on preverbal pronominal clitic [maː]

na maː manoŋi **H-** i le liona
'We two stank to the lion.'

Here, I provide evidence for the presence of the absolutive H- before postverbal pronouns. From consultants in Samoa and California, I elicited simple VSO and VOS declaratives with the pronominal form as the first argument (20) or the second, and with *malini* 'the marines' as the other argument. For both pronominal and non-pronominal DPs, I varied the case over all three possibilities for subject, direct object, and indirect object—ergative, absolutive, or

[11] My primary consultant varied in his judgments of it was licit for the verb to appear unsuffixed with *-ina* (or related suffixes) in transitive sentences with preverbal pronominal pronouns. Collins (2014, p. 107) also noted variability in his consultants.

oblique—resulting in 12 configurations: 3 cases (erg, abs, obl) × 2 arguments (*maːʔua*, *malini*) × 2 orders (VSO, VOS). (While the verb *momoli* 'to take, deliver, drop off' is ditransitive and some of the sentences may involve pro drop, I show later in §5.2.2 that pro drop has no special effects on the distribution of the H-: only overt arguments affect the presence of the H-.) I used a ditransitive verb to be able to construct sentences contrasting ergative, absolutive, and oblique case for a given argument in a single, controlled data set. A scenario was introduced for each sentence to give a referent for pro drop, e.g. the scenario that 'we two delivered the fish to the marines' for eliciting 'We two delivered (pro) to the marines.'

(20) Examples: pronoun as first (overt) argument

a. na momoli e maːʔua **H-** malini
PAST take ERG 1.DU.EXC ABS marine
'We two dropped off the marines.'

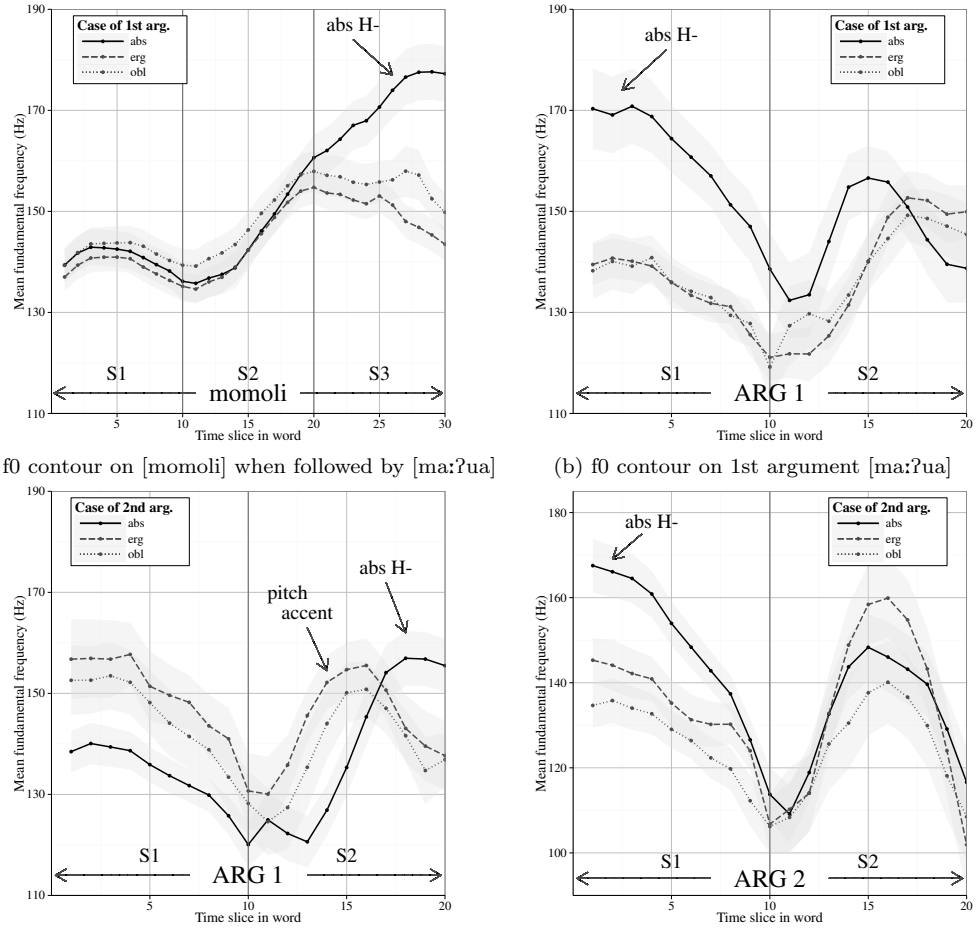
b. na momoli e maːʔua i malini
PAST take ERG 1.DU.EXC OBL marine
'We two delivered (it) to the marines.'

c. na momoli **H-** maːʔua i malini
PAST take ABS 1.DU.EXC OBL marine
'(pro) took us two to the marines.'

The elicitation of the described set of sentences resulted in data from 6 consultants in total. Only the subset of VSO sentences was included from the consultant who rejected VOS word order. One consultant produced many fluent utterances including prosodic junctures with silence. Since the presence of these junctures could lead to H-'s occurring purely due to prosodic phrasing choices, the consultant was asked to repeat the sentences at a faster speech rate when this occurred. For the other 4 consultants, no more than a handful of items were discarded due to speech errors or obvious prosodic junctures.[12]

Figure 5 illustrates the effect of case on mean f0 contours over the verb and pronominal argument in this set of sentences, including sentences in (20), and shows that the presence of an H- occurred only before (overt) absolutive pronouns. Figure 5a shows that an H- occurred at the right edge of the verb [momoli] when it was immediately followed by absolutive-case marked pronoun [maːʔua], but not an ergative or oblique one. Figure 5b shows that this H- persisted into the first syllable of the absolutive-case marked pronoun [maːʔua]. Figure 5c shows that an H- only occurred at the right edge of [maːʔua] when it was immediately followed by an absolutive argument. Note that the f0 rise to the absolutive H- clearly occurred later than the f0 rise due to the pitch accent on the stressed penultimate mora [u] in [maːʔua]. Figure 5d shows that the high f0 from this absolutive H- persisted from the first argument into the first syllable of the second argument, absolutive case-marked [maːʔua]. All together,

[12] A full list of stimuli and justification for discarded items is in Appendix §A.3.



(a) f0 contour on [momoli] when followed by [maːʔua]

(b) f0 contour on 1st argument [maːʔua]

(c) f0 contour on 1st argument [maːʔua]

(d) f0 contour on 2nd argument [maːʔua]

Fig. 5 Mean f0 contours for [momoli] and [maːʔua] in sentences with postverbal pronouns, e.g. (20). The large dips in the f0 contour at the boundary between the first and second syllables in the pronoun [maːʔua] (b,c,d) are due to the glottal stop, which was typically realized as some larygealization rather than a full glottal stop. In Figures 5b, c, and d, [maːʔua] is partitioned into intervals as [maː] in 'S1' and [ua] in 'S2'.

Figures 5a, b, and d show that absolutive postverbal pronouns are preceded by an H-; non-absolutive postverbal pronouns are not. Figure 5c shows that the postverbal pronoun itself can also bear the H- when it precedes an absolutive argument.

4.3.3 Nominalizations

Examples of nominalizations are given in (21) and (22). I call nominalizations "absolutive" if they occur in the absolutive argument position of a transitive sentence, and "oblique" if they occur in the oblique position of an intransitive sentence. In nominalizations, an H- appears before absolutive nominalized verbs, e.g. before *le lalaŋa* and *le momoli-ina* in 21, but no H- appears before these same nominalized verbs when they are oblique (22). The full stimulus set used for the plots in Figure 6 is in Appendix §A.4. As shown in Figure 6a, the subject *malini*, which immediately precedes the nominalized verb, bears an H- when it precedes absolutive nominalizations; no H- appears before oblique nominalizations.

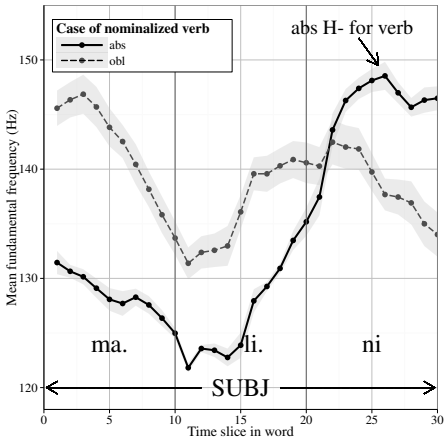
Second, the distribution of case marking and the H- also coincides for arguments internal to nominalizations. The agent in a nominalized transitive predicate may either maintain ergative marking (21c) or be marked with the alienable genitive *a* (21a) (Mosel and Hovdhaugen 1992, p. 545). The patient in a nominalized transitive predicate may either be marked with the inalienable genitive marker *o* (21b) or (appear to be) unmarked (21c) (Mosel & Hovdhaugen 1992: p. 546, Collins 2014). Figure 6b[13] shows the mean f0 contour over the final three syllables of the word preceding: (i) the *a*-marked agent, e.g. *mamanu* preceding *a malini* in (21a), (ii) the *o*-marked patient, e.g. *momoli-ina* preceding *o le malala* in (21b), or (iii) the unmarked patient, e.g. *liona* preceding *le manini* in (21c), ; this word is annotated in the figure as "verb" for short. Figure 6c shows the mean f0 contours over the unmarked or *o*-marked patient, or the *a*-marked agent, not including the determiner *le*, if present in the sentence. Together, the figures show that when an argument within a nominalization is *a*- or *o*-marked, e.g. *malini* in (21a) or *mamanu* in (22), it isn't preceded by an H-; however, if the argument is not preceded by a segmental case marker, e.g. *le manini* in (21c), it is preceded by an H-.

(21) Absolutive nominalizations

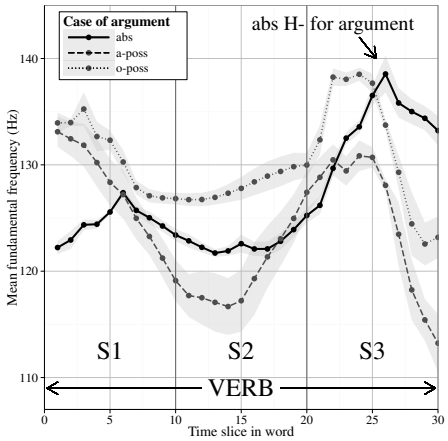
a. With *a*-possessive

e {faʔa-leː-lelei / leaŋa} **H-** [le lalaŋa mamanu
PRES {do-NEG-good / bad} ABS DET.SPEC.SG weave design
a malini] i le afiafi
GEN marine OBL DET.SPEC.SG afternoon

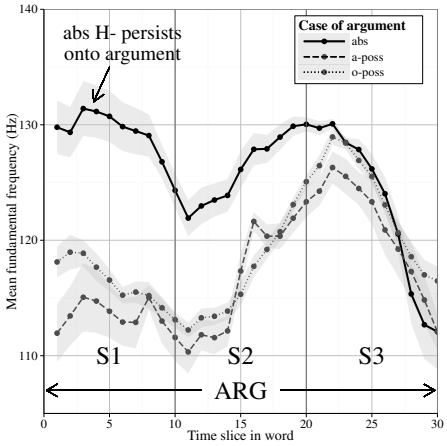
[13] In Figure 6b, the contrast between mean f0 contours may be hard to discern at first glance. In the last syllable, the dotted *o*-poss f0 contour is as high as the solid absolutive one, and the absolutive f0 contour also falls slightly at the end. However, a closer look shows that: (i) the *o*-poss f0 contour peak in syllable 3 is relatively lower than the absolutive one, since the *o*-poss f0 contour starts close to 10 Hz higher than the absolutive one in syllable 2, and (ii) the fall over syllable 3 for the *a*- and *o*-poss contours is clearly sharper than for the absolutive, and Figure 6c shows that the the absolutive high at the right edge of the word in Figure 6b is maintained into the absolutive patient in the nominalization, while the f0 contours over the *a*- and *o*-marked arguments are clearly lower. This is an example of where minimal comparisons between f0 contours is important (§3.3.2).



(a) f0 contour on subject



(b) f0 contour on final 3 syllables of word preceding argument in Fig. 6c



(c) f0 contour on argument in nominalization

Fig. 6 F0 contours for nominalizations. Figure 6a shows that a H- appears on the subject only when the following nominalized verb is absolutive. Figures 6b, c show that a H- precedes the argument within the nominalization only when it's absolutive and not if it's genitive-marked. See fn. 13 for a detailed explanation of Figure 6b.

'The marine's weaving of the design is not good' (faʔa-leː-lelei: poorly done, leaŋa: superstition).' (based on (Mosel and Hovdhaugen 1992, p. 545, (13.100)))'

b. With *o*-possessive

e iloa-atu e le malini **H-** [le
pres spot DET.SPEC.SG ERG marine ABS DET.SPEC.SG
momoli-ina o le malala]$_{abs}$ i le ala
deliver-INA gen DET.SPEC.SG charcoal obl the street

'The marine spots the delivering of the charcoal in the street.

c. Without *a* or *o*-possessive

e iloa-atu e le malini **H-** [le
PRES spot ERG DET.SPEC.SG marine ABS DET.SPEC.SG
momoli-ina e le liona **H-** le manini]$_{abs}$
deliver-INA ERG DET.SPEC.SG lion ABS DET.SPEC.SG fish
i le ala.
OBL DET.SPEC.SG street

'The marine spots the delivering of the fish by the lion in the street.'

(22) Oblique nominalizations example

e matamata **H-** le malini [i le laŋa
PRES watch ABS DET.SPEC.SG marine OBL DET.SPEC.SG weave
o le mamanu] i le fale
GEN DET.SPEC.SG design OBL DET.SPEC.SG house

'The marine watches the weaving of the design at home.'

In summary, an H- appears before nominalized predicates that are absolutive. Within a nominalization, arguments that receive genitive case are not preceded by an H-, but arguments that are not preceded by a genitive case marker do.

4.4 Pseudo noun incorporation

I complete the description of the basic distribution of absolutive H- with pseudo noun incorporation (PNI) (Massam 2001). I show an example of PNI in (23). In (23a), the order is Verb-Adverb-Subject-Object,[14] while with PNI (23b), the order is Verb-Object-Adverb-Subject. Also, the agent *Manogi* is marked with ergative case in (23a), but unmarked (segmentally) in PNI (23b). Using minimal comparisons between non-PNI and PNI sentences, I found that the absolutive H- always appears before postverbal subjects in PNI constructions, and never before the pseudo-incorporated object.

(23) An example of pseudo noun incorporation

a. V-S-O-Adv transitive without PNI, ABS-marked specific singular/plural object

na fufulu leaŋa e Manoŋi **H-** ∅ meleni i
PAST wash bad ERG Manogi ABS melon OBL DET.SPEC.SG
le ala
street

[14] My primary consultant treated [leaŋa] as an adjective modifying melon for this sentence, but my consultants treat other modifiers such as *loa* 'then' and *pea* 'continually' (Collins To appear, a; To appear, b) are treated as adverbs. I used [leaŋa] to produce clean pitch tracks.

'Manogi washed the bad melons in the street.'

b. V-O-Adv-S with PNI, unmarked object, ABS-marked subject

na fufulu meleni leaŋa Manoŋi i le ala
PAST wash melon bad Manogi OBL DET.SPEC.SG street

'Manogi melon-washed badly in the street.'

I elicited four minimal sets of sentences with and without PNI from my primary consultant with both non-pronominal subjects and postverbal pronominal subjects (24). (See Appendix §A.5 for the full set of sentences.)

(24) PNI with postverbal pronominal subjects

a. VSO, no PNI

na momoli e ia **H-** le malala i
PAST deliver ERG 3.SG ABS DET.SPEC.SG charcoal OBL
le teine
DET.SPEC.SG girl

'He delivered the bag of charcoal to the girl.'

b. VOS, with PNI

na momoli malala **H-** ia i le teine
PAST deliver charcoal ABS 3.SG OBL DET.SPEC.SG girl

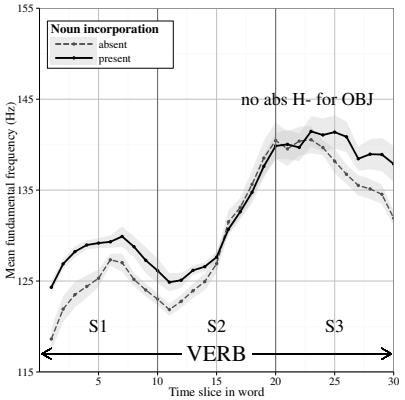
'He charcoal-delivered to the girl.'

Mean f0 contours over the verb (e.g. *momoli* in (24a))[15] and the last word in the object (e.g. [leaŋa] in (23)) are shown in Figure 7. The top row of Figure 7 compares f0 contours over the verb with and without PNI, for sentences with postverbal non-pronominal DP subjects (Fig. 7a) and postverbal pronominal subjects (Fig. 7b).The f0 contours when PNI is absent in Figures 7a, b provide a baseline for what the f0 contour on the verb looks like when it does not host an H- (when it's followed by the postverbal ergative subject in Figs. 7a, b). With these baselines for comparison, the f0 contours show that no H- precedes the pseudoincorporated object.[16]

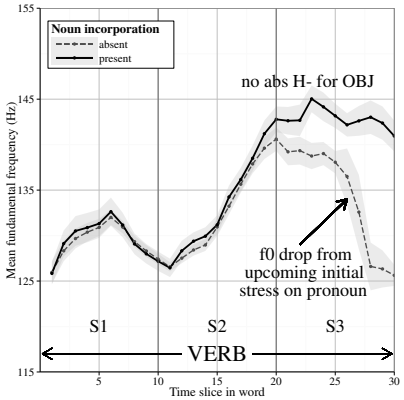
The bottom row of Figure 7 compares f0 contours over the object with and without PNI, for sentences with postverbal non-pronominal DP subjects (Fig. 7c) and postverbal pronominal subjects (Fig. 7d). For sentences with postverbal subjects without PNI, the object is followed by an oblique PP, which I show elsewhere isn't preceded by an H- (§5.2.1—there, I also show that an H- precedes an absolutive subject even if the subject is preceded by

[15] I excluded non-sonorant verbs like *fufulu* in plotting.

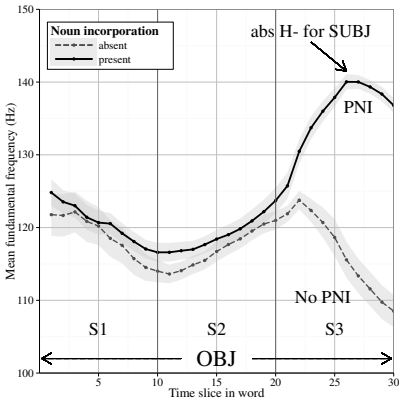
[16] As indicated in Figure 7b, the non-PNI f0 contour drops on the final syllable of the verb, unlike the PNI f0 contour. But this is because of the low target for initial stress and glottalization on the immediately following pronominal subject. Note also that the f0 contour for PNI in Fig. 7b does not rise at all in the final syllable, unlike the f0 contours of words bearing H-'s in Fig. 7c, d which rise well into the final syllable.



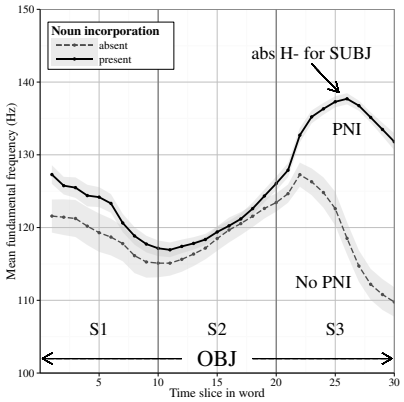
(a) f0 on verb (postverbal non-pronominal subject)



(b) f0 on verb (postverbal pronominal subject)



(c) f0 on object (postverbal non-pronominal subject)



(d) f0 on object (postverbal pronominal subject)

Fig. 7 The effect of (pseudo) noun incorporation on the presence of the H- at the right edge of the verb and the object in sentences with postverbal non-pronominal and pronominal subjects.

an oblique PP. Thus, the f0 contours in the absence of PNI provide a baseline for what the f0 contour looks like in the presence of an H- for Fig. 7c, d. With reference to the baselines, Figures 7c, d, show that in PNI, an H- appears before postverbal subjects.

It is also possible to have preverbal pronominal subjects in PNI constructions, which we tested with f03 and f05 in Auckland. For these sentences, an adverb must be present to distinguish between non-PNI and PNI constructions, as shown in (26), the answer to (25). Whether PNI was absent or present in the sentence, no H- appeared before the object *mamanu*.

(25) o le aː na fai loa e ŋaŋana i le fale?
'And then what did Gagana do at home?'

(26) a. na ia lalaŋa loa mamanu i le fale. (no PNI)
'Then he wove designs at home.'

b. na ia lalaŋa mamanu loa i le fale. (PNI)
'Then he design-wove at home.'

In summary, in PNI constructions, an H- appears before postverbal subjects. However, no H- appears before the pseudoincorporated object—whether the subject is pronominal, or whether the subject is postverbal or preverbal.

4.5 Evidence that the absolutive high is an edge tone

Having shown that a high tone appears before the absolutive argument, I now turn to the question of whether the high tone is attracted to heads or edges (Ladd 2008, Ch. 2-4). What's the evidence that the absolutive high is a tone attracted to an edge, rather than a tone attracted to a prominent, stress-bearing syllable? For instance, could the absolutive high be a trailing upstepped high in the pitch accent? The furthest away primary stress can be from the right edge of a prosodic word in Samoan is just one syllable away, when primary stress is on the penultimate syllable. This means that the usual method for diagnosing whether is a tone is attracted to a head vs. edge—by systematically varying the distance between the location of stress and the word edge—cannot be implemented.

In this paper, all I mean by "edge tone" is a tone whose realization tracks an edge rather than a head; by calling a tone an edge tone, I don't imply that it is associated with a prosodic constituent edge. There are two converging pieces of evidence that the absolutive high is indeed an edge tone. First, Samoan words may not permit primary stress no more than one syllable away from the right edge, but non-native names do. When asked to code-switch in English names as agents and patients with varying stress locations, consultants still invariably produce an H- at the right edge of the word preceding the absolutive argument. For example, f05 produced a high target aligned at the right edge of a name preceding an absolutive, across the set of names: initial stress (*Romeo*, *Melanie*), penult stress (*Marilla*, *Manogi*), final stress (*Gabrielle*, *Enelē*).

Second, I have noticed some utterances produced by speakers where the phonetic realization of pitch accents are extremely suppressed. At this point in time, I do not yet have enough data like this to understand what could be causing the pitch range reduction or deaccenting, but something that I can say is that the realization of the absolutive H- is still very clear even when pitch accent realization isn't.

Together, these observations support the hypothesis that the absolutive high is an edge tone. If it's an edge tone, though, what's the evidence that the absolutive high is associated to the right edge of the prosodic word preceding the absolutive argument, rather than the left edge of the absolutive argument? After all, the realization of the absolutive high persists into the syllable preceding the first primary stress in the absolutive argument. But if the absolutive high were associated to the left edge of the absolutive argument, it would be strange to have the f0 peak realized in anticipation of the segmental material

of the absolutive argument. If anything, one would expect the f0 peak to be realized *after* the syllable that the tone is associated to due to peak delay.

5 The source of the absolutive high

I've shown in §4 that a high edge tone appears at the right edge of the prosodic word preceding the absolutive argument in a diverse set of syntactic structures. This evidence is consistent with hypothesis that the absolutive H- is a tonal case morpheme. There are still alternative possibilities. In §1, I enumerated the following possible sources of tones: lexical representations, inflectional morphology, pragmatics, syntax, semantics, and phonology. It's clear that the source of the absolutive high cannot be lexical representations or truth-conditional semantics, but the other possibilities remain viable. The absolutive H- could be a tone placed by the phonological grammar at a prosodic constituent edge, with its placement predictable from prosodic phrasing. The absolutive H- could also be a prosodic constituent edge isomorphic to a syntactic constituent edge occurring before some class of structures including absolutive arguments, as suggested in Calhoun (2015). The absolutive H- might also mark some systematic property of information structure, placing the source in pragmatics. In the discussion below, I reject each of these sources—phonology (§5.1), syntactic constituency (§5.2), and pragmatics (§5.3)—as possible sources for the absolutive H-.

5.1 Against a phonological source

The claim that the absolutive H- comes from the phonological grammar is a claim that the presence of an absolutive argument invariably induces a prosodic constituent edge before it. And if the source of the absolutive H- is phonological, then the required phrase edge before it must come from some fact about the prosodic placement of an absolutive argument. Its presence should also be sensitive to variation in prosodic phrasing. Variation in prosodic phrasing may be conditioned by prosodic factors such as speech rate and prosodic length (Hayes and Lahiri 1991; Fougeron and Jun 1998; Jun 2003). But in the corpus of data presented in §4, there's nothing regular about the linear position of the absolutive argument or the size/length of the phonological material preceding it in the sentence, yet the absolutive H- always appears.

An H- *may* appear before an ergative argument, oblique PP, or genitive marked arguments. However, I find that the placement of an H- before non-absolutive arguments is infrequent and that it coincides with lengthening and pauses and disfluencies; these tones might be transcribed as "rushed" H% Intonational Phrase tones. Moreover, the appearance of H- before these non-absolutive arguments is highly variable, and can even vary between different utterances of the same string by the same individual. The pattern of frequency and variability in appearance of an H- before an absolutive is strikingly different: it is invariably present.

5.2 Against syntactic constituency as a source

The edge of some syntactic constituent can also not be the source of the absolutive H-. More specifically, I refer here to the claim that the H- marks some particular syntactic constituent or class of syntactic constituents that precedes an absolutive argument, or that is initiated by an absolutive argument—whether the absolutive argument is overt or not. But as I show in §5.2.1, the absolutive H- does not target a fixed syntactic position, and in §5.2.2, I show that it's not preserved under extraction of absolutive arguments out of relative clauses, nor under absolutive *pro* drop.

5.2.1 The absolutive H- does not target a fixed syntactic position

The evidence that the absolutive H- does not target a fixed syntactic position is that the presence of the absolutive H- is insensitive to argument order in sentences. I show this using f0 data from a set of ditransitive sentences derived from (27), where I permuted the location of the case markers in all $3! = 6$ ways, producing the argument orders schematized in Table 1. For instance, the first column in the table shows word orders where the absolutive object occurs first, i.e. *na momoli le liona e le nunua i le toloa* (ABS ERG OBL) and *na momoli le liona i le nunua e le toloa* (ABS OBL ERG), and the first row in the second column has the order given in (27), (ERG ABS OBL).[17] I found that an H- occurred immediately preceding the absolutive argument, regardless of the word order, as indicated in Table 1.

(27) na momoli e le liona **H-** le nunua i le toloa[18]
PAST take ERG DET.SPEC.SG lion ABS DET.SPEC.SG dolphin OBL DET.SPEC.SG duck
'The lion took the dolphin to the duck.'

ABS ____ ____	____ ABS ____	____ ____ ABS
H- ABS ERG OBL	ERG **H-** ABS OBL	ERG OBL **H-** ABS
H- ABS OBL ERG	OBL **H-** ABS ERG	OBL ERG **H-** ABS

Table 1 Permutations of word order among arguments in a ditransitive sentence, grouped by the location of the absolutive argument.

[17] One of the six consultants rejected both word orders with an initial oblique argument, as well as the abs-erg-obl order (his data wasn't included for the f0 plots). Another male speaker whose data was included rejected both word orders with a final absolutive argument.

[18] In the midst of fieldwork, I discovered that *nunua* 'dolphin' which I found in a Samoan wordbook was either an extremely rare word or possibly a typo for *mumua*. Although one of my older consultants accepted it, for most consultants, it was effectively a nonce word since I showed consultants the picture of the dolphin in the word book labeled as *nunua*. Since *nunua* was in every single sentence in this ditransitive data set, the results described here cannot be attributed to something about *nunua*—there are no asymmetries in f0 patterns that I can observe from *nunua* compared to the other two arguments.

Figure 8 shows the mean f0 contours over the verb and the first two arguments in the ditransitive sentence. (The third argument isn't shown since it has an initial stop which obscures the f0 contour shape.) Each plot shows three mean f0 contours: one for each position of the absolutive argument—the 1st argument, 2nd, or 3rd. In each plot, the only f0 contour shape that shows a final rise is the f0 contour when the absolutive argument immediately follows the word shown in the plot. For instance, the only f0 contour shape with a word-final rise over the verb *momoli* (Figure 8a), occurs when the first argument *liona* is absolutive. Figures 8b, c also show that high f0 from the absolutive H- carries over into the beginning of the absolutive argument. For example, the f0 contour over the 2nd argument *nunua* (Figure 8c) begins almost 20 Hz on average higher when it's absolutive compared to when it's ergative or oblique.

In summary, the H- appears before the absolutive object in verb-initial ditransitive sentences, regardless of how the arguments in the sentence are ordered. Thus, the H- cannot be targeting a fixed syntactic position.

5.2.2 The absolutive H- appears only with an overt absolutive argument

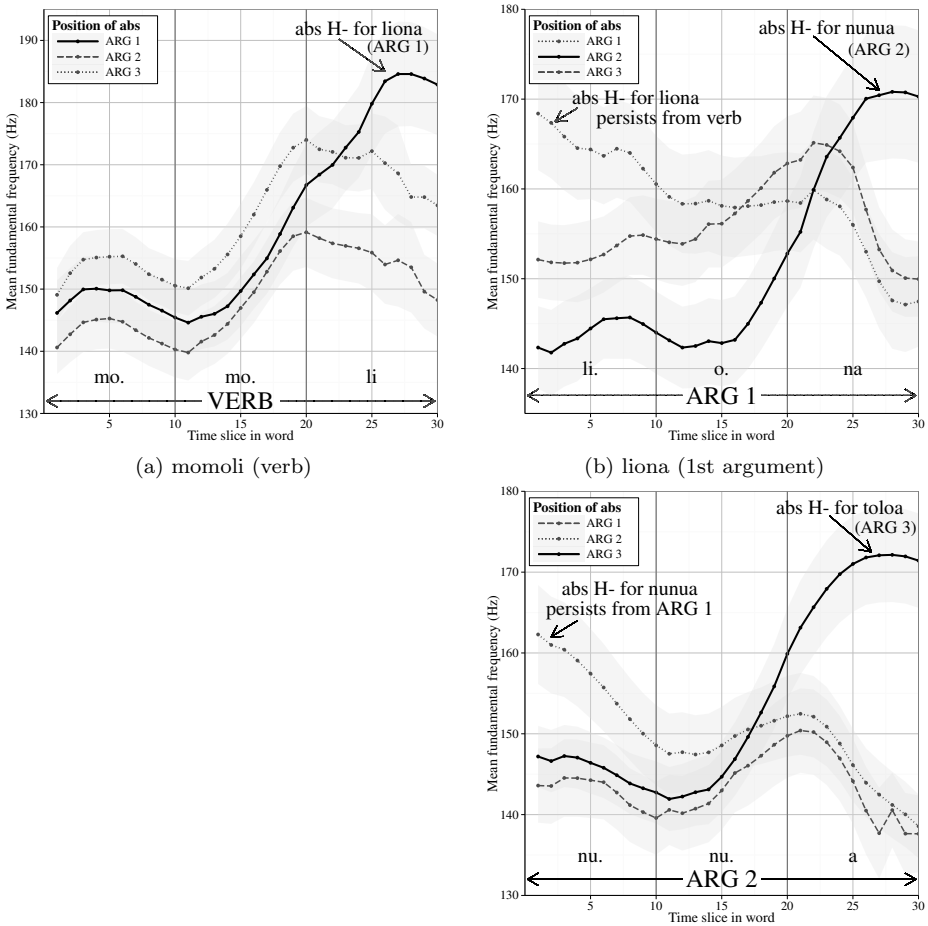
The H- also cannot be targeting some syntactic node dominating the absolutive case phrase. The evidence for this is that the absolutive H- does not appear when the absolutive argument has been *pro*-dropped, nor does it appear at the extraction site of absolutive arguments in embedded clauses.

pro drop In the sentences in (28) and (29) from four speakers, I found the absolutive H- was absent under *pro*-drop of the absolutive. However, the absolutive H- was present under *pro*-drop of the ergative, as long as an overt absolutive argument was present. That is, for the *pro*-drop sentences in (28) and (29), as long as [malini] was absolutive, the absolutive H- appeared. Figure 9a shows the mean f0 contours over [lau] and the first syllable of [malini] for the sentences in (28). Even though the realization of the H- on [lau] is difficult to discern because of final stress on [lau], the realization of the H- is quite clear at the onset of the absolutive argument [malini] in the f0 contour. Figure 9b shows the same results for *pro*-drop in (29): the absolutive H- is absent if the absolutive pronoun has been *pro*-dropped, but it is present otherwise, as long as the absolutive argument is overt.

(28) a. na lau e malini
PAST make.fun ERG marine
'The marines made fun of *pro*.' (*pro* drop of ABS)

b. na **H-** (ia) lau malini
PAST make.fun ABS (ABS) marine
'*pro* made fun of the marines.' (*pro* drop of ERG)

(29) na momoli { e / **H-** (ia) / i} malini
past drop.off { ERG / ABS (ABS) / OBL} marine
The marines dropped off pro / pro dropped off the marines / pro dropped off pro with the marines.



(a) momoli (verb)

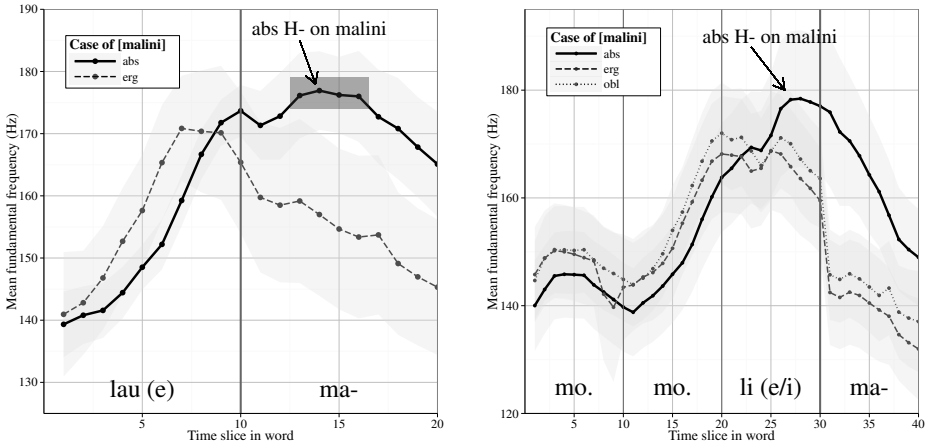
(b) liona (1st argument)

(c) nunua (2nd argument)

Fig. 8 Mean f0 contours for the verb *momoli* and the first two arguments *liona* and *nunua* in the ditransitive sentence set based on permuting the location of the case markers in (27).

Syntactic extraction in relative clauses The absolutive H- also does not appear in a relative clause when an absolutive argument has been extracted out of it. I show this with two data sets: one comparing extraction of the ergative subject vs. the absolutive object out of transitive embedded clauses, and one comparing extraction of ergative subjects out of transitive clauses vs. extraction of absolutive subjects out of intransitive clauses.

I elicited (30) as a minimal pair for comparing extraction of the ergative subject vs. the absolutive object out of a relative clause; see §A.6 for a minimal pair with a transitive matrix clause also elicited.



(a) na lau (e) malini (28) (b) na momoli (e/i) malini (29)

Fig. 9 F0 contours for *pro* drop sentences in (28) and (29). The absolutive H- isn't present if the absolutive pronoun is *pro*-dropped, but is present under ergative *pro*-drop as long as the overt argument [malini] is absolutive.

(30) Extraction of ergative subject vs. absolutive object, intransitive matrix clause[19]

a. Extraction of ergative subject

na manoŋi i le liona **H-** [le malini]$_i$
PAST smelly OBL DET.SPEC.SG liona ABS DET.SPEC.SG marine
[na lalaŋa-ina t_i **H-** le mamanu].
[PAST weave-INA t ABS DET.SPEC.SG design]

'The marine that wove the design was smelly to the lion.'

b. Extraction of absolutive object

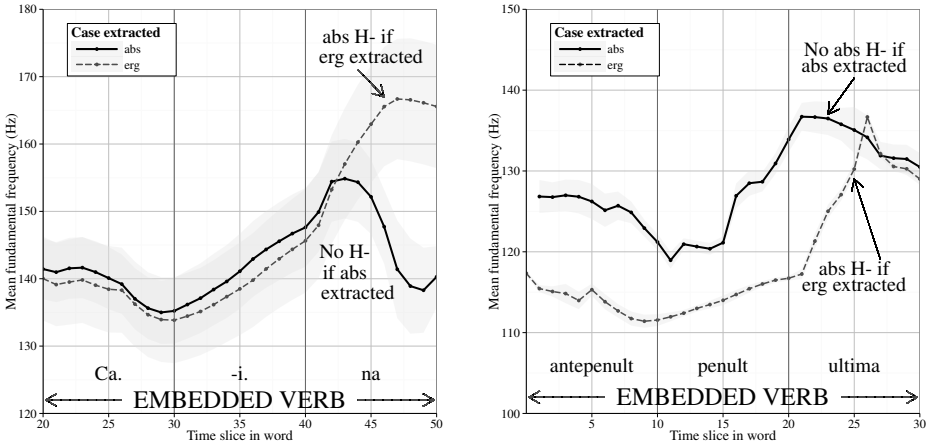
na manoŋi i le liona **H-** [le
PAST smelly OBL DET.SPEC.SG liona ABS DET.SPEC.SG
mamanu]$_i$ [na lalaŋa-ina e le malini t_i].
design [PAST weave-INA ERG DET.SPEC.SG marine t]

'The design that the marine wove was smelly to the lion.'

I show mean f0 contours over the last three syllables of the embedded verbs (e.g. [ŋa-i.na] from [la.laŋa-i.na]) in 30 from four speakers in Figure 10a.[20] Figure 10a shows that the absolutive H- does not appear at the right edge of the embedded verb if the absolutive object has been extracted. However, the absolutive H- does appear on the embedded verb if the ergative subject has been extracted, with the absolutive object remaining in the embedded clause.

[19] The sentences in 30 have oblique object - absolutive subject word order because this order was volunteered by two consultants.

[20] Appendix §A.6 explains why only four speakers were included.



(a) ERG subject vs. ABS object extraction (30) (b) ERG vs. ABS subject extraction (31)

Fig. 10 Mean f0 contours over embedded verb in relative clause for sentences. (a) f0 contours for ergative subject vs. absolutive object extraction, e.g. (30), (b) ergative vs. absolutive subject extraction, e.g. 31. An absolutive H- appears only if the ergative, rather than the absolutive argument, is extracted.

To confirm that the H- distribution shown in Figure 10a isn't the effect of subject vs. object extraction, I also elicited six additional sentences from my primary consultant with only subject extraction out of a relative clause, where the ergative or absolutive subject was extracted to object position in the matrix clause. Two examples are given in (31). These sentences were also "easier" extractions: subject extraction out of the final constituent in the matrix clause. Figure 10b shows that with these extractions, too, the absolutive H- did not appear on the embedded verb if the absolutive subject was extracted, but did appear if the ergative subject was extracted and the absolutive object was still present in the embedded clause. For this set of sentences, f0 on the embedded verb happened to be globally higher when the absolutive subject was extracted, compared to when the ergative subject was extracted. However, the contrast in the presence vs. the absence of the absolutive H- is still clear: the f0 contour is falling in the final syllable of the verb when the absolutive subject is extracted, but rising when the ergative subject is extracted.

(31) Examples of ergative vs. absolutive subject extraction[21]

a. Extraction of ergative subject

e laŋona e le liona **H-** (ia) [le
PRES hear ERG DET.SPEC.SG lion ABS DET.SPEC.SG marine
malini]$_i$ na momoli-ina t_i **H-** le manini
PAST deliver-INA t ABS DET.GS fish

'The lion hears the marine that delivered the fish.'

b. Extraction of absolutive subject

e laŋona e le malini **H-** (ia) [le
PRES hear ERG DET.SPEC.SG marine ABS DET.SPEC.SG fish
manini]$_i$ na manoŋi t_i i le liona
PAST smelly t OBL DET.SPEC.SG lion

'The marine hears the fish that was smelly to the lion.'

In summary, the absolutive H- cannot be targeting some syntactic constituent because the presence of the absolutive H- is insensitive to argument order, and because the absolutive H- isn't present if the absolutive argument isn't overt. An alternative way of the absolutive H- coming from a syntactic source would be for the prosodic phrasing induced by the absolutive to come from some more general syntactic relation, e.g. a phonological phrase must include a phrase head X^0 and all the phonological material within its maximal projection XP (Clements 1978; Nespor and Vogel 1982). But if this were the case, and we assume that an H- diagnoses some prosodic boundary larger than a prosodic word, then one would need to explain why the same general syntax-prosody mapping principle does not hold for the ergative argument or other syntactic constituents.

5.3 Against an information structural source

In the corpus of data for this paper, elicitations were typically done under out-of-the-blue focus, or with referents specified for sentences with pronouns and pro-drop. This raises the potential concern that the high tone I have found occurring before the absolutive might actually be marking some systematic information structural property. It has been observed cross-linguistically, independent of case-alignment, that new information preferentially appears in the S (subject) or O (object) roles, but not in the A (agent) role, e.g. DuBois (1987). Thus, if no context is given to a speaker in sentences elicited "out-of-the-blue", it's possible that speakers could be creating a context in their head, and opting for one that aligns with typical frequencies, i.e. where the absolutive argument happens to also to be introducing new information. Here I present additional evidence from systematic manipulation of discourse contexts that shows that the absolutive high is not in fact marking new information or information under focus; for completeness, I also show that it is not marking given material.

I elicited question-answer pairs manipulating discourse conditions with consultants in Auckland. Four sets of question-answer pairs were elicited: two with transitive verbs ([lalaŋa] 'weave', taking an inanimate object; [laŋona] 'hear', taking an animate object), and two with intransitive verbs ([malaŋa] 'journey', taking an inanimate PP object; [leaŋa] 'be bad', taking an animate PP object).

[21] A full list of stimuli recorded for ergative vs. absolutive subject extraction is in Appendix §A.6.

Below, for the [lalaŋa] set, I show the different question types used to generate different discourse conditions in (32), and the different answer types in (33). I recorded any question-answer pairs that the consultants accepted. The absolutive high is bolded in the answer examples.

(32) Question types

a. wh focus on subject

o ai na lalaŋa-ina le mamanu i le aso:?
top wh past weave-INA det.sg design obl det.sg day

'Who wove the design today?

b. wh focus on object

o le a: na fai e le malini i le aso:?
top det.sg wh past do erg det.sg marine obl det.sg day

'What did the marine do today?

c. wh focus on VP

o le a: le mea na lalaŋa-ina e le malini i
top det.sg wh det.sg thing past weave-INA erg det.sg marine obl
le aso:?
det.sg day

'What did the marine weave today?

d. broad (polarity) focus

na lalaŋa e le malini le mamanu i le aso:?
past weave erg det.sg marine det.sg design obl det.sg day

'Did the marine weave the design today?

e. corrective focus on subject

na lalaŋa e le pailate le mamanu i le aso:.
past weave erg det.sg pilot det.sg design obl det.sg day

'The pilot wove the design today.'

f. corrective focus on object

na lalaŋa e le malini le ato i le aso:.
past weave erg det.sg marine det.sg basket obl det.sg day

'The pilot wove the basket today.'

(33) Answer types

a. VSO

(leai,) na lalaŋa e le malini **H-** le mamanu i
(no) past weave erg det.sg marine abs det.sg design obl
le aso:.
det.sg day

'(No,) The marine wove the design today.'

b. VSO (negative polarity)

leai, e le?i lalaŋa-ina e le malini **H-** le mamanu
no, pres neg weave-INA erg det.sg marine abs det.sg design
i le aso**ː**.
obl det.sg day

'No, it's not the case that the marine wove the design today.'

c. VOS

na lalaŋa-ina **H-** le mamanu e le malini i le
past weave-INA abs det.sg design erg det.sg marine obl det.sg
aso**ː**.
day

'The marine wove the design today.
(The design was woven by the marine today.)'

d. fronted subject

(leai,) o le malini H- na lalaŋa-ina **H-** le mamanu
(no,) top det.sg marine H- past weave-INA abs det.sg design
i le aso**ː**
obl det.sg day

'(No,) The marine wove the design today.
(It was the marine that wove the design today.)'

e. fronted object

(leai,) o le mamanu H- na lalaŋa-ina e le malini
(no,) top det.sg design H- past weave-INA erg det.sg marine
i le aso**ː**
obl det.sg day

'(No,) it was the design that the marine wove today.'

Whether an argument was given, new, or under contrastive focus in the answers to the questions had no effect on the appearance of an H-: an H- always appeared before the absolutive argument, and never before the ergative argument or oblique object. This result is consistent with Calhoun (2015)'s results from intonational transcriptions for sentences elicited under broad focus ('What happened earlier'), question focus on the agent or direct object, and contrastive focus on the agent or direct object. That study also showed no evidence that the H- preceding the absolutive was sensitive to discourse structure.

6 The absolutive high as a tonal case marker

The current empirical evidence is against the source of the absolutive high coming from phonological grammar, syntactic constituency, or information structure. This leads me to propose that the source of the absolutive H- is

morphological: the high tone is a tonal case marker. This proposal raises a number of puzzles. First, how can there be a grammatical tonal morpheme in a non-tonal language from a language family without tone languages (§6.1)? Second, what is the phonological status of the absolutive high edge tone in the prosodic grammar (§6.2)? If the absolutive high is not just an edge tone, but also prosodic boundary tone, why should an absolutive argument in particular induce a prosodic boundary? And, if we assume that the absolutive high is a prosodic boundary tone, why is this tonal case marker realized in the prosodic phrase linearly *preceding* the absolutive argument rather than in the prosodic phrase initiated by the absolutive? After all, any reasonable syntactic theory would syntactically group the absolutive case head with the following DP.

6.1 A tonal morpheme in a sea of segmental ones?

There are documented cases of languages where there is an isolated inflectional tonal morpheme in a sea of otherwise segmental inflectional morphemes (Gordon 2005; Bennett and Henderson 2013). We will likely uncover more and more such cases as documentation of cross-linguistic prosody continues to grow. For the Samoan absolutive high, I have a hypothesis for its diachronic origin. A few sources in the literature remark that absolutive arguments are preceded by *ia* (Mosel and Hovdhaugen 1992: p. 51, 143; Vonen 1988: p. 38–39). Mosel and Hovdhaugen (1992, p. 143) states that absolutive *ia* is always optional and that it's mostly used before proper nouns and seldom in literary texts. Vonen (1988, p. 38-39) also states that *ia* is always optional and that it can be followed by an article, especially after hesitation.

In my own preliminary fieldwork, I've found that consultants are aware of the *ia* particle, and that they have systematic intuitions about where it is licit: *ia* may appear before an absolutive argument, but not before non-absolutive ones. The particle *ia* may also not occur between a fronted argument and the predicate, or before coordinators, where high edge tones also systematically occur. Thus, the distribution of *ia* appears to track with where absolutive H-tones occur, and not other H- tones. I hypothesize that the diachronic origin of the absolutive high may come from leftward tonal reassociation of the pitch accent on absolutive *ia*, upon deletion of the segmental material of *ia*. At a high-level, the process of segmental deletion and tonal re-linking that would be involved in this proposed origin of the absolutive H- is typical of tonal behavior in natural language. A characteristic property of tone is its "stability": even if the segmental material hosting a tone deletes, a tone will remain and be re-associated to remaining segmental material (Yip 2002: p. 67, Hyman 2011b: p. 210). Further elucidation of the connection between *ia* and the absolutive high is addressed in ANONYMOUS 2016.

6.2 The absolutive high in prosodic grammar

The empirical evidence supports that the absolutive high is an edge tone (§4.5) and not a head tone. Is this also grounds to claim that the absolutive H- is a prosodic boundary tone (that marks a prosodic boundary larger than a prosodic word)? In the intonational phonology literature, classification of a tone as an edge- rather than a head-marking tone is often taken as grounds for classification of a tone as a boundary tone demarcating a prosodic constituent within the prosodic hierarchy. That is, a high tone's peak systematically occurring at (close to) the edgemost mora of some prosodic constituent is taken to be a consequence of the high tone's association with that prosodic constituent's node in the prosodic hierarchy; conversely, the appearance of this high tone's peak is a diagnosis for a prosodic constituent edge, e.g. Pierrehumbert (1980) p. 32; Pierrehumbert and Beckman (1988), p. 126; Jun (1998), p. 221. However, Gussenhoven (2000) argues for a separation between the observed phonetic facts about the alignment of a tone and the tone's phonological association, and Gussenhoven (1990) argues for a divorce between domains of tonal association and constituents in the prosodic hierarchy.

I bring this up to point out that while there is empirical evidence that the absolutive high is aligned to an edge, it does not necessarily immediately follow that the absolutive high is associated to a particular constituent in some hierarchy of prosodic constituents. At this point in time, I do not have enough of an understanding of phonological processes that might be conditioned by prosodic domains in Samoan to provide a solid body of evidence that the edge where the absolutive high (or other H-'s) appears coincides with the edge of a domain that segmental phonological processes are sensitive to. Thus, I leave the status of the absolutive high in the prosodic grammar open; this issue is taken up in ANONYMOUS 2016. I sketch three hypotheses in (34), contrasting phrasing of an absolutive argument and the absolutive H- with the phrasing of an ergative argument and its case marker *e*:

(34) Three hypotheses for the status of the absolutive H- in the prosodic grammar

a. The absolutive H- is an edge tone but does not demarcate a prosodic constituent.

$\boxed{(\text{Verb } \mathbf{H\text{-}})_{PWd} \ (\ \ldots}$ and $\boxed{(\text{Verb } \mathbf{e})_{PWd} \ (\ \ldots}$

b. The prosodic phrasing of the absolutive and ergative arguments is the same even though no H- appears before the ergative, and there are non-tonal phonetic correlates of prosodic constituency.

$\boxed{(\text{Verb } \mathbf{H\text{-}})_{PPh} \ (\ \ldots}$ but $\boxed{(\text{Verb } \mathbf{e})_{PPh} \ (\ \ldots}$

c. The absolutive H- demarcates a prosodic constituent higher than a prosodic word, e.g. a phonological phrase. That is, an absolutive argument induces a prosodic domain higher than the prosodic word.

$\boxed{\text{(Verb } \textbf{H-})_{PPh} \text{ (} \ldots}$ but $\boxed{\text{(Verb } \textbf{e})_{PWd} \text{ (} \ldots}$

The first hypothesis states that an absolutive high tone appears at a prosodic word edge, but doesn't have the status of a prosodic boundary tone.

The second hypothesis points out that that the absence of tonal marking does not imply the absence of a prosodic constituent—prosodic domain edges sometimes lack target tones, but can be apparent from other properties of f0 such as pitch range scaling (Bennett To appear). Bennett (To appear) also notes the phenomenon of "covert" feet, where metrical structure exists without any direct phonetic correlate. Wagner (2005) proposed and showed initial evidence that finely resolved prosodic boundary strength is reflected in pre-boundary lengthening of conjuncts in coordinate structures, without any reference to tonal targets. The application of this idea in Samoan would be that syntax and/or phonology provides prosodic domain edges, which may be present even if tonal targets are not—including before non-absolutive arguments. The domain edge immediately preceding the absolutive attracts the absolutive high tone case morpheme, and domain edges may also attract other high tones. To test this idea, one would need to have a theory of where putative prosodic domain edges in Samoan would be, and then check for phonetic correlates of domain edges at these edges other than tonal targets, and compare them to domain edges marked by H-'s.

The third hypothesis states that the absolutive high tone is a prosodic boundary tone, demarcating the edge of some constituent higher than the prosodic word, such as a phonological phrase. In addition, the ergative argument is preceded by a constituent smaller than the constituent demarcated with an H-. That is, absolutive arguments always induces a prosodic constituent higher than a prosodic word, but not ergative arguments (or obliques); see Selkirk (2003) for a short discussion of the idea that tonal morphemes may induce prosodic phrase edges. What could be the explanation for a single member—but not the others in an inflectional paradigm—to induce a prosodic phrase edge? One idea is there is no (synchronic) explanation: the induction of a phrase edge by absolutive case is a "crazy rule" (Bach and Harms 1972)—a process motivated diachronically, but not synchronically. In this case, speakers might memorize that absolutive case is spelled out as a high boundary tone, with any pre-boundary lengthening a side-effect of having enough time to realize the upstepped absolutive H-. Another idea is that the imperative for contrast preservation in the case system ranks above constraints requiring that prosodic constituency be a faithful reflection of syntactic constituency, e.g. the family of MATCH constraints in Selkirk (2011). The stability of the absolutive high tone in the face of rampant dropping of segmental case markers in *tautala leaga* could be key for maintaining the contrast between ergative

and absolutive case and an important component of the input to language learners.

Positing that the absolutive high is a prosodic boundary tone gives rise to yet another puzzle: why is the absolutive high tone realized in the prosodic phrase *preceding* the one containing the absolutive argument? This location of the absolutive high tone peak is a puzzle because it implies a potential boundary paradox, schematized in (35). While any reasonable syntactic analysis would group the absolutive case marker and the absolutive DP in the same syntactic consituent, the prosodic phrasing splits the absolutive case marker and the absolutive DP into two different prosodic phrases.

(35) Boundary paradoxes for the absolutive high: prosodic vs. syntactic constituency

a. [ERG S] [ABS O] (syntactic constituency)

b. (ERG S ABS) (O) (prosodic constituency)

Preliminary evidence from the vowel quality of segmental case markers suggests that the same boundary paradox may occur for Samoan segmental case markers, so a unified explanation for the boundary paradox across case markers would be attractive. The boundary paradox introduced by these stressless segmental case markers could be explained as the ranking of StrongStart, which bans prosodic constituents that begin with weak prosodic elements (Selkirk 2011; Elfner 2012), above Match constraints demanding strict syntax-prosody isomorphism. The boundary paradox might also be explained on functional grounds: Himmelmann (2014) shows that the pattern of grammatical proclitics being phonological enclitics (but not the opposite) that I observe in Samoan is in fact the norm in natural language in cases of mismatches between syntactic and prosodic edges. Himmelmann (2014) further argues that this grouping generalization arises from speech planning. A final idea is to propose that there is no syntax-prosody boundary paradox, because prosodic constituency reflects spell-out units rather than syntactic constituency, e.g. Dobashi (2004, 2009). Spell-out units are not isomorphic with syntactic constituents. Under this theory of syntax-prosody mapping, we would need to say that the DP gets sent off to the phonological component, while the case head is left behind for the next Spell-out.

7 Conclusion

This paper has shown that a high edge tone (H-) precedes absolutive arguments. The evidence for this has come from a range of syntactic structures: transitive and intransitive sentences with specific and non-specific nominals, ditransitives, nominalizations, sentences with preverbal and postverbal pronominals or *pro*-drop, pseudo-noun incorporation, and extraction out of relative clauses. The source of the H- cannot be the phonological grammar, since the presence of the H- is insensitive to variation in prosodic length, and

since there's nothing fixed about the linear position of the absolutive in the sentence that could point to a regularity in prosodic phrasing surrounding the absolutive. It also can't be syntactic constituency, since the H- is absent before implicit absolutives and does not target any fixed syntactic node. It also can't be information structure, since the presence of the absolutive H- is insensitive to informational and contrastive focus. Thus, I can only conclude that the absolutive high has its source in the morphology.

My claim that the Samoan absolutive high is a tonal case marker introduces two puzzles. The first is the implication that Samoan has a single tonal inflectional morpheme—namely, the absolutive H-, while all other inflectional morphemes are segmental. I have sketched a way to address this puzzle by proposing a phonological process of tonal reassociation of a pitch accent after deletion of its host, absolutive *ia*, to the phonological material immediately preceding the absolutive argument. The second puzzle I have confronted comes from the asymmetry of a prosodic edge tone always preceding the absolutive argument, when there is none preceding non-absolutive arguments. I have raised the possibilities that: (i) the absolutive high does not demarcate a prosodic domain higher than a prosodic word and is not a prosodic boundary tone, or (ii) non-absolutive arguments do initiate prosodic domains just like absolutive arguments, but that these domains are not tonally marked, or (iii) constraints requiring that prosodic constituency be a faithful reflection of syntactic constituency are relaxed in favor of contrast preservation for case marking. Further explorations of the absolutive high and other high edge tones in Samoan will help elucidate the comparison between "tonal" vs. "intonational" tones and generally, the role that tones play in prosodic grammar.

The existence of an tonal absolutive case marker in Samoan also has implications for Austronesian morphosyntax, the syntax of ergativity, and the morphosyntax-phonology interface. While previous literature on Samoan has discussed unmarked case, the presence of the absolutive H- could discriminate between structures where case *is* marked for absolutive case, and structures where no overt case marking appears to be present. For instance, the lack of an H- before the pseudo-incorporated object in verb-initial sentences contrasts with the presence of an H- before the subject in PNI sentences. This distribution supports Massam (2001)'s analysis of PNI in Niuean which states that PNI involves fronting of the whole VP, with the PNI object being the internal NP inside; this NP has no case feature, but the agent DP argument can check absolutive case ((Massam 2001, (10)).

The existence of an absolutive H- also is reason for both optimism and pessimism about prosody as a transparent diagnostic for morphosyntactic structure (Steedman 1991; Wagner 2010). On the one hand, absolutive case appears to imply the presence of an H- unconditionally (though the phonetic realization of the H- may sometimes be difficult to discern). On the other hand, the homophony of the absolutive H- with other H-'s from a variety of sources in Samoan means that the presence of an H- alone cannot diagnose absolutive case for a linguist, parser, or learner. Perhaps most importantly, though, the existence of an absolutive H- is a reminder that the way utterances are pro-

nounced can reveal syntactic structure that is otherwise unclear in written sentences.

A Full list of stimuli elicited for basic distributional evidence

A.1 Transitive sentences (see §4.1)

Here is a full list of sentences used for the analysis in §4.1 in VSO order; one example is given for the VOS order counterpart.

(36) a. na tatala-(ina) e le tama **H-** le faitoto?a
PAST open-(INA) ERG DET.SPEC.SG boy ABS DET.SPEC.SG door
'The boy opened the door.'

b. sa: si?osi?o-(ina) e leoleo **H-** le fale
PAST surround-(INA) ERG police ABS DET.SPEC.SG house
'The police surrounded the house.'

c. ?ua etoeto-(ina) e le maile **H-** le manini.
PERF lick-(INA) ERG DET.SPEC.SG dog ABS DET.SPEC.SG fish
'The dog has licked the fish.'

d. na opo-(ina) e le tama **H-** le teine.
PAST hug-(INA) ERG DET.SPEC.SG boy ABS DET.SPEC.SG girl
'The boy hugged the girl.'

(37) na tatala-(ina) **H-** le faitoto?a e le tama.
past open-(INA) ABS DET.SPEC.SG door ERG DET.SPEC.SG boy
'The boy opened the door.'

A.2 Intransitive sentences (see §4.2)

Here is the full list of intransitive sentences used in the analysis in §4.2. The transitive counterpart for one of the first intransitive sentences is shown in (39), but the others are not.

(38) a. na manoŋi **H-** le manu i le maile i le
PAST smelly ABS DET.SPEC.SG bird OBL DET.SPEC.SG dog obl DET.SPEC.SG
afiafi.
evening
'The bird was smelly to the dog in the evening.'

b. na manoŋi **H-** le manu i maile i le afiafi.
PAST smelly ABS DET.SPEC.SG bird OBL dog OBL DET.SPEC.SG evening
'The birds were smelly to the dogs in the evening.'

c. na manoŋi **H-** le la: i le liona i le
PAST smelly ABS DET.SPEC.SG sun OBL DET.SPEC.SG lion OBL DET.SPEC.SG
taeao.
morning
'The sun was smelly to the lion in the morning.'

d. na manoŋi **H-** le la: i liona i le taeao.
PAST smelly ABS DET.SPEC.SG sun OBL lion OBL DET.SPEC.SG morning
'The sun was smelly to the lions in the morning.'

e. na manoŋi **H-** le laː i maile i le taeao.
PAST smelly ABS DET.SPEC.SG sun OBL dog OBL DET.SPEC.SG morning
'The sun was smelly to the dogs in the morning.'

(39) na laŋona e le manu **H-** le maile i le
PAST hear ERG DET.SPEC.SG bird ABS DET.SPEC.SG dog OBL DET.SPEC.SG
afiafi.
evening
'The bird heard the dog in the evening.'

A.3 Pronominals (see §4.3.2)

The full list of elicited stimuli partially exemplified in (20) and used to plot Figure 5 follows:

(40) Stimuli for Figure 5 in §4.3.2

a. na momoli e maːʔua **H-** malini
PAST take ERG 1.DU.EXC ABS marine
'We two dropped off the marines.'

b. na momoli e maːʔua i malini

c. na momoli **H-** maːʔua e malini

d. na momoli **H-** maːʔua i malini

e. na momoli jaː maːʔua e malini

f. na momoli jaː maːʔua **H-** malini

g. na momoli e malini **H-** maːʔua

h. na momoli e malini jaː maːʔua

i. na momoli **H-** malini e maːʔua

j. na momoli **H-** malini jaː maːʔua

k. na momoli i malini e maːʔua

l. na momoli i malini **H-** maːʔua

At least two fluent repetitions of each of these sentences were recorded and analyzed from all six consultants, with the following exceptions:

(41) Discarded repetitions

a. s18: one repetition each of 40c, 40e, 40h, 40i discarded due to disfluencies with obvious prosodic junctures

b. s19: one repetition of 40d discarded due to disfluency

c. s20: only VSO sentences were included since consultant rejected other word orders; these were 40b, 40d, 40g (one repetition disfluent; discarded), 40h, 40j

d. s21: one repetition of 40k discarded due to misreading sentence

The imbalance between the number of utterances of each item type for each speaker caused slight global skewing of the mean f0 values within an item type in the f0 contours in Figure 5 since the speakers had different pitch ranges, but the overall comparative trends between mean f0 contours in a plot were no different than if further items were discarded for balance across item types across speakers.

A.4 Nominalization (see §4.3.3)

The full nominalization stimulus set used for the plots in Figure 6 is given here. I call nominalizations "absolutive" if the occur in the absolutive argument position of a transitive sentence, and "oblique" if they occur in the oblique position of an intransitive sentence.

(42) Absolutive nominalizations

a. e {faʔa-leː-lelei / leaŋa} **H-** [le lalaŋa mamanu a malini] i
PRES {do-NEG-good / bad} ABS DET.SG weave design GEN marine OBL
le afiafi
DET.SG afternoon
'The marine's weaving of the design is not good' (faʔa-leː-lelei: poorly done, leaŋa: superstition).' (based on (Mosel and Hovdhaugen 1992, p. 545, (13.100)))'

b. e iloa-atu e le malini **H-** [le momoli-ina o le
pres spot DET.SG ERG marine ABS DET.SG deliver-INA gen DET.SG
malala]$_{abs}$ i le ala
charcoal obl the street
'The marine spots the delivering of the charcoal in the street.

c. e iloa-atu e le malini **H-** [le momoli-ina e le
PRES spot ERG DET.SG marine ABS (ABS) DET.SG deliver-INA ERG
liona **H-** (ia) le manini]$_{abs}$ i le ala.
DET.SG lion ABS DET.SG fish OBL DET.SG street
'The marine spots the delivering of the fish by the lion in the street.'

(43) Oblique nominalizations

a. e matamata **H-** le malini [i le lalaŋa o le mamanu]
PRES watch ABS DET.SG marine OBL DET.SG weave GEN DET.SG design]$_{obl}$
i le fale
OBL DET.SG house
'The marine watches the weaving of the design at home.'

b. e faʔaloŋoloŋo **H-** le malini [i le momoli-ina o le
pres listen ABS DET.SG marine obl DET.SG deliver-INA gen det.sg
malala]$_{obl}$ i le ala
charcoal obl DET.SG street
'The marine listens to the delivering of the charcoal in the street.

c. na faʔaloŋoloŋo **H-** le malini [i le momoli-ina e le
PAST listen ABS DET.SG marine DET.SG OBL deliver-INA ERG DET.SG
liona le manini]$_{obl}$ i le ala.
lion DET.SG fish OBL DET.SG street
'The marine listened to the delivering of the fish by the lion in the street.'

A.5 Pseudo noun incorporation (see §4.4)

There were four minimal sets used for plotting Figure 7 in §4.4. In addition to the pronominal sentences in (24), the minimal set of "charcoal delivering" sentences used for plotting Figure 7 also consisted of sentences with *le malini* as the subject:

(44) Charcoal delivering

a. na momoli e le malini malala i le teine
PAST deliver ERG DET.SPEC.SG marine charcoal OBL DET.SPEC.SG girl
'The marine delivered bags of charcoal to the girl.'

b. na momoli malala le malini i le teine
PAST deliver charcoal DET.SPEC.SG marine OBL DET.SPEC.SG girl
'The marine charcoal-delivered to the girl.'

Minimal sets like the "charcoal delivering" sentences, (44) and (24), were also elicited for (23), "badly melon washing", as well as "charcoal and blue chalk delivering" (45), and "badly lion hunting" (46).

(45) Charcoal and blue chalk delivering

a. na momoli e le malini **H-** (le) malala **H-** ma
PAST deliver ERG DET.SPEC.SG marine ABS (DET.SPEC.SG) charcoal CONJ CONJ
sioka lanu-moana i le teine
chalk color-sea OBL DET.SPEC.SG girl
'The marine delivered the bag(s) of charcoal and blue chalk to the girl.'

b. na momoli malala **H-** ma sioka lanu-moana **H-** le malini
PAST deliver charcoal CONJ CONJ chalk color-sea ABS DET.SPEC.SG marine
i le teine
OBL DET.SPEC.SG girl
'The marine charcoal-and-blue-chalk-delivered to the girl.'

(46) Badly lion hunting

a. na tuli e le malini le liona leaŋa
PAST hunt ERG DET.SPEC.SG marine DET.SPEC.SG lion bad
'The marine hunted the lion badly.'

b. na tuli liona leaŋa le malini i lalo o le laʔau
PAST hunt lion bad DET.SPEC.SG marine OBL under GEN DET.SPEC.SG tree
'The marine badly-lion-hunted under the tree.'

c. na tuli liona leaŋa ia i lalo o le laʔau

d. na ia tuli(-ina) liona leaŋa i lalo o le laʔau

A.6 Subject extraction out of relative clauses (see §5.2.2)

The data set exemplified in (31) included a set of six sentences elicited from my primary consultant. In addition to the pair of sentences in (31), this set of sentences included:

(47) Extraction of ergative subject

a. e manoŋi le liona i le malini na momoli-ina
ERG smelly DET.SPEC.SG lion OBL DET.SPEC.SG marine PAST take-INA
le manini
DET.SPEC.SG fish
'The lion smells to the marine that took along the fish.'

b. e manoŋi le liona i le malini na momoli-ina
ERG smelly DET.SPEC.SG lion OBL DET.SPEC.SG marine PAST take-INA
le manini
DET.SPEC.SG fish
'The lion hears the marine that took along the design.'

(48) Extraction of absolutive subject

a. e laŋona e le malini le manini na manoŋi i
PRES hear ERG DET.SPEC.SG marine DET.SPEC.SG fish PAST smelly OBL
le liona
DET.SPEC.SG lion
'The marine hears the fish that stank to the lion.'

b. e ŋalo le liona i le manini na manoŋi i
ERG forgotten.by DET.SPEC.SG lion OBL DET.SPEC.SG fish PAST smelly OBL
le malini
DET.SPEC.SG marine
'The lion is forgotten by the fish that the marine smelled to.'

References

Bach, Emmon, and Robert T. Harms. 1972. How do languages get crazy rules? In *Linguistic change and generative theory*, eds. Robert Stockwell and Ronald Macaulay, 1–21. Bloomington, IN: Indiana University Press.

Bennett, Ryan. To appear. Review of sun ah-jun (ed.) (2014). prosodic typology ii: the phonology of intonation and phrasing. *Phonology*.

Bennett, Ryan, and Robert Henderson. 2013. Accent in Uspanteko. *Natural Language & Linguistic Theory* 31: 589–645.

Boersma, Paul, and David Weenink. 2012. Praat: doing phonetics by computer (version 5.3.18) [computer program]. `http://www.praat.org`.

Bruce, Gösta. 1977. *Swedish word accents in sentence perspective*. Lund: CWK Gleerup.

Büring, Daniel. 2003. On D-trees, beans, and B-accents. *Linguistics and Philosophy* 26 (5): 511–545.

Calhoun, Sasha. 2015. The interaction of prosody and syntax in Samoan focus marking. *Lingua* 165 Part B: 205–229.

Chung, Sandra. 1978. *Case marking and grammatical relations in Polynesian*. Austin, TX: University of Texas Press.

Clements, George N. 1978. Tone and syntax in Ewe. In *Elements of tone, stress, and intonation*, ed. D. Napoli, 21–99. Washington, D.C.: Georgetown University Press.

Collins, James. To appear, a. Pseudo noun incorporation in discourse. In *Proceedings of AFLA 20*.

Collins, James N. 2014. The distribution of unmarked cases in Samoan. In *Argument realisations and related constructions in Austronesian languages: Papers from 12-ICAL*, eds. I Wayan Arka and N. L. K. Mas Indrawati, Vol. 2, 93–110. Canberra, Australia: Asia-Pacific Linguistics.

Collins, James N. To appear, b. Samoan predicate initial word order and object positions. *Natural Language & Linguistic Theory*.

Constant, Noah. 2014. Contrastive topic: meanings and realizations. PhD diss, University of Massachusetts Amherst, Amherst, MA.

Cook, Kenneth William. 1999. The Samoan transitive suffix as an inverse marker. In *Lexical and syntactical constructions and the construction of meaning: proceedings of the bi-annualICLA meeting in Albuquerque, July 1995*, ed. Eve Sweetser Marjolyn Verspoor Ki-dong Yi, 374–361. Amsterdam: John Benjamins Publishing Company.

del Mar Vanrell, Maria, Ignasi Mascaró, Francesc Toress-Tamarit, and Pilar Prieto. 2013. Intonation as an encoder of speaker certainty: information and confirmation yes-no questions in Catalan. *Language and Speech* 56 (2): 163–190.

Dobashi, Yoshihito. 2004. Multiple spell-out, label-free syntax, and PF-interface. *Explorations in English Linguistics* 19: 1–47.

Dobashi, Yoshihito. 2009. Multiple spell-out, assembly problem, and syntax-phonology mapping. In *Interface explorations : Phonological domains : Universals and deviations*, eds. Janet Grijzenhout and Baris Kabak, 195–220. Berlin, Germany: Mouton de Gruyter.

DuBois, John W. 1987. The discourse basis of ergativity. *Language* 63 (4): 805–855.

Duranti, Alessandro. 1981. *The Samoan fono: a sociolinguistic study. Pacific linguistics series b*. Canberra, Australia: Linguistic Circle of Canberra.

Duranti, Alessandro. 1990. Code switching and conflict management in Samoan multiparty interaction. *Pacific Studies* 14 (1): 1–30.

Elfner, Emily. 2012. Syntax-prosody interactions in Irish. PhD diss, University of Massachusetts Amherst, Amherst, MA.

Fougeron, Cécile, and Sun-Ah Jun. 1998. Rate effects on french intonation: prosodic organization and phonetic realization. *Journal of Phonetics* 26 (1): 45–69. doi:10.1006/jpho.1997.0062. http://www.sciencedirect.com/science/article/ B6WKT-45J4YMN-8/2/9470a0273f434170254bcf4dc9ab8ec7.

Gordon, Matthew K. 2005. Intonational phonology of Chickasaw. In *Prosodic typology*, ed. Sun-Ah Jun, 301–330. Oxford: Oxford University Press.

Gussenhoven, Carlos. 1990. Tonal association domains and the prosodic hierarchy in english. In *Studies in the pronunciation of english: a commemorative volume in honour of A. C. Gimson*, ed. Susan Ramsaran, 27–37. Routledge.

Gussenhoven, Carlos. 2000. The boundary tones are coming: on the nonperipheral realization of boundary tones. In *Papers in Laboratory Phonology V: Acquisition and the lexicon*, eds. Michael B. Broe and Janet B. Pierrehumbert, 132–151. Cambridge, UK: Cambridge University Press.

Hayes, Bruce. 1989. The prosodic hierarchy in meter. In *Rhythm and meter*, eds. Paul Kiparsky and Gilbert Youmans, 201–260. Orlando, FL: Academic Press.

Hayes, Bruce, and Aditi Lahiri. 1991. Bengali intonational phonology. *Natural Language & Linguistic Theory* 9: 47–96.

Hellmuth, Sam. 2009. The (absence of) prosodic reflexes of given/new information status in Egyptian Arabic. In *Information structure in spoken Arabic*, eds. J. Owens and A. Elgibali, 165–188. Oxford: Routledge.

Hellmuth, Samantha Jane. 2006. Intonational pitch accent distribution in Egyptian Arabic. PhD diss, School of Oriental & African Studies, University of London.

Himmelmann, Niklolaus P. 2014. Asymmetries in the prosodic phrasing of function words: Another look at the suffixing preference. *Language* 90 (4).

Hovdhaugen, Even. 1987. *From the land of nāfanua: Samoan oral texts in transcription with translation, notes and vocabulary*. Oslo, Norway: Norwegian University Press.

Hyman, Larry M. 2011. Tone: Is it different? In *The handbook of phonological theory*, eds. John Goldsmith, Jason Riggle, and Alan C. L. Yu, 197–239. Wiley-Blackwell. ISBN 9781444343069. http://onlinelibrary.wiley.com/doi/10.1002/9781444343069.ch7/summary.

Jackendoff, Ray. 1972. *Semantic interpretation in generative grammar*. Cambridge, MA: MIT Press.

Jun, Sun-Ah. 1998. The accentual phrase in the korean prosodic hierarchy. *Phonology* 15 (02): 189–226.

Jun, Sun-Ah. 2000. Korean ToBI, version 3. *UCLA Working Papers in Phonetics* 99: 149–173.

Jun, Sun-Ah. 2003. The effect of phrase length and speech rate on prosodic phrasing. In *Proceedings of the XVth International Congress of Phonetic Sciences*, 483–486. Barcelona, Spain.

Khan, Sameer ud Dowla. 2008. Intonational phonology and focus prosody of Bengali. PhD diss, University of California Los Angeles.

Khan, Sameer ud Dowla. 2014. The intonational phonology of Bangladeshi Standard Bengali. In *Prosodic typology ii: the phonology and phonetics of intonation and phrasing*, ed. Sun-Ah Jun, 81–117. Oxford, England: Oxford University Press. Chap. 4.

Koopman, Hilda. 2012. Samoan ergativity as double passivization. In *Functional heads: The cartography of syntactic structures*, Vol. 7, 168–180. Oxford: Oxford University Press.

Ladd, D. Robert. 2008. *Intonational phonology*, 2nd edn. Cambridge University Press.

Legate, Julie Anne. 2008. Morphological and abstract Case. *Linguistic Inquiry* 39 (1): 55–101.

Lewis, M. Paul, Gary F. Simons, and Charles D. Fennig, eds. 2014. *Ethnologue: Languages of the world, seventeenth edition*. Dallas, TX: SIL International. Online version: http://www.ethnologue.com.

Massam, Diane. 2001. Pseudo noun incorporation in Niuean. *Natural Language & Linguistic Theory* 19 (1): 153–197.

Mosel, Ulrike, and Even Hovdhaugen. 1992. *Samoan reference grammar*. Oslo: Scandinavian University Press.

Myers, Scott. 2003. F0 timing in kinyarwanda. *Phonetica* 60: 71–97. doi:10.1159/000071448.

Nespor, Marina, and Irene Vogel. 1982. Prosodic domains and external sandhi rules. In *The*

structure of phonological representation, eds. Harry van der Hulst and Norval Smith, 225–265. Dordrecht, The Netherlands: Foris Publications.

Nespor, Marina, and Irene Vogel. 1986. *Prosodic phonology*. Dordrecht, The Netherlands: Foris Publications.

Ochs, Elinor. 1982a. Ergativity and word order in Samoan child language. *Language* 58 (3): 646–671.

Ochs, Elinor. 1982b. Talking to children in Western Samoa. *Language in society* 11: 77–104.

Ochs, Elinor. 1986. Variation and error: a sociolinguistic approach to language acquisition in Samoa. In *The cross-linguistic study of language acquisition*, ed. Daniel Slobin, 733–838. Hillsdale, NJ: Lawrence Erlbaum.

Ochs, Elinor. 1988. *Culture and language development: language acquisition and language socialization in a Samoan village*. Cambridge, UK: Cambridge University Press.

Odden, David. 1987. Kimatuumbi phrasal phonology. *Phonology Yearbook* 4: 13–36. doi:10.2307/4615409. ArticleType: research-article / Full publication date: 1987 / Copyright © 1987 Cambridge University Press. http://www.jstor.org/stable/4615409.

Orfitelli, Robyn, and Kristine Yu. 2009. Intonational phonology of Samoan. In *Presented at Austronesian Formal Linguistics Association xvi, university of california, santa cruz.*.

Pawley, Andrew. 1966. Polynesian languages: a subgrouping based on shared innovations in morphology. *Journal of the Polynesian Society* 75: 39–64.

Pawley, Andrew. 1967. The relationships of Polynesian Outlier languages. *Journal of the Polynesian Society* 76: 259–296.

Pierrehumbert, Janet, and Mary Beckman. 1988. *Japanese tone structure*. The MIT Press.

Pierrehumbert, Janet, and Julia Hirschberg. 1990. The meaning of intonational contours in the interpretation of discourse. In *Intentions in communication*, eds. P. Cohen, J. Morgan, and M. Pollack, 271–311. Cambridge, MA: MIT Press.

Pierrehumbert, J. B. 1980. The phonology and phonetics of English intonation. PhD diss, MIT.

R Core Team. 2014. *R: A language and environment for statistical computing*. Vienna, Austria. R Foundation for Statistical Computing. http://www.R-project.org/.

Remijsen, Bert. 2001. Dialectal variation in the lexical tone system of ma'ya. *Language and Speech* 44 (4): 473–499. doi:10.1177/00238309010440040301. http://las.sagepub.com/content/44/4/473.abstract.

Riad, Tomas. 2006. Scandinavian accent typology. *STUF - Language Typology and Universals* 1: 36–55.

Selkirk, Elisabeth. 2003. Sentence phonology, 2nd edn. In *International encyclopedia of linguistics*, ed. William Frawley, Vol. 4, 41–42. New York: Oxford University Press.

Selkirk, Elisabeth. 2011. The syntax-phonology interface. In *The handbook of phonological theory*, eds. John Goldsmith, Jason Riggle, and Alan C. L. Yu, 435–484. Wiley-Blackwell. ISBN 9781444343069. http://onlinelibrary.wiley.com/doi/10.1002/9781444343069.ch14/summary.

Selkirk, Elisabeth O. 1986. *Phonology and syntax: the relationship between sound and structure*. Cambridge, MA: MIT Press.

Shue, Yen-Liang, Patricia Keating, Chad Vicenik, and Kristine Yu. 2011. Voicesauce: a program for voice analysis. *Proceedings of ICPhS XVI*.

Silverman, Kim E. A., and Janet B. Pierrehumbert. 1990. The timing of prenuclear high accents in English. In *Papers in Laboratory Phonology i: Between the grammar and physics of speech*, eds. John Kingston and Mary E. Beckman, 72–114. Cambridge University Press.

Steedman, Mark. 1991. Structure and intonation. *Language* 67 (2): 260–296.

Vonen, Arnfinn Muruvik. 1988. The noun phrase in Samoan and Tokelauan. PhD diss, University of Oslo, Oslo, Norway.

Wagner, Michael. 2005. Prosody and recursion. PhD diss, Massachusetts Institute of Technology.

Wagner, Michael. 2010. Prosody and recursion in coordinate structures and beyond. *Natural Language & Linguistic Theory* 28 (1): 183–237. doi:10.1007/s11049-009-9086-0. http://www.springerlink.com/content/43t2jp7h5p131tw8/.

Wickham, Hadley. 2009. *ggplot2: elegant graphics for data analysis*. Springer.

Xu, Yi. 1999. Effects of tone and focus on the formation and alignment of f0 contours.

Journal of Phonetics 27 (1): 55–105. doi:10.1006/jpho.1999.0086.
Xu, Yi. 2001. Fundamental frequency peak delay in Mandarin. *Phonetica* 58: 26–52.
Yip, Moira. 2002. *Tone*. Cambridge University Press.
Zuraw, Kie, Kristine M. Yu, and Robyn Orfitelli. 2014. The word-level prosody of Samoan. *Phonology* 31 (2): 271–327.