

Periodic tense markers in the world's languages and their sources

Guillaume Jacques

February 12, 2024

Jacques, Guillaume 2023. *Folia Linguistica*, 57(3):539-562, <https://doi.org/10.1515/flin-2023-2013>

ABSTRACT: This paper is the first survey of verbal affixes encoding the day period ('at night', 'in the morning' etc) or the yearly seasons ('in winter' etc) when the main action takes place. It introduces the term 'periodic tense' to refer to this comparative concept, explores the attested paradigms, their interactions with other verbal categories (including the more usual deictic tense) and investigates their diachronic origins. It shows that periodic tense markers are not restricted to incorporated nouns of time period, but constitute a highly grammaticalized verbal category in some languages, which redundantly co-occurs with adverbs or nouns of time.

KEYWORDS: Tense; temporal noun; grammaticalization; incorporation; complex predicates

1 Introduction

The present paper is the first survey of verbal PERIODIC TENSE across the world's languages, namely the marking of whether the event expressed by the verb occurs within a particular period of the day ('at night', 'in the morning' etc) or the year ('in winter', 'in summer' etc). Although descriptive grammars of languages with verbal periodic tense markers have identified the existence of this category and described entire paradigms (for instance, [Guillaume 2008](#): 239 on the Tacanan language Cavineña), there is little previous research devoted to this topic in a typological perspective.

This work comprises five sections. First, I introduce the terms *deictic* and *periodic tense* and their definitions. Second, I present typological parameters relevant to the description of the paradigms of periodic tense, and how they combine with other verbal categories. Third, I explore the sample of languages where periodic tense is attested and their geographical distribution. Fourth, I discuss the reconstructibility of periodic tense markers in

several language families. Fifth, I study the diachronic origins of attested periodic tense systems and their grammaticalization pathways.

2 Definitions

2.1 Deictic tense

In this paper, I use the term *deictic tense* to refer to the encoding of the time of occurrence (present, past, future) of an event or state described by the verb in relation to a point of reference (the deictic center). This includes what is usually called ABSOLUTE TENSE, when the deictic center corresponds to the speech act (Comrie 1985: 36), and RELATIVE TENSE, when a point of temporal reference distinct from the current moment is selected as deictic center (Comrie 1985: 56).

The deictic character of tense in the usual sense is regarded as an essential part of the definition of this notion (Traugott 1978). Yet, the study of time reference in language also includes that of temporal periods, not necessarily in relation to the present moment or another point in time.

2.2 Periodic tense

In contrast to deictic tense, *periodic tense* does not encode the moment of an event or a state in relation to any deictic center, but rather indicates whether it occurs during a particular recurrent time period, which can be a part of the 24 hour cycle (day, night, morning, afternoon etc) or a yearly season (winter, summer etc).¹

Periodic tense can be illustrated by the following examples from Nez Perce, which has special prefixes encoding the fact that the action occurs in the morning (MATUTINAL, 1a), the day (DIURNAL, 1b), the evening (VESPERAL, 1c), the night (NOCTURNAL, 1d), or winter (HIBERNAL, 1e). These markers co-occur with deictic tense, and are not only compatible with the present as in (1), but with all other tenses.

- (1) NEZ PERCE (nezp1238, Aoki 1994: 751-752)

- a. *méy-típ-se*
MAT-eat.meal-PRS:SG
'I am having breakfast.'
- b. *halxpa-típ-sa*
DIU-eat.meal-PRS:SG
'I am eating lunch.'

¹As suggested by an anonymous reviewer, periods other than parts of the day or of the year could be considered, such as the phases of the moon or the days of the week, but no language appears to have developed affixes with these meanings.

- c. *kulewí-tip-se*
VESP-eat.meal-PRS:SG
'I am eating supper.'
- d. *te·w-ćiq-ce*
NOCT-talk-PRS:SG
'I am talking at night.'
- e. *?elíw-tiñk-ce*
HIB-die-PRS:SG
'I am starving in winter.'

Not all incorporated nominal or adverbial stems referring to a time period can be analyzed as periodic tense markers. We can exclude three cases.

First, impersonal predicates referring to the time period itself often involve the incorporation of a temporal noun or adverb, such as *yabicha* 'night' in Wanano (2), but these do not count as periodic tense as there is no association of a distinct event or state to a particular time period.

- (2) WANANO (guan1269, Stenzel 2004: 241)
 ~yabicha-wa'a
 night-go

'When it gets dark...'

However, denominal verbs derived from nouns of time period with an instrumental marker expressing a distinct verbal action may be considered to be instances of periodic tense, as discussed in §3.6.

Second, in verbal compounds incorporating a periodic temporal stem lacking a corresponding simplex verb, that temporal element cannot be analysed as a tense marking. For instance, in Ancient Greek *nukto-makhéō* νυκτο-μαχέω 'fight by night' is a denominal verb which derives from the noun *nukto-makhía* νυκτο-μαχία 'night battle', and lacks a corresponding verb *makhéō* μαχέω: the related verb *mákhomai* μάχομαι 'fight' has a different (medio-passive) conjugation and one cannot posit a synchronic relationship linking *mákhomai* μάχομαι with *nukto-makhéō* νυκτο-μαχέω 'fight by night'. Hence, the stem *nukto-* νυκτο- 'night' is not a periodic tense marker in this form.

Third, I also exclude non-compositional compounds like English *day-dream*, which contain an element referring to a time period, but have an extended meaning distinct from the expression of periodic tense.

3 Typological parameters

3.1 Periodic tense and time adjuncts

In no language of the world are periodic tense markers the only way to express time periods of the day or the year.

In languages where periodic tense markers are incorporated time nominals, there is a tendency for the time noun to occur in non-incorporated form in the first reference to the time of the event in a discourse, and in incorporated form in the following instances. Thus in the Gunwinyguan language Bininj Gunwok, Evans (2003: 532), points out that the nocturnal *gak/kak-*, an incorporated form of the noun ‘night’, “shows the same external to incorporated progression through the discourse that characterizes incorporated generic nominals.” Thus, in a text, the first sentence contains the noun ‘night’ in locative form (3a) and is followed a few clauses later by a verb with the nocturnal prefix (3b).

- (3) BININJ GUNWOK (gunw1252, Evans 2003: 532)
- a. *Djidjnguk ka-re ku-kak*
p.n. 3-go:N.PST LOC-night
‘Djidjnguk passes by at night.’
 - b. *Nungka ka-rranjbu-n djenj bu ka-h-kak-re*
he 3-spear-N.PST fish SUB 3-IMM-NOCT-go
‘He gets a lot of fish going after them at night.’

Periodic tense markers can also co-occur with time adjuncts referring to the same time period in the same sentence, and be repeated on all the verbs in a particular passage. For instance, in the Yimas example (4), the nocturnal suffix *-kia* ‘at night’ (on which see §6.3) redundantly appears on two adjacent verbs (*am-* ‘eat’ and *ŋka-* ‘go by land’) together with the noun *wut* ‘night’.

- (4) YIMAS (yima1243, Foley 1991: 402)
- wut am-kia-k na-ma-ŋka-pu-kia-k**
night eat-NOCT-IRR 3SG.S-in-go.land-away-NOCT-IRR
- ‘At night he went inside to eat.’

Similarly, in (5), the suffix *-sisa* ‘all night’ in Cavineña (see §5.3) is reinforced by the presence of the adjunct *meta* ‘at night’.

- (5) CAVINEÑA (cavi1250, Guillaume 2008: 239)
- Meta=tu nei ju-sisa-kware.**
at.night=3SG rain be-NOCT-REM.PST

‘It rained all night long.’

This redundancy in the marking of time periods is comparable to what has been termed ‘echo phenomena’ in the study of associated motion (see for instance [Wilkins 1991: 251](#), [Guillaume 2016: 91, fn. 11](#)), and is reminiscent of ‘agreement’ between argument indexation markers and pronouns in the domain of person and number.

3.2 Periodic and deictic tense

Nearly all languages with periodic tense also encode deictic tense on the verb. The only exception found so far is the Siouan language Omaha ([Marsault 2021: 155](#)).

Some languages colexify periodic and deictic tense, having homophonous markers with either meaning in different morphological contexts (for instance, nocturnal and future in Yimas, §[6.3](#)).

On the other hand, languages encoding both periodic tense and deictic tense *at the same time* are uncommon: only two examples are known. In the Panoan language Kakataibo, for instance the suffix *-nët* ‘durative, the night before’ (6) appears to encode both deictic (past) and periodic (nocturnal) tense.

- (6) KAKATAIBO (cash1251, [Zariquey 2018: 335](#))

‘*ë=n ka=na ë=n xuta rabë*
1SG=A NAR=1SG 1SG=GEN grandson two:ABS
ka-nët-i-n bëtsi-kin
say-DUR.night.before-IPFV-1/2 other-S/A>A:SIMULTANEOUS

‘I told another (tale) to my two grandchildren all night long.’

The Tok-Orya language Berik is described by [Westrum \(1988: 150\)](#) as systematically encoding periodic tense (diurnal, nocturnal, and in some cases matutinal and meridial) in combination with deictic tense (past, present and future), resulting in highly complex and opaque paradigms (Table 1).² These data show that the morphological exponents of periodic tense in Berik are not easily segmentable morphemes, but unfortunately the verbal paradigms of this language remain poorly described.

²The source of these data may contain typos; in particular, the form *?gubafa* for nocturnal future may lack an *l*.

Table 1: Sample of diurnal and nocturnal distinctions in the paradigm of the verb ‘to give’ in Berik ([Westrum 1988](#): 150)

Period	Present	Past	Future
DIU	gulbana	gulbanant	gulbafa
NOCT	gulbasa	gulbafant	gubafa

3.3 Time duration and time limit

The meaning of some periodic tense markers can be broader or more specific than ‘do during the *X*’ or ‘do the action typical of what people do on *X*’.

For instance, the marker =ba?iná in Chácobo does not mean ‘during the day’ but rather ‘do the whole day’ (7a) or ‘do every day’ (7b).

- (7) CHÁCOBO (chac1251, [Tallman 2018](#): 876-878)

- a. *ho~hó=ba?ina=kan=(?)ái kiá*
come~come = DIU = 3PL = NMLZ:IPFV REP
‘It is said that they returned taking the whole day.’
- b. *i~?i=ba?ina i=?a=ka hiwi katia~katia=ba?ina*
do~do = DIU 1SG = NMLZ:O = REL log carry~carry = DIU
i wa=yami(t)=ki
1SG TR = DIST.PST = DEC:O
‘When I was doing this every day, I was carrying lumber every day.’

The interpretation ‘during the whole day’ (PANEMERIAL) can be forced by adding the adjunct *barí* ‘day’ in an echo construction (§3.1) as in (8).

- (8) CHÁCOBO (chac1251, [Tallman 2018](#): 879)

- no ka~ka=baina=ní=ki barí=no*
1PL go~go = DIU = REM.PST = DEC:O day/sun = SPATIAL

‘We went all day throughout the day.’

Some periodic tense markers can mark a single point in time or define a period of time by its lower limit. For instance, Arapaho *nookon-*, which originates etymologically from a verb ‘be dawn’ (§5.2), can express a punctual event ‘at dawn’ (9b) (AURORAL), a period ending at that point in time ‘until dawn’ (ADAURORAL), or its extension to the meaning ‘all night’ (9b) (PANNUCHIAL).

- (9) ARAPAHO (arap1274, [Cowell and Moss 2006](#): 460)

- a. *tih-’ii-nóókon-tóyoow-bée3-títoon-i-*.
when.PST.IPFV-HAB-dawn-cold-finish-camp(VAI)-X-0SG
‘When camp would be broken on cold mornings.’
- b. *nih-nóókon-betéee-3i*
PST-until.dawn-dance(VAI)-3PL
‘They danced all night.’

Table 2 recapitulates all attested types of periodic tense markers attested in the world’s languages. It introduces a set of Latin and Greek-based terms to refer to these categories, some of which have been previously used by linguists (for instance ‘matutinal’ and ‘nocturnal’ appears in [van der Voort 2004](#): 340), with the prefixal elements *pan-* and *ad-* for markers meaning ‘all X’ and ‘until X’, respectively.

Table 2: Attested types of periodic tense markers

period	example
<i>day periods</i>	
at dawn (AURORAL)	Cavineña -wekaka (Guillaume 2008 : 126)
in the morning (MATUTINAL)	Nez Perce <i>mey-</i> (1a)
at noon (MERIDIAL)	Berik (Westrum 1988 : 154)
during the day(DIURNAL)	May River Iwam - <i>harok</i> (Foley 2018 : 286)
in the afternoon (POSTMERIDIAL)	May River Iwam - <i>tep</i> (Foley 2018 : 286)
in the evening (VESPERAL)	Nez Perce <i>kulewi-</i> (1c)
in the night (NOCTURNAL)	Nez Perce <i>te-w-</i> (1d)
all day (PANEMERIAL)	Chácobo = <i>baina</i> (7)
all night (PANNUCHIAL)	Jarawara - <i>haba</i> (Dixon 2004 : 136)
until dawn (ADAURORAL)	Awtuw - <i>alw</i> (Feldman 1986 : 119)
until noon (ADMERIDIAL)	Omaha - <i>míthumo”shi</i> (Marsault 2021 : 309)
until afternoon	Alamblik - <i>krif</i> (Bruce 1979 : 275)
until nightfall (ADNOCTURNAL)	Omaha - <i>ho”</i> (Marsault 2021 : 309)
<i>yearly seasons</i>	
during winter (HIBERNAL)	(Cowell and Moss 2006 : 217-218)
during the spring (VERNAL)	Arapaho <i>cecín-</i>
during the summer (ESTIVAL)	Arapaho <i>benii’ow-</i>
during the fall (AUTUMNAL)	Arapaho <i>biicen-</i>
	Arapaho <i>toyoun-</i>

3.4 Time period paradigms

Eleven languages out of thirty in the sample (Table 4) only have one single periodic tense marker (for instance Shamala *uni-* ‘during the night’). On the other hand, some languages have elaborate paradigms for periodic tense.

Nez Perce counts five periodic tense markers (1), and Arapaho six markers including the four seasons of the year (see Table 2).

With the exception of Alto Perené, Paumarí and possibly Sepik Iwam and Alamblak (whose paradigms of periodic tense markers however are probably incomplete in the available sources), all languages in the sample have at least one NOCTURNAL marker. The second most widespread periodic tense category is MATUTINAL, attested in at least 15 languages.

The rarest type of period tense markers are those for yearly seasons, which are only found in Nez Perce and Arapaho in Northern America. It is unsurprising that these categories are absent from languages of New Guinea, Australia and Southern America, which are located in tropical zones. There is no example of tropical seasons such as monsoon or dry season having been grammaticalized as a periodic tense marker.

Apart from days and years, no other time periods (such as months or weeks) are encoded as periodic tense markers in any of the languages investigated.

Periodic tense is normally overtly marked, except in the isolate Tabo in Southern New Guinea, where diurnal forms are unmarked, while nocturnal forms are systematically built by adding a suffix *-n-* before the deictic tense suffix, as in *-aka* ‘recent past daytime’ vs *-n-aka* (-NOCT-RECENT.PST) ‘recent past nighttime’ (Evans et al. 2018: 736, based on Schlatter 2003).

3.5 Combination with other verbal categories

Other than the interaction with deictic tense (§3.2), little data is available in published descriptions on how periodic tense combines with other verbal categories.

Slavin (2006), provides however important data from Severn Ojibwe (Oji-Cree) showing scopal differences in the use of phasal preverbs such as *pooni-* ‘stop Xing’ or modal preverbs like *nanaantawi-* ‘look for’ with the matutinal *kishepaa-* and the nocturnal *niipaa-* preverbs.³ These examples illustrate the fact that phasal or modal preverbs have scope over the periodic tense preverbs when they are further away from the verb stem (10a, 10c), and that conversely they are closer to the verb stem, the periodic tense preverbs have scope over the preverbs (10b, 10d).

- (10) SEVERN OJIBWE (seve1240, Slavin 2006)

- a. *Pooni-niipaa-anohkii.*
stop-NOCT-work(VAI):3SG:INDEP
'S/he stopped working at night (does not work at night anymore).'

³These forms correspond to *gizhebaa-* ‘in the morning’ and *niibaa-* ‘at night’ in the orthography used for other varieties of Ojibwe. I keep here Slavin’s (2006) transcription without any modification.

- b. *Niipaa-pooni-anohkii.*
NOCT-stop-work(VAI):3SG:INDEP
'S/he quit his job at night.'
- c. *Nanaantawi-kishepaa-anohkii.*
look.for-MAT-work(VAI):3SG:INDEP
'S/he is looking for a morning job.'
- d. *Kishepaa-nanaantawi-anohkii.*
MAT-look.for-work(VAI):3SG:INDEP
'S/he is looking for a job in the morning (performing the search in the morning).'

Aside from modal and phasal markers, periodic tense can also be combined with durative markers, as in (11) from Chukchi, where the nocturnal *nəki-* co-occurs with the duration marker *ure-* 'for a long time'.

- (11) CHUKCHI (chuk1273, [Skorik 1977](#): 241; [Mattissen 2003](#): 283)

мын-ныки-урэ-қэпл-увичвэн-мык
mən-nəki-ure-qepl-uwigwen-mək
1PL-night-long.time-ball-play-IMP:1PL

'Let's spend a lot of time playing ball at night.'

Celerative markers such as Nez Perce *teqe-* 'quickly' can also combine with the matutinal *mey-* with a non-compositional meaning 'early in the morning' (§12) rather than 'quickly in the morning' ([Jacques 2022](#)).

- (12) NEZ PERCE (nezp1238, [Aoki 1994](#): 211)

teqe-mé-y-sep-ke?yk-u?
CELER-MAT-CAUS-move-FUT

'I will pack early in the morning.'

3.6 Periodic tense markers as primary predicate

In all of the examples examined above, periodic tense markers are either affixes, or incorporated stems in a complex predicate.

A distinct situation is observed in Omaha, where temporal nouns can be denominalized by instrumental prefixes (on this notion see [Palancar 1999](#); [Mithun 1999](#): 118-126), deriving verbs in which the action encoded by the prefix occurs *until* the time period expressed by the nominal root, which serves as the primary predicate ([Marsault 2021](#): 309). For instance, Table 3 illustrates the verbs derived from the nouns *ó"ba* 'day' and *ho"* 'night'.

These examples differ from temporal impersonal verbs, which are not considered to be cases of periodic tense in this study (such as ‘be night’ in 2 above), in that an additional action, depicted by the prefix, is taking place.

However, since instrumental prefixes are a closed class and are derivational elements, while the time period is marked by a lexeme, these examples are not instances of grammatical marking of periodic tense in the proper sense.

Table 3: Examples of instrumental denominal verbs derived from temporal nouns in Omaha ([Marsault 2018](#): 376)

Instrumental prefix		Derived verb	
<i>tha-</i>	with mouth	<i>tha-ó'ba</i>	‘speak until day’
<i>ga-</i>	by force	<i>ga-ó'ba</i>	‘beat until day’ (drum)
<i>noⁿ-</i>	with foot	<i>noⁿ-ó'ba</i>	‘walk until day’
<i>na-</i>	with fire	<i>na-ó'ba</i>	‘burn all night’
<i>mu-</i>	by shooting	<i>mú_hoⁿ</i>	‘to shoot all day until nightfall’

By contrast, when the temporal noun is incorporated, the resulting meaning is ‘during *X*’, as in (13), where the noun *hoⁿ* ‘night’ serves as a nocturnal marker.

- (13) OMAHA (omah1248, [Marsault 2021](#): 346, [Dorsey 1890](#))

Hoⁿ-í-moⁿthiⁿ édi athá=biamá.
night-LOC-walk there go=PL.report

‘They went thither by night.’

4 The sample

Thirty independent examples of verbal periodic tense markers from 18 language families and isolates have been identified, as represented in Table 4.⁴ Five language families, Algonquian, Sahaptian, Tacanan and Guwinyguan, comprise two or more languages with historically related periodic tense markers (§5), which are not counted separately. In total, 50 languages are represented on map 3 and included in the supplementary materials.

The data have been obtained from published sources and personal communications from linguists. Although some languages in the sample have written corpora (in particular Nahuatl), none of them is a major literary language with strong state support. The whole category of periodic tense

⁴The abbreviations UA, PT and LSR stand for Uto-Aztecan, Pano-Tacanan and Lower Sepik-Ramu.

is only attested in languages that are either vulnerable, endangered or extinct.

The sources are not always explicit concerning the productivity of the markers. Some of the examples are fully productive and extremely frequent in texts, while others (such as the Hopi prefixes) seem to be restricted to a few lexical items.

All languages with periodic tense have some form of argument indexation (even if limited to the number of the S/O, as in Berik and Hopi) and noun incorporation (even if non-productive), and nearly all (except Omaha) also encode deictic tense in the verb.

Table 4: Examples of periodic tense markers in the sample

Family	language	form	type	reference
Chukotkan	Chukchi	<i>naki-</i>	NOCTURNAL	Skorik (1977: 241)
Algic	Ojibwe	<i>gigizhebaa-naawakwe-onaagoshi-nibaa-naawakwe-waabani-</i>	MATUTINAL MERIDIAL VESPERAL NOCTURNAL MERIDIAL ADAURORAL	Livesay and Nichols (2021) Slavin (2012: 147)
Algic	Maliseet	<i>cehqono-spotiy-</i>	ADAURORAL DIURNAL	LeSourd (1986: 12) LeSourd (1986: 89)
Algic	Arapaho	<i>cecin-benii'ow-biicen-toyoun-nohkúseic-</i>	HIBERNAL VERNAL ESTIVAL AUTUMNAL MATUTINAL	Cowell and Moss (2006: 217-218)
Sahaptian	Nez Perce	<i>téw-méy-halxpa-kulewi-zelw-</i>	NOCTURNAL MATUTINAL DIURNAL VESPERAL HIBERNAL	Aoki (1970)
Siouan	Omaha	<i>hoⁿ-óba</i>	NOCTURNAL ADAURORAL	Marsault (2021: 346) Marsault (2018)

		<i>míthumōⁿshí-</i>	ADMERIDIAL	Marsault (2021: 309)
Chumashan	Shamala	<i>uni-</i>	NOCTURNAL	Applegate (1972: 338)
UA	Hopi	<i>mihiqw-</i> <i>tok-</i> <i>talavay-</i>	NOCTURNAL MATUTINAL	Malotki (1983: 338) Malotki (1983: 554) Malotki (1983: 293)
UA	Nahuatl	<i>yohual-</i>	NOCTURNAL	Andrews (2003: 266)
is.	Kwaza	<i>sile-</i> <i>-kore</i>	NOCTURNAL MATUTINAL	van der Voort (2004: 340)
PT	Kakataibo	<i>-nët</i>	'the night before'	Zariquey (2018: 335)
PT	Chácobo	<i>=finá</i> <i>=bañiná</i>	NOCTURNAL DIURNAL	Tallman (2018)
PT	Cavineña	<i>-wekaka</i> <i>-apuna</i> <i>-chinepe</i> <i>-sisa</i>	AURORAL VESPERAL DIURNAL NOCTURNAL	Guillaume (2008: 126)
Arawan	Jarawara	<i>-(ha)u</i> <i>-haba</i> <i>-mina</i>	'all day' 'all night' MATUTINAL, 'tomorrow'	Dixon (2004: 129) Dixon (2004: 136)
Arawan	Paumarí	<i>-kajoma</i>	MATUTINAL	Chapman and Derbyshire (1991: 321)
Arawakan	Alto Perené	<i>-aman</i>	MATUTINAL	Mihas (2015: 396)
Gunwinyguan	Dalabon	<i>kangH-</i>	NOCTURNAL	Evans (2017: 766)

		<i>rdeh-</i>	MATUTINAL	
Gunwinyguan	Bininj Kunwok	<i>mala-</i>	MATUTINAL	Evans (2003: 531)
Gunwinyguan	Rembarrnga	<i>tanjin-</i> <i>tappa-</i> <i>puttan-</i>	MATUTINAL POSTMERIDIAL NOCTURNAL	McKay (1975: 186) McKay (1975: 62)
is.	Tiwi	<i>aθ-</i> <i>kə-</i>	MATUTINAL VESPERAL	Osborne (1974: 45-46)
Sepik	Awtuw	<i>-dlw</i>	ADAURORAL	Feldman (1986: 119)
Sepik	Alamblak	<i>-krif</i>	'until afternoon'	Bruce (1979: 275)
Sepik	May River Iwam	<i>-yok</i> <i>-harok</i> <i>-tep</i> <i>-wae</i>	MATUTINAL DIURNAL POSTMERIDIAL NOCTURNAL	Foley (2018: 286)
Sepik	Sepik Iwam	<i>-iyakwok</i>	MATUTINAL	Foley (2018: 284)
Sepik	Abau	<i>-kok</i> <i>-ropay</i> <i>-mayr</i>	DIURNAL POSTMERIDIAL NOCTURNAL	Foley (2018: 292)
LSR	Yimas	<i>-kia</i>	NOCTURNAL	Foley (1991: 240)
LSR	Kopar	<i>-siri</i> <i>-ar</i> <i>-ma</i> <i>-se</i>	MATUTINAL MERIDIAL PSTMERIDIAL NOCTURNAL	Foley (2022: 136)

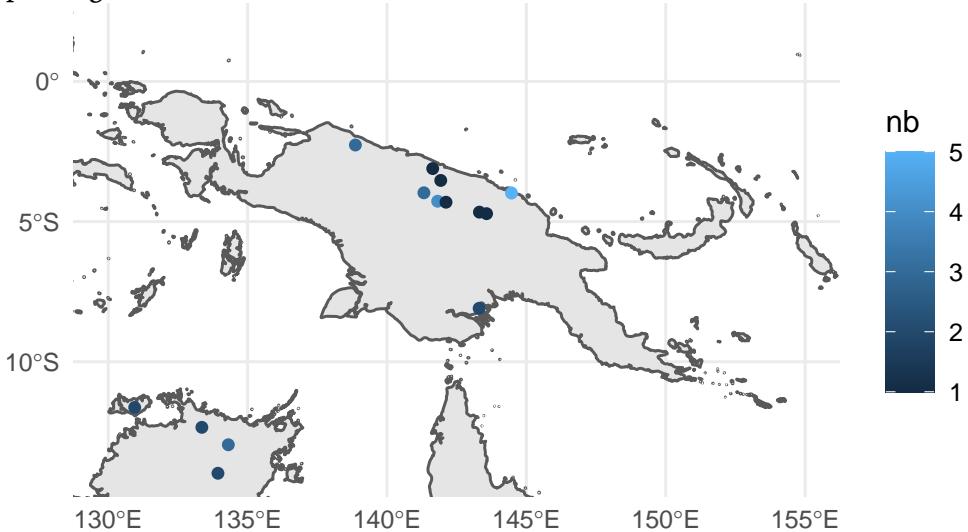
Tok-Orya	Berik	Table 1	DIURNAL, NOCTURNAL MATUTINAL, MERIDIAL	Westrum (1988: 150) Westrum (1988: 154)
is.	Tabo	zero -n-	DIURNAL NOCTURNAL	Schlatter (2003)
Fas	Momu	-pan	ADAURORAL	Honeyman (2016: 275)

4.1 Geographic distribution

Periodic markers are rare in the world's languages, and their areal distribution is highly skewed. Of the thirty independent examples of verbal periodic tense in the sample, ten are located in New Guinea (Figure 1), of which eight comprise adjacent languages of the Sepik, Fas and Lower Sepik Ramu families in the center north of the island. Although at least five languages in the Sepik family have periodic tense, the markers are not cognate, and the systems are quite different in terms of size and structure. In addition, there are two isolate outliers, Berik in Irian Jaya to the west of the Sepik basin area, and Tabo in the Southeast.

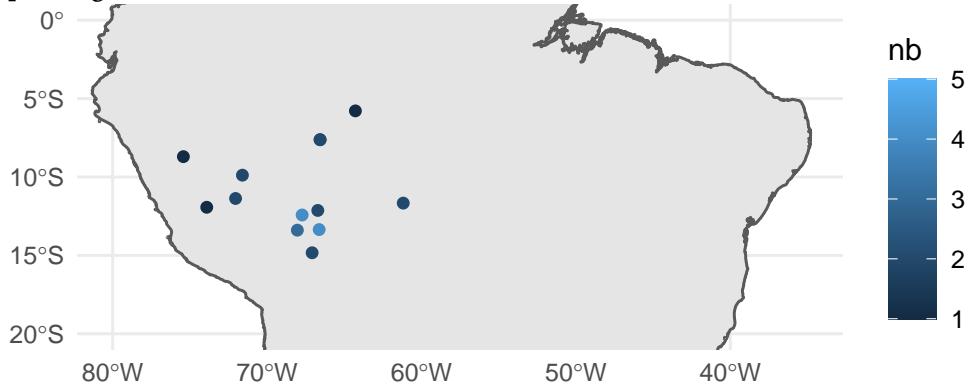
In Australia, periodic tense is found in a restricted area in Arnhem land and neighbouring islands, in several Gunwinyguan languages and the language isolate Tiwi.

Figure 1: Geographic distribution of languages with periodic tense markers in New Guinea and Australia ('nb' represents the number of markers in the paradigm)



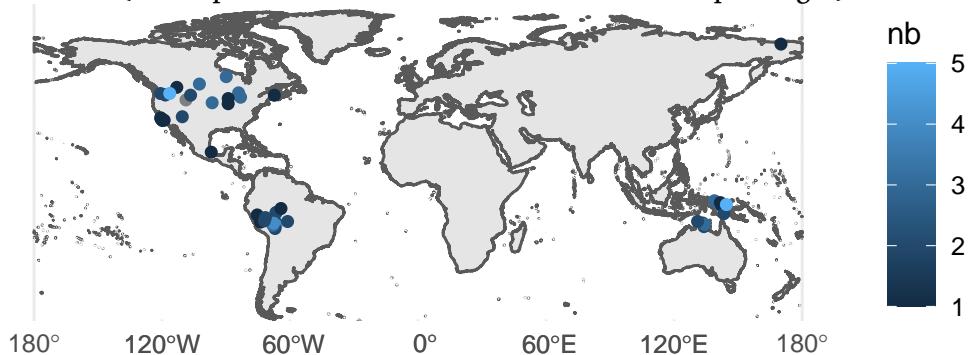
Outside of New Guinea and Australia, periodic tense is mainly attested in the Americas. In North America, they cover a wide geographical area due to the extent of the Algonquian family, where they are well developed. Otherwise, they are found in only four families, Sahaptian, Siouan, Chumashan and Uto-Aztecán. In South America, periodic tense is concentrated in an area in the Western Amazon corresponding to Pano-Tacanan, Kwaza and Arawan languages (map 2).

Figure 2: Geographic distribution of languages with periodic tense markers in the Amazon region ('nb' represents the number of markers in the paradigm)



Outside of the Americas, Papua and Northern Australia, periodic tense is only found in Chukotkan in Eurasia (map 3) and appears to be completely absent from Africa and the rest of Eurasia.

Figure 3: Geographic distribution of languages with verbal periodic tense markers ('nb' represents the number of markers in the paradigm)



The high concentration of periodic tense in a few restricted areas, and across language families, suggests that this category may have spread in some cases by contact in contiguous languages.

5 Reconstructability of periodic tense markers

At least five language families, Sahaptian, Algonquian, Tacanan, Panoan and Gunwinyguan, contain two or more languages sharing related periodic tense markers with regular sound correspondences. In this section, we study whether these affixes are evidence that a system of periodic tense

can be reconstructed for each proto-language, or whether it is due to parallel developments from cognate sources, in order to test the diachronic resilience of this type of markers.

5.1 Sahaptian

At least two of the five periodic tense prefixes found in Nez Perce (1) are reconstructible in proto-Sahaptian (Table 5).

Table 5: Reconstructible Sahaptian periodic tense prefixes

	Nez Perce Aoki (1970)	Yakima Sahaptin Jansen (2010: 222-223)	Proto-Sahaptian Aoki (1962)
MATUTINAL	<i>mey-</i>	<i>may-</i>	* <i>mêy-</i>
NOCTURNAL	<i>tew-</i>	<i>taw-</i>	* <i>têw-</i>

The nouns for ‘morning’ in Sahaptin (*máytski*) and Nez Perce (*mé:ywi*) contain reflexes of the stem **mêy-*, which is also attested in other nominal and adverbial forms such as Yakima *páchway* ‘midday’ and Nez Perce *pé:mme* ‘every morning’ but does not occur as an independent word in either language. It is therefore unclear whether the matutinal prefix comes from a noun or an adverb ‘morning’, or whether the nominals derive from this bound form.

The nocturnal prefix **têw-* on the other hand is quite different from the noun ‘night’ in both Nez Perce (*cikét* ‘night’, locative *ciké:tpe* ‘at night’) and Yakima (*sts’áat* ‘night’, locative *sts’átpa*), reconstructed as **cikét* in proto-Sahaptian. No reflex of the prefix **têw-* appears outside of the verbal system, indicating that it was already etymologically opaque in proto-Sahaptian. Given the fact that the prefix **têw-* colexifies the meaning ‘sleep’ (§6.4), it is possible that it is etymologically related to the verb *táwta*- ‘be in bed’ (Aoki 1994: 694).

5.2 Algonquian

Some Algonquian languages, in particular Arapaho (Table 2), have large periodic tense paradigms, but only one prefix is potentially cognate across the family: the ‘at dawn, until dawn, all night’ stem (Table 6; see also example 9 above).

Table 6: The prefix ‘until dawn, all night’ in Algonquian languages

Language	Form	Reference
Ojibwe	<i>waaban-</i>	Livesay and Nichols (2021)
Meskwaki	<i>wâpan(wi)-</i>	Goddard and Thomason (2005: 175)
Cheyenne	<i>vóon-</i>	Fisher et al. (2017)
Arapaho	<i>nóókon-</i>	Cowell and Moss (2006: 460)

Despite their surface differences, these forms are perfect phonetic matches, deriving from a proto-form **wap-an-*. In Arapaho, **w-* shifts to *n-*, **a* to *o* and **p* to *k/c* regularly ([Goddard 1974](#)), whereas in Cheyenne, **p* drops in contexts which are not completely understood ([Goddard 1988](#)).

Despite the cognacy of these prefixes, it remains unclear whether a periodic tense prefix **wap-an-* ‘at dawn, until dawn’ can be projected back to proto-Algonquian, as this prefix is transparently derivable from the intransitive inanimate verb **wap-an-wi* ‘be dawn’ (§6.1), attested in Meskwaki *wâpanwi* ‘it is dawn, it is morning, it is day’ ([Goddard and Thomason 2005: 175](#)) or Ojibwe *waaban* ‘be dawn, be tomorrow’ ([Livesay and Nichols 2021](#)), from the initial stem **wap-* ‘white, bright’ and the final stem **-an-*.

Hence, we cannot exclude the possibility that the nocturnal markers ‘until dawn’ in Ojibwe, Meskwaki, Arapaho and Cheyenne have been independently grammaticalized from a shared inherited verb. It is thus unclear whether periodic tense is an inherited or innovative category in Algonquian.

5.3 Tacanan

In the Tacanan family, four historically related periodic tense markers are attested in Cavineña and Araona, of which three are also found in Tacana and two remain in Reyesano (a moribund language).

These suffixes are relatable to roots reconstructed for proto-Tacanan by [Girard \(1971\)](#), and comply with regular sound correspondences. The only question in this set involves the correspondence of Araona *-ei-* to *-i-* elsewhere, a well-identified but unsolved problem ([Girard 1971: 31](#)).

While the roots from which the suffixes originate are cognate, it is unclear whether these suffixes were already grammaticalized in proto-Tacanan, as it might instead reflect parallel grammaticalization.

Table 7: Periodic tense suffixes in Tacanan languages

Language	DIU	NOCT	AUR	VESP	Reference
Cavineña	- <i>chinepe</i>	- <i>sisa</i>	- <i>wekaka</i>	- <i>apuna</i>	Guillaume (2008: 126)
Araona	- <i>tseiñe</i>	- <i>sisa</i>	- <i>huena</i>	- <i>niapona</i>	Pitman (1980: 28)
Tacana	- <i>tsine</i>	- <i>dhidha</i>	-(<i>sa</i>) <i>wena</i>		Guillaume (2009-2012) field notes
Reyesano	- <i>tsine</i>	-(<i>a</i>) <i>tsitsa</i>			Guillaume (2012: 209)
Proto-Tacanan	* <i>cine</i> 'day'	* <i>ziza</i> 'night'	* <i>ue</i> 'light'	* <i>apu</i> 'dark'	Girard (1971: 71;138;128;54)

In the case of the auroral marker, the suffix *-wekaka* ‘at dawn’ in Cavineña is identical to the verb *wekaka* ‘be dawn’ (Guillaume 2008: 243), while *-huena* in Araona and *-(sa)wena* in Tacana appear to derive from the same root **ue* ‘light’ with the verbalizer suffix *-na*. The formations are thus not identical across the family.

The vesperal suffix *-apuna* in Cavineña originates from the verb *apuna* ‘darken’, itself derived from the adjective *apu-* ‘dark’ followed by the verbalizer *-na* (Guillaume 2008: 243). The same origin can be postulated for *-niapona* in Araona.

5.4 Panoan

In the Panoan family, which is remotely related to Tacanan, some languages also have periodic tense (Table 8).

Although these suffixes are not reconstructed in Oliveira (2014), they evince sound correspondences attested elsewhere (compare **βa?i* ‘path’, Chácobo *bá?i*, Yaminahua *fai*, Oliveira 2014: 407).

Table 8: Diurnal and nocturnal suffixes in Panoan languages

Language	DIU	NOCT	Reference
Yaminahua	- <i>fain</i>	- <i>shin</i>	Faust and Loos (2002: 235)
Yora	- <i>fai</i>	- <i>shī</i>	Lord (2016: 51)
Chácobo	= <i>ba?iná</i>	= <i>finá</i>	Tallman (2018)
Proto-Pano	* <i>βa?inV-</i>	* <i>sinV-</i>	

In the absence of obvious lexical sources for these suffixes, it is plausible that they are reconstructible for the common ancestor of Yaminahua and Chácobo.

5.5 Gunwinyguan

The nocturnal prefixes in Dalabon *kangH-* (14) and Bininj Gunwok *gak-* (15) are historically related.

- (14) DALABON (ngal1292, [Evans 2017](#): 767)

Bala-h-kangH-bo-ŋg, mak bulu ka-marnu-barrhbu-y.
3PL-REAL-night-go-PST.PFV NEG 3PL.O 3SG.S.IRR-BEN-dawn-IRR

‘They travelled by night, it never dawned on them (while they were travelling).’

- (15) GUN-DJEIHMI (gund1246, [Evans 2003](#): 532)

a-gak-ganj-ŋgune-ŋg
1→3-NOCT-meat-eat-PST.PFV

‘I ate meat by night.’

However, there is evidence that these prefixes may not have been inherited from their common ancestor, but were rather independently innovated in each language.

Dalabon *kangH-* is grammaticalized *kangH-no* ‘night’ (where *-no* is the 3SG possessive), while Gunwok *gak-* is from *gun-gak* ‘night-time, darkness’ [Evans \(2003: 531\)](#) (where *gun-* is the class IV prefix, [Evans 2003: 185](#)). The aspirated nasal *-ŋgH* in Dalabon is due to the nasalization of *-k* when followed by a nasal,⁵ and the source of nasalization is probably the *-no* 3SG suffix. This implies that the nocturnal *kangH-* was incorporated after the nasalisation, and hence that it must have occurred after the split of Dalabon and Bininj Gunwok.

6 Diachronic pathways and colexifications

Since none of the languages with periodic tense in the sample have ancient written records, investigations into the diachronic origin of these systems can only be based on reconstructions of proto-languages based on the comparative method, and on the synchronic colexification patterns ([François 2008](#)).

In this section, we investigate the attested historical origins of periodic tense markers in languages where they are transparently grammaticalized. The data indicate that periodic tense affixes, unsurprisingly, come from the incorporation of nouns, adverbs or verbs referring to time periods, but there are in addition two other origins: deictic tense (future) and, more speculatively, non-temporal lexemes.

⁵For instance, the plant *Pandanus basedowii* is called *ngongHno* in Dalabon and *man-ŋgokŋo* in Bininj Gunwok (Nick Evans, p.c.).

6.1 Temporal verbs

An attested source of periodic tense markers are impersonal temporal verbs meaning ‘it is dawn, night, day’, as is clearly the case of the adauroral prefix in Algonquian (§5.2) and the auroral and vesperal suffixes in Tacanan (§5.3). Additional examples are found in Kwaza, where the nocturnal suffix *-sile* ‘nocturnal’ is transparently derived from *sile-* ‘be night’ (van der Voort 2004: 340).

In Nez Perce, alongside the inherited period tense prefixes (§5.1), the hibernal prefix *?elíw-* (1e), which is not found in Yakima Sahaptin, is related to the verb *?elwí-ce* ‘I spend winter’. Both the prefix and the verb are also historically related to the noun *?ením* ‘winter’ (Yakima *ánim*, proto-Sahaptian **?ení?m*), but with irregular nasalization, and the morphological relationship with the verb is more straightforward than with the noun.

6.2 Temporal nouns

Temporal nouns are possibly the most common origin of period tense markers. Classical Nahuatl provides a transparent example of this type with the nocturnal *yōhual-*, from the incorporation of the noun *yōhualli* ‘night’ (16).

- (16) CLASSICAL NAHUATL (clas1250, Andrews 2003: 266)

ni-yōhual-caqui
1SG-night-hear

‘I hear it in the night. I hear it at night.’

Similar cases of noun incorporation used to express periodic tense are found in Chukchi (11), Omaha (§13), Tacanan (§5.3) and Gunwinyguan (§5.5).

In Nez Perce, in addition to inherited prefixes (§5.1) and at least one prefix of verbal origin (§6.1), the vesperal *kulewí-* ‘in the afternoon’ (1c) and the diurnal *halxpá-* ‘during the day’ (1b) respectively come from the nouns *kulé-wit* ‘afternoon’ (cognate with Yakima *kwláawit* ‘late afternoon, evening’) and *haláxp* ‘daytime’.

The Nez Perce case illustrates that periodic tense systems can be composite, and comprise both recent and ancient elements, grammaticalized from different sources.

6.3 Deictic tense

In Yimas, the nocturnal suffix *-kia* (4) also expresses near future tense when combined with the definite *na-* and the irrealis *-k* (17).

- (17) YIMAS (yima1243, Foley 1991: 240)

ŋuany *na-kay-na-awl-kia-k*
 one.day.removed V.SG.O-1SG.A-DEF-get-FUT-IRR

‘We will get them tomorrow.’

According to Foley (1991: 240), this deictic tense meaning might be the original function of the suffix *-kia*, which he suspects is borrowed from the Iatmul future *-(i)kiya* (Jendraschek 2012: 193).

Foley also points out that Yimas people traditionally consider that a full day lasts from sunset to sunset, and thus that a person discussing during the day an event about to occur the same night must mark those with the near future *-kia*, and that for this reason, this marker became associated with night time, a meaning that the future suffix *-(i)kiya* does not have in Iatmul.

Hence, a marker of near future tense became reanalysed as a nocturnal, the future meaning being specified by the addition of the unrealis and definite markers. From a strictly synchronic point of view, the future *-kia* and the nocturnal *-kia* may be considered to be distinct affixes sharing a common origin.

An opposite semantic evolution may have occurred in Jarawara, where the matutinal suffix *-mina* ‘in the morning’ can also have a deictic tense interpretation ‘tomorrow’ (Dixon 2004: 129). In view of the highly frequent and unidirectional semantic evolution MORNING → NEXT DAY/TOMORROW (Buck 1949: 999), it is more likely to assume that this suffix was originally a pure periodic tense marker, which developed later the meaning ‘tomorrow’, rather than the opposite.

6.4 Non-temporal

The Nez Perce prefix *tew-* (§5.1), in addition to its function as a nocturnal marker, colexifies the meaning ‘sleep’ in some examples, as illustrated in (18), in particular with verbs of emotional state such as *texteqet-* ‘worry’ and *qum-* ‘miss’ and verb of accompaniment like *tiwe-* ‘be with’.

- (18) NEZ PERCE (nezp1238, Aoki 1994)
- a. *téw-tiwe-ce.*
 NOCT-be.with-PRS:SG
 ‘I sleep with (mine).’
 - b. *téw-texteqet-nu?*
 NOCT-worry-FUT
 ‘I will have trouble sleeping.’
 - c. *téw-qum-ce*
 NOCT-miss-PRS:SG
 ‘I want to sleep. I miss sleep.’

The verb *hí-nani-*, whose basic meaning is ‘to shape (with)’ when employed with an instrumental prefix (19a), means ‘make the bed’ when occurring with the nocturnal *tew-* (19b),⁶ further derived from ‘sleep’ and ‘night’.

- (19) NEZ PERCE (nezp1238, [Aoki 1994](#): 149)

- a. *?ica-hínani-sa*
with.knife-shape-PRS:SG
‘I am shaping with a knife.’
- b. *tá:w-inani-sa*
NOCT-shape-PRS:SG
‘I am making bed.’

These additional meanings of the nocturnal prefix *tew-* support the hypothesis of a historical relationship with the verb *táwta-* ‘be in bed’, entailing a segmentation *taw-ta-* with an unidentified element *-ta-*.

- (20) NEZ PERCE (nezp1238, [Aoki 1994](#): 694)

- táwta-cix*
be.in.bed-PRS:PL
‘We are in bed.’

These observations suggest that the nocturnal prefix in Sahaptian may not originate historically from a noun, a verb or an adverb related to a time period, but rather from a verb meaning ‘be in bed’ from which the temporal meaning was derived, possibly following the pathway in (21).

- (21) SLEEP ⇔ BE IN BED ⇒ BE AT NIGHT ⇒ NOCT

The colexification between ‘sleep’ and ‘night’ is not included in the CLICS database ([Rzymski et al. 2020](#)), and it is unclear whether this can be postulated as a frequent origin for a nocturnal markers crosslinguistically.

7 Conclusion

In comparison with deictic tense, periodic tense is rarely encoded in verb morphology in the world’s languages. Even in language families where it is attested, periodic tense markers are rarely cognate, and only very few markers are reconstructible even in the case of shallow language families, indicating that these markers are frequently renewed.

⁶The allomorph *tá:w-* is due to vowel harmony ([Aoki 1968](#)).

Periodic tense is concentrated in a few restricted areas, most prominently in Northern New Guinea and in the Western Amazon, suggesting that this feature spread through contact. Most languages with periodic tense have some form of noun incorporation, and although not all periodic tense markers originate from temporal nouns or verbs, they are not attested in languages lacking verbal compounds.

Acknowledgments

I would like to thank Nick Evans, Sune Gregersen, Olga Fischer, Antoine Guillaume, and two anonymous reviewers for useful comments and corrections on this work. I remain responsible for any remaining mistake.

Abbreviations

ADAUR adauroral, AUR auroral, CELER celerative, DEC declarative, DEF definitive, DIST distant, DIU diurnal, DUR durative, HAB habitual, HIB hibernal, IMM immediate, INDEP independent order, MAT matutinal, MER meridial, NOCT nocturnal, PRS present, REM remote, REL relativizer, REP reported speech, VESP vesperal, REL relative,

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