Chapter 4

Constituency and Wordhood in Kiowa

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This chapter builds on previous work (Miller 2015, 2018, 2020) and investigates wordhood in Kiowa, a polysynthetic Tanoan language spoken in Oklahoma, with a focus on the verbal predicate and clause. Using the Planar-Fractal Method (Tallman 2021), five candidates for wordhood are identified using twelve diagnostics (five morphosyntactic, six phonological, and deviations from biuniqueness). The candidates are identified by the convergence of both morphosyntactic and phonological criteria, and they are largely expected given previous analysis of the prosodic structure of Kiowa (Miller 2015, 2018, 2020).

1 Introduction

The definition of the word has been a longstanding focus of debate shaping multiple areas within linguistics (e.g. Dixon & Aikhenvald 2002, Dixon 2010, Bruening 2018). Polysynthesis has been a driving catalyst of the debate since first described by Duponceau (1819). Characteristic "sentence words", or single words that encode all necessary information to be a free-standing utterance, challenge traditional understandings of the "word" in all areas of grammar (Mithun 1983, Fortescue 1994, Evans & Sasse 2002: e.g.). Thus, polysynthetic languages must play a central role in determining a definition of wordhood. Complicating matters, Haspelmath (2011) suggests the lack of uniform criteria and methods across studies precludes a viable definition of the word. Additionally, Bickel & Zúñiga (2017) argue defining the word may be beyond reach due to substantial variation across and within languages. Tallman's (2021) Planar-Fractal Method offers a set of criteria that may be applied uniformly across languages, and this volume allows us to examine many languages (including a number of polysynthetic languages) while holding the methods constant.

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This chapter investigates wordhood in Kiowa, a polysynthetic Tanoan language spoken in Oklahoma, with a focus on the verbal predicate and clause. Building on previous work (Miller 2015, 2018, 2020), I use the Planar-Fractal Method to identify five candidates for wordhood using twelve diagnostics (five morphosyntactic, six phonological, and deviations from biuniqueness). The candidates are identified by the convergence of both morphosyntactic and phonological criteria, and they are largely expected given previous analysis of the prosodic structure of Kiowa (Miller 2015, 2018, 2020).

§2 provides an overview of the Kiowa language and its speakers. A brief grammatical sketch includes the phoneme inventories (2.1.1), basic syllable structure (2.1.2), tone inventory (2.1.3), the structure of the verb complex (3.4), and syntactic information relevant to the present analysis (2.1.5). I discuss how the data in this chapter is sourced and how it is presented in §2.2. In §3, I present the flattened planar structure of the Kiowa clause. §4 introduces five morphosyntactic constituency diagnostics to be applied to the Kiowa verbal planar structure: Free Occurrence (4.1), Non-interruptability (4.2), Non-permutability (4.3), Subspan Repetition (4.4), and Ciscategorial Selection (4.5). §5 introduces the six phonological processes which will be examined with respect to the verbal planar structure. Segmental domains are considered first: Syllabification and sensitive phenomena (5.1.1), Cluster Devoicing (5.1.2), Vowel Truncation (5.1.3), and Dental-Velar Switch (5.1.4). The section concludes with an examination of Tone Lowering (5.2) and Pausing (5.3). Finally I evaluate Deviations from Biuniqueness in §6. All results are summarized and discussed in §7.

2 The language and its speakers

Kiowa is a North American language spoken in southwestern Oklahoma. Though originally classified as a linguistic isolate by Powell (1891), later work found a close relationship between Kiowa and the Tanoan languages of New Mexico and Arizona (Harrington 1910, 1928, Miller 1959, Trager & Trager 1959). Hale (1962) showed that Kiowa should be classified as a Tanoan language, an affiliation which has since been adopted in subsequent work (e.g. Watkins 1984, Harbour 2003, Adger et al. 2009, McKenzie 2012, Sutton 2014, Miller 2015, 2018, 2020).

The Kiowa Tribal Complex is located in Carnegie, Oklahoma. While tribal membership is in the thousands, local administrators and activists estimate there are approximately ten expertly fluent native speakers and fifty proficient speakers of the language (Miller 2018). The most fluent elders are over 90 years old. Efforts to bolster language use and awareness are beginning to see results thanks

in large part to outreach events and teacher training through an Association for Native Americans (ANA) education grant awarded to the Kiowa tribe in 2016. Beginning at the same time, Dane Poolaw digitized and expanded upon work by Parker McKenzie, David Paddlety, Alecia Gonzales, and William Meadows, and compiled the Kiowa Language Student Glossary (Poolaw n.d.). A large-scale online dictionary project is also underway including full entries in four orthography systems, audio, story analyses, and grammatical sketches (Miller & Neely 2019). The four orthography systems will be presented and discussed in §2.2.

2.1 Grammatical sketch

This subsection provides a basic overview of relevant aspects of Kiowa grammar to be referenced in the present analysis. The phoneme inventory is presented in 2.1.1, followed by syllable structure in 2.1.2, and tone in 2.1.3. The final subsection (2.1.4) concludes with a summary of the morphophonological structure of the Kiowa verb complex, as well as the basic order of a Kiowa clause. The descriptions are intended to be very brief, as these topics are to be presented, justified, and modified when necessary in later sections.

2.1.1 Phoneme inventory

Kiowa's phoneme inventory has been established in earlier work (see Wonderly et al. 1954, Sivertsen 1956, Merrifield 1959, Watkins 1984). See Table 1 for the consonant inventory. In traditional Kiowa literature, the affricate [t͡s] is transcribed as [c], but I am adopting the IPA conventions here. The phoneme /l/ is noteworthy, as it is only realized as [l] syllable-initially. Otherwise, it is affricated as [^{d}l]. Note, also, that the phonemic status of the glottal stop is controversial. Some work has concluded that the glottal stop in Kiowa is problematic and unpredictable and therefore phonemic (Wonderly et al. 1954, Trager 1960), while other work has explained its distribution as entirely predictable and thus not phonemic (Sivertsen 1956, Merrifield 1959, Watkins 1984). The present analysis assumes the glottal stop is not a phoneme (adopting Watkins 1984's analysis, but the phonemic status of the glottal stop is not relevant to the arguments made here. It is included in Table 1 between parentheses, as this is an unresolved issue.)

Kiowa's vowel inventory may be found in Table 2. Monophthongs may be underlyingly short or long and oral or nasal. Diphthongs may be oral or nasal. Length is marked with the IPA symbol [:], and nasality is marked with the Polish hook (e.g. ą). The Polish hook is used extensively in the existing research on Kiowa, and that usage is continued here in place of the more modern tilde in order to avoid conflict with tonal diacritics.

Table 1: Consonants (adapted from Watkins 1984)

	Labial		Dental		Alveolar		Palatal	Velar		Laryngeal
Stops										
Plain	p	b	t	d				k	g	(ʔ)
Ejective	p’		t’					k’		
Aspirated	p^h		t^h					k^h		
Affricates										
Plain					t͡s					
Ejective					t͡s’					
Fricatives					s	z				h
Nasals		m		n						
Liquids				l						
Glides							j			

Table 2: Vowels (adapted from Watkins 1984)

	Monophthongs		Diphthongs	
	Front	Back	Front	Back
High	i	u		uj
Mid	e	o		oj
Low	a	ɔ	aj	ɔj

2.1.2 Syllable

The basic syllable in Kiowa consists of a vocalic nucleus, optionally preceded by one consonant (or Cj cluster), and optionally followed by one consonant from the set /p, t, m, n, l, j/ (Watkins 1984). The syllable may be schematized as (C)V(C). Thus, depending on the boundaries of syllabification, VCV sequences may be ambiguous in terms of syllabification. For example, a CVCV sequence may be syllabified as CV.CV as in the noun [màːˑjį́] ‘woman’ or as CVC.V as in the verb [bàt.ɔ̂m] ‘You make it’. This ambiguity forms the crucial test for syllabification domains in Kiowa, which will be discussed in detail in §5.1.1.

2.1.3 Tone

Pitch is contrastive in Kiowa (high, low, and falling). High tone (H) is marked with acute accent (e.g. á), low tone (L) is marked with a grave accent (e.g. à), and falling tone (HL) is marked with a circumflex (e.g. â). Only H and L are permitted on short vowels, while all three tones are permitted on long vowels or VC sequences when C is from the set /m, n, l, j/ (Watkins 1984). A minimal triplet is provided below in (1).

(1) H-L-F Minimal Triplet
t^{h}ɔ́: 'hunger'
t^{h}ɔ̀: 'sit, seat'
t^{h}ɔ̂: 'beyond'

Tones are modified through morphologically-conditioned (e.g. compound raising and lexically-specified tone lowering morphemes) and phonologically-conditioned processes (tone lowering). The present analysis focuses entirely on phonological tone lowering, as it is not restricted to specific morphemes or morphological structures. Interested readers are directed to Watkins (1984)'s discussion of morphologically-conditioned tone processes.

2.1.4 The verb complex

This subsection introduces previous accounts of the Kiowa verb and relevant morphophonological and syntactic information for the present analysis. This information, in particular, is expanded upon and updated in Sections 3-5 within the present methodology. A linear organization of the verb complex in Kiowa is provided in 2, which combines Watkins' Watkins (1984) and McKenzie's McKenzie (2012) analyses. Watkins refers to the extensive verb as the most complex word class in Kiowa.[1] With up to ten slots, the verb can form an independent clause through inflection, agreement, and the incorporation of verbs, nouns, and adverbs.

(2) PRONOM - (ADV) - (N) - (V) - STEM - ASP - (NEG) - (MOD) - (HSY) - (SYNT)

Only three elements above are obligatory: a pronominal (PRONOM), the stem (STEM), and a suffix indicating aspect (ASP), which is sometimes pronounced (e.g. imperfective /-mà/), sometimes phonetically null (e.g. perfective /-∅/), and sometimes collapsed with the STEM via stem allomorphy or alternations (e.g. adding

[1]Note that Watkins does not refer to any diagnostics for wordhood and is likely referring to traditional lexical categories and what could be considered an X^{0}.

falling tone to indicate the imperative). Therefore, a verb complex in Kiowa may be very short as in (3) or extremely long as in (4).

(3) *hɔ́n* *∅-* *t^{h}ép* *-∅*
NEG [3SG]- go.out -PFV
PRONOM- STEM -ASP
'He didn't go out.' (Miller 2018: 44)

(4) *àn* *à-* *bô:-* *pòlà:jì-* *ę̀:-* *bàn* *-mà*
HAB [1SG]- always- rabbit- hunt- go -IPFV
PRONOM- ADV- N- V- STEM -ASP
'I am always going rabbit hunting.' (Miller 2018: 44)[2]

Historically, the pronominal is a complex morphological element (Merrifield 1959, Watkins 1984, 1993, Adger & Harbour 2007, Miller in prep). Previous research traditionally calls the pronominal a "pronominal prefix", but this is modified here as "prefix" is a misnomer. Watkins (1984) argues that the pronominal was composed of a tightly knit cluster of morphemes, which indicate the semantic role of the primary animate participant (agent or patient), that participant's person and number, and the number of any third person object. Each piece of information is encoded as a sub-syllabic segment (C or V) or tone (H or L) in the form CV́VC or CV̀VC. The semantic interpretations of each segmental slot and tone are provided in (5).

(5)

C	-V	-V	-C	(L/H)
Person	-Person No.	-Object	-Object No.	(Agent/Patient)

For example, consider the pronominal in (6) below. Watkins glosses pronominals as bracketed strings containing primary role information (Agent, Patient, Object) like [A:P:OBJ], so the pronominal below is glossed as [(X/A):2PL/P:PL/OBJ]. In this case, there is an implied agent of unspecified person, a second person plural patient is the primary participant, and there is a plural object. Implied agents are not marked explicitly, so the segmental and tonal information comes from the Patient and the Object. Because the patient is second person, the first morpheme slot for Person is filled with /b/. The second slot for Person Number is then filled with /ɔ/, since the patient is plural.[3] The third slot for Object is filled

[2]The verb stem is incorrectly transcribed as [bá:] in Miller 2018. This is corrected here.

[3]/ia/ actually indicates that the number of the patient is non-dual, non-inverse, and non-singular (Watkins 1984: 118). I have abbreviated this as 'plural' here for clarity.

with /ia/, since the object is plural. The last morpheme slot is then filled with /d/, since a plural object is non-singular. Finally, the pronominal is marked with a high tone, since the primary animate participant is a patient.[4] The analysis is complex and abstract, but it is the best analysis of the patterns observed in Kiowa pronominals to date.

(6)

b	-ɔ́	-ia	-d
2	-PL	-PL	-NONSG

Each slot is then subject to a series of phonological processes yielding a surface form that can be quite different from the underlying form. All but one process (nasalization) are productive and seen outside of pronominals in Kiowa.[5] As seen below, the underlying form is subject to four processes: Vowel Truncation, Glide Formation, Glide Deletion, and Final Devoicing.

(7) [(X/A):2PL/P:PL/OBJ] (Watkins 1984: 41—42)

/b-ɔ́-ia-d/	
biád	Vowel Truncation
bjád	Glide Formation
bád	Glide Deletion
bát	Final Devoicing
[bát]	

This decomposition is not active synchronically. Speakers are not aware of meaningful segmental morphemes, and they instead focus on the complex meanings of the pronominals. Therefore, I treat them as single elements in the present analysis.

The verb stem may consist of a simple root or a root combined with derivational or inflectional endings resulting in several different kinds of stems, including derived transitives, intransitives, and thematic stems (Watkins 1984). The verb obligatorily marks Aspect (e.g. perfective vs. imperfective) via suffixation (e.g. /-má/ 'imperfective'), stem allomorphy (e.g. imperfective stems are marked by final -n, -l, or a falling tone on the root vowel), zero allomorphs (e.g. perfective stems are sometimes marked by -∅), or a combination of the three. All other verb endings are optional but must occur in the order Aspect - Negative - Modality - Hearsay. The two modality suffixes (imperative and future) may co-occur in that

[4] Interested readers are directed to Watkins (1984) and to Miller (in prep) for a discussion of the pronominal prefixes and all of the possibilities for each of the slots.

[5] Watkins (1984) argues that the nasalization process may have been more widespread historically. Interested readers are directed to her discussion beginning on page 48.

order when modifying an imperfective stem.[6] Consider the Stem /bá:/ ‘go’ in (8). In (8a), the stem is inflected as perfective. Because the root ends in a long vowel, a zero allomorph attaches, and the stem appears unchanged. When imperfective in (8b), the stem ends in [n] and the suffix *-má*. In (8c)-(8e), all suffixes attach to the perfective stem from (8a).

(8) Inflections of /bá:/ ‘go’

a. Stem-Aspect (Perfective)
bá: -∅
go -PFV
‘went’

b. Stem-Aspect (Imperfective)
bán -mà
go -IPFV
‘went’

c. Stem-Aspect-Negative
bá: -mɔ̂
go.PFV -NEG
‘not go’

d. Stem-Aspect-Negative-Modality
bá: -mɔ̂: -t’ɔ:
go.PFV -NEG -FUT
‘will not go’

e. Stem-Aspect-Negative-Modality-Hearsay
bá: -mɔ̂ -t’ɔ: -dê:
go.PFV -NEG -FUT -HSY
‘will not go (it was said)’

Preceding the stem but following the pronominal are optionally incorporated adverbs, nouns, and verbs (9). Incorporated stems are bare (without suffixes) and are typically phonologically identical to their inflected perfective stems.[7]

[6]The negative suffix only adds to perfective stems. Additionally, of modality suffixes (imperative and future), only future may co-occur with the other suffixes in this string unless the imperative and future co-occur together (Watkins 1984).

[7]A notable exception to this is that incorporated verbs beginning in an underlying voiced obstruent or /h/ demonstrate a stem-initial ablaut rule. Interested readers are directed to Watkins (1984: 60) for a discussion of this process.

(9) Incorporated Elements (Miller 2018: 46—47)

a. Adverb
à- *kɔ̀ét-* *bá:*
[1SG]- fearfully- go.PFV
'I fearfully went.'

b. Verb
à- *dę̀:-* *hê:m -à*
[1SG]- sleep- die -IPFV
'I'm sleepy/I'm about to sleep.'

c. Noun
bé- *t͡sát-* *hę̀:dè*
[2SG/A:INV/OBJ]- door- remove.IPFV
'Open the door.'

Finally, syntactic markers indicate clausal relationships such as relative clauses, subordinating conjunctions, and switch-reference markers (Watkins 1984).[8] A complete list of Kiowa's syntactic markers is provided in (10), and (11) shows the nominal basic suffix /-dè/ used in the relativization of the first verb complex referring back to the noun [kút] 'book'.

(10) Syntactic Markers (Watkins 1984: 230–244)

Nominal	/-dè/	'basic'
	/-gɔ̀/	'inverse'
Locative	/-èm/	'here/away'
	/-òj/	'at/generally'
	/-ę̀/	'here'
Switch-Reference	/-gɔ̀/	'and/same'
	/-nɔ̀/	'and/different'
	/-t͡sè/	'when, if/same'
	/-ę̀/	'when, if/different'
	/-k'ɔ̀t/	'yet, anyway/same'
	/-ɔ̀t/	'yet, anyway/different'
Other	/-àl/	'although, even though'
	/-dò/	'because'

[8] Watkins (1984) calls these "syntactic suffixes", but this is only true of the locatives. All others are clitics. Thus, I have chosen the more neutral term "syntactic markers" here.

(11) *kút gjá- tót -dè ją́-*
book [(1SG/A):2,3SG/P:SG/OBJ]- send.PFV -NOM [(2,3SG/A):1SG/P:PL/OBJ]-
ǫ́:
give.IMP
'Give me the book that was sent.' (Miller 2018: 47)

2.1.5 Relevant syntax

Kiowa demonstrates a basic SOV word order (e.g. Watkins 1984, 1990, Harbour 2003, Adger & Harbour 2007, Adger et al. 2009, McKenzie 2012) as seen in (12), though it is subject to change due to discourse factors. For example, topics may be left-dislocated and given nouns may be right-dislocated after the verb. When two objects are present, the indirect object precedes the direct object. Kiowa is also a pro-drop language, and any argument can be left out. In fact, most Kiowa sentences consist only of a verb and its pronominal.

(12) *t͡séɡùn sà:né ∅- hân*
dog snake [3SG/A:SG/OBJ]- eat.PFV
'The dog ate the snake.' (Miller 2018: 48)

Determiner Phrases consist of Quantifier - Demonstrative - Noun. Demonstratives are the only overt determiners in Kiowa (13). There are no adjectives in Kiowa. Instead, adjectival modification occurs through compounds (14) or relative clauses (recall 11).

(13) *té: új -ɡɔ̀ t͡sę́: -ɡɔ̀*
all that -INV horse -INV
'All those horses' (adapted from McKenzie 2012: 35)

(14) *k'ją́:hį́: + ét*
man + be.big
'big man' (Miller 2018: 48)

Relative clauses are head-internal and marked with a clause-final nominalizer that agrees in number with the head noun (/-dè/ or /-ɡɔ̀/). They are optionally preceded by a subordinating particle /ɔ́ɡɔ̀/ to provide clarity as in (15), and the relative anaphoric particle /ám/ is used when the relativized noun has been mentioned previously or the speaker assumes the addressee has it in mind (16). When both particles co-occur, the subordinating particle precedes the anaphoric particle.

(15) *{ɔ́gɔ̀ sôl bàt- tá:- ɔ̨́:m -è -dè}* *gjà- ból- dɔ̀:*
{SUB onion [2SG/A:PL/OBJ]- cook- do -PFV -NOM/BAS} [PL]- rotten- be
'The onions that you cooked are rotten.' (Watkins 1984: 231)

(16) *{ɔ́gɔ̀ ám kút bàt- hɔ́: -gjà -dè}*
{SUB ANPH book [2SG/A:PL/OBJ]- get -PFV -NOM/BAS}
ją́- ɔ́:
[(2,3SG/A):1SG/P:PL/OBJ]- give.IPFV
'Give me that book that you bought.' (Watkins 1984: 231)

McKenzie (2012) shows that relative clauses are embedded using scope facts and center-embedding, which I also assume here. In a neutral order, relative clauses occur in place of the relativized noun. In questions, the relative clauses are left-dislocated (17). To indicate new information or contrast, the head itself can be left-dislocated from the relative clause as in (18). Finally, like overt DPs, the relative clause can also be right-dislocated to indicate that it is old information.

(17) *{ɔ́gɔ̀ k'ją́:hí̯: ∅- pǫ́:- t͡sán -dè}* *hɔ́ Lawton-gù ∅-* *bá:*
SUB man [3SG]- see- arrive.PFV -NOM Q Lawton-to [3/SG]- go.PFV
'Did the man who came to see you go to Lawton?' (Watkins 1984: 212)

(18) *Gene ∅- tǫ́: -tɔ́: tógúl {ɔ́gɔ̀ t͡ségùn*
Gene [3SG/A:SG/OBJ]- talk.to -IPFV boy {SUB dog
à- p'ɔ̂j -dè}.
[(2,3SG/A):3SG/P:SG/OBJ]- lose.PFV -NOM/BAS
'Gene is talking to the boy who lost his dog.' (Watkins 1984: 234)

Questions use a sentence-initial yes/no question particle [hɔ̀] as in (19). Wh-words are obligatorily fronted as in (20).

(19) *á- jój -gɔ̀ hɔ̀ bèt- kój- tǫ̨- hájgjá- dɔ́:*
your- child.INV -INV Q [2PL/A:PL/OBJ]- Kiowa- speak- know- be
'Do your children speak Kiowa?' (Miller 2018: 48)

(20) *hɔ̂ndé ∅- dɔ́:*
what [3SG]- be
'What is it?' (Miller 2018: 48)

2.2 Data presentation and sources

All data presented in this chapter comes from previously published sources on Kiowa or my own fieldwork on the language in 2016 and 2019. It is provided in the International Phonetic Alphabet (IPA) rather than a Kiowa orthographic system. There is no standard Kiowa orthography, though there are four systems currently in use: the Original Parker McKenzie system (OPM), two Modified McKenzie systems (MMB uses a bracket notation and MMS uses a strike-through notation), and the Gonzales Phonic System (GPS).[9]

Parker McKenzie was a Kiowa leader and linguist who devoted the majority of his life to the study of the language and the development of an orthographic system. The system is a phonetic transcription system, aiming for a one-to-one relationship between symbols and sounds much like the IPA. The system is summarized and published in McKenzie & Meadows (2001). It is praised for its phonetic accuracy in Watkins & Harbour (2010). The system has also been used extensively in various works on Kiowa (Palmer Jr. 2003, Meadows 2010, McKenzie 2010, 2012, 2015, Sutton 2014: e.g.). Though the most popular orthography amongst language learners (e.g. at University of Oklahoma) and linguists for its marking of vowel length, nasality, and tone, older native speakers tend to find it difficult to understand. Language learners also struggle with how non-English sounds are transcribed, and it is difficult to use his diacritic system on a computer without complex unicode combinations or using typesetting systems like LaTeX.

Alecia Gonzales, a Kiowa speech language pathologist, used much of Parker McKenzie's work as a guide when creating a more user-friendly orthography for pedagogical purposes (Gonzales 2001). The GPS is a transphonic system, and it is decidedly closer to English orthography. It bypasses marking tone entirely, while marking nasalization and non-English sounds with a series of digraphs and trigraphs. It is also largely written in monosyllabic or monomorphemic chunks. Though it is successfully used in the classroom, it can be confusing without certain phonemic properties listed and is not well-suited to linguistic study. Neely & Palmer Jr. (2009) offer a comparison between the GPS and OPM systems, as well as examining the larger context of language ideologies.

The final two systems are closely related to the OPM system. The Modified McKenzie Bracket and Modified McKenzie Strike-through systems update OPM to include more intuitive symbols. The MMS was largely created at University of Oklahoma by Kiowa teachers and activists involved in language classes, and it

[9]Another system of note is the Summer Institute of Linguistics (SIL) system used to publish Kiowa hymns (Gibson et al. 1962; reprinted as sleeve notes in Kotay 2005), which is still well-liked.

is the orthography used in the Kiowa Student Language Glossary (Poolaw n.d.). The MMB was adapted by the Kiowa Language & Culture Revitalization Program in an effort to turn the MMS into a more "texting-friendly" system that does not require any special or conditional formatting like a strike-through. They almost exclusively use the MMB system now in their language materials.

A side-by-side comparison of all four systems are presented in Table 3 alongside the IPA.

Table 3: Kiowa orthography comparison. The translation between systems is my own.

	'come here'	'one'	'man'
IPA	èm-ą́:	pá:gɔ̀	k'ją́:hî̯:
OPM	èm ą́	fą́gàu	qą́hî̯
MMB	èm á:]n	]bá:gàu	k'já:]nhî:]n
MMS	èm á:~~n~~	~~b~~á:gàu	k'já:~~n~~hî:~~n~~
GPS	aim ahn	pbah gaw	kxai-hehn

It is worth noting that the use of spaces to connote word boundaries varies widely between speakers of Kiowa. Using GPS, most spaces occur between monosyllables or simple morphemes. Dashes are sometimes used, though, this seems to be dependent on who is writing. Most language learners use OPM or one of the Modified McKenzie systems. Though word boundaries in those systems are considered to be more along the lines of what a linguist would assume (grouping bound morphemes together into complexes), language learners often default to spaces between syllables at first. This is likely due to language learners not yet understanding the meanings associated with each morpheme. Instead, they focus on individual syllables at a time. In my experience, native speakers who use an orthography can agree on the meaning of individual morphemes but vary in identifying where words are. This is particularly interesting for this chapter, as it raises questions about the psychological reality of any wordhood candidates for native speakers and language learners alike.

3 Planar structure

For this analysis, I adopt the Planar-Fractal Method first introduced in Tallman 2021. All morphological and syntactic information is flattened and presented as a planar structure to eliminate as many a priori assumptions about structural

relationships or constituency as possible.[10] Planar structures include elements, positions, slots, and zones.

(21) Planar Structure Properties (Tallman 2021: 10–11)

a. **Element**: A formative, morpheme, affix, clitic, root, stem, phrase, clitic, or compound. Or more generally any simplex element or definable subspan of the planar structure. An element can refer to a whole paradigm of categories (e.g. associated motion) or a single morpheme (e.g. *=yó* 'completive') which may not enter into paradigmatic relations.

b. **Position**: Planar structures are made up of positions. Each position in a template has a number that is used to account for relative ordering of its elements within the planar structure. Each position is either a slot or a zone.

c. **Zone**: A type of position where more than one element can occur, and the elements are not constrained with respect to their ordering. For example, a zone with the elements a, b can output five possible strings: ∅, ab, ba, a or b.

d. **Slot**: A type of position where only one element can occur at a time. If elements are listed as potentially occupying a slot, they are mutually exclusive. For example, a slot with elements a, b can output three possible strings: ∅, a or b.

The Kiowa verbal planar structure is presented in Table 4. The structure expands upon the brief explanation of the Kiowa verb and syntactic information of the larger clause in 2.1. As mentioned before, the only required elements in a clause are the pronominal (Position 25), the verb stem (simple or derived in Position 29), and some Aspectual marking (Position 30 when a suffix). Note that overt DPs are included in their neutral pre-verbal position, but arguments are encoded via the pronominal.

Discontinuity is common in Kiowa. I have attempted to account for it as much as possible by indicating all places in the planar structure where certain elements may appear. As mentioned earlier, overt DPs and relative clauses may be right-dislocated due to new/old information or to avoid clashes with similar words. Relative clauses may also left-dislocate in questions, which is indicated in Position (1). These positions are included in the planar structure, but do not affect

[10] Interested readers are directed to Tallman 2021 for an in depth discussion of the motivation behind the Planar-Fractal Method. Such a discussion is beyond the purview of the present chapter.

Table 4: Kiowa verbal planar structure

Pos.	Type	Elements	Forms
(1)	Slot	Left-Dislocated RC	
(2)	Slot	Question Particles/WH Words	*hɔ́, hâ:têl, hôndé, etc.*
(3)	Slot	Clause Introducers	*hétɔ́, hègɔ́*
(4)	Zone	Modal Particles	*pàhɻ́:, bèthêndè, mɔ́n, etc.*
(5)	Zone	Tense/Aspect Particles	*sɔ́t, mîn, àn, etc.*
(6)	Slot	Adverbs (place, manner, time)	
(7)	Slot	Noun-Locative Adverbials	
(8)	Zone	Modal Particles	*pàhɻ́:, bèthêndè, mɔ́n, etc.*
(9)	Zone	Tense/Aspect Particles	*sɔ́t, mîn, àn, etc.*
(10)	Slot	Negation	*hɔ́n, pòj, hɻ́:*
(11)	Zone	Modal Particles	*pàhɻ́:, bèthêndè, mɔ́n, etc.*
(12)	Zone	Tense/Aspect Particles	*sɔ́t, mîn, àn, etc.*
(13)	Slot	DP {A, S} or RC	
(14)	Slot	Noun-Locative Adverbials	
(15)	Zone	Modal Particles	*pàhɻ́:, bèthêndè, mɔ́n, etc.*
(16)	Zone	Tense/Aspect Particles	*sɔ́t, mîn, àn, etc.*
(17)	Slot	DP {P, i.o.} or RC	
(18)	Slot	Noun-Locative Adverbials	
(19)	Zone	Modal Particles	*pàhɻ́:, bèthêndè, mɔ́n, etc.*
(20)	Zone	Tense/Aspect Particles	*sɔ́t, mîn, àn, etc.*
(21)	Slot	DP {d.o.} or RC	
(22)	Slot	Noun-Locative Adverbials	
(23)	Zone	Modal Particles	*pàhɻ́:, bèthêndè, mɔ́n, etc.*
(24)	Zone	Tense/Aspect Particles	*sɔ́t, mîn, àn, etc.*
(25)	Slot	Pronominal	
(26)	Slot	Incorp. Adverb	
(27)	Slot	Incorp. Noun	
(28)	Slot	Incorp. Verb	
(29)	Slot	Verb Stem (Root-Deriv)	
(30)	Slot	Aspect Suffix	*-mɔ̀, -gù, -(m)ià*
(31)	Slot	Negative Suffix	*-ɔ̂: allomorphs*
(32)	Zone	Modality Suffix	*-tɔ́:, -t'ɔ́:, -î*
(33)	Slot	Hearsay Suffix	*-hêl, etc. allomorphs*
(34)	Slot	Nominalizer/Relativizer Suffix	*-dè, -gɔ̀, -nɔ̀, etc.*
(35)	Slot	Locative/Directional Suffix	*-èm, -òj, ɻ̀:*, etc.
(36)	Slot	Subordinate Markers	*switch-reference markers, etc.*
(37)	Slot	Adverbs (place, manner, time)	
(38)	Slot	Noun-Locative Adverbials	
(39)	Slot	Right-Dislocated DP or RC	

any diagnostics and therefore will not be discussed much further. Finally, the subordinating and anaphoric particles in relative clauses mentioned in §2.1.5 are assumed as possible initial positions within any "RC" below but are not included in the overall planar structure.
Before turning to any constituency tests, let us examine each of the positions in Table 4. The remainder of this section is divided into the following subsections: Clause-Initial Elements (3.1), Adverbials and Negation (3.2), Modal and Tense/Aspect Particles (3.3), and the Verb Complex (3.4).

3.1 Clause-initial elements

Questions are introduced with a question particle (*hɔ́*) or WH-word in Slot 2 as in (22). Questioned relative clauses are the only elements which may occur earlier in the clause, which will be discussed in §3.4.

(22) Questions

a. *hɔ́ mén- gút*
2 25- 29.30
Q [(X/A):3DU/P:PL/OBJ]- write.PFV
'Did you write to them?' (Watkins 1984: 212)

b. *hɔ̂ndé ∅- dɔ̀:*
2 25- 29
what [3SG]- be
'What is it?' (Miller 2018: 48)

Clause introducing particles (*hègɔ́* 'now, then'[11] or *hétɔ́* 'still') follow in position 3 as in (23) and (24).

(23) Clause Introducer
hègɔ́ ját dè- kò:dó- pè:tòp
3 6 25- 26- 29.30
now right.now [1SG/REFL]- very- try.IPFV
'I'm really trying right now.' (Watkins 1984: 218)

[11]The particle *hègɔ́* is commonly used as a filler word in Kiowa. It is also often truncated or reduced, sometimes only pronounced as [g] (Andrew Robert McKenzie, p.c.). For this chapter, I will focus on its non-filler use, distribution, and restrictions.

(24) Question and Clause Introducer

hɔ́	*hègɔ́*	*gɔ́-*		*tʰét*	*-kjá*
2	3	25-		29	-30
Q	now	[(1SG/A):2SG/P:INV/OBJ]-		cut.open	-DET/PFV

'Did you manage to get it cut open?' (Watkins 1984: 143)

3.2 Adverbials and negation

Some elements are possible in multiple positions within the clause (adverbs and noun-locative adverbials) and are included at each location they may occur. For example, adverbs are possible in pre- and post-verbal Slots 6 and 37 as in (25).

(25) a. Pre-Verbal Adverb

gɪ́́:gɔ́:	*àn*	*dé-*	*kʰî:pòp*
6	24	25-	29.30
early/morning	HAB	[1SG/REFL]-	fly.up/IPFV

'I pop up early in the morning.' (Watkins 1984: 209)

b. Post-Verbal Adverb

jí:dè	*ójdè*	*mátʰɔ̀n*	*dɔ́-*		*k'ɔ́:t*	*-é*	*kʰí:dêl*
21	21	21	25-		29	-30	37
both	that	girl	[(X/A):1PL/P:∅/OBJ]-		meet	-PFV	yesterday

'Both those girls met us yesterday.' (Watkins 1984: 210)[12]

Noun-Locative Adverbials' neutral positions are post pre-verbal adverb (Slot 7) as in (26) or after overt Nouns (Slots 14, 18, and 22) as in (27).[13]

(26) Noun-Locative after Pre-verbal Adverb

t'á:gjàj	*mɔ́n-tò*	*gjá-*	*pʰáttɔ̀*
6	7	25-	29.30
carefully	hand-with	[1SG/A:SG/OBJ]-	smooth.IPFV

'I was carefully smoothing it with my hands.' (Watkins 1984: 210)

[12]The DP [jí:dè ójdè mátʰɔ̀n] 'both those girls' forms a single preverbal direct object DP slot 21. As DP structure is not within the scope of this chapter, I have chosen to mark each element within the DP as Slot 21. This method will be adopted throughout the rest of the chapter whenever a multi-part DP is present in the clause.

[13]Note that in (27c) the direct object - noun-locative sequence occurs within a relative clause. I have indicated the relative clause with braces.

(27) a. Noun-Locative After Overt Agent (Slot 13)
tʰàljóp *t͡sát-kjà* *ét-* *mɔ́bɔ́ttɔ̀*
13 14 25- 29.30
boy/INV door-at [3/REFL]- crowd.IPFV
'The boys were crowding at the door.' (Watkins 1984: 210)

b. Noun-Locative After Overt Patient (Slot 17)
k'ɔnkʰǐ:-gɔ̀ *tʰǫ́:-kjà* *è-* *jî:* *-jà*
17 18 25- 29 -30
turtle-INV water-in [3INV]- disappear -IPFV
'The turtles are disappearing into the water.' (Watkins 1984: 159)

c. Noun-Locative After Overt Object (Slot 21)[14]
{k'í: *k'ɔdá:l-ɔ̂:* *∅-* *òl-* *sɔ́l* *-dè}* *gjà-*
{21 22 25- 28- 29 -36}$_{21}$ 25-
{wood wagon-on [3SG]- load- be.in -NOM/BAS} [1SG/A:SG/OBJ]-
p'éttɔ̀
29.30
take.down/IPFV
'I am unloading wood that was loaded in the wagon.'
(Watkins 1984: 230)

If two Adverbs or Noun-Locative Adverbials are present, they may co-occur in Slots 6 and 7 respectively as in (26) above. The second element tends to shift to the post-verbal Slots 37 and 38 due to discourse factors (i.e. new/old information). Noun-locatives, for example, are right-dislocated to Slot 38 in (28).

(28) Right-Dislocated Noun-Locative
kʰí:dêl *páj* *∅-* *jâj* *mɔ́sɔ́-jɔ̀*
6 21 25- 29.30 38
yesterday sun [3SG]- disappear/PFV six-at
'The sun set at six yesterday.' (Watkins 1984: 210)

Negation is marked by a pre-verbal particle (*hɔ́n* in most cases; negative imperatives are marked with *pòj* and existential negatives are marked with *hę́:*) and a negative suffix on the verb (-ɔ̂:). The negative particle occurs in Slot 10, and the negative suffix occurs in Slot 31 after the verb stem. The negative particle is typically clause-initial (29), but it is optionally preceded by Question Particles/WH-Words and/or Clause Introducers (30). In addition, adverbs and non-locatives in

[14]Note that the relative clause itself fills the direct object's Slot 21 in the matrix clause. This is indicated with a subscript outside the braces.

contrastive focus or introducing new information may occur before a negative particle (31).

(29) *hɔ́n* *mát^{h}ɔ̀n* ∅- *t͡są́:n* *-ɔ̂:* *k^{h}í:dêl-gɔ̀:*
10 17 25- 29 -31 22
NEG girl [3SG]- arrive -NEG yesterday-since
'The girl hasn't come since yesterday.' (Watkins 1984: 214)

(30) Negation with Questions and Clause Introducers

a. *hɔ́* *hɔ́n* *k'ją́:hį̂:* *à-* *bǫ́:* *-mɔ̂*
2 10 21 25- 29 -31
Q NEG man [2SG/A:SG/OBJ]- see -NEG
'Didn't you see the man?' (Watkins 1984: 215)

b. *hétɔ́* *hɔ́n* *gjà-* *t^{h}áp-* *ɔ́m* *-gɔ̂:*
3 10 25- 28- 29 -31
still NEG [PL]- dry- become -NEG
'It still hasn't dried.' (Watkins 1984: 215)

(31) Preposed Adverbials and Negation
hègɔ́ *kój-dɔ̀m-gjà* *hɔ́n* *mà-* *t͡są́:n* *-ɔ̂:* *-hèl* *hàótè-sàj*
3 7 10 25- 29 -31 -33 37
now Kiowa-land-at NEG [2DU]- arrive -NEG -HSY several-year
'So (I hear) you haven't been in Kiowa country for several years.'
(Watkins 1984: 216)

3.3 Modal and tense/aspect particles

Modal and tense/aspect particles are the most freely ordered elements in the Kiowa clause, as they are only required to occur pre-verbally, though they do occur in the relative order with modal followed by tense/aspect particles when they co-occur.[15] There are eleven modal particles, which are listed in (32). As seen in (33), *hájáttò* translates to 'maybe' and indicates uncertainty as to whether the event will happen. While Watkins (1984) argues modal particles occur in complementary distribution, one example has been found which shows two modal particles co-occuring (34). Given this, I have indicated modal particles as a Zone, and exactly what may co-occur and in what order is left to future research.

[15] Watkins (1984) presents them as occurring in the opposite order, yet all data I have studied suggest otherwise. Therefore, I propose the order with modal particles occurring first unless future research shows otherwise.

(32) Modal Particles (Watkins 1984: 221–223)

pàhḭ́:	'clearly'
bèthêndè	'never, unlikely'
mɔ́n	'probably'
hájáttò	'maybe, might'
hàgjà	'maye, might'
mágjá	'was going to, might (have)'
dá	'must'
jàl	'hope'
hét	'let's, let me'
béthɔ̀:	'unknowing'
mɔ̀ɔ́jdèl	'fortunately not, if by ill fate'

(33) *hájáttò hɔ́n ján- t͡sá:- ɔ́mdé -t'ɔ̀:*
9 10 25- 28- 29 -32
maybe NEG [(1SG/A):2,3SG/P:PL/OBJ]- go- become -FUT
'You might not be able to get there.' (Watkins 1984: 221)

(34) *hét hàgjà ę́:dè kút ján- hájdé -t'ɔ̀:*
15_1 15_2 21 21 25- 29 -32
let's maybe this letter [(1SG:A):2,3SG/P:PL/OBJ]- learn -FUT
'Let's see if maybe you can understand this letter.' (Watkins 1984: 222)

There are five tense/aspect particles which indicate immediate time (*sɔ́t* 'immediate/recent past', *ját* 'immediate present', *mîn* 'immediate/near future'), not-yet-achieved future events (*mí:* 'almost'), or habitual acts (*àn* 'habitual'). For example, in (35), the habitual particle *àn* indicates that the act of rabbit hunting is a repeated process.

(35) *àn à- bô:- pòlà:jì- ę̀:- bàn -má*
24 25- 26- 27- 28- 29 -30
HAB [1SG]- always- rabbit- hunt- go -IPFV
'I'm always going rabbit hunting.' (Miller 2018: 44)

Just like modal particles, more than one tense/aspect particle is possible, though the first must be either *hétɔ́* 'still' or *hègɔ́* 'now, then'. The same two particles were seen earlier as clause introducers (Slot 3), and if they occur clause-initially before another tense/aspect particle it is ambiguous if they are acting as clause introducers or tense/aspect particles. They do pattern more freely as part of the tense/aspect particle zone later in the clause, though, and that is unambiguously

a case of two tense/aspect particles co-occurring. Consider, for example, the following example where *hègɔ́* occurs before another tense/aspect particle indicating the continuation of an event from the past to the present as in (36).

(36) *á:kʰì̀:gjà hègɔ́ mîn gjá- kʰî̀: -mà*
17 24_1 24_2 25- 29 -30
flowers now about.to [PL]- bloom -IPFV
'The flowers are about to bloom.' (Watkins 1984: 159)

As mentioned earlier, modal and tense/aspect particles may also co-occur and in that order. See (37) as an example.

(37) *mɔ́n mîn gɔ́- áttɔ̀*
4 5 25- 29.30
probably about.to [(X/A):2SG/P:∅/OBJ]- chase.IPFV
'It (a bull) is probably about to chase you.' (Watkins 1984: 221)

As they are the most freely ordered elements in the Verbal Planar Structure, the modal and tense/aspect particle zones are included in Table 4 in six possible positions prior to the verb complex. While complete data sets for each position are yet to be found (i.e. at least one modal particle, one tense/aspect particle, both a modal and tense/aspect particle), the present data are sufficient to indicate five of the six positions. The sixth position is assumed based on other patterns until data suggest otherwise. This will be discussed below.

The earliest position for both zones is after Clause Introducers (Slot 3) and before Adverbs (Slot 6) as Zones 4 and 5 as in (38) and (39) below.

(38) Modal Particle in Zone 4
hétɔ́ mɔ́n ę́:hɔ̀: ɔ́jhɔ̀: èm- t'ɔ́:
3 4 6 6 25- 29.30
still probably now there [2SG]- stay
'You are probably still there now.' (Watkins 1984: 219)

(39) Tense/Aspect Particle in Zone 5
hègɔ́ ját kóttè dè- pʰóttɔ̀
3 5 6 25- 29.30
now right.now hard [1SG/REFL]- blow.IPFV
'I am really blowing hard.' (Watkins 1984: 218)

Both zones may also occur immediately before negation in Zones 8 and 9. For example, the modal particle *hájáttɔ̀* 'maybe' occurs in this position in (40) below.

(40) Modal Particle in Zone 8
hájáttò hɔ́n ján- tsą́:- ɔ́mdé -t'ɔ̀:
8 10 25- 28- 29 -32
maybe NEG [(1SG/A):2,3SG/P:PL/OBJ]- go- become -FUT
'You might not be able to get there.' (Watkins 1984: 221)

The third position immediately precedes an overt Agent DP in Zones 11 and 12 as in (41) and (42).

(41) Modal Particle in Zone 11
dá-àl ám jí:dè kɔ̂l pį́:gjá gját- bɔ́:
11 13 13 21 21 25- 29.30
must-also you both some food [(X/A):1PL/P:PL/OBJ]- bring.IPFV
'You (dual) must also bring some food for us.' (Watkins 1984: 222)

(42) Tense/Aspect Particle in Zone 12
hɔ́n àn tsój gjà- thǫ́ -mɔ̂:
10 12 21 25- 29 -31
NEG HAB coffee [1SG/A:SG/OBJ]- drink -NEG
'I never drink coffee.' (Watkins 1984: 223)

In the fourth position, both zones (15 and 16) precede an overt Patient DP as in (43) and in (44).

(43) Modal Particle in Zone 15
béthɔ̀: ám èm- dǫ́ -mê:
15 17 25- 29 -33
unknowing you [2/SG]- be -HSY
'I didn't know it was you (standing behind the door).' (Watkins 1984: 223)

(44) Tense/Aspect Particle in Zone 16
àn t'ól ∅- sô: -jà
16 17 25- 29 -30
HAB snow [3SG]- descent -IPFV
'...it snows.' (adapted from Watkins 1984: 218)[16]

In the fifth position, both zones (19 and 20) precede a Direct Object DP as in (45) and (46).

[16]This clause originally appears in a subordinate clause in Watkins (1984) in the sentence 'When it gets really cold here, it snows.'

(45) Modal Particle in Zone 19

hét	*hàgjà*	*ɻ́:dè*	*kút*	*ján-*	*hájdé*	*-t'ɔ̀*
19_1	19_2	21	21	25-	29	-32

let's maybe this letter [(1SG/A):2,3SG/P:PL/OBJ]- learn -FUT

'Let's see if maybe you can understand this letter.' (Watkins 1984: 222)

(46) Tense/Aspect Particle in Zone 20

hɔ́	*kôl*	*sɔ́t*	*kút*	*ján-*	*gút*
2	6	20	25-	29.30	

Q some just letter [(1SG/A):2SG/P:PL/OBJ]- write.PFV

'Did I recently write you a letter?'

As mentioned earlier, the sixth position for both zones (23 and 24) is assumed in the planar structure above. It is the last logically possible position for both zones prior to the verb complex (i.e. after any overt DPs and noun-locatives but before the verb complex), even though I have yet to find unambiguous evidence that either zone occurs in this location. Given clear confirmation of the other five locations within the planar structure, however, I will assume that both zones may occur in this position until data suggests otherwise.[17]

3.4 The verb complex

The verb complex, as previously discussed in §2.1, consists of a pronominal (Slot 25), the stem (Slot 29), and an aspect marker (Slot 30). Syntactic markers occur after inflections as in (2), repeated below as (47) (Watkins 1984).

(47) PRONOM - (ADV) - (N) - (V) - STEM - ASP - (NEG) - (MOD) - (HSY) - (SYNT)

These syntactic markers include nominal, locative, switch-reference, and other subordinating conjunctions (see 10 again for the full list). At closer inspection, however, it seems that it is too simplistic to treat them identically and in the same position. As expected, the nominalizing/relativizing suffix (/-dè/ 'basic' or /-gɔ̀/ 'inverse' depending on the head noun) occurs at the end of the verb complex in Slot 34 as in (48).

(48)

{pɻ́á:dɔ̀	*è-*	*ét*	*-gɔ̀}*	*dé-*	*hɔ́:*	*-gjà*
{21	25-	29	$-34\}_{21}$	25-	29	-30

{table.INV [3INV]- big.SG -NOM.INV} [1SG:A:INV/OBJ]- get -PFV

'I bought a big table/table that is big.' (Watkins 1984: 230)

[17] Note there is no evidence to suggest modal or tense/aspect particles can occur between a DP and a noun-locative. This is assumed not to be the case, as it is not observed in the present data.

Relative clauses may also be accompanied by locative suffixes just like the noun-locative adverbials in Slots 7, 14, 18, 22, and 38. As seen below in (49), the locative suffix /-òj/ 'at/generally' occurs immediately following the nominalizing suffix /-dé/ in Slot 34.

(49) *{hègɔ́ mɔ́n mîn ɛ́- p'ɔ́jdép -dé}*
{3 4 5 25- 29 -34}$_{7}$
{now probably about.to [(2,3SG/A):2SG/P:∅/OBJ]- forget.IPFV -NOM}
-òj ján- gút
-7 25- 29.30
-at.generally [(1SG/A):2SG/P:PL/OBJ]- write.PFV
'You were probably about to forget me around the time I wrote you.'
(Watkins 1984: 235)[18]

As with adverbials, focus and new/old information can lead to dislocation of relative clauses. In cases of contrastive focus, the contrasted relative clause moves to the left and is the first element of the clause. As seen in (50), the second person singular *ám* is left-dislocated to precede the Question Particle *hɔ́* in the second clause.

(50) *gját- hájgjá- dɔ̀: ... nɔ̀ ám hɔ́*
[(X/A):1PL/P:PL/OBJ]- learn.DET- be ... and/DIFF you Q
25- 28- 29 ... 36 17 2
ján- hájgjá- dɔ̀:
[(1SG/A):2SG/P:PL/OBJ]- learn.DET- be
25- 28- 29
'We know... do *you* know?' (Watkins 1984: 212)

As mentioned earlier, in questions where the questioned element is a relative clause, the full relative clause moves to the left and is the first element of the clause (17 is repeated here as 51).[19]

(51) *{ɔ́gɔ̀ k'jɑ́:hî:∅- pǫ́:- t͡sán -dè} hɔ́ Lawton-gù ∅- bá:*
{SUB 13 25- 28- 29.30 -34}$_{13}$ 2 7 25- 29.30
{SUB man [3SG]- see- arrive.PFV -NOM} Q Lawton-to [3/SG]- go.PFV
'Did the man who came to see you go to Lawton?' (Watkins 1984: 212)

[18]The relative clause structure is not immediately clear in Watkins (1984)'s translation. An alternative translation is 'At the time of your probable forgetting me, I wrote you.'

[19]As mentioned earlier, the subordinating marker at the beginning is not provided a position in the planar structure. It is understood to be part of the RC, which itself fills a slot in the matrix clause.

The remaining syntactic markers are morphemes that may be used in subordination or coordination structures. There are three pairs of switch-reference markers (52) and three subordinate markers (53). Switch-reference markers in Kiowa are most often ambiguous as to whether they are being used in a subordinate or coordinate structure, but the difference does not seem to affect speaker intuitions. Watkins (1984) mentions that Kiowa linguist Parker McKenzie could not easily decide if switch-reference markers cohered to the preceding word as suffixes or clitics or if they were independent particles in the clause. She observed that he typically cliticized the switch-reference markers to the preceding word when clearly part of a subordinate clause instead of a coordinate construction (endnote 11, p. 245). McKenzie (2012, 2015) posits that switch-reference markers are pronominal heads in Kiowa, as opposed to grouping with T or C in traditional syntactic analyses. In my experience, I have found Kiowa speakers to even vary in the prosodification of switch-reference markers. Sometimes they cohere to the left, and sometimes they cohere to the following clause/pause group.

(52) Switch-Reference Markers (Watkins 1984: 236)

Same	Different	
gɔ̀	nɔ̀	'and, if' (neutral, sequential, conditional)
t͡sę̀:	ę̀:	'when, while' (simultaneous)
k'ɔ̀t	ɔ̀t	'yet, anyway' (contrary to expectation)

(53) Subordinate Morphemes

-ál	'although, even though'
né	'but'
-dò	'because' (with clause initial particle *bót*)

I will assume there is a verb-complex final position for Subordinate Markers (switch-reference and other subordinate suffixes). Research is split between a flat or compositional analysis of coordinate structures (see Wagner 2010 for an overview of the discussion). In a flat structure, the coordinating head projects to a new structure and therefore is defined by occurring outside of the clause (joining the two together with no clear head). A compositional structure is more obviously similar to subordinate constructions (a clause within a clause). Bickel (2010) argues that cross-linguistic variation blurs the line between coordination and subordination, suggesting a more continuum-like understanding of clause-linkage. For the present analysis, I remain as agnostic as possible. I adopt a flat structure and leave the coordinating switch-reference markers out of the planar structure pending future research.

4 Morphosyntactic diagnostics

This section provides an overview of the results of five morphosyntactic constituency diagnostics applied to Table 4: Free Occurrence (Minimal and Maximal), Non-interruptability (Free Simplex and Free Complex), Non-permutability (Rigid and Flexible), Subspan Repetition (Minimal and Maximal), and Ciscategorial Selection. Note that most tests are fractured into two sub-tests corresponding to different interpretations of the overarching test (cf. Tallman 2021). A contiguous subspan of planar positions is considered a candidate for wordhood if two or more diagnostics converge to identify it. Interested readers are directed to Tallman (2021) or to the introduction of this volume for more information on each test. Overall, eight subspans are identified using morphosyntactic information.

4.1 Free occurrence (25-30; 25-36)

Free Occurrence identifies a subspan of the planar structure that may be uttered as a minimal free form. That is, the subspan may form its own utterance or be a grammatical sentence-fragment answer to a question (e.g. Q: *What did the children do?* A: *Play*). This test may be fractured to two sub-tests: minimal and maximal. The Minimal Free Occurrence is the smallest subspan whose elements can be uttered as a free form. In Kiowa, the smallest possible verb complex consists of a pronominal (Positions 25), stem (Position 29), and aspectual marking (Position 30) as in (54). Incorporated elements can intervene and by definition are included in the identified subspan (Positions 25-30).

(54) *gját-* *gút* *-kjá*
25- 29 -30
[1sg/a:pl/obj]- write -pfv
'I wrote it/it was written.' (Miller 2018: 85)

Recall, however, that both the pronominal and aspectual marker can be a zero morpheme as in (55). If those were not actively present in the interpretation and agreement within the clause, one could argue it is only the verb stem itself that is required (Position 29-29). As both have semantic interpretations playing a role in the clause, and there are multiple forms of morphemes like the perfective (See §6 for further discussion), I assume that they are indeed present. Future research may suggest a better analysis, though.

(55) ∅- *t^{h}ép* -∅
25- 29 -30
[3SG]- go.out -PFV
'He went out.' (adapted from Miller 2018: 44)

The MAXIMAL FREE OCCURRENCE is the largest subspan whose elements may be uttered as a free form. Since there are additional suffixes and verb endings possible, the largest subspan that forms a minimal free form consists of the maximal verb complex. It spans from the pronominal through subordinate markers. Thus, the MINIMAL FREE OCCURRENCE in Kiowa is Positions 25-30. The MAXIMAL FREE OCCURRENCE is Positions 25-36.

4.2 Non-interruptability (29-36; 23-36)

NON-INTERRUPTABILITY identifies a subspan of the planar structure that cannot be interrupted. Again, this test may be fractured into two sub-tests: simplex and complex. NON-INTERRUPTABILITY (SIMPLEX) identifies the subspan that cannot be interrupted by any free form (e.g. any morpheme, particle, phrase, etc.). As bare stems are possible free forms, incorporated elements are ruled out. This subspan is therefore much more restricted and includes only the Verb Stem (Position 29) through the subordinate markers (Position 36).

NON-INTERRUPTABILITY (COMPLEX) identifies a subspan that cannot be interrupted by anything larger than a free form (e.g. a phrase). In Kiowa, this means examining where full DPs may occur/interrupt elements. It is also reasonable to assume Noun-Locative Adverbials form some type of adjuncted phrase themselves. Whatever that phrase is (i.e. Adverbial Phrase or a subset of DPs) is left to future research. Thus, the subspan that does not involve a full phrase intervening at any point is from the Modal and Tense/Aspect Particle zones immediately preceding the pronominal (Positions 23 and 24) through to the subordinate markers (Position 36) before any post-verbal adverbials. Thus, The NON-INTERRUPTABILITY (SIMPLEX) subspan is Positions 29-36. The NON-INTERRUPTABILITY (COMPLEX) subspan is Positions 23-36.

4.3 Non-permutability (25-31; 25-34)

NON-PERMUTABILITY identifies subspans of elements which cannot be variably ordered. This test is fractured into two sub-tests: rigid and flexible. A subspan demonstrates RIGID NON-PERMUTABILITY if its elements always occur in a fixed order with respect to one another. The majority of the verb complex is rigidly

ordered in Kiowa and does not allow for any other orders from the pronominal (Position 25) to through the Hearsay suffix (Position 31). As discussed earlier, Adverbials occur in different positions to indicate differences in discourse factors like new vs. old information. Prior to the verb complex, Modal and Tense/Aspect Particles are the most freely ordered elements in the clause and thus ruled out. To the right, it is possible to reorder due to scope differences.

A subspan demonstrates Flexible Non-permutablity if its elements are rigidly ordered but may re-order with respect to one another to condition differences in scope. Relative clauses may left-dislocate and move out of the scope of Negation in Position 10. Other variable orders (e.g. adverbials) are due to non-scope discourse factors like new versus old information and are thus disregarded here. The subspan identified by this sub-test is the minimal relative clause, or the verb complex from the pronominal (Position 25) through to the nominalizer suffix (34). Thus, Rigid Non-permutability and Flexible Non-permutablity identify the subspans Positions 25-31 and Positions 25-34, respectively.

4.4 Subspan repetition (1-39)

Subspan Repetition identifies subspans of the verbal planar structure that are repeated in specific constructions (e.g. compounds, serial verbs, reduplication, coordination, subordination, etc.). In Kiowa, we may test for this in coordination and/or subordination constructions. As mentioned earlier, it is almost always ambiguous in Kiowa if a given structure is truly coordinating or subordinating (Watkins 1984). There is a difference between coordination and subordination when it comes to the placement of switch-reference markers, though, for some speakers. In a truly subordinate structure, the switch-reference marker may cliticize to the right-edge of the verb complex. Otherwise, they act as independent particles between clauses. Let us focus only on the instances where subordinate markers are attached to the complex. Specifically, consider the subordinating marker /-àl/ 'although, even though' which is always found verb complex-finally.

As seen below, full clauses may be repeated in the construction. In (56), negation (Position 10) and the modal particle /àn/ 'habitual' (in any post-negation position (i.e. Positions 11, 15, 19, or 23) are permitted. In (57) a pre-verbal adverbial is permitted in the subordinate clause (Position 6). In both cases, the second clause has been marked with braces.

(56) *à- dę̀:- k'ɔ́: -àl {hɔ́n àn à- dę̀:- hę́:m -ɔ̂:}*
25- 28 29 -36 {10 11 25- 28- 29 -31}
[1sg]- sleep- be.lying -although {neg hab [1sg]- sleep- die -neg}
'Although I lie down, I can't fall asleep.' (Watkins 1984: 242)

(57) *bîndè gjàt- pó:l -î: -t'ɔ̀: -àl {bòt^{h}êndè à- tón- â:*
6 25- 29 -30 -32 -36 {6 25- 27- 29
much [1SG/A:PL/OBJ]- eat -IPFV -FUT -although {unlikely [1SG]- fat- grow
-jì: -t'ɔ̀:}
-30 -32}
-IPFV -FUT}
'Even if I should eat a lot, I can't/don't get fat.' (Watkins 1984: 242)

I have yet to find an example which includes the earliest positions of the planar structure (i.e. Question Particles or Clause Introducers) in previous work or in my own corpus of Kiowa data. There is no reason, however, to think that the coordinated/subordinated clauses cannot span the entire planar structure. Unless future analysis suggests otherwise, then, I assume that the entire Kiowa verbal planar structure is the REPEATED SUBSPAN. Additionally, I have found no data showing an element can take wide-scope of a coordinated conjunct. Therefore, there is not a need to fracture this test in Kiowa at this time.

4.5 Ciscategorial selection (29-33)

CISCATEGORIAL SELECTION identifies a subspan where all the elements are modifiers or dependents of a particular syntactic category (i.e. are ciscategorial). This can be fractured two ways: minimal and maximal. A subspan is MINIMALLY CISCATEGORIAL if all elements in the subspan are ciscategorial (only pertaining to the verb in this case). A subspan is MAXIMALLY CISCATEGORIAL if all elements outside of this span are transcategorial (may occur with more than one category or at least in non-verbal constructions). For Kiowa, both sub-tests identify the same subspan. Since incorporated stems are bare and not restricted to verbal predicates, they are ruled out. The subspan identified is from the Verb Stem (Position 29) through the hearsay suffix (Position 33). Incorporated elements are added to modify the understanding of the verbal predicate, but they are not strictly modifiers or dependent on the verb. The same suffixes used as nominalizers to mark relative clauses are used to mark number on nouns more generally. Thus, the subspan identified by CISCATEGORIAL SELECTION is Position 29-33.

5 Phonological domains

This section provides an overview of the results of the phonological domains identified in Table 4: Syllabification (Minimal and Maximal), Cluster Devoicing (Minimal and Maximal), Vowel-Truncation (Minimal and Maximal), Dental-Velar

Switch (Minimal and Maximal), Tone Lowering (Minimal and Maximal), and Pausing. As with morphosyntactic diagnostics, a contiguous subspan in Table 4 is considered a candidate for wordhood if two or more diagnostics converge to identify it. Overall, nine phonological domains are identified.

5.1 Segmental domains

Let us first consider the processes which result in changed segmental forms within a particular subspan. In Kiowa, there are seven such processes: two syllable-sensitive phenomena (Syllable-Final Devoicing and Closed Syllable Shortening), Cluster Devoicing, Glide Formation, Glide Deletion, Vowel Truncation, and the Dental-Velar Switch. In all cases, the phonological diagnostics will be fractured to form minimal and maximal subspans. A minimal subspan is that which there is positive evidence that the process in question applies. A maximal subspan is that which there is no counterevidence against the process in question applying across that subspan.

5.1.1 Syllabification and sensitive processes (29-36; 26-36)

Syllabification in Kiowa is characterized by two phonological processes: Syllable-Final Devoicing (devoicing syllable-final obstruents) and Closed-Syllable Shortening (shortening underlying long vowels in closed syllables). Miller (2018) identified the domains for syllabification within the verb complex and the larger clause. Syllabification spans the junctures between the verb stem (Position 29) and suffixes: aspect, negative, modality, and hearsay.

The data in (58) shows syllabification spanning the juncture between the verb stem /t͡są̂ː/ ‘arrive’, the aspectual suffix /-n/ ‘imperfective’, and the imperative (modality) suffix /-ìː/. The underlying long vowel in the stem does not need to shorten because /n/ can form the onset of the syllable with the imperative suffix.

(58) *páːtʰą̀ː-tʰɔ̀p* *∅-* *tʰóːgjáj* *-tʼɔ̀ː* *-ę̀ː* *à-* ***t͡są̂ː*** ***-n*** ***-ìː***
7 25- 29 -32 -36 25- 29 -30 -32_1
eleven-beyond [3SG]- pass -FUT -WHEN.DIFF [1SG]- arrive -IPFV -IMP
-tʼɔ̀ː
-32_2
-FUT
‘I’ll be coming (regularly) at eleven.’ (Watkins 1984: 173)

In (59), syllabification spans the juncture between the verb stem and the negative suffix. Again, the underlying long vowel of the stem need not shorten because

stem-final /d/ may form the onset of the syllable with the negative suffix. Compare to the same stem when not suffixed in (60). Because syllabification must end, the underlying long vowel shortens and the final /d/ devoices and surfaces as [t].

(59) *hón àn pį́ːgjá gjà- **tóːd -ô** (*gjà-tót-ô)*
10 11 21 25- 29 -31
NEG HAB food [3SG/A:SG/OBJ]- send -NEG
'They do not send the food.' (Miller 2018: 83)[20]

(60) *pį́gjá gjà- **tót***
21 25- 29.30
food [3SG/A:SG/OBJ]- send.PFV
'They sent the food.' (Miller 2018: 83)

Syllabification also spans the Stem-Hearsay juncture in (61) below. Just like above, the underlying long vowel surfaces unchanged and stem-final /n/ syllabifies as the onset of the syllable with the hearsay suffix /-ê/.

(61) *èm- **gṵ́ːn** **-ê** (*èm-gṵ́n-ê)*
25- 29.30 -33
[3SG/REFL]- dance.IPFV -HSY
'I heard they were dancing.' (Miller 2018: 93)

It is impossible to determine if syllabification spans the junctures across to the nominalizer or locative suffixes in the verb complex. Because nominalizer suffixes are consonant-initial and thus have onsets (e.g. /-dè/ and /-gɔ̀/), any preceding syllable will be self-contained and thus untestable. Even though there are vowel-initial locative suffixes (e.g. /-èm/ 'here, away'), they only co-occur with a nominalized relative clause. A nominalizer suffix is always short vowel-final and thus also irrelevant for both diagnostics. Subordinate markers are the only complex-final element that *can* be tested, but I have yet to find the relevant environments to conduct the test (e.g. obstruent-final preceding morpheme before a vowel-initial subordinate marker like /-ę̀ː/ 'when, different' or /-àl/ 'although'). Until there is such evidence, the subspan up to and including subordinate markers are included.

Finally, syllabification is restricted to the pronominals and blocked from spanning across the rest of the verb complex. In (62), for example, the final obstruent

[20]The stem in (59) and (60) is incorrectly transcribed as low in Miller (2018). This has been corrected here.

/d/ in the pronominal /b-ià-ia-d/ devoices to [t] rather than syllabifying as the onset of the following syllable.

(62) ***bàt-*** *ôm* *(*bàd-ôm)*
25- 29.30
[2SG/A:PL/OBJ]- do.IPFV
'You make it.' (Miller 2018: 82)

As for incorporated elements, Watkins includes discussions of /d/-final noun roots that devoice and also undergo Closed Syllable Shortening (e.g. /t͡sá:d/ 'door'). I have found no evidence of any relevant alternations in my own work, though, so these are set aside. Similarly, any obstruent-final adverbs already end in a voiceless sound (e.g. /kòét/ 'fearfully'). Therefore, the only possible test is an incorporated verb that is consonant- or obstruent-final so that syllabification may be confirmed. I have yet to find such an example. Through other phonological diagnostics, though, we will confirm that incorporated elements form individual phonological domains.

Therefore, the MINIMAL SYLLABIFICATION domain is Slots 29-36 (Stem to the subordinate marker). Given that there is only one possible test (an incorporated verb that is consonant- or obstruent-final), and it is left to future research to find such an example, we must conclude the MAXIMAL SYLLABIFICATION domain is Slots 26-36 (Incorporated elements through the subordinate marker). Stems tend to cross-linguistically form individual phonological words and thus are expected to form separate domains from the rest of the verb complex (see Miller 2018 and the discussion therein). Thus, I suspect future research will rule this out. Without such evidence though, I include the identified maximal subspan.

5.1.2 Cluster devoicing (29-31; 29-33)

Cluster Devoicing is an assimilation process which devoices stops after a voiceless obstruent. As seen in below, the process applies across the Stem-Aspect boundary. In (63), the initial /g/ of the perfective suffix devoices after the final [t] in 'write.'[21]

(63) *gját-* ***gút*** ***-kjá*** *(*gját-gút-gjá)*
25- 29 -30
[1SG/A:PL/OBJ]- write -PFV
'I wrote it/it was written.' (Miller 2018: 85)

[21]The underlying form of 'write' is /gú:l/. It first undergoes Lateral Obstruentization (l → d) before the initial obstruent of perfective /-gjá/. Then the final /d/ devoices via Syllable-Final Devoicing thereby triggering Cluster Devoicing of the /g/ in /-gjá/.

Cluster Devoicing also applies across the Stem-Negative boundary. Watkins (1984: 177) lists the negative form for 'be lying pl.' as [kóp-kɔ̂] (cf. *k'úl* ∼ *kóp* 'be lying pl'). It is impossible to test whether the process applies across the Stem-Modality juncture, as no modality suffix begins with a voiced stop. The stative and modal hearsay form /-dê:/ provides the necessary environment to test across the Stem-Hearsay juncture (i.e. after a stative verb ending in a voiceless obstruent), but I have yet to find such an example.

There is clear evidence, however, that Cluster Devoicing is blocked from applying across the Stem-Nominalizer juncture in (64). The nominalizer suffix /-gɔ̀/ surfaces unchanged after a /t/-final verb stem. All identified locative suffixes are vowel-initial and thus irrelevant for this test. There is a potential test for subordinate markers (e.g. when /-gɔ̀/ follows a [t]). There is no such example in the current corpus, though, leaving this to future research.

(64) *{pɟá:dɔ̀ è- **ét** **-gɔ̀}** dé- hɔ́: -gjá (*... è-ét-kɔ̀ ...)*
{17 25- 29 -34}$_{21}$ 25- 29 -30
{table.INV [3INV]- be.big -NOM} [1SG/A:INV/OBJ]- get -PFV
'I bought a big table/table that is big.' (Watkins 1984: 230)

Cluster Devoicing does not apply prior to the stem in the verb complex. As seen in (65), the process does not apply across a pronominal's juncture. The stem /gú:l/ 'write' surfaces unchanged after [t]. Similarly, the process is blocked across an incorporated element's juncture. In (66), the final [t] of the incorporated adverb /kɔ̀ét/ 'scared' does not trigger the devoicing of /b/ in /bá:/ 'go'.

(65) ***gját-*** ***gúl*** *-tɔ̀ (*gját-kúl-tɔ̀)*
25- 29 -32
[1SG/A:PL/OBJ]- write -FUT
'I will write.' (Miller 2018: 85)

(66) *à-* ***kɔ̀ét-*** ***bá:*** *(*à-kɔ̀ét-pá:)*
25- 29.30
[1SG]- scared- go.PFV
'I fearfully went.' (Miller 2018: 85)

When fractured into minimal and maximal sub-tests, Cluster Devoicing identifies two subspans. The Minimal Cluster Devoicing domain is from the stem to the negative suffix (Slots 29-31). The Maximal Cluster Devoicing domain spans from the stem through the hearsay suffix where there is clear evidence that the process is blocked across to the nominalizer (Slots 29-33).

5.1.3 Vowel truncation (29-30)

In vowel hiatus, the first vowel deletes via Vowel Truncation (a vowel is considered any monophthong, diphthong, or /ia/ sequence). The process applies across the Verb Stem-Aspect juncture. In (67), the verb root forms a derived intransitive (considered together the Verb Stem here) and combines with the perfective suffix -iá. Closed-Syllable Shortening, Vowel Truncation, and Glide Formation apply and yield the surface form [tʰémgjá]. This surface form is observed in (68).[22]

(67) Derivation of /tʰê:m-gé-iá/ 'break-ITRD-PFV'

/tʰê:m-gé-iá/	
tʰémgeiá	Closed-Syllable Shortening
tʰémgiá	Vowel Truncation
tʰémgjá	Glide Formation
[tʰémgjá]	

(68) *è-* *tʰémgjá*
25- 29.30
[3SG/A:INV/OBJ]- break.INTR.PFV
'It's broken.' (adapted from Miller 2018: 91)

Vowel Truncation does not apply, though, across any other morpheme junctures in the verbal planar structure. Instead, a gliding process (∅ → [j] / V_V) is observed across the Stem and negative, modality, and hearsay junctures. For example, a glide is inserted between vowels spanning the Stem-Negative juncture in (69). Miller (2018) first identified this gliding process. As it is restricted to these junctures and not seen elsewhere, it is excluded from the present results pending further research.

(69) *... á-* ***gû:*** *-jô:* *... (*á-gô:)*
... 25- 29 -31 ...
... [3PL]- get.well -NEG ...
'They don't get better.' (from Watkins 1984: 216)

Since the nominalizer suffix is always consonant-initial, it is impossible to test for Vowel Truncation's application. There is clear evidence that the process is blocked from applying at the locative juncture, though. In (70), the locative suffix /-èm/ 'where' attaches to the relative clause but does not undergo Vowel Truncation when adjacent to the vowel-final nominalizer.

[22]The underlying form of the verb root is /tʰê:m/ 'break' with a falling tone, but it changes to a high tone via detransitivization.

(70) *{ɔ́:kɔ́ ∅-* *t^{h}ón-* *dɔ́:* ***-dé}*** ***-èm*** *à-* *t͡sán* *-gòm*
{21 25- 28 29 -34}$_{21}$ -35 25- 29 -30
{well [3SG]- dig- be -NOM} -where [1SG]- arrive -DISTR/PFV
'I got around to places where wells had been dug.' (Watkins 1984: 180)

The process is blocked at the Stem-Subordinate marker juncture in (71). As seen below, the future and switch reference marker join together and form vowel hiatus. Vowel Truncation does not apply, and both endings surface unchanged.

(71) *gjá-* *t^{h}énts'ò* ***tɔ̀*** ***-ę̀:*** *èm-* *bá:*
25- 29 -32 -36 25- 29.32
[(1SG/A):2,3SG:/P:SG/OBJ]- allow -FUT -WHEN.DIFF [2SG]- go.IMP
'When I allow it, you will go.' (Miller 2018: 128)

Vowel Truncation applies within a pronominal but not across its juncture. Similarly, the process is blocked from applying across incorporated elements' junctures. Both instances can be seen in (72) below.

(72) *ę́:-* *ɔ́:-* *ɔ́:*
25- 26- 29.32
[(2,3SG/A):1SG/P:∅/OBJ]- temporarily- give.IMP
'(You) loan it to me.' (adapted from Miller 2018)

Even when fractured, the minimal and maximal domains identify a single subspan. The VOWEL TRUNCATION domain spans from the verb stem to the aspectual marker (Slots 29-30).

5.1.4 Dental-velar switch (30-33; 26-36)

The final segmental process we will consider is the Dental-Velar Switch, an interesting process in Kiowa where dental and velar stops switch before certain front vowels (i.e. /ge/ → [de] and /di/ → [gi]). There is evidence that the process applies across the Aspect-Modality juncture and the Aspect-Hearsay juncture. In (73), the initial /d/ in the imperfective suffix switches to [g] before the imperfective [-î:] following Vowel Truncation. In (74), the /g/ in the imperfective suffix switches to [d] before the hearsay [-ê:].

(73) Derivation of /há:-dè-î:/ 'shout-IPFV-IMP'
/há:-dè-î:/
há:-dî: Vowel Truncation
há:-gî: DV Switch
[há:-gî:]

(74) Derivation of /má:-dè-ê:/ 'feed-IPFV-HSY'

/má:-gè-ê:/	
má:-gê:	Vowel Truncation
má:-dê:	DV Switch
[má:-dê:]	

A combination of factors disallow testing of other morphemes and junctures. First, a phonotactic constraint bans /g/ as a coda thereby requiring that any test focus on /d/-final morphemes. Second, /i/-initial morphemes are rare in Kiowa. In order to test between the Stem-Aspect juncture, we need a /d/-final verb stem before an /i/-initial aspectual marker. No such sequence has been found in the current corpus. Additionally, there is no possible test for the negative suffix, nominalizers, or locative suffixes, as none of them begin with /i/ or /e/. While there are /e/-initial subordinate markers, it is not possible to test since there is no reason a final [g] would ever precede the subordinate marker.

Like Vowel Truncation, Dental-Velar Switch is attested within pronominals but not across their juncture. Because pronominals form their own syllabification domain, final /d/ always devoices to [t] thereby bleeding the application of Dental-Velar Switch. Additionally, there are very few /i/-initial morphemes reported in Kiowa (e.g. /îl/ 'warn,' /í:/ 'baby'). In fact, the current corpus and surveys of the literature do not include the necessary constructions to test across junctures between incorporated elements before the stem.

When fractured, the MINIMAL DENTAL-VELAR SWITCH domain identifies a subspan of the aspect, modality, and hearsay suffixes (Slots 30-33). Since there is very little that could be tested, we must say the MAXIMAL DENTAL-VELAR SWITCH domain is much larger. Though it is clear the process cannot apply from the right edge of the pronominal, there has been no counterevidence throughout the remainder of the verb complex. Thus, the domain spans from the first incorporated element through the subordinate marker (Slots 26-36).

5.2 Tone lowering (25-33; 25-36)

While there are several reported tone processes in Kiowa, most are morphologically-conditioned and thus irrelevant to the present analysis.[23] The only phonologically-conditioned tonal modification is observed in Tone Lowering (lower

[23]There is a tone raising rule found only in compounds, and there is a morphological tone lowering rule. Watkins cannot find a systematic analysis other than to lexically specify each verb root underlyingly as tone-lowering or non-tone-lowering. Interested readers are directed to Watkins (1984) for more information on these processes.

tones after a falling tone), a type of L-spreading. As seen in (75), the process is triggered by the falling tone on the pronominal and lowers the underlying high tone on both verb stems (cf. /pǫ́:/ 'look' and /ɔ́:/ 'give').[24]

(75) */kút bágî:- pǫ́:- ɔ́:/*
kút **bágî:-** **pǫ̀:-** **ɔ̀:**
21 25- 28- 29.32
book [2PL/A:(1,3SG/P):PL/OBJ]- look- give.IMP
'(You pl.) show me the book.' (adapted from Miller 2018: 92)

The process does not occur across the verb complex's left edge, though. As seen in (76), the falling tone in /k'já:hî:/ 'man' does not lower anything in the verb complex. In fact, the same verb stem for 'look' as above appears here unchanged with its underlying high tone /pǫ́:/.

(76) */k'já:hî: ∅- pǫ́:- ą̀:/*
k'já:hî: ∅- pǫ́:- ą̀:
21 25- 28- 29.30
man [3SG]- look- come.PFV
'The man came to see (you).' (Miller 2018: 98)

An incorporated element can also trigger lowering of the remainder of the verb complex. As seen in (77), the falling tone on the incorporated noun /sâą/ 'child' lowers the incorporated verb stem and verb stem.

(77) */à- sâ- pǫ́:- ą̀:/*
à- **sâą-** **pǫ̀:-** **ą̀:**
25- 27- 28- 29.30
[1SG]- child- look- come.PFV
'I came to see the child.' (Miller 2018: 92)

Low tone spreads throughout the verb suffixes like the imperative modality suffix, the negative suffix, and the hearsay suffix. In (78), the stem's falling tone triggers the imperative suffix /-î:/ to lower. In (79), the falling tone on the incorporated noun lowers the negative suffix /-mɔ̂/. Finally, the negative suffix's falling tone triggers the hearsay suffix /-hêl/ to lower in (80).

[24]For maximal clarity, I have provided underlying forms for each example in this subsection. They are found in the first line between slashes.

(78) */hóldà bàt- ɧ̂:m -î:/*
hóldà bàt- **ɧ̂:m** **-ì:**
21 25- 29.30 -32
dress [2SG/A:PL/OBJ]- make.IPFV -IMP
'Keep on making the dress.' (adapted from Miller 2018: 92)

(79) */à- są̂- pǫ́:- ą̀: -mɔ̂:/*
à- **są̂-** **pǫ̀:-** **ą̀:** **-mɔ̀:**
25- 27- 28- 29.30 -31
[1SG]- child- look- come.PFV -NEG
'I came to see the child.' (Andrew Robert McKenzie, p.c.)

(80) */hègɔ́ kɔ́j-dɔ̀m-gjà hɔ́n mà:- t͡są̀:n -ɔ̂ -hêl háòtè-sáj/*
hègɔ́ kɔ́j-dɔ̀m-gjà hɔ́n mà:- t͡są̀:n **-ɔ̂** **-hèl** háòtè-sáj
3 7 10 25- 29 -31 -33 37
now Kiowa-land-at NEG [2DU]- arrive -NEG -HSY several-year
'You (dual) reportedly haven't been in Kiowa country for several years.' (Watkins 1984: 178)

All nominalizer suffixes and subordinate markers have an underlying low tone, so it is not possible to test for the process's application. There are occasional examples where their underlying tones change, but it is not due to Tone Lowering. Tonal modification in Kiowa is relatively understudied and other tonal processes are left to future research.

Finally, the process is blocked at the right-edge of the verb complex (e.g. an adverb or right-dislocated element) just like the left. For example, (81) two verb complexes occur next to one another. The first ends in falling tone on the negative suffix, but that does not trigger Tone Lowering across into the next verb complex.

(81) */hɔ̂ndó hɔ́n ɛ́:- há:d -ɔ̂ ɛ́:-*
hɔ̂ndó hɔ́n ɛ́:- há:d **-ɔ̂** **ɛ́:-**
2 10 25- 29 -31 25-
why/Q NEG [(2,3SG/A):1SG/P:∅/OBJ]- call.to -NEG [(2,3SG/A):1SG/P:∅/OBJ]-
bǫ́: -t͡sɛ̀:/
bǫ́: -t͡sɛ̀:
29.30 -36
see.PFV -WHEN.SAME
'Why didn't you call to me when you saw me?' (Watkins 1984: 240)

When fractured, the Minimal Tone Lowering Domain is from the pronominal through the hearsay suffix (Slots 25-33). The Maximal Tone Lowering domain continues through to the subordinate markers that cannot be tested (Slots 25-36).

5.3 Pausing (1-39)

Finally, Kiowa uses pausing to mark grammatical information between clauses much like English (e.g. to indicate a conditional statement).[25] In my fieldwork, I have found that it is a consistent diagnostic of junctures between clauses. For example, a brief pause has been indicated by the IPA pause symbol (.) in (82) below. It occurs between the first and second clause, separating the conditional statement from the rest of the sentence. Thus, the domains for grammatical pausing is the full Kiowa verbal planar structure (Positions 1-39).

(82) *ją̀n-* *pį́ː-* *ɔ̂ːm* *-ę̀ː* *(.) bàt-*
25- 27- 29.32 -36 (.) 25-
[(2,3SG/A):1SG/P:PL/OBJ]- food- make.IMP -WHEN.DIFF (.) [2SG/A:PL/OBJ]-
pôː
29.32
eat.IMP
'If I make food for you, you must eat it.' (Miller 2018: 100)

6 Deviations from biuniqueness (29-34)

The final diagnostic we will consider is Deviations from Biuniqueness. Biuniqueness is the requirement that formatives display a one-to-one relation with meaning. Kiowa deviates from biuniqueness when inflecting verb stems with aspect, negation, and when forming a relative clause (Positions 29-34). For each of the morphemes involved, there are forms that do not appear to be phonologically conditioned.

Consider, for example, the perfective suffix (Table 5), which Watkins (1984) references as the most morphologically complex of any verb inflection categories. In all cases except for intransitive stems ending in basic verb suffixes *-bé*, *-dé*, or *-gé*, the perfective has multiple forms associated with the same meaning. First,

[25] I did not test for where a speaker *could* pause within a clause. I only examined cases of clause marking and disambiguation. Where exactly speakers are comfortable including pauses not directly related to clause-marking or grammatical information is left to future work.

stems ending in /m, n, j, V:/ may either surface seemingly unchanged (a zero allomorph) or with the suffix *-é*. There is no way to predict which one surfaces. Second, /l/-final stems undergo obstruentization (/l/ → [t]) but the form may also optionally include -é. Again, there is no way to predict when this suffix surfaces and when it does not. For those stems with the basic verb suffixes, transitive stems are suffixed with -ɔ́ or -é. Intransitive stems are only suffixed with -iá(j). Finally, some vowel-final stems include no *-é* but instead end in one of series of consonants (/m, n, j, p/). This choice is not phonologically predictable. Thus, a vowel-final stem inflected for the perfective may involve a zero morpheme (i.e. no surface change), an *-é* suffix, or end with one of four consonants (/m, n, j, p/), thereby deviating from Biuniqueness clearly.

Table 5: Perfective endings (Watkins 1984: 160–164)

Stems ending in	Allomorph(s)	Examples
m, n, j, V:	∅ or -é:	tʰêm ‘break.PFV’ (cf. /tʰę̂:m/) ɔ́:m-é ‘make-PFV’ (cf. /ɔ́:m/)
l	t or -é	gút ‘write.PFV’ (cf. /gú:l/) k’ɔ́:l-é: ‘bite.PFV’ (cf. /k’ɔ́:l/)
-bé, -dé, -gé	-ɔ́ or -é: (TR)	hé:b-ɔ̂ ‘bring in-PFV’ (cf. /hé:-bé/) k’ɔ́:t-é: ‘meet.PFV’ (cf. /k’ɔ́:té/)
	-iá(j) (INTR)	kʰút-kjá ‘get pulled off-PFV’ (cf. /kʰú:l/)
V:	-C (m, n, j, p)	tʰóm ‘drink.PFV’ (cf. /tʰǫ́:/)

Other aspect markers show similar patterns, though not nearly as complicated. The transitive imperfective, for example, has three forms: -mɔ̀, -tɔ̀, and -gù. The first two forms could arguably be grounded in phonology. The first form -mɔ̀ occurs after /m, n, j, V:/. The second -tɔ̀ occurs after l-final obstruentization and therefore exhibits a type of stop assimliation. One could argue that /-mɔ̀/ is underlying and the default form. The third form /-gù/, however, is not predictable in any way. There is no phonological explanation for why the first consonant needs to be [g] or why the vowel is different in that form (Table 6).

The negative suffix also shows deviation from biuniqueness when attached to vowel-final stems. Though they are predictably patterned in terms of transitivity and whether or not the verb is stative/active, the only thing connecting the three endings is a falling tone. The vowels and initial consonants differ with no obvious reason (Table 7).

Table 6: Imperfective endings (Watkins 1984: 164–167)

Stems ending in	Allomorph(s)	Examples
m, n, j, V:	-mɔ̀	kʰį̂n-mɔ̀ ‘cough-IPFV’ (cf. /kʰį̂:n/)
l	-tɔ̀	ót-tɔ̀ ‘drop/fall-IPFV’ (cf. /ó:l/)
j, V: (TR)	-gù	sô:-gù ‘sew-IPFV’ (cf. /sô:/)

Table 7: Negative endings (Watkins 1984: 176–178)

Stems ending in	Allomorph(s)	Examples
m, n, l, j	-ɔ̂	tʰę́:m-ɔ̂: ‘break-NEG’ (cf. /tʰę́:m/)
V̨	-mɔ̂	ą́:-mɔ̂: ‘come-NEG’ (cf. /ą́:/)
V	-gû (TR/ACT)	kʰí:-gû: ‘carry.out-NEG’ (cf. /kʰî:/)
	-jɔ̂ (INTR/ACT)	á:-jɔ̂: ‘grow-NEG’ (cf. /á:/)
	-gɔ̂ (INTR/STAT)	dé:-gɔ̂: ‘be.standing-NEG’ (cf. /dé:/)

Finally, the nominalizing suffix – specifically the inverse suffix /-gɔ́/ – shows deviations from biuniqueness. The nominalizing suffix references the head noun in a relative clause. In Kiowa, all nouns have an inherent or implicit number when unsuffixed. They may be singular/dual or dual/plural. The inverse suffix *-gɔ́* indicates the non-inherent number. A noun that is inherently singular/dual, for example, is plural when the inverse suffix is added. A noun that is inherently dual/plural is singular when the inverse suffix is added. The inverse suffix demonstrates numerous allomorphs that are not phonologically conditioned (Table 8).

To summarize, DEVIATION FROM BIUNIQUENESS identifies the subspan from the verb stem to the nominalizer (Slots 29-34). Outside of this subspan, Kiowa is pretty consistently and transparently agglutinative and predictable.

7 Discussion

In this section, I briefly summarize the results and wordhood candidates identified by convergence of diagnostics. I then discuss the implications of these results. I focus first on the success of the Planar Fractal Method for Kiowa and then how these results are situated within the larger wordhood discussion. I conclude by outlining further questions and future directions.

Table 8: Inverse endings (Watkins 1984: 80)

Stems Ending In...	Allomorph(s)	Examples
V̨j	-mɔ́	t'ájj/t'áj-mɔ̀ 'egg'
m	-bɔ́	kóm/kǫ́:-bɔ̀ 'friend'
n	-dɔ́	k'ɔ̂n/k'ǫ̂:-dɔ̀ 'tomato'
V̀l	-dɔ́	tógúl/tógú:-dɔ́ 'young man'
V̂l	-tɔ́	tâl/tát-tɔ̀ 'skunk'
j	-gú	kɔ́j-/kɔ́j-gú 'Kiowa'
i	-ój	p'í:/p'j-ój 'female's sister'
e	-óp	sà:né/sà:n-óp 'snake'
elsewhere	-gɔ́	t͡sę̂:/t͡sę̂:-gɔ̀ 'horse'

7.1 Summary

Together, morphosyntactic and phonological diagnostics converge and identify five candidates for wordhood. I have included the subspans in increasing size and which identifying diagnostics converged in (Table 9) below. Candidates 1, 2, 3, and 5 are characterized by a mix of morphosyntactic and phonological diagnostics, strengthening any proposals including them as candidates for wordhood, while Candidate 4 relies exclusively on phonological diagnostics.

Table 9: Wordhood candidates in Kiowa

Candidate	Positions	Convergence
(1) STEM-HSY	29-33	Ciscat. Select.; Cluster Devoicing (Max.)
(2) STEM-SUB	29-36	Nonint. (Simplex); Syllab (Min.)
(3) PRONOM-SUB	25-36	Free Occur. (Max.), Tone Lowering (Max.)
(4) INCORPADV-SUB	26-36	Syllab. (Max.), D-V Switch (Max.)
(5) FULL CLAUSE	1-39	Subspan Repitition, Pausing

Candidate 1 corresponds with what most interface theories would call a phonological word (verb and inflectional suffixes). This is, in fact, one of the phonological words identified in Miller (2015, 2018, 2020). Candidate 2 adds the remainder of the verb complex to Candidate 1 (i.e. Nominalizer, Locatives, and Subordinating Markers). Though this does not correspond to a previously proposed prosodic constituent in Kiowa, it is not surprising that there may be an intermediate

constituent between the phonological word and phonological phrase. Candidate 3 corresponds to the verb complex itself, which is not surprising since it is a complex V^0 and thus identified as a phonological word under some theories. In Miller (2018, 2020), however, this is identified as a phonological phrase. Candidate 4 is interesting, since it is the full verb complex without the pronominal. As it is identified by phonological criteria only, perhaps it is an artifact of the phonological separation of the pronominal clitic and the remainder of the verb. Finally, Candidate 5 consists of the entire Kiowa clause or verbal planar structure corresponding with an intonational phrase in Miller (2018, 2020).

7.2 Situating the results

In Miller 2018, I adopted a similarly structured method to the Planar-Fractal Method but focused entirely on phonological processes. Any domains that were identified by overlap (i.e. convergence of more than one process) were compared to theoretical predictions for prosodic constituents of different size. I concluded that there were three different sizes of phonological domains, and those domains correspond to the phonological word, phonological phrase, and intonational phrase. I am able to correctly predict the Kiowa domains using Tri-P Mapping (or Phase-based Prosodic Phonology) referencing cycles in the syntax to map prosodic structure (Miller 2018, 2020, Miller & Sande 2021). It is interesting that the Planar-Fractal Method 1) successfully replicated the results of this previous analysis (Candidates 1, 3, and 5 correspond to the phonological word, phrase, and intonational phrase, respectively) and 2) did so with minimal theoretical assumptions and machinery. The fact that it does so is impressive confirmation of the domains active in Kiowa and of Tri-P's analysis of the language.

These candidates correspond to prosodic constituents, though, and I hesitate to call them "words". If anything, I think these results suggest that the idea of the "word" is tangential to successful analysis. As mentioned earlier, it is the verb complex itself that is arguably a complex head V^0 and – by many scholars – would be called a word (see Selkirk 2011 and the discussion therein). This is not a meaningful distinction, though, without further extrapolation about the properties of this word and what that means. In this, the Planar-Fractal Method is a successful method for stripping away unnecessary assumptions and may be helpful in confirmation of theoretical proposals in the future. I would not go as far as Bickel & Zúñiga (2017) to say that a clear word definition (at least in phonology) is out of reach, though. Tri-P Mapping offers such a definition, and it is showing early success.

7.3 Remaining questions and future directions

In this section, I conclude with a list of questions to pursue in future research.

1. While previous research admits that more than one tense/aspect particle can occur, it is a novel analysis to allow modal particles to form a zone in the planar structure above. I have found only one example of two modals co-occurring, and this merits further interest. Which particles can co-occur? For both zones, is it possible for more than two to co-occur?

2. What is the difference between coordinate and subordinate structure in Kiowa, and how does that affect the prosodification of switch-reference markers?

3. What is the precise nature of the gliding process that seems to subvert Vowel Truncation?

4. What is the precise nature of the other tonal modification processes at play in the data?

5. Address the gaps in testing mentioned in the phonological analysis (i.e. those whose environments are indicated as crucial but no such example exists in the current corpus).

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Abbreviations

1	first person	MOD	modality suffix
2	second person	N	neuter
3	third person	NOM	nominative
A	agent	NONSG	non-singular
ACT	active	OBJ	object
ADV	adverbial	P	patient
ANPH	anaphoric marker	PFV	perfective
ASP	aspect suffix	PRONOM	pronominal element
BAS	basic	REFL	reflexive
DET	determiner	SAME	same referent, switch-reference
DIFF	different referent, switch-reference	STAT	stative
DISTR	distributive	STEM	stem
DU	dual	SUB	subordinator
FUT	future	SYNT	syntactic suffix
HSY	hearsay	TR	transitive
IMP	imperative	V	verb
INTR	intransitive	WHEN	when, switch-reference marker
INV	inverse		
IPFV	imperfective		
ITRD	derived intransitive	X	unspecified person

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Appendix: Complete diagnostic results

All results from the morphosyntactic and phonological constituency diagnostics throughout this analysis are summarized below:

Table 10: Diagnostic results for verbal planar structure: morphosyntactic diagnostics

	L	R	Size	Conv.	
Free Occurrence (Minimal)	25	30	6	1	The smallest possible span that can be a minimal free form
Free Occurrence (Maximal)	25	36	11	2	The largest possible span that can be a minimal free form
Non-interruptability (Simplex)	29	36	8	2	Elements in this span cannot be interrupted by any free form
Non-interruptability (Complex)	23	36	17	1	Elements in this span cannot be interrupted by anything larger than a free form
Non-permutability (Rigid)	25	31	7	1	Elements in this span cannot be permuted or variably ordered
Non-permutability (Flexible)	25	34	10	1	Elements in this span can only be permuted to change scope
Subspan Repetition	1	39	39	2	This is the smallest subspan which may be coordinated or subordinated.
Ciscategorial Selection	29	33	5	2	Elements in this span can only semantically combine with one part of speech class.

Table 11: Diagnostic results for verbal planar structure: Phonological domains

	L	R	Size	Conv.	
Syllabification (Minimal)	29	36	8	2	A span where there is positive evidence that elements of adjacent positions interact in syllabification.
Syllabification (Maximal)	26	36	11	2	The largest possible span where there is no evidence against elements of adjacent positions interact in syllabification.
Cluster Devoicing (Minimal)	29	31	3	1	A span where there is positive evidence that elements of adjacent positions interact in Cluster Devoicing.
Cluster Devoicing (Maximal)	29	33	5	2	The largest possible span where there is no evidence against the elements interacting in Cluster Devoicing.
Vowel-Truncation	29	30	2	1	The span where elements of adjacent positions interact in Vowel Truncation.
Dental-Velar Switch (Minimal)	30	33	4	1	The span where there is positive evidence that elements of adjacent positions interact in Dental-Velar Switch.
Dental-Velar Switch (Maximal)	26	36	11	2	The largest possible span where there is no evidence against the elements interacting in Dental-Velar Switch.
Tone Lowering (Minimal)	25	33	9	1	The span where there is positive evidence that elements of adjacent positions interact in Tone Lowering
Tone Lowering (Maximal)	25	36	12	2	The largest possible span where there is no evidence against the elements interacting in Tone Lowering
Pausing	1	39	39	2	The span where elements of adjacent positions interact in Pausing

Table 12: Diagnostic results for verbal planar structure: Other Diagnostics

	L	R	Size	Conv.	
Deviations from Biuniqueness	29	34	6	1	The span where forms in adjacent positions do not display a one-to-one relation with meaning, and the differences are not phonologically conditioned