'As long as', 'until' and 'before' clauses: Zooming in on linguistic diversity

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This paper investigates 'before', 'until' and 'as long as' clauses in the Baltic languages in their wider areal and genealogical context in a sample of 72 modern and ancient doculects of European and Indo-European languages. In a bottom-up construction of the semantic map of 'before', 'until' and 'as long as' connectors from parallel text data, a fourth cluster intermediate between 'before' and 'until' with negative main clauses is identified. The typology resulting from the different overlaps of clusters locates Baltic languages in an intermediate zone between Western, Eastern, and Northern European languages. This goes hand-in-hand with a high diversity of Baltic languages in their typology of 'before', 'until' and 'as long as' clauses. The temporal connectors found in Baltic varieties can be classified according to whether they originate from strategies expressing temporal identity (simultaneity) or non-identity (non-simultaneity). Many connectors in Baltic derive from correlative constructions and originally express identity, but can then shift from simultaneity towards posteriority as they gradually lose their association with correlative constructions. Since temporal clauses are never at-emporal and are hence incompatible with permanent states and since negation often expresses permanent states, negation—a marker of non-identity—is prone to develop non-polarity functions in 'before' and 'until' clauses. The Baltic and Slavic languages are rich in various kinds of expanded negation (translation equivalents in other languages lack negation) and expletive negation (negation does not have the function of expressing negative polarity) in 'before' and 'until' clauses. However, indefinite negative pronouns often retain their negative semantic value when standard negation in temporal clauses is expanded and semantically bleached.

Keywords: temporal clauses, posteriority, time, subordination, expletive negation, lexical aspect, correlative constructions, simultaneity, semantic maps, parallel texts

And miles to go before I sleep
Robert Frost

Linksminkimos linksminkimos
Pakol jauni esma
Antanas Vienažindys

1. Introduction and roadmap

This paper investigates connectors, negation marking, and aspect in 'before', 'until', and 'as long as' temporal clauses in European and Indo-European languages (i.e., including also Indo-European languages of Asia) with special reference to Baltic languages. This introduction outlines the roadmap of the article. (1)–(3) contain examples for 'as long as', 'until', and 'before' temporal clauses.

(1) *The deadline might pass **before** I can submit my paper.*

(2) *I will continue working with the paper **until** the editor will send me a reminde*r.

(3) ***As long as** it is still March, there is still some hope that I can finish the paper in tim*e.

I will henceforth refer to these adverbial clauses as LATE clauses, where "LATE" is an acronym for *as Long As-unTil-bEfore* (or, if you prefer, Early Modern English *as Long As-Till-Ere*).

Temporal clauses make part of complex sentences, and complex sentences may have many different properties, which are difficult to investigate all at the same time. As other adverbial clauses, temporal clauses differ, among other things, in their degree of deranking or downgrading (Hetterle 2015, ch. 4), in their relative order with respect to the main clause (Chafe 1984; Diessel 2001; 2005), and whether they have minimum forms or expanded connectors (such as *until that day when*; Edgren 1971, 27). This paper will say very little about downgrading, will address order very selectively, will not address the controversies in the definition of the term subordination (e.g., Hetterle 2015, 38 against Cristofaro 2003, 296), and will avoid the consideration of expanded connectors. The focus of this article is on how non-expanded temporal connectors, whether used in finite or non-finite constructions, are distributed across the semantic space of LATE clauses and how these markers interact with negation and aspect.

Temporal connectors (traditionally called temporal subordinate conjunctions or temporal subordinators) are markers of temporal clauses that express the time specification given to the event in another clause (traditionally called "main clause" or "matrix clause" although there need not be any formal relationship of subordination between main clause and temporal clause) by connecting it to the event expressed in the temporal clause. This definition mainly follows Heinämäki (1974, 2), who does not, however, consistently distinguish between meaning and form. Here I will use "connectors" for markers and

"relation" for the meaning expressed by the connector. The title of this article, using English connectors as labels for relations, suggests that there are three relations in the LATE domain: BEFORE, UNTIL and AS.LONG.AS. (Henceforth I will refer to relations in small caps.) However, this is a matter of debate. It has been proposed that FACTUAL.BEFORE (*Sachi bought a Toyota before the price went up*) and NON-FACTUAL.BEFORE (*Max died before he saw his grandchildren*) must be distinguished, which is rejected by Heinämäki (1974, 76–96), who thinks the difference is a matter of context. Karttunen (1974) has argued that there are two different kinds of UNTIL. In Section 2, I will discuss selected formal semantic, typological, and lexicographic literature arguing for and against various sets of temporal relations (with a focus on the LATE domain), which provides the background for Section 3, where the semantic space of LATE clauses is built bottom-up from a cross-linguistic comparison of exemplars in a parallel text corpus.

In my view there is no principled difference between contextual and essential meaning, and relations can be defined in different ways, notably with different levels of granularity. More general relations, such as BEFORE, can simply be viewed as clusters of exemplars with similar meanings. In a cross-linguistic investigation based on parallel texts where the meaning of markers can be compared across languages on the level of translation-equivalent exemplars, more general meanings can be derived by methods of cluster analysis, such as Partitioning Around Medoids (Kaufman & Rousseeuw 2005, ch. 2).

In Section 3, I compile a database of LATE connectors in 133 contextually embedded situations in a parallel text corpus, the New Testament and its translations, in 72 doculects from Indo-European and European languages. A distance matrix is computed from the proportion of doculects with the same connector in any pair of contextually embedded situations. This dissimilarity table of all pairs of contextually embedded situations serves as an input for two kinds of statistical analyses: (i) A probabilistic semantic map of LATE connectors is constructed with Multi-dimensional Scaling where each dot represents a contextually embedded situation and the distance between any pair of dots reflects the probability that both are expressed by the same connector in any language (see also Wälchli & Cysouw 2012). (ii) The contextually embedded situations are sorted into various numbers of clusters by Partitioning Around Medoids and the optimal number of clusters for partitioning is determined. Not unexpectedly, the result will be that the ideal number of clusters is three and that these roughly correspond to English *before*, *until*, and *as long as*. However, if we want to emphasize the difference between languages (which is the aim of linguistic typology), it is profitable to choose a larger number of clusters. Notably, there is an intermediate

zone between 'before' and 'until', not unlike Karttunen's (1974) second 'until', which I will call FÖRRÄN according to the Modern Swedish connector *förrän*, in which it is lexicalized. FÖRRÄN-contexts usually have negation in the main clause, as in *you will never get out of there **until** you have paid back even the last cent!* Languages without a dedicated FÖRRÄN-connector differ in whether FÖRRÄN is encoded in the same way as UNTIL, such as English (FÖRRÄN/UNTIL overlap), or in the same way as BEFORE, such as Finnish, Danish, and Turkish (BEFORE/FÖRRÄN overlap). Partitioning can be used as a basis for a typological classification of the doculects of the sample. Section 3 further discusses particular relations for which the cluster analysis does not provide much support.

The overlap patterns are distributed areally across Europe. Languages in Western Europe have UNTIL/FÖRRÄN overlap, languages in Eastern Europe AS.LONG.AS/UNTIL/FÖRRÄN overlap, and languages in Northern Europe mostly BEFORE/FÖRRÄN overlap. The Baltic languages are spoken where these three areas meet. The sample contains nine Baltic doculects from Lithuanian, Latvian, and Latgalian, and from various periods of time. These exhibit a high degree of typological diversity. In Section 4, I will show that characteristics of the West European, the East European, and the North European patterns can all be found in Baltic doculects, and that there are also some patterns in Baltic that are not attested anywhere else in the sample.

The connectors in the nine Baltic doculects highly differ in use, but are similar in forms, given that the Baltic languages are closely related genealogically. The most useful approach to capture the diversity is to classify the connectors according to their etymological sources and to consider how these pattern across the semantic space. In Section 4 it is found that the marking strategies in Baltic languages can be classified according to whether they originally express identity or non-identity. Not unexpectedly, identity patterns with simultaneity and non-identity with posteriority (non-simultaneity). However, one important group of markers sticks out: interrogative (*k-*, Latvian *c-* before *i/e*), demonstrative (*t-*), and relative (*i(e)-*) adverbs of quantity and quality, many of which are related to forms meaning 'how much, as much'. It can be shown that they originate from correlative constructions.

Section 5 explores the relationship between correlative constructions and LATE clauses in Baltic. It is argued that correlative constructions are originally a strategy to express identity. There are two different generations of markers with correlative origin in Baltic. As correlative constructions expand to the posterior zone of LATE clauses, they gradually lose some of their characteristic formal properties.

Section 6 addresses expanded negation (where translation equivalents in other languages lack negation) in BEFORE- and UNTIL-clauses, which is a well-known phenomenon in the typological literature (Thompson, Longacre & Hwang 2007, 247–248; Kortmann 1997, 184). While correlatives are an identity-denoting strategy, negation is a non-identity-denoting strategy, which is why it is not astonishing that expanded negation hardly ever occurs in AS.LONG.AS-, WHILE-, and WHEN-clauses. When negation is used beyond its original domain of use, it is often bleached to expletive negation (does not express negative polarity anymore). A reason why negation can be used beyond its core function in temporal clauses is that there is very little need of truth-functional negation in temporal clauses. This is because temporal clauses are temporal in two different senses. Not only do they express time, they are also temporal in the sense of "not atemporal" (not permanent); put differently, temporal clauses always express a change of state or a potential change of state. Atemporal states of affairs, such as *one and one is two*, do not make sense in temporal clauses *(??As soon as 1 + 1 is 2, everybody is happy, ??Everybody is happy, until 1+1 is 2.*) The negation of an event usually expresses that that event does not take place and hence there is no change of state expressed. While this explains why negation markers are potentially free to be used for other functions in temporal clauses, it does not explain how expletive negation originates in temporal clauses. In Section 6, I will argue that the expansion of negation is a gradual process and that it originates in temporal clauses with very specific connotations, from where it can further expand to other temporal clauses. The Baltic and Slavic languages are particularly interesting for the study of how negation can spread in BEFORE- and UNTIL-clauses, as they exhibit a high diversity of different formal and semantic sources for negation-marking in LATE clauses.

While expanded negation in BEFORE is more common cross-linguistically, expanded negation in Eastern Europe and in Indo-Aryan occurs most markedly in UNTIL (or, more precisely, FÖRRÄN/UNTIL). This is connected with the fact that these languages have a (FÖRRÄN/)UNTIL/AS.LONG.AS overlap in connectors. This correlation makes sense from a functional point of view. Expanded negation can contribute to the discrimination between the meanings 'until' and 'as long as' in languages where the connector does not make this distinction. Now the question arises as to whether the two features develop together or, if not, whether expletive negation or the UNTIL/AS.LONG.AS overlap is first. The modern Baltic languages, where negation has not expanded to UNTIL, provide evidence that the UNTIL/AS.LONG.AS overlap comes first. This finding is supported by diachronic evidence from Slavic, Indo-Aryan, Hungarian, and Georgian.

The marker used for expanded negation is typically the standard negation marker. Interestingly, other kinds of negation, such as the phasal negation 'no longer' and negative indefinite pronouns, typically retain their negative force, which suggests that they do not participate in the expansion of negation in temporal clauses. 'No longer' and negative indefinite pronouns in UNTIL-clauses are discussed in Section 7.

In Russian and Polish (but not in South Slavic languages), 'no longer' is not compatible with UNTIL due to restrictive aspectual properties of UNTIL-clauses. Section 8 discusses aspectual behavior of UNTIL-clauses in Lithuanian, Latvian and Livonian. They are intermediate between Germanic and Finnish, on the one hand, and Russian and Polish, on the other hand. Section 9 concludes this paper.

The paper does not address the relationship between connectors in temporal clauses and adpositions of time, which would be a very interesting field of research.

While the Baltic languages are a major focus of the present article, there is no ambition to describe all properties of LATE clauses in the Baltic languages. For more general treatments of Lithuanian temporal clauses, see Pajėdienė (2004) and Wiemer (2009); for subordination in Lithuanian in a wider perspective, see Holvoet & Judžentis (2003). A profound survey of clause linkage in Latvian and Latgalian with a detailed treatment of temporal clauses is given in Nau (2017a). For spoken Latgalian, see Nau (2018).

2. What relations to expect in the semantic space of LATE clauses

In this paper, I am adopting a similarity-semantics approach (Wälchli & Cysouw 2012), where similarity is considered to be a more basic notion than identity in semantic analysis. Rather than addressing questions such as whether meaning X and meaning Y are the same or different, I am assuming that any two meanings are potentially different from each other in meaning. The relevant question in similarity semantics is how similar or dissimilar various meanings are. Similarity semantics can be modelled in form of a multi-dimensional space, where the distance between any pair of exemplars reflects the degree of (dis)similarity in meaning. What traditional semantics considers to be one meaning typically corresponds to a dense cluster of exemplars in semantic space. Similarity semantics predicts that there can be disagreements as to whether a set of exemplars constitute one or two distinct meanings, since there is no unequivocal

way to determine exactly how many clusters there are. In the literature on temporal relations there is much discussion as to whether certain meanings should be considered the same as or different from other meanings. To consider this literature is highly useful for approaches to similarity semantics, as we can learn from it how the semantic space may be expected to be structured. If there is disagreement about whether two meanings are the same or different, this can mean that the two meanings reflect two clusters in a more granular analysis and one cluster in a less granular analysis of semantic space.

Kortmann (1997, 80–89) defines a set of 32 adverbial relations in complex sentences, nine of which are temporal (Table 1). Rather than using Kortmann's Latinate labels, I will use here the major English representatives in small caps, that is, for instance, AS.LONG.AS instead of SICOEX. Kortmann (1997, 80) derives his set of meanings from standard grammars of eight modern and ancient European languages. All nine relations are expressed by distinct connectors in English and other Standard Average European languages. Three of Kortmann's relations are in the LATE domain, the three first ones in Table 1.

Table 1: Kortmann's (1997) nine temporal interclausal relations
(p: subordinate clause)

POST Posteriority 'before'	*p* simply follows *q* in time
TAQUEM Terminus ad quem 'until'	*p* identifies a point or period of time in the (relative) future up to which *q* is true
SICOEX Simultaneity Co-Extensiveness 'as long as'	*p* opens up a time interval for the whole of which *q* is true
SIDUR Simultaneity Duration 'while'	*p* opens up a time interval for the whole or part(s) of which *q* is true
SIOVER Simultaneity Overlap 'when'	*p* overlaps with *q*
IMANTE Immediate Anteriority 'as soon as'	*p* immediately precedes *q*
ANTE Anteriority 'after'	*p* simply precedes *q* in time
TAQUO Terminus a quo 'since'	*p* identifies a point or period of time in the (relative) past from which onwards *q* has been true
CONTIN Contingency 'whenever'	at all times when *p* is true, *q* is true, too

According to Kortmann, the definite time relations (all but CONTIN 'whenever') can be arranged on a scale as shown in Figure 1 with the LATE area highlighted on the right hand side of the scale:

Figure 1: Semantic map of definite time relations according to Kortmann (1997, 185), simplified:

SINCE − AFTER − AS.SOON.AS − WHEN − WHILE − AS.LONG.AS − UNTIL − BEFORE

Heinämäki (1974) is not entirely explicit about her set of relations. If we count as a distinct relation every item with a different semantic definition, the set is largely congruent with the inventory of English temporal connectors and Kortmann's set in Table 1. Only *as soon as* is treated as a special case of AFTER (Heinämäki 1974, 108).

Karttunen (1974) argues that there are two different 'until'-relations (see also Giannakidou 2002 for Greek). *Until* in affirmative clauses only occurs with durative (main clause) predicates (**The princess woke up until 9*). However, in negative clauses it can be combined with punctual (main clause) predicates *The princess did not wake up until 9 / until the prince kissed her*. According to Karttunen, this non-durative *until* is basically the same as 'before' (and is expressed in some languages in the same way as 'before', such as Finnish *ennen kuin*), but expresses in addition lateness, which is particularly manifest in the German equivalent *erst* with affirmative construction: *Die Prinzessin erwachte erst um 9 / erst als der Prinz sie küsste.*[1]

De Swart (1996) argues that negative clauses introduce their own discourse referents and are states and can be quantified as in *He often does not eat dinner*. Thus, *the princess did not wake up* can be interpreted as a window of opportunity, a period of time when the event of waking up might have happened, but did not. Surveying a large amount of literature in semantics, de Swart (1996) shows that three proposed analyses, the one with punctual 'until' (the "ambiguity thesis"), the one with durative negation (the "scope analysis") and the one that treats *not...until* as a lexicalized unit (the "lexical composition approach") are

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[1] Not all LATE constructions (remember that LATE is just an acronym) have the connotation of lateness. In fact, 'before' often has the connotation of earliness, as expressed, for instance, in German by *noch bevor* 'even before' as in *noch heute Nacht, noch bevor der Hahn kräht, wirst du mich dreimal verleugnen* 'during this night, before the rooster crows, you will deny me three times' (Matth. 26:34). The subordinate clause event is in a relative sense later both in UNTIL- and BEFORE-clauses. The examples rather differ in whether the pair of events expressed by the whole construction is early or late.

semantically (truth-conditionally) and pragmatically equivalent: "they all interpret *not...until* as expressing exclusion of a range of values on the time axis" (de Swart 1996, 242). In terms of semantic space, this means that we can expect that 'until' with negative main clause will be located between BEFORE and UNTIL, and will entertain connections beyond the field of temporal clauses to other relations that express exclusion.

Several languages have been reported to make finer semantic distinctions within the BEFORE-domain. In Russian, the connector *prežde čem* 'before' expresses nothing else but posteriority. However, when the connector *poka*, which ranges from 'as long as' to 'until' and 'before', is used in the BEFORE-domain—in this case always with expanded negation—there is the connotation of preventing the subordinate clause event to take place (Iordanskaja & Mel'čuk 2009, 248). The particular connection between the two events creates a window of opportunity in which the main clause event is pleasant, easy, possible or useful, which ends when the subordinate clause event starts. Iordanskaja & Mel'čuk (2009, 248), who describe this particular connection, use the term "convenient". I will call this kind of 'before', OPPORTUNITY.BEFORE. The main clause event can take place or makes sense in the interval before the subordinate clause event starts (if not prevented). Iordanskaja & Mel'čuk (2009) point out that the verb in the subordinate clause with *poka ne* in the meaning 'before' obligatorily takes the past tense. Note that Russian does not distinguish past from perfect, and it makes sense to interpret the past as having the function of a perfect here (Barentsen 2007, 245), emphasizing the endpoint of the convenient interval.

(4) Russian (Iordanskaja & Mel'čuk 2009): OPPORTUNITY.BEFORE

Ja	*porobotaju,*	***poka***	***ne***
I.NOM	DLM.work(PFV).PRS.1SG	**as.long.as/until/before**	**not**
stalo		*temno.*	
become.PST.N.SG		dark.N.SG	

'I'll work a bit, before it gets dark.'

Japanese has a similar distinction in the BEFORE-domain, which has been discussed by Kuno (1973, 153–158). While *mae ni*, literally "in advance, in front" is just 'before', *-nai uti ni* with expletive negation, literally "not inside, in the interval (that something does) not (happen)", is largely parallel to Russian *poka ne* 'before'.[2]

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[2] There are some differences between Russian and Japanese. Affirmative *(no) uti* is used as a simultaneous temporal connector 'while', but less widespread in this function than Russian affirmative *poka*. For Japanese *-nai uti ni* it seems to be important that the speaker does not know when the

(5) Japanese (Kuno 1973, 155): OPPORTUNITY.BEFORE

Ame	*ga*	*hura-**nai***	***uti***	***ni***	*kaerimasyoo.*
rain	NTOP	fall-**NEG**	**inside**	**to**	let's.go.home

'Let's go home before it rains.'

In both Russian and Japanese, the OPPORTUNITY.BEFORE construction is typically used for taking advantage of an opportunity which will not be possible anymore at some later point in time, such as 'before I forget':

(6) Japanese (Kuno 1973, 155): OPPORTUNITY.BEFORE

*Wasure-**nai***	***uti***	***ni***	*henzi*	*o*	*kakimasyoo*
forget-**NEG**	**inside**	**to**	answer	ACC	let's.write

'I will write an answer before I forget it'

Iordanskaja & Mel'čuk (2009, 233) emphasize the specific "illocutive" use of Russian *poka* connected to this meaning, which connects the subordinate clause to the fact of uttering the main clause.

(7) Russian (Iordanskaja & Mel'čuk 2009): illocutive BEFORE

Poka	*(ja)*	***ne***	*zabyl,*
as.long.as/until/before	I.NOM	**not**	forget.PST.M.SG
sxodi	*za*	*xlebom!*	
go.after(IPFV)	behind	bread.INS.SG	

'Before I forget: go buy some bread'

In a similar way as negation in main clauses in 'until' constructions can transform punctual to durative predicates, OPPORTUNITY.BEFORE introduces an interval. In a semantic space of LATE clauses, we can thus expect OPPORTUNITY.BEFORE to be intermediate between BEFORE and UNTIL.

Russian has another construction with the connector *poka* without expanded negation which frames the main clause event as an accomplishment. It can be

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change of state takes place (Kuno 1973, 154). Kuno (1973) further emphasizes the non-factivity of Japanese *-nai uti ni*, which is questioned by Hasegawa (2015, 208–209), who claims that *-nai uti ni* rather implies the speaker's evaluation of, or expectation concerning, the temporal sequence and posits three subtypes: (a) the temporal clause expresses an undesirable event ('I quit smoking before I was caught by my parents'), (b) the construction expresses an unexpected order of events ('The company started construction before a permit was granted'), and (c) the construction emphasizes how soon the event expressed in the main clause occurs ('My feet started aching even before I'd walked for ten minutes'). For Russian, however, Iordanskaja & Mel'čuk (2009, 247) emphasize that the main clause predicate must be voluntary.

assumed to be intermediate between UNTIL and AS.LONG.AS. Accomplishments both express an interval (compatible with AS.LONG.AS) and a change of state (compatible with UNTIL).

(8)   Russian (Iordanskaja & Mel'čuk 2009): connotation of enough time
      Poka   *stanet*   *temno,*   *ja*
      as.long.as/until   become(PFV).PRS.3SG   dark.N.SG   I.NOM
      eščë   *porabotaju.*
      yet   DLM.work(PFV).PRS.1SG
      'Until it has become dark ["until/as long as it will get dark"], I'll still (manage to) work a bit.'

According to Heinämäki (1974, 125), accomplishments are bad in a main clause of an UNTIL-construction. This is true for English, but not for Russian and the Baltic languages (see Section 8). UNTIL-clauses expressing a result are another type of clauses that are intermediate between UNTIL and AS.LONG.AS. Heinämäki (1974, 126) points out that "[w]hether the result is obtained usually depends on whether the activity goes on long enough". Zorikhina Nilsson (2002, 97–99) discusses Russian examples with the adverb *dolgo* 'a long time' and other expressions of quantification of time in the main clause, where the use of negation in the UNTIL-clause in Russian is optional and where the presence of the quantification of the interval can correlate with the absence of expanded negation. Another set of examples contains imperatives in the main clause, as in (9):

(9)   Russian (Zorikhina Nilsson 2002, 99): imperative in main clause
      Podoždite,   ***poka***   *ja*
      wait(PFV).IMP.2PL   **as.long.as/until**   I.NOM
      nakinu   *čto-nibud'*
      throw.on(PFV).FUT.1SG   something.ACC
      'Wait until I put something on.'

Accomplishments in main clauses, results after long time intervals, and constructions with imperatives in main clauses are a hybrid cluster of examples which all have in common that they are intermediate between UNTIL and AS.LONG.AS.

We may summarize that the semantics of LATE connectors is rather complex on a granular level. Many types of specific kinds of examples can be identified. However, on a global level we may expect the semantic space to be structured as a scale with three major clusters AS.LONG.AS–UNTIL–BEFORE (as postulated by

Kortmann 1997, 185, see Figure 1). On a more granular level we may expect intermediate clusters, such as 'until'-clauses in constructions with negative main clauses intermediate between BEFORE and UNTIL, and constructions with imperatives in main clauses that are intermediate between UNTIL and AS.LONG.AS.

3. Building the semantic space of LATE relations bottom-up

3.1 Semantic analysis with parallel text data

In particular languages, meaning is always distorted by categorization. Categorization implies that a range of similar, but different, meanings are expressed by the same form and are treated as if they were the same thing although they are slightly different meanings. The distorting effect of categorization can be reduced by means of cross-linguistic comparison. It is true that all languages categorize, but they categorize in different ways. Hence, differences in meaning that are irrelevant in one language may become apparent in another language.

According to Haiman's (1985, 19) Isomorphism Hypothesis, which I assume holds largely true, cross-linguistically recurrent identity of form reflects similarity in meaning. Similarity is gradable. The more often any pair of meanings are expressed by the same form in different languages, the more similar are their meanings. To the extent we have translations of texts across many different languages (massively parallel texts), we can investigate the similarity of meanings on the level of exemplars. Actually, languages are too abstract units to be used in practice. All we have is specific varieties of languages, in which particular texts are written, for which the use of the term doculect has become common practice. We can then compile a table with the doculects in the parallel corpus as columns and with the cross-linguistically aligned parallel passages as rows and with the markers to be compared (here temporal connectors) in the cells. Table 2 lists four of 133 passages in 7 of 72 doculects.

Table 2: Aligned connectors across different doculects, excerpt from the database

	aln	cat	hrv	dan	dut	eng-amstd	eng-leb
001	para se	abans de	prije nego	**förend**	eer	before	before
002	deri sa	quan	dok	**förend**	NONE	till	until
003	**deri sa**	**fins que**	sve dok	**indtil**	**totdat**	till	**until**
004	**deri sa**	**fins que**	dok	**indtil**	**totdat**	until	**until**

In Table 2 it is directly visible that 003 and 004 are very similar, since most doculects express it by the same form. A very simple measure for similarity that can be used is Hamming distance, which is 1-s/t, where s is the number of same markers across the pairs (boldface in Table 2) and t the total number of pairs. Thus, in Table 2, the dissimilarity of the pair <003;004> is 1–5/7 and the dissimilarity of the pair <001;002> is 1–1/6 (there is one pair less, since one form is not attested for one doculect). The resulting distance matrix table, where the values range between 0.0 (maximal similarity) and 1.0 (maximal dissimilarity) is then taken as an input for Multi-dimensional Scaling (MDS), that visualizes the distance matrix. The first two dimensions of MDS, which are those with most information, visualize the distances in form of a map where every cross-linguistically aligned passage is a dot. In this map, which has been called a probabilistic semantic map (Wälchli & Cysouw 2012), the distance between any pairs of dots reflects the semantic dissimilarity of any pair of cross-linguistically aligned passages in the dataset. On the probabilistic semantic map some areas will be denser (with many closely similar passages where most doculects nearly always use the same markers) and some other areas will be more loosely populated.

A different kind of analysis we can perform with the distance matrix is Partitioning. Partitioning divides the cross-linguistically aligned passages into a freely selectable number of clusters such that all clusters are as dense as possible. A smaller number of clusters corresponds to a rougher semantic analysis, where many finer distinctions relevant only for a few languages are glossed over. A larger number of clusters corresponds to a more fine-grained division of the semantic space.

In this section I will construct the semantic space of LATE clauses in European and Indo-European languages bottom-up from the comparison of the concrete use of connectors in particular examples in parallel texts. Since it is highly interesting how modern language use compares to earlier attested stages, the ideal parallel text corpus for this purpose is the New Testament, which is widely available in many modern and historical language varieties. A major interest of this paper is how LATE clauses are encoded in Baltic languages, and we will see here that there is a very large diversity in LATE clauses among different varieties of Baltic languages. In order to obtain a larger picture, I will use a sample of 72 doculects of European and Indo-European languages (the wider context of Baltic languages), as listed in Table 3. Most languages of Europe are Indo-European, but the sample also contains other languages of Europe and the Caucasus area (Uralic, Turkic, Basque, Afro-Asiatic and Kartvelian) and also some Indo-European languages of Asia (Armenian, Iranian, Indo-Aryan). The

typology of LATE clauses is not particularly stable diachronically. It is hence useful to include many varieties from the same genera and varieties of different historical periods. The limit of 72 doculects is mere convenience. Even if many translations are available electronically, the data collection had to be made manually in order to reach an acceptable level of accuracy, and this naturally limits the size of the sample. The sample contains nine translations into Baltic languages: four Lithuanian ones, four Latvian ones, and one in Latgalian. Due to the large number of doculects, I will sometimes have to refer to varieties by abbreviations. Three letter codes are used, as listed in Table 3 (ISO 639-3, where there is just one doculect per language). Lower case and numbers are used for modern varieties, upper case for ancient or more archaic varieties.

Originally, 180 passages containing LATE clauses (including some clauses which later turned out to be rather 'while' and 'when' clauses) were sampled. These were selected on the basis of the occurrence of 'before', 'until' and 'as long as' markers in English, German, Latvian and Lithuanian, and Russian. The set was later reduced to 133 clauses due to three different reasons. (i) Passages usually not encoded by temporal connectors were removed. (ii) Passages usually rendered by expanded connectors containing temporal nouns, such as *until that day when* (Edgren 1971, 27), were removed. (iii) Passages often encoded by 'before' expressions with nouns or nominalizations, such as *before the foundation of the world*, were removed. It has to be admitted that (ii) and (iii) are questionable decisions, but retaining these examples would have added more variability. I have therefore decided to simplify things. However, it should be kept in mind that the semantic space of LATE clauses is more complex and less easily reducible to a single scale, if passages usually expressed by connectors with temporal nouns are included.

It is not always obvious which elements of the construction should be considered parts of a connector. Here I have not included expanded negation as part of connectors. For instance, Russian *poka ne* [connector NEG] 'until' is coded in the same way as affirmative *poka* 'as long as'. Expanded negation will be discussed in Section 6.

The database consists of 9576 cells (133*72) of which 613 are empty (not attested or no temporal connector), which is less than 7% of gaps. From the data table, a distance matrix cross-table of all passages is calculated (133*133 cells) using Hamming distance as a maximally simple distance measure. Values range from 0.0 to 1.0. The value 0.0 means that all doculects use the same connector for that pair of passages. 1.0 means that all doculects use different connectors for that passage. The distance matrix is then used as input for Multi-Dimensional

Scaling (R: cmdscale()). For further details on how probabilistic semantic maps are built from parallel text data see, for instance, Wälchli (2010), Wälchli & Cysouw (2011) and Wälchli (2016), and further references given there.

Table 3: Sample of 72 European and Indo-European doculects
(Version and/or year of publication in parenthesis)

Basque: Basque (EABD) **eus**

Afro-Asiatic: Maltese **mlt**

Indo-European:

Celtic: Irish **gle**, Welsh **cym** (BCN/BCDN)

Italic: Latin (Vulgata) **LAT**, Portuguese **po1** (ARC), **po2** (NHL), **po3** (NVI), Spanish **spa** (RVES), Catalan (BCI) **cat**, French (LSG 1910) **fra**, Italian **ita** (Diodati 1607), Romanian (VDC) **rom**

Germanic: Gothic **GOT**, Icelandic **isl**, Faroese **fao**, Danish **dan**, Norwegian (Bokmål) **nob**, Swedish (1917) **SWE**, Swedish (2000) **swe**, Middle English (Wycliffe) **ENM**, English (American Standard) **ENG**, (LEB) **eng**, Dutch (SV 1637) **nld**, German (Neue) **deu**

Baltic: Latvian (1965) **la1**, Latvian (Jauns tulkojums 2007) **la2**, Latvian Gliks (1685) **laG**, Latvian Elgers (~1640) **laE**, Latgalian (1933) **ltg**, Lithuanian (1965) **li1**, Lithuanian (2000) **li2**, Old Lithuanian Bretkūnas (1559–1590) **liB**, Old Lithuanian Chyliński (1656–1660) **liC**

Slavic: Old Church Slavonic **OCS**, Bulgarian **bul**, Macedonian **mkd**, Serbian **srp**, Croatian **hrv**, Slovene (JUB) **slv**, Slovak **slk**, Czech (Kralická 1613) **CES**, (21. století) **ces**, Polish (Gdańska 1632) **POL**, (NVC 2011) **pol**, Lower Sorbian (Jakubica 1548) **DSB**, Ukrainian (UBIO 1962) **ukr**, Russian (Synodal 1876) **RUS**, (IBS 2003/2009) **rus**

Greek: Koine Greek **GRC**, Greek (Filos 1994) **ell**

Albanian: Albanian **aln** (1990)

Armenian: Western Armenian **arm**

Iranian: Ossetic (2003) **oss**, Tajik **tgk**

Indo-Aryan: Hindi **hin**, Marathi (1993) **mar**, Maithili (2010) **mai**

Uralic: Livonian (1942) **liv**, Estonian (1968) **es1**, (1997) **es2**, Finnish (1992) **fin**, Northern Saami **sme**, Erzya Mordvin **myv**, Meadow Mari **mhr**, Zyrian Komi **kpv**, Hungarian (Károli 1586) **HUN**, (1996) **hun**

Turkic: Turkish (1987) **tur**, Azerbaijani **aze**

Kartvelian: Old Georgian **GEO**, Georgian **kat** (IBT 2001)

With 133 entities, the multi-dimensional space that is built contains a maximum of 132 dimensions (n–1). Multi-Dimensional Scaling arranges the entities in such a way that the dimensions with the lowest numbers cover as much information as possible. In Figure 2, Dimensions 1 and 2 are shown. In Figure 2, the semantic map consists of the identical configuration of dots for all languages, which is exemplified for particular languages. Dots with the same symbol represent the same connector and connectors are listed (without diacritics) in a legend with number of occurrence in brackets in their order of frequency. The clusters can be interpreted by inspecting what kinds of markers are realized in the clustering units in particular languages. Dimension 1 (x-axis) singles out an UNTIL-cluster (negative pole) from a WHILE/WHEN/AS.LONG.AS-cluster (positive pole) as can be seen, for instance, when looking at the English data (top left in Figure 2). For convenience, labels for semantic clusters, such as "BEFORE", are added in all plots. Dimension 2 singles out a BEFORE-cluster (positive pole). However, the figure should not be read as a triangle. BEFORE and UNTIL, and UNTIL and AS.LONG.AS are connected, whereas BEFORE and AS.LONG.AS are not. MDS plots often take the form of a horseshoe (here open to the right hand side, where the legend is placed). Thus, the plot can actually be read as a scale BEFORE>UNTIL>AS.LONG.AS>WHILE.

MDS is useful for visualization because it arranges semantically similar units close to each other. The closer two dots are, the more likely that the corresponding passages are encoded by the same marker in any language of the sample (this is why this is called a probabilistic semantic map). Another simpler advantage of the plots in Figure 2 is that they allow for comparability on the level of particular examples, because the passages in all doculects are arranged in exactly the same way. We can directly see the difference between English (top left) and Russian (top right), which uses the same connector *poka* for both UNTIL and AS.LONG.AS and has a range of different connectors for BEFORE (mainly *prežde čem* and *do togo kak*). Recall that expanded negation has been disregarded when coding the examples in the database, otherwise Russian would display a difference between negative *poka ne* (largely 'until') and affirmative *poka* 'as long as' (largely 'as long as').

Figure 2: Connectors in LATE clauses in selected doculects, and five clusters in the semantic map
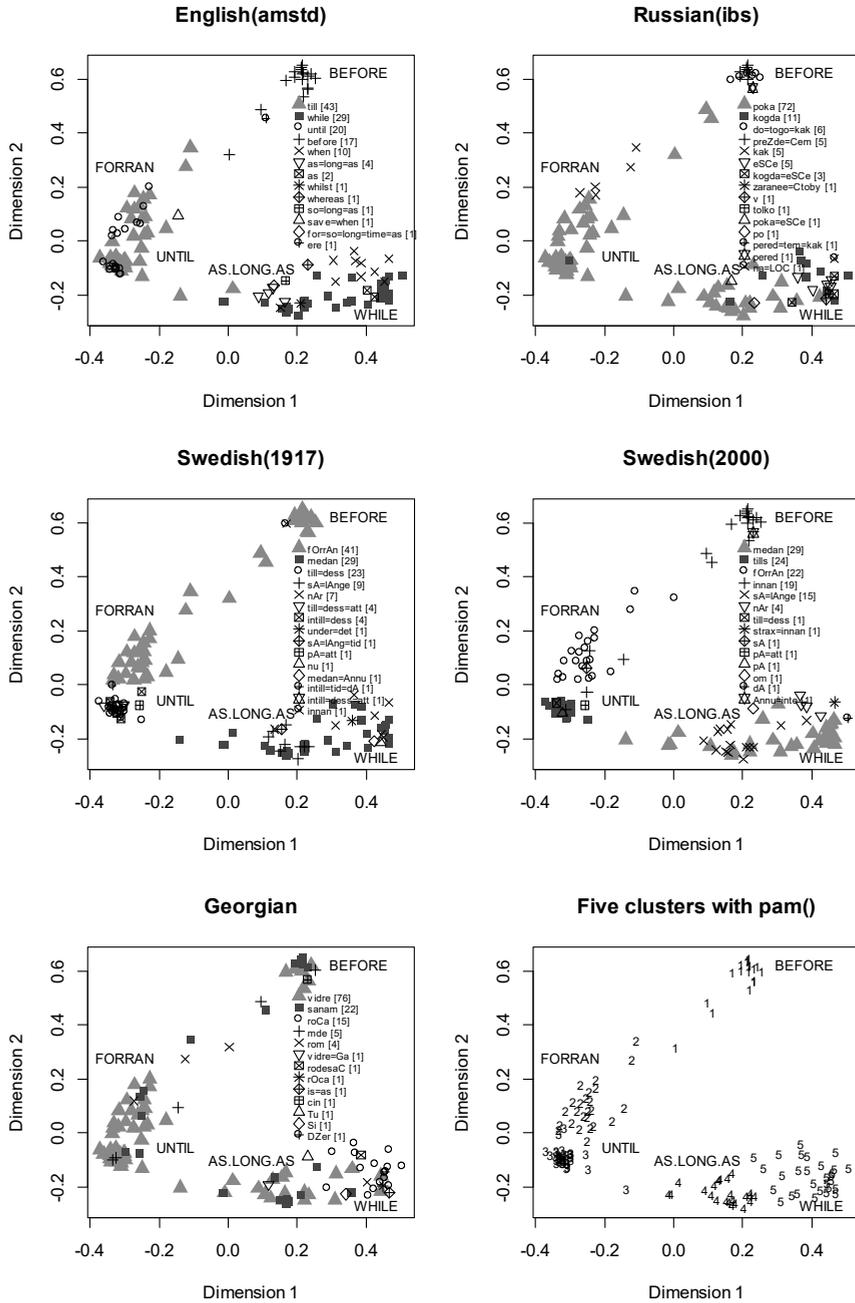
The probabilistic semantic map in Figure 2 confirms the semantic map of temporal relations postulated by Kortmann (1997, 185), or rather just one end of it, because we are zooming in here on LATE clauses: WHILE – AS.LONG.AS – UNTIL – BEFORE (in Kortmann's terms: SIDUR – SICOEX – TAQUEM – POST). However, while Kortmann takes the units SICOEX, TAQUEM, POST etc. as given, the clusters in our analysis are the result of the analysis. The present analysis supports the view that AS.LONG.AS, UNTIL, and BEFORE are three different semantic clusters (at least as far as European languages are concerned). A cluster analysis with Partitioning Around Medoids (R: pam(); Kaufman & Rousseeuw 2005, ch. 2) reveals that three is the optimal number of clusters for the current dataset (highest Average Width value 0.558 for k=3). However, it cannot be concluded from the dataset considered that 'as long as' (SICOEX), 'while' (SIDUR) and 'when' (SIOVER) should best be considered instances of the same cluster, since the selected dataset does not represent 'while' (SIDUR) and 'when' (SIOVER) accurately. It only contains passages that are encoded by typical 'as long as' (SICOEX) markers in at least some languages. The question as to how many clusters 'as long as' (SICOEX), 'while' (SIDUR) and 'when' (SIOVER) ideally should be divided into is an issue for further research.

That three is the optimal number of clusters quantitatively does not mean that we should refrain from looking for additional potential clusters. Modern Swedish (Figure 2, middle right) displays a compact set of passages between UNTIL and BEFORE, lexicalized by a separate connector *förrän*. Two markers with similar meaning clustering in different areas of the space are indicative of semantic difference. Put differently, the map invites us to look for a semantic difference between Swedish *innan* and *förrän*. This is not the case for Early Modern English *till* and *until* (Figure 2 top left) which cluster in the same area. The region where Swedish *förrän* occurs appears as cluster in Partitioning Around Medoids if the number of clusters chosen for is 5 or higher. The clusters resulting with k=5 (average width 0.408) is given in Figure 2 (bottom right) where the "förrän" region is Cluster 2 between BEFORE (Cluster 1) and UNTIL (Cluster 3).

What the examples in Cluster 2 have in common is that the main clauses are negative, as illustrated in (10) with a Swedish example, and this is exactly the context where Swedish *förrän* is used (see SAOB ("vid nekad huvudsats" [with negated main clause] and Zorikhina Nilsson 2009, 423). This is nothing else than Karttunen's (1974) punctual 'until', discussed in Section 2.

(10) Modern Swedish (40001025³): *förrän* with negation in main clause

Han	*rörde*	*henne*	*inte*	**förrän**	*hon*
he.NOM	touch.PST	she.OBL	not	**before/until**	she.NOM

hade	*fött*	*en*	*son...*
have.PST	give.birth.SUP	a.COM	son

'...and did not have sexual relations with her until she gave birth to a son.'

Cluster 2 in Partitioning Around Medoids (see Figure 2 bottom right) is not exactly identical in extension with *förrän* in the Swedish (2000) translation. Two examples with *förrän* are in Cluster 1 (BEFORE) and Cluster 3 (UNTIL) and five examples in Cluster 2 have other connectors in the Modern Swedish text, even though their main clauses are negative semantically. As shown by example (11), which is in Cluster 2 (FÖRRÄN), the cluster is more semantic than Swedish *förrän*, which is triggered by grammatical negation in the immediately superordinated clause and not, for instance, by lexical negative words, such as *förbjuda* 'to forbid' in (11).

(11) Modern Swedish (41009009): *innan* with formally affirmative verb in main clause

[*När de gick ner från berget*]

förbjöd	*han*	*dem*	*att*	*berätta*	*för*	*någon*
forbid.PST	he.NOM	they.OBL	CMPL	tell.INF	for	somebody

vad	*de*	*hade*	*sett,*	**innan**	*Människosonen*
what	they.NOM	have.PST	see.SUP	before	man.son.DEF.SG.COM

hade	*uppstått*	*från*	*de*	*döda.*
have.PST	rise.SUP	from	DEF.PL	dead.PL

'And as they were coming down from the mountain, he ordered them that they should tell no one the things that they had seen, except when the Son of Man had risen from the dead.'

However, in want of a short label for the cluster ("between 'until' and 'before' with negation in superordinate clause" is too long), I will refer to the cluster as FÖRRÄN.⁴

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³ As is common in typological work using the Bible corpus, a single number is used to refer to verses in the Bible. The first two digits indicate the book. "40" is Matthew, the first book of the New Testament. The next three digits stand for the chapter and the final three digits for the verse.

⁴ Swedish *innan* is actually not strictly banned from occurrence with negation in main clause.

If the quantitative analysis suggests that it is better to disregard the FÖRRÄN cluster, this actually means that there are very few languages that have separate encodings for this cluster as Modern Swedish does. The two other doculects that come closest to it are Icelandic *fyrr en* and Faroese *fyrr enn*.

At closer inspection, it proves to be highly profitable not to disregard the FÖRRÄN cluster for the typological classification, since languages differ as to whether FÖRRÄN overlaps with UNTIL or with BEFORE. In most Indo-European languages there is an UNTIL/FÖRRÄN overlap, but many languages outside of Europe which are not part of the sample of this study (for instance, Quechuan languages and Indonesian; Wälchli 2018) have a BEFORE/FÖRRÄN overlap. Within Europe a BEFORE/FÖRRÄN overlap is characteristic for some Nordic, Finnic, and Turkic languages.

Table 4: Typology of overlaps involving FÖRRÄN and AS.LONG.AS

	Cluster 1 [18] "BEFORE"	Cluster 2 [25] "FÖRRÄN"	Cluster 3 [38] "UNTIL"	Cluster 4 [23] "AS.LONG.AS"
English (amstd) ENG	*before* [17]	*till* [16], *until* [8]	*till* [26], *until* [12]	*while* [12], *as long as* [4]
English (leb) eng	*before* [17]	*until* [24]	*until* [37]	*while* [13], *as long as* [5]
Russian (ibs) rus	*do togo kak* [6], *prežde čem* [5], *poka* [3]	*poka* [15], *kak* [5]	*poka* [31]	*poka* [17]
Swedish (1917) SWE	*förrän* [16]	*förrän* [24]	*till dess* [23], *till dess att* [4], *intill dess* [3]	*medan* [11], *så länge* [9]
Swedish (2000) swe	*innan* [15]	*förrän* [20], *innan* [3]	*tills* [24]	*så länge* [13], *medan* [9]
Georgian kat	*vidre* [7], *sanam* [7], *-mde* [2]	*vidre* [18], *sanam* [4], *rom* [2]	*vidre* [33], *sanam* [2], *-mde* [2]	*vidre* [13], *sanam* [7]

Forms with less than 2 occurrences in a semantic cluster are not shown. Number of occurrences in brackets.

For the further analysis of the data I have therefore used Partitioning Around Medoids with five clusters and have discarded Cluster 5 ("while/when"), which

is beyond the realm of the LATE zone of temporal relators, from further consideration. As shown in Table 4, doculects can be classified according to what kinds of overlaps they have. To simplify things we can concentrate on overlaps of the most frequent forms within a cluster. English has a FÖRRÄN/UNTIL overlap. Russian has a FÖRRÄN/UNTIL/AS.LONG.AS overlap. Earlier Swedish has a BEFORE/FÖRRÄN overlap, whereas Modern Swedish has no overlap. The most radical overlap in the sample is Modern Georgian with an overlap of all four clusters (Figure 2 bottom left). Even though there are two different connectors *vidre* and *sanam*, none of them is strictly specialized to any cluster, and the suffix *-mde* 'until' following nominalizations is not a dominant choice in any cluster.

If we arrange the attested overlaps in two dimensions, according to whether or not FÖRRÄN and whether or not AS.LONG.AS are involved, this results in the typology given in Table 5. Here I further single out a group of doculects which have some tendency towards an AS.LONG.AS/UNTIL overlap, which does not result in a full overlap of the most frequent markers in the two semantic clusters. The typology is also shown in Map 1 for the most modern doculect per language of the sample.

There is only one clear example of OPPORTUNITY.BEFORE (preventing the occurrence of an undesirable event, see Section 2) in the sample of clauses, illustrated in (12) from Russian, with the expected expanded negation and past tense form in this meaning (Iordanskaja & Mel'čuk 2009, 247).

(12) Russian (ibs) (43004049): OPPORTUNITY.BEFORE

    ...pojdëm,   ***poka***   *syn*   *moj*
    go(PFV).PRS.1PL,   **as.long.as/until/before**   son.NOM.SG   my.NOM.SG.M
    eščë   ***ne***   *umer*
    yet   **not**   die.PST.M.SG
    '[The royal official said to him, "Sir,] come down before my child dies!"'

This is not enough for exactly deciding how many languages in the sample have an UNTIL/OPPORTUNITY.BEFORE overlap like Russian does. However, there is evidence for such an overlap among other things from some further Slavic languages, Romanian, some Baltic doculects, and Ossetic. (13) from Romanian illustrates the second best example for OPPORTUNITY.BEFORE from the N.T. The context is that the conspirators plan to kill Paul before he arrives at the chief priests' place, which they consider to be the favorable timespan for the homicide.

(13) Romanian (44023015): OPPORTUNITY.BEFORE

şi	**pînă**	să	ajungă		el,	noi	sîntem	gata
and	**until**	CMPL	arrive.SBJ.PRS.3SG		he	we	be.PRS.1PL	ready

să-l		omorîm.
CMPL-3.SG.M.OBL		kill.SBJ.PRS.1PL

'And we are ready to do away with him before he comes near.'

Interestingly, Kortmann (1997, 183, 187) considers Romanian *pînă* to be an in-stance of an UNTIL/BEFORE overlap. The more granular analysis in this chap-ter suggests that there is only an OPPORTUNITY.BEFORE/UNTIL overlap and no BEFORE/UNTIL overlap (see also Figure 3 top right). Given the scarcity of exam-ples for OPPORTUNITY.BEFORE in the N.T., Partitioning Around Medoids is of no use for identifying a cluster.

Table 5: Typology of overlaps in LATE connectors

	AS.LONG.AS sepa-rate: L	partial AS.LONG.AS/UNTIL overlap:	AS.LONG.AS/UNTIL overlap: LU
BEFORE/FÖRRÄN overlap: BF	Danish, Norwegian, Swedish (1917), Estonian (1968), Finnish, Northern Saami, Turkish,	Estonian (1997)	**Latvian Elgers (~1640)**
partial BEFORE/FÖRRÄN overlap:	Azerbaijani		
FÖRRÄN sepa-rate: F	Icelandic, Faroese, Swedish (2000)		
partial FÖRRÄN/ UNTIL overlap:			**Latvian (1965)**, Czech (1613)
FÖRRÄN/UNTIL overlap: FU	Irish, Welsh, Spanish, Catalan, French, Italian, Middle English, English (amstd, leb), Dutch, Ger-man, **Lithuanian**	Basque, Maltese, Latin, Portuguese (ARC, NHL, RVES), Gothic, Koine Greek, **Latvian Gliks (1685), Lat-vian (2007)**, Polish	**Lithuanian (1965, 2000)**, Old Church Slavonic, Bulgar-ian, Macedonian, Serbian, Croatian, Slovene, Hindi, Maithili,

	AS.LONG.AS separate: L	partial AS.LONG.AS/UNTIL overlap:	AS.LONG.AS/UNTIL overlap: LU
	Chyliński (1656–1660), Modern Greek, Western Armenian, Marathi, Meadow Mari	(1599, NVC), Lower Sorbian, Albanian, Tajik, Old Georgian	Livonian, Erzya Morvin, Hungarian (1586, 1996)
OPPORTUNITY. BEFORE/ FÖRRÄN/UNTIL overlap:	**Lithuanian Bretkūnas (1559–1590)**, Romanian	Ukrainian	**Latgalian**, Modern Czech, Slovak, Russian (Synodal, IBS), Ossetic
BEFORE/FÖRRÄN/ UNTIL overlap: BFU		Zyrian Komi	Modern Georgian

Map 1: Typology of overlaps in LATE connectors, map of modern doculects
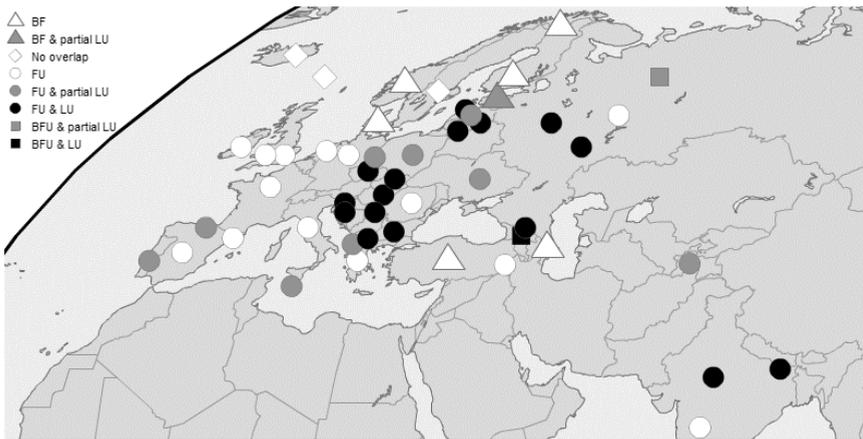
Map drawn with The Interactive Reference Tool for *The World Atlas of Language Structures* by Hans-Jörg Bibiko.

We will see in Section 6 that many of the languages with full UNTIL/AS.LONG.AS overlap actually have pervasive expanded negation in UNTIL. This holds for most modern Slavic languages, Hindi and Maithili, Hungarian, and Erzya Mordvin. However, it does not hold for Lithuanian and Livonian.

The Baltic doculects are marked in boldface in Table 5 and the nine doculects fall into highly different types. In Map 1 it can be seen that the Baltic languages are located where areal zones of different types meet, between Northern European BEFORE/FÖRRÄN overlap as opposed to FÖRRÄN/UNTIL overlap south of it and between AS.LONG.AS/UNTIL overlap in the East as opposed to distinct AS.LONG.AS in Western Europe. This suggests that there might be areal factors involved in the diversity of Baltic doculects (see Section 4 for further discussion).

While the intermediate zone between BEFORE and UNTIL forms a compact cluster with a neat characterization (negation in main clause), there is less clear evidence for an intermediate zone between UNTIL and AS.LONG.AS in the examples from the N.T. However, there is a small cluster of five examples listed in Table 6 appearing as soon as the number of clusters is eight or higher with Partitioning Around Medoids (in contrast, recall that FÖRRÄN already pops up with k=5).

Table 6: Set of examples intermediate between UNTIL and AS.LONG.AS

42017008	*...Prepare something that I may eat, and dress yourself to serve me **while** I eat and drink...*
41014032	*... Sit here **while** I pray.*
40026036	*Sit here **while** I go over there and pray.*
40014022	*And immediately he made the disciples get into the boat and go ahead of him to the other side, **while** he sent away the crowds.*
41006045	*And immediately he made his disciples get into the boat and go on ahead to the other side, to Bethsaida, **while** he himself dismissed the crowd.*

A rough characterization of the examples in Table 6 is activity that takes a limited amount of time irrespective of whether there is a neat result in the end. Interestingly, the examples in Table 6 share another characteristic. The main clauses express requests, direct imperatives or indirect commands. One effect of having commands in main clauses together with temporal clauses is that a relationship between two partly simultaneous events of limited duration is established. Constructions with imperatives in main clauses were one of various kinds of uses discussed in Section 2 as possibly intermediate between UNTIL and AS.LONG.AS. Some other uses mentioned in Section 2 happen not to be represented in the N.T. and are hence not present in the semantic map.

One way of obtaining an UNTIL-construal in the examples in Table 6 is to introduce some sort of resultative construction in the subordinate clause, as is the

case in (14) from Norwegian. The use of 'until'-expressions is the more likely, the clearer the endpoint of the subordinate event is emphasized, which makes the two events appear more asynchronous than they actually are.

(14) Norwegian Bokmål (42017008)

...gå	mig	til	hånde	**til**	jeg	får	ett
go.IMP	I.OBL	to	hand.OBL	until	I.NOM	get.PRS	eat.SUP

og	drukket
and	drink.SUP

'to serve me while I eat and drink' lit. "until I get eaten and drunken"

However, there are a number of doculects where 'until' expressions are used in all five or some of the examples in Table 6 even without any terminativization of the subordinate clause predicate. These include Latin (*donec*), Romanian (*pînă*), Estonian (*kuni*), Polish (*aż*[*by*]), and Ukrainian (*aż poky*).

(15) Latin (42017008): 'until' with delimited activity

ministra	*mihi*	***donec***	*manducem,*	*et*	*bibam*
serve.IMP.2SG	I.DAT	**until**	eat.SBJ.1SG	and	drink.SBJ.1SG

'serve me while I eat and drink'

(16) Romanian (41014032): 'until' with delimited activity

Şedeţi	*aici*	***pînă***	*Mă*	*voi*	*ruga*
sit.IMP.2PL	here	**until**	I.RFL	FUT.1SG	pray.INF

'sit here while I pray'

Interestingly, both Latin *donec* (Heberlein 2015) and Romanian *pînă* (Kortmann 1997, 183, 187) have been claimed to have an extension of 'until' to AS.LONG.AS. In the parallel corpus considered here, Latin *donec* and Romanian *pînă* (Figure 3 top) cannot be said to extend fully to AS.LONG.AS. They hardly extend beyond the examples in Table 6, which make up Cluster 5 with *k*=8 (Figure 3 bottom right). Estonian *kuni* is more extended (Figure 3 bottom left) in the 1997 translation (but not in the 1968 translation).

Figure 3: The intermediate area between UNTIL and AS.LONG.AS
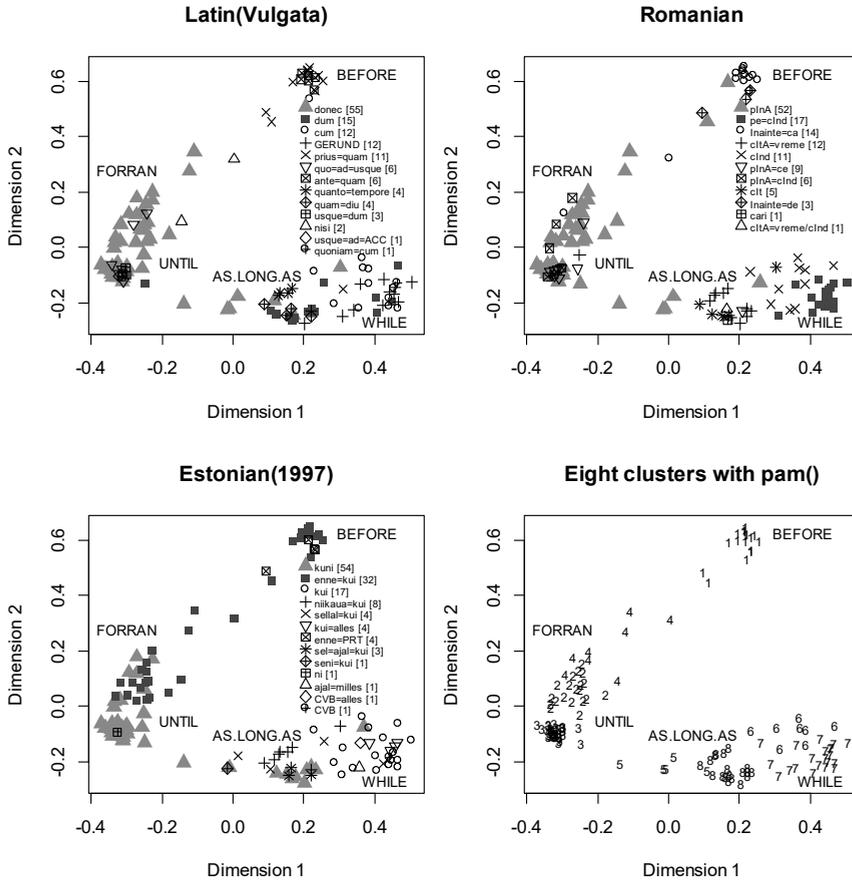
Further evidence that delimitative events are relevant for the intermediate area between UNTIL and AS.LONG.AS comes from Russian. Russian uses the same connector *poka* for UNTIL and AS.LONG.AS, but in UNTIL there is in most cases expletive negation (*ne*) and perfective aspect, whereas in AS.LONG.AS there is imperfective aspect with very few exceptions, one of them being delimitative verbs. According to Iordanskaja and Mel'čuk (2009, 241), perfective with *poka* 'as long as' can occur only with resultative or delimitative meaning or with a negated verb, since only such perfective verbs can be associated with a time interval.

(17) Russian: delimitative verbs *poka* 'as.long.as' (Iordanskaja and Mel'čuk 2009, 245)

Maša	*počitaet*	*poka*	*Ivan*
Masha.NOM	DLM.read(PFV).PRS.3SG	as.long.as	Ivan.NOM

pospit
DLM.sleep(PFV).PRS.3SG
'Masha will read a bit, while Ivan will have slept a bit.'

To summarize, the probabilistic semantic map built in this section clearly supports Kortmann's view that there are three major clusters AS.LONG.AS, UNTIL and BEFORE in the LATE zone of temporal clauses. However, typological differences between different European languages can be better understood if some intermediate zones are also taken into account. In particular, there is clear evidence for an intermediate cluster between BEFORE and UNTIL, which is only rarely lexicalized by a marker of its own, as in Modern Swedish *förrän*, but languages differ in whether this intermediate zone is colexicalized with BEFORE or with UNTIL. European languages can be classified according to what kind of overlaps they exhibit involving AS.LONG.AS and FÖRRÄN. In this typology, the Baltic languages exhibit a considerable amount of diversity, which I now will consider in more detail in the next section.

4. The diversity of connectors in LATE clauses in Baltic languages

4.1 Strategies for the expression of identity and non-identity

Temporal clauses express temporal relations between two events, which can be simultaneous or non-simultaneous. Strategies for expressing (non-)simultaneity can be dedicated, such as anterior and simultaneous converbs. However, many marking strategies used in temporal clauses are not dedicated to the expression of time. If we abstract from the category time, what distinguishes simultaneity and non-simultaneity is (non-)identity. It is hence useful to classify non-dedicated marking strategies in temporal clauses into two types according to whether they express identity or non-identity (Table 7).

Table 7: Strategies for the expression of…

…identity	…non-identity
Affirmation	Negation
Comparison of equality	Comparison of inequality
Overlapping location: 'within, in' etc.	Non-overlapping location: 'in front of', etc.
Qualities of identity: 'equal', 'even'	Temporally ordinal expressions: 'first', etc.
Interrogative adverbs and pronouns	
Correlative constructions	

When a non-dedicated strategy enters the temporal domain, it can be assumed that it will at least originally express a temporal relation with which it is associated concerning identity or non-identity. We can thus expect negation, comparison of inequality, local prepositions expressing non-overlapping location, such as 'in front of', and temporally ordinal expressions, such as 'first, earlier', to originate in the BEFORE-domain rather than in WHEN and WHILE, and we can expect overlapping location 'within', interrogative adverbs and correlative expressions, such as 'when…then', to originate in WHEN, WHILE, AS.LONG.AS rather than in BEFORE. This is illustrated in (18) from Lithuanian and (19) from Latvian. (18) from Lithuanian contains a temporal adverb in the comparative form. The temporal clause is introduced by a comparative connector that contains a negation marker. For negation marking in comparison, see 6.4.

(18) Lithuanian (43008058): temporally ordinal expression, comparison of inequality and negation in BEFORE

pirm-iau,   **ne**-gu   buvo   Abraomas,
first-COMP.ADV   **NEG**-CMPL   be.PST.3   Abraham.NOM
Aš   Esu!
I.NOM   be.PRS.1SG
'before Abraham was, I am!'

(19) Latvian (40013026): correlative construction with interrogative adverb in WHEN

Bet   **kad**   labība   uzauga   un   deva   augļus,
but   **when**   grain.NOM.SG   grow.PST.3   and   give.PST.3   fruit.ACC.PL

> **tad**   *parādījās*   *arī*   *nezāle.*
> **then**   appear.PST.3.RFL   also   not.grass.NOM.SG
> 'So when the wheat sprouted and yielded grain, then the darnel appeared also.'

In subsequent developments, strategies can shift within the semantic field of temporal expressions and will then become less neatly associated semantically with the strategy that motivates them originally. In Baltic languages, it has been particularly common for markers to originate in AS.LONG.AS in correlative constructions and then to expand to UNTIL, FÖRRÄN, and partly even BEFORE. This leads us to the discussion of the cyclic expansion and replacement of forms originating in correlative constructions in 4.2.

4.2 A cyclic development

In Section 3 we have seen that the overlap patterns in LATE clauses in the nine Baltic doculects in the sample are highly diverse. The three major types, the "Eastern European", the "Western European" and the "Northern European" patterns, are all represented. Modern Lithuanian and Latgalian display the typical overlap pattern of Eastern European languages (BEFORE – FÖRRÄN/UNTIL/AS.LONG.AS). Old Lithuanian texts display an overlap pattern characteristic of Western European languages (BEFORE – FÖRRÄN/UNTIL – AS.LONG.AS), Old Latvian Gliks (1685) also sorts mainly here. Old Latvian Elgers (~1640) patterns with North European languages (BEFORE/FÖRRÄN – UNTIL/AS.LONG.AS). Modern Latvian is most variable: one text (1965) is similar to the Modern Swedish lack of overlap pattern (BEFORE – FÖRRÄN – UNTIL – AS.LONG.AS), The New Translation (2007) is closest to the Western type (BEFORE – FÖRRÄN/UNTIL – AS.LONG.AS), but many Modern Latvian texts rather reflect the same Eastern pattern as Lithuanian and Latgalian (BEFORE – FÖRRÄN/UNTIL/AS.LONG.AS).

While the distribution of forms in the semantic space is highly diverse, the forms involved are less variable. The discussion of the different kinds of forms is postponed to 4.3. Here we focus on selected forms originating in correlative constructions that are most important for understanding the dynamicity of the typological patterns—"interrogative" K-forms and "relative" I-forms. Why these forms are called "interrogative" and "relative" will become fully clear only in Section 5, which will address synchronic and diachronic properties of correlative constructions in more detail. Here, I will simply claim that the I-forms Lithuanian *iki*, and Latvian *iekam(s)* represent an older layer of forms entering

the temporal domain in AS.LONG.AS and that the K(/C)-forms Lithuanian *(pa) kol(ei)*, Latgalian *cikom*, Latvian *kamēr*, *ciekams* represent a younger layer of forms entering the temporal domain in the same relation AS.LONG.AS. The outcome is the cyclic development shown in Table 8, which entails rapid changes in the typology of overlap patterns, whereas there is less change in the forms involved (see 4.3).

Table 8: Cyclic development of the LATE typology when markers drift from AS.LONG.AS to UNTIL/FÖRRÄN:

Stage 1	Stage 2	Stage 3	Stage 4 (typologically = Stage 1)
Marker I originating in AS.LONG.AS and having spread across the whole domain	Marker K originating in AS.LONG.AS	Marker K expanding to UNTIL	Marker K expanding to FÖRRÄN
FÖRRÄN/UNTIL/ AS.LONG.AS[I]	FÖRRÄN/UNTIL[I] – AS.LONG.AS[K]	FÖRRÄN[I] – UNTIL[K]	FÖRRÄN/UNTIL/ AS.LONG.AS[K]
"Eastern" type	"Western" type	"Northern" type	"Eastern" type
Proto East-Baltic (?)	Old Lithuanian	Old Latvian (Elgers)	Modern Lithuanian and Latgalian

The development is complicated by the superposition of other forms entering the domain. Figure 4 illustrates the cyclic development in the semantic map of LATE clauses (see Section 3) in the three doculects where the I-forms are best retained and in abstraction from superposed forms: Lithuanian Bretkūnas (1559–1590), Latvian Elgers (1640) and the more conservative Modern Latvian translation (1965). Elgers (1640) is only a partial translation of the N.T., hence the sparse population with dots in Figure 5, since many examples are just not translated in Elgers.

Figure 4: I- and K-forms in three Baltic doculects illustrating Stage 2 (liB), Stage 3 (laE) and Stage 3~4 (la1) of the cyclic development
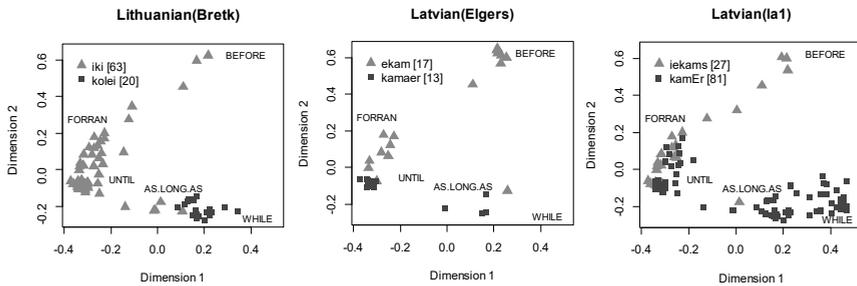
The cyclic development sketched here suggests that the typological similarity with languages of three adjacent areas might be a mere coincidence. However, there is also some evidence that contacts with neighboring languages have contributed to the diversity of LATE clauses in Baltic. This will be discussed in Section 4.4.

4.3 The distribution of non-identity and identity strategies in the Baltic doculects

Non-identity strategies in Baltic LATE connectors are marked boldface in Table 9 and fall into the following kinds:

- **Negation**: Old Lithuanian *net* 'except, save, until' derives from negation *ne-* and a demonstrative element (see 6.5 for further discussion).[5] Modern Lithuanian *dar ne...us* in BEFORE combines negation *ne-* and the phasal adverb *dar* 'still, yet' with the anterior converb (see 6.2). For negation marking in comparison of inequality, see example (18) in 4.2 above and 6.4.
- **Temporally ordinal adverb**: *Pirm*, Latvian *pirms* with *-(i)s* from an instrumental plural masculine or neuter ending, is a originally a temporal adverb 'first', now usually with the superlative prefix *vis-* (< all[GEN.PL]) in the adverbial meaning: *vispirms* 'first'. The stem also occurs with a comparative suffix (Latgalian *-ōk*, Lithuanian *pirm-iau*).
- **Preposition**: Lithuanian *prieš* 'in front of' is first of all a local preposition, metaphorically extended to time.

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[5] In Modern Lithuanian *net* is an additive focus particle 'even', but this is not its original meaning.

Most forms connected to the identity strategy in Baltic LATE connectors originate in correlative constructions: **interrogative** (*k-*, Latvian *c-* before *i/e*), **demonstrative** (*t-*), and **relative** (*i-, ie-*) adverbs in correlative constructions. Some markers have an element *-k*, from forms meaning 'how much, as much' (Lithuanian *kiek?* 'how much?', *tiek* 'as much', Latvian *cik?*, *tik*). Other forms have an *-l* element (Lithuanian *kol*) or an element of nominal origin in the second part: Latvian *mērs* 'measure', in dialects also *-met* (Lithuanian *metas* 'measure, period, season'). Most of these forms originally meant 'how much, that much, to what extent' and the like, that is, are originally adverbs of quantity. The forms with *-l* are originally associated with distance (hence the adjective Lithuanian *tolus*, Latvian *tāls* 'far away'). All these forms derive from correlative constructions (see Section 5).

The Latvian preposition *līdz* 'until' combines the identity strategy (original meaning 'equal, even') with the non-identity strategy (preposition expressing non-overlapping localization). It goes back to an adjective with the meaning 'equal, even' (Lithuanian *lygus*). As a local preposition 'until', however, it expresses adjacency rather than overlap. Latgalian *koleidz* is obviously a contamination of *kolei* (attested for Old Latgalian and widely attested in Lithuanian) and the preposition *leidz* 'until' (Latvian *līdz*). The first Latgalian translation, Evangelia Toto Anno, from 1753 (only portions) has *koley* (20), as Lithuanian has *kolei*.

(20) Latgalian 1753 Evangelia Toto Anno (42021032; Kursīte & Stafecka 1995, 98)

...neporjis	*tiey*	*ćilts*	
NEG.pass.FUT.3	that.NOM.SG.F	tribe.NOM.SG	
koley	*tis*	*wys*	*nùtiks*
until/as.long.as	that.NOM.SG.M	all.NOM.SG.M	happen.FUT.3

'...this generation will never pass away until all these things take place

Table 9: LATE connectors and their overlaps in the nine Baltic N.T. doculects

	BEFORE [18]	FÖRRÄN [25]	UNTIL [38]	AS.LONG.AS [23]
Lithuanian Bretkūnas 1559–1590	***pirm*** [13], *iki* [3]	*iki* [19], ***net*** [6]	*iki* [37]	*kolei* [18], *iki* [4]
Lithuanian Chyliński 1656–1660	***pirm*** [16]	***net*** [22]	***net*** [30], *pakołey* [3]	*pakołey* [9], *kayp iłgey* [3], ***net*** [2], *iki kołey* [2]

|	BEFORE [18]	FÖRRÄN [25]	UNTIL [38]	AS.LONG.AS [23]
Lithuanian 1965	**dar ne...us** [6], **prieš** [6]	kol [18], iki [4]	kol [33], iki [3]	kol [19]
Lithuanian 2000	**dar ne...us** [6], **prieš** [6]	kol [15], iki [4], kai [2]	kol(ei) [27], iki [3]	kol(ei) [19]
Latgalian 1933	**pyrms** (+GEN/kai) [5], **pyrmōk** (kai) [4], koleidz [5]	koleidz [20], cikom [2]	koleidz [33], cikom [3]	koleidz [22]
Latvian Elgers ~1640	ekam [7]	ekam [6]	kamær [9], ekam [3]	kamær [4]
Latvian Gliks 1685	**pirms** [17]	tiekams [18], **pirms** [5]	tiekams [31], kamēr [6]	kamēr [12], ciek ilgi [3], ciekams [2]
Latvian 1965	**pirms** [12], iekams [5]	iekams [11], kamēr [11], **pirms** [2]	kamēr [26], iekams [10]	kamēr [20]
Latvian New transl. 2007	**pirms** [17]	līdz [6], kamēr [6], tiekams [4], **pirms** [4], iekams [3]	līdz [17], kamēr [10], līdz kamēr [3], tiekams [2]	kamēr [21]

Forms with less than 2 occurrences in a semantic cluster are not shown. Number of occurrences in brackets.

The different types of origin are not distributed at random. Constructions originally expressing identity are concentrated in AS.LONG.AS, which is semantically close to simultaneity. Local adpositions expressing the relation between two different places, negation, non-simultaneous converbs, and comparison of inequality are constructions originally expressing non-identity and these are concentrated in BEFORE; UNTIL is intermediate.

Lithuanian Bretkūnas (1559–1590) reflects Stage 2 of the cycle (Figure 5, top left). The use of the older generation of I-based correlative forms is illustrated in (21). In Lithuanian Chyliński (1656–1660), ik(i) has been replaced by net in FÖRRÄN and UNTIL (from negative manner clauses, see 6.5) (Figure 5, top right). In Modern Lithuanian, iki 'until' is mainly restricted to prepositional use.

(21) Lithuanian Bretkūnas (43004049): OPPORTUNITY.BEFORE

Wieschpatie,	*ataik,*	***ik***	*mano*	*Waiks*
lord.VOC.SG	come.IMP.2SG	**until**	my	child.NOM.SG

nenumirschta.
NEG.die.PRS.3SG

[The royal official said to him, "Sir,] come down before my child dies!"

Figure 5: LATE connectors in older Baltic varieties in the semantic space
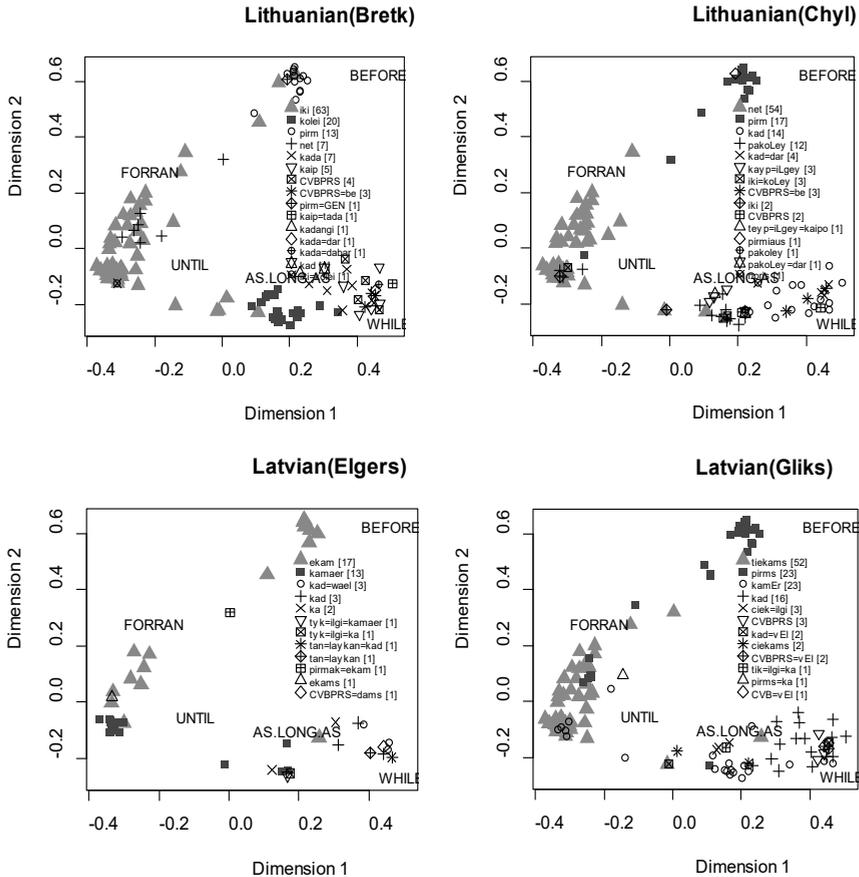
Latvian Elgers (~1640) reflects Stage 2 of the cycle (Figure 5, bottom left). *Pirm* is not attested as a connector, instead <ekam> (*iekām* or *iekam*) is used, as illustrated in (22).[6] In Gliks (1640), the demonstrative form *tiekams*, which must have

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[6] According to Nau (2017a, 16), there is no subordinator *pyrms* in Latgalian. In the Latgalian N.T. *pyrms* does occur in BEFORE, but is arguably always a temporal adverb in a complex expression with

originated from the main clause in a correlative construction, is used for UNTIL and FÖRRÄN (Figure 5, bottom right).

(22) Latvian Elgers (42022015): BEFORE

warræn	*man*	*ilgoias*	*ʃʒo*	*Leladenas*
very	I.DAT	long.PRS.3.RFL	this.ACC.SG	Easter.GEN.SG

iærinîe		*ar*	*iums*	*æʃt,*	***ekam***	*es*
lamb.DIM.ACC.SG		with	2PL.DAT	eat.INF	**before**	I.NOM

cêʃʒu
suffer.PRS.1SG

'I have earnestly desired to eat this Passover with you before I suffer.'

Modern Lithuanian and Latgalian have completed the cycle in Table 8 and can be clearly assigned to the "Eastern type" with their UNTIL/AS.LONG.AS-overlap (Figure 6, top). In Modern Latvian there is more variation. The preposition and connector *līdz* is restricted to UNTIL and happens to be widely used in the New Translation (2007; Figure 6, bottom right). The extensive use of *iekams* in the 1965 translation (la1; Figure 6 bottom left) is archaic and reflects Stage 3 of the cycle, which is represented in Old Latvian Elgers in a purer form. The two Modern Latvian translations make very different choices within the considerable range of variability for Modern Latvian. In addition, Latvian *kamēr* can have the same range of use as Lithuanian *kol* and Latgalian *koleidz*. Interestingly, Latvian *kamēr* also extends beyond LATE clauses to WHILE and WHEN (in this respect it is similar to Serbian, see Barentsen 2007) and is even sometimes used for SINCE (not included in the semantic space depicted), as in (23).

(23) Latvian (Brāļi Kaudzītes, *Mērnieku laiki*): *kamēr* for SINCE
[*...cik nelabs gars valda tagad mūsu mājā,*]

| ***kamēr***	*Liena*	*no*	*mums*
as.long.as/until/since	Liena.NOM	from	we.DAT

aizgājusi!
away.go.PST.PA.NOM.SG.F

'...what kind of depressed mood reigns now in our house, since Liena has gone away from us!'

---

the subordinator *kai* 'as' or *na kai* 'than' (comparison of inequality, see 6.3). No strategy in the Latgalian text is dominant, but the most frequent one is the preposition *pyrms* governing a nominalization in genitive case (*pyrms jūs kūpā saīšonas* [before 3.GEN.PL together together.go.ACN.GEN.SG] 'before they came together' 40001018).

Figure 6: LATE connectors in modern Baltic varieties in the semantic space
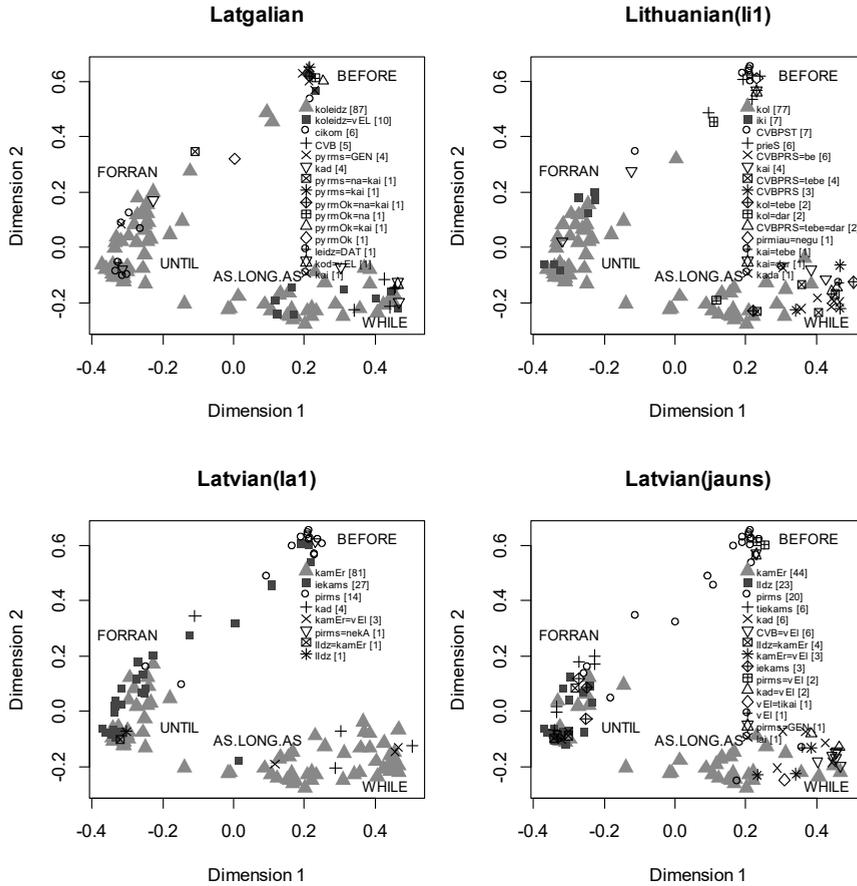
The Latgalian N.T. translation has *koleidz* ranging from WHEN and WHILE over AS.LONG.AS, UNTIL, and FÖRRÄN all over to OPPORTUNITY.BEFORE. However, in most modern Latgalian texts *cikom* is used instead, with largely the same semantic range as *koleidz* in the N.T., as exemplified in (24).[7] In the N.T., *cikom* only occurs 6 times in LATE clauses.

(24) Latgalian *cikom* 'until, as long as' (Pīters Vylāns in Kursīte & Stafecka 1995, 174)

...jyus	*sēdit*	*un*	*gaidot,*
2PL.NOM	sit.IMP.2PL	and	wait.IMP.2PL

---

[7] Nau (2017b, 15) gives the following numbers in the Latgalian corpus surveyed by her: *cikom* 438 times, *cikam* 37 times, *kamer* 42 times and *koleidz* 20 times.

cikom	*pīnōks*	*ari*	*jyusu*	*pošu*
until/as.long.as	come.FUT.3	also	2PL.GEN	self.GEN.PL
kōrta				
turn.NOM.SG				

'…you sit and wait until your own turn comes.'

4.4 Areal patterns and language contact

As shown in Section 3, the Baltic doculects can be roughly classified into three types, which are characteristic of Eastern European languages (AS.LONG.AS/UNTIL overlap), Western European languages (UNTIL/FÖRRÄN overlap) and Northern European languages (BEFORE/FÖRRÄN overlap). In 4.2 it has been argued that the diversity of LATE clauses within Baltic languages might also be accounted for by a cyclic development. The question thus arises as to what extent language contacts with Eastern (East Slavic, Russian), Western (in particular, German) and Northern (in particular Finnic) languages are responsible for the diversity of Baltic LATE clauses.

The clearest case of convergence with German I am aware of is Nehrungs-kurisch, a variety of Latvian formerly spoken on the Curonian Spit with very strong influence by Lithuanian and German, as reflected in the texts by Pietsch (1982). The prepositions and connectors *pr(i)eš* 'before' and *lik(e)* 'until' are loans from Lithuanian (*prieš*, *ligi*), but their use follows very much the model of German. *Preš* 'before' takes the infinitive rather than the verbal noun (*preš gulête iete* [before sleep.INF go.INF] 'before going to bed'; Pietsch 1982, 90) and the preposition *like* 'until' precedes other local prepositions: *like us 400 m* [until on 400 m] 'until 400 m' = German *bis auf* (Pietsch 1982, 18). The connector *ta ilge* [so long] 'as long as' is exactly formed on the model of German *so lange*. Note that Latvian uses the quantitative adverb *tik* 'as long, as much; only' in combination with *ilgi* 'long[ADV]', not the manner adverb *tā* 'thus, so'. *Ta ilge* [so long] 'as long as' is used as adverbial in main clauses with 'until' subordinate clauses (25) and as connector in AS.LONG.AS (26), very much as in German. No form with UNTIL/AS.LONG.AS overlap, such as Latvian *kamēr*, is used in Pietsch's (1982) variety of Nehrungskurisch.

(25) Nehrungskurisch (Pietsch 1982, 80): UNTIL

un	*palîdzij*	*vinģe*	***ta***	***ilge,***	***lik***	*viņš*	*vel*
and	help.PST.3	3.SG.ACC	**so**	**long.ADV**	until	3.SG.NOM.M	again

> *pats*   *varij* *zvejuoate*
> self.NOM.SG.M can.PST.3 fish.INF
> '[and the other fishermen] helped him until he was able to go fishing himself again'

(26) Nehrungskurisch (Pietsch 1982, 148): AS.LONG.AS

> ***Ta*** ***ilge***   *vinš*   *us* *sausume*   *bij,*
> **so** **long.ADV** 3.NOM.SG.M on dry.GEN[?].SG be.PRS.3,
> *turij*   *šnapse*   *duoate.*
> have.PST.3 liquor   give.INF
> 'As long as the boat was on dry land, there had to be liquor for the people assembled.'

However, we cannot conclude from the example of Nehrungskurisch that all cases of UNTIL/FÖRRÄN overlap are due to German influence. In Old Lithuanian, *iki* has been expanded from the connector to the preposition (Petit 2015, 122), and the cyclic development sketched in Section 4.1 accounts better for it than language contact. Modern Latvian *līdz* 'until', which extended from the preposition to the connector, may be partly due to German influence. German influence may also have played a role in the expansion of *pirms* in 'before', which is lacking in Elgers Old Latvian translation and in Latgalian (as suggested to me by Nicole Nau).

The UNTIL/FÖRRÄN overlap in Elgers Old Latvian translation may be accounted for by the cyclic development sketched in Section 4.2. However, it is perhaps no mere coincidence that the Northern European pattern is only attested in a Latvian and not in a Lithuanian variety, given the intensive contacts between Latvian and Finnic languages. After all, there is no reason to assume that Old Lithuanian necessarily must have passed through a Stage 3, which is not attested. It is perfectly conceivable that Lithuanian shifted directly from Stage 2 ("Western type") to Stage 4 ("Eastern type"). Livonian (Finnic), however, belongs to the Eastern type (*kuņtš* 'until; as long as'), probably due to influence from Modern Latvian.

What speaks against strong influence from Russian in the Modern Baltic languages is the very restricted use of expanded negation unlike Russian (see 6.6). The Eastern type can be accounted for by the cyclic development sketched in Section 4.2. However, the UNTIL/AS.LONG.AS overlap pattern also correlates with certain aspectual properties that Baltic languages partly share with Slavic, notably a predilection for accomplishments in UNTIL-clauses (see 5.3 and Section 8).

To summarize, LATE clauses tend to be expressed by forms of correlative origin all the way from AS.LONG.AS to OPPORTUNITY.BEFORE (in Latvian Elgers even further to BEFORE). There are two generations of markers of correlative origin. Some varieties of Latvian show affinities with Finnic and Nordic languages in displaying overlap between BEFORE and FÖRRÄN. Expressions for UNTIL/FÖRRÄN have been renewed at various periods of time from various sources (demonstrative form from main clause in correlative constructions, negative connector 'except, save', preposition 'until'). Modern Latvian and Latgalian display a considerable intra-variety variability with sets of forms with partial or full synonymy. These circumstances entail that there is much diversity in the expression of LATE clauses across ancient and modern varieties of Baltic.

5. Baltic correlative constructions and their degeneration in LATE clauses

5.1 What is a correlative construction?

Correlative constructions (*korrelative Diptycha*, as Lehmann 1984, 124 calls them) are well known in typology as an unusual type of relative clauses—attested, among other things, in Sanskrit, Hittite, other older Indo-European languages, and modern Indo-Aryan languages (27)—which are not embedded in noun phrases, but rather adjoined in the left periphery, in the same way as correlative adverbial clauses (28). Starting with Srivastav (1991) and culminating in the volume edited by Lipták (2009a), correlative constructions, especially in Hindi/Urdu, have been studied in many contributions in formal syntax.

(27) Hindi (Srivastav 1991, 664): relative clause in correlative construction

jo	*laRkii*	*khaRii*	*hai,*	*vo*	*(laRkii)*	*lambii*	*hai.*
REL	**girl**	standing	is	**that**	girl	tall	is

'Which girl is standing, that girl/she is tall. / The girl who is standing is tall.'

(28) Hindi (Bhatt & Lipták 2009, 349): temporal clause in correlative construction

jab-tak	*steshan*	*khulaa*	*thaa,*		
when-until	station	open	be.PST.M.SG		
tab-tak	*Mary*	*vaha:*	*baiThii*	*rah-ii*	
then-until	Mary	there	seated	stay-PFV.F.SG	

'Mary sat at the station as long as it was open.'

Lipták (2009a, 2) ascribes correlative clauses the structure [$_\text{CORRELATIVE CLAUSE}$…
relative phrase…] [$_\text{MAIN CLAUSE}$… correlate…], and this terminology is confusing,
since the term "correlat(iv)e" is used for the construction as a whole, for the sub-
ordinate clause and for the marker in the main clause. I cannot therefore avoid
suggesting another terminology. Since the adjoined clause typically has topical
function (Lipták 2009a, 13), I will call it the correlatopic clause, and since the
marker in the main clause typically is an anaphoric pronoun or demonstrative,
I will call it the correlaphoric marker. Hence, Lipták's (2009a, 2) structure in
my terms is [$_\text{CORRELATOPIC CLAUSE}$… [$_\text{CORRELATOPIC PHRASE}$ correlatopic marker]…] [$_\text{CORRELA-}$
$_\text{PHORIC CLAUSE}$… [$_\text{CORRELAPHORIC PHRASE}$ correlaphoric marker]…]. I will use "correlative"
as a cover term for correlatopic and correlaphoric.

Correlative phrases are typically coreferential, i.e. express an identity of per-
son, object, place, time, manner, quantity, size, or quality. Identity is reflected
both in meaning and in form (I will not consider here to what extent correlative
constructions are iconic). The formal literature speaks of "matching effects" and
"matching requirements" (see, for instance, Leung 2009). There can be several
correlatopic phrases in a sentence, but then there must be the same number of
matching correlaphoric phrases (Lipták 2009b, 9). However, not everything has
to match. Reference and category (person, object, place or time, etc.) match, but
not necessarily the semantic role. Bhatt & Lipták (2009, 353, 358) discuss such
Hindi examples as (in translation) 'With whom they find a gun, they confiscate
it from those' (matching category person, reference is the same, mismatch in
semantic roles) and 'I will run till the location from which Ram starts running'
(matching category place, reference is the same, mismatch in semantic roles
goal and source). The two sentences in a correlative construction also typically
have the same information structure and characteristically the correlatopic and
correlaphoric phrases are in focus (have the same position as interrogative pro-
nouns; Leung 2009, 323).

Correlatopic markers typically contain interrogative or relative stems, which
testifies to the close relationship of correlatopic clauses with information ques-
tions and relative clauses. Sanskrit and modern Indo-Aryan languages use rela-
tive stems, Hittite and Modern Slavic and Baltic languages interrogative stems.
However, as we will see in 5.3, there is an older layer of relative correlatopic
markers based on the relative stem in Baltic and Slavic. To the extent interroga-
tive stems occur in correlative constructions, information questions may have
played a role in their grammaticalization. However, correlative constructions
are very different from question-answer pairs in that they connect two different
states of affairs which share a referent or a set of referents that is not named or

at least not fully named (as it is identified by the two events), whereas question-answer pairs provide information about a single state of affairs and are linked by a referent that is not named in the question but named in the answer.

5.2 Correlative constructions degenerate when used for non-identity

Not all temporal relations lend themselves equally well to correlative construal. There is identity of time only in simultaneous pairs of events, not if anterior and posterior events are involved. It can therefore be expected that correlative constructions in temporal clauses are primarily used for simultaneous temporal relations, notably for WHEN. (29) illustrates a correlative construction with a WHEN-clause from Lithuanian exhibiting the major hallmarks of prototypical correlative constructions.

(29) Lithuanian: proverb involving simultaneity (http://patarles.dainutek-stai.lt)

Kada	*kepa,*	***tada***	*kvepia.*
when	bake.PRS.3	**then**	smell.PRS.3

'When baking is done, then it smells.'

The correlatopic clause is topical and precedes the correlaphoric clause with the demonstrative adverb *tada* 'then' as anaphor for time. Both correlative markers have the same focus-associated initial position in their phrases, the position an interrogative would have in Lithuanian. In Modern Lithuanian, the interrogative *k*-set is used in correlatopic clauses and the distal demonstrative *t*-set of forms is used in correlaphoric phrases. *Kada* 'when' and *tada* 'then' clearly express the category time and are coreferential (refer to the same time). These prototypical properties are listed in the left column of Table 10. However, many constructions displaying some properties of correlative constructions also have some of the properties listed in the right column of Table 10 under the heading "Symptoms of degeneration". I will refer to constructions that have properties from both columns as "pseudo-correlative constructions". I will argue in this section that the constructions reminiscent of correlative constructions in Baltic LATE clauses are actually pseudo-correlative and that the number of symptoms of degeneration increases to the extent that the constructions are used for non-simultaneous temporal relationships.

Table 10: Properties of correlative and pseudo-correlative constructions

	Prototypical property of correlative construction	Symptoms of degeneration (examples in parenthesis)
(a)	Correlatopic clause precedes	(Pseudo-)correlatopic clause follows (33)
(b)	Correlaphoric marker present	Correlaphoric marker missing (34)
(c)	The markers have the same focus-associated position in their clauses	Different position of markers in their clauses (35)
(d)	Morphological component for category reflects the category referred to	Morphological component for category not dedicated to the category referred to (30)
(e)	Correlatopic marker is externally motivated as an interrogative or relative form	Correlatopic marker is not an interrogative or relative synchronically (32)
(f)	Correlaphoric marker is externally motivated as demonstrative or anaphoric form	Correlaphoric marker is not a demonstrative or anaphoric form synchronically
(g)	Markers denote coreferential units	There is some formal indication that the markers do not denote coreferential units (36, 37)

Let us now look at some examples with increasing degrees of degeneration. (30) with an AS.LONG.AS-clause is quite similar to (29) structurally. However, the category expressed is not time in general; Lithuanian *kol* 'how long?' and *tol* 'as long' do not just express time as *kada/tada* 'when/then' do. *Tol* can also be used in a local sense: *vandens buvo ligi tol* [water.GEN.SG be.PST.3 until CRPH] 'the water went up to that point' (Lyberis 1988, 832). This is because *kol/tol* do not originate in the semantic field of time, but originally express quantity 'how often/ how long? / as often/as long'; compare the adjective Lithuanian *tolus* 'distant, far away' with the same etymology (from distal demonstrative *t*-stem). Hence, we have to deal with cross-field origin from the category of quantity or distance. Put differently, there is no component in the form that properly expresses the category time irrespective of the temporal relation. This is a first symptom of degeneration. Note also that *tol* is predominantly used in (pseudo-)correlative constructions. Anaphors in prototypical correlative constructions are hardly ever strictly dedicated to a particular construction type.

(30) Lithuanian correlative construction (Julita Varanauskienė, LILA)

...**kol**	*negrąžinsim*,	**tol**	*vargsim.*
as.long.as	NEG.return.FUT.1PL	**CRPH**	suffer.FUT.1PL

'[Most likely because we took loans] Until we pay back, we will be poor'

The Latgalian marker *cikom* clearly originates from the category of quantity and is related to Latvian/Latgalian *cik?*, Lithuanian *kiek?* 'how much?' with a suffix *-ām* (Latgalian *-om*) often encountered in adverbs (Petit 2015, 104). Example (31) illustrates quantitative *cik* and temporal *cikom* in the same pseudo-correlative clause with a co-reference of quantity of time and with an interrogative main clause, which turns the main clause into the topic, so that the correlative marker in the main clause is not anaphoric as is usually the case.

(31) Latgalian (Jōņs Klīdzējs, *Debešu puse*; Kursīte & Stafecka 1995, 187)

...**par**	**cik**	*gon*	*saule*	*nūgrymst*	*zamōk,*
by	**how.much**	PTC	sun.NOM.SG	down.sink.PRS.3	low.COMP
cikom	*saskaita*		*leidz*	*symtam?*	
as.long.as	together.count.PRS.3		until	hundred.DAT	

'...how much does the sun go down, until/while you count to hundred?'

The Modern Latvian counterparts of Lithuanian *kol/tol* exhibit further symptoms of degeneration. Unlike Lithuanian *kol?* 'how long?', Latvian *kamēr* cannot be used as an interrogative and the corresponding correlaphoric markers *tikām* (32) and *tikmēr*, even though they have the *t-* of the demonstrative series, are not fully paradigmatic counterparts. The correlaphoric form *tamēr(t)* is attested, but is marginal (M-E IV 129).

(32) Latvian (Pasakas gr11/1100105): correlative construction in AS.LONG.AS domain

Kamēr	*viens*	*puisis*	*strādā,*	
as.long.as	one.NOM.SG.M	lad(M).NOM.SG	work.PRS.3	
tikām	*abi*	*pārējie*		*var*
CRPH	both.NOM.PL.M	remaining.NOM.PL.M.DEF		can.PRS.3
atpūsties.				
rest.INF.RFL				

'As long as one young man works, [during this time] the two other ones can rest.'

Latgalian is intermediate. The forms *tikom/cikom* are parallel phonologically, but *cikom* does not seem to be used as an interrogative. Table 11 also lists Livonian, which has borrowed *kamet* from Latvian dialects. Neither the borrowed *kamet* nor the inherited *kuņtš*, formed from a Finnic interrogative stem *ku-* with a terminative suffix, can be used as interrogatives in Livonian.

Table 11: Pseudo-correlative markers for AS.LONG.AS~UNTIL in Baltic languages and Livonian

Lithuanian	*tol...kol*
Latgalian	*tikom...cikom*
Latvian	*tikām...kamēr, tikmēr...kamēr*
Livonian	*seņtš...kuņtš, seņtš kōgin...kamet*

Example (33) shows another typical symptom of degeneration of *kol/tol* in Lithuanian. In (33), the pseudo-correlatopic clause is postposed and does not have any topical function.

(33) Lithuanian: proverbs involving simultaneity (http://patarles.dainutekstai.lt)

Tol   *mokinamės,*   **kol**   *gyvi*   *esame*
CRPH   teach.PRS.1PL.RFL   as.long.as   alive.NOM.PL.M   be.PRS.1PL
'We are learning as long as we live.'

We might, of course, say that this is an inversion of a correlative construction (Lehmann 1984, 131). However, it is the order in (30) that is the exception. Clauses with *tol* more often precede and if the temporal clause with *kol* is postposed, there is often no correlaphoric marker in the main clause. This is illustrated with a Latgalian example with *cikom* 'as long as' in (34).

(34) Latgalian (Jōņs Klīdzējs, *Debešu puse*; Kursīte & Stafecka 1995, 187)

Cikom   *tu*   *tik*   *ilgi*   *guli,*
as.long.as   2SG.NOM   so.much   long.ADV   sleep.PRS.2SG,
tovu   *Žiku*   *aizvad.*
your.SG.ACC.SG   Žiks.ACC   away.lead.PRS.3
'[Sleep, sleep...sleep deeply!] While you are sleeping, we will take away your dog Zhiks'

The by far most frequent position of the pseudo-correlaphoric marker *tol* is immediately preceding the temporal clause with *kol* as in (35), where the markers clearly do not have the same parallel position in their clauses.

(35) Lithuanian (J. Ivanauskaitė, *Placebas*, 2009, LILA): Non-canonical correlative construction

Tikros,	*gilios,*	*visa*	*apimančios*
true.GEN.SG.F	deep.GEN.SG.F	all.NA	embrace.PRS.PA.GEN.SG.F

meilės,	*trunkančios*	***tol,***	***kol***	*išskirs*
love(F).GEN.SG	endure.PRS.PA.GEN.SG.F	CRPH	until	part.FUT.3

mirtis.
death(M).NOM.SG

'True, deep and all-embracing love, enduring until death parts [them].'

It might be argued that the clause-final position is also a focus position and that the positions then, although not parallel, at least have similar functions. However, in UNTIL-clauses, as in (36), there is another problem. It is not clear whether *tol* and *kol* are coreferential. In UNTIL-constructions, the main clause expresses an interval and the UNTIL-clause is usually punctual and expresses the change of state terminating the interval expressed by the main clause. Accordingly, Lithuanian *tol* and Latvian *tikām* tend to have durative interpretation. This is clearly visible for Latvian *tikām* when it is iterated to express an unexpectedly long period of time, as in (36). However, *kamēr* cannot be repeated, and it would not make any sense in (36), since it is punctual.

(36) Latvian (http://pasakas.lfk.lv/wiki/132101062): repeated correlative word

Viens	*saimnieks*	***tikām,***	***tikām***
one.NOM.SG.M	peasant.NOM.SG.M	CRPH	CRPH

līdzis		*Rīgā*	*vienu*	*pūķi,*
haggle.PST.PA.NOM.SG.M		Riga.LOC	one.ACC.SG	dragon.ACC.SG

kamēr	*par*	*lielu*	*naudu*	*salīdzis.*
until	for	big.ACC.SG	money.ACC.SG	buy.PST.PA.NOM.SG.M

German translation given in the source: *Ein Bauer feilschte und feilschte beim Kauf eines Drachens, bis er ihn schließlich für viel Geld erstand.*

'A peasant haggled and haggled over the purchase of a dragon in Riga until he finally bought it for a lot of money.'

This is a variant of a widespread construction attested in many languages and especially popular in fairytales for the expression of a longish activity with

a finally desirable result, where the activity word is repeated. Usually the activity and the result words are verbs (*meklēju, meklēju, kamēr sammeklēju* 'I searched and searched until I found'). Another similar construction found in Latvian fairytales uses *arvienu, arvienu, kamēr* [always, always, until], which is clearly not correlative.

In Lithuanian, *tol*, but not *kol*, is sometimes preceded by *iki* 'until' as in (37), which suggests that *kol* is punctual by itself, whereas *tol* is not.

(37) Lithuanian https://tv.lrytas.lt/zinios/pramogos/2017/05/12/news/d-me-
izelyte-is-l-kernagio-vestuviu-isvaziavo-paskutine-dainavo-iki-tol-kol-
-is-jos-ateme-mikrofona-1683723/ [2018-11-24]

dainavo	*iki*	*tol,*	*kol*	*iš*	*jos*	*atėmė*
sing.PST.3	until	CRPH,	until	from	3.GEN.SG.F	away.take.PST.3

mikrofoną.
microphone.ACC.SG
'she sang until they took away the microphone from her'

Lithuanian *kol* is ambiguous between 'as long as' and 'until', and using the preposition *iki* 'until' with *tol* is a possibility to resolve the ambiguity, so that *iki tol, kol* is on its way to be reanalyzed as an UNTIL-connector as a whole expression. However, there are still some contexts where the temporal clause with *iki tol, kol* is an AS.LONG.AS-clause, and this is notably the case in constructions of the kind *nuo…iki…* 'from…to…' when a temporal clause is added in the second slot, as in (38):

(38) Lithuanian
http://www.kurjeris.lt/layout/set/print/Priedai/Verslo-aleja/2014-m.-
rugsejo/Karsta-vasara-atgaivino-ne-tik-ledu-valgytojus-bet-ir-ju-par-
davejus [2018-11-24]

dirba	*nuo*	*9*	*val.*	*iki*	*tol,*
work.PRS.3	from	nine.GEN.SG	hour.GEN.SG	until	CRPH

kol	*yra*	*klientų.*
as.long.as	be.PRS.3	client.GEN.PL

'is open from nine until as long as there are clients'

We have seen in Section 4 that the Gliks Bible in Old Latvian has *tiekams* as UNTIL-connector instead of the expected *ciekams*. *Ciekams*, however, is sporadically attested with the meaning 'as long as'. These forms must go back to a pseudo-correlative construction *…tiekams, (c)iekams…*, with the non-parallel posi-

tion of the correlaphoric marker adjacent to the following correlatopic marker characteristic of degenerated correlative constructions; *tiekams* was originally part of the main clause. It is not unexpected that *tiekams* as a reanalyzed connector is mainly restricted to UNTIL, since the development presupposes a high degree of degeneration of correlative constructions as it is more characteristic for UNTIL than for AS.LONG.AS.

We may conclude that the UNTIL-domain is less appropriate for expression by a correlative construction than the AS.LONG.AS-domain, and the AS.LONG.AS-domain is less appropriate for expression by a correlative construction than the WHEN-domain, which most clearly stands for temporal identity in temporal clauses. Accordingly, it is not unexpected that correlative constructions in AS.LONG.AS-clauses exhibit symptoms of degeneration, and this holds even more for UNTIL-clauses.

In this section we have concentrated on interrogative-based *k/c*-forms, which represent the new generation of correlatopic markers in Lithuanian, Latvian and Latgalian. In 5.3 we will now turn to the older generation of relative-based forms, which are even more degenerated.

5.3 Two generations of forms of correlative origin: *k-* and *(j)i-*

Section 5.2 discussed the interrogative-based correlatopic markers in the AS.LONG.AS-domain in Modern Baltic languages, which have expanded to the UNTIL-domain, have cross-field origin in quantity, size or length, and display increasingly more symptoms of degeneration especially when used in the UNTIL-domain. In this section I will argue that Lithuanian *iki* 'until' and Latvian *iekam(s)* 'before, until', which are not correlative synchronically any more, reflect an older generation of Baltic correlatopic markers, which were relative-stem based. Put differently, Lithuanian *kol(ei)*, Latgalian *cikom* and Latvian *kamēr* are nothing else but the new *iki* (Lithuanian) and *iekam(s)*, *ikām* (Latvian). In order to demonstrate that this is the case, I have to make plausible (i) that the forms with *i(e)k-* have been used as correlatopic markers earlier, (ii) that their original meaning in temporal clauses was 'as long as', (iii) that they can easily shift to the UNTIL-, FÖRRÄN-, and BEFORE-domains, and (iv) that they derive from the Indo-European relative stem **i̯o-*, which is used in correlatopic markers in Sanskrit. This section heavily draws on the work by Hermann (1912) on the development of subordinate clauses in Lithuanian and by Petit (2015) on the origin of Baltic distributive pronouns.

Hermann (1912, 86) observes that adverbial connectors derived from *$i̯o$- in Lithuanian, Latvian and Slavic tend to be replaced by forms from the interrogative stem *ko-, which, according to him, is connected to a parallel shift in relative clauses from forms with *$i̯o$- to interrogative-based forms from the stem *ko-. However, loss of *$i̯o$-forms is not equally advanced in all adverbial clauses. For instance, in simultaneous temporal clauses, Lithuanian *kada* 'when' is the only attested form, and in Old Slavic *jeda* is only attested as a relic with a different meaning 'if'. In conditional, causal, and purpose clauses, however, *$i̯o$-forms are still retained. Hermann (1912, 88) explains the expansion of *ko-forms and their distribution by their association with correlative constructions: „Daran wird, wie ich vermute, das korrelative Verhältnis schuld gewesen sein." Given that simultaneous temporal relations are better suited for being expressed by correlative constructions than posterior relations are (see 5.2), it is expected that correlative-based temporal connectors are most easily renewed in the WHEN-, WHILE- and AS.LONG.AS-relations.

Petit (2015, 121) shows that Baltic *$ik(a)$ has undergone a semantic development from quantitative meaning 'as much as' to durativity 'as long as' and further to telicity 'until', and that 'as much as' is also the source for distributive pronouns 'every'. He also argues that the prepositional function of Lithuanian *iki* 'until' is secondary and that Lithuanian *iki* 'until' was originally a connector. Petit emphasizes the importance of the archaism of Latvian folksongs (dainas) for the semantic reconstruction. Indeed, the form *ikām* is attested both with the meaning 'while/as.often.as' (39) and in a correlative construction together with the correlaphoric form *tikām* (40) in the dainas:

(39) Latvian dainas (BW 22416-0 http://www.dainuskapis.lv; M-E II 704)
    Ikàm   *tautas*   *diendusî,*   *Es*   *pie*   *mātes*
    while   suitor.NOM.PL day.nap.LOC.SG   I.NOM   at   mother.GEN.SG
    launagâ.
    lunch.LOC.SG
    '[My mother did well that she married me to the close neighborhood.] when/whenever/as often as the husband and his family take a daytime nap, I am with my mother at lunch time.'

(40) Latvian dainas (BW 1687-0 http://www.dainuskapis.lv)
[*Utubunga, utubunga / Mūsu kunga meža sargs: /*]

Ikam	*uts*	*izbungaja,/*
while/before	louse.ACC.PL	out.drum/slay.PST.3
Tikam	*mežu*	*izlaupiju.*
CRPH	forest.ACC.SG	out.rob.PST.3

'[Louse brat, louse brat / the forest warden of our landowner /] while he slays all lice (before he has slain the lice) I rob all the wood (I have robbed the wood).'

Example (39) clearly demonstrates that *ikām* could express temporal simultaneity and the generalizing meaning of (39) matches well with the original quantitative meaning 'as much as, as often as'. Example (40) clearly shows that *ikām* is used as a correlatopic form with the correlaphoric counterpart *tikām*. Example (40) also shows how we can easily get from 'when, as long as' to 'before' by means of aspect. (40) is a poacher's abusive song about the powerless forest warden. The singer boasts that he has finished whatever he was up to in the forest before the forest warden has even slain all his lice. Both predicates are accomplishments whose durative intervals are parallel, but whose termination is not simultaneous. Temporal clauses where the predicates both in main and subordinate clause are accomplishments are thus an ideal context for shifting the meaning of a simultaneous temporal connector to posteriority. As Petit (2015, 121) puts it "aspect is the basis that makes the ['as long as'/'until'] polysemy of these conjunctions possible". See Section 8 for further discussion of the role of accomplishments for the 'as long as'/'until' polysemy.

The remaining problem is the historical phonology of Lithuanian *iki* and Latvian *iekam(s)*, *ikām*. Why do these forms not have initial *j-* if they derive from the relative stem **i̯o/i̯e-*? The forms with **ik-* look like Indo-European zero degree forms, and if they should derive from an Indo-European zero degree, *#i* (rather than *#ji-*) would be the correct reflex. The only Lithuanian word with *#ji-* is the third person pronoun *jis, ji* 'he, she', where *#j-* must be due to analogy to case forms with other following vowels. However, if *ik* is shortened from **jeik > jiek*, it is likely that **#jik* would have yielded *ik* since *j* is regularly lost before *i* when following a consonant. In Lithuanian, forms with *jie-* are attested (Smoczyński 2018, 458, 454): *jiek* 'every' and the noun *(j)iekà* '(water) level' in *Toj pačioj jiekoj Nemunas stovi* [that.LOC.SG.F same.LOC.SG.F size(F).LOC.SG Nemunas.NOM stand.PRS.3] 'The River Nemunas stands on the same water level', but it cannot be excluded that there has been a development *#ie- > #jie-*. Petit (2015,

114) suggests that the demonstrative stem *id- might have been used in a correl-ative construction *jadán…*idán 'when…then' and that the forms with #i- might be due to analogy with this stem. That this stem was involved in correlative constructions can be seen in the Old Church Slavonic connector donьdeže 'until, as long as' < *do-ьde-že [until-here-PARTICLE] with analogical -n- from certain combinations of prepositions with pronouns (Vasmer 1976 I, 363). We may sum-marize that it is not entirely clear, how exactly the forms Lithuanian iki and Latvian iekam(s), ikām have developed, but it is clear beyond any doubt that these forms were originally used in correlative constructions.

We can conclude that the forms with i(e)k- have been used as correlatopic markers earlier, that their original meaning in temporal clauses was 'as long as' (< 'as much as, as often as'), and that accomplishment predicates provide a con-text where AS.LONG.AS-clauses can be reinterpreted as UNTIL- or BEFORE-clauses.

6. Expanded negation in BEFORE- and UNTIL-clauses

6.1 Introduction

It is well known in the typological literature that negation can be part of the construction of BEFORE- and UNTIL-clauses (Thompson, Longacre & Hwang 2007, 247–248; Kortmann 1997, 184; Cristofaro 2003, 62–63). To give the phe-nomenon a name, I will speak of expanded negation in temporal clauses in all cases where typical translation equivalents in many other languages lack ne-gation irrespective of whether or not negation is expletive (does not have the function of expressing negative polarity). For expletive negation, see Section 7.

In the reference grammar sources of Hetterle's (2015, 136, 140) stratified world-wide sample, negation is attested as part of the BEFORE-construction in 16 of 45 languages, but only in one language as part of an UNTIL-construction. But even if expanded negation seems to be less common cross-linguistically in UNTIL-clauses, it is very frequent in Eastern Europe and South Asia and is well-attested in the sample of this study.

Functional explanations have been proposed to account for expanded nega-tion, among other things, by Hetterle (2015) and Kortmann (1997). For Hetterle, the observation that posterior (BEFORE-)clauses are commonly negated cross-linguistically is one instance of demonstrating the "extremely close relation between linguistic form and function" (Hetterle 2015, 145–146). "Conceptually, the [state of affairs] depicted in the adverbial clause is construed as not having taken place yet at the time of the main clause. This negative relation translates

directly into linguistic form" (Hetterle 2015, 136). For Kortmann (1997, 183) 'as long as' and 'until' can be viewed as complements of each other: "Roughly, the propositional schema 'q, until p' asserts 'q, as long as not-p'". Both explanations are periphrasis-based and both suggest that expanded negation originates within the field of temporal clauses. In this section, I will show that cross-field origin of expanded negation from such sources as negative manner, negative condition, and negative hortative clauses, is as relevant as intra-field origin. Paraphrases are also involved, but I will argue that the role they play is a more local one than suggested by Hetterle and Kortmann.

According to their different origin, we may distinguish two kinds of expanded negation: intra-field expansion, illustrated by (41) from German, and cross-field expansion, as in (42) from Catalan. In intra-field expansion, the affirmative counterpart of the construction is also from the semantic field of temporal clauses. If there is a connector, it is temporal, but not dedicated to 'before' or 'until' (*als* 'when' in (41)). Since temporal clauses always express (potential) changes of state, negation in intra-field expansion has to be phasal ('not yet' or 'no longer') semantically. Intra-field expansion is reminiscent of paraphrases ('before' is roughly the same as 'at the time when not yet'). Intra-field expansion need not affect the whole BEFORE- or UNTIL-domain. In German, it is very limited. (41) is the only example in the N.T.

(41) German (neue, 44007002): intra-field expansion of negation to BEFORE
[*Der Gott, dem alle Herrlichkeit gehört, erschien unserem Vater Abraham in Mesopotamien,*]
als er **noch nicht** *nach Haran gezogen war.*
when he.NOM **not yet** to Haran move.P.PST be.PST.3SG
'[The God of glory appeared to our father Abraham while he was in Mesopotamia,] **before** he settled in Haran.'

In cross-field expansion, the negation originates outside the semantic field of temporal clauses, in negative manner clauses, negative conditional clauses, or negative hortative clauses. The negation need not be standard negation. In (42) from Catalan it is the connector dedicated to negative manner clauses *sense* 'without'. Negation from cross-field expansion is typically not phasal negation. Cross-field expansions are not temporal paraphrases of 'before' or 'until'. Like intra-field expansions, cross-field expansions can be more or less limited. This is simply a matter of how much the construction has expanded. Catalan *sense* in temporal clauses is highly limited (7 occurrences in the N.T.), and all examples

are in the ғöʀʀäɴ cluster and are semantically akin to negative manner and negative condition clauses.

(42) Catalan (bci, 42002026): negative manner connector in ғöʀʀäɴ

..no	*veuria*	*la*	*mort*	***sense***	*haver*
ɴᴇɢ	see.ᴄᴏɴᴅ.3sɢ	ᴅᴇғ.ғ.sɢ	death(ғ).sɢ	**without**	have.ɪɴғ

vist	*el*	*Messies*	*del*	*Senyor.*
see.ᴘᴄᴛᴘ.ᴘsᴛ	ᴅᴇғ.ᴍ.sɢ	Messiah	of.ᴅᴇғ.sɢ.ᴍ	lord(ᴍ).sɢ

'...he would not see death **before** he would see the Lord's Christ'

The Baltic and Slavic languages are rich in different types of expanded negation in ᴜɴᴛɪʟ and ʙᴇғᴏʀᴇ as summarized in Table 12. The different types will be discussed one-by-one in the following subsections.

Table 12: Diversity of expanded negation in Baltic and Slavic

	Old Lithuanian (Bretkūnas)	Old Lithuanian (Chyliński)	Lithuanian	Latgalian	Latvian	Old Church Slavonic	Czech	Polish	Russian
'not yet' in ʙᴇғᴏʀᴇ			x						
Standard negation in ʙᴇғᴏʀᴇ						xx			
Negation through comparison	xx	xx	x	xx	(x)		xx	xx	
Neg. connector in ғöʀʀäɴ/ᴜɴᴛɪʟ	(x)	xx					x		
Standard negator in ғöʀʀäɴ/ᴜɴᴛɪʟ			(x)	(x)	(x)		xx	x	xx

xx: dominant; x: partly; (x): rare

The major aim will be to determine whether the different types of expanded negation represent cases of intra-field or cross-field expansions (or mixtures of intra-field and cross-field expansions). As we will see, this is not always as easy to determine as in (41) and (42).

6.2 'not yet' in BEFORE

While 'not yet' in BEFORE is common on a global scale (Hetterle 2015, 136, 140), it is rather rare in Indo-European and in European languages. Hittite is an Indo-European language too old to be represented in the N.T. sample, where 'not yet' in BEFORE was dominant, as illustrated in (43). The case of Hittite suggests that the strategy was probably more common in Indo-European at earlier times.

(43) Hittite (Lauffenburger 2008, 111, 113): 'not yet' in BEFORE

nu-mu arahzenas	KUR.KUR	^{LÚ}KÚR	*kuēs*		*kururiyahhir*
nu	*ANA*	KUR	^{LÚ}KÚR	***nāwi***	***kuitman***	*kuēdanikki*
PTC	DAT	land	enemy	not.yet	while	any.DAT/LOC.SG
pāun
go.PST.1SG

'[these neighboring countries that had started to attack me] before I leave against any enemy country'.

If we disregard marginal uses of 'not yet' in BEFORE as in (41) from German, 'not yet' in BEFORE in the N.T. sample is attested in Modern Lithuanian, Western Armenian, and Ossetic. In none of these doculects does it cover the whole BEFORE domain. In Lithuanian 'not yet' in BEFORE can occur both in a non-finite converb construction as in (44), originating from an absolute dative construction, and with the simultaneous temporal connector *kai* 'as', as in (45). However, both constructions contain a past participle or converb form. Thus, the Lithuanian 'not yet' construction in BEFORE can be seen as a negation of a corresponding anterior clause. This suggests that the basic function of these clauses is to deny anteriority. This is particularly useful in contexts where the order of events is the major issue, which holds for both (44) and (45). The two clauses in (45) express location of one person in different places. As a consequence, simultaneity is excluded. In that case, the denial of anteriority is tantamount with posteriority.

(44) Lithuanian (40001018):

| ***dar*** | ***ne**pradėjus* | *jiems* | *kartu* | *gyventi,* |
| yet | NEG.begin.PST.CVB | 3.DAT.PL.M | together | live.INF |
| [*ji tapo nėščia iš Šventosios Dvasios.*] |

'but before they came together, she was found to be pregnant by the Holy Spirit.'

(45) Lithuanian (44007002)

[*Šlovės Dievas apsireiškė mūsų tėvui Abraomui Mesopotamijoje,*]

kai	*jis*		**dar**	**ne**buvo	*persikėlęs*
as	3.NOM.SG.M		yet	NEG.be.PST.3	move.RFL.PST.PA.NOM.SG.M
į	*Charaną,*				
into	Haran.ACC.SG				

'The God of glory appeared to our father Abraham while he was in Mesopotamia, before he settled in Haran.'

Lithuanian 'not yet' expanded negation in BEFORE is a clear case of intra-field expansion. This holds both for the converb construction in (44) and the construction with a WHEN-connector in (45).

6.3 Negation in BEFORE from negative hortatives

Old Church Slavonic consistently uses negation in the BEFORE-construction. The negation marker follows the complex connector *prěžde daže*, as shown in (46).

(46) Old Church Slavonic (43004049)

http://syntacticus.org/sentence/proiel:20170214:marianus:41840

...sъnidi	*prěžde*	*daže*	*ne*	*oumьretъ*
descend(PFV).IMP.2SG	before	HORT.SUB	NEG	die(PFV).PRS.3SG
otročę	*moe*			
son(N).NOM.SG	my.NOM.SG.N			

'...come down before my child dies!'

Prěžde is an adverb 'earlier, before' with comparative morphology (**prěd-j-e*) and *daže* consists of the hortative particle *da* plus the element *-že*, which often marks subordinate clauses (for instance in relative clauses, see (47)).[8] An earlier stage of grammaticalization of the construction *prěžde daže ne* 'before' cannot be traced. However, it is not unlikely that it originated from negative hortatives as in (47). The position of *-že* indicates that the subordinator is *daže* and that *prěžde* 'before' is still a temporal adverb.

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[8] The only other context *daže* occurs in the text is in *daže do* as an emphasizer of the preposition *do* 'until'.

(47) Old Church Slavonic (40024017)
      http://syntacticus.org/sentence/proiel:20170214:marianus:39472

iže	*na*	*krově*	***da***	***ne***	*sъlazitъ*
REL.NOM.PL.M	on	roof.LOC.SG,	**HORT**	**NEG**	descend(IPFV).PRS.3SG

vъzęti	*eže*	*estъ*	*vъ*	*xramě*
take(PFV).INF	REL.NOM.SG.N	be(IPFV).PRS.3SG	in	house.LOC.SG

ego.
3.GEN.SG.M

'The one who is on his housetop must not come down to take things out of his house'

The origin of the Old Church Slavonic negation would then be parallel to the Maithili example in (48), where a negative hortative clause is used in the same context as Old Church Slavonic (46). In Maithili, this construction has not further spread across the BEFORE-domain.[9]

(48) Maithili (43004049)

...एखन चलू। नहि तँ हमर बौआ मरि जायत।

ekhan	*cəl-u,*	***nəi tæ̃***	*həm-ra*	*bəua*	*məir ja-it*
now	walk-IMP[2.HON]	**not therefore**	I-ACC/DAT	child	die go-IPFV

'...come down before my child dies!'

Given the total spread of the construction across BEFORE in Old Church Slavonic, it is difficult to strictly prove that the scenario suggested in this section is correct. However, it is very unlikely that the construction represents an intra-field expansion; *da* or *daže* are not used in any other temporal clauses, there is no intra-field periphrasis, and the negation is not phasal. It is therefore safe to conclude that the Old Church Slavonic construction reflects some kind of cross-field expansion.

Catalan *abans no* 'before not' might also sort here. According to Wheeler *et al.* (2002, 562) the semantic source of expletive negation in Catalan is "the hope that something will *not* happen".

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[9] The construction is reminiscent of negative purpose clauses with the discontinuous connector *kəhī...tæ̃* [lest...therefore] 'lest' (Yadav 1996, 368).

6.4 Negation marking from the comparison construction in BEFORE

Expanded negation marking in BEFORE can also originate from comparison constructions. In many languages, markers of 'before' are combined with a comparison construction, and this irrespective of whether comparison is of the separative type (Erzya Mordvin *tuje-ma-do ikel'e* [depart-ACN-ABL before] 'before departing') or particle type (Modern Russian *prežde čem*, German [Luther] *ehe denn*, Danish *før-end* [before-than]; see Stassen 1985 for the typology of comparison constructions). Particles in comparison constructions can originate from negation or contain a negation marker, and this is particularly common in Indo-European in Baltic and Slavic. (49) from Latgalian is interesting in that the comparative particle *na* is on a morphological level identical with the negation marker and only different from negation by its distribution (negation is preverbal). More common in Latgalian is the connector *na-kai* [not-how].

(49) Latgalian (43001048): negation morpheme with comparison in BEFORE

Agrōk	***na***	*Filips*	*tevi*	*paaicynōja,*
early.COMP	NEG	Philip.NOM	2SG.ACC	invite.PST.3

Es	*tevi*	*redzēju*	*zam*	*figu*	*kūka.*
I.NOM	2SG.ACC	see.PST.1SG	under	fig.GEN.PL	tree.GEN.SG

'Before Philip called you, when you were under the fig tree, I saw you.'

In the sample, comparison particles containing or consisting of negation markers are attested for Modern Czech ces [39], Lower Sorbian DBS [23], Lithuanian Chyliński liC [22], Polish POL [21], Czech CES [20], Lithuanian Bretkūnas liB [18], Ukrainian ukr [16], Croatian hrv [15], Latgalian ltg [8], Russian RUS [11], Latvian Gliks laG [6], Lithuanian li1 [2], li2 [2], Polish pol [1], and Latvian la1 [1]. In the Modern Lithuanian text, the particle *negu* 'than' (containing *ne-* 'not') is found only in combination with *pirm-iau* [first-COMP.ADV], see example (18) above, which is overtly marked for comparison morphologically, but not with *prieš* 'before, in front of'. This suggests that negation marking originating in comparative construction is most clearly motivated if there is a temporal adverb in the construction with a clear comparative meaning 'earlier' as is also the case in (49) from Latgalian.

The highest frequency of markers of comparative origin with negation can be found in older West Slavic and older Lithuanian texts, and in Modern Czech, where *niž* got a life of its own and has expanded further to the UNTIL-domain. In Czech and Lower Sorbian, the temporal adverb can be omitted and the compar-

ison particle can be used on its own to express the meaning 'before' (For Lower Sorbian, Muka 2008 [1911-28] says *ńežli* 'than; before (elliptically); except'). (50) from Lower Sorbian (translated from the German Luther Bible) illustrates that this may have happened because the temporal adverb did not have to be adjacent to the comparison particle. (50) also shows that it is the comparison particle that is the subordinator, which makes it plausible from a syntactic point of view that the syntactically optional adverb is omitted rather than the syntactically obligatory subordinator.

(50) Lower Sorbian (1548) (44013024): temporal adverb dislocated from comparative particle

Jak	*to*	*tesch*	*Jan /*	*ie*	***prwey***
as	PTC	also	Jan.NOM	be.PRS.3SG	**first/before**

predgowal		*temu*		*luedu*
preach.PTCP.PST.M.SG		DEF.DAT.SG.M		people.DAT.SG.M

Israelskemu, /	*tu*	*ksczesniczu*	*tego*
Israelian.DAT.SG.M	DEF.ACC.SG.F	baptism.ACC.SG	DEF.GEN.SG.M

Pokaianå,	***neschly***	*won*	*se*	*pochopy.*
repentance.GEN.SG	**than**	3.NOM.SG.M	RFL	begin.AOR.3SG

wie denn Johannes zuvor dem Volk Israel predigte die Taufe der Buße, ehe denn er anfing. 'Before his coming John had publicly proclaimed a baptism of repentance to all the people of Israel.'

Modern Polish also has an elliptical comparative subordinator *zanim* [*za-nim* behind-3.INS.SG.N] in BEFORE, but originating from a locative comparative strategy with *za* 'behind' (Koptjevskaja-Tamm & Wälchli 2001, 684).

A development comparison > 'before' makes sense only if 'before' is the only temporal relation that displays it. Del Prete (2008) argues for Italian that there is asymmetry between *prima* 'before' and *dopo* 'after' in that only the former exhibits properties of a comparative. The data considered here suggest that there is similar asymmetry in Slavic and Baltic. However, there are also languages like Latin (*postquam* 'after', *antequam/priusquam* 'before' with the comparative particle *quam*) and Erzya Mordvin (ACN-*do mejl'e* 'after' with the separative ablative marker -*do*) where comparison also extends to 'after'. As expected, comparison of inequality goes together with temporal relations of non-identity rather than of simultaneity (see also Section 4.1).

Negation marking in BEFORE having expanded together with comparative constructions is a clear case of cross-field origin of expanded negation in temporal clauses.

6.5 Negative manner connectors expanding to temporal clauses

In Old Lithuanian, the connector of negative manner clauses *net* 'without that' has expanded to temporal clauses, first to a particular micro-domain of FÖRRÄN and then to all of FÖRRÄN and UNTIL. The form *net* consists of the negator *ne* plus some demonstrative element (the same *-t* as in as in *bet* 'but'). In Modern Lithuanian *net* is a focus particle 'even', but this is a later development.

In the Bible translation by Bretkūnas, *net* is restricted to a micro-domain of FÖRRÄN exemplified in (51).

(51) Old Lithuanian, Bretkūnas (40005026): negative connector in FÖRRÄN domain

...neischeisi	*isch*	*tę,*	***net***	*ußumokeies*
NEG.out.go.FUT.2SG	out.of	there	**until**	pay_back.PST.PA.NOM.SG.M

paskiausį	*jodikį*
last.ACC.SG	penny.ACC.SG

'you will never come out of there until you have paid back the last penny'

While *net* in Bretkūnas' Old Lithuanian translation (1579–1590) has a very restricted distribution similar to the standard negation marker in Modern Lithuanian and Latvian in the FÖRRÄN domain (see 6.6), it has expanded all the way through FÖRRÄN and UNTIL in Chyliński's (1656–1660) Old Lithuanian translation, and even to the intermediate zone between UNTIL and AS.LONG.AS, as can be seen in (52).

(52) Old Lithuanian, Chyliński (41014032): negative connector in UNTIL~AS.LONG.AS

Sedekit	*ćia,*	***net***	*pasimełsiu*
sit.IMP.2PL	here,	**until**	DLM.RFL.pray.FUT.1SG

'Sit here while I pray.'

Old Lithuanian *net* 'without, save, until' is a clear case of cross-field expansion, very much in the same way as Catalan *sense* 'without' discussed in 6.1.

A similar development has taken place in Turkish and Azerbaijani. These languages also have connectors containing a negation marker originating in negative manner clauses and spreading to the same micro-domain in FÖRRÄN which is semantically associated with negative manner. However, their further expansion from the FÖRRÄN domain does not go to UNTIL, but in the opposite di-

rection to BEFORE. In Turkish and Azerbaijani, negative manner clauses (53) and 'before' clauses are expressed with the form *-mA(z)-dAn*, consisting of negation *-mA* (distinct from the verbal noun *-mA* by stress on the syllable preceding it; see Kornfilt 1997, 71, 73) and ablative *-dAn*. The form did not contain an ablative originally (Lewis 2000, 182), which was introduced in analogy with other constructions used in BEFORE, where the ablative is motivated from the comparative construction, as in *İsa'-nın gel-iş-in-den önce* [Jesus-GEN come-ACN-POSS.3-ABL before] 'before the coming of Jesus' (44013024). Note also that the subject is not marked with genitive in (53–55), as would be the rule for nominalizations. (53) illustrates the semantic link between negative manner and posteriority, "not to eat without washing" and "before washing" are almost the same thing here.

(53) Turkish (41007004): negative manner clause
*Keza,   çarşı-dan   dönü-n-ce,   yıka-n-**ma-dan**   yemek*
equally   market-ABL   turn-RFL-CVB   wash-RFL-**NEG-ABL**   food
ye-mez-ler
eat-NEG.AOR-3PL
'And when they come from the marketplace, they do not eat unless they wash.'

(54) Turkish (44023012): FÖRRÄN
*«Pavlus'-u öldür-**me-den** bir   şey   yiy-ip   iç-er-sek,*
Paul-ACC   kill-**NEG-ABL**   one thing eat-CVB   drink-AOR-COND.1PL
biz-e   lanet   ol-sun!»
we-DAT   damned   be-IMP.3SG
'they would neither eat nor drink until they had killed Paul.'

(55) Turkish (43001048): BEFORE
*«Filipus çağır-**ma-dan önce**   sen-i   incir   ağac-ın-ın*
Philip   call-**NEG-ABL**   **before**   2SG-ACC fig   tree-POSS.3SG-GEN
alt-ın-da   gör-dü-m»
under-POSS.3SG-LOC   see-PST-1SG
'before Philip called you, when you were under the fig tree, I saw you.'

Examples (53)-(55) form a grammaticalization cline, where negation is increasingly more bleached. In (53), negation is clearly motivated semantically, in (55) it is nothing else but convention that BEFORE uses a marker originating from negation.

Expanded negation in BEFORE also exists in Turkmen (not in the sample), where the suffix consists of the negative past participle *-mAn* also used in negative manner clauses and the simultaneous temporal connector *-kA*-POSS (Clark 1998, 484).

6.6 Expanded standard negation in UNTIL and FÖRRÄN

Almost all Modern Slavic languages, Hindi, Maithili, Hungarian, and Mordvin have expanded negation in both UNTIL and FÖRRÄN, and these languages also have an overlap of UNTIL and AS.LONG.AS. This suggests that expanded negation in UNTIL might originate from a paraphrase "as long as not". However, there is reason to believe that expanded negation in all these languages is younger than the overlap. Old Church Slavonic, for instance, already had an overlap in the connector *donъdeže* 'as long as, until', but no expanded negation in UNTIL or FÖRRÄN, as illustrated in (56):

(56) Old Church Slavonic (40005026): FÖRRÄN-clause without expanded negation
http://syntacticus.org/sentence/proiel:20180408:marianus:50667

ne	*izideši*	*otъ tǫdě,*	***donъdeže***	*vъzdasi*
not	out.go.PRS.2SG	out.of.there	**until/as.long.as**	back.give.PRS.2SG

poslědьnii	*kodrantъ*
last.ACC.SG	penny.ACC.SG

'you will never come out of there until you have paid back the last penny'

While AS.LONG.AS-clauses denote time intervals, UNTIL-clauses denote changes of state, and in (56) the object 'last penny' delimits the event and makes it punctual (in addition to the perfective aspect of the verb). Thus, AS.LONG.AS- and UNTIL/FÖRRÄN-clauses can be distinguished whenever it can be determined whether the clause denotes a time interval or a change of state.

In Russian, with its strict aspect distinction, non-habitual UNTIL-clauses have perfective verbs and AS.LONG.AS-clauses usually have imperfective verbs. Negative imperfective predicates, as in *poka Ivan ne rabotal* [work(IPFV).PST.SG.M] 'as long as Ivan did not work' can therefore not be mistaken for 'until' (Iordanskaja & Mel'čuk 2009, 239), at least if not habitual. However, negated perfective verbs may express time intervals and are therefore possible in AS.LONG.AS-clauses as in (57):

(57) Russian (Iordanskaja & Mel'čuk 2009)

Oni	*ne*	*umrut,*	***poka***	*my*	*ix*
3.NOM.PL	not	die(PFV).PRS.3.PL	**as.long.as/until**	we.NOM	3.GEN.PL

ne	*zabudem.*
not	forget(**PFV**).PRS.1PL

'They will not die as long as we will not forget them'

The AS.LONG.AS-clause in (57) has the same construction *poka ne* with a perfective verb as the FÖRRÄN-clause in (58). The only difference is the phase profiled. In (57), the important information is the time interval 'not forget', in (58) the emphasis is on the change of state.

(58) Russian (Synodal 40005026)

ty	*ne*	*vyjdëš'*	*ottuda,*	***poka***
2SG.NOM	not	out.go(PFV).PRS.2SG	out.of.there	**until/as.long.as**

ne	*otdaš'*	*do*	*poslednogo*	*kodranta*
not	back.give(**PFV**).PRS.2SG	until	last.GEN.SG.M	penny.GEN.SG

'you will never come out of there until you have paid back the last penny'

It is hence conceivable that (58) may arise by means of a paraphrase ("as long as not") with a shift of which time phase is profiled (from interval to change of state). A precondition for intra-field origin of the kind sketched above is a connector overlap in AS.LONG.AS/UNTIL, which is present in many languages of the sample, as shown in Table 13, but missing in some Romance languages and in Modern Latvian *iekams* (largely restricted to FÖRRÄN, OPPORTUNITY.BEFORE and UNTIL, see Section 4), which has expanded negation in FÖRRÄN as much as Latvian *kamēr* with AS.LONG.AS/UNTIL overlap.

Table 13: Expanded negation in FÖRRÄN/UNTIL and overlap in AS.LONG.AS/UNTIL

	AS.LONG.AS/UNTIL overlap	No overlap
Expanded negation in FÖRRÄN (with negation in main clause and mostly not factual)	Bulgarian, Modern Baltic languages, Tajik, Livonian, Portuguese	Romanian, Italian, Catalan, (Latvian *iekams*)

	AS.LONG.AS/UNTIL overlap	No overlap
Expanded negation in FÖRRAN and a little bit extended to UNTIL	Hungarian (Károli), Modern Georgian	
Expanded negation in FÖRRAN and UNTIL	All Modern Slavic languages (except Bulgarian), Hindi, Maithili, Modern Hungarian, Mordvin, Komi	

To the Romance languages in Table 13 we may add German, where expanded negation with *bis* 'until' and *bevor* 'before' in FÖRRÄN is so limited that it is not attested in the N.T. Kortmann (1997, 184) gives the following examples: *Ich gebe dir kein Taschengeld, bevor/bis du (**nicht**) den Rasen gemäht hast.* 'I won't give you your pocket money, before/until you have mown the lawn' and *Wir werden dich hier behalten, bis du uns (**nicht**) gesagt hast, wo das Geld ist.* 'We'll keep you here until you have told us where the money is'. In these examples *nicht* 'not' is optional and does not change the meaning of the sentences. Wöllstein-Leisten & Eisenberg (2016, 927) claim that *bis nicht* "until not" has the meaning *solange nicht* 'as long as not' in *Ich gehe nicht schlafen, bis die Kinder nicht zu Hause sind* 'I will not go to sleep as long as the children are not at home/until the children are at home', and Sarlin (2014, 306) makes a similar claim for Romanian for examples such as (59):

(59) Romanian (Sarlin 2014, 306)

Nu	*cred*	***până***	***nu***	*văd*
not	believe.PRS.1SG	**until**	**not**	see.PRS.1SG

'I do not believe until I see / I do not believe as long as I do not see.'

I believe that this claim goes too far, as (59) does not profile the interval in the same way as (57). There are, however, several properties that the German and Romanian examples share:

(i) The main clause is semantically negated so that the whole predicate expresses an interval, but there is a potential change of state expressed by the verb. If the verb is not formally negated, there are verbs such as *behalten* 'keep' or 'remain' which contain a component 'not cease to' (Iordanskaja & Mel'čuk 2009, 240, n. 6) that have a similar effect as negated predicates.

(ii) The FÖRRÄN-clause is neither factual nor non-factual, as it is not yet known whether it will come true (Heinämäki 1974, 92). This favors the use of

negation as UNTIL-clauses tend to be factual. FÖRRÄN-clauses in the typical kind of examples denote future events (need not necessarily be marked with future tense).

(iii) Even though the interval is not profiled as in AS.LONG.AS-clauses, there can be strong emphasis on the interval as well (can be expressed such words as *never*).

(iv) The FÖRRÄN-clause has the connotation of a negative conditional clause ("konditionale Nebenbedeutung", Wöllstein-Leisten & Eisenberg 2016, 927), 'you will not come out if you do not pay back', etc.

Properties (ii) and (iv) motivate the use of negation, (ii) by intra-field association to negative AS.LONG.AS-clauses and (iv) by cross-field association to negative conditional clauses. Note that negative manner clauses expanding to FÖRRÄN (see 6.5) shift to temporal clauses in the same semantic micro-domain. Intra-field and cross-field origin can thus conspire in expanded standard negation in FÖRRÄN.

In the remainder of this section I will argue for the following four points:

(a) In all languages in the sample except Portuguese, the connector involved has (or had) the meaning 'until' irrespective of whether or not it is affected by expanded negation.

(b) Expanded negation in UNTIL presupposes expanded negation in FÖRRÄN.

(c) Expanded negation gradually spreads from FÖRRÄN to UNTIL. Irrespective of whether or not the connector can mean 'until' without negation, the expansion follows the same path, and

(d) AS.LONG.AS/UNTIL overlap strongly favors the expansion of negation from FÖRRÄN to UNTIL.

Although the UNTIL/AS.LONG.AS overlap seems to correlate with expanded negation in UNTIL (see Table 13), the UNTIL/AS.LONG.AS overlap is a larger phenomenon than expanded negation in UNTIL. Diachronically, in all cases except Portuguese, it can be shown that the UNTIL/AS.LONG.AS overlap is established before negation starts expanding to FÖRRÄN and UNTIL. In Portuguese, *enquanto* 'as long as' always has negation when it is used in the FÖRRÄN-domain. Most occurrences in the N.T. are not factual, (60) is the only example in the N.T. with a factual FÖRRÄN-clause.

(60) Portuguese (nvi) (40001025): expanded negation with *enquanto* in FÖRRÄN

Mas	*não*	*teve*	*relações*	*com*	*ela*	**enquanto**	*ela*
but	NEG	hold.PST.PFV.3SG	relation.PL	with	she	**as.long.as**	she

não	*deu*		*à*	*luz*	*um*	*filho*
NEG	give.PST.PFV.3SG	to	light	IDF.M.SG	son(M).SG	

'and did not have sexual relations with her until she gave birth to a son.'

A connector overlap of UNTIL/AS.LONG.AS without expanded negation seems to have been quite common in older Indo-European and Kartvelian languages. In the N.T. corpus, it is attested for Koine Greek, Old Church Slavonic (see example (56) above) and Old Georgian. In Middle Indian Pali, *yāva* 'as far as; as long as, whilst, until' (correlative *tāva...yāva*) does not seem to be negated usually in the meaning 'until'. For negative *yāva...na* the dictionary gives the translation 'not until, unless, as long as not' (Davids & Stede 1921–1925). The development of expanded negation in UNTIL is thus a parallel development in Modern Slavic languages, in some Modern Indo-Aryan languages and in Modern Georgian. In Modern Slavic languages, the expansion is least expanded in Bulgarian. In the N.T. corpus, expanded negation is entirely restricted to the FÖRRÄN-domain in Bulgarian. Derzhanski & Siruk (2016) find that Bulgarian and Ukrainian have a strong preference for expanded negation sentences with negative matrix clauses (i.e., the FÖRRÄN-domain). According to Iordanskaja & Mel'čuk (2009), in Modern Russian expanded negation may be omitted if the subordinate clause is in the future, if the verb of the main clause is imperfective and if the main clause precedes the subordinate clause as in (61) (and imperfective in main clauses occurs in UNTIL rather than in FÖRRÄN):

(61) Russian (Iordanskaja & Mel'čuk 2009, 251): omissible expanded negation in UNTIL

Ja	*budu*	*stučat',*	**poka**	**(ne)**
I.NOM.SG	FUT.1SG	knock(IPFV).INF	**until/as.long.as**	**(not)**

otkrojut.
open(PFV).PRS.3PL

'I will knock on the door until they open.'

In Modern Hungarian, negation is more expanded in UNTIL than in the Károli translation (1586). The case suffixes in the markers in Komi (terminative *kịt'ś-ẹd'ź* 'until where?') and Mordvin (illative, *źar-s* 'until how much?') suggest that 'until' was the original meaning in both languages. The same holds for Tajik *to* 'until'.

In the Baltic languages, expanded negation is more restricted than in Slavic. The major condition favoring negation in the subordinate clause is negation in

the main clause and the major condition disfavoring the use of expanded negation is factuality. No translation to a Modern Baltic language in the sample uses negation in the FÖRRÄN-clause in (60) where Portuguese has negation. A major factor in the variability across translations is whether there happens to be negation in the main clause. In (62), Latgalian happens to have a negative prefix in the nominal predicate *namīrā* "(be) in unrest", which is the trigger for negation in the subordinate clause. The other translations to Baltic languages happen to lack negation in the main clause entirely, so there is no negation in the subordinate clause either.

(62) Latgalian (42012050): expanded negation triggered by negative nominal predicate

...un	*Es*	*asmu*	***na****mīrā,*	*koleidz*
and	I.NOM	be.PRS.1SG	NEG.peace.LOC.SG	as.long.as/until
tys		***na****izapiļdeis*		
that.NOM.SG.M		NEG.RFL.fulfill.FUT.3		

'...and how I am distressed until it is accomplished!'

No expanded negation is found in earlier Latvian translations, and Old Lithuanian had a different form of expanded negation, as discussed in 6.5.

There is no language in the sample with expanded negation only in the UNTIL-, but not in the FÖRRÄN-domain. However, in languages where the UNTIL-domain hosts more than one connector, expanded negation may associate selectively with only one or only some among them. It is especially the form *až/aż* in West Slavic and Ukrainian that does not take expanded negation (except in Colloquial Polish) (see also Barentsen 2007 for Polish and Derzhanski & Siruk 2016 for Ukrainian). There are at least three (not mutually exclusive) reasons for this: (i) its non-subordination origin from the contrastive conjunction *a* 'and, but' plus particle *-že* (Vasmer 1976, 6), (ii) its lack of overlap with AS.LONG.AS, and (iii) its similarity in use to German *bis* 'until' (compare also the parallel between Lower Sorbian *tak dlugo asch* and German *so lange bis*). Like German *bis* 'until', *až* can be combined with another preposition or connector. Ukrainian often has *až poky* and *až doky*, which then can take expanded negation. *Asch/aż/až* is most frequent in the Lower Sorbian text[10] and least frequent in Ukrainian.

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[10] The Lower Sorbian N.T. is not homogeneous, the incidence of connectors more similar to Czech increases towards the end of the translation.

An independent case is Komi, where the suffix *-tẹd'ź* 'before, until' is not combined with standard negation,[11] whereas *kịt'śẹd'ź* 'as long as; until' takes standard negation in the meaning 'until'. All this is summarized in Table 14.

Table 14: Languages with several UNTIL *connectors differing concerning negation*

	Connectors combining with expanded negation	Connectors not combining with expanded standard negation	Total Freq. in N.T.
Ukrainian	*až poky, poky, doky, až doky*	*až*	42
Early Czech	*dokavad(ž), dokud(ž) (by)*	*až (by)*	30
Zyrian Komi	*kịt'śẹd'ź*	*-tẹd'ź*	20
Standard Polish	*dopóki*	*až*	12 / 23
(1632 / 2011)			
Lower Sorbian	*dokulsch (by), dokud, dokawasch (by)*	*(tak dlugo) asch*	12

The languages in Table 14 provide further evidence that AS.LONG.AS/UNTIL overlap favors the expansion of negation from FÖRRÄN to UNTIL. There is no language in the sample where standard negation occurs in the UNTIL-domain if there is no AS.LONG.AS/UNTIL overlap. The only evidence for expanded negation in the UNTIL-domain without AS.LONG.AS/UNTIL overlap comes from doculects where negation has become part of the connector, as in Old Lithuanian *net* (see 6.5) and possibly Latin *donec*, if it contains the negation **ne*, which is a matter of debate (Walde & Hofmann 1938, 371).

6.7 Expanded negation in OPPORTUNITY.BEFORE

Expanded negation in OPPORTUNITY.BEFORE is illustrated in (63) from Erzya Mordvin. See also examples (12), (21) and (65).

(63) Erzya Mordvin: expanded negation in OPPORTUNITY.BEFORE (43004049)

Sa-k,	*z'ars*	*ez'*	*kulo*
come.IMP.2SG	**as.long.as/until**	NEG.PST.3SG	die.CONEG

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[11] According to Georgieva & Muraviev (2018), the Komi terminative converb suffix *-tẹd'ź* consists of *-t-* negation and terminative *-ẹd'ź*. Traditional descriptions of Komi and Udmurt do not assume a negation marker *-t-*.

c'ora-m.
son.POSS.1SG
'Come before my son dies!'

In this section, I will consider expanded negation in languages where the expression of OPPORTUNITY.BEFORE is different from the rest of BEFORE.[12] The doculects in the sample with OPPORTUNITY.BEFORE having the same connector as FÖRRÄN/UNTIL and a connector different from BEFORE form an areal cluster in Eastern Europe and all of them have expanded negation in OPPORTUNITY.BEFORE. Most doculects involved also have an AS.LONG.AS/UNTIL overlap. Some doculects use in addition past or perfect tense (see Table 15). Where perfective aspect or perfectivizing prefixes are available, these are used in the construction (not in Romanian and in Erzya Mordvin). These characteristic features all have similar effects. As mentioned in Section 2, using the UNTIL-connector frames the phase of the subordinate clause in OPPORTUNITY.BEFORE as extending until the impending change of state. Negation turns the predicate into a time interval. Perfective aspect and/or perfect or past tense emphasize the change of state.

Table 15: Doculects with expanded negation in OPPORTUNITY.BEFORE without overlap between BEFORE and OPPORTUNITY.BEFORE

	Overlap with AS.LONG.AS	No overlap with AS.LONG.AS
Verb in present tense*	Croatian, Slovak	Romanian, Old Lithuanian Bretkūnas
Verb in perfect tense*	Bulgarian, Serbian, Latvian (la1), Latgalian, Georgian	
Verb in past tense* (in East Slavic < perfect tense)	Russian (RUS, rus), Ukrainian, Lithuanian (li1, li2), Ossetic, Erzya Mordvin	

*in the N.T. in 43004049

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[12] Where the expression for BEFORE and OPPORTUNITY.BEFORE is the same, the sources for expanded negation are the same as for BEFORE: in 43004049 'not yet' in Western Armenian (6.2), negative hortative in Maithili and perhaps in Catalan (6.3), comparison in Czech and Old Lithuanian Chyliński (6.4), and negative manner in Turkish and Azerbaijani (6.5).

Given that almost all doculects involved also have an overlap of the connector with the AS.LONG.AS-domain, a paraphrase from "as long as not (yet) p" seems possible. In Romanian and Old Lithuanian, however, only the intermediate area between UNTIL and AS.LONG.AS is involved (see Section 3). Another problem for the intra-field paraphrase solution is aspect. In Russian and other Slavic languages, AS.LONG.AS-clauses are mostly imperfective and OPPORTUNITY.BEFORE-clauses are perfective (see example (12)). However, according to Iordanskaja & Mel'čuk (2009, 244), Russian AS.LONG.AS-clauses can be perfective when negated, since punctual negated verbs can express a time interval, as in (64) (see also 6.6):

(64) Russian: negated perfective verb expressing a time interval (Iordanskaja & Mel'čuk 2009, 245)

Maša	*pozvonila*	*mne,*	*poka*	*Ivan*	*eščë*
Maša.NOM	call(PFV).PST.SG.F	I.DAT	as.long.as	Ivan.NOM	yet

ne   ušël.
not   go.away(PFV).PST.SG.M
'Masha called me as long as Ivan had not yet left.'

If Masha's calling might prevent Ivan from leaving, (64) is a paraphrase for OPPORTUNITY.BEFORE, and illustrates how intra-field origin for negation in OPPORTUNITY.BEFORE is possible. According to Iordanskaja & Mel'čuk (2009), (64) is only grammatical in the meaning 'as long as' with *eščë* 'yet'. While *eščë* 'yet' is usually not present in OPPORTUNITY.BEFORE in Russian, Modern Lithuanian might speak in favor of an intra-field origin, as the negation in the OPPORTUNITY.BEFORE-domain is sometimes explicitly marked as phasal *dar ne-* 'not yet', as in (65).

(65) Lithuanian (li1): 'not yet' in OPPORTUNITY.BEFORE (43004049)

ateik,	***kol***	*mano*	*vaikas*	***dar***
come.IMP.2SG	**as.long.as/until**	my	child.NOM.SG	**yet**

***ne**numirė*
NEG.PRV.die.PST.3
'Come before my child dies!'

An alternative hypothesis is that negation in OPPORTUNITY.BEFORE comes from the FÖRRÄN-domain (see 6.6). The set of Eastern European doculects in Table 15 is almost a subset of languages with expanded negation in FÖRRÄN. This solu-

tion might also work for Romanian where "*Până nu* [until not] is especially used after a negative main clause" (Sarlin 2014, 306); i.e., in the FÖRRÄN-domain. The single exception is Old Lithuanian Bretkūnas, where negation in FÖRRÄN is expressed differently by a negative manner connector (see 6.5), to the extent there is negation at all. Old Lithuanian Bretkūnas is thus a problem both for a paraphrase from "as long as not (yet) p" and for an expansion from FÖRRÄN. However, as we have seen in 5.3, Lithuanian *iki* 'until' must have been in use for 'as.long.as' and 'until' before it was restricted to 'until' after the expansion of *kolei* 'as long as'.

Negation in OPPORTUNITY.BEFORE is attested in Old Russian (Borkovskij 1979, 200–201), where expanded negation in UNTIL was still lacking. If expanded negation was lacking also in FÖRRÄN (which I have not verified), Old Russian might support the paraphrase origin.

(66) Old Russian: expanded negation in OPPORTUNITY.BEFORE (Borkovskij 1979).

doneli	*že*	***ne***	*vnide*	*v*	*zemlju*
as.long.as/until	SUB	**NEG**	in.go.AOR.3SG	into	land.ACC.SG
ego	*i*	*bi*	*čelomъ*	*emu*	
3.GEN.SG.M	and	hit.AOR.3SG	front.INS	3.DAT.SG.M	

'[And Oleg Rjazan'skyj met Tsar Taxtamysh] before he[Taxtamysh] entered his[Oleg's] land and bowed down to him.'

Further research is needed to sort out how expanded negation in the OPPORTUNITY.BEFORE-domain has originated in Eastern European languages. The evidence assembled so far suggests that both a paraphrase origin from 'as long as' and an expansion from the FÖRRÄN-domain (see 6.6) might have played a role.

6.8 Synthesis

It has become clear in this section that the distribution of negation marking in BEFORE, FÖRRÄN, and UNTIL is highly diverse cross-linguistically and that a larger set of explanations applying at different levels is necessary to account for the complex facts. Periphrastic explanations are part of this set, but they operate at a local level.

In Section 3 we have seen that the three clusters BEFORE, UNTIL and AS.LONG.AS are the optimal number in a partitioning analysis of connectors

for the languages of the sample. I take this as evidence that the three different meanings represented by these markers (the temporal relations BEFORE, UNTIL and AS.LONG.AS) strive for different encoding. Now, if there is an overlap between AS.LONG.AS and either UNTIL or BEFORE in connectors, negation in BEFORE and UNTIL has the potential of disambiguating between the temporal relations. From this we can derive the hypothesis that negation in BEFORE tends to occur if the encoding of AS.LONG.AS and BEFORE is the same otherwise, and negation in UNTIL tends to occur if the encoding of AS.LONG.AS and UNTIL is the same otherwise. Indeed, this is exactly what often can be observed cross-linguistically.

Table 16: Correlation between overlap patterns (vertical line) and negation (boldface)

	Tok Pisin	Paumarí	Hixkaryana
BEFORE	*taim* 'time' + S + ***no*** NEG + V + *yet* 'yet'	V-DEP + *viahani-a* before-OBL	V-***hra*** [V-NEG] + *ro* 'time' + *rma* 'continuing' + *hak(a)* 'yet'
UNTIL	*inap* 'enough' + *long* OBL.PREP + *taim* 'time' + S + V	V-***ri/ra***-DEP [V-**NEG**-DEP] + *oadani* 'length'	V-***hra*** [V-NEG] + *ro* 'time' + *rma* 'continuing' + *hak(a)* 'yet'
AS.LONG.AS	*taim* 'time' + S + V + (*yet* 'yet')	V-DEP + *oadani* 'length'	V-INFL + *ro* 'time' + *rma* 'continuing' + *hak(a)* 'yet'

As illustrated in Table 16 with languages from outside Eurasia (not in the sample for this study), many languages suggest that there is a correlation between overlap pattern and expanded negation in BEFORE- and UNTIL-clauses. In Tok Pisin (data from Verhaar 1995 and the N.T. translation), as in many other languages, there is a construction overlap (indicated in Table 16 by vertical lines) between BEFORE- and AS.LONG.AS-clauses, where the construction in BEFORE-clauses differs only by adding 'not (yet)' (boldface), whereas UNTIL-clauses have another construction. This overlap pattern is frequent cross-linguistically, but rare in Europe and South Asia and very weakly represented in the sample of this study (see 6.2). In Paumarí (Chapman & Derbyshire 1991; N.T.), and this type

is cross-linguistically much less frequent, there is an overlap pattern between UNTIL- and AS.LONG.AS-clauses, and the negation is in UNTIL, but not in BEFORE. In Hixkaryana (Derbyshire 1979; N.T.), there is basically the same construction all the way from BEFORE to AS.LONG.AS, which is rare cross-linguistically, and the negation is in BEFORE and in UNTIL.

This suggests the following explanation on the level of temporal relations. Temporal relations tend to be encoded differently. If connectors are not different otherwise, the addition of negation in BEFORE or UNTIL is favored. However, this functional explanation at the level of connectors, while having some plausibility, is far from being able to account for the whole picture. Not only is negation distributed differently across clusters, it is also distributed unevenly within clusters. Consider examples (67) and (68) from Latvian. Both examples are clearly from the UNTIL-cluster (not BEFORE or FÖRRÄN) and the English text has UNTIL in both cases. In Latvian (1965) there is negation in (67), but not in (68), and this difference is not purely accidental. There are 19 doculects of the sample with standard negation in (67), but only 7 doculects with standard negation in (68). However the difference is explained, it has to be accounted for on a more local level. Actually, negation in the UNTIL-clause in (67) is favored because there is an implied negative connotation that the subject would not come out of jail until everything was repaid (see 6.6).

(67) Latvian (1965) (40018034) *kamēr* 'until, as long as' in UNTIL-domain with negation
Un viņa kungs, kļuvis dusmīgs, nodeva to mocītājiem,

kamēr	*tas*	***ne****atdos*	*visu*
until/as.long.as	that.NOM.SG.M	NEG.give.back.FUT.3	all.ACC.SG

parādu.
debt(M).ACC.SG
'[And because he was angry, his master handed him over to the merciless jailers] until he would repay everything that was owed.'

(68) Latvian (1965) (66002025) *kamēr* 'until, as long as' in UNTIL-domain without negation
[*Tomēr to, kas jums ir, turiet,*]

kamēr	*es*	*atnākšu!*
until/as.long.as	I.NOM	come.FUT.1SG

'[Nevertheless, hold fast to what you have] until I come.'

In 6.6 I have argued that the negation in (67) originates and has expanded from contexts such as (69), where negation, unlike in (67), is obligatory in Latvian.

(69) Latvian (1965) (40005026) *kamēr* 'until, as long as' in FÖRRÄN-domain with negation
      [*Patiesi es tev saku, ka no turienes tu neizkļūsi,*]

kamēr	***ne**būsi*	*samaksājis*
until/as.long.as	**NEG**.be.FUT.2SG	pay.PST.PA.NOM.SG.M
pēdējo	*artavu.*	
last.ACC.SG.DEF	penny.ACC.SG	

      '[Truly I say to you, you will never come out of there] until you have paid back the last penny!'

Example (69) is from the FÖRRÄN-cluster (with negation in the main clause) and it has a close semantic affinity with negative conditional clauses ("if you have not paid back the last penny"). As many as 32 doculects in the sample have standard negation in (69), so there is a cline of negation marking on a local level. Negation is more likely in (69) than in (67) and more likely in (67) than in (68). In 6.6, I have argued that expanded negation in UNTIL originates in such FÖRRÄN-contexts as (69), due to an interplay of semantic affinity with negative conditional clauses and paraphrase from "as long as not", from where it can gradually expand across the FÖRRÄN- and UNTIL-domains.

We need thus a model with multiple factors on different levels to account for expanded negation in UNTIL- and BEFORE-clauses. Such a model is outlined in Table 17. The emergence of expanded negation in temporal clauses in general is favored because temporal clauses always express (potential) changes of states and because negation in its standard polarity function, to the extent it is not phasal ('not yet; no longer'), does not express changes of state. Negation in posterior temporal clauses rather than simultaneous ones is favored by the fact that negation is a non-identity marking strategy (see Section 4). On the level of temporal relations, as pointed out above, negation is favored by overlap patterns. On a local level, however, negation is favored by affinity with various kinds of non-temporal negative clauses and by the possibility of intra-field paraphrases.

Table 17: Model of multiple factors on different levels accounting for expanded negation in UNTIL- and BEFORE-clauses

Level	Factor	Effect on negation	Role in diachrony
All temporal clauses	Temporal clauses express (potential) changes of state	Non-phasal polarity negation is not used in temporal clauses	Facilitates the development of expanded negation
Posterior vs. simultaneous vs. anterior	Negation (and comparison of inequality, which can contain negation marking) is motivated by non-simultaneity	Negation is possible in BEFORE/UNTIL and disfavored in WHEN/WHILE/AS.LONG.AS	Limits the expansion
	Negation is motivated by non-factivity	Negation is disfavored in AFTER/SINCE	
Temporal relations	Temporal relations tend to be encoded differently	If connectors are not different otherwise, the addition of negation in BEFORE or UNTIL is favored, provided negation can expand from some local level.	Favors or disfavors expansion
Local (micro-domain)	Semantic affinity with non-temporal negative clauses. Possibility of negative paraphrases. Collocation with comparative forms	Negation marking more likely to the extent there is a local affinity with non-temporal negative clauses or a possibility of a negative paraphrase or use of comparative forms	Micro-domain origin in temporal clauses with formally characteristic particular constructions

The following predictions result from the model in Table 17, which are consistent with the discussion in this section:

(i) The set of micro-domain origins is limited. Negation expanding to UNTIL never originates in the UNTIL-domain, but mostly in contexts such as (69) in the FÖRRÄN-domain, and in various contexts in the BEFORE-domain.

(ii) Expansion is gradual. The cross-linguistic likelihood of negation marking decreases with the semantic distance from a micro-domain origin. This is illustrated in examples (67)–(69) and is consistent with the findings in 6.5 and 6.6.

(iii) Extensive expansion tends to go together with a connector that also has an overlap pattern with AS.LONG.AS, where the negation, however, remains restricted to the UNTIL(/FÖRRÄN) or the BEFORE(FÖRRÄN) domain. This has been shown to bear out for the languages of the sample in 6.6.

We can conclude that the complex distribution of expanded negation from different origins only can be accounted for by a complex model of explanation that takes into account factors operating at various levels of semantic generalization. Expanded negation can originate both from intra-field paraphrases (see 6.2, 6.6, and 6.7) and from cross-field transfers (see 6.3–6.7).

7. The different behavior of negative indefinite pronouns and of phasal negation 'no longer'

7.1 The relationship between expletive negation and expanded negation

In this section and in 7.2 I will further investigate the nature of expanded negation by exploring the different behavior of phasal negation 'no longer' and of negative indefinite pronouns. I will show that expanded negation in BEFORE- and UNTIL-clauses can be of various kinds. It can express polarity (as non-expanded negation does) or it can be expletive. According to Espinal (2000, 49), in expletive negation, the negative marker does not make any effective contribution to meaning. She characterizes expletive negation in a study on Catalan as follows: "a negative item, which lexically contributes to negation, does not modify the truth value of the proposition in which it occurs" (Espinal 2000, 49). However, the term "expletive negation" can have different senses in the literature. Sometimes it is used to denote formal incompatibilities. Abels (2005, 10) defines expletive negation for Russian descriptively as the presence of a negative marker that does not license negative polarity items, notably negative indefinite pronouns. Given that indefinite pronoun forms used in negation do

not behave the same cross-linguistically (Haspelmath 1997), expletive negation cannot be defined as a cross-linguistically valid comparative concept by means of the behavior of negative indefinite pronouns. However, in the languages considered in this section, negative indefinite pronouns can be used as a diagnostic for expletive negation in Espinal's sense.[13] This is because negative indefinite pronouns in most of the languages considered here are strictly dedicated to negation ("direct negation" in Haspelmath 1997, 2) and because negative indefinite pronouns do not undergo the same semantic bleaching as standard negation markers in temporal clauses.

Example (70) from Russian illustrates expletive negation in an UNTIL-clause. There is a standard negation marker *ne*, but the indefinite pronoun is not from the negative set (*nikto* 'nobody'), but from the specific set (*kto-to* 'somebody (specific)').

(70) Russian: expletive negation without negative concord
       http://soulpost.ru/v-zhizni-my-mozhem-polyubit-tolko-trex-chelovek-
       i-kazhdogo-po-svoej-prichine/ [2018-03-24]
       [*Ljubov'—èto vsego liš' slovo,*]

poka	**kto-to**	**ne**	*pridët*	*i*	*ne*
until	**somebody.NOM**	**not**	come(PFV).PRS.3SG	and	NEG

pridast	*emu*	*značenija.*
give(PFV).PRS.3SG	3.DAT.SG.M	meaning.GEN.SG

       'Love is just a word until somebody comes and gives it meaning.'

Negation is not always expletive with Russian *poka*, it is not expletive if *poka* has the meaning 'as long as', where negation is not expanded, and it is not expletive with *poka* with the meaning 'until' if negation has a phasal interpretation 'no longer'. We will see in 7.2 that Russian does not allow the expression of 'no longer' in UNTIL-clauses with adverbs, but the meaning 'no longer' can be evoked by the combination of standard negation with certain verbs, as with the verb *ostat'sja* 'to stay (PFV)' in (71).

(71) Russian: phasal negation with *ostat'sja* 'to remain'
       quest-art.com/quest/grim/ [2018-11-19]

Artisty	*isčezali*	*odin*	*za*
artist.NOM.PL	disappear(IPFV).PST.PL	one.NOM.M	behind

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[13] But not in Catalan, the language considered by Espinal (2000), where the indefinite pronouns used in negation have a wide range of functions (see Haspelmath 1997, 258).

> *drugim,*   ***poka***   ***ne***   ***ostalos'***   *nikogo.*
> other.INS.M   **until**   **not**   **remain(PFV).PST.SG.N.RFL**   nobody.GEN
> 'The artists disappeared one by one, until no one was left.'

Note that the perfective aspect in the meaning 'until' is obligatory except in habitual interpretation. (71) is not expletive negation and not expanded negation[14] unlike *poka ne ostalos' tol'ko dva* [until NEG remain(PFV).PST.N.SG.RFL only two.NOM.M] 'until only two remained'.

Expanded negation and expletive negation can both be considered forms of semantic bleaching (and, arguably, grammaticalization, to the extent semantic bleaching in grammatical constructions is a hallmark of grammaticalization), but in different ways. Expansion is the gradual dimension of semantic bleaching. In Section 6, we have seen that various examples in FÖRRÄN, BEFORE and UNTIL differ in their degree of association with intra-field paraphrases and with negative clauses in other fields, such as negative conditionals and negative hortatives. Expletivity is a more categorial kind of semantic bleaching. Expletive negation obtains if expanded negation cannot be interpreted as negation expressing polarity anymore compositionally within the construction. Given that temporal clauses always express a (potential) change of state, semantic negation in temporal clauses is only compatible with phasal negation. 'Until' is further restricted in that it is only compatible with 'no longer', but not with 'not yet'. As a consequence, all negation marking in UNTIL-clauses must be expletive for semantic reasons (cannot express the polarity meaning of negation), unless we have to deal with semantically phasal negation 'no longer'. Similar grammaticalization developments triggered by aspectual incompatibilities are well-known elsewhere from temporal clauses. Traugott & König (1991, 194–199) show that the incompatibility of temporal clauses with states contributes to the cross-field grammaticalization of temporal *since* to causal *since*.

German differs from Russian in that expanded negation with UNTIL is much more limited than in Russian. While expanded negation in Russian covers almost the whole UNTIL-domain, in German it is limited to a few FÖRRÄN contexts, which are semantically closely associated with negative manner and conditional clauses, such as *Ich verteile kein Taschengeld,* ***bis nicht jemand*** *den Rasen gemäht hat* 'I will not distribute any pocket money **until somebody** has mown the lawn', a modification with an indefinite pronoun of Kortmann's

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[14] Another possible interpretation is that two negative words merge into one by combining *poka ne* and *ne ostalos'* in (71), but then still one of them is not expletive.

(1997, 184) example, demonstrating that the negation in German is expletive, although the expansion of negation in German is minimal in comparison to Russian. The negative indefinite pronoun is not acceptable (*?bis niemand den Rasen gemäht hat*), unless under very special conditions where it is first expected that the lawn will be mown and then it finally turns out later that this expectation will not be met (*Diese Farce geht dann so weiter, bis niemand den Rasen gemäht hat* 'This charade will then continue until nobody has mown the lawn'), thus forcing a change of state interpretation by implicature. Generally negative indefinite pronouns are compatible with German *bis* 'until', if the meaning of the negation is phasal 'no longer', as in (72) about a patient who is very afraid of people.

(72) German: non-expletive phasal negation with 'until'
   [*An manchen Tagen will er das Essen vor die Tür gestellt bekommen und wartet,*]
   bis   niemand   *in der*   *Nähe*   *ist,*
   until nobody.NOM in DEF.DAT.SG.F neighborhood(F).SG be.PRS.3SG
   [*um es sich dann hereinzuholen.*]
   'On some days he wants the food to be placed in front of his door and waits then **until no one** is around (any more) before he brings it inside.'
   https://n.angehoerige-hessen.de/fileadmin/archiv/versorgung/inhalte/090128_peukert_koordinierte_hilfen.pdf [2018-11-17]

In 6.5 I have discussed the expansion of a Turkish construction with negation marking from negative manner clauses to FÖRRÄN and UNTIL. This is cross-field expansion and the original negation was not phasal. Turkish temporal clauses with *-mA-dAn* are expletive negation, as is expected, since the negation was not phasal originally. *Kimse* 'nobody' is a negative polarity item in negative manner clauses with *-mA-dAn* as much as in declarative finite main clauses (73a).[15] However, where negation is expanded and expletive in FÖRRÄN (73b) and BEFORE (73c), *kimse* 'nobody' is not acceptable and must be replaced by *biri* 'somebody', even though the same suffix as in (73a) is used.

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[15] Negative indefinite pronouns in Turkish are not equally dedicated to negation as the Russian and German ones are (see Haspelmath 1997, 286).

(73) Turkish (Hatice Zora, p.c.)
    a. ***Kimse**-yle*   *konuş-**ma-dan***   *yaşa-yabilir*   *mi-yiz?*
       nobody-with   speak-**NEG-ABL**   live-POT   Q-1PL
       'Can we live without talking to anyone?'
    b. ***Biri***   *öde-**me-den***   *dinlen-me-yeceğ-im.*
       somebody   pay-**NEG-ABL**   rest.RFL-NEG-FUT-1SG
       'I will not rest until somebody pays'
    c. ***Biri**-yle*   *konuş-**ma-dan***   *önce*   *düşün.*
       somebody-with   speak-**NEG-ABL**   before   think[IMP.2SG]
       'Think before talking to anyone'

In 6.6 I have argued that cases of co-evolution of expanded negation and AS.LONG.AS/UNTIL overlap are the exception in the languages of the sample. The most likely candidate for such a development is Portuguese *enquanto* 'as long as' with very limited expansion of the connector always together with negation to a part of the FÖRRÄN-domain. If this is intra-field expansion, negation must be originally phasal semantically 'as long as not yet'. However, 'not yet' is not compatible with 'until'. Hence, the expectation is that Portuguese *(não)...enquanto não* '(not)...until' is expletive, albeit expansion is restricted and probably has field-internal origin. Example (74) suggests that this prediction is borne out.[16]

(74) Portuguese (https://books.google.se/books?isbn=8580578116) [2018-11-17]
    [...*mas isso não vai acontecer até eu soltar o botão, o que não vai acontecer*]
    ***enquanto alguém não** abrir*   *a*   *porta.*
    as.long.as somebody not open.FUT.3SG   DEF.SG.F   door(F).SG
    '[...but it will not happen until I release the button, which will not happen] **until someone** opens the door.'

While all examples of expanded negation discussed so far in this section are also expletive, it is not the case that expanded negation in temporal clauses is always expletive. Non-expletive expanded negation can be found in the BEFORE-domain. However, my prediction is that this only may be the case if the negation is originally phasal (which is not the case in Turkish in (73b) as we have seen above).

    Modern Lithuanian has intra-field expansion of 'when...not yet' to the BEFORE-domain, where the 'not yet' construction is retained (see 6.2). Example (75) with negative concord, as expected in polarity negation, shows that this

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[16] Portuguese negative indefinite pronouns are restricted to direct and indirect negation (Haspelmath 1997, 256).

expanded negation is not expletive, and it is important to note here that Lithuanian (and Latvian) negative indefinite pronouns are strictly restricted to direct negation (Haspelmath 1997, 275).

(75) Lithuanian: negative indefinite pronouns in BEFORE with expanded negation
http://www.greitas.eu/nuomone/dar-niekam-nieko-nepasakius-jie-jau-zino-ka-kaltinti—paraso-pirmi-ir-kaip-suneliai-liezuvi-iskise-laukia-ar-kas-uzsikabinsligoniai-sifilitikai-gygykytes-ir-ne-tik-patys-o-ir-savo

Dar	**niekam**	**nieko**	**ne***pasakius,*	*jie*
yet	**nobody.DAT**	**nothing.GEN**	**NEG**.say.PST.CVB	3.NOM.PL.M

jau	*žino*	*ką*	*kaltinti.*
already	know.PRS.3	who.ACC	blame.INF

'Before anybody has said anything, they already know whom to blame.'

The rest of this section will now deal with OPPORTUNITY.BEFORE with a focus on Latvian. In 6.7 we have seen that expanded negation in OPPORTUNITY.BEFORE can originate both from cross-field and from intra-field expansion. In Modern Latvian, the construction requests the perfect and in Modern Russian the past in perfect function, which might be an argument for intra-field paraphrasis expansion from 'as long as not V-PERFECT' > 'before'. If the negation originates from 'as long as', it must be semantically phasal 'not yet', and to the extent it remains semantically phasal in 'before', it might be non-expletive. All examples in Russian that I have come across are actually expletive, such as *poka kto-to ne umer* [as.long.as somebody.NOM not die.PST.SG.M] '[The police does not take this seriously] until somebody dies.' However, in Latvian, there are two possibilities. Example (76) shows the non-expanded non-expletive construction with the meaning 'as long as' with a (passive) past participle. This example is actually very close to intra-field expansion and it could be translated with 'until'. But whether or not it is expanded negation or not, it is certainly not expletive, otherwise the affirmative indefinite pronoun *kāds* would have to be used.

(76) Latvian: 'as long as' with negation and negative indefinite pronoun
http://jauns.lv/komentari/raksts/sievietem/171209-sieviete-nav-tikai-viriesa-labakais-draugs-un-citas-tabu-temas [2018-03-24]

kamēr	*neviens*	*nav*	*nogalināts,*
as.long.as	**nobody.NOM**	**be.PRS.3**	kill.PST.PP.NOM.SG.M

nekas	*netiek*	*darīts*
nothing.NOM	NEG.get.PRS.3	do.PST.PP.NOM.SG.M

'as long as nobody is killed, nothing is done'

The majority of examples with indefinite pronouns I have encountered where the OPPORTUNITY.BEFORE meaning is evident are expletive, such as (77) from an ad, but non-expletive negation, as in (78), may occur as well.

(77) Latvian: OPPORTUNITY.BEFORE with affirmative indefinite pronoun
www.draugiem.lv/www.linulade.lv/news/index/?cat=0&pg=5   [2018-03-24]

Nāc,	**kamēr**	**kāds**
come.IMP.2SG	**before/until/as.long.as**	**somebody.NOM.SG**
nav	*nopircis*	*Tavu*
NEG.be.PRS.3	PRV.buy.PST.PA.NOM.SG.M	2SG.ACC.SG
mētelīti.		
coat.DIM.ACC.SG		

'Come here before somebody (else) buys (what could be) your coat.'

(78) Latvian: OPPORTUNITY.BEFORE with negative indefinite pronoun
https://www.filmas.lv/movie/1330/ [2018-03-24]

Kamēr	*neviens*	*to*	*nav*
before.until/as.long.as	**nobody.NOM**	that.ACC.SG	**NEG.be.PRS.3**
uzzinājis,	*Ceplis*	*ātri*	*savērpj*
notice.PST.PA.NOM.SG.M	Ceplis.NOM	quick.ADV	spin.PRS.3
intrigu.			
intrigue.ACC.SG			

'Before anybody notices this, Ceplis quickly spins a web of intrigues.'

This may be due to the circumstance that the phasal meaning in (78) is tangible, although 'yet' is formally not expressed. (78) is taken from a short description of the plot of the film *Ceplis* (1972). Ceplis is a businessman with dubious business conduct, and when things go bad, before anybody notices this, he assigns somebody else as a frontman who is meant to take the blame.

To summarize, the examples surveyed here show that expletive negation is very common in expanded negation in UNTIL-clauses. I have argued that this is the case because 'until' is incompatible with non-phasal negation and with 'not yet' phasal negation. The only real negation that makes sense with 'until' is 'no

longer', and 'no longer' does not obtain as a result of expansion, be it cross-field or intra-field expansion. If we view the expansion of negation as a grammaticalization process, we may say that 'until no longer' does not participate in it. Things are different for intra-field expansion of semantically phasal 'not yet' negation to BEFORE and OPPORTUNITY.BEFORE, where the negation still can make sense in its literal polarity sense after having been expanded.

7.2 'no longer' in the UNTIL-domain in languages with expanded negation

Unlike non-phasal negation, 'no longer' is semantically compatible with 'until'. In this section I will explore how 'until no longer' is rendered in a number of selected languages with expanded negation. In the languages considered, there are basically two kinds of behavior. In the type that seems to be more widespread, 'until' is compatible with 'no longer' and the resulting negation is not expletive. This is the case in South Slavic, Czech, and Slovak, in Hungarian, and in the Baltic languages. In another type of languages, for which I have only two clear examples, Russian and Polish, 'until' and 'no longer' are not compatible, and phasal auxiliaries, such as 'to stop', or lexical periphrases occur instead. The material used comes from elicitation with native speakers, from parallel texts, and from internet examples, both original and translated texts.

In Bulgarian and in Hungarian, 'until' is compatible with 'no longer', as illustrated in (79) and (80), and the resulting negation is not expanded and not expletive. Note that Bulgarian and Hungarian differ in their typology of how 'no longer' is formed (see van der Auwera 1998), and this does not seem to matter for the compatibility with 'until'. In Bulgarian, 'no longer' is expressed compositionally by a combination of standard negation and 'already'. Hungarian uses an expression consisting of standard negation and *több* 'more'. In (80), the 'more'-component is actually part of a noun phrase 'more water'. It does not seem to matter how 'no longer' is expressed, if only the semantics is phasal ('no longer'), negation is not expletive.

(79) Bulgarian (Ljuba Veselinova, p.c.): 'until no longer'

Prodălžix		*da*	*se*	*borja*		***dokato***
continue(PFV).AOR.1SG		CMPL	RFL	fight(IPFV).PRS.1SG		**until**
veče	***ne***	*možex*		*da*	*se*	*dviža*
already	**NEG**	can(IPFV).IPF.1SG		CMPL	RFL	move(IPFV).PRS.1SG

Translation of: 'I continued to fight until I could not move anymore.'

(80) Hungarian (Kärcher WPD 100 manual): non expletive negation in UNTIL
https://karcher-cleanteh.com/media/files/100.pdf

Nyomja   *meg*   *a*   *nem*   *temperált*   *víz*
press.SBJ.3SG   PRV   DEF   not   temper.PST.PTCP   water
gombját,   **amíg**   **nem**   *jön*   *ki*   **több**   *víz.*
button.POSS.3SG.ACC   **until**   **not**   come.PRS.3SG   out   **more**   water
Translation of: 'Press the button for untempered water until no more water is dispensed.'

The Baltic languages behave like Bulgarian and Hungarian, as shown in (81) and (82).

(81) Latvian (www.ogresnovads.lv [2018-3-23]): 'until no longer'

Sūkņi   *savu*   *darbu*   *turpina*   *līdz*
pump.NOM.PL   RPOSS.ACC.SG   work.ACC.SG   continue.PRS.3   until
brīdim,   **kamēr**   **vairs**   **ne**pastāv
moment.DAT.SG   **until**   **anymore**   NEG.persist.PRS.3
plūdu   *draudi.*
flood(PLT).GEN   danger(PLT).NOM
'The pumps are continuing their work until the moment when there is no danger of flooding anymore'

(82) Lithuanian (http://www.diena.lt/naujienos/lietuva/salies-pulsas/klaipedos-i-vilniu-penkias-valandas-797217?psl=2 [2018-11-19]): 'until no longer'

[*Nuolaida bus taikoma iki remonto pabaigos, tai yra,*]
kol   **ne-be**-*bus*   *didelių*   *vėlavimų.*
until   NEG-CNT-be.FUT.3   big.GEN.PL   delay.GEN.PL
'The discount will apply until the end of the repair, that is, until there are no (longer) significant delays.'

Russian and Polish, and probably also Ukrainian and Belarusian, are markedly different. In Russian, imperfective aspect is not acceptable in clauses with *poka ne* 'until' except in habitual contexts. Predicates in Russian UNTIL-clauses cannot be durative; their predicates have to express a change of state. Put differently, it is not sufficient that the whole clause expresses a change of state, the change of state has to be expressed by the verb (which may also be an auxiliary). It cannot be expressed by an adverb. Hence it is not possible to have the change

of state expressed with a phasal expression, such as *uže ne* [already not] or *bol'še ne* [more not] 'no longer':

(83) Russian (M. Koptjevskaja-Tamm, p.c.): instead of "until no longer"

Ja	*bežala,*		*poka*	*mne*	*bylo*
I.NOM	run(IPFV).PST.F.SG		as.long.as	I.DAT	be(IPFV).PST.N.SG

xolodno	/	*poka*	*ja*	*ne*	*sogrelas'*
cold.N.SG	/	until	I.NOM	not	get.warm(PFV).PST.F.SG.RFL

Translation of: 'I ran until I was not cold anymore.'

What is possible, however, is to have the phasal meaning expressed lexically—with the verb always in perfective aspect—as in (84) and in (85). Russian has a lexical verb *razljubit'* 'not love any more', which is not usually constructed reciprocally with a reflexive suffix as in (84). However, this playful example neatly illustrates the point that verbs with 'no longer' built in in their lexical meaning, as long as used in the perfective aspect, are fine with *poka ne* 'until'.

(84) Russian (www.doktorpapa.ru/blog/3581 [2018-3-25]): 'no longer' within the lexeme [*roditeljam srazu soobščili, čto u nas ljubov' i sročno*]

nužno	*nas*	*poženit',*	*poka*	*ne*
necessary.N.SG	we.ACC	marry(PFV).INF	until	NEG

razljubilis'
apart.love[PFV].PST.PL.RFL

'[In the first class...] we immediately told the parents that we love each other and that they have to marry us immediately, before we will not love each other anymore.'

Polish shares the Russian avoidance of combining 'until' with 'no longer'. In (85) we encounter another avoidance strategy: the use of a phasal verb *przestać* [PFV] 'to stop'. Note that the example is from Colloquial Polish. In Standard Polish, *aż* does not combine with expletive negation (see 6.6).

(85) Polish (Marcin Włodarczak, p.c.): instead of "until no longer"

Biegałem,	***aż/dopóki***	***nie***	***przestało***	*mi*	*być*
run.PST.1SG.M	**until**	**NEG**	**stop(PFV).PST.3SG.N**	I.DAT	be.INF

zimno.
cold.N.SG

Translation of: 'I ran until I was not cold anymore.'

In Section 8 we will see that this typology with two types, which sets apart Russian and Polish from other languages, is in fact a typology with three types on a scale, where Lithuanian and Latvian are intermediate and differ from Germanic languages in that they strongly avoid UNTIL-clauses with stative predicates, in the same way as Russian and Polish.

8. The aspectual behavior of UNTIL-clauses

In 7.2 Russian and Polish were found to differ from most other European languages in that they have strict aspectual restrictions on predicates in UNTIL-clauses. In contrast to this, Germanic and Finnish (which do not have any overlap of UNTIL and AS.LONG.AS in connectors) do not only allow for stative predicates, but also for stative clause complements of the 'until' connector, as in Heinämäki's example (86):

(86) English (Heinämäki 1974: 121)
      Claire kept telling funny stories until Paul was in a good mood.

While the meaning of the temporal clause construction in (86) as a whole is not durative, it is only the connector *until* that transforms it into a change of state. Without the connector, the clause *Paul was in a good mood* is stative.

The Baltic languages are intermediate between the Russian/Polish type not allowing for durative predicates and the Germanic type allowing for durative clauses complements in UNTIL-clauses. The Lithuanian translation of (86) has a non-durative predicate, as shown in (87):

(87) Lithuanian (J. Pakerys, p.c.): translation from UNTIL with durative predicate

Kler	*tol*	*pasakojo*	*juokingas*	*istorijas,*
Claire	CRPH	tell.PST.3	funny.ACC.PL.F	story.ACC.PL

kol	*Polis*	*pralinksmėjo* /	*Polio*
until/as.long.as	Paul.NOM	become.happy.PST.3 /	Paul.GEN

nuotaika	*pasitaisė.*
mood.NOM.SG	PRV.RFL.ameliorate.PST.3

Translation of: 'Claire kept telling funny stories until Paul was in a good mood.'

There is actually a slight difference between Latvian and Lithuanian. Remember from Section 4 that Modern Latvian has two connectors in the UNTIL-domain, which are largely interchangeable in many contexts: *kamēr* with overlap with 'as long as' and *līdz* with the same form as the preposition *līdz* 'until', which only means 'until'. (88) is a context where only *līdz* is possible with the intended reading. If *kamēr* would be substituted, an 'as long as' reading is forced. This is because *kamēr* in the meaning 'until' is not compatible with a durative clause complement.

(88) Latvian (Lithuanian-Latvian parallel corpus): UNTIL with stative predicate
[eurLex4/eurLex41-50[53.txt_lvlt.xml Komisijas Īstenošanas regula (ES) Nr. 284/2012]
[*Sūtījumi paliek oficiālā uzraudzībā ne vairāk kā piecas darbdienas,*]

līdz	*ir*	*pieejami*	*laboratorijas*
until	be.PRS.3	access.PRS.PP.NOM.SG.M	laboratory.GEN.SG

analīžu	*rezultāti.*
analysis.GEN.PL	result.NOM.PL

'Consignments remain under official supervision for a maximum of five working days until laboratory analysis results are available.'

The Lithuanian translation, where only *kol* with UNTIL/AS.LONG.AS overlap is available, has to be explicit in the predicate about the change of state, which obtains in (89) with the past passive participle of *gauti* 'to receive'. (88) has a present participle instead, that does not express a change of state.

(89) Lithuanian
eurLex4/eurLex41-50[53.txt_lvlt.xml Komisijas Īstenošanas regula (ES) Nr. 284/2012 [*Oficialios kontrolės priemonės siuntoms taikomos ne ilgiau nei 5 darbo dienas,*]

kol	*bus*	*gauti*
until/as.long.as	be.FUT.3	obtain.PST.PP.NOM.PL

laboratorinio	*tyrimo*	*rezultatai.*
laboratory.ADJ.GEN.SG	research.GEN.SG	result.NOM.PL

'The official control measures for consignments shall not exceed 5 working days until the results of the laboratory examination are obtained.'

However, there is a strong tendency in Latvian to avoid durative clause complements in UNTIL-clauses. For instance, I did not manage to force a Latvian native

speaker, whom I consulted, to accept a translation with *līdz* 'until' and a stative predicate in a translation of (86/87).

While Latvian and Lithuanian avoid durative clause complements in UNTIL-clauses, they have a preference for accomplishments in UNTIL-clauses, as exemplified in (90), and this they have in common with Russian (to the extent the accomplishments are marked for perfective aspect). Sentences with 'until' and 'as long as' as entire constructions generally tend to have the aspectual structure of accomplishments. The main clause describes an interval at the end of which there is some change of state. What is special in (90) and in many other examples in Baltic languages is that the verb of the subordinate clause itself has the structure of an accomplishment. In (90) the stem is durative *važiuoti* 'go by car' and it has a prefix *nu-* indicating that there is an endpoint.

(90) Lithuanian: 'until' clause with accomplishment (R. Granauskas, *Kenotafas*, 2006, LILA)

Juk   *maždaug*   *tiek*   *laiko*   *jam*   *reikės*
after.all   about   that.much   time.GEN.SG   3.DAT.SG.M   need.FUT.3

iš-sėdėti   *mašinoj,*   *kol*   **nu**-*važiuos*   *į*   *tuos*
out-sit.INF   car.LOC.SG   until   **down**-go.by.car.FUT.3   into   that.ACC.PL

Raseinius.
Raseiniai(PLT).ACC

'After all, he will need to sit in the car for about that much time until he gets to Raseiniai.'

The Latvian translation with *kamēr aiz-brauks* [until/as.long.as away-go.by.car.FUT.3] is entirely parallel. Bybee & Dahl (1989, 86) have termed such affixes and particles which make processes denoted by the verb telic (or "bounded") bounders. In English it is not possible to translate (90) with an accomplishment verb; an achievement (*gets to*) has to be used instead.

Livonian, although closely related to Finnish, patterns with Latvian and Lithuanian in this typology. Livonian also has an UNTIL/AS.LONG.AS overlap as a probably quite recent development due to Latvian influence. Even though prefixes with the function of bounders have been borrowed from Latvian, their use is limited in Livonian, and expanded negation in UNTIL is only weakly developed, as in Latvian. However, Livonian has its own lexical strategy to avoid stative clause complements in UNTIL-clauses, which run the risk of being ambiguous with 'as long as'. In Setälä's (1953) collection of Livonian original texts, I could not find any ambiguous examples with durative predicates. Particularly

effective for the avoidance of ambiguity is the verb *īedõ* 'to stay, to become'. Unlike what the translation 'to stay' suggests, this is a verb indicating change of state. It also means 'to become'. While Finnish freely can use 'to be' in UNTIL-clauses, I could not find any such examples for Livonian, and if there were any, they would be ambiguous with an 'as long as' reading. Example (91) illustrates the use of *īedõ* 'to stay'. It is from a variant of the tale *Straw, Coal and Bean*, where the bean laughs so hard that it bursts.

(91) Livonian (Setälä 1953, 62): the disambiguating effect of *īedõ* 'to stay'[17]

pubā	*kaņt*	*pāl*	*nā'nd*	*un*	*iřgõn*
bean	edge	on	see.PST.PA.SG	and	start.PST.PA.SG

na'grõ	*un*	*seņtš*	*na'grõn*	***kuņtš***
laugh.INF	and	CRPH	laugh.PST.PA.SG	**until/as.long.as**

īend	*sū*	*vāldiń*
stay/become.PST.PA.SG	mouth	open

'the bean saw this on the edge and started laughing and laughed so much until it could not close its mouth any more.', lit. "until the mouth stayed/became open."

The discussion of this section is all summarized in Table 18. Due to the small number of languages considered, it may be premature to call this a typology of aspectual behavior of UNTIL-clauses.

Table 18: Toward a typology of aspectual behavior of UNTIL-clauses

Stative clause complements allowed	Stative clause complements not possible or avoided, but stative predicates (with phasal adverb 'no longer') possible	Stative predicates not allowed, not even with the phasal adverb 'no longer'
Avoidance of accomplishments	Predilection for accomplishments	
UNTIL and AS.LONG.AS expressed by different connectors	UNTIL/AS.LONG.AS overlap	
English, German, Finnish	Lithuanian, Latvian, Livonian	Russian, Polish

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[17] The past participles express evidential mood (hearsay).

For further research it might be interesting to verify how the aspectual behavior of UNTIL-clauses relates to the area of prefixal perfectivization (Arkadiev 2014, 2015), which includes Slavic, Baltic, Yiddish, Hungarian, Ossetic, and the Kartvelian languages, and to a certain extent even Livonian (with prefixes borrowed from Latvian). Examples such as (90) suggest that there is some interaction between the construal of UNTIL-clauses and the pervasiveness of bounders in a language.

9. Conclusions

This paper zooms in on cross-linguistic diversity on various levels: (i) a minor zone of adverbial clauses is explored ('as Long As', 'unTil' and 'bEfore' – LATE – clauses), (ii) cross-linguistic comparison is applied on the level of exemplars in parallel texts, (iii) a radial set of similar language varieties is considered (Baltic languages with their wider genealogical and areal context; i.e., the Indo-European family and Europe), (iv) diachronic considerations are largely limited to the attested range of variability (less than four centuries in the case of Baltic languages), and (v) only a few properties of complex sentences are studied (connectors, negation, and aspect, and how they interact).

A similarity-semantics approach is pursued to build the semantic space of connectors in LATE clauses bottom-up in order to circumvent the effect of categorialization in particular languages. This allows us to distinguish different levels of granularity of temporal relations. On a more general level the scale BEFORE–UNTIL–AS.LONG.AS postulated by Kortmann (1997) is confirmed, on a more granular level, more specific clusters, such as a second 'until' which is related to 'before', different kinds of 'before', and a heterogeneous intermediate zone between 'until' and 'as long as' are identified, which have been postulated or described in formal semantic studies and language-particular descriptions (Section 2). An intermediate level of clustering with four clusters turns out to be an appropriate starting point for a typological classification based on different kinds of overlap patterns (Section 3). Within this typology, the Baltic language varieties considered turn out to be very diverse, which is explained by the interplay of a diachronic cyclic process and language contacts (Section 4). The LATE zone of temporal relations extends from simultaneity (identity in time) to posteriority (non-simultaneity, non-identity in time). Marking strategies in temporal clauses can be classified according to whether they are originally motivated by identity and non-identity. The paper explores a major identity-marking strategy

(correlative constructions) and a major non-identity-marking strategy (negation), which both play important roles in Baltic languages. Two generations of markers originating in correlative constructions are identified, which have both expanded from simultaneity towards posterior relations. Together with the resulting demotivation we can observe a degeneration of typical properties of correlative constructions (Section 5). Negation in temporal clauses comes in various forms, but is always semantically phasal ("not yet" or "no longer") if not bleached. Bleaching comes in two overlapping forms, a gradual one, expanded negation (use of negation in contexts where other languages lack negation) and a more categorial one, expletive negation (non-truth-functional use of negation marking). From a typological perspective, expanded negation occurs much more often in 'before', but negation in 'until' clauses is an areal phenomenon in Eastern Europe and South Asia. Languages (and varieties of languages) differ very much as to exactly which parts of the 'before' and 'until' domains negation has spread to. Zooming in on linguistic diversity allows us to uncover different factors on different levels conspiring in the promotion of expanded negation marking (Section 6). Not all forms of expansion are also expletive negation. Expletive negation can be shown to correlate with the impossibility of a phasal interpretation of the negator, irrespective of whether negation originates as an intra-field paraphrase within temporal clauses or has cross-field origin from some other negative clauses outside the realm of time (Section 7). There is a correlation between expanded negation in 'until' and connector overlap in 'until' and 'as long as'. However, in almost all cases it can be shown that the connector overlap predates the gradual expansion of negation. This is only possible if the relations 'until' and 'as long as' can be disambiguated by aspect. Different languages have different strategies for aspectual distinction which can range from highly grammaticalized aspect, as in Russian and Polish, to entirely lexical choice, as in Livonian. This results in considerable cross-linguistic differences in the aspectual structure of 'until' clauses, where the Baltic languages and Livonian are intermediate between Russian and Polish, on the one hand, and Germanic, Finnish, on the other hand (Section 8).

This study shows that the comparison of data from highly similar but different language varieties on the level of language use can reveal complex mechanisms of interaction of most different parts of language structure, such as clause combining, pronominal stems, negation, and aspect, which can only be detected when zooming in.

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Acknowledgements

Abbreviations

1 — first person, 2 — second person, 3 — third person, ABL — ablative, ACC — accusative, ACN — action nominal, ADJ — adjective, ADV — adverb, AOR — aorist, CMPL — complementizer, CNT — continuative, COM — genus commune, COMP — comparative, COND — conditional, CONEG — conegative form, CRPH — correlaphoric marker, CVB — converb, DAT — dative, DEF — definite, definite article, DEP — dependent verb suffix, DIM — diminutive, DLM — delimitative, F — feminine, FUT — future, GEN — genitive, HON — honorific, HORT — hortative, IDF — indefinite, IMP — imperative, INF — infinitive, INS — instrumental, IPF — imperfect, IPFV — imperfective, LOC — locative, M — masculine, N — neuter, NA — non-agreement (neuter), NEG — negation, NOM — nominative, NTOP — non-topic, OBL — oblique, PA — active participle, PFV — perfective, PL — plural, PLT — plurale tantum, POSS — possessive, POT — potential, PP — passive participle, PREP — preposition, PRS — present, PRV — perfectivizing preverb, PST — past, PTC — particle, PTCP — participle, Q — question particle, REL — relative, RFL — reflexive, RPOSS — reflexive possessive, SBJ — subjunctive, SG — singular, SUB — co-subordinating particle, SUP — supine, VOC — vocative

Corpora and Parallel texts used

N.T. (selected); Latvian Elgers: Draviņš (1961) and Draviņš & Ozola (1976); Gliks (1974); Lithuanian Bretkūnas: Range & Scholz (1991); Chyliński: Kudzinowski & Otrębski (1958); Lower Sorbian Schuster-Šewc (1967)

LILA = Lithuanian-Latvian-Lithuanian parallel corpus http://tekstynas.vdu.lt/page.xhtml?id=parallelLILA, see Rimkutė et al. (2012)

Pasakas = valoda.ailab.lv/folklora/pasakas

Senie = www.korpuss.lv/klasika/Senie/

Software used

R 2.15.0 https://www.r-project.org/, Python 2.7 https://www.python.org/

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