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SPACE-TIME MAPPING IN TURKISH: A CORPUS-BASED, CROSSLINGUISTIC INVESTIGATION

Abstract: Space and time are the most central and closely related domains of human cognition. While our embodied spatial experience is considered as relatively more concrete and perceptually richer, time and accordingly, temporal understanding is abstract and elusive in nature. When speaking about time as an abstract concept, language users refer to space/motion as a more concrete domain with well-established metaphors such as THE PASSING OF TIME IS MOTION among many others. In most languages, the metaphorical grounding of time in space involves an understanding of time as a horizontal line with two perspectives: “moving-time” and “moving-ego”. The moving-time perspective assumes a mental schema in which the individual observes flowing time as in “the new year is coming up”. As per the moving-ego perspective, the individual is moving on the timeline where the future is typically in front of and the past is behind her/him as in “we are approaching the new year”. This corpus-based study investigates the weight of moving-time and moving-ego patterns in Turkish with two verbal adjectives representing the two canonical perspectives, that is, *geçen* – “[time word] that passes” and *geçtiğimiz* – “[time word] that we pass”, respectively. 5,058 concordances associated with the two lexemes were extracted from the Turkish National Corpus. Concordances were then inspected for the instances of space-time mapping based on a list of predefined temporal words to occupy the target domain. All occurrences were annotated according to their semantic sphere (i.e. metaphorical time, metaphorical motion, and literal motion). Chi-square and binomial tests comparing the token, type, and hapax legomena frequencies per semantic domain showed that based on the selected lexemes, the ego-moving perspective was significantly more frequent than the time-moving perspective in Turkish in contrast to many other languages. Importantly, the metaphorical use of both lexemes in the temporal domain dominates over their non-temporal use in the spatial domain even though space and motion lie at the semantic core of *geçmek* – “to pass” in Turkish. The findings are expected to lay a basis for experimental studies to compare the processing ease of time-moving and ego-moving frames in Turkish, a critically understudied language in terms of space-time mapping.

Keywords: space-time mapping, metaphor, temporal understanding, frames of reference, linguistic relativity

INTRODUCTION

Time is a fundamental domain of our existential experience and a crucial element of human thought. In a sense, the survival of our species depends on not only perceiving but also understanding the concept of time. That being said, its elusive and intangible nature, that is, the fact that you cannot see or touch time, makes the notion difficult to imagine, conceptualize, and reason about. Space, on the other hand, is an equally central concept but emerges directly out of the bodily experience. Space is more tangible, more concrete and more experiential compared to time. Language users typically refer to embodied, sensorimotor experiences to talk about abstract domains in a metaphorical way (Claudi & Heine, 1986; Lakoff & Johnson, 1980; Lakoff & Kövecses, 1987). Likewise, time is understood in terms of space in most cultures (Boroditsky, 2011; Casasanto & Boroditsky, 2008; Clark, 1973; Traugott, 1975). Linguistic metaphors can be said to be the most salient and widespread manifestation of space-time mapping (see Lakoff, 1993). TIME IS SPACE can be regarded as the main, overarching space-time conceptual metaphor. Other conceptual metaphors such as THE PASSING OF TIME IS MOTION (as in “days are *gone by*”), AMOUNT OF TIME IS DISTANCE (as in “it was a very *long day*”), TIME IS LOCATION and by extension, HERE IS NOW, PAST IS BEHIND and FUTURE IS FRONT (as in “the better days are *ahead of us*”) are the derivations of the main TIME IS SPACE metaphor. Decades of research indicate that metaphors establishing the spatiotemporal mapping are highly ubiquitous across several world languages within geographically and typologically distinct families such as Indo-European, Afro-Asiatic, Sino-Tibetan, Japonic, Austronesian, Papuan, Niger-Congo, Mayan, Aymaran, and Tupian among others (Bender & Beller, 2014; Bybee, 1994; Clark, 1973; Haspelmath, 1997; Levinson, 2003; Núñez & Cooperrider, 2013; Radden, 2011).

SPATIOTEMPORAL RELATIONS IN LANGUAGE

Time is typically understood in one-dimensional, linear space rather than exploiting the whole range of spatial directions in the physical world (McCormack & Hoerl, 2017; Radden, 2011). The orthodox dimension is horizontal with a front-back orientation in most languages. Thus, only a limited set of linguistic expressions referring to space is used to cover all temporal experiences. The (non)availability and the type of a reference point, known as deixis, to express temporal events is a central constraint of space-time mapping in language. Spatiotemporal metaphors can take three main forms based on a reference point

(Evans & Levinson, 2009): D-time, S-time, and T-span.¹ D-time or deixis time, also called A-series according to McTaggart's (1908) distinction, predicates the present moment as the deictic reference point. The other points across time in the past or future are arranged and expressed with respect to this static present moment. For example, comprehending the sentence "tomorrow will be a rainy day" requires a mental representation of a reference point implied in the sentence. In other words, the word *tomorrow* intrinsically refers to the present moment, which is *today*. Space-time metaphors with such deixis can take two perspectives as well: (1) time-moving (external D-time or event agent) and (2) ego-moving (internal D-time or human agent).

Time-moving perspective, as the name implies, assumes that time flows and the ego observes time from the outside similar to an individual observing a moving train from a distance. The direction of the flowing time is heavily influenced by the writing direction (e.g. Bergen & Chan Lau, 2012). Time is spatialized on a horizontal scale and from left to right in languages where the writing direction is from left to right such as English and Turkish. Accordingly, the past is on the left and the future is on the right on a temporal spectrum where the present moment is situated in the very middle. Metaphors merging space and time such as "the new year is approaching", "the worst day has passed" or "the week after" are constructed with such a (left-to-right) time-moving perspective. However, time passes from right to left in Hebrew (Fuhrman & Boroditsky, 2010), and from top to bottom in Mandarin in addition to the horizontal direction (Boroditsky, 2001; Fuhrman et al., 2011; but see J. Y. Chen, 2007; Yu, 2012). Apart from the conventional horizontal and vertical patterns, Boroditsky and Gaby (2010) demonstrated that time flows according to the cardinal facing direction (e.g. from left to right when one is facing south but toward the body when one is facing east etc.) in Pormpuraaw, an Aboriginal language.

Ego-moving perspective, on the other hand, dictates that the observer, that is, the ego is the reference point rather than the present moment. The ego itself moves on the timeline and the bodily reference point allows arranging the temporal order of events on a typically front-back axis. For the sake of the analogy, the individual is now inside the moving train. The Western construal of the ego-moving perspective is the one in which THE PAST IS BEHIND and THE FUTURE IS IN FRONT. Based on the ego-moving frame of reference, "we leave things behind" and "move on" as "we approach the new year". Along with that, the flow of time is determined by several factors such as the immediate context of

1 S-time and T-span are beyond the scope of the current study and are not addressed.

the observer shaped by her/his embodied experiences situated in a geographical or cultural environment. For example, gestural data revealed that the future is behind and the past is in front in Aymara, a language spoken in the Andean highlands of Bolivia (Núñez & Sweetser, 2006) (see also Klein, 1987 for Toba time where one faces past). Likewise, environment-based, topographic concepts rather than body-based concepts construe time in Yupno of Papua New Guinea, according to which the future is uphill and the past is downhill (Cooperrider et al., 2022).

CURRENT STUDY

It is safe to argue that spatiotemporal mapping is almost universal transcending geographical, linguistic, and cultural borders as there are no languages in which space-time metaphors are virtually non-existent (Haspelmath, 1997). Lakoff (1993) even argued that metaphorical understanding of time in terms of space is biologically determined and thus, extends to all human beings. That said, several typological studies discussed briefly above revealed striking crosslinguistic differences in spatiotemporal relations. Therefore, the crucial question is the extent and the scope of crosslinguistic variability in the spatialization of time (Sinha & Bernárdez, 2015).

Time-moving and ego-moving frames of reference provide a suitable testbed for investigating the variability among languages in the metaphorical grounding of time in space. The question has been investigated through experimental and corpus-based approaches (see Bender & Beller, 2014 for a comprehensive review). A meta-analysis of experimental studies showed that English speakers have a baseline preference for the moving-ego metaphor variant (Stickles & Lewis, 2018). On the other hand, Dutch, German, Mandarin, and New Zealand English speakers demonstrate a relatively strong preference for the time-moving perspective (Lai & Boroditsky, 2013; Loermans & Milfont, 2018; Loermans et al., 2019).

The experimental studies assume that the two temporal perspectives are equally frequent in language allowing the probe sentence to be truly ambiguous, which is presumably not the case (Stickles & Lewis, 2018). In this regard, corpus-based research to shed light on the prevalence of the two patterns in the language is crucial but surprisingly little. In one comparative study, Feist and Duffy (2020) demonstrated that time-moving metaphors are more frequent than ego-moving metaphors in English, but there is no such difference in Spanish (see also Valenzuela & Carrión, 2020). Time-moving metaphors have also been documented to be more frequent than ego-moving metaphors in Japanese

(Suzuki, 2015). Chinese is a controversial language in this regard. While there is evidence that the moving-time is the fundamental conceptualization of time in Mandarin Chinese (Ahrens & Huang, 2002; Alverson, 1994; Yu, 1998), there are other researchers who claim that the difference is more complicated than such a binary distinction (C. Chen, 2014; Pamies-Bertrán & Yuan, 2020). Brdar and Brdar-Szabó (2017) argued that moving-ego metaphors in Croatian, Hungarian, and Romanian are unnatural and less frequent as compared to their moving-time counterparts based on data from Web corpora, Google and translation. There is also corpus-based and experimental evidence that the valence of the described events plays a role in schematizing the time. Language users refer to ego-moving expressions more frequently than time-moving expressions when describing a positive event (McGlone & Pfister, 2009), which also implies the grounding of valence in motion (M. Chen & Bargh, 1999).

Against this background, Turkish remains a critically understudied language in terms of space-time mapping. Although there are studies investigating spatiotemporal language in different contexts (e.g. Arik, 2012; Gen, 2015; Ördem, 2015; Özçalışkan, 2008), no study has yet to systemically compare the two schemas in Turkish. The current corpus-based study aims to fill this gap by quantitatively analyzing the time-moving and ego-moving perspectives. With this aim in mind, two verbal adjectives from the spatial domain were selected to represent the time-moving and ego-moving perspectives in Turkish. Accordingly, *geçen* (which literally translates as “[time word] that passes”) represented the time-moving perspective and *geçtiğimiz* (which literally translates as “[time word] that we pass”) represented the ego-moving perspective. Both expressions correspond to THE PASSING OF TIME IS MOTION conceptual metaphor and refer to the past.

METHOD

The current study is a corpus-based investigation that adopts a semi-automatic metaphor extraction procedure (Kumcu, 2021; Ronga et al., 2012; Strik Lievers, 2015; Winter, 2019) as the main methodology. This procedure is composed of five steps: (1) Compilation of a lexical list involving words from source and target domains, (2) searching for the source and target words in the corpus, and (3) extracting the metaphorical patterns from the concordance lists, (4) inspecting the patterns manually, and (5) annotating the metaphors.

- (1) The lexical list was composed of spatial adjectives (source domain) and temporal nouns (target domain). Spatial adjectives to function as the source

were originally motion verbs. To be more precise, 16 motion verbs describing a path (e.g. *to come, to go, to arrive, to pass, to return* etc.) were compiled in the infinitive form based on the lists used in similar corpus-based studies (e.g. Feist & Duffy, 2020; Suzuki, 2015). The list was then adapted to Turkish by adding and omitting certain verbs. Candidate verbs in the final list were adjectivized with appropriate suffixes such that the time-moving variants reflect a 3rd person singular perspective (verb-ADJ-Ø) while the ego-moving variants reflect a 1st person plural perspective (verb-ADJ-POSS[1PL]).

The total frequency of the variants was then computed which revealed that the most frequent motion verb was *gelmek* – “to come” ($f = 33,503$) with the perspective variants of *gelen* – “[n] that comes” ($f = 33,086$) and *geldiğimiz* – “[n] that we come” ($f = 417$). However, a pre-investigation indicated that there were not sufficient temporal nouns associated with *gelen* and *geldiğimiz* to conduct reliable statistical analyses. Further, the frequency of the two variants was not balanced. As a result, the second most frequent motion verb, *geçmek* – “to pass”, whose inflected variants had a total frequency of 23,556, was selected to represent time-moving (*geçen*, $f = 21,499$) and ego-moving (*geçtiğimiz*, $f = 2,067$) perspectives.

Temporal nouns belonging to the target domain were compiled from Turkish dictionaries, thesauri and studies on space-time metaphors in Turkish with an appendix (e.g. Bostan et al., 2016). Temporal nouns in the list may refer to a point (e.g. *gün* – “day”) or a period (e.g. *on yıllar* – “decades”) in the calendar. Additionally, they may refer to an event (e.g. *düğün* – “wedding”, *seçim* – “election” etc.) or a stage in life (e.g. *çocukluk* – “childhood”, *gençlik* – “youthhood” etc.). Although words that are clearly associated with time such as *day, week* or *year* were easier to identify, a series of practical decisions were given for spatiotemporally ambiguous words. For example, nouns whose core meanings are related to “progress” rather than time in a strict sense such as *aşama* – “stage”, *evre* – “phase”, and *gelişme* – “development” were not included in the list. On the other hand, nouns that refer to time directly such as *süre* – “span” and *süreç* – “process” were included. The final list, which is by no means exhaustive, is composed of 117 temporal nouns and can be accessed at <https://osf.io/f4k9x/>.

- (2) The corpus used in the study was the Turkish National Corpus (TNC) (Aksan et al., 2012). TNC is a well-established, balanced and representative general-purpose corpus of contemporary Turkish with 50 million word tokens across a wide variety of genres covering 20 years (1990–2009). The written component consists of texts produced in both literary and non-literary

domains. Transcriptions from spoken data involve spontaneous, everyday conversations and speeches collected in particular communicative settings such as meetings and lectures. The TNC allowed for a sufficient number of occurrences of space-time mapping due to its large volume.

- (3) Metaphorical pattern in the study was defined based on (Stefanowitsch, 2008, p. 66): “a metaphorical pattern is a multi-word expression from a given source domain into which one or more specific lexical item from a given target domain have been inserted.” Accordingly, a space-time metaphor involves a temporal head (a noun or a verb) and a spatial modifier (an adjective or an adverb) from the lexeme list such as *geçtiğimiz gün* – “the day that we pass”. Obviously, this method would only capture instances manifesting themselves as patterns with lexical items from source and target domains that are also available in the predefined lexical list. Although some metaphorical instances may not be as clear with lexical items from both domains, this method is more precise than the traditional extraction method as long as the lexical items are chosen wisely. It must also be acknowledged that metaphorical expressions are gradable on a spectrum of “metaphoricity” rather than binary (e.g. either metaphor or not). That means certain instances were more metaphorical than others on the non-figurative–figurative continuum (Dirven, 2009). As token, type, and hapax frequencies demonstrate below, most space-time metaphors in Turkish are highly conventionalized while some of them are dynamic (ad-hoc coinages) (see Hanks, 2008).
- (4) The semi-automatic extraction method used in the present study may result in false hits (i.e. instances that were mistakenly included in the list of space-time metaphors although they are not). Thus, all time-space metaphorical instances were manually inspected, which corresponds to the “semi” part of the method. False hits such as “harekete *geçtiğimiz gece* uyumadı” – “s/he did not sleep the night we took action” and duplicate concordances were removed.
- (5) As the last step, I annotated the metaphorical instances on two dimensions: domain (time, metaphorical motion, and literal motion) and temporal type (occurrence, sequence, and duration). Temporal type indicated the type of temporal events referred to by temporal nouns in the target domain and described by motion adjectives in the source domain. Temporal types were employed to categorize examples from the corpus. I also annotated the token (total number of occurrences), type (every distinct occurrence), and hapax legomena instances (types that occur only once in the sample and thus, unique occurrences). A set of rules was formulated

when identifying types: Instances that refer to different points in time (e.g. *Temmuz* – “July” and *1999 Temmuz* – “July 1999”) were regarded as distinct instances and were thus identified as types. Specific events and their generic names (e.g. *festival* – “festival” and *Berlin Film Festivali* – “Berlin Film Festival” or *yıl* – “year” and *yasama yılı* – “legislative year”) were also regarded as types. However, patterns described with an adjective rather than referring to a distinct time point or period as in *politik süreç* – “political process” were not regarded as types. Instances annotated with different temporal types such as *ay* – “month” (occurrence) and *12 ay içinde* – “within 12 months” (duration) were regarded as different occurrences as well.

Token, type and hapax frequencies of the extracted occurrences were computed as the main indicator of dominance. I also computed the type–token ratio (TTR) (i.e. the number of types divided by the number of tokens) to measure how “lexically varied” the metaphorical perspectives were. Frequencies were analyzed with binomial and chi-square tests in the R programming language and environment (R Core Team, 2022). Raw data (i.e. the lexeme list and the list of all occurrences), processed data used in analyses and data visualization and the annotated R scripts are publicly available via Open Science Framework (OSF) and can be accessed at <https://osf.io/f4k9x/>. Turkish examples from the sample were presented with their translations in English and interlinear morpheme-by-morpheme glosses according to the Leipzig Glossing Rules (<https://www.eva.mpg.de/lingua/resources/glossing-rules.php>).

RESULTS

Among the 50,678,199 words in the corpus, the observed frequency of *geçen* was 21,499 (normalised $f = 424.23$) and the observed frequency of *geçtiğimiz* was 2,067 (normalised $f = 40.79$). In total, 5,058 concordances were investigated. The majority of the space-time patterns were simple adjective clauses (spatial adjective + temporal noun). In some cases, the verbal adjectives were further described with adverbial clauses (e.g. *üzerinden 24 yıl geçen o gün* – “the day over which 24 years have passed” or *krizlerle geçen yıl* – “the year that has passed with crises”).

Time-Moving Perspective: Geçen

3,073 concordances were extracted with the word *geçen* from the corpus after the duplicate entries were deleted. Token frequencies of *geçen* as per three semantic domains were presented in Table 1.

Table 1. Token Frequency of *Geçen* (Percentage in Parentheses) Distributed per Semantic Domain

Domain	<i>f</i> (%)
Time	1,977 (64.33)
Motion (metaphorical)	789 (25.68)
Motion (literal)	307 (9.99)
Total	3,073 (100)

A chi-square test showed that there was a significant difference between the frequency of the word within time, metaphorical motion and literal motion domains; $\chi^2(2) = 1442.4$, $p < 0.0001$, $w = 0.48$. A binomial test indicated that there was also a significant difference between the frequencies of the temporal ($n = 1,977$) and non-temporal (i.e. metaphorical and literal motion, $n = 1,096$) domains; $P = 0.64$, $p < 0.0001$. Lastly, there was a significant difference between the frequencies of metaphorical (i.e. time and metaphorical motion, $n = 2,766$) and non-metaphorical ($n = 307$) use of the word; $P = 0.90$, $p < 0.0001$.

Collocation frequencies verified the chi-square and binomial tests based on token frequencies (see Table 2). As can be seen from the table, 80% of the most frequent ten collocates of *geçen* were associated with the temporal domain.

Table 2. 10 Most Frequent Collocates of *Geçen* Ranked by Log-likelihood (G^2) This sentence will be inserted as a note referring to the Table 2.: (M) stands for metaphorical.

Rank	Left	Right	Domain	G^2
1		<i>yıl</i> – “year”	Time	16,272.44
2		<i>gün</i> – “day”	Time	13,641.76
3		<i>hafta</i> – “week”	Time	12,116.36
4	<i>adı</i> – “its name”		Motion (m)	8,366.97
5	<i>her</i> – “every”		Time	6,831.50
6		<i>sene</i> – “year”	Time	4,351.66
7		<i>yılın</i> – “of the year”	Time	3,991.67
8	<i>aradan</i> – “in between”		Time	3,667.16
9	<i>bahsi</i> – “its mention”		Motion (m)	2,522.30
10		<i>ay</i> – “month”	Time	2,078.26

The most frequent right collocates clearly belong to the time domain and do not need further explanation. That said, the most frequent fifth and eighth left collocates, that is, *her* – “every” and *aradan* – “in between”, are annotated with the time domain as well although they are not temporal words themselves. This

is because when these words are located on the left of *geçen*, the right collocates following it were almost always temporal nouns as in the case of *her geçen gün* – “every (passing) day” or *aradan geçen zaman* – “the time that passes in between”. *Aradan* – “in between” is a more peculiar case because the word itself belongs to the spatial domain as well. Language users can be said to emphasize the spatial grounding of time by using two spatial lexemes together in *aradan geçen* – “[n] that passes in between” when talking about time. Lastly, the most frequent collocate of *geçen* in the domain of literal motion was *yoldan geçen* – “[n] that passes the road” ($G^2 = 1155.21$) and ranked 16th in the overall collocation list. Selected examples of *geçen* that represent each domain are presented below:

- (1) Time (occurrence)
geç-en gün
 pass-ADJ day
 “the other day”
- (2) Time (sequence)
geç-en sayı
 pass-ADJ issue
 “the previous issue (of the magazine)”
- (3) Time (duration)
geç-en ay-lar-da
 pass-ADJ month-PL-LOC
 “in the last months”
- (4) Motion (metaphorical)
ad-ı geç-en kitap
 name-POSS[3SG] pass-ADJ book
 “the book that has been mentioned”
- (5) Motion (literal)
yol-dan geç-en adam
 road-ABL pass-ADJ man
 “the man passing by (the road)”

I also calculated the type, token and hapax frequencies of *geçen* used in the temporal domain (see Table 3). Type-token ratio indicated that the lexical variability of *geçen* as metaphorical time was well below 50% and can be considered very low.

Table 3. Type, Token and Hapax Frequencies of *Geçen* in the Temporal Domain

Frequency type	<i>f</i>
Token	1,977
Type	123
Hapax	66
Type-token ratio (TTR)	6.22%

Ego-Moving Perspective: *Geçtiğimiz*

1,985 concordances were extracted with the word *geçtiğimiz* from the corpus after the duplicate entries were deleted. Token frequencies of *geçtiğimiz* as per three semantic domains were presented in Table 4.

Table 4. Token Frequency of *Geçtiğimiz* (Percentage in Parentheses) Distributed per Semantic Domain

Domain	<i>f</i> (%)
Time	1,802 (90.87)
Motion (metaphorical)	126 (6.35)
Motion (literal)	57 (2.87)
Total	1,985 (100)

A chi-square test showed that there was a significant difference between the frequency of the word within time, metaphorical motion and literal motion domains; $\chi^2(2) = 2951.5$, $p < 0.0001$, $w = 0.86$. A binomial test indicated that there was also a significant difference between the frequencies of the temporal ($n = 1,802$) and non-temporal (i.e. metaphorical and literal motion, $n = 183$) domains; $P = 0.91$, $p < 0.0001$. Lastly, there was a significant difference between the frequencies of metaphorical (i.e. time and metaphorical motion, $n = 1,928$) and non-metaphorical ($n = 57$) use of the word; $P = 0.97$, $p < 0.0001$.

Collocation frequencies verified the tests based on token frequencies (see Table 5). As can be seen from the table, all of the most frequent ten collocates of *geçtiğimiz* were associated with the temporal domain. The ninth most frequent right collocate of the lexeme, that is, *içinden* – “through” is a spatial word itself. As in the case of *aradan* – “in between” discussed above, the pattern *içinden geçtiğimiz* – “[n] that we pass through” is predominantly used with temporal nouns as in *içinden geçtiğimiz günler* – “days we pass through”. The most frequent collocate of *geçtiğimiz* in the domain of literal motion was

önünden geçtiğimiz – “[n] that we pass by” ($G^2 = 137.38$, ranked 13th) and *temasa geçtiğimiz* – “[n] that we get into touch” ($G^2 = 50.01$, ranked 33rd) in the domain of metaphorical motion.

Table 5. 10 Most Frequent Collocates of *Geçtiğimiz* Ranked by Log-likelihood (G^2)

Rank	Left	Right	Domain	G^2
1		<i>günlerde</i> – “in days”	Time	3,683.29
2		<i>yıl</i> – “year”	Time	2,485.77
3		<i>hafta</i> – “week”	Time	2,229.29
4		<i>aylarda</i> – “in months”	Time	1,317.98
5		<i>yıllarda</i> – “in years”	Time	970.54
6		<i>ay</i> – “month”	Time	793.86
7		<i>haftalarda</i> – “in weeks”	Time	686.66
8		<i>sezon</i> – “season”	Time	388.92
9	<i>içinden</i> – “through”		Time	253.85
10		<i>yılım</i> – “of the year”	Time	234.12

Selected examples of *geçtiğimiz* that represent each domain were presented below:

- (1) Time (occurrence)
geç-tiğ(i)-miz 10 Eylül gün-ü
 pass-ADJ-POSS[1PL] 10 September day-ACC
 “the last 10th of September”
- (2) Time (sequence)
geç-tiğ(i)-miz hükümet-ler
 pass-ADJ-POSS[1PL] government-PL
 “the previous governments”
- (3) Time (duration)
geç-tiğ(i)-miz 1 yıl-lık süre
 pass-ADJ-POSS[1PL] 1 year-ADJ duration
 “(the duration of) the last one year”
- (4) Motion (metaphorical)
gül-üp geç-tiğ(i)-miz şey
 laugh-ADV pass-ADJ-POSS[1PL] thing
 “the thing we laughed away”

(5) Motion (literal)

geç-tiğ(i)-miz köprü-ler-in halat-lar-ı

pass-ADJ-POSS[1PL] bridge-PL-GEN rope-PL-POSS[3SG]

“the ropes of the bridges we go across”

I also calculated the type, token and hapax frequencies of *geçtiğimiz* in the temporal domain (see Table 6). Type-token ratio indicated that the lexical variability of *geçtiğimiz* as metaphorical time was even lower than *geçen*.

Table 6. Type, Token and Hapax Frequencies of *Geçtiğimiz* in the Temporal Domain

Frequency type	<i>f</i>
Token	1,802
Type	88
Hapax	50
Type-token ratio (TTR)	4.88%

Time-Moving Versus Ego-Moving Perspectives

The difference of “temporal metaphoricity” between *geçen* and *geçtiğimiz* as the main research question of our study was investigated with a two-sided proportion test. Results showed that the proportion of time metaphors associated with *geçtiğimiz* (90.78%) as to all instances extracted with *geçtiğimiz* was significantly higher than the proportion of time metaphors associated with *geçen* (64.33%) as to all instances extracted with *geçen*; $\chi^2(1) = 445.06$, $p < 0.0001$, $h = 0.68$.

Although it was not the main focus of the study, results also revealed a significant difference between the metaphoricity of *geçtiğimiz* (93.65%) and *geçen* (90%); $\chi^2(1) = 19.98$, $p < 0.0001$, $h = 0.15$. That said, there was no significant difference between type; $\chi^2(1) = 0.46$, $p = 0.5$ or hapax frequency ratios; $\chi^2(1) = 0.59$, $p = 0.44$ of *geçen* (type = 4%, hapax = 2%) or *geçtiğimiz* (type = 4%, hapax = 3%). Type-token ratios between the temporal uses of *geçen* (6.22%) and *geçtiğimiz* (4.88%) were not significantly different either; $\chi^2(1) = 2.95$, $p = 0.09$. Figure 1 is the network plot that illustrates the most frequent 50 collocates of *geçen* and *geçtiğimiz* from all domains and their commonalities.

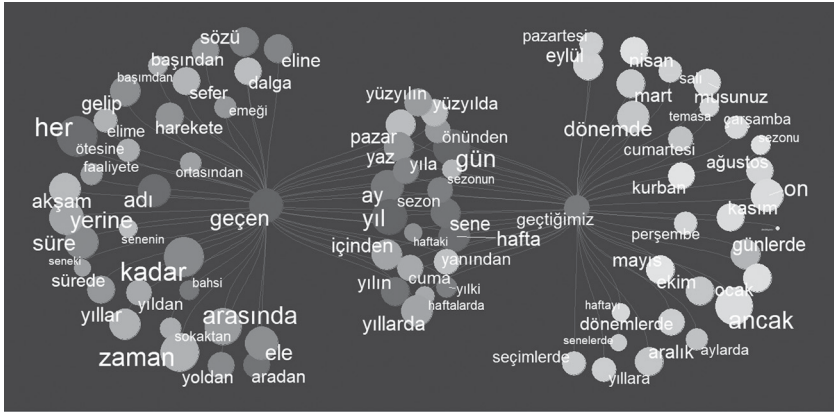


Figure 1. Network Plot of the Most Frequent Collocates of *Geçen* and *Geçtiğimiz*

Note: The size of words and circles indicate the frequency of the words in the general corpus: Larger words and circles indicate a higher frequency. Circle colours show the strength of the collocational relationship based on the mutual information (MI) score: Darker colours indicate a stronger relationship.

DISCUSSION

The present study compared the weight of the time-moving and ego-moving perspectives in Turkish by taking two verbal adjectives representing each frame, respectively: *geçen* and *geçtiğimiz*. Results from the TNC showed that the temporal use of *geçtiğimiz* (as compared to its non-temporal use) is significantly more dominant than the temporal use of *geçen* (as compared to its non-temporal use) with a large effect size. These results suggest that the ego-moving perspective might be more dominant than the time-moving perspective in Turkish based on the selected lexemes. Although there are other motion-path verbs in our list (and obviously, in Turkish) to replicate the same analysis, a pre-investigation suggested that the selected adjectives carry a lot of potentials to reveal several instances of space-time mapping.

The most frequent occurrences of space-time mapping in Turkish based on the selected lexemes were *geçen yıl* – “the last year” and *geçtiğimiz günlerde* – “in the previous days”. A Google search also showed that *geçtiğimiz günlerde* (11,300,000 hits) is a more frequent pattern than *geçen yıl* (10,100,000 hits), further revealing the status of the ego-moving perspective associated with the passing motion. Another difference between the two schemas is the type of temporal concepts

described. Although all instances were not analyzed systematically in this respect, the most frequent collocates indicate that while time-moving perspective is used to speak about occasional points on the timeline regardless of their length such as *gün* – “day”, *ay* – “month” or *yıl* – “year”, ego-moving perspective refers to durational periods such as *günlerde* – “in days”, *aylarda* – “in months” or *yıllarda* – “in years” with plural and locative markers, which further stresses the transfer from space to time.²

The results are striking overall considering that *geçmek* – “to pass” is a predominantly path-motion verb. Its first three definitions in the Dictionary of the Turkish Language Association (<https://sozluk.gov.tr/>) are directly related to motion. Only the 22nd definition refers to its metaphorical, temporal meaning, defining the lemma as “moving through the time, leaving it behind”. That said, temporal use of the word dominates over its spatial use in both variants although the difference is even more salient in the ego-moving frame of reference. Certain temporal nouns with low frequency in the corpus made the list of the most frequent common collocates such as *haftaki* – “that of the week” and *yılki* – “that of the year” (see Figure 1).

Low TTRs further show that the space-time metaphors in Turkish are highly conventionalized rather than being creative, ad-hoc innovations. Certain transfers between the domains are particularly strong with an additional adverb of place (*içinden*) as in the case of *içinden geçtiğimiz günler* – “the days we pass through”. Notably, these patterns are also conventionalized and they become unnatural if the adverb is replaced. For example, although one can pass *through* time in Turkish, it is not possible to pass *by*, *across* or *under* it, which underlines the defining characteristic of the ego-moving perspective where the ego travels *on* the timeline from the first-person point of view.

The results reported in the current study seem to contradict the findings from most languages which show bias toward time-moving patterns (e.g. Brdar & Brdar-Szabó, 2017; Feist & Duffy, 2020; Suzuki, 2015). The weight of the ego-moving perspective in the current study might be related to several linguistic and/or cultural factors. But before speculating about the reasons, it is important to note that the results reported here are based on two specific motion verbs referring to the past within the PASSING OF TIME IS MOTION conceptual metaphor

2 An additional proportional analysis also showed that ego-moving perspective with *geçtiğimiz* was significantly more frequently taken when speaking about months ($p < 0.0001$) and years ($p < 0.001$) as compared to *geçen*. There was no such difference for days, weeks or centuries (all $ps > 0.05$).

and therefore, can be considered merely one piece of a great puzzle. We should not disregard the possibility that the dominance of the ego-moving perspective might be specific to the selected lexeme. Informal Google searches with similar time-moving and ego-moving variants of common space-time patterns in Turkish suggested a mixed picture: For example, *sona yaklaşıyoruz* – “we are approaching the end” (73,100 hits) turned out to be a more frequent pattern than its time-moving variant, *son yaklaşıyor* – “the end is approaching” (39,600 hits). On the other hand, *bayram yaklaşıyor* – “the festival is approaching” (39,600 hits) seems to be much more frequent than its ego-moving version, *bayrama yaklaşıyoruz* – “we are approaching the festival” (1,550 hits). In any case, there is much room for research in this line of inquiry with additional variables. Future studies could categorize the space-time patterns according to the valence of the described events or investigate patterns reflecting different conceptual metaphors.

Another point to consider is the methodological differences between the abovementioned corpus-based studies. Following a rigid methodology and reporting the metaphor extraction procedure clearly are pivotal to replication studies in crosslinguistic research (see Winter, 2019). It is equally important to disambiguate linguistic, cultural and individual variability. There is much evidence that cultural variables such as religion (e.g. Li & Cao, 2021) and individual variation such as being future-oriented (e.g. de la Fuente et al., 2014) can alter our temporal perspective which is expected to be manifested in language.

Space-time mapping could be one of the most important metaphorical understandings of humankind as the transfer involves the two fundamental domains of cognition with possible consequences on other faculties of mind from semantic judgement to reasoning. In this respect, our results overall suggest that the projection of time onto space seems to be deeply entrenched in Turkish similar to other languages and that the ego-moving perspective might be a fundamental conceptualization of time. I expect that our results will pave a way for further corpus-based investigations and corroborate future experimental studies on the processing ease of the two temporal frames among Turkish speakers.

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