Chapter 12

Reflection of Temporal Horizon in Linguistic Performance

Jacek Tadeusz Waliński, University of Lodz

A significant body of cognitive research has identified the way in which temporal horizons are developed in the human mind, as well as the influence they exert on individual and social behavior. This study demonstrates a cognitive schema of temporal horizon that emerges from the frequency of expressions denoting temporal distance in spontaneous linguistic performance of Polish speakers. Linguistic material analyzed in this study includes transcriptions of impromptu conversations conducted in informal personal contexts, which were compiled into a demographically annotated linguistic corpus that amounts to 2.4 million words. The results reveal that the temporal horizon functions predominantly within three distinctive brackets corresponding to one day, one year, and up to 50 year periods. Moreover, the findings indicate that it tends to alter dynamically with age.

Keywords

time, time perspective, temporal horizon, cognitive schema, language, cognition

1. Introduction

Different currents of the 20th century phenomenology put emphasis on different aspects of temporality. Bergson (1889/2001) stressed a crucial role of the past in the psychological perception of self in time. Although he admitted that the future gives us hope and drive for activity, he assumed that the true meaning of time resides in the past. Heidegger (1927/2002), though not denying the union of self with the past, insisted that the most important aspect of existence lies in the constant process of becoming and developing in time. From that perspective, the future is the primary meaning of the perception of self in time. Husserl (1917/1991) insisted that the consciousness of time functions in the subjective present, and neither reflective returns to the past nor anticipations of future events can violate our immediately accessible temporal intuitions. These different orientations to time demonstrate

---

1 Research carried out within COST Action TD0904 TIMELY, supported with Polish National Science Centre grant No. 2011/01/M/HS2/03042 “Perception of Time as a Linguistic Category”.
that temporality has advocates for the future, past, or present dominance, which is not necessarily an irreconcilable antagonism, but rather a testimony to the fact that philosophers and psychologists recognize the division of time into three temporal zones of past, present, and future residing in the human psyche.

However, Thomas Cottle, who developed a series of ingenious inventories of psychological time measurement in the 1960s (e.g. Cottle, 1967; 1968; Cottle & Pleck, 1969), notes that the idea of subjective time measurement is illusory:

Some might like to take refuge in a position that like heat, light, and sound, time may be defined as that which is measured by some appropriate instrument or gauge. Thus, a clock or calendar, or even biological and cultural cycles, may be likened to thermometers, photometers and audiometers. But likeness is not literalness and while they capture a certain essence of objectivity, such scientific tools of measurement rarely grasp for even a moment the evanescent qualities of so-called subjective time. (Cottle, 1968, p. 130)

This observation points out that the scientific approach to temporality strips away the evanescent (or transient, see Galton, 2011) essence of time, and transforms it into a static, calculable model. Bergson describes the transition of temporal thought into spatial language and mathematical codification in the following manner:

Immanent in our measurement of time, therefore, is the tendency to empty its content into a space of four dimensions in which past, present, and future are juxtaposed or superimposed for all eternity. This tendency simply expresses our inability mathematically to translate time itself, our need to replace it, in order to measure it, by simultaneities which we count. (Bergson, 2002, p. 215)

He adds that spatialization of time is possible because our consciousness “infuses living duration into a time dried up as space”. From that outlook, by defining subjective time zones of present, past, and future we address only a convenience aspect of temporal definitions. Organization of temporality into those three logical categories is investigated in studies of temporal horizon.
2. The concept of temporal horizon

In the 1920s the French pioneer psychologist Pierre Janet (discussed in Fraisse, 1963) started examination of time perception from the outlook of human social behavior. Janet observed a strong connection between the perception of time and the socializing process, which he regarded as a reciprocal relationship: on the one hand, people adapt to time; on the other hand, they create time in their minds. The concept of *time perspective* was discussed in a similar manner by Frank (1939), another pioneer psychologist emphasizing the role of the total mental representation of past, present, and future in the study of human behavior.

Subsequently, the problem of how we adapt to time and create temporal conditions was investigated by Paul Fraisse (1963), who maintained that we have no direct experience of time, but only of particular sequences and rhythms (see Fraisse, 1978). Therefore, it is not time as such, but what happens in time that creates temporal effects, which are subsequently turned into psychological temporal perspectives reflecting personal life experience. Fraisse (1963) views the construction of time structure as an effort to adapt to the changing world. He distinguishes three levels of psychological reaction to time: (1) physiological time; (2) perception of time; (3) speculation on time. With reference to the last level Fraisse introduced the concept of *temporal horizon*, in which cognitive and motivational factors interact in real life conditions.

Over the years a number of studies have described the concept of time perspective somewhat differently. For example, Fraisse (1963, p. 153) sees *temporal horizon* as “the way in which we behave in relation to three aspects of time: the past, the present, and the future”. Ornstein (1969, p. 23) views *time perspective* as “philosophical, social, cultural constructions of the world and their effects on the interpretation of time experience”. Block (1990, p. 1) defines *temporal perspective*, as “an individual experience and conceptions concerning past, present, and future time”. As emphasized by Fraisse (1963, 1984) and Kastenbaum (1964, 1994), the study of *time perception* should be distinguished from the study of time perspective, which attempts to examine how and why people turn beyond the present moment. It has been noticed (Drake, Duncan, Sutherland, Abernethy & Henry, 2008) that an increased interest in studying cognitive aspects of time results in proliferation of terminology used in that domain of studies. Apart from *temporal perspective, time perspective, and*
temporal horizon other terms used in a very similar meaning include time attitudes, temporal beliefs, and temporal orientation.

3. Time and the socializing process

Fraisse (1963) asserts that individual temporal horizons are constructed on the basis of personal life experience: they change with age and tend to reflect one’s developmental history and individual position in the society. Therefore, as the human life progresses, time perception is systematically turned into the temporal horizon. As we grow older our temporal horizons become broader and more multifaceted due to the increasingly wider experience, which is also supported by observations in developmental psychology (Friedman, 2003; see also Piaget, 1946/1969).

The impact of time on human condition was researched by Lewin (1939, 1951), who developed a life-space model, in which a person’s life space is influenced not only by the geographical and social environment, but also by the temporal dimension. It involves the influence of both the past and the future on an individual’s present behavior. Lewin (1951, p. 75) defines time perspective as “the totality of the individual’s views of his (or her) psychological future and psychological past existing at a given time”. He asserts that the time perspective is influenced by personal social background and plays a crucial role in motivation.

Nuttin supports Lewin’s life-space model. He notes that “future and past events have an impact on present behavior to the extent that they are actually present on the cognitive level of behavioral functioning” (Nuttin, 1985, p. 54). He emphasizes a motivational aspect of future time perspective by stressing its crucial role in human intentions and motivation. Kastenbaum (1994) enumerates the following basic properties of the time perspective:

- protension – the cognitive temporal extension in which we think ahead into the future;
- retrovation – the cognitive temporal extension in which we think back into the past;
- density – the number of past or future events that we think about;
- coherence – the degree of organization within cognitive past-present-future matrix;
- directionality – the sense of perceived rate of movement toward the future.

Furthermore, Seligman (1975, cited in Roeckelein, 2000, p. 55) provides certain generalizations concerning temporal perspectives, for example:
• people tend to project into the future as they move from childhood to adulthood;
• the stereotype that older people “live in the past” seems to be false;
• time perspectives become more alert and effective when individuals have a sense of control in usefulness of their lives;
• time perspectives tend to shrink in economic recession when jobs are hard to find.

Cross-cultural research on differences in perception and representation of the past, present, and future (Block, Buggie & Matsui, 1996; Hill, Block & Buggie, 2000; Ji, Guo, Zhang, & Messervey, 2009) show that temporal perspectives vary to some extent across countries and ethnic groups. The temporal perspective has been viewed both as a cognitive schema (e.g. Kastenbaum, 1963, 1964) and as a personality trait (e.g. Zimbardo & Boyd, 1999, 2008). Block (1990, p. 27) emphasizes that the temporal perspective is a uniquely psychological, tensed phenomenon, since this conception of time is not accounted for in physics, where fundamental time-related equations concern only the tenseless relative ordering of events as happening earlier or later (see Le Poidevin, 2007 for a discussion).

4. Measurement of time perspective in psychology

One of the early methods of measuring time perspective is the Future Time Perspective test (Wallace, 1956), which measures individual abilities to conceptualize the future in terms of the timing and ordering of personalized future events. Other psychological tests used for time perspective measurement either focus on its full complexity, e.g. Time Reference Inventory (Roos & Albers, 1965), Thematic Apperception Test (Wohlford, 1966), Circles Test (Cottle, 1967), Lines Test (Cottle & Pleck, 1969), and Time Attitude Scale (Nuttin, 1985), or they concentrate only on a single dimension, e.g. present or future, which includes Sensation Seeking Scale (Zuckerman, 1994), Consideration of Future Consequences Scale (Strathman, Gleicher, Boninger & Edwards, 1994), and Future Anxiety Scale (Zaleski, 1996). However, none of those tests has gained wider popularity in applications because of their questionable psychometric properties and scoring problems.

In the 1990s Philip Zimbardo developed the Stanford Time Perspective Inventory (STPI) test, which provides a straightforward way of measuring multiple time perspectives as
individual temporal profiles. An extensive series of studies (e.g. Boyd & Zimbardo, 1997; Keough, Zimbardo, & Boyd, 1999; Zimbardo & Boyd, 1999; Zimbardo, Keough, & Boyd, 1997) demonstrated its innovative potential in temporal perspective research. As summarized in a later study (D’Alessio, Guarino, De Pascalis & Zimbardo, 2003), the STPI test addressed shortcomings of the earlier one-dimensional scales by providing consistent evaluation of various dimensions within individual temporal profiles. In the outcome, the test has gained a widespread acceptance in psychology as a standard measure of personal characteristics concerning time perspective with clearly distinguished psychometric properties and a potential of application in diverse research paradigms.

Essentially, Zimbardo (2002; Zimbardo & Boyd, 1999, 2008) concurs in his views with the above-mentioned Lewin’s position that the temporal perspective plays a fundamental role in a variety of individual and social contexts. He defines the time perspective as “the manner in which individuals, and cultures, partition the flow of human experience into distinct temporal categories of past, present and future” (Zimbardo et al., 1997, p. 1008). He argues that time perspective variations between individuals are modified by a variety of personal, social, and institutional influences, such as one’s cultural values, social background, religion, education, etc. Since the time perspective is used in forming individual expectations, goals, and decisions taken in the immediate life-space, it exerts pervasive and powerful influence on the human behavior:

A positive past orientation connects us with our roots, heritage, family, religion and national rituals. It gives us a sense of stability, of our self over time; it’s where positive self-esteem is nourished. A future orientation gives us wings to soar to new destinations, to seek challenges and opportunities by envisioning scenarios of possible future selves. A present time perspective allows spontaneity, sensation seeking, openness to novelty, being in the moment and fully experiencing and expressing emotions. (Zimbardo, 2002, p. 64).

The STPI test makes it possible to assign individuals to specific categories manifesting different behavioral and social characteristics in real life situations. The STPI indices can be used as predictors for discovering psychological inclinations and, in turn, developing appropriate remedial strategies in a variety of social contexts. For example, the results of the STPI test have been used as a predictor of risky driving (Zimbardo et al., 1997), substance use (Keough et al., 1999), or to determine how faithfully students are likely to meet their
obligations (Harber, Zimbardo & Boyd, 2003). Moreover, Zimbardo and Boyd (2008) discuss how past-, present- and future-oriented ways of perceiving time can be used to the advantage of the whole psychological well-being (see also Drake et al., 2008).

5. Reflection of temporal horizon in spontaneous conversations

Language and time are related in cognition in many reciprocal ways. Language is used in time, it has been developed in time, and it serves as a principal means for understanding time, i.e. its structuring, representing, and conceptualizing (see Boroditsky, 2011; Jaszczolt, 2012; Lewandowska-Tomaszczyk, 2014 for reviews). Languages afford a wide variety of ways of referring to the past, present, and future, as well as conveying relative temporal ordering of events. There exists an array of linguistic devices for referring to time, including overt means expressed with lexical markers of time (e.g. temporal adverbs, temporal connectives), and grammatical markers of time (e.g. tense, aspect, modality).

This study investigates properties of a cognitive schema of temporal horizon reflected in linguistic performance. In this paper the term cognitive schema is used in the Piagetian sense of image-schematic model representing an aspect of cognition with a diagram that helps interpret and organize abstract concepts (Lakoff, 1987; Hampe, 2005), not in the sense of a cognitive structure distinguished in clinical contexts of psychology (cf. Riso & McBride, 2007). This research approaches the cognitive schema of temporal horizon from the perspective of cognitive corpus-based linguistics (Heylen, Tummers & Geeraerts, 2008; see Lewandowska-Tomaszczyk & Dziwirek, 2009 for examples of studies), which essentially combines the descriptive framework of cognitive linguistics (Croft & Cruse, 2004; Evans, 2012) with the methodological workbench of corpus linguistics (Biber, Conrad & Reppen, 1998; McEnery & Hardie, 2012).

The corpus-based investigation of the cognitive schema of temporal horizon is conducted with a systematic examination of references to temporal perspectives in transcriptions of impromptu conversations conducted among a wide demographic diversity of Polish speakers in various informal personal contexts. The study demonstrates how the cognitive schema of temporal horizon emerges from the frequency of temporal adverbials (Haspelmath, 1997). This study follows a model of representational space proposed by Langacker (2012) for processing time in human cognition. On the grounds of that model, temporal conceptions emerge at the level of interpreted experience as the product of cultural
elaboration and transfer from linguistic manifestations created in the human mind, i.e. a product of cognition in the socio-cultural context reflected in spontaneous linguistic performance.

5.1. Research methodology

This study is based on the 2010 edition of the PELCRA Spoken Conversational Corpus of Polish (henceforth, PELCRA SCCP), which, to the best of our knowledge, is the largest collection of impromptu conversational Polish available publicly worldwide. It is composed of meticulously transcribed spontaneous speech recordings that were annotated with demographic information about age, gender, and education of speakers (see Pęzik, 2012a for a general description of the corpus data). This edition of the PELCRA SCCP is available free of charge with full access to the corpus data through a user-friendly online concordancer (Waliński & Pęzik, 2007) at: http://www.nkjp.uni.lodz.pl/spoken.jsp as an offshoot of the National Corpus of Polish project.

It is noteworthy that none of the conversations in the PELCRA SCCP is devoted specifically to the topic of time. Moreover, they were recorded with most of the speakers being unaware that they were being taped (although they were informed about it later and eventually granted their permission to publish the transcriptions). The only difference between original conversations and their transcripts is that some sensitive personal details, e.g. surnames, addresses, security numbers, etc. mentioned in the conversations were anonymized, i.e. replaced with fictitious counterparts. The exclusive use of this particular type of linguistic data yields results that reflect spontaneous personal references to temporal perspectives. It reduces the number of instances when the temporal perspective is expressed from abstract, impersonal, and projected viewpoints, and eliminates biases resulting from the typical affectedness of language in written and formal-spoken linguistic data, where the spontaneity of expression is largely restricted by the pragmatics of public communication with impersonal audiences.

Corpus queries used in this study are based on a fundamental linguistic pattern characteristic of temporal adverbials, which is composed of a temporal preposition, e.g. in, from, on, since, for, before, after, through, etc. (Polish: “o, z, w, na, za, przez, przed, po, od”) preceding in certain proximity a time unit. This pattern identifies most expressions denoting absolute temporal distance, i.e. one expressed in time units. A set of time units selected for examination includes those that are commonly used to express duration, e.g. moment, second,
The lexical pattern employed for this research can be summarized as follows:

**TEMPORAL PREPOSITION + TEMPORAL UNIT; SLOP=[2–5], PRESERVE ORDER=YES**

It represents a fundamental way of articulating protensive and retrotensive temporal distances with temporal adverbials, e.g. “for a moment”, “since yesterday”, “in a week”, “after two years”, etc. Although this specification of temporal expressions leaves out indirect temporal discourse markers, the aim of this research is not to study the full variety of linguistic means used to express temporal relations, but to observe fundamental properties of the cognitive schema of temporal horizon.

The distance between the preposition and the following time unit was adjusted by application of proximity queries (Bernard & Griffin, 2009), which are implemented in the web interface to the corpus. They allow for specifying a slop value, which expresses how far apart the lexical items included in a query can be from one another to be still returned as a result to the query. For periods measured in tens, hundreds, and thousands of years the slop value was increased appropriately to account for compound numerals. An additional preserve order option, which specifies whether the original order of lexical items should be retained, was set to “yes” to prevent coincidental hits. All corpus queries used in this research are listed in Appendix, which provides for immediate replicability of the study with just a web browser.

6. Density of temporal horizon

The following chart presents frequencies of temporal adverbials found for the selected time units in the whole corpus, i.e. 513 conversations held among 1712 speakers.
Frequency observed in the corpus data show that in spontaneous conversations Polish speakers talk most frequently about moments, days and years. As shown in Fig. 1, the difference in frequency between these three units of temporal distance and the rest is substantial enough to put moments, days, and years ahead of other temporal units as fundamental constituents in the cognitive schema of temporal horizon. It is noteworthy that the high frequency of expressions referring to moments indicates their prominent role in temporal cognition (cf. Pöppel, 2009; Wittmann, 2011). Moreover, the day and the year have been found to have a critical impact on human experience and behavior based on neuropsychological and psychophysical evidence (Wittmann & Paulus, 2009).

The outstanding frequency of those temporal adverbials makes it possible to partition the temporal horizon into three corresponding regions. The first region of the temporal horizon that can be distinguished on the basis of the corpus data extends to the bracket of one day, which includes lexemes today, yesterday, and tomorrow (Polish: “dzisiaj”, “wczoraj”, “jutro”). Temporal adverbials referring to one day or shorter periods occur most frequently in the conversations, which indicates their prominence in mental operations required for functioning in a variety of immediate life-space contexts. Please note that this observation does not distinguish between the protensive and the retrotensive temporal perspectives.

Another bracket of the temporal horizon discernible in the data extends between the frequencies of adverbials expressing periods measured in days and adverbials denoting the period of one year. The frequency of adverbials referring to one year appears to mark a significantly meaningful range between the immediate temporal vicinity and longer temporal
spans, which indicates that the temporal cognition typically operates within the period of one year.

(4) The third bracket of the temporal horizon that can be distinguished on the basis of frequencies found in the conversations extends beyond the span of one year. It is particularly easy to discern in Polish, which uses distinct morphological forms for a single year (“rok, roku, rokiem”) and multiple years (“lata, lat, latach, laty”). Examination of the data for longer periods reveals that the density of references to temporal perspectives decreases progressively beyond this range.

### 7. Extension of temporal horizon

The following chart presents frequencies of temporal adverbials for the range from eleven to multiple thousand years found in the whole corpus, i.e. 513 conversations held among 1712 speakers.

![Figure 2. Extension of temporal horizon observed in the corpus data](image)

(5) The corpus data show that beyond one year region the longer temporal perspective is, the less frequently it is mentioned in the conversations. This observation is largely congruent with Construal Level Theory (Trope & Liberman, 2003, 2010), which essentially assumes that the greater the temporal distance is, the more likely events are to be represented in terms of abstract and decontextualized characteristics. Fig. 2 illustrates how evidently the frequency of
temporal adverbials in the conversations declines as time periods become progressively longer.

(6) Another interesting tendency, but for the frequency of references to rise, as shown in Fig. 1 and 2, occurs for round number periods, e.g. 5, 10, 20, and 100 years. This confirms psychological observations (Lewin, 1951; Fraisse, 1963; Zimbardo & Boyd, 1999, 2008) that the time perspective is significantly influenced by a variety of socio-cultural frames (see Goffman, 1974), which results in its mental partitioning according to some common patterns widely-held in the society.

(7) There is a clearly apparent drop in the frequency of references to periods exceeding 50 years. It was examined closer through a concordance analysis of individual examples, which reveals that the longest temporal perspective expressed from a personal point of view occurs at the distance of 55 years. The remaining 25 examples for periods exceeding 50 years that crop up in concordances do not refer to temporal perspectives from a personal point of view. Instead, they specify age of elderly individuals, historic events, and abstract truths. They also occur in a variety of set phrases (especially “100 years”). References to the temporal distance beyond that period are hardly ever used in impromptu conversations to discuss matters reflecting personal experiences or expectations, which indicates that in practice a personal temporal horizon stops at the boundary of around 50 years.

(8) On the other hand, the retrieved language samples demonstrate that an abstract temporal horizon is practically unlimited. The longest time periods mentioned in the conversations extend to 5,000 years (a remark about Chinese culture) and 200,000,000 years (a remark about the history of the Solar System), which shows that in everyday speech it is not uncommon to refer to some transcendental facts occurring in potentially infinite periods back and ahead in time (cf. Boyd & Zimbardo, 1997; Suddendorf & Corballis, 2007).

8. Alterations of temporal horizon across age groups

The following chart presents frequencies of temporal adverbials found in five year brackets distinguished for the age of speakers. For periods shorter than or equal to one day, the results are based on 2124 examples found in 420 different conversations. For periods longer than or equal to one week, the results are based on 2130 examples found in 389 different conversations. That corresponding amount of linguistic material was normalized in the
Jacek Tadeusz Waliński

analysis proportionally both to the number of analyzed examples and to the number of utterances recorded in the corpus for each distinguished age bracket (see Appendix for details). Frequencies for speakers younger than 21 and older than 75 are not discussed in this study, since members of these age groups are relatively underrepresented in the corpus.

Figure 3. References to periods shorter than or equal to one day vs. periods longer than or equal to one week observed different age groups in the corpus across data

(9) Fig. 3 presents frequencies of temporal adverbials for the distinguished five year brackets, separated into periods shorter than or equal to one day, and periods longer than or equal to one week. As shown in the chart, corpus data indicate that the temporal horizon plays an important role in the human mindset throughout the whole lifetime, which is congruent with psychological conclusions (Fraisse, 1963; Seligman, 1975; Hendricks, 2001) that the time perspective never ceases to exert an influence on our functioning in the life-space.

(10) What is also noticeable in the chart is that people in certain age brackets manifest a tendency to refer to temporal perspectives more frequently than others. This can be observed in the 31 to 35 and 36 to 40 age brackets. For these age groups, both shorter and longer time perspectives appear to be similarly important. On the other hand, a drop in the frequency of adverbials expressing both shorter and longer temporal distances can be observed among 41–50 year olds. Interestingly, when speakers cross the threshold of retirement (over 61 age brackets) the frequency of adverbials referring to temporal distance,
especially longer ones, remains at levels similar to those observed in younger groups, and even increases in the 66 to 70 age bracket, which confirms that temporal horizons do not dissipate as we grow older but tend to change dynamically over the life span (Kastenbaum, 1963; Rakowski, 1986; Hendricks, 2001).

(11) Moreover, the frequencies suggest that speakers belonging to certain age groups have a tendency to refer more often to longer temporal distances. As demonstrated in Fig. 3, this inclination can be observed in the 26 to 30 age bracket, and among speakers who passed the 60th year of their lives. Statistical significance of these differences for the distinguished age groups was checked with the GLMEM test of logistic regression (Generalized Linear Mixed-Effects Model), which was found by Gries (2011) to yield a relatively highest accuracy in linguistic studies examining frequencies of lexemes. The statistical analysis was conducted with R software (R Foundation for Statistical Computing, 2012).

Testing showed that statistical significance of the difference in frequency between longer and shorter temporal horizons exists for the distinguished 26–30 age bracket, $Pr(|z|) = 0.000381$. Additionally, statistical significance emerges for the distinguished groups of older speakers: the 61–65 age bracket, $Pr(|z|) = 0.066349$, and the 65–70 age bracket, $Pr(|z|) = 0.055072$, which when analyzed together as a 10 year bracket manifests statistical significance, $Pr(|z|) = 0.0232$. Validation of the above results with the test of independence based on chi-square, confirmed the statistical significance of the whole set of data ($\chi^2 = 23.6, df = 10, P(>\chi^2) = 0.0087$).

The difference observed for the distinguished 26–30 age bracket indicates that longer temporal perspectives are characteristic of early adulthood. This is congruent with observations by Fingerman and Perlmutter (1995), who found that younger adults (aged 20 to 37) think frequently of more distant future periods because they view time from longer perspectives of their individual, social, and professional development at that stage of life. The difference observed for the distinguished 61 to 75 age brackets indicate that as we enter the autumn of our lives we tend to consider time from relatively longer perspectives, i.e. measured in weeks and longer periods. It goes in line with psychological observations (Kastenbaum, 1963; Rakowski, 1986; Hendricks, 2001) that in later adulthood we tend to approach time from a broader outlook.

(12) Generally, temporal perspectives observed though a lens of the conversational corpus data manifest a tendency to alter dynamically across age groups. These changes are likely to be related to subjective importance attached by people in different stages of life to shorter and longer time perspectives. The course of alterations observed in the corpus data is
generally congruent with psychological findings on differences in time perspectives across the life span. Parallel examinations conducted for the other demographic variables registered in the corpus, i.e. gender and level of education or speakers, did not reveal statistically significant correlations (cf. Hancock & Rausch, 2010).

9. Cognitive schema of temporal horizon

The above discussed properties of the temporal horizon observed in spontaneous linguistic performance of Polish speakers can be summarized into a general cognitive schema of temporal horizon based on Lewin’s (1951) field theory and Langacker’s (2012) representational space model of processing time in human cognition. The image schema that emerges from the frequency of adverbials denoting temporal distance found in the corpus data is depicted in Fig. 4. The extension of temporal horizon, i.e. the aggregated frequency of references to temporal perspective in each distinguished temporal region, is represented by the radius length. The density of temporal horizon, i.e. the average frequency of references to temporal perspective in each distinguished temporal region, is represented by the density of dots.

![Figure 4. Cognitive schema of temporal horizon emergent from the corpus data](image-url)
The emergent image schema indicates that the temporal horizon does not function in the human mindset as homogeneous circular zones or evenly spreading centrifugal circles, but is more likely to operate in three distinctive temporal brackets. Fig. 4 illustrates how the temporal horizon is partitioned in the human mind. The central part of the chart (characterized by the greatest frequency of references to temporal distance observed in spontaneous conversations) represents one day span. Since expressions referring to one day or shorter temporal perspectives are mentioned most frequently in the conversations, this temporal region is likely to be most relevant to our daily coping in the immediate life-space. For that reason, it can be labeled as immediate time perspective.

The next emergent area (also characterized by a very high frequency of references to temporal distance observed in the conversations) extends to the region of one year. The frequency of references found in the corpus data indicates that it is almost as important in the daily activity. Because of its significant influence on the daily coping in the immediate life-space, it can be labeled as operational time perspective.

Beyond the region of one year the data show a clear tendency for the frequency of references to temporal perspectives to decline progressively as time periods become longer. Each consecutive year (except for round periods) is characterized by a noticeably lower frequency of references to temporal distance, which occurs to the boundary of about 50 years. The analysis of the corpus data demonstrates that within that region references to temporal perspectives are used mainly for projecting ourselves in a variety of past and future situations, hence it can be labeled as projective time perspective. Beyond the region of 50 years the frequency of temporal adverbials observed in the data is so immaterial and random, that it is impossible to discern any further consistent temporal horizons functioning systematically in the human mind from the personal perspective.

Moreover, the results indicate that the personal temporal horizon, which reflects personal life experience, should be distinguished from the abstract temporal horizon (cf. transcendental in Boyd & Zimbardo, 1997). The latter is practically unlimited, and can be observed in constructing time after death (Boyd & Zimbardo, 1997), and in mental time travel (Suddendorf & Corballis, 2007).

Furthermore, the frequencies found in the linguistic data across age brackets indicate that the personal temporal horizon has a tendency to alter dynamically throughout the lifetime. Therefore, the temporal horizon, as represented in the above chart, is not static, but acts somewhat like a human iris (which it resembles): it adjusts dynamically to the life-space conditions of a given stage of life. Although the distinguished immediate, operational, and
**projective** temporal horizons are characteristic of the population of speakers represented in the corpus (cf. Block et al., 1996; Hill et al., 2000; Ji et al., 2009), their significance to an individual’s functioning in the immediate life space is influenced by a multitude of personal factors (Zimbardo & Boyd, 2008).

### 10. Conclusions

The results obtained in this study do not arise from a subjective interpretation of linguistic declarations, but reflect objectively verifiable frequencies found in the corpus data, which validates credibility of findings. However, despite the fact that the PELCRA SCCP is among the largest repositories of demographically annotated transcriptions of spontaneous conversations available currently in the world, it is not unusual for a single person to produce thousands spoken words every day (Levelt, 1999), which means that billions of words are spoken in conversations every day. Since in reality no corpus can ever hope to be fully representative of a language (McEnery and Wilson, 2001, pp. 77–78), the PELCRA SCCP must be approached as a rough approximation of the actual linguistic reality.

Additionally, there are much more sophisticated algorithms used for mining linguistic patterns in text conversations (see Carenini, Murray & Ng, 2011), which means that the results presented in this study can be further refined to exclude cases coincidentally identified by the employed algorithm as belonging to the given temporal perspective. For example, some utterances referring to “that year” are obviously situated in a further perspective than one year, though it still indicates that the past period is perceived from a year’s perspective.

### References


Jacek Tadeusz Waliński


Heylen, Kris, Jose Tummers, and Dirk Geeraerts (2008). ‘Methodological issues in corpus-based Cognitive Linguistics.’ In Cognitive Sociolinguistics Language Variation,


Appendix

**Explanations for query listings**

The PELCRA Spoken Conversational Corpus of Polish (2010 edition) is available via PELCRA online concordancer at: [http://www.nkjp.uni.lodz.pl/spoken.jsp](http://www.nkjp.uni.lodz.pl/spoken.jsp). All queries were implemented only for the *conversational* type of linguistic data (available via “Typ: typ_konwers” option). The number of returned results was set to the maximum of 10000 (available via “Wyniki” option). Each proximity query is presented with the value of *slop* factor (available via “Maks. odstęp” option). The PELCRA online concordancer offers an underlying Polish morphological dictionary, which allows for queries incorporating all Polish inflectional forms with the use of double asterisk (**) as a wildcard. For example, the query [rok**] substitutes for “rok, roku, rokiem… etc.” A single asterisk (*) replaces any number of characters, e.g. [*naście*] results in “jedenaście, dwanaście, kilkanaście, etc.” The pipe ( | ) indicates logical AND. For age demographics the results were normalized proportionally to the number of utterances for each distinguished age bracket: 21-25: 69203, 26-30: 24719, 31-35: 13070, 36-40: 4413, 41-45: 7179, 46-50: 13931, 51-55: 13461, 56-60: 4079, 61-65: 1551, 66-70: 1339, 71-75: 1076. Statistics were computed using R software, a language and environment for statistical computing, available for download at: [http://www.R-project.org](http://www.R-project.org)

**Corpus queries used to examine density and extension of time perspective:**

**moment(s):** [o|z|w|na|za|przez|przed|po|od moment**|momencik**|chwila**|chwilka**], SLOP FACTOR=2

**second(s):** [o|z|w|na|za|przez|przed|po|od sekunda**|sekundka**], SLOP FACTOR=2

**minute(s):** [o|z|w|na|za|przez|przed|po|od minuta**|minutka**], SLOP FACTOR=2

**hour(s):** [o|z|w|na|za|przez|przed|po|od godzina**|godzinka**], SLOP FACTOR=2

**day(s)** (incl. ‘today’, ‘tomorrow’, and ‘yesterday’): [o|z|w|na|za|przez|przed|po|od dzień**|dzisiaj**|jutro**|wczoraj**], SLOP FACTOR=2

**week(s):** [o|z|w|na|za|przez|przed|po|od tydzień**], SLOP FACTOR=2
month(s): [o|z|w|na|za|przez|przed|po|od miesiąc**, SLOP FACTOR=2
1 year: [o|z|w|na|za|przez|przed|po|od rok|roku|rokiem], SLOP FACTOR=2
2 years: [o|z|w|na|za|przez|przed|po|od dwa** lat|lata|latach|laty], SLOP FACTOR=2
3 years: [o|z|w|na|za|przez|przed|po|od trzy** lat|lata|latach|laty], SLOP FACTOR=2
4 years: [o|z|w|na|za|przez|przed|po|od cztery** lat|lata|latach|laty], SLOP FACTOR=2
5 years: [o|z|w|na|za|przez|przed|po|od pięć** lat|lata|latach|laty], SLOP FACTOR=2
6 years: [o|z|w|na|za|przez|przed|po|od sześć** lat|lata|latach|laty], SLOP FACTOR=2
7 years: [o|z|w|na|za|przez|przed|po|od siedem** lat|lata|latach|laty], SLOP FACTOR=2
8 years: [o|z|w|na|za|przez|przed|po|od osiem** lat|lata|latach|laty], SLOP FACTOR=2
9 years: [o|z|w|na|za|przez|przed|po|od dziewięć** lat|lata|latach|laty], SLOP FACTOR=2
10 years: [o|z|w|na|za|przez|przed|po|od dziesięć** lat|lata|latach|laty], SLOP FACTOR=2
11-19 years: [o|z|w|na|za|przez|przed|po|od *naście*|następnos|ño lat|lata|latach|laty], SLOP FACTOR=2
20-29 years: [o|z|w|na|za|przez|przed|po|od dwadzieścia** lat|lata|latach|laty], SLOP FACTOR=3
30-39 years: [o|z|w|na|za|przez|przed|po|od trzydzieści** lat|lata|latach|laty], SLOP FACTOR=3
40-49 years: [o|z|w|na|za|przez|przed|po|od czterdzieści** lat|lata|latach|laty], SLOP FACTOR=3
50-59 years: [o|z|w|na|za|przez|przed|po|od pięćdziesiąt** lat|lata|latach|laty], SLOP FACTOR=3
60-69 years: [o|z|w|na|za|przez|przed|po|od sześćdziesiąt** lat|lata|latach|laty], SLOP FACTOR=3
70-79 years: [o|z|w|na|za|przez|przed|po|od siedemdziesiąt** lat|lata|latach|laty], SLOP FACTOR=3
80-89 years: [o|z|w|na|za|przez|przed|po|od osiemdziesiąt** lat|lata|latach|laty], SLOP FACTOR=3
90-99 years: [o|z|w|na|za|przez|przed|po|od dziewięćdziesiąt** lat|lata|latach|laty], SLOP FACTOR=3
100-199 years: [o|z|w|na|za|przez|przed|po|od sto** lat|lata|latach|laty], SLOP FACTOR=4
200-990 years: [o|z|w|na|za|przez|przed|po|od dwieście**|trzysta**|czterysta**|pięćset**|sześćset**|siedemset**|osiemset**|dziewięćset** lat|lata|latach|laty], SLOP FACTOR=4
thousand(s) years: [o|z|w|na|za|przez|przed|po|od tysiąc** lat|lata|latach|laty], SLOP FACTOR=5

Corpus queries used to observe alterations of time perspective across age groups:
Time perspective \(>= 1\) day: [o|z|w|na|za|przez|przed|po|od moment**|chwila**|minuta**|godzina**|jutro**|wczoraj**|dzień**], SLOP FACTOR=3
Time perspective \(<= \) week: [o|z|w|na|za|przez|przed|po|od tydzień**|miesiąc**|kwartał**|rok**], SLOP FACTOR=3

The results for particular age brackets were obtained by sorting of the resulting concordances by age.