Te Reo
the Journal of the Linguistic
Society of New Zealand

Volume 63
Issue 1 (*Regular Issue*)
Research Article
2020
1–37

July 2020

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This paper is a peer-reviewed contribution from https://www.nzlingsoc.org/journal/current-issue/

Editor: Andreea S. Calude

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Abstract

This study presents a cross-linguistic investigation of attributive temporal clauses encoded by a Generic Head Noun meaning 'time'. While most studies have concentrated on the diachronic origin of this construction, no typological study has explored the synchronic properties of constructions encoded by a GHN of time (e.g. *At the time I went there, I felt sick*) that are used to express temporal adverbial semantic relations. The research reports on 45 languages in which attributive temporal clauses are the primary conventionalized way of expressing temporal adverbial relations. This construction is found in almost every macro-area, but especially in Africa, Papunesia, and Eurasia (particularly in Sino-Tibetan languages and Caucasian languages). In exploring the construction, the study takes into account three parameters, viz. the linear position of the Generic Head Noun of time, the encoding of Generic Head Nouns of time in comparison to other relativized temporal nouns (e.g. 'day', 'year'), and whether languages tend to have specialized or unspecialized Generic Head Nouns of time to encode this construction.

Keywords

relative clause, temporal adverbial clause, complex sentence, subordination

1 Introduction

The analysis of complex sentences has traditionally classified subordinate clauses into three types, according to their propositional act function, viz. complement clauses, relative clauses, and adverbial clauses (Croft, 2001, p. 321).[i] However, sometimes it is difficult to draw clear lines between these types. In this regard, Diessel (2001, p. 436) and Gast & Diessel (2012, p. 1) explain that this tripartition should probably be regarded as a rough guideline rather than a rigid classification, since many languages do not categorically differentiate these types. In particular, there are many languages in which certain semantic types of adverbial clauses take the form of relative clauses. For instance, Thompson et al. (2007, p. 245) point out that adverbial clauses expressing time (e.g. *We'll go when Tom gets here*), location (e.g. *I'll meet*

you where the statue used to be), and manner (e.g. *She spoke as he had taught her to*) can commonly be paraphrased, in many languages, with a relative clause that appears with a GENERIC HEAD NOUN (GHN) that is semantically empty, such as 'time' (e.g. *We'll go at the time at which Tom gets here*), 'place' (*I'll meet you at the place at which the statue used to be*), and 'way/manner' (e.g. *She spoke in the way in which he had taught her to*), respectively.

From a diachronic perspective, different authors have argued that relative clauses encoded by GHNs expressing time, location, and manner provide a common source[ii] for adverbial clauses. For instance, temporal adverbial clauses are frequently formed via the grammaticalization of a GHN of time. This has been attested in many languages not genetically related, such as Early Biblical Hebrew, Kikuyu, and Tamil, among others (Heine & Kuteva, 2002, p. 298; Heine & Kuteva, 2007, p. 246). Diessel (2019, p. 106) explains that relative clauses encoded by a GHN of time provide a very frequent source for adverbial subordinators encoding temporal adverbial clauses, in particular simultaneous temporal clauses. A well-known example comes from English, in which the subordinator 'while' developed from an adverbial phrase translatable as 'at the time that' consisting of an accusative distal demonstrative, an accusative noun meaning 'time', and a subordinating device meaning 'that' (Hopper & Traugott, 2008, p. 90). Hetterle (2015, p. 90) notes that clause-linking devices derived from nouns meaning 'time', 'day', and 'duration/period' are very common cross-linguistically. She explains that most commonly clause-linking devices derived from these nouns occur in constructions that express temporal adverbial clauses, in particular simultaneous temporal clauses.

While most studies have concentrated on how relative clauses encoded by a GHN of time provide a common source for temporal adverbial clauses, to the best of my knowledge, no typological study has explored the synchronic properties of constructions encoded by a GHN of time used to express temporal adverbial relations. Formally, these constructions are similar to relative clauses, but functionally they are largely equivalent to temporal adverbial clauses. They can be considered constructions that are not (yet) fully grammaticalized (i.e. constructions that are still closely related to relative clauses).

The present work makes inroads into this territory by exploring constructions encoded by a GHN of time in languages in which this is the primary conventionalized way of expressing temporal adverbial relations, as can be seen in the Kisi example in (1) that appears with the GHN *lɔ́ɔ́* 'time'.

Kisi (Niger-Congo/Mel)

(1) *ŋ̀* *cò* *cììkìáŋ* ***lɔ́ɔ́*** *ŋ̀* *cò* *hùnɔ́ɔ́-ó.*
1PL.SBJ AUX meet time 2SG.SBJ AUX come-REL
'We will see you when you come.' (Childs, 1995, p. 287)

In exploring these constructions, this paper takes into account: (1) the linear position of the GHN of time, (2) the encoding of GHNs of time in comparison to other relativized temporal nouns (e.g. 'day', 'year'), and (3) whether languages tend to have specialized or unspecialized GHNs of time to encode this type of construction. The overall plan of the present paper is as follows: Section 2 provides some theoretical remarks on the construction of interest for the present study and some remarks on the sample used in this paper. Section 3 explains some methodological limitations. Section 4 introduces the analysis of the three parameters addressed in the present research, viz. the linear position of the GHN of time, the encoding of GHNs of time in comparison to other relativized temporal nouns (e.g. 'day', 'year'), and whether languages tend to have specialized or unspecialized GHNs of time. Section 5 provides some final comments. The languages referred to in the paper and the sources of information on them are given in the Appendix.

2 Theoretical remarks and sample used in the present study

One type of adjunct that may be relativized in many languages of the world is a GHN meaning 'time', as in the Daakaka example in (2), which occurs with the GHN *bili* 'time'. This relative clause-like structure may be the primary conventionalized way equivalent in the given language of what in most languages are expressed syntactically as temporal adverbial dependent clauses.

Daakaka (Austronesian/Oceanic)

(2)	***bili***	*na*	*ka*	*ya=ta*	*tas*	*tene*	*ka*	*ya=p*	*tiye*,
	time	COMP	SUB	3PL.SBJ=DIST	sit	wait	COMP	3PL.SBJ=POT	kill

'While they were waiting to kill him,

te	*mo*	*kuowilye*	*mo*	*nok*.
CONJ	REAL	know	REAL	finish

he already knew.' (von Prince, 2015, p. 391)

Because of the relative lack of typological studies on this construction, there is as yet no consensus on the proper terminology for referring to it. For instance, Lichtenberk (2008, p. 1173), in his grammar of Toqabaqita, calls this construction a "temporal relative clause" to explain the behavior of relative clauses modified by the head noun *manga* 'time' or, rarely, *kada* 'time'. For lack of a better term, I will refer to these constructions as ATTRIBUTIVE TEMPORAL CLAUSES. The advantage of using this term is that it also enables us to take into account GENERAL NOUN-MODIFYING CLAUSE CONSTRUCTIONS (GNMCCs), that is, a single construction that covers all or a significant part of the Noun-Modifying Clause Construction range of a language (Matsumoto et al., 2017, p. 6). Japanese is a language that has GNMCCs which express different temporal adverbial semantic relations, as can be observed in (3), in which the GNMCC is encoded by *toki* 'time', and as is illustrated in (4), in which the GNMCC appears with *aida* 'time_interval'.

Japanese (Isolate)

(3)	*Hiroshi-ga*	*hon-o*	*yonde-i-ta*	***toki***,
	Hiroshi-NOM	book-ACC	read-ASP-PST	time

'When Hiroshi was reading a book,

Yumi-ga	*me-o*	*samashi-ta*.
Yimi-NOM	eye-ACC	wake.up-PST

Yumi woke up.' (Oshima, 2011, p. 5)

Japanese (Isolate)

(4)	*pooka-o*	*shite-i-ru*	***aida***,
	poker-ACC	do-ASP-PRS	time_interval

'While we played poker,

tsuyo-i	*kaze-ga*	*fuite-i-ta*.
strong-PRS	wind-NOM	blow-ASP-PST

strong wind was blowing outside.' (Oshima, 2011, p. 3)

As was briefly mentioned before, I am only interested in languages where a relative clause-like structure encoded by a GHN of time is the primary conventionalized way of expressing temporal adverbial relations.[iii] By primary is meant the strategy that is used significantly more frequently than all the others to express temporal adverbial relations. Note that I relied heavily on the authors of the primary sources consulted in order to determine whether this construction was the primary strategy to express temporal adverbial relations. Therefore, this led me to exclude languages which relativize a head noun that happens to be temporal, but are not the primary conventionalized expressions equivalent to temporal adverbial clauses. For instance, in Abau, subordinate temporal clauses are usually encoded by the subordinating conjunction *menkin* 'when' (Lock, 2011, p. 216). Therefore, the Abau example in (5) is not considered in the present study because it is not the primary conventionalized way of expressing subordinate temporal clauses. In a similar fashion, the Savosavo example in (6) is excluded from the present study. This stems from the fact that temporal clauses in this language are usually expressed by the subordinating conjunctions *kia* 'when' and *tuka* 'when(ever)' (Wegener, 2008, p. 263).

Abau (Sepik/Upper Sepik)

(5) *hrom* *so-erey* *ma* *ley* *ney-ney* ***enekwei*** *so-ho-kwe,*
1PL.SBJ DIST.DEM-LOC REL go go-go time DIST.DEM-GEN.TOP.M-TOP
'At the time when we all went there,

nyo *prueyn* *hiy-kwe* *sawk* *hakan.*
lad one 3SG.SBJ-TOP DIR flee
one boy fled.' (Lock, 2011, p. 216)

Savosavo (Solomon East Papuan)

(6) *lo* *kise-ghu* *lo* *ba-tu* *lo* ***taemu****=la,*
DET.SG.M fight-NMLZ 3SG.M come-REL DET.SG.M time=LOC.M
'At the time when the fighting came,

apoi *vata* *togho-ghu=me* *te.*
what kind live-NMLZ=2PL.NOM EMPH
what kind of life where you leading that day?' (Wegener, 2008, p. 273)

The fact that attributive temporal clauses have to appear with a GHN of time that is semantically empty led me to exclude constructions in which the head noun was not generic, as is illustrated in the following examples.

Somali (Afro-Asiatic/Lowland East Cushitic)

(7) ***waa****-gi* *ay* *inanta* *ahayd,*
era-DET 3SG.SBJ girl.DET was
'When she was a girl,

Dhegdheer *way* *qurux* *badnaan* *jirtey.*
Dhegdheer DECL beauty much used
Dhegdheer (Long-Ear) was very beautiful.' (Saeed, 1999, p. 218)

Emai (Niger-Congo/Edoid)

(8) ***ìsòkpísòkpá*** *lí* *ọ́* *rẹ́ˈ* *míẹ́* *Òhí,*
moment REL 3SG.SBJ PST.PERF.take see Ohi
'At the moment she saw Ohi,

ọ́ *óˈ* *vbì* *Ìwè.*
3SG.SBJ PST.PERF.enter LOC house
she entered the house.' (Schaefer & Egbokhare, 2017, p. 914)

Araki (Austronesian/Oceanic)

(9) *mo* *varia-a* *nunu*
3SG.REAL take-3SG shadow
'He took the photo

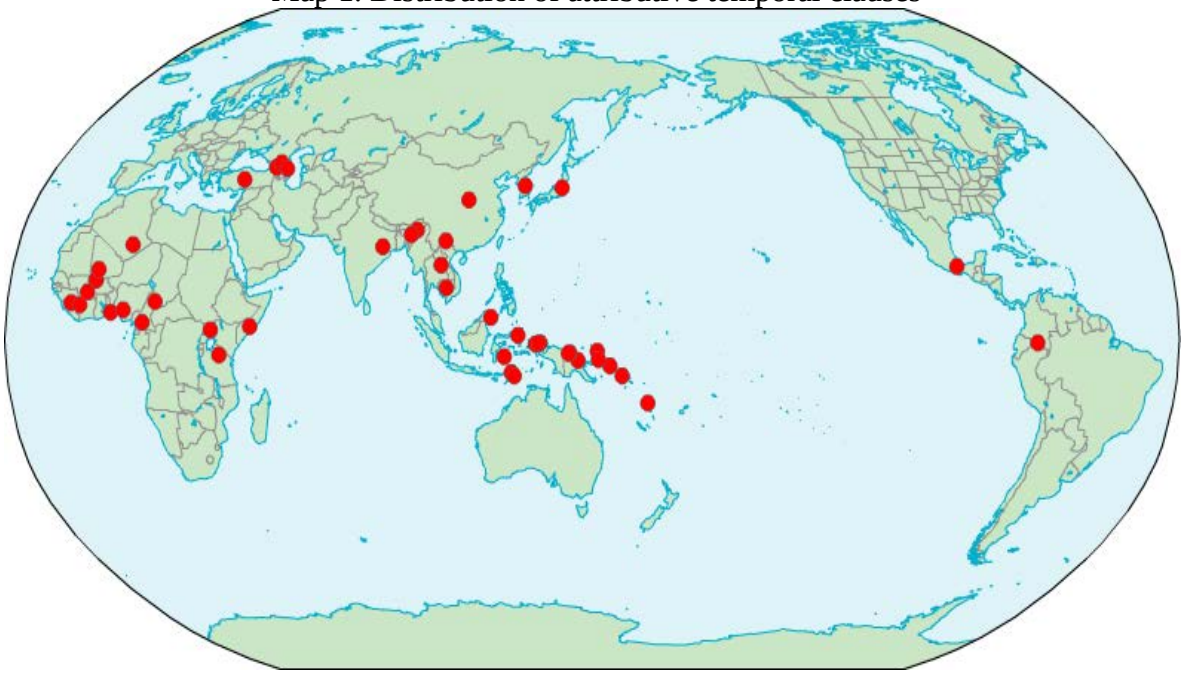
lo ***dani*** *no-m̈am* ta mo pa *m̈is* *m̈audu* *ro.*
LOC day POSS-1EXCL.PL dad 3SG.REAL SEQ still live PROG
when our father was still alive.' (François, 2002, p. 182)

Jalkunan (Mande/Western Mande)

(10) ***ɲɛ̄ɛ́*** *mì* *mā* *nɔ̀ŋɔ́* *dɛ̀kɛ́,* *mā* *wál* *mɛ̀ɛ̀=nɛ̄ɔ.*
year REL 1SG friend finish.PFV 1SG work do.PFV=NEG
'The year my friend passed away, I did not do any work.' (Heath, 2017, p. 307)

Since this is primarily an explorative study that seeks to characterize a new type of construction, I draw on all of the data for which the sources consulted identified attributive temporal clauses. In this regard, I collected data from descriptive materials (mostly reference grammars) of 45 different languages, listed in the Appendix.[iv] This sample is therefore one of convenience (Cysouw, 2005, p. 555), based primarily on availability of data, and it cannot be assumed to be make the kinds of cross-linguistic predictions that a balanced variety sample would (Mauri, 2008, p. 12). However, it is important to stress that languages from almost all macro-areas are represented. The macro-areas are: Africa, Australia, Eurasia, North America, Papunesia, and South America. As can be observed in Map 1, attributive temporal clauses as primary conventionalized way of expressing temporal adverbial relations are common in the languages of the world. They are found in almost every macro-area, but they seem to be attested for the most part in Africa, Papunesia, and Eurasia (particularly in Sino-Tibetan languages and Caucasian languages). There are some other observations to be gleaned from Map 1. First, attributive temporal clauses are completely absent from Australia in the languages of the sample. This seems to stem from the fact that in this area, languages tend to express temporal adverbial clauses by means of case markers which function as subordinating devices (Blake, 1999, p. 307)[v], or by means of non-finite dependent clauses that appear with switch-reference markers (Austin, 1981). Second, attributive temporal clauses are almost completely absent from languages of the Americas. This seems to stem from the fact that languages from this area use other types of clause-linking strategies to express temporal adverbial clauses. With respect to North America, Mithun (1999, p. 264) explains that in many languages of this area, temporal adverbial clauses, and other semantic types of adverbial clauses, are formed by nominalizations which sometimes are accompanied by case-markers or dependent clauses marked by switch-reference markers. Regarding South America, temporal adverbial clauses tend to be encoded by case markers which function are subordinating devices (van Gijn, 2014, p. 293).

Map 1. Distribution of attributive temporal clauses[vi]



3 Methodological limitations

Before I discuss the three parameters taken into account in the present study in Section 4, mention should be made of some methodological limitations of this research. First, as will be observed through the body of the paper, some examples lack a main clause. In this case, it was possible to know that this is the primary conventionalized strategy of expressing temporal adverbial relations in the language because the authors explicitly mentioned this aspect. However, it was not possible to observe in more detail the interaction between the dependent clause (i.e. the attributive clause encoded by the GHN) and its main clause. For instance, Heath (2008, p. 558) explains that one of the primary strategies of expressing temporal adverbial relations in Jamsay is relative constructions headed by a noun meaning 'time', such as *dògùrù*. However, he does not provide any examples in which the dependent clause appears with the main clause.

Second, some grammars only provide one example to explain the behavior of attributive temporal clauses. Therefore, these languages have not been taken into account in the sample. The main rationale behind this decision is that it was not possible to determine whether this construction is a primary conventionalized strategy of expressing temporal adverbial relations.

Third, the sources of the sample do not explain whether the clause boundary of attributive temporal clauses continues to appear between the GHN and the attributive clause (e.g. time [(REL) I left], you arrived), or the GHN is now a constituent of the attributive clause (e.g. [time (REL) I left], you arrived). Only rarely does one find independent evidence of whether the GHN becomes a constituent of the attributive clause. For instance, the clause-initial conjunction *nuair* 'when' in Irish and Scottish Gaelic developed from the sequence *an* 'the' and *uair* 'time' as a temporal head noun of a relative clause (Kortmann, 1997, p. 65). With this limitation in mind, I therefore leave open the issue of whether synchronically in the languages of the sample the GHN has been reanalyzed as being within the attributive clause or not, and I refer to the GHN as being initial, medial, or final within the construction rather than within the clause.

Fourth, sometimes it is far from clear whether some GHNs meaning ‘time’ have been bleached sufficiently to count as a kind of temporal subordinating conjunction, in particular the GHN *č’awuz* ‘time’ in Lezgian (Haspelmath, 1993, p. 388) and the GHN *zaman* ‘time’ in Turkish (Göksel & Kerslake, 2005, p. 38). While I have decided not to exclude these two instances because the authors do not provide criteria that support their explanation, caution needs to be exercised with these instances. With these theoretical limitations in mind, let us proceed to the analysis of the present study.

4 Analysis

As was mentioned above (Section 1), this study focuses on three main aspects: (1) the linear position of the GHN of time, (2) the encoding of GHNs of time in comparison to other relativized temporal nouns (e.g. ‘day’, ‘year’), and (3) whether languages tend to have specialized or unspecialized GHNs of time to encode attributive temporal clauses.

4.1 Linear position of the generic head noun of time

As argued at the end of Section 3, GHNs will be classified as initial, medial, or final within the construction rather than with respect to the clause. In this regard, the Japanese example in (11) illustrates a final GHN, the Fongbe example in (12) shows an initial GHN, and the Jamsay example in (13) illustrates a medial GHN. Note that there are languages that have both initial and final GHNs (e.g. Motuna; Onishi, 1994, 433). As can be observed in Map 2, initial GHNs of time are attested in almost all macro-areas. However, they seem to be more common in Africa and Papunesia. Furthermore, this seems to be the most common position of GHNs of time in the languages of the sample. On the other hand, final GHNs of time are attested for the most part in Eurasia.

Japanese (Isolate)

(11) *Hiroshi-ga* *hon-o* *yonde-i-ta* ***toki***,
Hiroshi-NOM book-ACC read-ASP-PST time
‘When Hiroshi was reading a book,

Yumi-ga *me-o* *samashi-ta*.
Yimi-NOM eye-ACC wake.up-PST
Yumi woke up.’ (Oshima, 2011, p. 5)

Fongbe (Niger-Congo/Kwa)

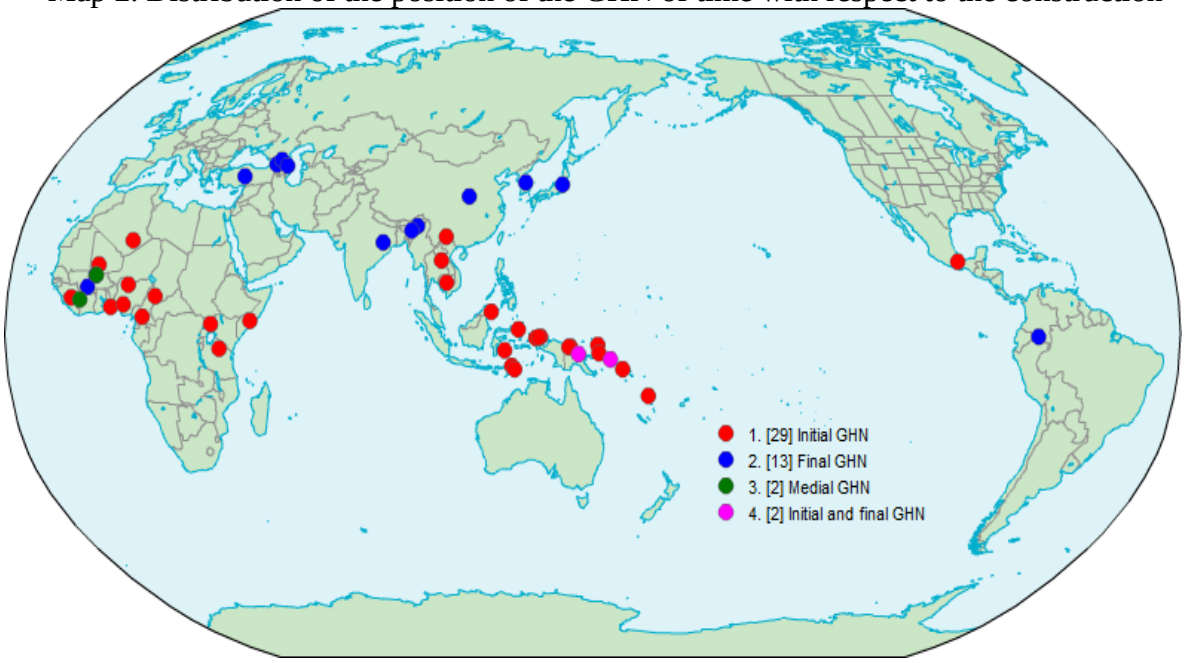
(12) ***hwènù*** *ɖé-è* *à* *xá* *átín* *jí* *ɔ́*,
time OP-RES 2SG.SBJ climb tree on DEF
‘When you climbed up the tree,

ùn *mɔ́* *wè*.
1SG.SBJ see 2SG.OBJ
I saw you.’ (Lefebvre & Brousseau, 2002, p. 170)

Jamsay (Dogon)

(13) *wárú* ***dògùrù*** *ù* *gô:-Ø*.
farming time 2SG.SBJ go_out-NON.HUM
‘At the time when you first went out to do farming.’ (Heath, 2008, p. 559)

Map 2. Distribution of the position of the GHN of time with respect to the construction



The general question at this point is: How does this compare with the general rules in the language for positioning heads of relative clauses? The position of the GHN of time seems to follow the general rules in the language for positioning heads of relative clauses (e.g. when relativizing subjects, objects, indirect objects) in all the languages of the sample. However, for some languages GHNs meaning 'time' may occupy a fixed position when other relative clauses allow more freedom.

The first example comes from Supyire. Relativized nouns in Supyire can either be placed before or after the relative clause. The former structure is the more commonly used, and relativized head nouns may have different syntactic roles, such as subject, as in (14), direct object, as in (15), instrumental, as in (16), and comitative, as in (17), among others (Carlson, 1994, p. 491).

Supyire (Niger-Congo/Gur)

(14)	***nàŋjiibíí***	*pi*	*nye*	*na*	*u*	*kwɔ̀hɔ̀lì*	*ké.*
	young.men.DEF	3PL.SBJ	be	PROG	it	dance.IPFV	REL

'The young men who are dancing with it.' (Carlson, 1994, p. 491)

Supyire (Niger-Congo/Gur)

(15)	***myàhíí***	*u*	*a*	*cèè*	*gé.*
	song.DEF	3SG.SBJ	PERF	sing	REL

'The songs which she sang.' (Carlson, 1994, p. 492)

Supyire (Niger-Congo/Gur)

(16)	***vàànyi***	*ì*	*u*	*sí*	*m̀/pwɔ̀*	*ké.*
	cloths.DEF	with	it	FUT	FUT-tie	REL

'The cloths with which it will be tied.' (Carlson, 1994, p. 493)

Supyire (Niger-Congo/Gur)

(17)	***cwoòni***	*ì*	*u*	*màha*	*ŋ-kare*	*sigé*	*e*	*u.*
	pot.DEF	with	3SG.SBJ	HAB	INTRANS-go	bush.DEF	to	REL

'The pot with which he goes to the bush.' (Carlson, 1994, p. 493)

However, although in the majority of relative clauses the relativized noun is placed before the relative clause, it is also possible, but less common, to leave the relativized noun within the relative clause if its syntactic role is that of direct object or indirect object (Carlson, 1994, p. 498). The author explains that of the 288 relative clauses occurring in the corpus of texts, only 64 (=22%) have relativized nouns that appear within the relative clause. Interestingly, the GHN *tèni* 'time' will always occur within the relative clause (Carlson, 1994, p. 551), as can be seen in (18).

Supyire (Niger-Congo/Gur)

(18)	*u*	*a*	*kwùùlò*	***tèni***	*ǹdé-mù*	*ì*	*gé,*
	3SG.SBJ	PERF	shout	time.DEF	DEM-REL	at	REL

'When he shouted,

kà	*pi*	*í*	*wá*	*na*	*u*	*cyàhà-n.*
and	3PL.SBJ	NARR	be.there	PROG	him	laugh-IPFV

they laughed at him.' (Carlson, 1994, p. 551)

A further instance is found in Mongsen Ao. In this language relativized nouns having different syntactic relationships within the clause occur either after or before the relative clause, as in the examples in (19) and (20). The only relativized noun that has a single position of occurrence is the GHN *hmapaŋ* 'time'. This GHN will always appear construction-finally (Coupen, 2007, p. 221), as in (21).

Mongsen Ao (Sino-Tibetan/Kuki-Chin)

(19)	*a-ji*	*ʧəm-ja*	*li-pàʔ*	***a-miʔ***	*ʧu*
	NRL-rice.beer	drink-CONT	be-NMLZ	NRL-person	DIST.DEM

'The guy drinking the rice beer

kə-un-ùʔ.

1SG.POSS-younger.sibling-DECL

is my young brother.' (Coupen, 2007, p. 219)

Mongsen Ao (Sino-Tibetan/Kuki-Chin)

(20)	***a-miʔ***	*a-ji*	*ʧəm-ja*	*li-pàʔ*	*ʧu*
	NRL-person	NRL-rice.beer	drink-CONT	be-NMLZ	DIST.DEM

'The guy drinking the rice beer

kə-un-ùʔ.

1SG.POSS-younger.sibling-DECL

is my young brother.' (Coupen, 2007, p. 219)

Mongsen Ao (Sino-Tibetan/Kuki-Chin)

(21)	*a-ʧak*	*ʧhuwa-pàʔ*	***hmapaŋ***	*ku,*
	NRL-paddy	emerge-NMLZ	time	LOC

'When the paddy was sprouting,

pùŋì	*nə*	*a-ʧak*	*ʧu*	*ʧâʔ.*
wild.pig	AGEN	NRL-paddy	DIST.DEM	consume.PST

a wild pig ate the paddy.' (Coupen, 2007, p. 418)

After having analyzed the above examples, the question at this point is: Why do GHNs of time in these languages do not correlate with the position of heads of relative clauses (e.g. when relativizing subjects, objects, indirect objects)? It is important to bear in mind that these constructions are similar to relative clauses, but functionally, they are largely equivalent to temporal adverbial clauses. Accordingly, it seems reasonable to assume that the GHN of time will acquire particular properties of adverbial clauses. Interestingly, the position of the GHN of time of the two languages mentioned before correlates with the position of adverbial subordinating devices.

In Supyire, adverbial subordinating devices may appear clause-initially or clause-internally with respect to the adverbial clause. Regarding clause-initial subordinating devices, this language has borrowed many of them from Bambara and French (e.g. Bambara *sani* 'before', Bambara *fɔ* 'until', French *depuis* 'since'; Carlson, 1994, p. 555), as can be seen in (22). With respect to clause-internal subordinating devices, there is only one semantic type of adverbial clause that seems to appear in this position, viz. manner adverbial clauses encoded by the nominalizer *-ŋkana*, as in (23). The GHN of time *tèni* 'time' appears in the same position than the clause-internal subordinating device *-ŋkana*, which has been derived from a GHN meaning manner (Carlson, 1994, p. 567). This seems to indicate that the position of the GHN of time *tèni* 'time' correlates with that of subordinating devices that have been derived from other GHNs. It is important to mention that other types of GHNs in this language do not appear in the same position than *tèni* 'time' and *-ŋkana*. In this regard, locative adverbial clauses are encoded by the GHN *cyāge* 'place' that appears before the relative clause, as can be seen in (24).

Supyire (Niger-Congo/Gur)

(22)	***sána***	*yi*	*Ø*	*kuru*	*jyiile*	*ké*,
	before	3SG.SBJ	SUBJ	this	cross	TC

'Before they cross this,

mu	*gú*	*ta-tɔɔngɔ*	*fé*.
2SG.SBJ	POT	LOC-be.long	run

you will run a long way.' (Carlson, 1994, p. 556)

Supyire (Niger-Congo/Gur)

(23)	*pyìibíí*	*sàhá*	*ɲye*	*na*	*byíí*
	children.DEF	NEG.YET	NEG	PROG	raise.IPFV

'Children are no longer raised

pi	*taŋjáà*	*byí-**ŋkáni***	*na*	*mɛ́*
3SG.POSS	yesterday	raise-manner.DEF	on	NEG

The way that they were raised in the past (lit. on their way of being raised yesterday).' (Carlson, 1994, p. 567)

Supyire (Niger-Congo/Gur)

(24)	***cyāge***	*e*	*mìi*	*kùrù*	*tà*	*gé*,
	place.DEF	in	1SG.SBJ	this	get	REL

'In the place I got this,

waní	*mìi*	*a*	*kùrù*	*yàha*.
there	1SG.SBJ	PERF	3SG.OBJ	leave

it is there that I have left it.' (Carlson, 1994, p. 566)

Mongsen Ao shows an interesting scenario. In this language, adverbial clauses are encoded by converbs that appear in clause-final position (Coupe, 2007, p. 422), as in (25). Some converbs seem to be derived from a noun phrase modified by a relative clause (e.g. the causal converb construction originated from an erstwhile noun phrase containing a relative clause; Coupe, 2007, p. 444). Another important aspect to bear in mind is that some nouns that appear construction-finally are used to express different types of adverbial semantic relations. For instance, the noun *sin* 'back' is used to express temporal subsequence (Coupe, 2007, p. 449), as is shown in (26). Therefore, the fact that this language has: (1) adverbial clauses encoded by converbs that occur clause-finally, (2) converbs that are historically derived from head nouns, and (3) adverbial clauses encoded by nouns that appear construction-finally indicates that these factors have played a role in the position of the GHN *hmapaŋ* 'time'.

Mongsen Ao (Sino-Tibetan/Kuki-Chin)

(25)

akhu	*ʧu*	*nùkhu*	*kə̀t-**pàkukà?**…*
NRL-tiger	DIST	wound	have-CONCESS

'Even if the tiger has a wound…' (Coupen, 2007, p. 439)

Mongsen Ao (Sino-Tibetan/Kuki-Chin)

(26)

tuŋət	*li-ər*	***sin***,	*á-hlú*	*jìm*.
3DU	stay-SEQ	back	NRL-field	cultivate.PST

'After living (together), they cultivated the field.' (Coupen, 2007, p. 449)

What these examples seem to show is that another aspect relevant to the typological study of the linear order of GHNs of time is their position with respect to that of adverbial subordinating devices (i.e. free or bound morphemes which mark adverbial clauses for their semantic relationship to the main clause; Dryer, 2013). Dryer (2013) explains that adverbial subordinating devices may appear in different positions with respect to their adverbial clause. First, subordinating devices may occur clause-initially, this is especially common in (i) Europe; (ii) an area in Asia stretching from the Middle East to India; (iii) Southeast Asia through the Pacific, including Australia but not the mainland of New Guinea; (iv) Africa; and (v) parts of North America, notably the Pacific Northwest and Mesoamerica. Second, subordinating devices may appear clause-finally, this is common in (i) an area in Asia stretching from India northeast through Burma and China into northeastern Asia; (ii) New Guinea; and (iii) South America. Third, subordinating devices may occur clause-internally.

In most languages of the sample, the position of the GHN of time correlates with the position of adverbial subordinating devices. First, in Koyra Chiini, attributive temporal clauses are encoded by the initial GHN of time *saa* 'time', as in (27). In this language, all semantic types of adverbial clauses are encoded by clause-initial adverbial subordinating devices, as in (28), where the adverbial clause appears with the conditional marker *nda* 'if', and as in (29), where the adverbial clause occurs with the subordinating device *hal* 'until'.

Koyra Chiini (Songhay)

(27)

saa	*di*	*kaa*	*addabba*	*di*	*yo*	*o*	*čii…*
time	DEF	REL	animal	DEF	PL	IPFV	speak

'When the animal spoke…' (Heath, 1999, p. 197)

(28) ***nda*** *a* *gar* *baana* *na* *kar* *bi*,
if 3SG happen rain NEG strike yesterday
'If it hadn't rained yesterday,

yer *o* *bun* *nda*.
1PL.SBJ .IPFV die with heat
we would have died of heat.' (Heath, 1999, p. 267)

Koyra Chiini (Songhay)
(29) *woo* *či* *a* *nin* ***hal*** *a* *hasara*
DEM be 3SG.SBJ ripen until 3SG.SBJ be.ruined
'That is, it (=crumbly limestone) rotted until it was ruined.' (Heath, 1999, p. 278)

Second, the Ingush example (30) below illustrates an attributive temporal clause expressed by the final GHN of time *xaana* 'time'. In this language, all semantic types of adverbial clauses are encoded by clause-final adverbial subordinating devices, as in (31), where the adverbial clause occurs with the temporal subordinating marker *t'ehwagha* 'after'.

Ingush (Nakh-Daghestanian/Nakh)
(30) *siexan* *Ahwmad* *hwa=chy-veannacha* ***xaana***,
yesterday Ahmed DEIC=N-go.PTCP.OBL time.DAT
'Yesterday when Ahmed got home,

bolx *bezh* *joallar* *so*.
work do.CVB.SIM PROG.IMPERF 1SG.SBJ
I was working.' (Nichols, 2011, p. 605)

Ingush (Nakh-Daghestanian/Nakh)
(31) *dogha* *diilxachu* ***t'ehwagha***, *duqa* *buc* *joal*
rain weep.PTCP.COMP after much grass go.PRS
'After it rains, a lot of grass grows.' (Nichols, 2011, p. 607)

Third, in Tommo So, attributive temporal clauses are encoded by the internal GHN of time *bày*^{L} 'time', as in (32). Adverbial clauses in this language are encoded by clause-internal adverbial subordinators, as is shown in the example in (33), where the adverbial subordinating device *-mi-* 'before' appears clause-internally.

Tommo So (Dogon)
(32) *àná=gɛ* ***bày***^{L} *míy-è=gɛ*, *sáy-ni* *kìlèmɔ́* *kílém-aa=be-y*.
rain=DEF time rain-PFV=DEF much-ADV party party-PFV=be.PST-1PL.SBJ
'On the time that the rain came, we partied a lot.' (McPherson, 2013, p. 430)

Tommo So (Dogon)
(33) *díí* *ǹd-íyé-**mi**-è=nɛ*, *jáá* *ɲ́yè-dìŋ*.
water bather-MED.PASS-before-3PL=OBL meal eat-IPFV.3PL
'Before bathing, they will eat.' (McPherson, 2013, p. 477)

These examples should suffice to show that the position of the GHN of time tends to correlate with the position of adverbial subordinating devices in most languages of the sample. However, there are languages in the sample that have both adverbial subordinating devices and

attributive adverbial clauses encoded by different types of head nouns. For these languages, adverbial subordinating devices and the head nouns of attributive adverbial clauses appear in different positions (e.g. adverbial subordinators may appear clause-initially and head nouns of attributive adverbial clauses may occur construction-finally). Interestingly, in these languages, the position of the GHN of time of attributive temporal clauses will usually appear in the same position than other types of head nouns rather than that of adverbial subordinating devices. In what follows, I discuss some examples that illustrate this point.

In Emai, adverbial clauses are expressed by clause-initial adverbial subordinating devices, as in (34), (35), (36), (37), and (38) or clause-internal adverbial subordinating devices, such as the concessive adverbial marker *ré́ré́*, as in (39).[vii] The GHN *é́ghé́* 'time' appears in the same position than clause-initial adverbial subordinating devices in this language. Note that different devices in clause-initial position are specialized head nouns that encode particular semantic relations, such as *ètíní* 'expect', as in (35), *òbó́* 'hand', as in (36), *ógúí* 'activity', as in (37), and *ò́hí́ó́* 'cause', as in (38). Accordingly, the position of the GHN *é́ghé́* 'time' correlates with the position of other attributive adverbial clauses encoded by specialized head nouns in this language.

Emai (Niger-Congo/Edoid)

(34)	*ó́lí*	*ó́mó́hé*	*ó́*	*ò́*	*kpè*	*ìtásà*
	the	man	SBJ.C	HAB	wash	plate

'The man washes plates

sí	*ó́lí*	*ó́mó́*	*ó́*	*ò́*	*sìé.*
if	man	child	SBJ.C	HAB	play

if the child plays.' (Schaefer & Egbokhare, 2017, p. 886)

Emai (Niger-Congo/Edoid)

(35)	***ètíní***	*lí*	*ó́*	*ló́*	*ré̀*	*é́nyò́,*
	expect	REL	SBJ.C	PRED	take	drink

'Anticipating when he will drink the wine,

ì	*kú*	*ó́ì*	*kú*	*à.*
1SG.SBJ	throw	3SG.OBJ	disperse	CS

I have thrown it away.' (Schaefer & Egbokhare, 2017, p. 916)

Emai (Niger-Congo/Edoid)

(36)	*ó*	*ì*	*ké*	*dàán*	*ghè*	*dè*
	3SG.SBJ	NEG	ant	be.well	ever	reach

'She has not been very well

òbó́	*lí*	*ó́*	*ré*	*gbé*	*ó́lí*	*ófè.*
1SG.SBJ	throw	3SG.OBJ	take	kill	the	rat

since she killed the rat.' (Schaefer & Egbokhare, 2017, p. 919)

Emai (Niger-Congo/Edoid)

(37)	*é*	*yé*	***ógúí***	*é́nyó́*	*údàmí.*
	3PL.SBJ	move.to	activity	wine	drinking

'They went to drink wine.' (Schaefer & Egbokhare, 2017, p. 939)

Emai (Niger-Congo/Edoid)

(38) ***ọ̀híọ́*** *khí* *ọ́lí* *ọ́mọ̀hè* *dé́* *ìmátó* *lí* *ọ̀gbọ̀n*,
cause IND the man buy car REL new
'Because the man is buying a new car,

ọ̀ *ọ́* *gbé.*
3SG.SBJ C dance
he is dancing' (Schaefer & Egbokhare, 2017, p. 942)

Emai (Niger-Congo/Edoid)

(39) *ọ̀* *khà* ***ré́ré́*** *míé́* *òhi*,
3SG.SBJ HYP CONCESS see Ohi
'Even if he has seen Ohi,

ọ̀ *ló́* *ò* *vbí* *ìwè.*
3SG.SBJ PRED enter LOC house
he will enter the house.' (Schaefer & Egbokhare, 2017, p. 891)

In Jalkunan, adverbial subordinating devices occur in clause-initial position, as in (40) and (41), and in clause-final position, as in (42). The GHN ˈ*Sóʔó* 'time' appears construction-medially, and therefore, its position does not correlate with that of clause-initial or clause-final adverbial subordinating devices. It is important to mention that the language has other types of attributive adverbial clauses encoded by GHNs, such as *làʔá* 'place', as in (43), and *cógō* 'manner', as in (44). These GHNs occur construction-medially. Accordingly, the position of the GHN ˈ*sóʔó* 'time' correlates with that of other GHNs used to encode attributive adverbial clauses.

Jalkunan (Mande/Western Mande)

(40) ***kàbí*** *mā* *sé́*, *mā* *tɔ́=ɔ̄ⁿ* *wéé=rēʔ.*
since 1SG.SBJ come.PFV 1SG.SBJ stay.PFV=1SG.REFL bathe.PFV=NEG
'Since I came, I haven't bathed (yet).' (Heath, 2017, p. 308)

Jalkunan (Mande/Western Mande)

(41) ***nī*** *ká-ná=Ø* *sā*, *mùʔúⁿ=Ø* *sà* *sɔ́ɔ́.*
if rain-NOM=IPFV rain.fall.ANTEC 1PL.SBJ=IPFV FUT enter.IPFV
'If it rains, we'll go in.' (Heath, 2017, p. 312)

Jalkunan (Mande/Western Mande)

(42) *mā* *cíé́* *bàrí-mèè* ***tɔ́rɔ́***,
1SG.SBJ speak.PFV conversation-do.VBLN while
'While I was conversing (elsewhere),

gbɔ̄-nɔ̄ *sà* *sɔ́ɔ́* *sàá* *tɔ̀.*
thief-NOM FUT dance house in
the thief was entering the house.' (Heath, 2017, p. 310)

Jalkunan (Mande/Western Mande)

(43) *mùʔùⁿ* *ɲíī* ***làʔá*** *mì* *tɔ́*,
1PL.SBJ spend.night.PFV place REL in
'The place where we spent the night,

é=Ø *fòʔò-bɛ̀ɛ́.*
3SG.SBJ.NON.HUM=3SG.SBJ.NON.HUM.REFL be.distant.PFV
it is far away.' (Heath, 2017, p. 310)

Jalkunan (Mande/Western Mande)
(44) *jàlsàdù* *sɛ́ʔɛ́* ***sèʔè-cógō*** *mì,*
Blédougou sit.PFV sit.VBLN-manner REL
'The way Blédougou was settled,

má=Ø *kɔ̀ɔ̀* *dě* *wō* *tɔ́ʔɔ́* *mā* *mā.*
1SG=IPFV want.IPFV that 2SG say.IMP 1SG DAT
I want you to tell (it) to me.' (Heath, 2017, p. 361)

In Motuna, adverbial subordinating devices may appear clause-initially, as in (45), or clause-finally, as in (46). It is important to mention that *tiinohno* 'while' is the only adverbial subordinating device appearing clause-initially. The GHN *poti* 'time' appears in the same position than *tiinohno* 'while'. Onishi (1994, p. 505) explains that *tiinohno* 'while' has been derived from the local noun *tii-nohno* 'that.time-length'. This seems to indicate that the position of the GHN of time *poti* 'time' correlates with that of subordinating devices that have been derived from other GHNs.

Motuna (East Bougainville)
(45) *ho-ko* *uko-ji-**ijo**,* *inokee* *na-raku-kori*
it-EMPH take-3SG.OBJ.2SG.SBJ-after again one-CL.river-L

mono-ong-io, *ti-ki* *nee-ung-heenuio-ng.*
see-3SG.OBJ.1PL.SBJ-after there-ERG eat-3SG.OBJ.1PL.SBJ-FUT-M
'After you take it, we will again see a river, and we will eat it there.' (Onishi, 1994, p. 510)

Motuna (East Bougainville)
(46) ***tiinohno*** *ti-uru-ki* *no-uru-ki* *hoo* *pau*
while ART-CL.human-ERG one-CL.human-ERG ART.M food

mono-o-mo, *aani-i-mo…*
look.at-3SG.OBJ.3SG.SBJ-SS claim-3SG.OBJ.3SG.SBJ-SS
'While everyone of them was looking at the food, they claimed it as his or hers…' (Onishi, 1994, p. 505)

On the whole, what I hope to have established in this part of the paper is that the position of the GHN of time with respect to the attributive clause seems to follow the general rules in the language for positioning heads of relative clauses (e.g. subjects, objects, indirect objects) in almost all the languages of the sample. Furthermore, the position of the GHN of time correlates with the position of adverbial subordinating devices in most languages of the sample. As for those languages having both adverbial subordinating devices and attributive adverbial clauses encoded by different types of head nouns, the position of the GHN of time of attributive temporal clauses will usually appear in the same position as other types of head nouns rather than that of adverbial subordinating devices.

Having discussed the linear position of the GHN of time, I now turn to the second parameter, that is, the encoding of GHNs of time in comparison to other relativized temporal nouns (e.g. ‘day’, ‘year’).

4.2 Encoding of generic head nouns of time

GHNs of time may be encoded in different ways. The following examples do not exhaust the whole range of ways in which GHNs of time may be encoded in the languages of the sample since the range is too large, but should serve for discussion purposes only. With that proviso, let us briefly discuss some of these examples.

In just about half of the languages of the sample (23/45=51.11%), the GHN of time is bare, as can be seen in the 'Are'are example in (47) and the Jamsay example in (48). The GHN *horoˈa* ‘time’ and the GHN *dògùrù* ‘time’ are bare in that they do not appear with definite markers, adpositions, or case markers, among others.

'Are'are (Austronesian/Oceanic)

(47)	***horoˈa***	*kou=ka*	*oori*	*hi*	*nima*	*na*,
	time	1DU.INCL=TAM	go	to	house	DET

‘When we get home,

taˈa	*koru*	*karao*	*hana*.
SEQ	1PL.INCL	FUT	eat

then we will eat.’ (Naitoro, 2013, p. 219)

Jamsay (Dogon)

(48)	*wárú*	***dògùrù***	*ù*	*gô:-Ø*.
	farming	time	2SG.SBJ	go.out-NON.HUM

‘At the time when you first went out to do farming.’ (Heath, 2008, p. 559)

The fact that relativized nouns may be bare in many languages has not gone unnoticed and in part echoes Cristofaro & Giacalone Ramat (2007, p. 76), who show that a number of languages do not use adpositions to relativize temporal nouns. In this respect, Givón (1990, p. 679) explains that the absence or optionality of adpositions in relativized temporal nouns stems from the fact that temporal nouns usually occur as circumstantials. Therefore, since the default role for temporal nouns is that of circumstantials, they tend not to appear with any morpho-syntactic means outside or inside the relative clause (cf. Cristofaro & Giacalone Ramat, 2007, p. 76).

The second most common way in which GHNs of time are encoded in the languages of the sample (6/45=13.33%) is by means of locative case markers or locative adpositions. In the Atong example in (49) the GHN *somay* ‘time’ appears with the locative clitic *=ci*.

Atong (Sino-Tibetan/Bodo-Garo)

(49)	*u=ci*	*muʔ-butuŋ*	***somay****=ci*,
	DIST.DEM=LOC	stay-while	time=LOC

‘During the time they lived there,

badri	*nemen*	*manʔ=ay*	*saʔ-a=no*.
Pname	very	in.great.amounts=ADV	eat-CUST=QUOT

Badri was very rich (ate in great amounts), it is said.’ (van Breugel, 2014, p. 521)

The third most common way in which GHNs of time are encoded in the languages of the sample (4/45=8.88%) is by means of definite markers, as is illustrated in the Hausa example in (50), where the GHN *lokaci* 'time' occurs with *-n* 'the'.

Hausa (Afro-Asiatic/West Chadic)

(50) *Audu* *yaa* *iso*
Audu 3SG.SBJ arrive
'Audu arrived

***lokaci**-n* *da* *yara-n* *suka* *fita*.
time-the REL kids-the 3PL.SBJ go.out
when the children went out.' (Bagari, 1976, p. 27)

The fourth most common way in which the GHNs of time are encoded in the languages of the sample (3/45=6.66%) is by means of dative case markers. In the Georgian example in (51), the GHN *dro* 'time' appears with the dative case-marker *-s*. In the Lezgian example in (52), the GHN *č'awu* 'time' occurs with the dative case-marker *-z*. In the Ingush example in (53), the GHN *xaana* 'time' is in the dative. In the Udihe example in (54), the GHN *ekin* 'time' occurs with the dative case-marker *-di*.

Georgian (Kartvelian)

(51) *tvitmprinav-ši* *še-svi-is* ***dro**-s*,
aeroplane-in PREV-enter-GEN(MASD) time-DAT
'At the time I enter a plane,

gul-is *r-ev-a* *m-e-cʾqʾ-eb-a* *xolme*.
heart-GEN churn-THEM-MASD(NOM) me-IND.OBJ-begin-THEM-it generally
I start to feel nauseous as a rule.' (Hewitt, 1995, p. 591)

Lezgian (Nakh-Daghestanian/Lezgic)

(52) *rağ* *dağ-lar.i-n* *qʾuluqʰ* *akat-aj* ***č'awu**-z*,
sun mountain-PL-GEN behind set-AOR.PTCP time-DAT
'At the time the sun had set behind the mountains,

Hürmet *wiči-n* *kʾwal.i-z* *xta-na*.
Hürmet self-GEN house-DAT return-AOR
Hürmet returned home.' (Haspelmath, 1993, p. 375)

Ingush (Nakh-Daghestanian/Nakh)

(53) *siexan* *Ahwmad* *hwa=chy-veannacha* ***xaana***,
yesterday Ahmed DEIC=N-go.PTCP.OBL time.DAT
'Yesterday at the time Ahmed got home,

bolx *bezh* *joallar* *so*.
work do.CVB.SIM PROG.IMPERF 1SG.SBJ
I was working.' (Nichols, 2011, p. 605)

Udihe (Altaic/Tungusic)

(54) *xojo* *sol'o-i* ***ekin-di**-ni*,
salmon go.upstream-PRS.PTCP time-DAT-3SG
'When the salmon go upstream,

uma *egdi-we* *uma-ŋisi-je*.
hook many-ACC hook-V-IMP.2SG
set up many hooks.' (Nikolaeva & Tolkskaya, 2001, p. 405)

The question at this point is: Why do GHNs of time appear with locative or dative markers?[viii] The GHN typically serves an oblique function in the attributive clause of time. However, in the languages of the sample attributive temporal clauses do not include morphosyntactic indication of the syntactic role of the GHN inside the attributive clause as many other types of oblique relative clauses do. For instance, relative clauses in which the head serves as instrument inside the relative clause often include a dangling or fronted adposition (Comrie & Kuteva, 2005). Interestingly, the oblique syntactic function of the GHN of time is encoded externally by means of locative or dative markers. [ix]In this regard, Cristofaro & Giacalone Ramat (2007, p. 76) explain that there is usually no overt presence of the syntactic role of the temporal noun inside the relative clause. This stems from the fact that temporal nouns in this construction provide a temporal setting for the events being described rather than designating discourse participants relevant to ongoing discourse, that is, temporal nouns in attributive clause constructions do not function as relevant referents and topics for further conversation. For instance, in the construction '*on the day we met, it rained*', the speaker's intention is not to identify some particular day with respect to others in which it rained (e.g. *on that day it was raining*). Rather, the speaker's intention is to establish a linkage between the meeting and the rain. Cristofaro & Giacalone Ramat (2007, p. 76) mention that "since the relative clause is not being used to identify a particular entity within a set of possible referents, it not so important to provide overt morphosyntactic specification about this entity in the relative clause."

Another important aspect to bear in mind is that the GHN of time may combine with other morphosyntactic elements to make the GHN of time semantically specific. This is in line with Hetterle (2015, p. 106) who explains that different constructional properties may combine to dictate a particular adverbial reading. For instance, in Somali some GHNs of time become semantically specific when they appear with particular morphosyntactic elements. In the example in (55), the GHN *mar* 'time' is an unspecialized GHN in that it does not express a particular temporal relation (e.g. 'when'). However, when this GHN appears with the adposition *lá* 'with', it becomes semantically specific in that it expresses immediate temporal subsequence (i.e. 'as soon as'), as in (56).

Somali (Afro-Asiatic/Lowland East Cushitic)

(55) ***mar**-kii* *uu* *qol-kii* *ká* *baxáy*,
time-the 3SG.SBJ room-the from went
'When he left the room,

wáxaa-n *kú* *idhi* *nabád* *gélyo*.
wáxaa-1SG.SBJ to said peace enter.CAUS.OPT
I said goodbye to him.' (Saeed, 1999, p. 218)

Somali (Afro-Asiatic/Lowland East Cushitic)

(56) ***is-la*** ***mar-kii*** *uu* *tegáy,* *sháqàan* *bilaabay*.
REFL-with time-the 3SG.SBJ went work.1SG.SBJ.FOC began
'As soon as he left, I began working.' (Saeed, 1999, p. 218)

Having explored the most common ways in which GHNs of time may be encoded in the languages of the sample, I now can proceed to exploring whether GHNs of time are encoded in the same way as other relativized temporal nouns (e.g. ʿday', ʿyear') or not. Since the sources of the sample sometimes do not contain information on the relativization of other temporal nouns, this study will not address the cross-linguistic distribution of languages in which GHNs of time are encoded in the same way as other temporal nouns or in a different way. Therefore, this research can make only a modest contribution to the understanding of this parameter.

4.2.1 Generic head nouns of time encoded in the same way as other temporal nouns

In many languages in the sample, GHNs of time are encoded in the same way as other relativized temporal nouns. In what follows, some of these languages will be used to illustrate this pattern.

In Amele, the GHN *saen* 'time' must always appear with the postposition *=na* 'at', as in (57). In a similar fashion, John Roberts (p.c.) informs me that other temporal nouns, such as *deel* 'day', also have to be followed by the same postposition *=na* 'at', as in (58). Therefore, the general rules apply for encoding all types of relativized temporal nouns in this language.

Amele (Trans-New Guinea/Madang)

(57) *age* *sigin* *hew-ec-eb* *age* ***saen*** *eu=**na***,
3PL knife hold-DS.SEQ-3SG.NOM 3PL time that=at
'After he circumcises them,

age *jacas* *qee* *j-egi-na* *ceb* *qee* *j-egi-na*.
3PL tobacco NEG eat-3PL.NOM-PRS betelnut NEG eat-3PL.NOM-PRS
they do not smoke tobacco or chew betelnut.' (Roberts, 2016, p. 119)

Amele (Trans-New Guinea/Madang)

(58) *ija* *cabi* *meul* *ceh-ig-en* ***deel*** *eu=**na*** *ma=ca,*[x]
1SG garden new plant-1SG.NOM-FUT day that=at taro=ADD
'On the day I plant my new garden,

ceta=ca *mun=ca* *manin=ca* *ceh-ig-en*.
yam=ADD banana=ADD bean=ADD plant-1SG.NOM-FUT
I will plant taro, yam, banana and beans.'

In Emai, the GHN *ẹ́ghẹ́* 'time' is bare in that it does not appear with definite markers, adpositions, or case markers, as can be seen in (59). In a similar fashion, other temporal nouns are also bare, such as *ìsòkpísòkpá* 'moment', as is shown in (60).

Emai (Niger-Congo/Edoid)

(59) *ọ́lí* *ọ́mọ́hé* *gbéˈ* *ófé*
the man PST.PERF.kill rat
'The man killed a rat

ẹ́ghẹ́ *lí* *ọ́* *rẹ́ˈ* *vàdé.*
time REL 3SG.SBJ PST.PERF.take come
when he was coming.' (Schaefer & Egbokhare, 2017, p. 913)

Emai (Niger-Congo/Edoid)

(60) ***ìsòkpísòkpá*** *lí* *ọ́* *rẹ́ˈ* *míẹ́* *Òhí,*
moment REL 3SG.SBJ PST.PERF.take see Ohi
'At the moment she saw Ohi,

ọ́ *óˈ* *vbì* *ìwè.*
3SG.SBJ PST.PERF.enter LOC house
she entered the house.' (Schaefer & Egbokhare, 2017, p. 913)

4.2.2 Generic head nouns of time encoded in a different way than other temporal nouns

Unlike the picture described above, there are only a few languages of the sample in which GHNs of time are encoded in a different way than other relativized temporal nouns. In what follows, this paper discusses some of these languages.

In Bangime, attributive temporal clauses encoded by *sāŋà* 'time' are bare in that they do not appear with definite markers, adpositions, or case markers, as is shown in (61). On the other hand, when the head is a different temporal noun, such as *nīj̄ɛ̄* 'day' or *bīī* 'year', a fuller construction with a spatial postposition is used (Heath & Hantgan, 2017, p. 457), as can be seen in (62).

Bangime (Isolate)

(61) *à* *dóó* *á* *tèè* *∅* *nóó* *mɛ̀* ***sáŋá,***
2SG.SBJ convey.PFV DEF tea 3SG.SBJ come.IPFV REL time
'When you brought the tea,

kú(ú)ⁿ *∅* *náw.*
market 1SG.SBJ be
(in) the market (focus) I was.' (Heath & Hantgan, 2017, p. 457)

Bangime (Isolate)

(62) *à* *nóó* *á* ***nīj̄ɛ̄/bīī*** *mɛ̄* ***hùⁿ.***
2SG.SBJ come.IPFV DEF day/year REL on
'On the day/in the year when you-sg came.' (Heath & Hantgan, 2017, p. 457)

Daakaka shows an interesting scenario in that it has two GHNs of time, viz. *bili* 'time' and *taem* 'time'. On the one hand, *bili* 'time' is encoded in the same way as other relativized temporal nouns (e.g. *webung* 'time') in that they do not appear with any adpositions, as in (63). On the other hand, Kilu von Prince (personal communication, 2019) informs me that the preposition *yen* 'in' can appear before the temporal noun *taem* 'time', as in (64), but it cannot appear with other relativized temporal nouns.

Daakaka (Austronesian/Oceanic)

(63) ***bili*** *na* *ka* *ya=ta* *tas* *tene* *ka* *ya=p* *tiye,*
time COMP SUB 3PL.SBJ=DIST sit wait COMP 3PL.SBJ=POT kill
'While they were waiting to kill him,

te	*mo*	*kuowilye*	*mo*	*nok.*
CONJ	REAL	know	REAL	finish

he already knew.' (von Prince, 2015, p. 391)

Daakaka (Austronesian/Oceanic)

(64)

yen	***taem***	*na*	ka	*te*	*kyep,*
in	time	COMP	SUB	DIST	shit

'When they shit,

mwe	*kyep*	*te*	*sy-en*	*ma*	*giy=e*	*kyun.*
REAL	shit	CONJ	shit-3SG.POSS	REAL	be.like=DEM	just

it shits and its crap is like this.' (von Prince, 2015, p. 392)

Before I close the present section, mention should be made of the thought-provoking scenario that Dogon languages show with respect to the encoding of attributive temporal clauses. Jeffrey Heath (personal communication, 2019) informs me that attributive temporal clauses encoded by an in-situ internal head noun are very common in this language family. One of the most common patterns is for this entire construction to be followed by a postposition, which depending on the language may be locative or instrumental. For instance, in Yanda Dom attributive temporal clauses encoded by *wàgàdù* 'time' may appear with the instrumental postposition *m* 'with', as in (65). On the other hand, other temporal nouns, such as *ìzèn* 'day', when they are relativized may not be followed by an instrumental postposition, as in (66).

Yanda Dom (Dogon)

(65)

wàgàdù^{L}	*mì*	*pílé*	*wò*	***m***,
time	1SG.SBJ	fall.PFV.REL	DEF.INAN.SG	with

'When I fell,

pòl	*↑gɛ́lâ:=bá-lù-m.*
knife	have.IPFV=PST-PFV.NEG-1SG.SBJ

I didn't have a knife (on me).' (Heath, 2014a, p. 448)

Yanda Dom (Dogon)

(66)

módùbè	***ìzèn^{L}***	*nà*	*wé*	*wò,*
holy.man	day	3SG.SBJ	come.PFV.REL	DEF.INAN.SG

'The holy man, (on) the day he came,

dàmá	*wò*	*cɛ̂m*	*yà*	*múmbí-y-á.*
village	DEF.INAN.SG	all	REAL	assemble-MED.PASS.PFV-3PL.SBJ

the whole village (=all the villagers) assembled.' (Heath, 2014a, p. 448)

However, Jeffrey Heath (personal communication, 2019) informs me that there is also another option. Some Dogon languages allow internal temporal nouns to be doubled, while a GHN of time may not be doubled. For instance, in Ben Tey a definite imperfective attributive temporal clause headed by *wàgàtù^{L}* 'time' must be followed by the instrumental postposition *ɲây^{n}*, as in (67). On the other hand, double head nouns are only possible when the internal head is *ùsù^{L}* 'day', as in (68). Heath (2015a, p. 243) explains that the double head noun has the tonal form of a possessed noun and the syntax is therefore 'the day of the day the grasshoppers came'.

Ben Tey (Dogon)

(67) *ɔ̂:-m* ***wàgàtù***^{L} *yé-m̀* *kú* ***ɲâyⁿ***,
chief-ANIM.SG time come.IPFV-PTCP.INAN DEF come.IPFV-PTCP.INAN
'While the chief was coming,

ɔ̀rⁿɔ́: *bírέ* *bírέ-m̀=bὲ-ỳ.*
field work work-IPFV=PST-1SG.SBJ
I was working in the fields.' (Heath, 2015a, p. 243)

Ben Tey (Dogon)

(68) *kì-kã:* ***ùsù***^{L} *yɛ̃́-ẁ* ***ᴸùsù***
RDP-grasshopper day come.PFV-PTCP.INAN day
'The day the locusts came

ŋ̀gúrù *í* *tὲmbì-Ø.*
here 1SG.OBJ find.PFV-3SG.SBJ
found me here.' (Heath, 2015a, p. 243)

In a similar fashion, in Togo Kan, attributive temporal clauses encoded by the GHN *tὲŋὲ* 'time' must be followed by the instrumental postposition *bὲ*, as in (69). Other temporal nouns with meanings like 'day' and 'year' are encoded in a different way. For instance, when the relativized noun is the temporal noun *nìŋìrⁿì* 'day', it must be doubled and requires a {H}-toned form of a perfective verb, as in (70). On the contrary, when the relativized noun is the temporal noun *àrⁿà* 'year', it does not show the doubling and it does not require a postposition, but rather it is bare, as is shown in (71).

Togo Kan (Dogon)

(69) ***tὲŋὲ*** *nùrⁿú* *ú* *á:-jú* ***bὲ***,
time sickness 2SG.OBJ catch-IPFV with
'When you were getting sick,

íⁿ *bàmàkɔ́* *wɔ̀.*
1SG.SBJ bàmàkɔ́ be.SG
I was in Bamako.' (Heath, 2015b, p. 303)

Togo Kan (Dogon)

(70) ***nìŋìrⁿì*** *ú* *yέr-έ* ***nìŋìrⁿì***,
day 2SG.SBJ come-PFV day
'The day you came,

nî *àrⁿú* *lɔ́w-ὲ.*
here rain rain.fall-PFV
it rained.' (Heath, 2015b, p. 303)

Togo Kan (Dogon)

(71) *kă:* ***àrⁿà*** *kó* *yέr-ὲ*,
grasshopper year SG come-PFV
'The year the locusts came,

émɛ́	*pàrà-bírɛ́*	*bì-lâ:.*
1PL.SBJ	autumn-work	do-PFV.NEG

we didn't do the harvest.' (Heath, 2015b, p. 303)

As was illustrated in the examples above from different Dogon languages, GHNs of time tend to appear with a postposition while other temporal nouns, mostly those meaning ʿday', tend to be doubled. Interestingly, in some Dogon languages, this doubled head noun construction may be suppletive, i.e. a synonym rather than a copy. For instance, in Bunoge the GHN of time *nàŋgà* ʿtime' functions as an echo for *dénì* ʿtime' as internal head in (72). Heath (2014b, p. 273) explains that the echoed noun is often marked in different Dogon languages morphologically or tonally as a possessum. The author points out that echoing is limited in some languages to attributive temporal clauses, such as Bunoge. However, in some eastern languages, the echoing system is more elaborate and includes classifiers, such as human singular and human plural.

Bunoge (Dogon)

(72)

dénì	*ŋ̀*	*ʔégè*	***nàŋgà***	*dɔ̌:wɛ̀.*
time	1SG.SBJ	come.PFV	time	die.PFV.3SG.SBJ

'He/She died when I came.' (Heath, 2014b, p. 273)

Having discussed the second parameter, that is, the encoding of GHNs of time in comparison to other relativized temporal nouns (e.g. ʿday', ʿyear'), I now turn to the third parameter, that is, whether languages tend to have specialized or unspecialized GHNs of time to encode attributive temporal clauses.

4.3 Specialized and unspecialized generic head nouns of time

As was briefly pointed out in Section 1, languages may have GHNs of time that are specialized and unspecialized. Recall that by specialized is meant those GHNs of time that correspond to semantically distinct conjunctions or converbs in languages where these are the basic way(s) of expressing particular temporal relations (e.g. ʿwhile', ʿafter', ʿbefore', ʿsince', ʿuntil'). By unspecialized is meant those GHNs of time that do not express a particular temporal relation (e.g. ʿwhen').[xi]

Most languages of the sample have unspecialized GHNs of time encoding attributive temporal clauses, as can be observed in the Georgian example in (73) and the Kisi example in (74).

Georgian (Kartvelian)

(73)

tvitmprinav-ši	*še-svi-is*	***dro**-s,*	
aeroplane-in	PREV-enter-GEN(MASD)	time-DAT	

'A the time I enter a plane,

gul-is	*r-ev-a*	*m-e-cˈqˈ-eb-a*	*xolme.*
heart-GEN	churn-THEM-MASD(NOM)	me-IND.OBJ-begin-THEM-it	generally

I start to feel nauseous as a rule.' (Hewitt, 1995, p. 591)

Kisi (Niger-Congo/Mel)

(74) *ŋ̀* *cò* *cììkìáŋ* ***lɔ́ɔ́*** *ŋ̀* *cò* *hùnɔ́ɔ́-ó.*
1PL.SBJ AUX meet time 2SG.SBJ AUX come-REL
'We will see you when you come.' (Childs, 1995, p. 287)

While most languages of the sample (33⁄45=73.33%) have unspecialized GHNs of time, only a few languages have specialized GHNs of time that encode particular adverbial semantic relations (9⁄45=19.99%) or both types (3/45=6.66%). Interestingly, all the languages that specialized GHN have GHNs that encode simultaneity.[xii] The following examples illustrate languages which have GHNs of time specialized for encoding simultaneity.

Hatam (West Papuan)

(75) ***mpe*** *di-no* *di-bong* *leu* *su,*
time REL-3SG 1SG.SBJ-sleep from already
'While I slept,

lene *tungwa* *gom* *kwei* *nggimang* *dit-de* *radio.*
then human one come steal 1SG-POSS steal
someone came and stole my radio.' (Reesink, 1999, p. 130)

Makasae (Timor-Alor-Pantar/Makasae-Fataluku-Oirata)

(76) ***watu*** *a'a* *ani* *sirbisu* *ere,* *gi* na'u *au* *mi-mi.*
time REL 1SG.SBJ work DEM 3SG.SBJ just COMPL sit.SG-RDP
'He just sits about while I am working.' (Huber, 2005, p. 112)

There are some languages which have one specialized GHN of time and one unspecialized GHN of time. For instance, in Eton the GHN *jɔ̀ŋ* 'time' is unspecialized, as in (77). The GHN *té* 'time' is specialized in that it is used to express simultaneous temporal relations (Van de Velde, 2008, p. 359), as in (78).

Eton (Niger-Congo/Bantoid)

(77) *mè-ŋgénà* *tʃətʃàd* *í-ì-**jɔ̀ŋ*** *ú-ŋgá-pám* *ná́-lá.*
1SG.SBJ-COP small AUG-7-time III-REM.PST-come.out thus-ID
'I was still very small when it came out like this.' (Van de Velde, 2008, p. 173)

Eton (Niger-Congo/Bantoid)

(78) *H-Ǹ-**té*** *mə-Ltέ* *L-jàŋà* *Ǹ-kúŋkúmá,*
AUG-3-time 1SG.SBJ-PRS INF-wait 3-chief
'While I am wating for the chief,

mə-à-láŋ *tʃətʃàd.*
1SG.SBJ-S.PRS-read a.bit
I am reading a bit.' (Van de Velde, 2008, p. 359)

Japanese also has two GHNs of time for encoding attributive temporal clauses, viz. *aida* 'time_interval' and *toki* 'time'. The GHN *aida* 'time_interval' is specialized in that it is only used to express some interval of time, that is, it is used when an action took place over some span of time (Oshima, 2011, p. 4), as is illustrated in (79). The other GHN is *toki* 'time', as can be seen in (80), is unspecialized for the reason that it may have different temporal interpretations in the same way as the *when*-clause in English (Oshima, 2011, p. 6).

Japanese (Isolate)

(79) *Hiroshi-ga* *hon-o* *yonde-i-ta* ***toki***,
Hiroshi-NOM book-ACC read-ASP-PST time
'When Hiroshi was reading a book,

Yumi-ga *me-o* *samashi-ta*.
Yimi-NOM eye-ACC wake.up-PST
Yumi woke up.' (Oshima, 2011, p. 5)

Japanese (Isolate)

(80) *pooka-o* *shite-i-ru* ***aida***,
poker-ACC do-ASP-PRS time_interval
'While we played poker,

tsuyo-i *kaze-ga* *fuite-i-ta*.
strong-PRS wind-NOM blow-ASP-PST
strong wind was blowing outside.' (Oshima, 2011, p. 3)

Moskona shows a situation similar to that in Eton and Japanese in that it has one specialized and one unspecialized GHN of time. While *mona* is used to express simultaneous temporal relations (Gravelle, 2010, p. 348), as in (81), *kus* is not specialized in that it is not used to express a particular temporal semantic relation (Gravelle, 2010, p. 349), as in (82).

Moskona (East Bird's Head)

(81) *jig* ***mona*** *noga* *mas* *es* *oysa* *jog*,
LOC time REL rain spray finished already
'While the rain stopped,

ofa *ek* *maw* *egak* *ed* *meren* *odog*.
3SG.SBJ see sun leg strike lake leg
he saw the sun's rays strike the lake's surface.' (Gravelle, 2010, p. 349)

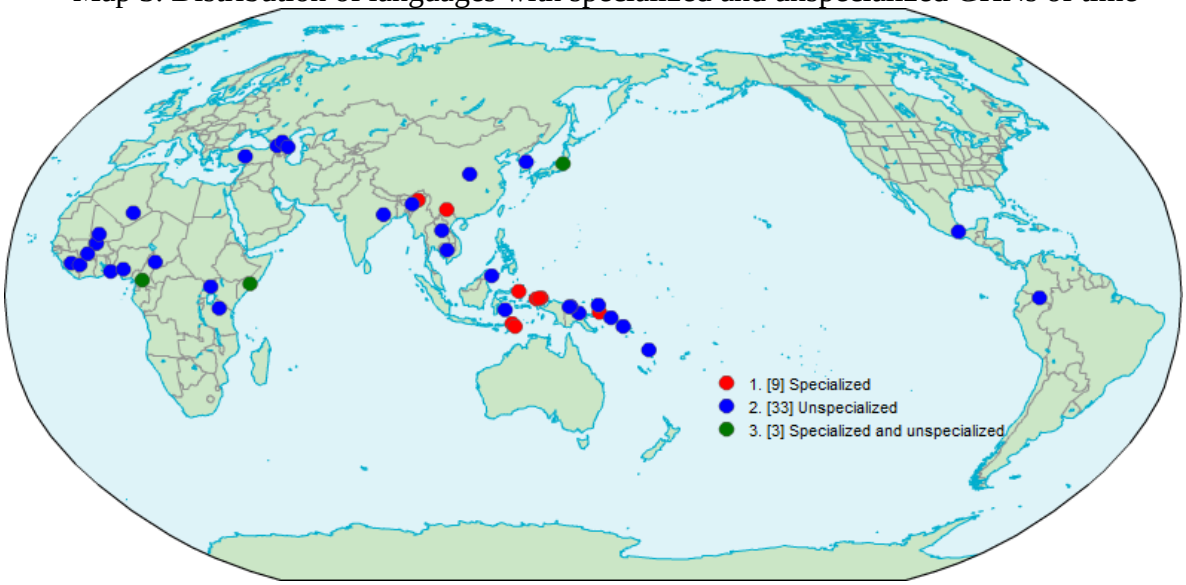
Moskona (East Bird's Head)

(82) *ofa* *ec* *miyes*
3SG.SBJ buy clothes
'He bought the clothes

kus *noga* *dif* *di-éysaha* *jig* *Jayapura*.
time REL 1SG.SBJ 1SG.SBJ-reach LOC Jayapura
when I arrived in Jayapura.' (Gravelle, 2010, p. 349)

As can be seen in Map 3, while unspecialized GHNs of time are mostly attested in Africa and Eurasia, specialized GHNs of time are mostly found in Papunesia and Eurasia. However, they seem to be more common in Papunesia. Note that languages that have both types, that is, specialized and unspecialized GHNs of time, are only attested in Africa and Eurasia.

Map 3. Distribution of languages with specialized and unspecialized GHNs of time



5 Final remarks

This paper has explored attributive temporal clauses from a cross-linguistic perspective. In doing so, I discussed three main aspects. The first aspect covered was the linear position of GHNs of time within the construction. This paper has demonstrated that initial GHNs are attested in almost all macro-areas. However, they seem to be more common in Africa and Papunesia. Furthermore, this seems to be the most common position of GHNs of time in the languages of the sample. This research has also shown that the position of the GHN of time with respect to the attributive clause seems to follow the general rules in the language for positioning heads of relative clauses (e.g. subjects, objects, indirect objects) in almost all the languages of the sample. Two exceptions are Supyire, in which the GHN *tèni* 'time' will always occur within the relative clause, and Mongsen Ao, in which *hmapaŋ* 'time' will always appear in final position. Furthermore, the position of the GHN of time correlates with the position of adverbial subordinating devices in most languages of the sample. As for those languages having both adverbial subordinating devices and attributive adverbial clauses encoded by different types of head nouns, the position of the GHN of time of attributive temporal clauses will usually appear in the same position as other types of head nouns rather than that of adverbial subordinating devices.

The second aspect addressed was the encoding of GHNs. It was shown that the GHN of time may be bare, may appear with locative markers, dative markers, and definite markers. This study also has shown that while GHNs of time are encoded in the same way as other relativized temporal nouns in many languages of the sample, only in some languages GHNs of time are encoded in a different way than other relativized temporal nouns. This is the case of many Dogon languages in the sample.

The third aspect explored was the use of specialized and unspecialized GHNs of time encoding attributive temporal clauses. This research found that while unspecialized GHNs of time are mostly attested in Africa and Eurasia, specialized GHNs of time are mostly found in Papunesia and Eurasia. This paper showed that most languages of the sample (33⁄45=73.33%) have unspecialized GHNs of time and only a few languages have specialized GHNs of time that encode particular adverbial semantic relations (9⁄45=19.99%) or both types (3/45=6.66%).

Interestingly, these GHNs of time are usually specialized for encoding simultaneity adverbial relations.

Attributive temporal clauses provide a frequent diachronic source for temporal adverbial clauses (Heine & Kuteva, 2002, p. 298; Heine & Kuteva, 2007, p. 246; Diessel, 2019, p. 106). Accordingly, attributive temporal clauses can be considered constructions that are not (yet) fully grammaticalized into temporal adverbial clauses. The synchronic findings of all three parameters (i.e. linear order, morphological encoding, and meaning) might be explained if we look at them from a diachronic perspective. Regarding the linear order of attributive temporal clauses, Diessel (2019, p. 106) notes that temporal adverbial clauses derived from relative clauses encoded by a GHN of time involve postnominal, prenominal, or internally-headed relative clauses. As was shown in this study, attributive temporal clauses with initial, medial, and final GHNs of time are all attested in the sample, which seems to corroborate the idea that the three positions of GHNs of time are common in the historical development of temporal adverbial clauses. With respect to the morphological encoding of the GHN of time, although Diessel (2019, p. 106) does not explicitly mention it, he shows different examples in which temporal adverbial subordinators have been derived from GHNs of time that are bare or accompanied by adpositions, case markers, and definite articles. This is in line with the synchronic finding of the present study in that GHNs of time may be bare or accompanied by adpositions, case markers, and definite articles. Regarding, the meaning of the GHN of time, Diessel (2019, p. 106) notes that the development of temporal adverbial clauses from attributive temporal clauses seems to be especially frequent with temporal *when*-clauses and *while*-clauses. This is also found in the present study in that GHNs of time may be have unspecialized or specialized for encoding simultaneity adverbial relations.

It remains an open task to explore the extent to which language contact has played a significant role in the cross-linguistic distribution of attributive temporal clauses. In several languages of the sample the GHN of time has been borrowed from another language. For instance, in Goemai, the GHN *lókàshi* ‘time’ was borrowed from Hausa (Hellwig, 2011, p. 70). In Atong, the GHN *somay* ‘time’ is an Indic loanword related to Hindi *samay* ‘time’ (van Breugel, 2014, p. 520). In both Fehan Tetun (van Klinken, 1999, p. 321) and Ternate (Hayami-Allen, 2001, p. 246), attributive temporal clauses are headed by the GHN *oras* ‘time’ which was borrowed from Portuguese *horas* ‘hours’. In Begak-Ida'an (Goudswaard, 2005, p. 366), the GHN *waktu* ‘time’ modifying attributive temporal clauses was borrowed from Malay. In Daakaka, the GHN *taem* ‘time’ has been borrowed from Bislama (von Prince, 2015, p. 392).[xiii] It also remains to be explored whether some languages have developed attributive temporal clauses not because of the borrowing of GHNs from other languages, but because of externally-motivated grammaticalization. For instance, as was exemplified in this paper, in some Nakh-Daghestanian languages (e.g. Lezgian and Ingush), the GHN of time appears with a dative case marker. Interestingly, other languages not genetically related, but spoken in the same geographical area (e.g. Georgian), also have attributive temporal clauses in which the GHN of time appears with a dative case marker. The historical background to this parallelism requires further investigation.

Abbreviations

1=first person, 2=second person, 3=third person, ACC=accusative, ADD=additive, ADV=adverbial, AGEN=agentive, ANAPH=anaphoric, ANIM=animate, ANTEC=antecedent, AOR=aoristic, ART=article, ASP=aspect, AUG=augment, AUX=auxiliary, C=concord CAUS=causative, CL=classifier, COMP=complementizer, COMPL=completive, CONCESS=concessive, CONJ=conjunction, CONT=continuous, COP=copula, CS=change of state, CUST=customary, CVB=converb, DAT=dative, DECL=declarative, DEF=definite, DEIC=deictic, DEM=demonstrative, DET=determiner, DIR=directional, DIST=distal, DS=different subject DU=dual, EMPH=emphatic, ERG=ergative, EXCL=exclusive, FOC=focus, FUT=future, GEN=genitive, HAB=habitual, HUM=human, HYP=hypothetical, ID=intermediate distance, IMP=imperative, IMPERF=imperfect, INAN=inanimate, INCL=inclusive, IND=indicative, INF=infinitive, INTRANS=intransitive, IPFV=imperfective, L=local, LOC=locative, M=masculine, MASD=masdar, MED=medio, N=noun, NARR=narrative, NEG=negative, NMLZ=nominalizer, NOM=nominative, NRL=non-relational, OBL=oblique, OBJ=object, OP=operator, OPT=optative, PASS=passive, PERF=perfect, PFV=perfective, PL=plural, POSS=possessive, POT=potential, PRED=predicate, PREV=preverb, PROG=progressive, PRS=present, PST=past, PTCP=participle, QUOT=quotative, RDP=reduplication, REAL=realis, REFL=reflexive, REL=relativizer, REM=remote, RES=resumptive pronoun, S=southern, SBJ=subject, SEQ=sequential, SG=singular, SIM=simultaneous, SS=same subject, SUB=subordinator, SUBJ=subjunctive, TAM=tense aspect mood, TC=time adverbial clause marker, TEMP=temporal, THEM=thematic, TOP=topic, V=verb, VBLN=verbal noun.

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Appendix: Languages of the sample

Language	Macro-area	GHN of time	Position of GHN	Encoding of GHN	Specialized/ Unspecialized	Source
Amele	Papunesia	*Saen*	Initial and final	Postposition	Unspecialized	Roberts (2016)
Atong	Eurasia	*Somay*	Final	Locative postposition	Unspecialized	van Breugel (2014)
Bangime	Africa	*Sáŋá*	Final	Bare	Unspecialized	Heath and Hantgan (2017)
Begak-Ida'an	Papunesia	*Waktu*	Initial	Bare	Unspecialized	Goudswaard (2005)
Sochiapan Chinantec	North America	*Hmáï*	Initial	Bare	Unspecialized	Foris (2000)
Chinese	Eurasia	*Shíhuo*	Final	Bare	Unspecialized	Yip and Rimmington (2004)
Daakaka	Papunesia	*Bili*	Initial	Bare	Unspecialized	von Prince (2015)
		Taem	Initial	Preposition	Unspecialized	
Emai	Africa	*É̱ghé̱*	Initial	Bare	Unspecialized	Schaefer and Egbokhare (2017)
Eton	Africa	*Jɔ̀ŋ*	Initial	Augment	Unspecialized	Van de Velde (2008)
		Tɛ́	Final	Augment	Specialized	
Fongbe	Africa	*Hw£un*	Initial	Bare	Unspecialized	Lefebvre and Brousseau (2002)
Georgian	Eurasia	*Dro*	Final	Dative marker	Unspecialized	Hewitt (1995)
Hatam	Papunesia	*Mpe*	Initial	Bare	Specialized	Reesink (1999)
Hausa	Africa	*Lokaci*	Initial	Determiner	Unspecialized	Bagari (1976)
		Sa'a	Initial	Determiner	Unspecialized	
		Loto	Initial	Determiner	Unspecialized	
		Yayi	Initial	Determiner	Specialized	
		Zamani	Initial	Determiner	Specialized	
Huitoto	South America	*Fakai*	Final	Bare	Unspecialized	Wojtylak (2017)
Ingush	Eurasia	*Xaana*	Final	Dative marker	Unspecialized	Nichols (2011)
Iraqw	Africa	*Qooma*	Initial	Demonstrative	Unspecialized	Mous (1993)
Jalkunan	Africa	*ˈSóʔó*	Medial	Comitative postposition	Unspecialized	Heath (2017)
Japanese	Eurasia	*Aida*	Final	Bare	Specialized	Oshima (2011)

		Toki	Final	Bare	Unspecialized	
Kharia	Eurasia	*Bhere*	Final	Deictic marker	Unspecialized	Peterson (2011)
Khmer	Eurasia	*Pee:l*	Initial	Preposition	Unspecialized	Haiman (2011)
Kisi	Africa	*Lɔ́ɔ́*	Initial	Bare	Unspecialized	Childs (1995)
Kombio	Papunesia	*Temp*	Initial	Bare	Unspecialized	Henry (1992)
Korean	Eurasia	*Ttay*	Final	Postposition	Unspecialized	Chang (1996)
Koyra Chiini	Africa	*Saa*	Initial	Definite marker	Unspecialized	Heath (1999)
Kuot	Papunesia	*Tara*	Initial	Preposition	Specialized	Chung and Chung (1996)
Lango	Africa	*Káré*	Initial	Preposition	Unspecialized	Noonan (1992)
Lao	Eurasia	*Vêlaa2*	Initial	Bare	Unspecialized	Enfield (2007)
		Tòòn3	Initial	Bare	Unspecialized	
Lavukaleve	Papunesia	*Ta*	Initial	Bare	Unspecialized	Terrill (2003)
Lele	Africa	*Kur*	Initial	Bare	Unspecialized	Frajzyngier (2001)
Lezgian	Eurasia	*Č'awu*	Final	Dative marker	Unspecialized	Haspelmath (1993)
		Waxtunda	Final	Inessive marker	Unspecialized	
		Arada	Final	Inessive marker	Unspecialized	
Makasae	Papunesia	*Watu*	Initial	Bare	Specialized	Huber (2008)
Maybrat	Papunesia	*Kine*	Initial	Bare	Specialized	Dol (1999)
		Um	Initial	Bare	Specialized	
Mongsen Ao	Eurasia	*Hmapaŋ*	Final	Locative Postposition	Unspecialized	Coupe (2006)
Moskona	Papunesia	*Mona*	Initial	Locative preposition	Specialized	Gravelle (2010)
		Kus	Initial	Bare	Unspecialized	
Motuna	Papunesia	*Poti*	Initial and final	Bare	Unspecialized	Onishi (1994)
Nuosu	Eurasia	*Te*	Initial	Locative postposition	Unspecialized	Gerner (2013)
Somali	Africa	*Mar*	Initial	Determiner	Unspecialized	Saeed (1999)
		Kól	Initial	Determiner	Unspecialized	
Sulka	Papunesia	*Kolkha*	Initial	Locative preposition	Unspecialized	Tharp (1996)
Supyire	Africa	*Tèni*	Medial	Definite marker	Unspecialized	Carlson (1994)
Tamashek	Africa	*Ajúd*	Initial	Comitative postposition	Unspecialized	Heath (2005)

		Ælwæqq	Initial	Comitative postposition	Unspecialized	
Ternate	Papunesia	*Oras*	Initial	Oblique preposition	Unspecialized	Hayami-Allen (2001)
Tetun	Papunesia	*Oras*	Initial	Locative preposition	Specialized	van Klinken (1999)
Tommo So	Africa	*Wàgàdù*	Medial	Bare	Unspecialized	McPerson (2013)
Turkish	Eurasia	*Zaman*	Final	Bare	Unspecialized	Göksel and Kerslake (2005)
Urim	Papunesia	*Wang*	Initial	Bare	Unspecialized	Hemmilä and Luoma (1987)
West Coast Bajau	Papunesia	*Waktu*	Initial	Bare	Unspecialized	Miller (2007)
		Masa	Initial	Bare	Unspecialized	

Notes

[i] This work benefitted immeasurably from discussions with Bernard Comrie, Marianne Mithun, Eric W. Campbell, and two anonymous reviewers. Any errors remain entirely my responsibility.
[ii] I would like to express my gratitude to the following linguists for their help with some languages of the sample: Jeffrey Heath (Dogon languages), John Roberts (Amele), Kilu von Prince (Daakaka), Seino van Breugel (Atong), Yi-Yang Cheng (Chinese), Karen Tsai (Japanese), Mark Van de Velde (Eton), B. George Hewitt (Georgian), and John Peterson (Kharia).
[iii] This study only takes into account attributive temporal clauses in which the GHN is explicitly mentioned. Therefore, this paper excludes languages, such as Cuwabo (Bantoid/Niger-Congo), in which temporal relations are expressed by means of a relativized verb that appears with the concordial prefix of class 5 *ni-* but not with a GHN. It is important to mention that *ńsaká* 'time' is among the many nouns that belong to class 5 and is implied in this construction (Guérois, 2015, p. 485). This study also excludes constructions with a non-lexical head, such as the Russian conjunction *posle togo, kak* 'after', literally 'after that, as', where the neuter pronoun *to* is probably a non-lexical head that is not linked to any particular lexical head (Comrie, personal communication, 2019).
[iv] I followed the genealogical classification of WALS with the following adjustments. First, if a particular language does not appear in the WALS database, but appears in a grouping in Glottolog 2.7 that corresponds to the genus of WALS, then we consider the language to belong to that genus. Note that for a Glottolog grouping to correspond to a WALS genus, the Glottolog grouping must include all languages in the WALS genus and no languages that are classified outside that genus in WALS. Second, if a particular language does not appear in the WALS database, but appears as an isolate in Glottolog, then we treat it as a separate genus.
[v] Case markers as subordinating devices are common in other areas of the world, such as Tibeto-Burman languages (Aikhenvald, 2008, p. 573) and in several African languages, particularly in subgroups of the Nilo-Saharan and Afro-Asiatic phyla (Jakobi & El-Guzuuli, 2016, p. 162).
[vi] All Maps in this paper were created with the Interactive Reference Tool accompanying WALS.
[vii] Other adverbial clauses are encoded by relative tense markers that occur in clause-internal position, such as the anterior relative tense marker *ke* (Schaefer & Egbokhare, 2017, p. 900) and the continuous relative tense marker *kpe* (Schaefer & Egbokhare, 2017, p. 906).
[viii] With respect to dative case markers, it is important to bear in mind that this category may indicate beneficiaries, recipients, and maleficiaries. However, they may also mark oblique relations, such as locative, instrumental, or spatial relations (Haspelmath, 2009, p. 510).
[ix] Haspelmath (1997, p. 102) mentions that languages commonly restrict the application of their spatial markers to noun phrases headed by temporal nouns, including nouns denoting canonical time periods and others that are more generic, such as 'time'.
[x] Example provided by John Roberts (personal communication, 2019).
[xi] As correctly pointed out by one of the anonymous reviewers, attributive clauses headed by a GHN of time may encode other types of adverbial semantic relations. For instance, conditional clauses in Somali (Afro-Asiatic/Lowland East Cushitic) are headed by the noun *had* 'time' suffixed with the definite article *-tii* forming *haddii* (Saeed, 1999, p. 222). In German, cause and condition clauses encoded by adverbial subordinators (i.e. *weil* and *falls*) are based on nominal heads meaning 'time (span)' and 'case' (Diessel, 2019, p. 106).
[xii] Attributive temporal constructions encoding temporal simultaneity are a common feature of Papuan languages (Foley, 1986, p. 202).
[xiii] For a detailed discussion of other languages from Vanuatu that have attributive temporal clauses (e.g. Lo-Toga and Hiw), the reader is referred to François (2010).