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The evolution of finite temporal subordination From parataxis via correlatives to temporal and event relatives in Hungarian

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This paper examines how Hungarian, originally a head-final language with non-finite subordination, developed finite temporal subordination. It is claimed that the source construction of complex sentences with a finite temporal subordinate clause was a paratactic pre-correlative structure, with an indeterminate pronoun in the initial clause. The next stage of the evolution was the emergence of a temporal correlative construction, with the indeterminate pronoun reinterpreted as a relative operator. Correlative clauses evolved into free, light-headed, and lexically headed relative clauses, which gradually supplanted non-finite temporal clauses. Temporal relative clauses introduced by *mikor* 'when' also assumed an alternative, event relativizing structure and interpretation, and later the set of event relativizers was extended by PPs like *mielőtt* 'REL-before' and *miután* 'REL-after'. In event relativizing constructions, the string-vacuity of relative operator movement gave rise to the base-generation of the relativizer in the complementizer domain, where it was reanalyzed from a phrase in Spec,CP to a head in C.

1 Introduction

Since Hungarian split away from its SOV Ugric sister languages, the Ob-Ugric Khanty and Mansi, it has undergone a drift to SVO syntax.[1] The change in head directionality has also affected subordination; the head-final non-finite subordinate constructions reconstructed for Proto-Ugric, still preserved in the conservative Ob-Ugric languages, have given way to finite subordinate clauses with a clause-initial complementizer domain (Bacskai-Atkari & Dékány 2014; É. Kiss 2023a; to appear). The aim of this paper is to explore this process by outlining the evolution of finite temporal clauses. The analysis contributes to the clarification of both diachronic and synchronic issues of temporal subordination. It is claimed that Hungarian finite adverbial clauses did not develop from non-finite ones (contra e.g. Harris and Campbell 1995: 310). They can be traced back to the correlative construction, which is argued to be the descendant of a paratactic coordinate structure (contra e.g. Weiß 2020, and supporting Heine and Kuteva 2007: Ch. 5.3.3). Temporal correlative constructions are shown to have evolved into free, light-headed and adnominal temporal relative clauses. Temporal relative clauses further developed into event relatives (the equivalents of English *before, after, until* clauses), with event relativizers grammaticalizing from relative operators in Spec,CP into temporal complementizers in C.

Section 2 of the paper illustrates non-finite temporal subordination in the SOV Ob-Ugric languages, and its relics in Old Hungarian (896–1526).[2] Section 3 presents the first finite temporal subordinate clause type emerging in the Ugric languages, the temporal correlative construction, and argues for its paratactic origin. Section 4 discusses temporal correlatives in Old Hungarian. Section 5 documents the evolution of temporal correlatives into headless, light-headed, and adnominal relative clauses. Section 6 examines event relatives, and the developmental path from temporal relatives via event relatives to temporal clauses introduced by a temporal complementizer.

2 Non-finite temporal subordination in Ob-Ugric and its relics in Old Hungarian

We can form a hypothesis about temporal subordination in Proto-Hungarian on the basis of temporal subordination in the conservative, SOV sister languages of Hungarian, and of “running out” temporal subordinate constructions in Early Old Hungarian. The easternmost Uralic languages, at least their variants spoken by monolingual or non-Russian-dominant bilingual speakers, still preserve the strict SOV structure reconstructed for Proto-Uralic e.g. by Ravila

[1] The Hungarian language is assumed to have split from the Ob-Ugric languages around 1000 BCE, but the Hungarian and the Ob-Ugric populations lived in each other’s neighborhood for another 1500–1800 years (Türk 2023; Németh & Szeverényi 2024).

[2] 896 is the date of the arrival of Hungarian tribes in the Carpathian Basin; 1526 is the date of the beginning of the 150-year-long Turkish occupation of the central part of the Hungarian Kingdom.

(1960), Janhunen (1982), Aikio (2022), or Zhivlov (2023).[3] These languages, among them the Ob-Ugric Khanty and Mansi, do not use finite subordination; as is typical of head-final languages, their subordinate clauses are non-finite (infinitival, participial, or gerundive) projections.

In Ob-Ugric texts recorded before the second half of the 20th century, we only find non-finite subordination, where the subordinator is the non-finite suffix on the clause-final verb (see e.g. Nikolaeva (1999) on Khanty; Riese (2001) on Mansi). Temporal adverbial clauses are often prenominal relative clauses modifying a head noun meaning 'time' – see (1). Notice that the non-finite clauses of these languages have no tense and no complementizer, i.e., no TP and CP layers, but they can have an independent subject, and can show subject-verb agreement of the type that is used in possessive constructions.

(1) **[köčɣi-ł** **ałəm-m-ał]** łat-nə tas-əŋ qo ńăwmił[4]
sabre-3SG raise-PSTPTCP-3SG time-LOC rich man said
'When he raised his sabre, the rich man said:'
(Khanty, Csepregi 2011: 96, OUDB 737)

A non-finite clause can function as a time adverbial also without an overt temporal nominal. Sometimes the temporal import of the subordinate clause can be inferred from the type of the non-finite suffix. A converbial clause, for example, denotes an event that overlaps with the time of the main clause event:

(2) [qåt-a łăŋ-**min**] łüw ťeťi ŏjaɣt-əɣ.
house-LAT enter-CVB s/he grandfather find-PST.3SG
'[When] entering the house, she found her grandfather'
(Khanty, Csepregi and Gugán 2017: ex. 24)

The temporal relation of the subordinate event and the main clause event is often indicated by a postposition (3), or an adverbial case suffix (4). A locative suffix indicates the simultaneity or overlapping of the two events (4a), whereas a lative suffix suggests that the main clause event follows the subordinate event (4b). The posteriority of the event of the subordinate clause can be expressed by the combination of a negative participle with a locative suffix (4c).

(3) [ʌiw-m-aʌ jen't'-**m-aʌ**] **pyrnə**
eat-PSTPTCP-3SG drink-PSTPTCP-3SG after
'after he has eaten and he has drunk'
(Khanty, Csepregi 2011: 28)

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[3] The younger generations of Uralic speakers in Russia, schooled in Russian, are all Russian-dominant bilinguals.

[4] I cite the examples as they are spelled in their sources. Thus the examples cited from the Ob-Ugric Database (OUDB, https://www.babel.gwi.uni-muenchen.de/index.php?navi=linguistic&abfrage=linguistic) are presented in an IPA-transcription.

(4) a. [miša jăqə łăŋ-**m-ał**]-**nə** maša kem ł'iwət.
Miša inside enter-PSTPTCP-3SG-LOC Maša out exist.PST.3SG
'When Miša entered, Maša went out.'
(Khanty, Csepregi and Gugán 2017: ex. 93)

b. [sułtə-**m**-am]-**a** ülak ńur man köčəɣ-nat äwətəm-i.
slip_in-PSTPTCP-1SG-LAT harness tether I.LOC knife-with cut-PASS.PST.3SG
'After my having slipped in [the water], the harness tether was cut by me.'
(Khanty, Csepregi 2011: 96, OUDB 730)

c. ma [wŏnt-nam mən-**łəɣ**-am]-**nə** ar łiwpəs łiťatə-ł-əm.
I forest-APPR go-NEGPTCP-1SG-LOC lot_of food prepare-PRS-1SG
'I prepare a lot of food before going to the forest.'
(Khanty, Csepregi and Gugán 2017: ex. (95))

Although the Old Hungarian sentence, documented in coherent texts since the end of the 12th century, is basically verb-initial already, the above patterns of non-finite temporal subordination are still common as gradually disappearing relics of the SOV syntax of Proto-Hungarian. Thus we find participial clauses associated with a head noun meaning 'time', as in (5), where the non-finite projection and the head noun form a possessive construction:

(5) [poncius pilat[9] Iudea-ban birolkot-**t**-a]-**nac** **idèi-e-bèn** … lọt
Pontius Pilate Judea-in reign-PTCP-POSS-DAT time-POSS-in happen.PST.3SG
vr-nac igė-iè ianos-hoz
lord-DAT word-POSS John-to
'the Lord's word to John happened in the time of Pontius Pilate's reigning in Judea'
(Old Hungarian, *Müncheni C.* 1416: 56v, Luke 3/1)[5]

Non-finite clauses may function as temporal adjuncts owing to the inherent aspectual meaning of the non-finite suffix. *-atte/-ette* converbs, for example, are progressive:

(6) [ọ az nep-è-t taneit-**atta** 7 a templom-ban euāgelizal-**atta**] egbè
he the people-POSS-ACC teach-CVB and the temple-in evangelize-CVB together
gọlèkez-e-n[c] a papoc-nac fèiedèlm-e 7 az irastudoc
assemble-PST-3PL the priests-DAT prince-POSS and the scribes
'[while] he was teaching his people and evangelizing them in the temple, the head of priests and the scribes assembled'
(OH, *Müncheni C.* 1416: 78v, Luke 20/1)

[5] The Old Hungarian sources (among them 54 codices, letters and other short texts), as well as five Bible translations from the Early Middle Hungarian period are stored in a digitized, searchable form in *Ómagyar korpusz* [Old Hungarian Database] http://omagyarkorpusz.nytud.hu/hu-bible_translations.html.

The temporal relation of the non-finite projection and the main clause can be indicated by a case suffix (7a) or a postposition, which assigns dative case to its complement in (7b):

(7) a. [Zent fferencz Sena-nal lakoz-**t**-a]-**ban** yew hoz-za nemy
Saint Francis Sena-at live-PSTPTCP-3SG-INE came to-3SG some
predicatorok-nac zerzet-e-bel-y doctor
ecclesiastes-DAT convent-POSS-INE-ADJ doctor
'While Saint Francis lived at Sena, a doctor from the order of ecclesiastes came to him.'
(OH, *Jókai C.* 1370: 95)

b. ivdith ... ez-t kér-é az olofernes-tǫl, hoǵ ky me-heet-ne
Judith this-ACC ask-PST.3SG the Olofernes-from that out go-POSSIB-COND.3SG
az ymadsag-ra, ... méégh [wyrrat-**t**-a]-**nak** **elǫtt-e** es
the prayer-for still dawn-PTCP-3SG-DAT before-POSS also
'Judith asked Olofernes if she could also go out for praying still before it dawned.'
(OH, *Székelyudvarhelyi C.* 1526: 37v)

These remnants of Proto-Hungarian are giving way to finite temporal subordinate clauses in the Old Hungarian period.[6] The non-finite clause of (6), a Biblical sentence (Luke 20/1), for example, is translated by a finite temporal clause a hundred years later:

(8) [**mykoron** az nepek-et tanoytt-**anaa** az templom-ban es predicall-**ana**],
when the people-ACC teach-COND.3SG the temple-in and preach-COND.3SG
egybe gyűl-ee-nek az papy feyedelm-ek es az yraſtwdo-k
together gather-PST-3PL the priest prince-PL and the scribe-PL
'while he was teaching the people in the temple and he was preaching, the heads of priests and the scribes assembled'
(OH, *Jordánszky C.* 1516: 598)

In sum: the non-finiteness of temporal subordination in the SOV Ugric languages suggests that Proto-Hungarian, too, only had non-finite temporal subordinate clauses at the beginning of its drift from SOV to SVO. Non-finite temporal subordination is still present in Old Hungarian, but it represents a running out strategy. An Ob-Ugric or Old Hungarian non-finite clause can assume temporal function as the modifier or specifier of a head noun meaning 'time'. Sometimes the temporal import of the non-finite clause is inferable from the type of the non-finite suffix. The

[6] In Modern Hungarian, only converbial projections can have a temporal import, and they are only licensed if their subject has a main clause controller, e.g.:

(i) Haza-érkez-vén János megvacsoráz-ott.
home-arrive-CONV John dine-PST.3SG
'Having arrived home, John had dinner.'

temporal relation of the non-finite clause to the main clause is often encoded by an adverbial case suffix or a postposition.

3 A paratactic pre-correlative construction in Ob-Ugric and its relics in Old Hungarian

In the Uralic languages, the emergence of finite subordinate clauses proceeds in parallel with the drift to head-initial syntax (Asztalos 2018; 2021; É. Kiss 2023a; to appear). Whereas in Hungarian these processes started more than a thousand years ago, and were well under way at the beginning of the documented period of the language at the end of the 12th century already (É. Kiss ed. 2014; Bacskai-Atkari and Dékány 2014),[7] in the Ob-Ugric languages the loosening of strict SOV has barely begun (according to the results of Asztalos et al. (2017), the word order is still SOV in 92% of sentences). Accordingly, Khanty and Mansi texts produced by monolingual or Khanty/Mansi-dominant bilingual speakers, primarily those recorded before the middle of the 20th century, display the embryonic stage of the emergence of finite subordination. While they abound in various types of non-finite subordination, they contain a single construction that appears to the present reader to involve two finite clauses in an asymmetric relation. The databases translate this construction into Russian, English, or Hungarian as a complex sentence with a free relative clause. The apparent relative expression is often a temporal adverb, as in the Khanty examples in (9), and the Mansi examples in (10):

(9) a. [βɒ:jəx quːɬ kənʈ-min [$_{VP}$ **kətʃ** [$_{VP}$ ɑŋqɯɬ-əɬ]]] əj mət-ɬ əntem.
game fish search-CVB when go-PRS.3SG one something not.exist
'when he goes around hunting and fishing, there is nothing.'
(Khanty, Paasonen 1901, OUDB 1313)

b. [kɐ:t kət-ɣən-nɐt [$_{VP}$ **quːntə** [$_{VP}$ kɐ:t-ɬ-təm]]] kɐ:t tʲorɐs-ɣən puːt ɐːɬəm-ɬ-əm
two hand-DU-COM when hold-PRS-1SG two thousand-DU pot lift-PRS-1SG
'When I hold with two hands, I can lift two thousand pots.'
(Khanty, Paasonen 1901, OUDB 1316)

(10) a. [isʲkum [$_{VP}$ **kʷæʃ** [$_{VP}$ nuŋk-kenʲsʲ-i]]] atʲ kʷotəlʲ at nʲow-i, worowiːn-əl
boy when up-wake-PRS.3SG nowhere not move-PRS.3SG rope-with
pjeːrs-ow-s.
tie-PASS-PST.3SG
'When the boy wakes up, he cannot move, he has been tied up with a rope.'
(Pelym Mansi, Kannisto 1955, OUDB 1258)

[7] The restructuring of Hungarian grammar from head-final to head-initial is nearly complete; only the PP, and the NP layer of DP are still head-final (É. Kiss 2002). Halm (2021), however, raises the possibility that the V-initial VP of Modern Hungarian is a derived structure; it is the result of V-to-T movement from a head-final VP.

b. [$_{VP}$ **kʷæʃ** [$_{VP}$ amnoo̯nəmnə pyːtm-iː-tə]] joo̯ too̯təl olˈ-p pat
when I-OBL shove-PRS-3SG and empty be-PRSPTCP cheek
pætʲ-k-əm nəs kuːrət-ow-s
bottom-DIM-1SG just cut-PASS-PST.3SG
'When he thrust at me, only my empty cheek bottom was cut.'
(Pelym Mansi, Kannisto 1955; OUDB 1335)

The initial sentences of these constructions, however, cannot be relative clauses. First, in the Pelym Mansi dialect (10a,b), they are often linked to the subsequent clause by a coordinating conjunction (which is not reflected by the translations provided in the Ob-Ugric Database).[8] Furthermore, when these sentences were recorded, Khanty and Mansi only had participial gap relatives, which contain no relative pronoun or proadverb (Nikolaeva 1999: 76, 45; Shagal 2023). Notice that the temporal adverbs in (9a,b) and (10a) are not moved to a peripheral position. In the Mansi examples they clearly occupy the regular position of VP-adverbs, following the topicalized subject (a lexical NP in (10a) and a pro in (10b)) and left-adjoined to the VP (a particle + verb complex in (10a) and an internal argument + verb complex in (10b)), and they are presumably left-adjoined to the VP in the Khanty examples, as well. These temporal adverbs must be indefinites, more precisely, existentially bound indeterminate proadverbs. Indeterminate pronouns/proadverbs are expressions denoting sets of alternatives bound by the nearest operator (Kratzer and Shimoyama 2002; 2017; Bende-Farkas 2014: 112–113). In Khanty and Mansi, they can be bound by a covert interrogative operator or by existential closure, as a consequence of which they function either as interrogative pronouns or as indefinites (Nikolaeva 1999: 18). In (9) and (10) they cannot be interrogatives, hence they must be indefinites, the equivalents of 'once', or 'sometime'. Thus these sentences must originally have been understood as follows:

(9') a. 'Once he goes around hunting and fishing, there is nothing.'
b. 'Once I hold with two hands, I can lift two thousand pots.'

(10') a. 'Once the boy wakes up, and he cannot move, he has been tied up with a rope.'
b. 'Once he thrust at me, and only my empty cheek bottom was cut.'

The claim that these sentences contain indefinite rather than relative proadverbs is corroborated by the corresponding Old Hungarian construction, in which the underspecified indeterminate adverbs, e.g. that in (11), alternate with their indefinite counterparts bearing the *vala-* 'some-' existential prefix, see (12).

[8] Although coordinating conjunctions are relatively new in Ob-Ugric (Borise & É. Kiss 2023), the pattern in (10b) sporadically also occurs in other dialects, e.g. É. Kiss (2024) cites a similar example from Eastern Khanty.

(11) [Wr-onk x̄p̄c̄ samar hat-a-n Jh̄r̄l̄m̄-ba **ha** men-th] ew samar-a
lord-1PL Christ donkey back-3SG-on Jerusalem-to when go-PST.3SG he donkey-3SG
megh santul-th val-a.
PRT lame-PRF.3SG be-PST.3SG
'Once our Lord went to Jerusalem on the back of his donkey; his donkey was lamed.'
(OH, *Bagonyai ráolvasások* 1488)

(12) a. [**vala-ha** eggic a· masik-nac èngèd ual-a] ... mègagg-a ual-a az
some-when one the other-DAT give_way.3SG be-PST loosen-3SG be-PST the
èmber o̩ sari-a-t 7 o̩ rokon-a-nac agg-a ual-a
man he sandal-3SG-ACC and he relative-3SG-DAT give-3SG be-PST
'If sometime/Whenever one gave way to the other, he loosened his sandal and gave it to his relative.'
(OH, *Bécsi C.* 1416: I/9, Ruth 4/7)

b. [**vala-mikor** akar-ia-toc] ióI te-het-tec ő̩ vę̩l-ec.
some-when want-OBJ-2PL well do-POSSIB-2PL he with-3PL
'If sometime/Whenever you want it, you can do well by them.'
(Middle Hungarian, Károli 1590: 45v, Mark 14/7)

The construction represented by (9a,b), (10a,b), and (11) is analyzed by É. Kiss (2024) as a pre-correlative pattern, the starting point of the developmental path of correlatives reconstructed by Belyaev and Haug (2020). The correlative construction, assumed by many linguists to be the earliest type of finite subordination in the Indo-European languages (cf. e.g. Haudry 1973; W. Lehmann 1980; Ch. Lehmann 1984; Pompei 2011; Weiß 2020), consists of a free relative clause, and a main clause containing an overt or implicit expression that is anaphorically related to the relative pronoun. The relative pronoun is assigned a *whenever, whoever, whatever*-type quasi-universal free choice interpretation.[9] Belyaev and Haug argue that the source construction of correlatives is a pair of paratactically juxtaposed sentences where the first sentence contains an indefinite pronoun, and there is an implicit conditional relation between the sentences. The correlative construction developed through the anaphoric integration of the two sentences, which resulted in their topic–focus interpretation. This allowed the assumption of a covert conditional operator with the topical initial clause functioning as its restrictor, and the focal second clause functioning as its nuclear scope. The Khanty and Mansi (9)-(10) and the Old Hungarian (11) represent the earliest, paratactic stage of this grammaticalization path. The Old Hungarian (12a,b) already have typical free choice correlative readings, hence they must involve an implicit conditional operator.

[9] Belyaev and Haug (2020) claim that this only holds for *wh*-based correlatives. The primary reading of demonstrative-based correlatives is the definite reading; the universal reading may be absent.

In the past decades, finite relativization has also appeared in Khanty and Mansi (Riese 2001: 72; Dékány et al. 2020). As discussed by Dékány et al., the language of the younger Khanty-Russian bilingual generations has both free and postnominal relative clauses, which are introduced by a relative pronoun identical with the corresponding interrogative pronoun. For these speakers, sentences like (9a,b) presumably contain a temporal relative clause already. Dékány et al. (2020) analyze the emergence of finite relativization in Khanty as pattern borrowing from Russian.

In sum: in the SOV Ob-Ugric languages we can observe the starting point of the development of finite temporal subordination, identified as a pre-correlative construction. This construction consists of two paratactically juxtaposed or conjoined coordinate clauses, with an indeterminate temporal proadverb in the initial clause. The structure still exists in Old Hungarian, too, where the proadverb can also bear the existential prefix of indefinites.

4 Old Hungarian temporal correlatives

The grammaticalization of the correlative construction, the starting point of which is attested in 20th century Ob-Ugric, had been completed in Hungarian before the beginning of the documented period of the language, i.e., before the end of the 12th century. Old Hungarian abounds in full-fledged temporal correlative structures.

The underspecified temporal indeterminate pronoun was originally *ha* (see (11)), as preserved in the indefinites *né-ha* ‘sometimes’ and *vala-ha* ‘once’ and in the negative indefinite *so-ha* ‘never’. Examples with a relative *ha* are rare in Old Hungarian though as *ha* soon evolved into a conditional complementizer and ceased to function as an indeterminate adverb (Haader 1995: 576–577; Bacskai-Atkari 2014). The function change must have taken place in correlative constructions similar to that in (13a), where the universal reading of the temporal relative *ha* is non-distinct from that of a conditional complementizer. There is no way to test whether *ha* occupies the specifier or the head position of CP in such constructions. In (13b), which contains both *ha* and the temporal wh-phrase *mikoron* ‘when’, however, *ha* is presumably a conditional complementizer in C already.

(13) a. [**ha** te zyw-ed-eth lat-om] banat-om-ath nem mond-hat-om
if you heart-2SG-ACC see-1SG sorrow-1SG-ACC not tell-POSSIB-1SG
‘Whenever/if I see your heart, I cannot tell my sorrow.’
(OH, *Czech C.* 1513: 63)

b. [**Ha mykoron** ez zent zvz az zokot jmadsag-y-t be nem
if when this saint virgin the usual prayer-POSS.PL-ACC PRT not
tellesseht-het-y val-a] ... tahat igen bankod-yk val-a
complete-POSSIB-3SG be-PST then very_much grieve-3SG be-PST
‘If sometime this saint virgin could not complete her usual prayers, she grieved very much’
(OH, *Margit legenda* 1510: 5r)

As is common in correlatives, the temporal relative phrase may contain the relativized noun. The very first surviving temporal relative from 1195 is of this type:

(14) ysa [**kí nopu-n** e-md-ul oz gimils-twl] halal-nec halal-á-ál hol-z.
indeed what day-on eat-FUT-2SG that fruit-ABL death-DAT death-POSS-INS die-2SG
'Indeed on which day you eat from that fruit, you die a deadly death.'[10]
(OH, *Halotti beszéd* [Funeral sermon] 1195)

The temporal *wh*-adverbs replacing *ha* evolved from *wh*-phrases with a lexical head. *Mikor* 'when', used both as an interrogative and as a relative adverb, started out as an expression involving the *wh*-determiner *mi* 'what', and the lexical head *kor* 'time' supplied with the superessive suffix *-on* (15a) or the case suffix *-t* (15b). Actually, it is unclear whether the *-t* suffix of *mi-kor-t* is the archaic locative *-t*, which is not productive any more, or the accusative suffix, which can have an adverbial role in some contexts, e.g., *egy kicsi-t* lit. a little-ACC 'for a little while'. In the course of the 15th–16th centuries, the use of the case suffix on *kor* became more and more infrequent; the determiner *mi* 'what' came to be reanalyzed as the nominal head, and *kor* was recategorized as a temporal adverbial case marker (15c). Although the *-kor* suffix, called the marker of temporalis case in Hungarian grammars, is still productive, occurring in expressions like *öt-kor* 'at five', *ünnepek-kor* 'at holidays', and *vacsora-kor* 'at dinner [time]', *mikor* – as well as its demonstrative correlate *akkor* 'then' – became temporal adverbs, non-compositional for the present-day intuition. (In (15c) *akkor* 'then' is implicit, as is often the case in temporal correlative constructions.)

(15) a. [Mert **mÿ-kor-on** mond-om ual-a kÿ vagÿ te en ÿsten-em] <u>tehat</u>
for what-time-on say-1SG be-PST who be.2SG you I god-1SG then
val-e-k edesseg-nek nemÿ vÿlagossag-a-ban
be-PST-1SG sweetness-DAT some light-POSS-in
'For when I was saying: who are you my God, then I was in a light of sweetness'
(OH, *Jókai C.* 1370: 46)

b. [**my-kor-t** Crystws zyl-et-e-k] <u>a-kor-t</u> ew Roma-ban
what-time-ACC Christ bear-PASS-PST-3SG that-time-ACC he Rome-in
lel-eth-ee-k
find-PASS-PST-3SG
'when Christ was born, then he could be found in Rome'
(OH, *Érsekújvári Codex* 1529: 489)

[10] In such examples, the maximal feature of the relative phrase yields a definite rather than universal reading because of the uniqueness of the main clause predicate (Beyaev and Haug 2020: Sect. 4.5).

c. [**Mi-kor** kedig bǫitǫl-ēd-etec] ne-akar-i-atoc len-nè-tec źomoro-k mikent
what-time CONJ fast-FUT-2PL not-want-IMP-2PL be-INF-2PL sad-PL like
kepmutatoc
hypocrites
'When you fast, do not be sad like the hypocrites'
(OH, *Müncheni C.* 1416: 12va, Matthew 6/16)

The temporal *wh*-adverb *midőn* 'time', a synonym of *mikor*, grammaticalized from the noun *idő* 'time' preceded by the *wh*-determiner *mi* and followed by a superessive suffix (16a). The process was presumably triggered by the merger of the final *-i* vowel of the relative determiner and the initial *-i* vowel of the noun. The temporal adverb *míg* 'while' derived from the wh-pronoun *mi* supplied with the terminative suffix *-ig* (16b).

(16) a. [**Midǫn** [mi-idő-n] ėtèl-nç idè-iè lè-nd] io̯-y idè 7
what-time-on meal-DAT time-POSS be-FUT.3SG come-IMP2.SG here and
ė-g-èl kėńèr-èt
eat-IMP-2SG bread-ACC
'When it is the time of meal, come here and eat bread'
(OH, *Bécsi C.* 1416: 5, Ruth 2/14)

b. [**Mygh** [mi-ig] Bebek vr-am el] az-igh nem les-en
while [what-for] Bebek master-1SG live.3SG that-for not be.FUT-3SG
nugodalm-a az en vr-am Josag-a-nak oth
peace-3SG the I master-1SG stock-3SG-DAT there
'As long as Mr Bebek is alive, my master's stock will have no peace.'
(OH, *Középkori leveleink* [Letters from the Middle Ages], 1537: 148)

It is unclear when *midőn* and *míg* ceased to be compositional. Their spellings indicate non-compositionality. At the same time, the main clause *azigh* in (16b) is still a clear combination of the demonstrative *az* and the terminative suffix *-ig*, which may have helped the interpretation of *míg* in the relative clause as a similar structure, the combination of the relative pronoun *mi* and the suffix *-ig*.

In sum: the paratactic pre-correlative temporal sentence type found in the SOV sister languages of Hungarian, the relics of which can also be pointed out in Old Hungarian, evolved into a full-fledged correlative temporal construction by the beginning of the documented period of Hungarian in the late 12th century. After the temporal wh-adverb *ha* was recategorized as a conditional complementizer, new temporal relative adverbs grammaticalized from relative phrases with a lexical head corresponding to 'time', and from relative pronouns supplied with a case suffix. Whereas the pre-correlative construction illustrated in (11)–(12) did not survive the Old Hungarian period, the correlative construction is a productive pattern in Modern Hungarian, as well.

5 From correlatives to free, light-headed, and PP-adjoined adverbial relative clauses

Correlative clauses are adjuncts left-adjoined to the matrix clause, as Lipták (2012) showed based on evidence from binding. The correlative clause has been argued to be the source of both complement clauses, see Axel-Tober (2017), and adnominal relative clauses, see Haudry (1973) and Ch. Lehmann (1984), among many others. The evolution of complement clauses from a correlative antecedent involved the integration of the correlative adjunct into the matrix clause. In Hungarian, this process was manifested first in the right adjunction of the subordinate clause to the matrix VP, and then in its reanalysis as the V'-internal complement of the matrix verb, triggering object-verb agreement (É. Kiss 2023b). The evolution of attributive relative clauses from a correlative source structure is marked by the right adjunction of the relative clause to a matrix nominal, which is usually located in the postverbal domain of the matrix clause (Dékány et al. 2020; É. Kiss 2024). The integration of temporal correlative clauses into the matrix clause, by contrast, is usually not manifested in a change in their position – because most temporal clauses remain clausal adjuncts, and the unmarked position of temporal adjuncts in Hungarian is in the left periphery.

Nevertheless, temporal relative clauses do occasionally appear after the matrix verb in Old Hungarian, in which case they are not correlatives but free (17a) or light-headed (17b) temporal relative clauses:

(17) a. Ewrewl ual-a zent Att-ya ez-ek-ben [**mÿkoron** hal-ya ual-a ew
rejoice.3SG be-PST holy father-3SG this-PL-INE when hear-3SG be-PST he
fÿ-a-ÿ-t …]
son-POSS-PL-ACC
'His holy Father was rejoicing over these when he was listening to his sons….'
(OH, *Jókai C.* 1372: 94)

b. az íǫuendǫ ídǫ-t ísten-nec zolgalatt'-a-ba akar-ŷ́a es kevanń-a
the coming time-ACC god-DAT service-POSS-INE want-3SG and wish-3SG
elkǫlte-ní-e mínd add-íg [**míg** ez velag-ba el].
spend-INF-3SG all that-for while this world-in live.3SG
'He wants and wishes to spend the future time in God's service as long as he lives in this world.'
(OH, *Nádor Codex* 1508: 66v)

Whereas the correlative clause always precedes the matrix,[11] a left-peripheral temporal relative clause can also occupy a post-topic position, preceding the comment (a TP or FocP) – see (18a,b). In (18b) it modifies a temporal PP left-adjoined to the comment of the matrix sentence.[12]

[11] Correlative clauses precede the main clause crosslinguistically – see Belyaev & Haug (2020: e6).

[12] On Old Hungarian sentence structure, see É. Kiss (2014).

(18) a. [$_{CP1}$ kí-k [$_{TopP}$ nek-o̩d [**[$_{CP2}$ míg el-e-l]** [$_{FocP}$ barat-í-d val-a-nac]]]]
who-PL DAT-2SG while live-PST-2SG friend-PL-2SG be-PST-3PL
'who, while you were alive, were the friends of you'
(OH, *Nádor Codex* 1508: 164v)

b. [$_{TopP}$ Ez tabla-t zent margÿt azzon [[$_{PP}$ menden-kor-on mend eyel mend nappal
this table-ACC saint Margit lady all-time-SUP both night both day
[mykoron jmadkoz-ÿk val-a]] [$_{FocP}$ zem-e-y-nek elevtt-e targÿ-a
when pray-3SG be-PST eye-3SG-PL-DAT before-POSS be-PST
val-a]]]
keep-3SG
'Lady Saint Margaret kept this table in front of her eyes at all times, both day and night, when she was praying.'
(OH, *Margit legenda* 1510: 65v)

If the adverbial relative clause precedes a main clause that contains no overt anaphoric correlate of the relative adverb, it can, in principle, be either a correlative clause with an implicit main clause correlate, or a free relative (19a). A sentence with an initial relative clause and a demonstrative correlate in the main clause can also be derived in two ways; it can be a correlative construction, or the demonstrative adverb can be analyzed as the "light" head of the left-dislocated adverbial relative clause (19b). We can distinguish the two constructions based on whether the temporal adverb has a [+maximal] feature, a criterial property of correlatives. In (19a), *hogy* is non-maximal; it denotes a non-specific, indefinite member of the set of occasions when the subject had dinner, which supports the free relative clause analysis. In (19b), the maximal feature of the relative pronoun is manifested in a non-universal, definite interpretation because of the uniqueness of the predicate.

(19) a. [**hogi**[13] vačoral-ik val-a] egi hal tetem altal all-a ah tork-a-n
as dine-3SG be-PST a fish bone through pierce-PST.3SG the throat-POSS-on
'As he was dining, a fish bone pierced into his throat.'
(OH, *Debreceni C.* 1519: 89)

b. [**mi-kor-t** Crÿstws zÿlet-e-k] akor-t ew Roma-ban
what-time-ACC Christ be.born-PST-3SG that-time-ACC he Rome-in
lel-eth-eek.
find-PASS-PST.3SG
'When Christ was born, then he could be found in Rome.'
(OH, *Érsekújvári C.* 1529: 245r)

[13] The primary meaning of *hogi/hogy* is 'how'. Its temporal meaning must have developed in sentences in which it referred to a situation.

The integration of the adverbial relative clause into the main clause is clearest when it modifies a PP, as was the case in (18b) and as happens in (20):

(20) mÿnden-kor-on gyakorta lel-te evtet jmadsag-ban [$_{PP}$ veternye-nek elevt-e
every-time-on often found-3SG her prayer-in vespers-DAT before-POSS
[**mykoron** ez soror megÿ-en val-a az ora meg lat-nÿ]]
when this soror go-3SG be-PST the clock PRT see-INF
'All the time she frequently found her in prayer before vespers when this soror was going to see the clock'
(OH, *Margit legenda* 1510: 7v)

The dates of examples (17)–(20) indicate that free, light-headed, and PP-adjoined temporal relative clauses were already present in the first book-length Old Hungarian texts, simultaneously with correlative temporal clauses, i.e., their evolution from the correlative construction must have happened in Proto-Hungarian. An evolutionary step that took place in the Old Hungarian period was the appearance of the *a-* prefix on relative temporal adverbs as a manifestation of the differential morphological marking of indeterminate pronouns and proadverbs of different functions (Bacskai-Atkari & Dékány 2021; Bende-Farkas 2015). (21a,b) contain temporal relative clauses with a specific relative adverb already; their Modern Hungarian equivalents would essentially be the same.[14]

(21) a. [$_{CP1}$ **[$_{CP2}$ a-mykor$_i$ [$_{FocP}$ az soltar-t olwas-sag t_i]]** [$_{CP1}$ [$_{TopP}$ thahat
REL-when the psalm-ACC read-3PL then
[$_{FocP}$ e-keppen kel olwass-ny]]]]
this-way needs read-INF
'When they read the psalm, then it needs to be read in this way'
(OH, *Lányi C.* 1519: 301)

b. [$_{CP1}$ **[$_{CP2}$ A-mmég$_i$ [$_{FocP}$ vęl-ec vagyon** t_i **[$_{VP}$ a' vőlegény]]]** [$_{CP1}$ [$_{TopP}$ add-ig
REL-while with-3PL is the bridegroom that-for
[$_{NegP}$ nem bőtel-het-nec]]]]
not fast-POSSIB-3PL
'While the bridegroom is with them, for that time they cannot fast.'
(Middle Hungarian, Heltai 1565: I4v)

The *a(z)-* morpheme grammaticalized from the demonstrative *az* heading a subject relative clause, via rebracketing – see Bacskai-Atkari & Dékány (2021). The incorporation of the main

[14] (21a,b) involve minimal phonological, morphological and lexical archaisms for the Modern Hungarian reader. For example, the meaning of *tahat/tehát* 'then' has changed by now; Old Hungarian *tahat/tehát* corresponds to *akkor* in Modern Hungarian.

clause demonstrative into the relative pronoun was followed by demonstrative renewal. Bacskai-Atkari and Dékány reconstructed the following process:

(22) $[_{TP} \ldots [_{DP}$ az $[_{CP}$ ki...]]...] > $[_{TP} \ldots [_{DP} [_{CP}$ a(z)ki...]]...] > $[_{TP} \ldots [_{DP}$ az $[_{CP}$ aki...]]...]
that who who that who

In temporal relative clauses, however, the demonstrative preceding the relative clause was a heavy *akkor* 'then', or *addig* 'till then', which could hardly have worn off into an *a-* vowel. The appearance of the *a-* prefix on temporal relative adverbs must have been the result of analogical leveling, a process by which the category of relativizing operators assumed regular morphological marking.[15]

When reviewing the temporal clauses of Old Hungarian, we see no clause type derived from a non-finite temporal clause by the insertion of TP and CP layers (as hypothesized by Harris and Campbell (1995: 311)). The shift from non-finite to finite subordination meant non-finite clauses being supplanted by finite clauses, as can be observed in subsequent translations of the same Biblical sentences. Compare, for example, the 1416 non-finite translation of a temporal clause from Luke 3/1 and its 16th century finite equivalent. The change does not lie in the non-finite VP assuming an inflectional layer. The inflectional domain above the verb in the non-finite clause, involving a participial suffix and a possessedness suffix (plus a dative case suffix merging with the non-finite projection as a whole functioning as the possessor of the subsequent noun) is just as complex as that above the verb in the finite clause. The source construction of the finite temporal clause type replacing the non-finite projection is the correlative clause, which derives from a paratactic sentence, as argued above.

(23) a. [poncius pilat[9] Iudea-ban biro-l-kot-t-a]-nac idèi-e-bèn
Pontius Pilate Judea-in judge-VBL-FREQ-PTCP-POSS-DAT time-POSS-in
'in the time of Pontius Pilate's reigning in Judea'
(Old Hungarian, *Müncheni C.* 1416: 56v)

b. mij-kor-on Poncius Pilatus Sijdosag-ba few wol-na
what-time-on Pontius Pilate Jewry-in head be-SBJV.3SG
'when Pontius Pilatus was the head among the Jewry'
(Middle Hungarian, Pesti 1536: 118v)

In sum: in Hungarian, the temporal correlative construction gave rise to free, light-headed, and lexical-headed temporal relative clause types by the documented period of the language. Similarly to correlatives, temporal relative clauses tend to appear in the left periphery of the main clause, but, unlike correlatives, they often stand in a non-initial, post-topic position.

[15] The term is due to Hockett (1967), who applied it to processes by which a morpho-phonologically irregular form is replaced by a more regular one.

6 Event relatives

6.1 Event relatives versus temporal relatives

The above overview of the evolution of finite temporal relative clauses leads to the question whether all types of finite temporal subordinate clauses can be subsumed under relativization. This question has already been raised about English, where not all temporal subordinate clauses contain a *wh*-pronoun. As Larson (1990) observed, *before, after, since*, and *until* clauses display no visible relative pronouns, nevertheless, these prepositions appear to have cross-clausal long distance readings, which is unexpected from prepositions but is typical of relative operators. In (24a,b), for example, the preposition can be associated with either CP1 (high reading) or CP2 (low reading).

(24) a. I saw Mary in New York [$_{PP}$ before [$_{CP1}$ she claimed [$_{CP2}$ that she would arrive]]]
b. I encountered Alice [$_{PP}$ after [$_{CP1}$ she swore [$_{CP2}$ that she had left]]]

In (24a), the main clause event could have happened either before Mary making a claim or before her arrival; in (24b) it could have happened either after Alice's swearing or after her leaving. Larson claimed that it is not the preposition that moves in this sentence type but an invisible relative operator, which can originate in either one of the embedded clauses, as shown in (25a). In (25b), the Complex NP Constraint prevents movement from the lower clause, eliminating the low reading.

(25) a. I saw Mary in New York [before [$_{CP1}$ ***Op***$_i$ she claimed ***t***$_i$ [$_{CP2}$ that she would arrive ***t***$_i$]]]]
b. I saw Mary in New York [before [$_{CP1}$ ***Op***$_i$ she made [$_{DP}$ the claim ***t***$_i$ [$_{CP2}$ that she had arrived]]]]

Later analyses, e.g., Dubinsky and Williams (1995), categorize *before* and *after* in such contexts as complementizers in C, right-adjacent to the operator in Spec,CP. Van Gelderen (2011: 18, 262–264) analyzes them as a complementizers grammaticalized from prepositions.

Hungarian temporal clauses construed with the postpositions *előtt* 'before', *után* 'after', *alatt* 'throughout', or *közben* 'during' contain the *wh*-pronoun *mi* 'what'; still, as Lipták (2005) and Ürögdi (2012) observed, their properties are different from those of free temporal relative clauses. Superficially, (26a) and (26b) look similar; however, their subordinate clauses bear different relationships to the main clause:

(26) a. [**Mikor** Anna megérkez-ett] Péter elmen-t.
when Anna arrive-PST.3SG Peter leave-PST.3SG
'When Anna arrived, Peter left.'

b. [**Mi-után** Anna megérkez-ett] Péter elmen-t.
what-after Anna arrive-PST.3SG Peter leave-PST.3SG
'After Anna arrived, Peter left.'
(Hungarian)

Lipták interprets (26a) as follows: the relative pronoun *mikor*, roughly corresponding to 'at time *t*', is the temporal modifier of the arrival event, preposed into Spec,CP. The relative clause as a whole, too, denotes the time specification that characterizes the event internal to the relative clause. The temporal clause, denoting this time expression, is then applied to the main clause event. This way, the embedded clause and the main clause events have the same specification in the temporal domain.

In (26b), by contrast, the relative phrase does not originate inside the relative clause and it does not denote the time specification of the embedded event. The relative clause does not mean that 'Anna arrived after time *t*'; it means 'after the event of Anna's arrival', or, assuming Larson's relative operator, 'after [the time] when Anna arrived'. Lipták argues that the operator relativizes the IP as a whole; therefore she calls this clause type 'IP-relative'. Ürögdi (2012) uses the term 'event relative' instead, presumably because the relativized proposition can involve different functional extensions with different syntactic labels. Compare the structures Lipták (2005) assigns to free temporal relatives (27a) and to event relatives (27b):

(27) a. [$_{CP}$ **mikor**$_i$ [$_{IP}$ Anna vásárol-t t_i]]
when Anna shop-PST.3SG
'when Anna was shopping'

b. [$_{PP}$ **mi**$_i$-közben [$_{DP}$ t_i [$_{CP}$ [$_{C'}$ t_i [$_{RelP}$ t_i [$_{IP}$ Anna vásárol-t]]]]]]
what-during Anna shop-PST.3SG
'while Anna was shopping'
(Hungarian)

In (27b), the pronoun *mi* relativizes the IP; it moves from Rel via the head positions of the dominating CP and DP projections into the head position of a PP, where it merges with the postposition base-generated there.

Lipták (2005) claims that temporal relative clauses and event relative clauses differ in the following respects:

(i) The pronouns introducing temporal relative clauses can, those introducing event relative clauses cannot have relative morphology (i.e., an *a-* prefix).

(28) a. [**(A)-mikor** Anna itt van], Péter boldog.
REL-when Anna here is Peter happy
'When Anna is here, Peter is happy.'

b. [(***A**)**-mi-után** Anna megjö-tt], Péter elmen-t.
REL-what-after Anna arrive-PST.3SG Péter leave-PST.3SG
'After Anna arrived, Peter left.'
(Hungarian)

Ürögdi (2012: 117) actually cites examples from the internet where event relativizers, too, have an *a-* morpheme. To clarify the issue, I carried out a written test with 15 participants comparing the acceptability of *a*-marked and *a*-less event relativizers. The evaluation of *a-mi-előtt* 'REL-what-before', and *a-mi-közben* 'REL-what-during' confirmed Lipták's judgement. The *a*-marked versions were found worse than the *a*-less ones in each of 30 cases; 21 of the 30 examples with an *a*-marked relativizer were rejected (*), and 9 were evaluated as marginal (?? or ?). By contrast, event relatives introduced by *a-mi-óta* 'rel-what-since' were found only slightly more marked than the *a*-less versions, and those introduced by *amíg* (*a-mi-ig*) 'REL-what-until' and *míg* were found equally grammatical. The reason for their unexpected acceptance must be that *mióta* 'since' and *míg* 'for, until' are ambiguous. They can be used both with punctual and with durative events, and they are event relativizers only in the former case (29a); as duratives, they are temporal relativizers licensing the *a-* prefix (29b).

(29) a. (?**A**)-**mi-óta** Anna megérkez-ett, Péter boldog.
REL-what-since Anna arrive-PST.3SG Peter happy
'Since Anna arrived, Peter has been happy.'

b. **A-mi-óta** Anna itt van, Péter boldog.
REL-what-since Anna here is Peter happy
'Since Anna has been here, Peter has been happy.'

The acceptibility of *amióta* and *amíg* in event relatives must be due to the interference of these forms in temporal relative clauses.[16]

(ii) Temporal relative clauses can, event relative clauses cannot host multiple *wh*-pronouns:

(30) a. [**A-ki** **a-mi-óta** ismeri Annát] az azóta szereti.
REL-who REL-what-since knows Anna-ACC that that-since loves
'Everyone loves Anna since the time he/she has known her.'

b. *[**Ki** **mi-közben** énekel], az a-közben boldog.
who what-during sings that that-during happy
Intended: 'Everyone is happy while he/she is singing.'
(Hungarian)

[16] *Amíg – míg* relative clauses involve a further confounder. If their predicate denotes a punctual event, they nearly always include a negative particle, as in (i):

(i) Péter boldogtalan, (a)míg Anna meg nem érkezik.
Peter unhappy until Anna PRT not arrives
'Peter is unhappy until Anna arrives.'

In such examples, the *(a)míg* clause can be interpreted either as a temporal relative with a predicate describing a state (the state of Anna not arriving) or as an event relative involving expletive negation, with the predicate denoting a punctual activity (Anna's arrival).

(iii) Temporal relative clauses do, event relative clauses do not have adnominal construal:

(31) a. A nap [**a-mi-kor** Anna megjö-tt] emlékezetes Péter-nek.
the day REL-what-at Anna arrive-PST.3SG memorable Peter-DAT
'The day when Anna arrived is memorable for Peter.'

b. *A nap [**mi-után** Anna megjö-tt] emlékezetes Péter-nek.
the day what-after Anna arrive-PST.3SG memorable Peter-DAT
Intended: 'The day after Anna's arrival is memorable for Peter.'
(Hungarian)

(iv) *Wh*-pronouns introducing temporal relative clauses do, those introducing event relative clauses do not have cross-clausal construal. Actually, the Hungarian native speakers I consulted judged long construal marginal also in the case of temporal relatives, but they, too, found it more acceptable in temporal relatives than in event relatives.

(32) a. Add-ig marad-ok [**a-mi-ig** mond-od, hogy marad-j-ak].
that-for stay-1SG REL-what-for say-2SG that stay-SBJV-1SG
HR: 'I will stay as long as you keep saying I should stay.'
?LR: 'You say I should stay for time *t*. I'll stay for time *t*.'

b. Az-után indul-ok [**mi-után** mond-od, hogy Péter elindul].
that-after leave-1SG what-after say-2SG that Peter leave.3SG
HR: 'I'll leave after the time of you saying that Peter is leaving.'
*LR: 'You say Peter is leaving at time *t*. I'll leave after time *t*.'
(Hungarian)

Ürögdi (2012) found a further difference setting the two clause types apart:

(v) Temporal relatives do not, event relatives do have *that*-clause equivalents. The *that*-clause explicates the demonstrative complement of the main clause postposition. The complement clause assumes a temporal reading owing to the postposition.

(33) a. *A-kkor /a-midőn [**hogy** Zsuzsa elmen-t], Tamás megjö-tt.
DEM-when/DEM-when that Zsuzsa leave-PST.3SG Tamás arrive-PST.3SG
Intended: 'When Zsuzsa left, Tamás arrived.'

b. Az-után /az-előtt [**hogy** Zsuzsa elmen-t] Tamás megjö-tt.
DEM-after/DEM -before that Zsuzsa leave-PST.3SG Tamás arrive-PST.3SG
'After/before Zsuzsa left (lit. After/before it that Zsuzsa left), Tamás arrived.'
(Hungarian)

Ürögdi also illustrates this difference between temporal relatives and event relatives by a minimal pair. As pointed out in connection with (28)–(29), *míg* [*mi-ig*] 'for, until' clauses function

as temporal relatives when the embedded proposition is durative, and they function as event relative clauses when the embedded proposition is punctual. In (34a), the embedded clause contains an imperfective predicate associated with a time interval, whereas in (34b), it contains a perfective accomplishment predicate associated with a point of time. The P *-ig* allows a *hogy* 'that' clause complement only in the latter case:

(34) a. *[Add-ig vár-t-am] **hogy** forr-t a viz.
DEM-for wait-PST-1SG that boil-PST.3SG the water
'I waited as long as the water was boiling.'

b. [Add-ig vár-t-am] **hogy** fel-forr-t a víz.
DEM-until wait-PST-1SG that up-boil-PST.3SG the water
'I waited until the water boiled up.'
(Hungarian)

Ürögdi's structural analysis of event relatives is simpler than that of Lipták (2005); it involves no DP projection above the embedded clause:

(35) [$_{PP}$ **mi**$_i$-közben [$_{CP}$ ***t***$_i$ [$_{RelP}$ ***t***$_i$ [$_{IP}$ Anna vásárol-t]]]]
what-during Anna shop-PST.3SG
'while Anna was shopping'
(Hungarian)

Whereas in Lipták's analysis the relative pronoun is a head undergoing cyclic head movement, eventually merging with the P, in Ürögdi's structure it is a phrasal operator generated in Spec,RelP and moved to Spec,CP, then presumably landing in Spec,PP. Lipták's claim that *miközben*, *mielőtt*, *miután* are complex heads can be corroborated by the following argument. An interrogative PP can contain the coordinated Ps *előtt* and *után* taking a *mi* complement, as illustrated in (36a). In an event relative, the coordination of *előtt* and *után* is impossible; only *mielőtt* and *miután* can be coordinated – see (36b):

(36) a. [**Mi** [**előtt és után**]] kell ez-t a bor-t in-ni?
what before and after needs this-ACC the wine-ACC drink-INF
'Before and after what shall one drink this wine?'

b. [**Mi-előtt és *(mi-)után**] e-tt-ünk, jó-t beszélget-t-ünk.
what-before and what-after eat-PST-1PL good-ACC talk-PST-1PL
'Before and after we ate, we had a good conversation.'
(Hungarian)

Mi előtt és után 'before and after what' in (36a) appears to involve a pair of coordinated postpositions rather than a pair of coordinated PPs with an elided *mi* in the second PP because *előtt* and *után* are understood to share the same complement, i.e., the sentence means 'what

(food) is to be preceded and followed by this wine'. The coordination of *előtt* and *után* in (36b) is impossible because *mielőtt* and *miután* are semantically non-compositional syntactic heads.

Accepting the head analysis of *mielőtt* and *miután* does not mean the acceptance of the whole structure assigned to event relatives by Lipták (2005) though. What I find problematic in both Lipták's (2005) and Ürögdi's (2012) analysis is that the PP harboring the *wh*-pronoun is external to the subordinate clause. Event relative clauses can have a demonstrative correlate (a proleptic pronoun/proadverb) in the main clause as shown in (37a,b). If *miközben*, *miután* were parts of the main clause in these sentences, then the clauses containing them would have two referentially identical PPs. Instead, they belong to the embedded clauses; they occupy their C positions.

(37) a. A-közben, [$_{CP}$ [$_{C}$ **mi-közben**] Anna bevásárol-t], Péter iv-ott egy sör-t.
DEM-during what-during Anna shop-PST.3SG Peter drink-PST.3SG a beer-ACC
'While Anna was shopping, Peter had a beer.'

b. Az-után, [$_{CP}$ [$_{C}$ **mi-után**] Anna bevásárol-t], Péter iv-ott egy sör-t.
DEM-after what-after Anna shop-PST.3SG Peter drink-PST.3SG a beer-ACC
'After Anna shopped, Peter had a beer.'
(Hungarian)

The analysis of *miközben* and *miután* as complementizers corresponds to Dubinsky and Williams's (1995) and van Gelderen's (2011) analysis of the English *before* and *after* in temporal relative clauses. In Dubinsky and William's clause structure, temporal relative clauses also contain an invisible relative operator in Spec,CP. In Hungarian, the relative morpheme has historically been incorporated in the complementizer; there is no evidence of a distinct relative operator in Spec,CP.

In sum: in complex sentences containing a temporal relative clause, introduced e.g. by *mikor* 'when', the main clause shares the time specification of the relative clause. In case of a different type of temporal clauses called event relatives, introduced e.g. by *mielőtt* 'REL-before' or *miután* 'REL-after', the temporal relation of the relative clause and the main clause is determined by the postposition incorporated in the temporal complementizer. Temporal relatives and event relatives differ in their morphology (only the pronouns and proadverbs of temporal relative clauses can have the *a-* relative prefix), and in their syntax, as well. The adverbs of temporal relative clauses are phrasal operators in Spec,CP binding a clause-internal variable, and as such they allow long distance construal. Adverbs introducing event relative clauses, by contrast, are heads, i.e., complementizers; hence they can only be interpreted locally.

6.2 From temporal relatives to event relatives

Whereas event relative clauses look superficially similar to temporal relatives, the temporal adverb introducing an event relative does not bind a clause-internal variable; it does not specify the time of the embedded event. Consequently, event relatives – unlike temporal relatives – cannot be descendants of the correlative construction, where the temporal adverb is part of embedded proposition thematically. The question arises how event relatives came into being. It will be argued below that first *mikor*-type temporal relative pronouns were reanalyzed as event relativizers; then *miután*-type event relativizers emerged with the analogical extension of the *mikor* class.

Temporal phrases are adjuncts in most cases, hence a proposition introduced by a temporal relative pronoun like *mikor* 'when' is also complete if *mikor* binds no empty time adverbial position in it. A *mikor* clause can easily be analyzed as an event relative, with *mikor* inserted outside the proposition, relativizing the proposition as a whole. That is, *mikor* (and *midőn* 'when', etc.) relatives can be assigned either the structure and interpretation of temporal relative clauses (38a), or the structure and interpretation of event relative clauses (38b). (English *when*-clauses are argued to display a similar ambiguity by Hall & Caponigro (2010).)

(38) a. [$_{CP}$ **Amikor**$_{i}$ [$_{TopP}$ Péter t_{i} megérkez-ik]], meglátogat-unk.
REL-when Peter arrive-3SG visit-1PL
'We will visit you at the time Peter arrives.'

b. [$_{CP}$ **Mikor**$_{i}$ [$_{RelP}$ t_{i} [$_{TopP}$ Péter megérkez-ik]]], meglátogat-unk.
REL-when Peter arrive- 3SG visit- 1PL
'We will visit you the time Peter arrives.'
(Hungarian)

In Modern Hungarian, the *a-* prefix is an obligatory part of all kinds of relative pronouns and proadverbs other than temporals. The relative pronouns *hol* 'where', *ki* 'who', *mi* 'what', *milyen* 'what-ADJ', *miért* 'why', *hogyan* 'how', etc. are either ungrammatical without the *a-* morpheme in present-day Hungarian, or have a distinctly archaic flavour, e.g.:

(39) a. *[**Mi-t** vásárol-t-am], nem tetsz-ett a férj-em-nek.
what-ACC buy-PST-1SG not please-PST.3SG the husband-1SG-DAT
'What I bought did not please my husband.'

b. *[**Hol** lak-om], oda nem jár autóbusz.
where live-1SG there not goes bus
'The bus does not go to where I live.'

c. *[**Hogyan** a szoprán énekel-t], az minden várakozás-t felülmúl-t.
how the soprano sing-PST.3SG that all expectation-ACC exceed-PST.3SG
'It exceeded all expectations how the soprano sang.'
(Hungarian)

In the case of the relative adverbs *mikor* 'when', *midőn* 'when', or *míg* 'while', by contrast, the *a-* prefix is optional (see (28a)); in Modern Hungarian they are just as unmarked and just as common as *amikor, amidőn,* and *amíg*. Recall that Lipták (2005) claimed that pronouns introducing temporal clauses can, whereas those introducing event relative clauses cannot, have a relative *a*-prefix, without explaining this difference. I suggest that temporal adverbs have relative morphology when they are relative operators in Spec,CP. Event relativizers lack the *a-* prefix because they have been targeted by the economy principle *Be a head rather than a phrase* (van Gelderen 2001: 13–18), as a result of which they have been recategorized as heads, i.e., complementizers in C position. *Mikor,* and other temporal adverbs that occur both with and without the *a-* prefix are ambiguous categorially and functionally; they can be phrases in Spec,CP as temporal relativizers, and heads in C as event relativizers. Temporal adverbs that have no *a*-marked versions are always heads in C and they always relativize events – see **Table 1**.

Temporal relative phrases	*amikor* 'when', *amidőn* 'when', *amíg/ameddig* 'while', *amióta* 'since (time interval)', *ahogy* 'as', *amint* 'as'[17]
Temporal complementizers	*mikor* 'when', *midőn* 'when', *míg* 'until', *mióta* 'since (point of time)', *mihelyt* 'as soon as', *miután* 'after', *mielőtt* 'before', *mialatt* 'throughout', *miközben* 'during'

Table 1: Temporal relativizers versus temporal complementizers in Modern Hungarian.

A-marked temporal relative phrases, which are phrasal variable-binding operators, are expected to allow cross-clausal construal, as is the case with *amíg* in the slightly marked (32a) of Lipták (2005). *A*-less temporal complementizers, which are C heads, are expected not to allow the long construal also ruled out in (32b). To test the behaviour of *amikor*, assumed to be a relative phrase, versus *mikor*, assumed to be a head, I asked 15 native speakers to compare the acceptability of the following minimal triplet. The intended interpretation of the relative adverb is the low reading; in fact, this is its only coherent reading.

[17] The *a*-less versions of *ahogy* and *amint* have no temporal functions. *Hogy* is the general complementizer, the equivalent of 'that', and *mint* is the comparative complementizer, the equivalent of 'as' and 'than'.

(40) a. Az-on a nap-on, **[a-melyik-eni** mond-tá-tok, hogy Mari érkezik t_i], nem
that-on the day-on REL-which-on say-PST-2PL that Mari arrives not
lesz-ek itthon.
be-1SG at.home
'On the day on which you said Mary would arrive I won't be at home.'

b. ?**A-mikor**$_i$ mond-tá-tok, t_i hogy Mari érkezik t_i, nem lesz-ek itthon.
REL-when say-PST-2PL that Mari arrives not be-1SG at.home
'When you said Mary would arrive I won't be at home.'

c. *__Mikor__$_i$ mond-tá-tok, hogy t_i Mari érkezik, nem lesz-ek itthon.
when say-PST-2PL that Mari arrives not be-1SG at.home
'When you said Mary would arrive I won't be at home.'
(Hungarian)

The low reading has been found to be perfectly possible in the case of *amelyiken* 'on which', possible but marked in the case of *amikor*, and impossible in the case of *mikor*.[18] This follows if *amelyiken* and *amikor* are phrases moving through Spec,CP, but *mikor* is a head, which could only move into the next higher c-commanding head position, which is taken by *hogy*.

I assume that the evolution of event relatives introduced by *mi-előtt* '*wh*-before', *mi-után* '*wh*-after', or *mi-közben* 'wh-during' was triggered by *mikor* clauses interpreted as event relatives. Recall that the morpheme *-kor* of *mikor*, originally a noun meaning 'time', was recategorized as a temporal adverbial suffix meaning 'at [the time of]'. The meaning of semantically vague adverbial case suffixes can be made more precise if they are replaced by postpositions, which still preserve some of the lexical content that has already been lost in the case of adverbial case suffixes. Thus the vague location denoted by the demonstrative *a-nnál* 'at that', marked by the adessive suffix *-nál* 'at', can be marked more precisely if *-nál* is replaced by a postposition, e.g., *a-mögött* 'behind that', *az-előtt* 'before that', *a-mellett* 'at the side of that'. The time of an event can also be anchored more precisely if *mi-kor* 'when, *lit.* at what [time]' is replaced by *mi-után* 'after what [time]', *mi-előtt* 'before what [time]', *mi-alatt* 'in what [time]', *mi-közben* 'during what [time]', or *mi-óta* 'since what [time]'. Event relative clauses introduced by a *mi* + postposition complex must have evolved by the replacement of the *-kor* suffix in the semi-transparent adverb *mi-kor* by various postpositions.

Whereas temporal relative phrases had already been common in Hungarian when the first surviving documents were created at the end of the 12th century, postpositional event relativizers

[18] (40a) was judged to be grammatical by all the 15 participants. (40b) was found grammatical by 5, marginal (?) by 7, and ungrammatical (*) by 3 participants. (40c) was found marginal (?) by 4, ungrammatical (*) by 11 participants. No participant found (40b) more acceptable than (40c).

must have been innovated around that time, as they are still rare in Old Hungarian. The oldest book-length Hungarian document, Jókai Codex (1372), relating the life of Saint Francis, contains 127 instances of relative *mikoron* 'when' but only 3 instances of *miután* '*wh*-after', and one instance of *mielőtt* '*wh*-before', i.e., the *miután* and *mielőtt* run up only to 3% of the occurrences of *mikoron*. In a 20th century version of Saint Francis' life story (Balanyi 1925), we find 66 occurrences of *(a)mikor*, 13 occurrences of *miután*, and 2 occurrences of *mielőtt*, i.e., *miután* and *mielőtt* total up to 22,7% of the occurrences of *(a)mikor* relatives.

When event relativizers emerged, they may have relativized the proposition, binding a trace in a RelP below CP, as assumed by Lipták (2005) and Ürögdi (2012). Eventually, however, they must have been targeted by the economy principle *Merge as late as possible,* (van Gelderen 2011: 13–18). Event relativizing heads in Hungarian can be merged where they appear, i.e., they can be base-generated in the C position of the temporal clause, without the assumption of a RelP and Rel-to-C movement. The reason that motivated the relativization analysis of English *before* and *after* clauses does not hold in Hungarian; the Hungarian counterparts of these sentences do not allow the long construal of *mielőtt* 'before' or *miután* 'after' (see (32b)).

Once the *mi* + P complexes of event relatives grammaticalized into heads base-generated in C, these clauses ceased to be relative clauses; they are temporal subordinate clauses introduced by a temporal complementizer.[19]

In sum: event relativization may have emerged as an alternative analysis of relative clauses introduced by *mikor*, with *mikor* recategorized as a head base-generated in C. Postpositional event relativizers evolved by the substitution of the *-kor* temporal case suffix in the semi-transparent *mikor* with postpositions such as *után* 'after', *előtt* 'before', or *közben* 'during'. *Mikor* also preserved its temporal relative operator status; as such, it has the *a-* relative prefix.

7 Conclusion

This paper examined how Hungarian, originally a head-final language with non-finite subordination, developed finite temporal subordination. The source construction of complex sentences with a finite temporal subordinate clause was a paratactic pre-correlative structure, with an indeterminate temporal pronoun in the initial clause, as can be observed in the conservative sister languages of Hungarian. The next stage of the evolution was the emergence of a correlative construction involving a free temporal relative clause left-adjoined to the main

[19] This analysis of temporal complementizers is different from the complementizer analysis of *wh*-pronouns in two Norwegian dialects (Westergaard and Vangsnes 2005), and in Bavarian and Alemannic (Bayer and Brandner 2008; Bacskai-Atkari 2023), where the *wh*-words recategorized as heads preserve their *wh*-feature and undergo *wh*-movement.

clause. The correlative construction developed into light-headed, and lexically headed relative clauses. Initially the indeterminate temporal adverb *ha* functioned as a relativizer, but after it was recategorized as a conditional complementizer, new relative temporal adverbs grammaticalized from time-denoting PPs. Later they assumed the *a-* prefix of relative pronouns. Clauses introduced by *mikor* 'when' were also assigned an alternative, event relativizing structure and interpretation, with *mikor* recategorized as a complementizer in C position, and as such exempt from the *a-* prefix. *Miután*-type event relativizers emerged with the analogical extension of the *mikor* class. It is unclear if event relativizing clauses originally involved a RelP projection. If they did, and the event relatiziving adverbs were merged in Rel, the string-vacuity of Rel-to-C movement and the Late Merge Principle have led to their base-generation in complementizer position.

Abbreviations

ABL = ablative, ACC = accusative, ADJ = adjectivalizer, APPR = approximative, ASP = aspect marker, C. = codex, CAUS = causative, COND = conditional, CONJ = conjunction, CONV = converb, DAT = dative, DEL = delative, DEM = demonstrative, DU = dual, ESS = essive, ex. = example, FREQ = frequentative, FUT = future, ILL = illative, IMP = imperative, INF = infinitive, INE = inessive, INS = instrumental, KP = kase phrase, LAT = lative, LOC = locative, NEG = negative, NEGPTCP = negative participle, NOM = nominalizer, OBJ = object agreement, Op = operator, OUDB = Ob-Ugric Database, P = postposition, PP = postpositional phrase, PASS = passive, PL = plural (verbal or possessive agreement), PL<3SG = a morpheme complex or portmanteau morpheme crossreferencing the number feature of the object and the person and number of the subject, POSS = possessedness suffix, POSSIB = possibility, PRF = perfect, PRS = present, PRSPTCP = present participle, PRT = particle, PTCP = participle, PSTPTCP = past participle, Q = question particle, r = recto, RECIP = reciprocal, REL = relative, REFL = reflexive, SBJV = subjunctive, SG = singular (verbal or possessive agreement), SG<1SG = a morpheme complex or portmanteau morpheme crossreferencing the number feature of the object and the person and number of the subject, SUP = superessive, TP = tense phrase, v = verso, transl. = translator, VBL = verbalizer.

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Competing interests

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