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Evolution in the Use of *Evolution*? An Overview of the Term in the Corpus of Historical American English

Shala Barczewska

Jan Kochanowski University, Poland

Abstract

While synchronous analyses of the interaction between language and society abound, e.g., in discourse studies, diachronic corpus-based studies are rare. This paper attempts to fill that gap with an investigation into the frequency and collocational preferences of *evolution* in COHA: The Corpus of Historical American English (Davies 2010). This lexeme was chosen for two reasons. First, the acceptance and teaching of biological evolution, especially in public schools, have been points of contention in American culture for 100, if not 150, years, comprising one of America's "culture wars." Hence, the topic is of contemporary as well as historical discourse interest. Second, a pattern between the frequency of *evolution* and the popularity of the theory in American history was noted by Barczewska (2017). This suggests a link between the use of the lexeme and the theory's reception. The current analysis investigates the frequency of *evolution* in COHA as a whole and according to genre. Collocational preferences within the corpus reveal changes in the way *evolution* is used over time. The paper also highlights the advantages and disadvantages of using COHA for similar research projects and suggests that the process applied here could be used to study the verbalization of other culture-shaping phenomena.

Keywords: corpus linguistics; COHA; evolution; cultural-linguistic analysis

1. Introduction

This paper represents a preliminary study of the collocates of *evolution* in American English as found in COHA: The Corpus of Historical American English (Davies 2010). The impetus for this study is a remark in Barczewska (2017) that the frequency of *evolution* in COHA drops significantly after the controversy over its teaching was ignited by the trial of John T. Scopes in 1925. This paper goes beyond Barczewska's observation by analyzing the instances of *evolution* in COHA and aligning them with events in US cultural and scientific history. It examines the corpus as a whole as well as sub-corpora divided according to genre and important phases in the reception of the theory. It also investigates the term's nearest collocates to identify patterns between the use of *evolution* and historical events. The results

were not separated into biological and non-biological senses of *evolution,* as we view the two senses as mutually influencing one another and expect cultural and historical events to impact both over time. This premise was validated by the data in this study and is evident in the examples from the corpus discussed in this paper.

Application of COHA for a cultural-linguistic study is something that, to date, has only been done on a limited scale. Moreover, those studies that have been done primarily focus on linguistic aspects, e.g., Jucker (2018), who analyzes apologies, or Ng et al. (2015), who study agism. Hence, this study also fills a gap in research by using a diachronic corpus, i.e., COHA, to analyze the intersection of language and society.

Section 2 provides the context of the study. It reviews the development of different views on biological origins and their subsequent influence on science standards and legal decisions regarding school curricula. Once the foundations of the historical and cultural context have been laid, the methodological approach used in this study is explained. This includes the choice of the corpus and the collocation span. The penultimate section presents the results and analysis. This section is divided into three subsections: the overall frequency of *evolution* in COHA and its distribution according to genre, the top ten 2L-2R collocates of *evolution* in COHA as a whole, and the top 2L-2R collocates of *evolution* according to time period. The conclusion draws together the findings, discusses limitations of using COHA for such a study, and provides suggestions for future research.

2. Teaching evolution: one of America's culture wars

Before beginning our linguistic analysis, it is important to understand the historical and cultural context of the reception of Darwinian evolution in the United States, particularly as it concerns teaching children in the public school system. Table 1 presents a general overview. Written vertically, the Theories of Origins column lists the period when theories about the origin of life gained prominence—their height in the graph roughly lines up with the corresponding Time Span in the middle section. The far-right column presents the focus of the debate over teaching evolution (and its alternatives) in the public school system during the corresponding time frame.

While it had its dissenters, acceptance of biological evolution and its cultural corollary, Social Darwinism, was widespread in the US at the turn of the twentieth century. School coursebooks in biology included words such as *civic* in their titles, and they taught the values of Social Darwinism, such as the now abhorrent notions of an evolution-based hierarchy of races and the need to sterilize the "feeble-minded" and "undesirables." It was not until the early 1920s that legislation regulating the teaching of biological evolution was proposed. Commentators suggest that this was, at least in part, a reaction to the horrors of scientific advancement in military capabilities during WWI and the fear that, if children were taught that they had evolved from animals, then such cruelty would only increase. The first law to include a punishment—a fine—was passed in Tennessee in 1925. It specifically outlawed teaching that man had evolved from a lower life form; teaching the evolution of other species was still permitted. Soon after, the American Civil Liberties Union advertised legal support for

Table 1: *Historical overview of the debate over teaching evolution (based on Barczewska 2017, p. 15, Larson 2003)[1]*

Theories of Origins and Their Popularization					Time Span	Public Education
Old Earth creationism	Darwinian Evolution (1859): theistic or naturalistic	Neo-Darwinian synthesis (1930-1940s)	Scientific creationism—young Earth (1960s)	Intelligent design (1984/1992)	1859–1919	Darwinian Evolution and Social Darwinism taught
					1920s	Bills passed outlawing teaching that man evolved from a lower life form
					1930–1959	Laws against teaching the evolution of man enforced
					1960s	Teaching of evolution legalized
					1970s	Bills passed legislating equal time for scientific creationism and biological evolution
					1980s	Scientific creationism declared religious by the courts and is removed from public school science curriculum
					1990s	Teaching evolution mandated in science standards
					2000s	Bills passed enabling teaching the strengths and weaknesses of evolution

any teacher willing to go to trial for breaking the law. City leaders in Dayton, TN, saw an opportunity to bring publicity to their town and convinced physical education teacher and substitute science teacher John T. Scopes to "confess" to having taught human evolution from *A Civic Biology* (G. Hunter 1914).[2] Prominent lawyers on both sides of the divide volunteered their services, and the event took on a circus-like atmosphere. Scopes lost and was fined, although the decision was later overturned on a technicality. As a result, schools and teachers nationwide decided to avoid the controversial topic of human evolution. Textbook publishers followed suit, and G. Hunter (1926) produced an updated version of *A Civic Biology* that reduced the frequency of *evolution* from 24 occurrences to one, which was in the reference section. Thus, in this book's first and second editions alone, the influence of the trial on textbook language is visible.

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[1] As of 2014, a "Third Way" has been developing as an alternative to current theories in mainstream evolutionary biology. However, because their proposal does not presuppose a deity or intelligent designer and because they have restricted their work to academic studies, they have not encountered legal battles nor garnered much publicity (https://www.thethirdwayofevolution.com/).

[2] There is doubt as to whether or not he actually taught the evolution of man.

This was the status quo until the 1960s, when some science teachers took action to legalize the teaching of evolution.[3] *Epperson v. Arkansas* (1968) settled the matter at the national level, ensuring that the teaching of biological evolution in the public school system could not be banned. Around the same time, the notion of scientific creationism entered the mainstream with the publication of *The Genesis Flood: the Biblical record and its scientific implications* (Whitcomb and Morris 1961), revising and popularizing flood geology and young-earth creationism. As a result, evolution-related education legislation during the late 1960s through to the 1980s focused on providing equal time for scientific creationism and neo-Darwinian evolution: i.e., if one was taught, the other also had to be. However, this proved to only be a temporary solution.

The 1980s witnessed two cases resulting in the categorization of scientific creationism as "religion:" *McLean v. Arkansas Board of Education* (1982) and *Edwards v. Aguillard* (1987). This effectively removed the theory from the public-school science curriculum. The decision was based in part on *Lemon v. Kurtzman* (1971), which concluded that any school activity with religious content must have a secular purpose. In the 1990s, neo-Darwinian evolution became the only permissible explanation for the development of life, and science standards were rewritten to make it a central part of the biology program. However, not all scientists were content with the status quo.

During the mid-1980s and early 1990s, another opposition to purely random, materialistic evolution emerged: Intelligent Design (ID). Although attempts have been made to construe ID as *Creationism's Trojan Horse* (Forrest and Gross [2004] 2007), its research paradigm differs significantly. First, it makes no claims regarding the age of the earth or the reliability of the Bible, and fellows of the Discovery Institute (its main proponent) include Christians, Jews, Muslims, and agnostics. Second, the focus is not on geology and fossils as much as it is on genetics and information. For example, proponents argue that genes are irreducibly complex (Behe 2007), making progress via random mutation statistically improbable. Third, the Discovery Institute does not support teaching intelligent design in schools. Instead, they advocate for teaching more evolution, including the theory's strengths and weaknesses as expressed in scientific, peer-reviewed articles.[4] Despite its apparent scientific and secular motivation, this approach has not been met with approval by the National Centre for Science Education (NCSE), a leading organization dedicated to protecting evolution and climate change education. As a result, heated debates regarding science standards and curricula continue to crop up throughout the country.

Thus, the controversy is neither linear nor dichotomous. The debate carries across several platforms—from private to public, from social to legal—and represents one of America's many culture wars (see J. Hunter 1991).

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[3]   Teaching evolution was, in actuality, only outlawed in a small number of states.

[4]   The policy of suggesting students read a book about intelligent design in the school library that lead to *Kitzmiller v. Dover Area School District* was not supported by Discovery Institute; they had actually advised against it.

3. Methodology

As mentioned in the introduction, the data for this study comes from COHA: The Corpus of Historical American English (Davies 2010). COHA contains over 475 million words from texts from 1820 to 2019. Compared to other corpora covering a similar time span, apart from the Google Books corpus, it is 50-100 times larger.[5] Although the Google Books Corpus contains an impressive 155 billion words of American English, it was not chosen for this study for three specific reasons. First, there is the issue of accuracy: often books appear in years they were not published, or, alternatively, they are over represented because they were released in different formats a few months apart. Second, the corpus is heavily weighted towards scientific books; thus, it is not an accurate representation of overall language use. Third, the interface does not allow the same depth of analysis as COHA. Specifically, the interface takes the user to a list of Google Books and not specific examples of the word/phrase in context.[6] Hence, the types of analyses conducted in this paper would not have been possible using Google Books.

The study was conducted in the following manner. The COHA interface was used first to identify the frequency of *evolution* according to decade and genre. Then, it was used to identify collocates in a 2L:2R span with a minimum MI score of 3. This was done for the corpus as a whole, as well as according to distinct phases according to the word's frequency. Our goal is to answer the following questions:

- Does the corpus provide support for the suggestion in Barczewska (2017) that it was the Scopes Trial and not, e.g., the Great Depression, that led to a decrease in the frequency of *evolution*?
- Does the use of *evolution* in COHA parallel events surrounding the theory in US history?
- How does text type impact the frequency of *evolution* in COHA?
- What do the top ten overall collocates of *evolution* in COHA reveal about the term, its senses, and/or its reception during these decades?
- Is there a visible difference in collocates of evolution during different phases of the theory's reception?

It is believed that the answers to these questions will also help establish the advantages and disadvantages of using COHA for similar research projects, thereby contributing to broader applications of the corpus.

Section 4, Results and analysis, is organized as follows. First (4.1), the presence of *evolution* in the corpus as a whole and according to genre is compared with the historical context discussed in Section 2. Then, the top ten collocates are listed and divided into three categories according to their distribution in COHA over time (4.2). In 4.3, the corpus is divided into three subcorpora according to the phases identified in 4.1, and 2L-2R collocates were identified for each. This enables a closer examination of each time period's unique relationship with the theory.

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[5] Data come from english-corpora.org, where the mentioned corpora can be found.
[6] For an overview of using Google Books for linguistics study and its limitations, see Pechenick et al. 2015; Friginal et al. 2022.

4. Results and analysis

4.1. *The frequency of* evolution *in COHA*

The first step is to examine Barczewska's (2017) comment regarding the frequency of *evolution* in COHA. As Figure 1 demonstrates, its use appears to coincide with the historical events discussed in Section 2.
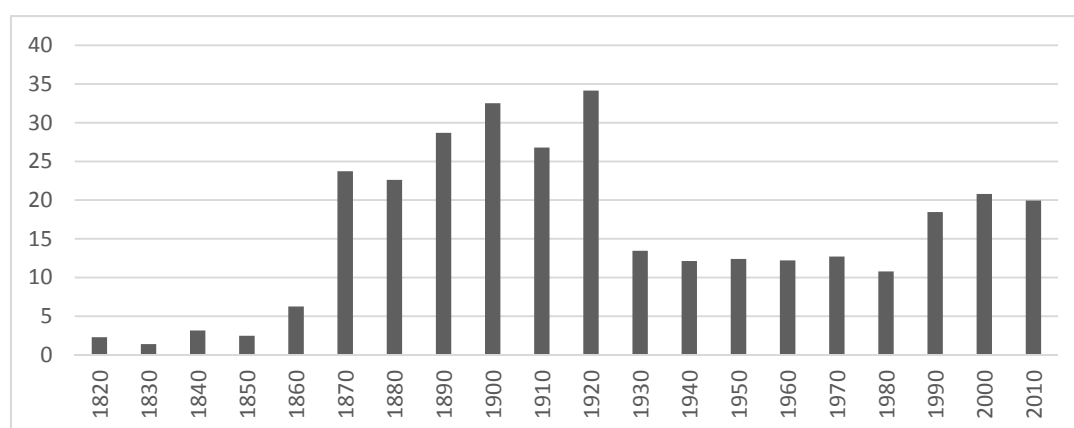
Figure 1: *Instances of* evolution *in COHA, words per million*

As the graph shows, occurrences of *evolution* in the corpus nearly quadrupled between 1860 and 1870 (6.26 and 23.74 tokens per million, respectively) when Darwin's theory was introduced and disseminated. The use of the word remained high, increasing to 34.16 words per million in 1920. This suggests that the theory was of increasing prominence and interest in American discourse. However, this changed drastically in the 1920s. Following the Scopes trial in 1925 and the subsequent removal of *evolution* from classroom science books, the frequency of *evolution* declined to 13.46 ww/mil. Although one could argue that the decline was due to the distractions of the Great Depression and international affairs in Europe, the data in Figure 2 seems to confirm that the verdict in the Scopes trial was the motivator, as we see a sharp drop after 1925. Word frequency does not begin increasing significantly until 1990, as the teaching of evolution becomes mandatory, but even then, it does not reach 1920 levels at just 18.46 words per million.
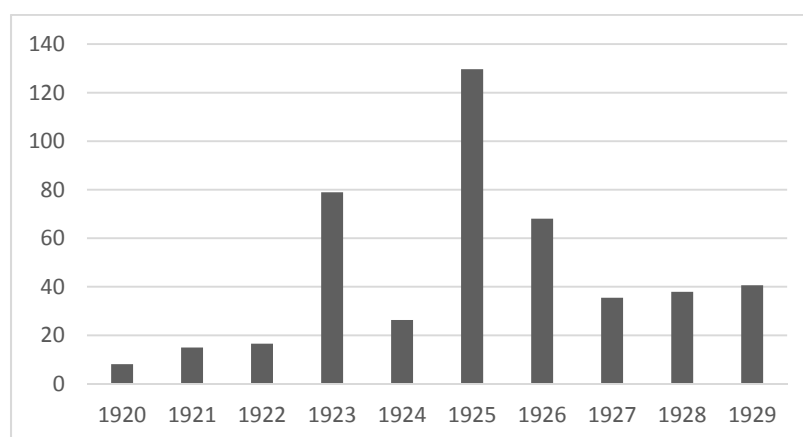
Figure 2: *Instances of* evolution *in COHA in the 1920s, words per million*

The data in Figure 1 also suggest three possible phases, which I would like to label *reception and fascination* (1860s-1920s), *trepidation* (1930s-1980s), and *embracing the conflict* (1990s-2010s). During the first period, there was an intensified interest in the theory and its implications. During the second, *evolution* appears to have become almost taboo in common discourse. During the final period, discussions about *evolution* again became relevant in the public sphere, albeit not as prominently as at the turn of the 20th century. This coincides with what we know about the intensity of the approval/disapproval of Darwin's theory during those time periods.

However, that is not the only way to divide the corpus data. We could also look at it in terms of genre, as presented in Figure 3.
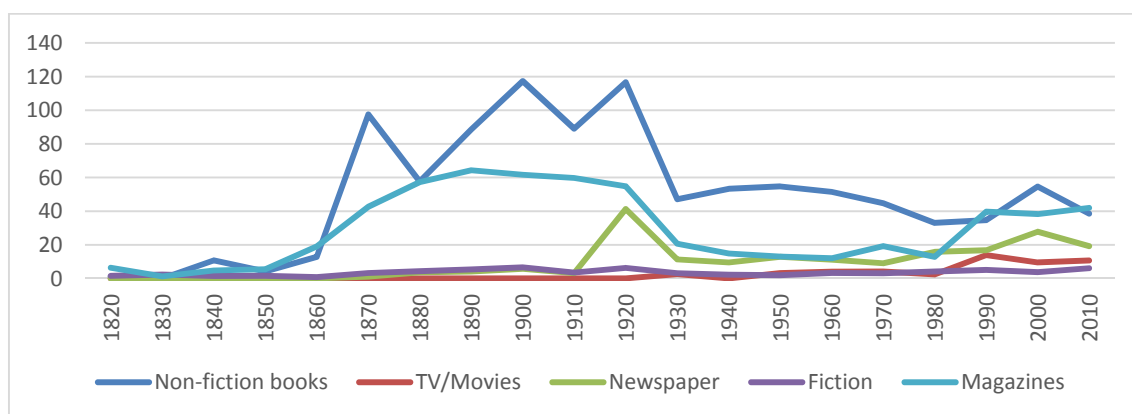
Figure 3: *Occurrences of* evolution *according to genre*

The results suggest that potential intersections between contemporary events and their lexical output are also constrained by genre. As we can see from the graph, newspapers tend to mention *evolution* primarily during periods of intense debate over the theory's teaching: the 1920s and again from the 1980s onward. Non-fiction books and magazines include the word *evolution* more frequently in their texts than any other genre, which is due, in part, to the nature of such material. Specifically, a book or article about a given topic, e.g., *evolution*, will mention it several times. An example of this phenomenon can be found in occurrences of *evolution* from the 1870s (according to COHA), in which over half come from the book *The History of the Warfare of Science with Theology* (White [1896] 1993).[7] Not surprisingly, *evolution* does not appear in movies until the 1930s, after sound has been introduced and more complex dialogues are possible. Five of the 1930s productions represented in COHA contain *evolution*, only one occurrence of which means *change* and not biological evolution. *Evolution* is not present in this sub-corpus during the 1940s, possibly due to concerns related to World War II, but it returns in the 1950s and continues to increase in frequency. *Evolution* even appears in a discussion between Ross and Phebe in the popular *Friends* TV sitcom, emphasizing the salience of the theory in contemporary culture. On the other hand, although written works of fiction discuss *evolution*, those represented in COHA do not seem to change

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7   It is not clear if the material in COHA is misdated or if the creators of the corpus had access to an older transcript. All searches for White's book date it 1986; however, Wikipedia does mention that it is based on a 1874 lecture that was published the same year.

in frequency according to contemporary events. There is only a slight peak in the 1920s and none in the 1980s, when TV/movie occurrences outrun those in fiction books.

4.2. *The top ten collocates of* evolution

Along with word frequency, we also see a shift in collocational preference. However, the results do not exhibit the expected level of variation. This is in part due to the fact that *evolution* is significantly more frequent between 1870 and 1920, and, as a result, MI scores and frequency counts inevitably favor collocations used during this period. The discussion in 4.3 attempts to correct for this and presents collocates according to the epochs identified in 4.1.
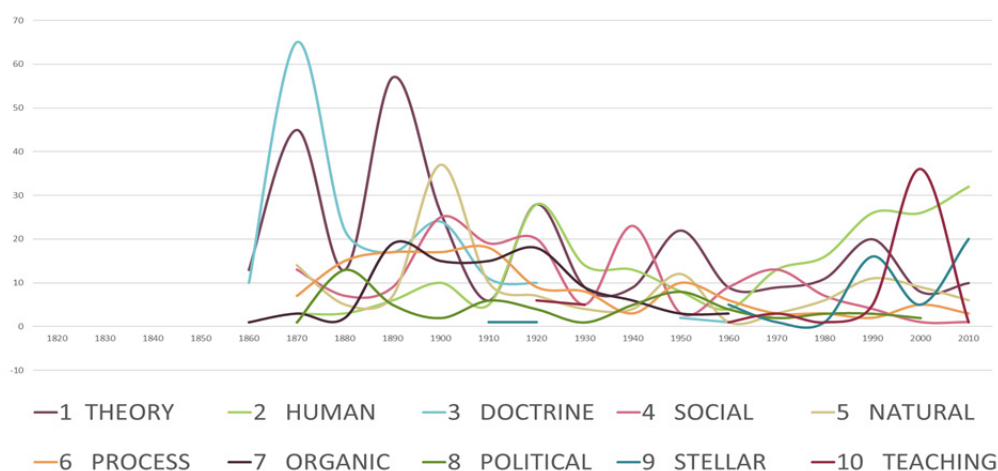
Figure 4: *Top ten collocates of* evolution *from 1820-2010*

There are two different ways to organize these collocates. If we categorize the collocates grammatically, there are four nouns—*theory*, *human*, *doctrine*, *process*; five adjectives—*social*, *natural*, *organic*, *political*, *stellar*; and one gerund—*teaching*. If we group the collocates according to dispersion, we also have three groups:

- collocates that co-occur with *evolution* in all decades: theory, human, social, natural, process
- collocates whose decline in use parallels the word's overall presence in COHA: *doctrine*
- collocates that vacillate in distribution: *organic*, *political*, *stellar*, *teaching*

   As this study focuses on the intersection of history, culture, and language, the second grouping, which is done according to dispersion, has been chosen for analysis. The final group of collocates listed above, those that appear to fluctuate alongside contemporary events, receive the greatest attention.

4.2.1. Collocates that co-occur with *evolution* in all decades

Five of the top six collocates fit the first group; that is, they occur in each decade. *Theory*, despite visibly decreasing in frequency over the years, is a collocate across the decades. This is

not surprising, as it is integral to the description of evolution. It peaks in 1870 and 1890 with 45 and 57 co-occurrences, respectively, and four other decades also see twenty or greater co-occurrences. While not as frequent, *human* is also a consistent collocate, with peaks in the 1920s, 1990s, 2000s, and 2010s (28, 26, 26, and 32 co-occurrences, respectively). This could point to our focus, as humans, on our own anthropological and ancestral history. *Social,* with peaks in the 1900s, 1920s, and 1940s (25, 26, and 23 co-occurrences, respectively), often references Social Darwinism, a controversial notion related to Darwin's theory that seems to have declined in interest post-WWII. *Natural* (peaking between 1900 and 1909 with 37 co-occurrences) and *process* (peaking in the 1910s with 19 co-occurrences) are important attributes of biological evolution and are frequently discussed within both scientific and popular contexts. Because of their regularity, it can be argued that these five collocates have been, and continue to be, the most salient aspects of our shared knowledge about evolution. Despite their apparent benign nature, they are all contested, as the following excerpts demonstrate.

(1)   California's decision to *teach evolution* as both fact and *theory* is a slippery equivocation that alloys science with dogma. (*Time Magazine* 1990)

(2)   when we clearly see the results which follow from a rigid adherence to the doctrine of *natural evolution*, we can not help asking whether a grave mistake has not been made in attempting to explain intelligence and morality by a principle which necessarily excludes all freedom either in knowing or in willing. (*An Outline of Philosophy* 1901)

As suggested in (1) and (2), controversies involving these collocates include

– whether evolution is a *fact* or *theory*,
– if the *process* of evolution is fully *natural* or involves supernatural guidance or intervention,
– whether *human* evolution differs from that of animals, and
– if human society is an example of *social* Darwinism.

These questions have been debated by scientists, philosophers, and laymen since Darwin published his theory. They appeared in the Wilberforce and Huxley debate in 1860 and have found their way into legislation and legal trials from the 1920s to the present. Thus, they remain central to the concerns over the theory's scientific accuracy as well as applicability beyond biology.

4.2.2. Collocates whose decline in use parallels the word's overall presence in COHA

Doctrine, although statistically the third most frequent collocate overall, is only a strong collocate between the 1860s and 1920s. It co-occurs with *evolution* most frequently in the 1870s; however, it virtually disappears as a collocate in the 1920s, only to briefly reappear in the 1950s and 1960s. This coincides with the word's general usage, which, according to COHA, began declining in the latter half of the nineteenth century (Figure 5).
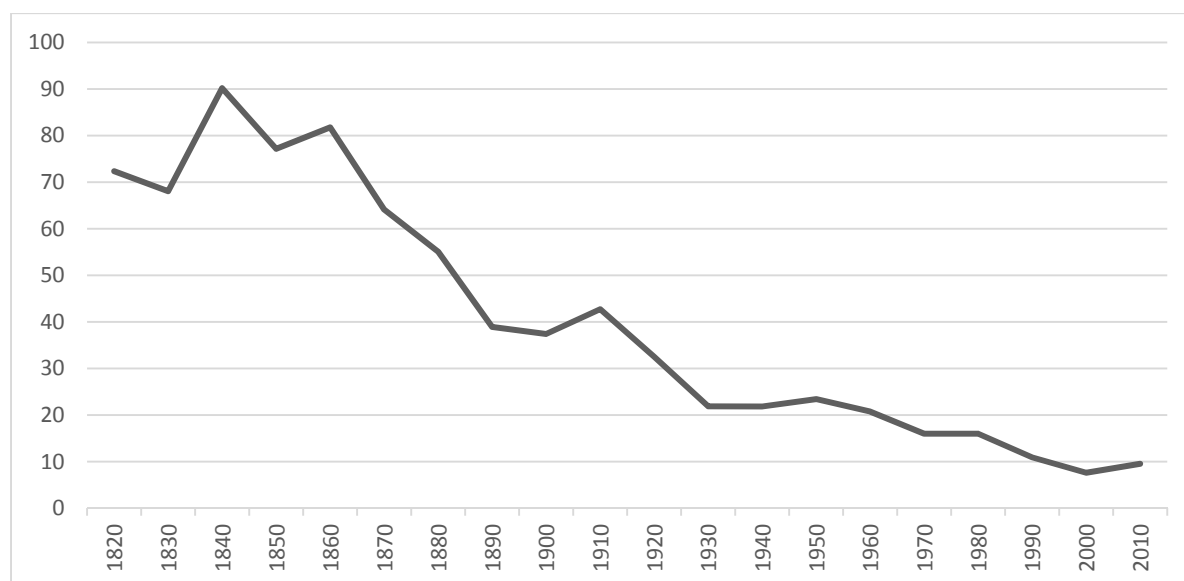
Figure 5: *Occurrences of* doctrine *in COHA according to decade, words per million*

These results could, in part, be due to the narrowing of the word's usage. Although contemporary dictionaries allow for *doctrine* to be used in science and politics, it is currently most often associated with the domain of religion, as noted in the Collins COBUILD Advanced Learner's Dictionary (2025): "A doctrine is a set of principles or beliefs, especially religious ones." Hence, at first glance, it would be tempting to see the late 19th-century phrase *doctrine of evolution* as metaphorical, perhaps suggesting that evolutionism is some sort of religion. However, a closer look at examples from the corpus suggests non-metaphorical uses are the most prevalent.

(3)   and this is the *doctrine of evolution* which, if it be not proved conclusively, has great probability and great scientific (*Physics and Politics* 1872)

(4)   contention that has declared itself between us. For on one hand the *doctrine of evolution* which Virchow attacks has already so far become a sure basis of biological science (*Freedom in Science and Teaching* 1879)

Instead, it appears as if we have an archaic use of the word, as these excerpts from the 1870s come closer to matching Webster's (1828) definition:

In a general sense, whatever is taught. Hence, a principle or position in any science; whatever is laid down as true by an instructor or master. […] Hence a *doctrine* may be true or false; it may be a mere tenet or opinion.

As such, the use of *doctrine* at the turn of the century is neither metaphorical nor does it belong to the domain of religion. Thus, *doctrine of evolution* in (3)-(4) could be glossed as *teaching about evolution* or *theory of evolution.* This underscores the importance of not assigning contemporary meanings anachronistically, as there are often subtle changes or shifts in meaning (e.g., *organic*, discussed in 4.2.3, and *parent*, discussed in Person [2019]). Recognizing these shifts is important for discourse analyses and metaphor identification (cf. Steen et al. 2010) so as to avoid jumping to inaccurate conclusions.

4.2.3. Collocates that vacillate in distribution

The remaining four collocates—*organic*, *political*, *stellar*, *teaching*—appear, disappear, and reappear across the decades. Their inconsistent use should not be surprising, as they are less frequent collocates overall. Indeed, one of the reasons for setting the cut-off at ten is that the collocates were less and less consistent across decades. We will look at each of the final four collocates individually.

    Organic collocates with *evolution* from the 1870s until the 1960s and only reappears in the 2000s. This is inconsistent with the overall frequency of *organic* in COHA, which has varied over the years and peaked in the 2010s. Moreover, the instances of *organic evolution* from the 2000s question whether or not *organic* could be viewed as a salient collocate of *evolution* for this time period. First, they only come from two sources: *Evolution: the remarkable history of a scientific theory* (three occurrences) and an article in *Psychology Today* (one occurrence). The former is a book by Edward Larson (2004), a respected scholar of the debate over evolution, who, incidentally, is also cited in Section 2 of this paper. Two instances of *organic evolution* from his book are given in (4).

(5)   On the matter of *organic evolution* […] He studied it carefully (albeit not in the light of Darwin's later arguments for it) and found it wanting. […] Creation implies a creator, and so to dispense with the need for a biological creator, such ancient philosophers as Anaximander, Empedocles, the atomists, and the Epicureans advanced various crude notions of *organic evolution*.

In the excerpt, Larson describes early 19th-century scientist Georges Cuvier's unwillingness to accept *organic evolution* as scientifically viable (5). Thus, although the book was written in the 21st century, it borrows phraseology from 150 years prior.

    The use of *organic evolution* in (7) could be viewed as metaphorical, as it does not refer to biological evolution but to spiritual or philosophical changes that the speaker has experienced due to her adaptation of Ayurveda. She tells her interviewer:

(6)   It has been an *organic evolution*. Through my practice of yoga I was drawn to Ayurveda, a sister philosophy, and also to things that are generally better for me. My diet, and also the way that I respond to the world and the world to me, has gradually changed. (*Psychology Today* 2001)

Thus, these uses are either outdated, as in the case of Larson's book, or not related to biological evolution, as in the latter. Indeed, a comparison of the collocates of *organic* at the turn of the century and those of the more recent decades shows a shift from the domain of natural sciences to that of food and farming practices. As a result, we can say that *organic evolution* belongs to the earlier decades of the theory's development.

    Political co-occurs with *evolution in* COHA three times before Darwin published his theory, all within the same article. However, a shift in meaning can be detected between the 1825 (7) and post-Darwin uses.

(7)   Consider, again, the study of *political evolution*. It is true this is open to the most varied presentation, but its importance in the education of those who are to lead the people justifies it. (*North American Review* 1825)

(8)   No doubt it may be urged that the *political evolution* has necessitated all this, and that is quite true. But it is also true that the *evolution* of events is aided or hindered by the wisdom or unwisdom of the individuals who direct public movements. (*New England Magazine* 1889)

(9)   What is certain is that World War II compressed half a century of *political evolution* and economic change into not much more than a decade. (*Atlantic Monthly* 1959)

In (7) *evolution* could be replaced by *change*; however, in (8) and (9) it could not. The phrase *aided or hindered by the wisdom or unwisdom of the individuals who direct public movements,* by being set in opposition to *political evolution*, suggest two oppositional forces—natural and human-directed—and a conceptual comparison with the biological meaning. This comparison between biological evolution and political change seems to also motivate (9). Here, the conceptual link is the reference to the time that evolutionary processes usually require. The frequency of the co-occurrence of *political* and *evolution* peaks significantly in the 1880s (18 co-occurrences), and it appears in every decade up until the 2010s. This decline raises questions beyond the scope of this paper, e.g., is this decrease due to global political situations, or does it reflect a decreasing belief in the notion of unguided, natural political change in favor of some other mechanism?

The ninth-ranked collocate is *stellar*. Although the question of stellar evolution has been of interest to scientists since at least the 1890s, it seems to have peaked in common discourse in the 1990s. This could be a response to the publication of the first edition of the seminal *Stellar Structure and Evolution* (Kippenhahn and Weigert 1990). Instances of *stellar evolution* in the 1990s in COHA come from various sources; however, all but two of the 2000s and 2010s occurrences come from the same two journals, *Mercury* (2000s) and *Astronomy* (2010s), but not the same issues.

Finally, let us look at *teaching* and *evolution*. As much of the debate in the US revolves around education, the presence of this collocate is not surprising. What is surprising, perhaps, is that it did not rank higher. There are two possible reasons for this. One is the type of statistical calculation used. As *stellar* is less frequent in the corpus in general, its collocation strength with *evolution* is greater than that of *teaching*, which has other, more frequent collocates of its own. This hypothesis is confirmed by searching for both *stellar* and *teaching* independently in the COHA: s*tellar* occurs 3.06 times per million words, whereas *teaching* occurs 44.99 times. Moreover, *evolution* is the most frequent 2L:2R collocate of *stellar* but the 26th collocate of *teaching*. The other reason is that large collocate searches in COHA, such as this, do not lemmatize. If the lemma TEACH is sought within the 2L:2R span of *evolution*, 38 additional co-occurrences are found.[8] Co-occurrences of *teaching* and *evolution* underscore the controversy:

(10)   "Why, yes, we're *teaching evolution*," said the young man, prepared to argue about it. (*Sons of the Puritans* 1939)

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[8] When the lemma TEACH is the search term, only ten instances of *teaching* are retrieved instead of the expected 48. This is because the computer has only tagged those instances as VERB+ING. Any future study on the co-occurrences of *teach(ing)* and *evolution* would need to take this into account.

(11)   Kraemer (1995) found that 40 percent of biology teachers in Minnesota spend little or no time *teaching evolution*, while 15 percent include creationism in their classes. (*BioScience* 2004)

Most co-occurrences of *teaching* and *evolution* in the 2000s, including (11), come from the article "How well do biology teachers understand the legal issues associated with the teaching of evolution?" The dialog in (10) comes from a work of fiction.

4.3. Comparison of collocates according to phases identified in 4.1

There are two problems with treating all of COHA as one whole for collocate identification. First, since *evolution* is more frequent at the turn of the century, collocates during that period have the greatest weight. Second, as a result, important collocates in later decades are less visible. Hence, a decision was made to identify the top fifteen 2L-2R collocates of evolution for the three phases identified in 4.1.[9] Of the ten collocates examined in 4.2, only three—*theory, natural, human*—occur in the top 15 of each time period and thus can truly be viewed as overall collocates of *evolution*. Another four—*doctrine, social, organic, process, political*—occur in the first two phases but not in the third. Of the remaining two, *stellar* only occurs in the latter two phases, and *teaching* only in the final phase, from 1990 to 2019.

Table 2: Collocates of evolution *according to the phase of the word's frequency in COHA*

	Reception and fascination 1860-1929		Trepidation 1930-1989		Embracing the conflict 1990-2019	
	Collocate	**Hits**	**Collocate**	**Hits**	**Collocate**	**Hits**
1	THEORY	188	THEORY	69	HUMAN	84
2	DOCTRINE	159	HUMAN	68	TEACHING	42
3	SOCIAL	93	SOCIAL	60	STELLAR	41
4	PROCESS	83	PROCESS	33	THEORY	38
5	NATURAL	80	NATURAL	30	NATURAL	26
6	ORGANIC	73	POLITICAL	23	TEACH	18
7	HUMAN	55	GRADUAL	22	ECOLOGY	17
8	LAW	44	CULTURAL	22	BIOLOGICAL	16
9	STAGE	37	ORGANIC	21	CREATIONISM	15
10	POLITICAL	31	BIOLOGICAL	17	UNDERSTANDING	15
11	MENTAL	23	ECONOMIC	17	MICROSTRUCTURAL	13
12	GRADUAL	22	STELLAR	16	DIRECTED	13
13	CREATIVE	21	PARALLEL	13	BIOLOGY	11
14	HEAT	19	HISTORY	13	GALAXY	11
15	STAGES	18	STAGES	12	DARWINIAN	10

In the decades immediately following the publication of Darwin's theory, collocates suggest a focus on the theory and its scientific applications. However, extensions into other spheres are also visible, e.g., *social, political, mental, creative*. Below are examples of the latter two.

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9   Fifteen was used as the cut-off point instead of ten to increase the chances of finding shared collocates across time periods.

(12)   For cases, see Animal Intelligence, in the chapters on Ants and Bees; and, for discussion of principles, *Mental Evolution* in Animals, in the chapters on Instinct. (*Darwin after Darwin* 1892)

(13)   this explanation would place within comparatively recent times the *evolution of mental* powers which have distinguished the race from the most ancient times. (*Atlantic Monthly*, April 1896)

(14)   He recognizes, as a truth for him, that theory of *creative evolution* which holds that in the ascending progress of the race each thinking person becomes a species by himself. (*The American Spirit in Literature* 1918)

The context suggests that both *mental evolution* in (11) and *evolution of mental powers* in (12) refer to the actual biological evolution of the mind and its abilities, rather than a metaphorical concept. The majority of the references to *creative evolution* discuss Henri Bergson's book by the same name, published in French in 1907 and English in 1911. From (13) it is unclear whether or not *creative evolution* is a biological phenomenon or metaphorical extension, but in either case it is connected with the biological notion.

Collocates from the 1930s to the 1970s suggest greater focus on evolution's social applications: *political, cultural, economic, history.*

(15)   I would also suggest that in *cultural evolution* we might introduce the concept of the struggle for maintenance (*A Scientific Theory of Culture* 1944)

(16)   But when Lenin became boss of Russia, people had to comprehend the logic of *economic evolution* the way he comprehended it and adapt their social consciousness to his interpretation (*Harpers* 1934)

(17)   the critics are right in pointing out that new material needs also have been carried to the fore by *social* and *economic evolution*? (*Harpers* 1961)

Excerpts (15)-(17) also exemplify potential metaphorical uses of the term. They, along with the previous examples, also confirm the assumption made at the beginning of the study that many apparently non-biological uses of *evolution* are conceptually linked to Darwin's theory.

Collocates of recent decades—*biological, biology, teach, teaching, Darwinian, creationism*—underscore the national division regarding evolution.

(18)   "I talk a lot about the holes in *evolution*; students need to know this information more than that they came from monkeys"; "I present *evolution* and *creationism* and let students make up their own minds" (*BioScience* 2004)

(19)   issued a statement accusing Jones of trying "to stop the spread of a scientific idea and even to prevent criticism of *Darwinian evolution* through government-imposed censorship rather than open debate, and it won't work." (*San Francisco Chronicle* 2005)

The quotes in (19) come from the same article as (11) and, combined with (20), display the complexities of the viewpoint and the struggle between censorship and free speech.[10]

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[10] The event referenced in (20) is Judge Jones' ruling on the *Dover* case mentioned in Section 2. See DeWitt et. al. (2006) for more context.

5. Conclusions and ideas for future research

The data presented above represent an introductory study of the presence of *evolution* in COHA. As a pilot study, this research was successful in its area of focus. Frequency data coincided with events relevant to the reception of the theory of evolution and the debate over its teaching in the US public school system. For example, a sharp decline in the word's usage was observed after 1925, the year of the (in)famous trial of John T. Scopes. Only when the theory of evolution became mandated in school curriculum did word frequency increase again. It also revealed differences in lexical output according to genre. Specifically, non-fiction works seemed to most closely reflect the intensity of the controversy surrounding evolution at a given time. The investigation into the top ten overall collocates of *evolution* gave both expected and surprising results. Expected collocates—theory, *process*, *natural,* and *teaching*—were interspersed with those whose co-occurrence with evolution appears archaic, e.g., *doctrine* and *organic*. This is because these words' main meanings have changed in the past 150 years. Finally, comparison of the collocates of *evolution* according to time period demonstrated different focal points at different phases of the theory's reception. Excerpts discussed in 4.2 and 4.3 suggest that non-biological collocates of *evolution*, e.g., *political, mental, economic,* often have some conceptual link to Darwin's theory.

This study also highlights the possible limitations of using COHA as a window to cultural-historical events. First, the frequency of a word or phrase may be the result of one text in the corpus. Second, COHA does not allow lemma searches at this level, and the collocates are limited by their word form. Third, quotations from the past may present a false indication of current use. Fourth, a collocate's frequency may not be as dependent on its association with the node word but more dependent on the uniqueness of the collocate in the corpus as a whole, e.g., *stellar*. While these potential pitfalls are not new to corpus linguists, they do reinforce the important role of the human researcher in corpus-based studies.

In conclusion, it is hoped that this study not only provides a better understanding of the shifting collocational patterns of *evolution* but also a possible methodology for studying aspects of culture (and culture wars) diachronically via their representation in corpora, thereby filling a gap in research on the intersection between language and society.

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The Teacher and the Frog: Unveiling the Morphosyntax of Gender Shifts in Czech with Nanosyntax

Daniel Boucník

Masaryk University, Czech Republic

Abstract

This study examines the formation of nouns in Czech that show grammatical gender through stem morphemes and three productive suffixes: *-a, -k-(a)*, and *-ák*. These suffixes are the main morphological exponents across three noun classes – monomorphemic (e.g. *kmotr/kmotr-a*), bimorphemic (*učitel/učitel-k-a*), and stem–suffix compounds (*žáb-a/žab-ák*). Using nanosyntax, the study shows that gender alternations arise from hierarchical syntactic structures rather than lexical or semantic defaults.

By investigating noun pairs such as *učitel* ('teacher.Masc') / *učitel-k-a* ('teacher.Fem') and *žáb-a* ('frog.FEM') / *žab-ák* ('frog.MASC'), the study shows that masculine forms contain Class and Masc, while feminine forms emerge through the addition of Fem. Suffixes such as *-k-a* and *-ák* function as lexicalization solutions, structured through movement-based operations.

This approach refines our understanding of Czech gender morphology, demonstrating that nanosyntax captures gender alternations systematically even when surface forms are unpredictable. By modeling these alternations within a unified syntactic framework, the study provides a principled account of morphological derivation and paves the way for further cross-linguistic extensions.

Keywords: Czech noun morphology; gender alternation; nanosyntax

1. The morphosyntax of gender alternation

In Czech, grammatical gender plays a crucial role in the morphology of nouns, particularly in how masculine and feminine forms are often derivable from each other, especially in subdomains rich in such gender pairs, for instance profession nouns or animal nouns. While profession nouns are often associated with masculine gender, animal nouns exhibit a more

mixed distribution, with many smaller or domesticated animals tending to be feminine (*kočka* 'cat', *liška* 'fox') and larger or wild animals often being masculine (*lev* 'lion', *medvěd* 'bear').[1]

Many non-syntactic accounts treat gender pairs as one-directional – the masculine is treated as the base and the feminine as derived, with the masculine interpreted as generic and the feminine as sex-specific (Fiebig 2023; Baggio 2022; Spathas and Sudo 2020). In this article, I adopt nanosyntax which instead derives both forms on the same structural spine: the feminine differs by the additional Fem node above Masc and other grammatical features of the nominal domain (Caha 2009, 2021; Caha, Taraldsen Medová 2022; Harley and Ritter 2002; Janků 2022). Lexicalization proceeds by matching stored trees to the built structure, following the lexicalization algorithm (De Clercq et al. 2025; Starke 2018; Starke 2009). The theory does not privilege the masculine; any perceived "direction" of derivation reflects the lexical inventory of Czech, not a theoretical default gender.

For orientation, two alternative theories would treat the nouns in this work differently, and this contrast motivates the present approach. I will show this contrast on the noun pair *kmotr / kmotr-a* that begins section 2 of this work and the analysis itself. In a traditional Slavic description (a lexicalist analysis), *kmotr* and *kmotr-a* are two words: the masculine nominative singular has no overt ending, while the feminine is formed with *-a* and then inflects as a feminine; the relation is stated in the lexicon, not in the structure (Acquaviva 2008). In Distributed Morphology, the root combines with gender/number/case features built by syntax, and Late Insertion – that is, inserting phonological exponents after syntax has finished building the feature structure – chooses Nom.Sg = Ø for [Masc, Sg, Nom] and Nom.Sg = *-a* for [Fem, Sg, Nom] (Halle and Marantz 1993; Harley and Noyer 1999; Kramer 2015). By contrast, nanosyntax integrates lexicalization into the syntactic derivation itself: features are merged one by one along an ordered functional sequence (fseq), and lexical items (LIs) are stored trees that can realize the newly built structure when they match it. This makes nanosyntax particularly suitable for Czech alternations like *kmotr / kmotr-a* and *učitel / učitel-k-a*, which look different at the surface (one uses *-a*, the other *-k-a*) but are structurally comparable once mapped to the same fseq; in the feminine, *-a* realizes Fem < # < Nom, while the stem shrinks accordingly to realize only the features at the bottom of this functional sequence. Details of the matching procedure are introduced in section 2.

Masculine and feminine nouns differ by exactly one additional feature – Fem – merged above Masc in the gender domain; neuters lack Masc and Fem and show only Class. What that means is that within the part of the fseq where gender features sit (the gender domain), we can find the Class feature, the Masc feature and the Fem feature. These three features represent the three genders of Czech (neuter, masculine, feminine) in the following way: neuter nouns have the Class feature, masculine have the Class and Masc features, and feminines are defined by having Class, Masc and Fem. In other words, neuters exemplify a baseline structure containing the lowermost gender feature Class; merging Masc yields

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[1] Neuter nouns also exist: *sele* ('piglet'), *kuře* ('chick'), *štěně* ('puppy') or *prase* ('pig'). This analysis focuses on masculine – feminine pairings and neuters are disregarded.

Class < Masc; adding Fem on top of the two yields Class < Masc < Fem.[2] Thus, gender (and all other notions of semantics and grammar) in nanosyntax is defined syntactically, by the merging and the organization of the featural nodes in the structure of the noun. This approach accounts for both regular and irregular gender alternations, demonstrating that nouns – despite their diverse surface realizations – follow the same underlying hierarchy. By unifying masculine and feminine derivations under a single system, this analysis shows, step by step, how nanosyntax captures gender morphology without presupposing asymmetries as an inherent part of the grammar.

2. How nanosyntax derives a gender alternation

In nanosyntax, the syntax builds structure one feature at a time along an fseq; after each Merge, the derivation attempts lexicalization by matching the built structure with a stored LI (tree in the lexicon). Before proceeding, a quick reminder of the fseq notion: fseq is the ordered spine of features for a domain (here, the nominal domain, or more specifically, the gender domain), determining the order of Merge.

To show the principles of nanosyntax in action, let us start with the simplest possible example, the noun couple *kmotr* and *kmotr-a*. *Kmotr* ('godfather.Masc.Sg.Nom') is a masculine noun and *kmotr-a* ('godmother.Fem.Sg.Nom') is feminine[3]. *Kmotr-a* can be decomposed into two morphemes, the stem morpheme (which in this case is a nominal root), and a suffix, *kmotr-a*. The relationship between these two nouns is derivational: the feminine *kmotr-a* can be derived from its masculine counterpart *kmotr* by adding a suffix *-a*. This approach could be applied to other gendered noun couples, such as *Jan* and *Jan-a*, or *magistr* and *magistr-a*.[4]

In nanosyntax, each morpheme is assumed to have an underlying syntactic structure which represents specific semantic and grammatical content. This content is represented in the form of a (segment of) fseq, a universal hierarchy of features. Starting with *kmotr* and *kmotr-a*, let us look at the inner structure of the stem morpheme *kmotr* and the suffix morpheme *-a*. I claim that these – at the first glance – simple morphemes are intricate; let us use them as steppingstones illustrating the principles of nanosyntax, starting with a more detailed look at fseq.

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[2] I presume here that in neuter nouns, only the Class feature is present out of the Class < Masc < Fem trio, following Caha's (2021) proposal for neuters.

[3] *Kmotr / kmotr-a* are general human nouns. Neither one is the default form, they both are specific, one of them usable for women and the other for men. Still, the relative simplicity of this noun pair makes it a perfect candidate to explain the workings of nanosyntax.

[4] While *kmotr* is used only for male referents and *kmotr-a* for females, *magistr* ('graduate_student.M') is the umbrella term for the group of individuals (see previous footnote) but *magistr-a* ('female_graduate_student.F') is only for female referents. The question of where in the fseq such genericity/specificity should be located, or whether it needs to be a standalone feature at all, is yet to be answered. For more on markedness / specificity / defaultness in gender see Jakobson (1985), Corbett (1991), Bobaljik and Zocca (2011) and Kramer (2015).

Fseq is a universal hierarchy of features, seen as applicable to all the world's languages. Fseq acts as a blueprint, specifying the order in which features are added during the noun's construction and in which the features are merged in syntax. Given that this research deals with nominal phrases (nouns, really), I am interested in the nominal fseq, and the proposed structures follow works by Caha (2021), Caha and Taraldsen Medová (2022), and Janků (2022). For a masculine noun (like *kmotr*), the nominal fseq is NP < Ref < Class < Masc < # < Nom; for a feminine (*kmotr-a*), the masculine sequence is extended by Fem: NP < Ref < Class < Masc < Fem < # < Nom.

NP (Noun Phrase) is the lowest projection in the nominal structure in my diagrams (it sits at the base of the tree); higher features are merged above it along the fseq. It represents all features that would be part of a tree of a noun but are irrelevant to the analysis. Such features might be, e.g., verbal domain features in the case when a noun is derived from a verb. Each feature (Ref, Class, Masc, etc.) can project its own phrase (RefP, ClassP, MascP) unless the feature is displaced during derivation through evacuation or pied-piping. *Pied-piping* describes the movement of a larger node together with the problematic feature, allowing successful matching with a lexical item higher in the structure. The featural node "pied-pipes" the larger node to move with it. NP thus functions as the outer shell that contains all lower projections relevant to the nominal domain. Ref (Reference) encodes the noun's capacity to refer to entities (concrete and abstract), Class forms the base of the gender domain and corresponds to neuter in Czech, Masc adds masculine gender, # encodes Number (here: Singular, the grammatical count feature), and Nom expresses case (Nominative), following Caha (2009).[5]

In nanosyntax, syntax first merges features along the fseq and builds the tree that the lexicon will try to lexicalize. After each Merge, the derivation attempts "lexicalization": a stored LI (a tree) can spell out the current structure if it is a superset of that structure (Superset Effect; Starke 2009). It happens cyclically after each merging of a new feature. Unlike Distributed Morphology, which operates under the Subset Principle (a vocabulary item is inserted if its features are a subset of the position's features), nanosyntax follows the Superset Effect, allowing a single lexical item to lexicalize a structure if it is a superset of the structure (i.e. if the LI contains the structure as part of it).

This work uses the De Clercq et al.'s (2025) *subextracting algorithm* which encodes the steps that drive the derivation process, as well as any rescue operations that take place when a matching with the lexicon is unsuccessful. The lexicalization algorithm acts as a set of rules that govern how syntactic structures are constructed to find available lexical items (LIs).

I propose (1) and (2) to be the LIs which are stored in the lexicon for *kmotr* and *-a* (with their LF and PF). They are conventionally marked down by a double arrow between the tree structure and the morpheme's surface form.

---

[5]   The pairing of form and meaning – e.g. why this structure lexicalizes kmotr rather than any other masculine noun with the same feature set – follows from matching the built syntactic structure with stored lexical items in the lexicon. Once a match is found, the structure pairs with both the lexical exponent and the associated concept 'GODFATHER'. The nanosyntactic algorithm searches for structural matches, while lexical retrieval adds the conceptual match, selecting the lexical item containing the intended meaning.

(1) LI for *kmotr*

```
        NomP
       /    \
     Nom     #P
            /   \           ⇔ kmotr
           #    MascP
               /    \
            Masc    ClassP
                   /    \
                Class   RefP
                       /   \
                     Ref    △
                            NP
```

(2) LI for *-a*

```
        NomP
       /    \
     Nom     #P   ⇔ a
            /   \
           #    FemP
                 |
                Fem
```
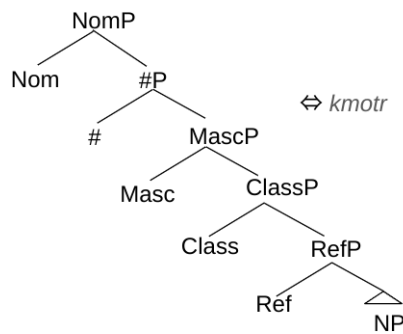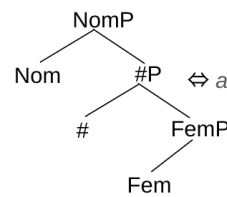
The LIs come into the picture after merging of a new feature by syntax. Each time syntax interfaces with the Lexicon, syntax checks whether there is a stored lexical tree that matches the syntactic tree. In (3), NP is generated (merged), as the first step in the derivation of the noun *kmotr*. (3) represents the syntax. The triangle under NP symbolizes that it is a complex node.

(3) Merge F (the NP)

```
        △
       NP
```

A necessary ingredient of the lexicalization process is that the matching between the lexicon and syntax operates on the Superset Effect (Starke 2009): the LI must be the superset of the syntactic structure for a match to be successful. Image (4) shows by a dotted circle that there is a subpart of the LI capable of interpreting the NP that was merged in syntax. The reason for this has to do with the matching condition (De Clercq et al., 2025) from which the Superset Effect follows: the LI in (4) is a superset of the newly merged syntactic tree, labelled NP, in (3).

(4) The LI is a superset of NP / NP is contained in the LI for *kmotr*

```
         NomP
        /    \
      Nom     #P
             /   \          ⇔ kmotr
            #    MascP
                /    \
             Masc    ClassP
                    /    \
                 Class   RefP
                        /   \
                      Ref   ( △ )
                            ( NP )
```
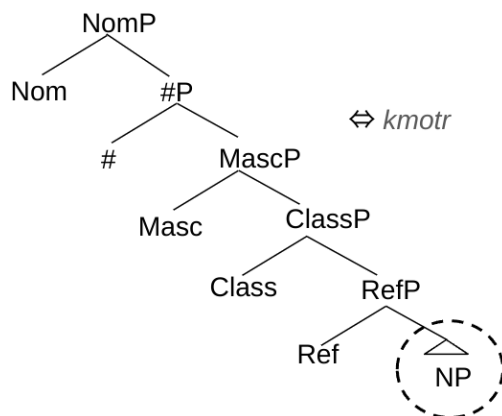
The lexicalization algorithm determines the steps in the lexicalization process, by steering the derivation in such a way that the language specific lexicon of Czech can be mapped onto the universal functional sequence. So far, I have explored the first step of the algorithm: Merge F and lexicalize. For the sake of clarity, it is repeated in (5).

(5)   First look at the lexicalization algorithm

I. Merge F and lexicalize.

II. …

Following step I. of the algorithm, F, in the case of (3) this is NP, needs to get lexicalized. Since the syntactic structure (3) matches a subconstituent of the lexical item in (4), the lexicalization is successful. This is shown in (6). I henceforth mark successful lexicalization by encircling the lexicalized substructure.[6]

(6)   Successful lexicalization
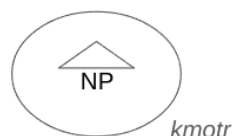
The next feature in the fseq is Reference. This feature is merged with the structure containing only the node NP, changing it to the one in (7). Afterwards, this newly merged projection RefP is lexicalized.

(7)   Merge the next F on top of existing structure
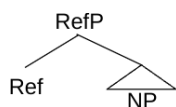
It is easily discernible that the syntactic tree in (7) is again a subconstituent of (4), therefore the LI in (4) is a superset of (7) and can lexicalize it, as visualized in (8).

(8)   Successful lexicalization of the second derivation step
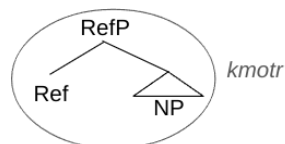
What follows is the merge of Class. This step is shown in (9) and the successful lexicalization in (10).

(9)   Merge Class
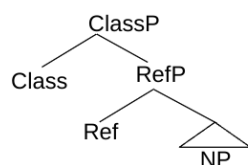
(10)   Successful lexicalization of the structure

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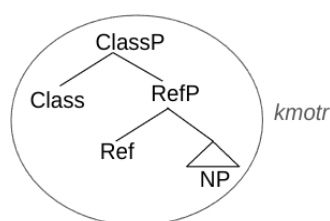
[6]   Note that more than one lexical item can, in principle, match the same syntactic structure under the Superset Effect. In such cases, the choice of lexical item is free (Free Choice). See Caha, De Clercq & Vanden Wyngaerd (2019) for discussion.

Afterwards, Masculine is merged in (11), and another smooth lexicalization (12) follows. Before each lexicalization, the LI, in (4), is always checked to confirm whether it is the superset of the current result of the derivation or not. Here it is, without an issue.

(11)　Merge Masc
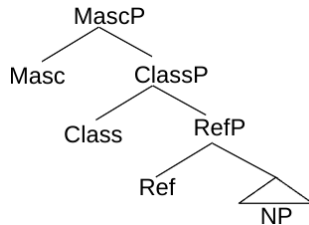
(12)　Successful lexicalization
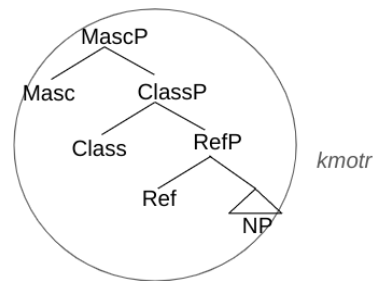
One by one, the features from the fseq NP < Ref < Class < Masc < # < Nom are merged, and a match is found in the lexicon after each Merge, ending in a successful lexicalization. This summary applies to steps (13) – (16).

(13)　Merge #
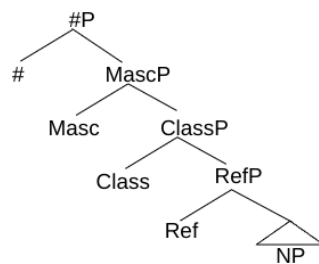
(14)　Successful lexicalization
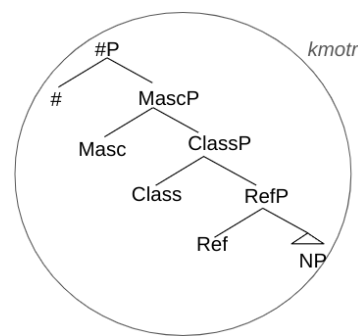
(15)　Merge Nom
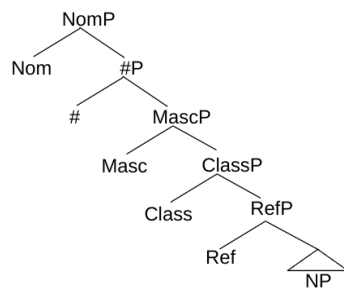
(16)　Successful lexicalization
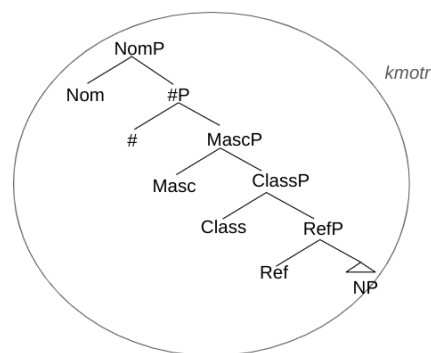
Kmotr is a straightforward example. The end of the fseq is reached, and I can conclude that *kmotr* has been derived. It is now *kmotr-a*'s turn. In deriving *kmotr-a*, I propose the following LIs: the first of them is the already defined nominal stem *kmotr* and the second is the suffix *-a*, which introduces Fem. The fseq for *kmotr-a* is going to be NP < Ref < Class < Masc < Fem < # < Nom. Merging NP, Ref, Class, and Masc follows the same steps as in *kmotr*. Let us jump forward to that point in the derivation when Masc is lexicalized as *kmotr*, (17) and the derivation continues.

(17)   Lexicalize as *kmotr*

MascP
Masc   ClassP
Class   RefP
Ref   NP
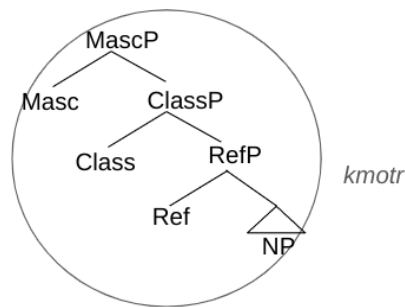
kmotr

In (18), Feminine is merged, and for the first time, lexicalization is not possible. The reader can check for themselves by comparing the LI for the stem *kmotr*, repeated for convenience in (19), that there is no Fem in the tree. In other words, the LI is not a superset of the syntactic tree in (18) and hence lexicalization is not possible.

(18)   Merge Fem

FemP
Fem   MascP
Masc   ClassP
Class   RefP
Ref   NP

(19)   LI for *kmotr*

NomP
Nom   #P
MascP
Masc   ClassP
Class   RefP
Ref   NP
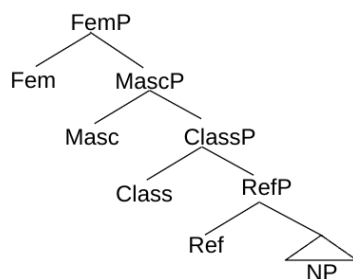
⇔ *kmotr*
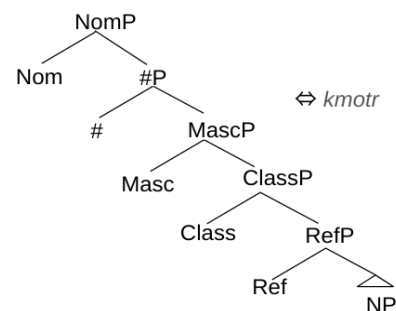
Whenever the lexicon cannot provide a matching lexicalization, the syntax will have to do a rescue operation. The rescue operations that the syntax may have to perform are ranked in the lexicalization algorithm. After merge, which I detailed as the first step in the algorithm, evacuation movement is the next possible operation. Starting from the newly merged feature and its phrasal projection, the syntax will search for the *Closest Labeled Non-Remnant Constituent*. CLN-RC (Closest Labeled Non-Remnant Constituent) identifies the nearest syntactic constituent (here: MascP) that can be evacuated when lexicalization fails. That constituent is then moved to the Specifier position of the newly merged featural head.[7] The movement is shown in (20) and its result in (21).

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[7]   The descriptor "Specifier position" is in nanosyntax taken from X-bar phrase structure as a shorthand for navigation in the syntactic tree, which the reader might be familiar with. The internal structure of nanosyntax and the rules for movement in it differ from the standard Spec-to-Spec movement and Spec of the Complement movement, as I will explore partly in the derivation of *kmotr-a* and partly in the derivation of *učitel* and *učitel-ka* in section 3.

(20)   CLN-RC evacuation
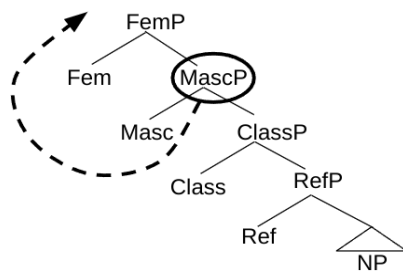
(21)   Evacuation result
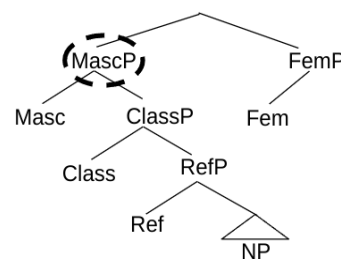
(22) illustrates this rescue operation as the second step of the algorithm.

(22)   Lexicalization algorithm

     I.   Merge F and lexicalize.
     II. If fail, evacuate the Closest Labeled Non-remnant Constituent (CLN-RC) and lexicalize.

     III. …

There is quite a lot to unpack in this second step of the algorithm: The newly merged feature has a phrasal projection FemP above it, which serves as the focus of our attention. When the algorithm says, "evacuate the *closest … constituent*", it means the closest in relation to the newly merged feature (Fem). Secondly, "evacuate the … *labeled* … constituent" is there to leave out non-labelled nodes, i.e. those resulting from a previous movement. Lastly, "evacuate the … *non-remnant* constituent" prevents from trying to move remnants, i.e. nodes that something has been evacuated from.

     With the terminology clarified, let us focus back on the derivation in (21), where the structure has two branches. The left branch can be lexicalized by *kmotr*, but the right branch cannot. I proposed an LI for *-a* in (2) and repeated here in (23), which can lexicalize the right branch of (21), because the right branch is a subconstituent of the LI in (23).

(23)   LI for *-a*
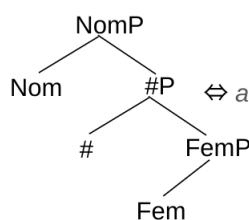
The features Fem, #, and Nom are grouped in *-a* because Czech *-a* appears exactly where these three features coincide – in the nominative singular of feminine nouns. Treating them as a single bundle reflects this co-occurrence and distinguishes this *-a* from the homophonous masculine *-a* (as in *hrdin-a*), which lacks *Fem* and serves only inflectional purposes.

     While *-a* typically introduces the feminine feature in Czech, there exists a small but systematic class of masculine nouns ending in *-a*, such as *hrdin-a* ('hero.M') and *koleg-a* ('colleague.M'). These forms share some inflectional properties with feminines but pattern syntactically as masculines (the change is visible in Dative and Locative Singular but is invisible in Nominative and other grammatical cases of the Singular Number). The simplest

account is that there are two homophonous LIs: a feminine *-a* (Fem > # > Nom) and a purely inflectional *-a* (# > Nom) used in masculine paradigms. A full analysis is left for future work.

The lexicalization of *-a* is shown in (24): the left branch is realized by *kmotr*, the right branch by *-a* and the whole structure has the surface form of *kmotr-a*.

(24)   Lexicalization by *kmotr* and *-a*
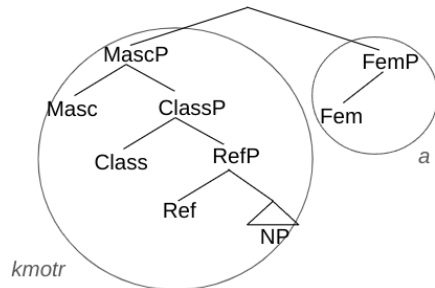
Number (#) is the next feature in the queue. It is merged on top of the structure in (25), attempt lexicalization, and find out there is no match in the lexicon.

(25)   Merge #
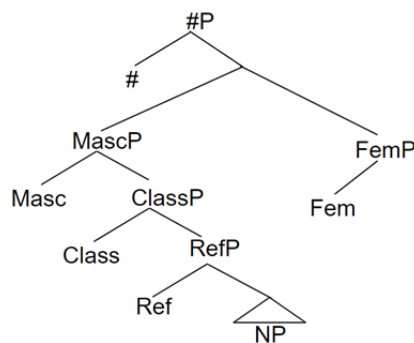
The way out is step II of the algorithm in (22), just like when merging Fem: Evacuate the closest labeled non-remnant constituent (CLN-RC) and lexicalize. For the first time in this derivation, the structure contains an unlabeled constituent because of the previous rescue movement, highlighted by a black dot in (26).

(26)   Highlighting the CLN-RC
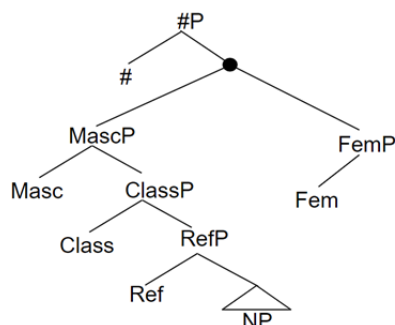
The unlabeled node is skipped and MascP is moved. The movement is in (27) and results in (28).

(27)   Evacuate CLN-RC
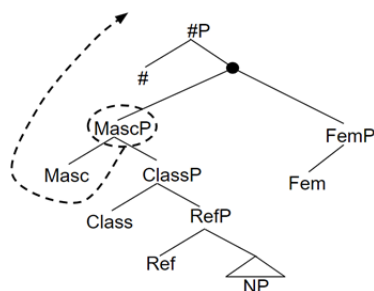
(28)   Lexicalize as *kmotr-a*
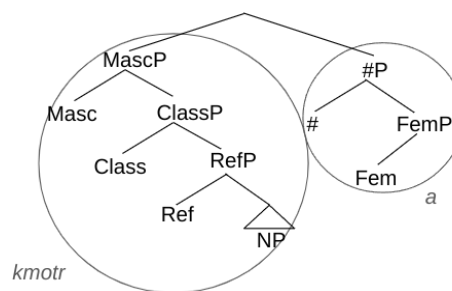
Finally, Nominative is merged in (29).

(29)   Merge Nom
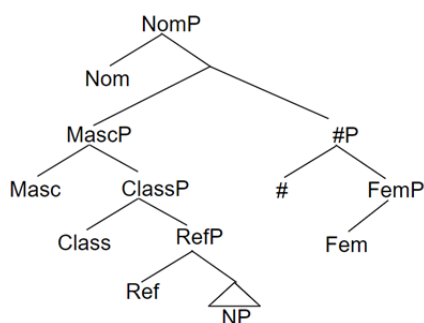
The lexicalization succeeds after a CLN-RC evacuation in (30) and the result is in (31). Since the left branch is lexicalized by *kmotr* and the right branch by *-a*, the total is *kmotr-a* ('godmother.Fem.Sg.Nom'). The lexicalization of *kmotr-a* has been successful.

(30)   Evacuate CLN-RC
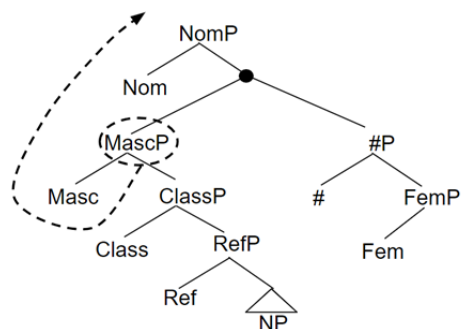
(31)   Lexicalize as *kmotr-a*
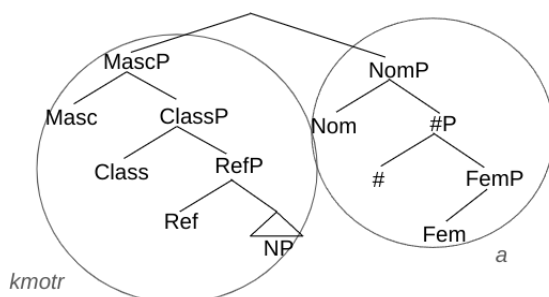
Another way to visualize derivations, which shows the same actors but accents their roles differently, is a lexicalization table, shown in (32). The topmost row in the table contains the fseq. The other rows represent different morphemes or phrases and the corresponding parts of the functional sequence which they lexicalize, e.g. the stem *kmotr* lexicalizes all features in the fseq (compare with LI 3 / 19). For *kmotr-a*, the lexicalization table shows that the stem morpheme *kmotr* will shrink, i.e. it will not lexicalize its full lexical potential. *Shrinking* refers to a lexical item realizing a smaller subset of the functional sequence than it potentially could, often as a result of an evacuation / pied-piping operation. As such, it will only lexicalize NP, Ref, Class and Masc; # and Nom will be lexicalized by *-a*, the morpheme that kicked in to lexicalize Fem. The colors in the table show how far every morpheme reaches and how many features it can lexicalize (i.e. *kmotr* lexicalizes all features up to Nom). The black spot shows the absence of a feature (i.e. *kmotr* does not contain Fem).

(32)   A lexicalization table for *kmotr* and *kmotr-a*

ΔNP	Ref	Class	Masc	Fem	#	Nom
kmotr						
kmotr				a		

The derivation of *kmotr-a* thus illustrates the basic functioning of the algorithm. We can now assess the same mechanism on a more articulated stem.

3. The role of the complex left branch

The lexical trees in *kmotr* / *kmotr-a* were straightforward, non-branching. Now, let us look at the masculine *učitel* ('teacher'). Even though it consists of a root *učit* and a suffix *-tel* (*uči-tel*), I treat this noun as the stem / one functional morpheme for the purposes of this analysis, so in the lexicalization table (33) it realizes all the features up to Nom. As a consequence of this decision, I presume that *-tel*, if it were analyzed separately, would lexicalize the Ref feature. The table proposes the division of labor between the stem *učitel* and other functional morphemes.

(33)   Lexicalization table – *učitel* / *učitel-k-a*

NP	Ref	Class	Masc	Fem	#	Nom
učitel						
učitel		k		a		

If the two masculine nouns I have presented here behaved identically to each other, *učiteľ*'s expected feminine form would be **učitel-a*, just like *kmotr-a*. Yet the actual feminine form for 'female teacher' is *učitel-k-a*. The answer to the problem lies again in the structure, but to get to it I first have to propose how the functional morphemes divide the fseq.

There is already a proposal for what *-a* lexicalizes: I argued it lexicalizes Fem, # and Nom. Therefore, I propose to segment the ending of *učitel-ka* into *-k* and *-a*, with *-a* lexicalizing Fem, # and Nom and k lexicalizing the middle features Class and Masc. The root, *učitel*, will

have to shrink to Ref, as visualized in the second row of (33). Since (33) is just a lexicalization table, one wonders how *-k* will be able to kick in and how the shrinking of *učitel* comes about?

Before continuing with lexicalization, a brief note on *-k*. The suffix *-k* (often with the vowel *-e-*) is central and highly flexible in Czech word formation. It acts as a nominalizer creating concrete nouns (*úplat-ek* 'bribe.Masc'), results of actions (*zlom-ek* 'fraction', *zbyt-ek* 'remnant'), and agentive or univerbated forms (*minerální voda* 'mineral water.Fem' → *minerál-k-a* 'mineral_water.Fem'). Because it lexicalizes the low nominal domain – Class and Masc – it can surface in feminine (*řidič-k-a* 'driver.Fem') and diminutive (*nož-k-a* 'foot.Fem.Dim') contexts alike. Traditionally, *-k* is considered synonymous with *-ice* in feminine derivation (*děln-ice* 'female_worker') (Dokulil 1986: 218–231; Štícha 2018: 160). In what follows, we will see how this flexibility enables *-k* to enter the derivation of *učitel-k-a*, adding a uniquely nominal layer.

Although *-k* appears in several environments (feminization, diminutives, …), in this paper it remains an affixal exponent of the low nominal domain: it realizes Class and Masc (and, when word-final, may co-realize #/Nom). Crucially, I do not assume that *-k* carries a referential layer. Its output becomes a full noun because the derivation builds that layer elsewhere (e.g., through higher functional structure or another suffix), not because *-k* itself introduces Ref. In other words, *-k* is multifunctional by distribution, not by raising the noun to referentiality on its own.[8]

Returning to the derivation, complex left branches (CLB) are now crucial. In a CLB, one or more nodes of the lexical tree are in a position that is higher than their original position. This is a consequence of evacuation movement, i.e. a feature at a lower level has moved to a higher level (Blix 2022).[9] Since all lexical items in nanosyntax consist of well-formed syntactic objects, and since we know that tree structures with evacuation movements are well-formed syntactic objects, it is not surprising that this type of object gets stored in the lexicon. Janků (2022) and Cortiula (2023) show how lexical items with complex left branches are extremely useful in the analysis of nouns and verbs respectively. In this paper, their use shows how morphemes can "shrink", which is exactly what we see with the stem *učitel* in *učitel-k-a*.

A CLB can be seen in picture (34). The order in which features have been merged is XP – 1 – 2 – 3.

(34)   A complex left branch (CLB)

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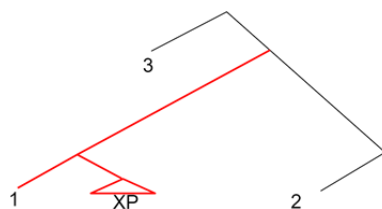
[8] A CLB for *-k* is a theoretical possibility. Future work may probe whether some *-k* items show CLB-like behavior but the derivations in the present account do not require it.

[9] CLBs admittedly give nanosyntax boost in generative power by allowing for certain ABA patterns. For more information, see Blix (2022), Caha et al. (2024), Kasenov (2023). For more on *ABA in adjectival paradigms see Bobaljik (2012) and others.

To the naked eye this seems the fseq order was violated, but such structures are still syntactically salient, and it is logically possible for LIs to vary in this way (Caha et al. 2022). Picture (35) shows this way of drawing the tree in the specific case of the noun *učitel*: the shape of this LI will allow that a syntax that has the structure of the left branch, i.e. containing NP and Ref, can be lexicalized by *učitel* without the need for the features Class, Masc and #. This is exactly what will be needed for the lexicalization of the feminine form. [10]

(35)   The complex left branch (CLB) in the LI for *učitel*
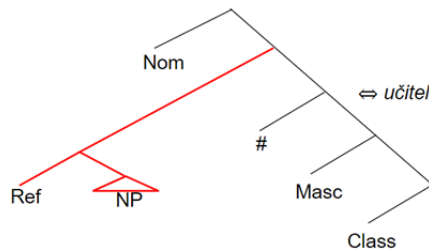
Based on these general notions and observations, I propose that *-k* carries Class, the basic gender feature. Secondly, *-k* carries # and Nom because it can be word final. It is word-final in masculine nominalizations, too, and therefore an ideal carrier of Masc. I do not expect *-k* to lexicalize Fem, as it is not unique to deriving feminines, in contrast with *-a*.

This specification also covers diminutive formations across genders: In masculine diminutives like *dědeč-ek* ('grandpa.Dim.M'), *-k* again realizes the low slice of the fseq (Class, Masc). Because the it is word-final, #/Nom can be co-realized there. The gender remains masculine because no Fem feature is introduced. In feminine diminutives like *žab-k-a* ('frog.Dim.F'), *-k* still spells out the same low slice and *-a* contributes Fem, #, Nom. In neuter diminutives like *slun-íčk-o* ('sun.Dim.N'), the cluster *-íčk-* contains *-k* as the consonantal exponent of the low slice, while *-o* provides the neuter inflectional ending (realizing #/Nom in the neuter paradigm). In all three patterns, the "diminutive effect" comes from the larger suffixal complex (the vocalic material and the final inflection), while *-k* consistently realizes the same low-domain features.[11] In neuter diminutives such as *bříšk-o*, the absence of Masc means *-k* can lexicalize only up to Class, and the neuter ending *-o* supplies the remaining #/Nom. Masc (and Fem) would be represented by a black cell in the lexicalization table.

In (36) I propose the separate LIs for *učitel, -k* and *-a*. With all three together, it is now possible to derive *učitel-k-a*.

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[10] As an alternative, *-a* could have a CLB. If its LI contains a left branch on which Fem can be absent (due to prior evacuation), the same item can lexicalize the right branch both with Fem (Fem < # < Nom) and without Fem (# < Nom). This covers the feminine *-a* and the masculine *-a* with a single LI by structure, not by ambiguity. However, this remains a tentative explanation: the exact tree geometry and steps that would create such a CLB are not clear, as is uncertain whether it is achievable by a well-formed derivation at all.

[11] Diminutive might also be analyzed as a separate feature of the fseq. This analysis is left to future research.

(36) LIs for a) -*k*, b) -*a* and c) *učitel*

a) NomP ⇔ *k*
Nom #P
MascP
Masc ClassP
Class

b) NomP ⇔ *a*
Nom #P
FemP
Fem

c) NomP
Nom RefP #P ⇔ *učitel*
Ref NP # MascP
Masc ClassP
Class
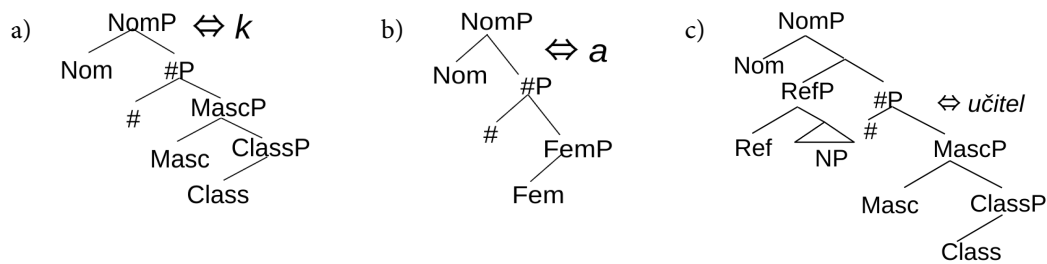
Even with an innovated shape for LI, the derivation of *učitel* still follows the algorithm. Merge NP (the first node in our nominal fseq) in (37). *Učitel* (36c) is a superset of NP even though it contains the NP on a left branch (cf. (36)). This LI can still lexicalize the newly merged NP as *učitel*, as visualized in (38).

(37) Merge F (the NP)

NP

(38) Lexicalize as *učitel*

NP *učitel*

Subsequently, in (39), Ref is merged. *Učitel*, repeated in (40), matches this structure and acts as a superset of it, therefore the lexicalization goes through without an issue, summarized in (41).

(39) Merge Ref

REF NP

(40) LI for *učite*

NomP
Nom RefP #P ⇔ *učitel*
Ref NP # MascP
Masc ClassP
Class
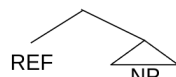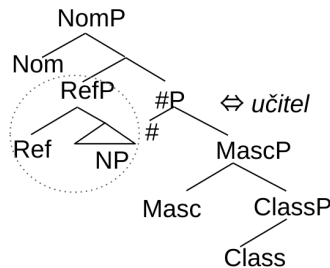
(41) Lexicalize *učitel*

REF NP *učitel*
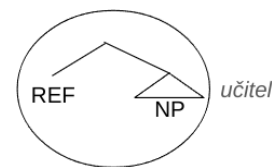
Continuing, Class is merged, with (42) being the result. But even though lexicalization is attempted, there is no constituent in the superset of the LI for *učitel*, again in (43), which would match it, and the attempt fails.

(42) Merge Class

ClassP
Class RefP
Ref NP
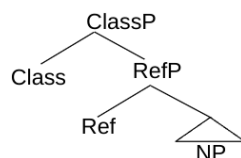
(43) Structure of the LI *učitel*

NomP
Nom RefP #P ⇔ *učitel*
Ref NP # MascP
Masc ClassP
Class
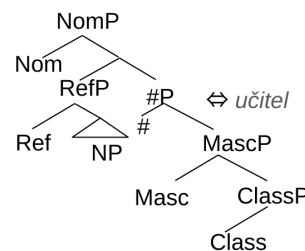
Fortunately, the algorithm is ready for this: when it fails, the second step instructs to evacuate the closest labeled non-remnant constituent.

(44)   Lexicalization algorithm

    I.   Merge F and lexicalize.
    II.   If fail, evacuate the Closest Labeled Non-remnant Constituent (CLN-RC) and lexicalize.

    III. …

The CLN-RC evacuates above the newly merged feature. (45) visualizes the movement step and (46) the results of the movement, highlighting the part available for lexicalization by *učitel*. This step is one of the first operations that offers additional options when failure is imminent.

(45)   CLN-RC evacuation
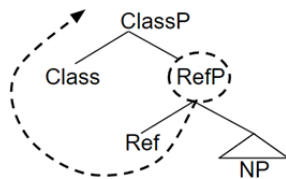
(46)   Lexicalize *učitel-k*
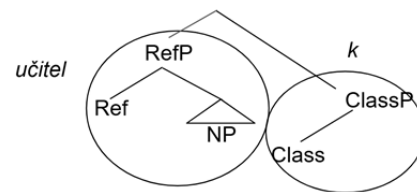
(46) might seem to lead to failure even so. The Class feature on the right branch is, after all, lexicalized by a morpheme *-k*, proposed back in (36a), which does not occur in the masculine *učitel*. This item can, nonetheless, lexicalize this right branch and only thanks to it can the derivation continue. This does not lead to failure, because there are still features to merge. The derivation continues with Masc in (47). *Učitel* does not find a match and a CLN-RC evacuation follows. The constituent in question is highlighted by a dashed line in (48).

(47)   Merge Masc
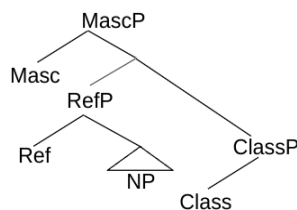
(48)   Evacuate CLN-RC
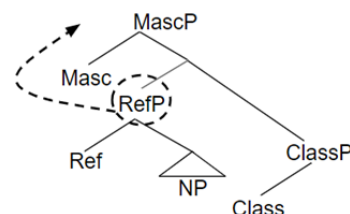
The resulting structure in (49) has two branches now: a left one, containing a complex moved constituent, and a right one, which is a remnant constituent with Class and Masc. The left branch can be interpreted by *učitel,* and lexicalization is successful, in (50).

(49)   The result of CLN-RC evacuation
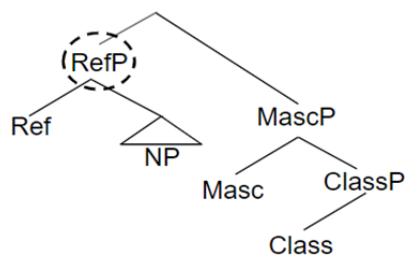
(50)   Lexicalize as *učitel-k-*
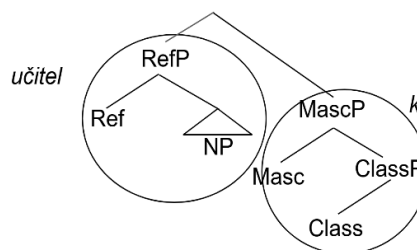
In (51), # is merged, without a match, followed by a CLN-RC movement in (52).

(51) Merge #
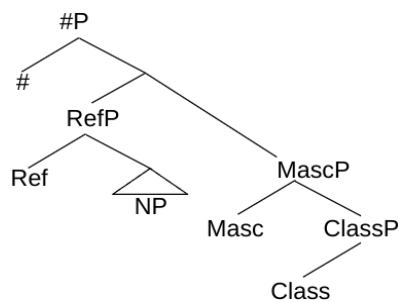
(52) Pied-pipe
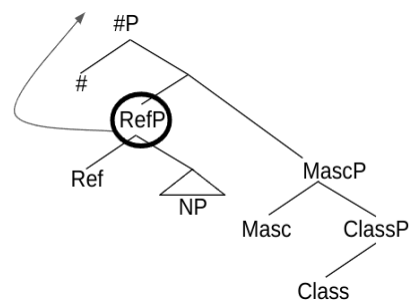
When we check the structure of *učitel*, repeated in (53), there is a clear match in it for the result of the derivation: the whole tree is lexicalized as *učitel*, with no branches left out. Check for yourselves in (54).

(53) LI for *učitel*
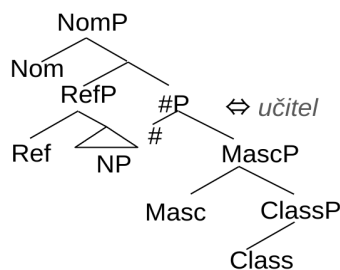
(54) Lexicalize tree as *učitel*
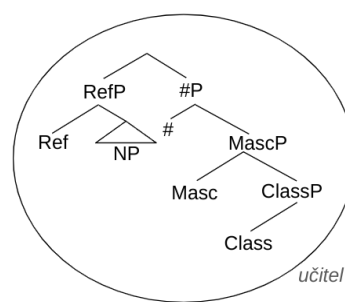
Finally, Nom is merged in (55) on top of the preceding step, and the structure exactly matches the lexical tree for *učitel*. Lexicalization is successful, as shown in (56).

(55) Merge Nom
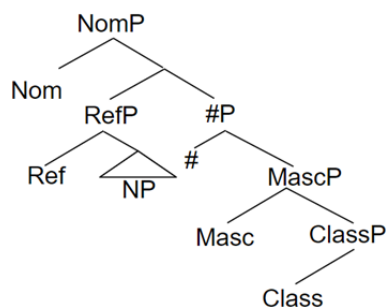
(56) Lexicalize *učitel*
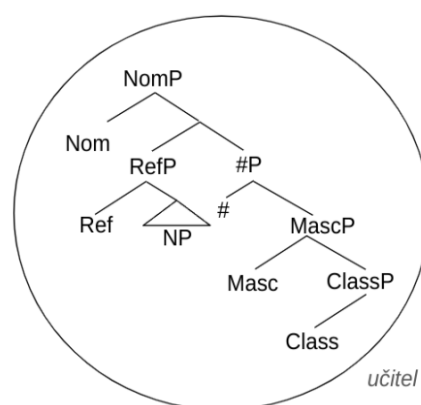
The derivation of *učitel* is finished. Since *učitel* and *učitel-k-a* both use the *učitel* derivational stem and, inevitably, a lot of steps in their derivation repeat. The crucial difference is that *učitel-k-a* is a feminine form and as such is presumed to contain the Feminine feature. In the fseq, Fem is right after Masc, so until Fem is merged in the structure, it is possible to recycle steps (37) to (50). Picture (57) therefore fast-forwards to the crucial moment when Fem is merged, and we divert from *učitel*.

(57)   Merging Fem

```
              FemP
          /        \
       Fem          \
              RefP          \
           /    \        MascP
        Ref     /\      /      \
              NP     Masc     ClassP
                              /
                           Class
```
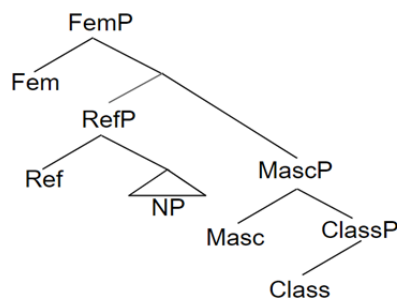
Fem is added with no match from the lexicon for the whole tree, and the structure resulting from a CLN-RC movement is without a match either. For that step see (58).

(58)   Evacuation of the Closest Labeled Non-Remnant Constituent to NP
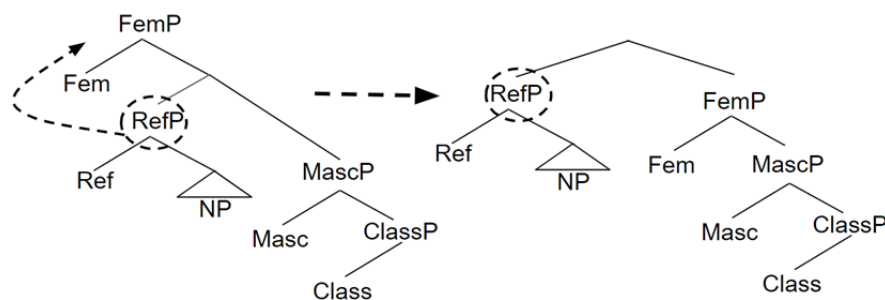
There is one more rescue movement to try out if moving the CLN-RC does not yield results: Pied-piping the next higher (unlabeled) node. This strategy is now mentioned in line III of the lexicalization algorithm in (59).

(59)   Lexicalization algorithm

    I.   Merge F and lexicalize.
    II.   Evacuate the closest labeled non-remnant constituent (CLN-RC) and lexicalize.
    III. Pied-pipe a node one notch higher and lexicalize.

    IV. …

Pied-piping starts from the unsuccessful movement in step (58), targets a node one notch higher in the tree, and moves it above the phrasal projection of the newly merged feature (see (60) for both the movement and the result). It produces a syntactic structure with three branches: the left one containing NP and Ref, the middle one with Class and Masc, and the one on the right with Fem.

(60)   Pied-piping a higher node
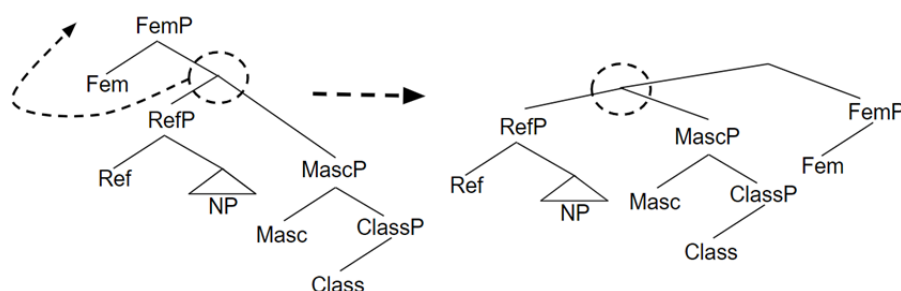
(61)   Lexicalize *učitel-k-a*
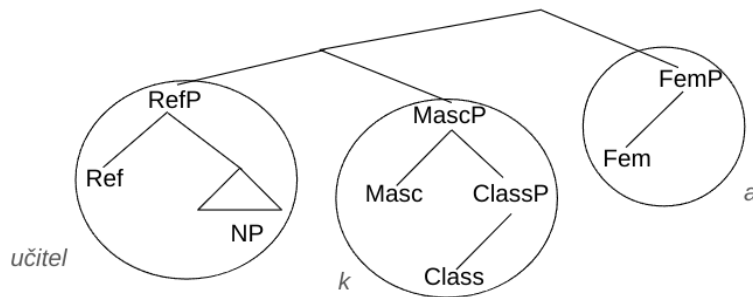
If we compare the three branches of (61) to the LIs, repeated in (62), we can see that LI for *učitel* is the superset of the left branch, the LI for *-k* is the superset of the middle branch and *-a* is the superset of the right branch.

(62)   LIs for *učitel*, *-k* and *-a*
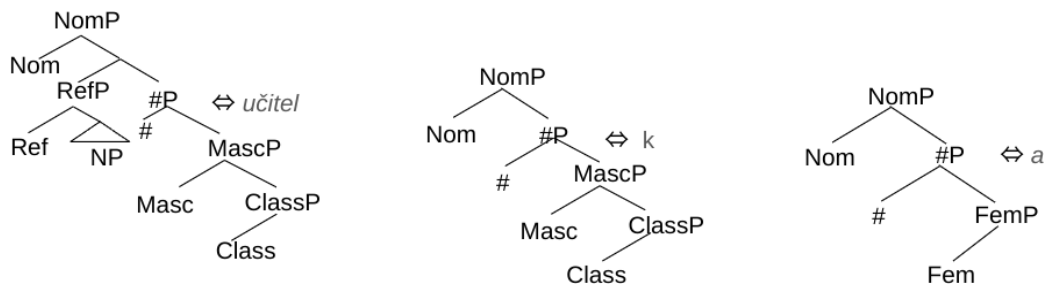
Two more features are left to merge: # and Nom. # is merged first, on top of the previous step of the derivation. Immediate lexicalization is not possible, but for a rescue movement to work, syntax needs to identify the closest labeled non-remnant constituent. Since both the right and the middle branches have been evacuated from, they are remnant constituents, therefore they do not fit the algorithm's rule. The derivation skips the unlabeled nodes, as they also have been created by the evacuation movement operations. (63) shows both the structure at the merging of # and the CLN-RC, RefP, highlighted by a dashed oval shape.

(63)   Merge #
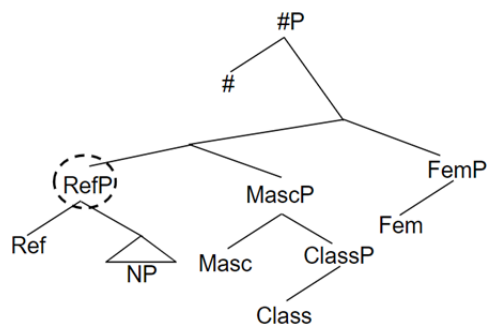
This movement produces the complex structure in (64) which does not find a match in the lexicon.

(64)   Evacuate CLN-RC
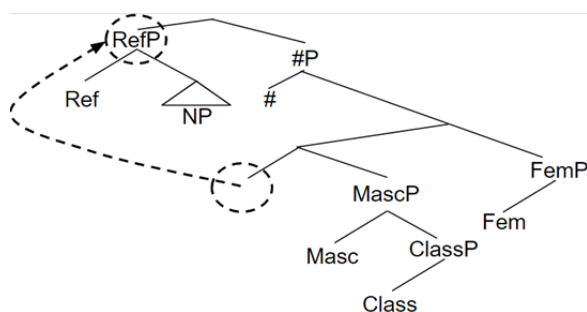
Therefore, in (65), the next highest notch is pied-piped.

(65)   Pied-piping a higher node
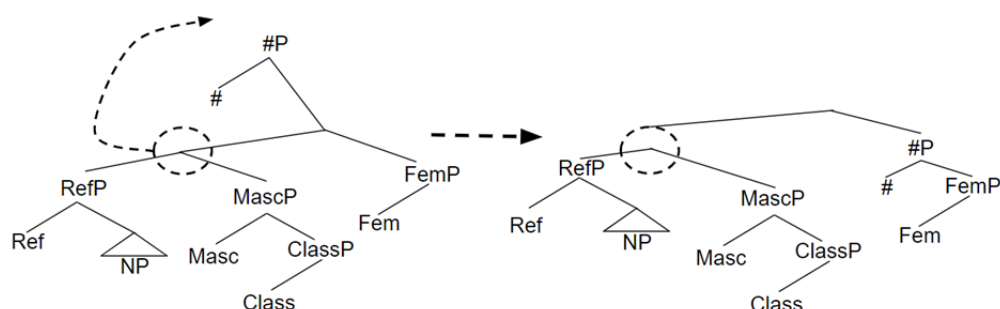
Finally, in (66) there is a match for each one of the branches.

(66)   Lexicalization successful
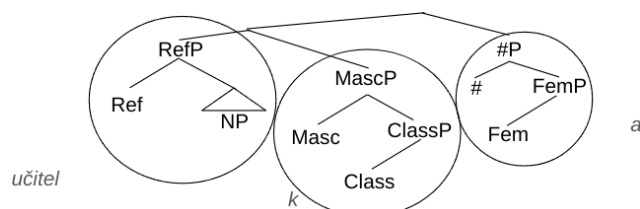
The last step, at least to derive *učitel-k-a*, Nominative is merged as the first case feature, with no luck in immediate lexicalization, followed by a CLN-RC movement in (67), also without acceptable matching results.

(67)   Evacuation of CLN-RC leads to failure
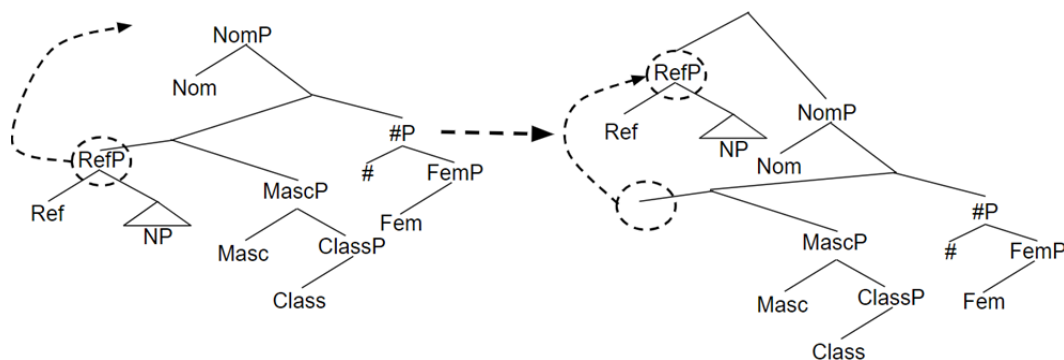
A higher node is pied-piped in (68), just like in the previous steps of the derivation, and the outcome is successful lexicalization.

(68)   Pied-piping a node one notch higher than RefP
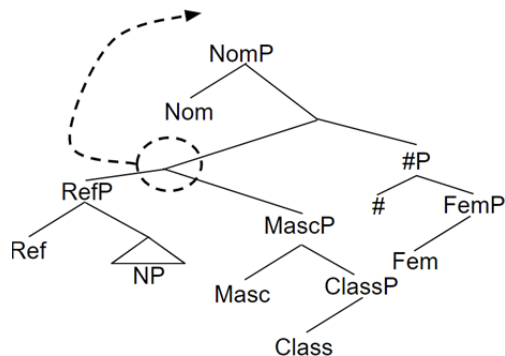
All features from the fseq have been merged, and the form *učitel-k-a* has been derived, leading to the picture in (69).

(69)   Result of the pied-piping and successful lexicalization of *učitel-k-a*
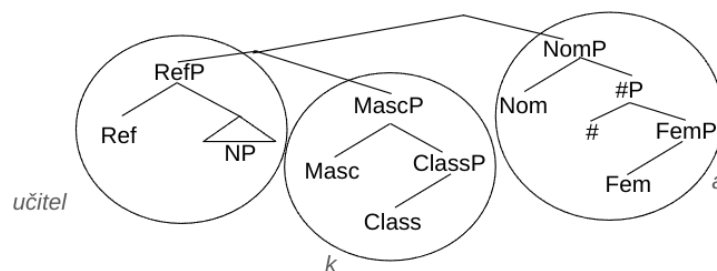
To summarize, this paper has so far contained a detailed explanation of how masculine and feminine forms of nouns are derived when following the algorithm of nanosyntax. Structures for several LIs have been proposed, built on the idea of a universal hierarchy of features in the form of an fseq. The structure inventory consists of two separate stem morphemes, *kmotr* and *učitel*, the latter exemplifying a complex left branch in its tree. Furthermore, there are two separate suffixal items that have been used to derive feminine forms of *kmotr-a* and *učitel-k-a*, but whose usefulness and applicability is yet to be assessed. Such an assessment comes in the form of deriving more nouns that contain similar morphology, and that is why in the following paragraphs nominal forms with more complex stems will be introduced, which undergo gender alternation. The next section shows the complementary case of *-ák*: unlike *-k*, *-ák* carries a CLB with Ref and therefore licenses a referential noun directly.

4. Nouns with bi-morphemic stem

The aforementioned noun *žab-ák* ('frog.Masc') pairs with its feminine correlate *žáb-a* ('frog.Fem'). An analogy with *kmotr → kmotr-a* might suggest adding *-a* to *žabák* and

obtaining *žabák-a*, which is in fact the accusative case form of the same masculine noun.[12]. That expectation is incorrect. The reason is structural: in the masculine *žab-ák**, the suffix* -*ák* comes with a lexical entry that does not introduce Fem and leads to a different distribution of coverage for the root. When Fem is merged, the matching proceeds differently: the LI *-a* lexicalizes out the slice Fem < # < Nom, and the stem *žab-* shrinks to its lower portion in order to fit that match. The feminine correlate is therefore *žáb-a*, not *žabák-a*. The table in (70) and the trees in (71)–(73) display the two distributions side by side, so the reader can see exactly which slices are realized in the masculine and in the feminine.[13]

The role that *-a* plays is complicated by some masculines having *-a* as a suffix, e.g. *hrdin-a* ('hero.Masc'). In this analysis, *-a* is the carrier of the Fem feature which is associated only with feminine nouns.[14] When masculine nouns end in *-a*, I assume a distinct, homophonous LI lacking Fem in their fseq as the simplest account.[15] The reasons for getting a different feminine form in *žáb-a* than in *učitel-k-a* might be multiple, but this nanosyntactic analysis pinpoints the specific part of the syntactic structure that influences why we get *-a* and not *-k-a* or *-ič-k-a*. For this part of the derivation, the stem morpheme *žab*, and the new suffixes *-a* and *-ák* will be necessary. These morphemes are represented in the lexicalization table (70).

(70)   Lexicalization table for *žab-ák* and *žáb-a*

△NP	Reference	Class	Masculine	Feminine	Number	Case
žab	ák			■	...	
žab				a		

From the lexicalization table of *žab-ák* and *žáb-a* in (70) it can be deduced that the morpheme *žab* is followed by *-ák*, *žab* only takes care of NP, but the stem morpheme plays a much larger lexicalization role when Fem is introduced into the picture with *-a*.

I propose the functional morpheme *-ák* or its phonological variant *-ak*[16] as a standalone morpheme. This morpheme derives denominal nouns for conceptual or spatial relation (*škol-ák*, 'schoolgoer.Masc'), animal names (*plameň-ák*, 'flamingo.Masc'), derived versions of feminines (the aforementioned *žab-ák*), and many others. The multiplicity of meanings suggests that the suffix *-ák* is linked to multiple concepts in the lexicon. Based on that, it is closer to a stem (like *kmotr*) than to a suffix (like *-k*). Because of this I propose that *-ák*

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[12] Since this paper focuses on laying the foundation for the analysis, it skips over the issue of what role the inflectional endings of different cases play.

[13] On a more general level, it is becoming clear that how LIs work and how noun derivation works are two different issues. Even though one noun, e.g. *učitel-k-a*, is derived from a different one, e.g. *učitel*, it is not true that one LI is derived from another (e.g. *-ák* is not derived from *-a* or *-k*). Nouns and endings are the things observed by speakers on the surface, while LIs are the deep structural representations.

[14] The LI for *a* (repeated in (73)) contains Fem at its foot which means it is not capable of lexicalizing any structure which does not likewise contain Fem. Remember that a LI only lexicalizes a structure of which it is a superset.

[15] A CLB-based single-entry analysis has been considered (see footnote 10), but I leave its viability open.

[16] Length alternation is a common phonological effect in Czech nouns, even though it most often applies to words ending with the much more frequent *-ík* (e.g. *děln-ík* / *děln-ice*, *domovn-ík* / *domovn-ice*).

contains a CLB, similarly to some of the presented stems. The LI for *-ák* is shown in (71). The foot of the tree lacks the complex NP node reserved for stems; therefore, it is a suffix morpheme.

(71)   LI for *-ák*
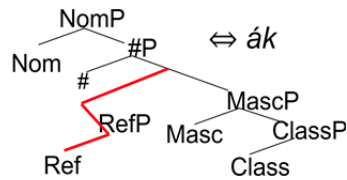
The Ref feature appears on the CLB of *-ák* because this suffix creates nouns that can stand alone as referring expressions (*žab-ák*, *škol-ák*), rather than only extending the meaning of the base. *Žab* and *-a* are in (72) and (73). The red branches in *žab*'s and *-ák*'s trees are CLBs. It is thanks to the CLB that *žab* can play a small role in *žab-ák* and a bigger role in *žáb-a*. The reader can see a left branch showing up in *-ák* morpheme as well in (71).
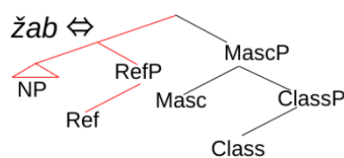
(72)   LI for *žab*   (73)   LIs for *-a*
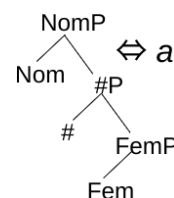
Let us derive *žab-ák* first. The algorithm dictates the first step: Merge NP the first node. It can be lexicalized by *žab* without an issue, (75), because *žab* is a superset of this node and I want to talk about a [FROG]. This is followed by merging Ref on top in (76).

(75)   Lexicalize as *žab*   (76)   Merge Ref
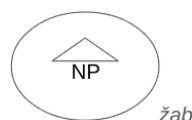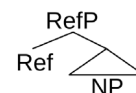
The (76) structure cannot be lexicalized by *žab* in (72) because it is not (72)'s subconstituent. That is because the LI for *žab* contains a CLB. The NP is evacuated above Ref. The closest constituent (NP) of the merged feature is moved up, resulting in (77), which is lexicalized by *žab*. The visualizations of the evacuation will be skipped for brevity.

(77)   Lexicalize as *žab*
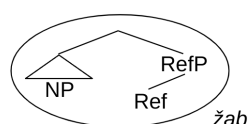
The derivation continues by merging Class (78) and finding out that lexicalization straight up is impossible.

(78)   Merge Class

Class
NP
RefP
Ref
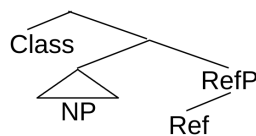
Rescue movement of the closest constituent (CLN-RC) does not yield lexicalization either, as can be seen in (79). Because of how *-ák* and *žab* are shaped, *-ák* cannot lexicalize the right branch of the rightmost tree in (79) (symbolized by a question mark).

(79)   CLN-RC evacuation

Class
NP
RefP
Ref
Class RefP
NP
žab
Ref
?
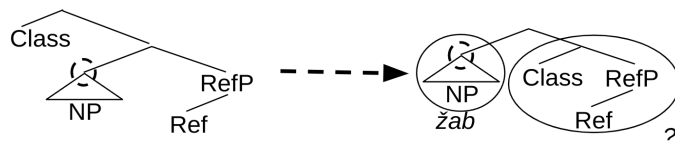
A higher node therefore needs to be pied-piped. That node is highlighted by a red ball, and the result of the pied-piping is visible in (80).

(80)   Pied-piping of a node one notch higher

Class
NP
RefP
Ref
RefP
NP
Ref
Class
žab   *k*
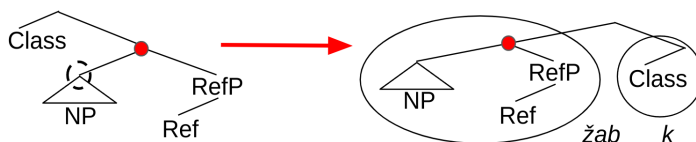
The lexical tree for *-k*, proposed originally for *učitel-k-a*, will help here, as it can lexicalize the rightmost branch of (80). See picture (81) for the repetition of the LI.

(81)   LI for *k*

CaseP   ⇔ *k*
Case   #P
MascP
Masc   ClassP
Class
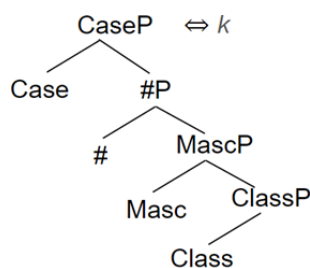
Even though the result (80) at this point is *žab-k*, this is an intermediate result, and it does not predict what the final structure is going to be. Masc is merged in (82), with no matches found in the lexicon and lexicalization being impossible right away.

(82)   Merge Masc

Masc
NP
RefP
Ref
Class
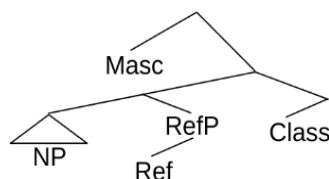
Just like in the previous merge step, CLN-RC evacuation does not help (83), but pied-piping a higher node brings us to the structure (84) which can be lexicalized just by the single morpheme of *žab*, taking *-k* out of the equation for now.

(83)   CLN-RC evacuation
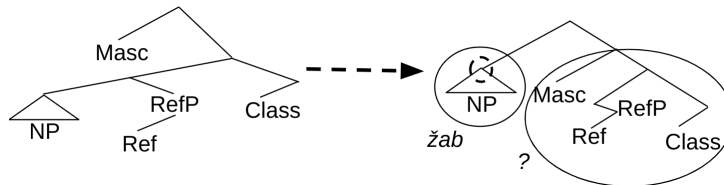
(84)   Pied-pipe a higher node
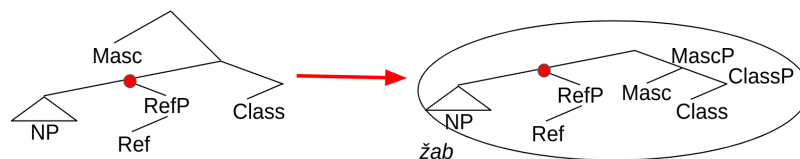
Since this is a derivation of a masculine noun, Number (#) is merged right after the Masc feature. This moment is crucial. When # is merged in (85), the total cannot be lexicalized, and in (86) only CLN-RC evacuation can result in the right branch perfectly matching the hypothesized LI for *-ák*.

(85)   Merge #
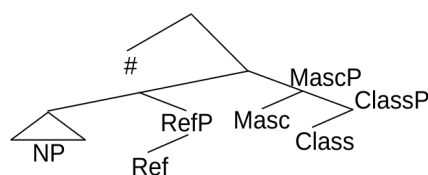
The node that undergoes the rescue operation is highlighted by the white ball in (86).

(86)   Evacuate CLN-RC
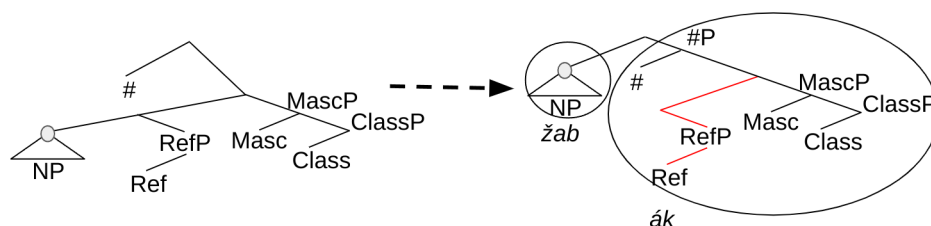
Lexicalization is successful, with only one more feature to go. In the process of the most recent movement, the Ref feature has been stranded by NP, but since it arrived at its current place in the tree as a result of evacuation, the shape of the branch is left crooked to signal that Ref is, in fact, still hanging on a complex left branch. By designing the LIs to already contain movement in them, just like the LI for *-ák* does, their usefulness increases. Such a LI can lexicalize just the feature(s) on its CLB, just the features on its right branch, or the constituent containing both.

The last merge in the fseq line is Nom in (87).

(87) Merge Nom
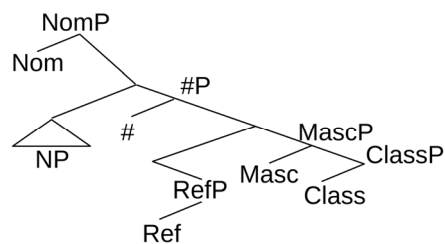
No possible lexicalization of the tree in (87) warrants the evacuation of the CLN-RC in (88), highlighted by the white ball.

(88) *Žab-ák* is lexicalized
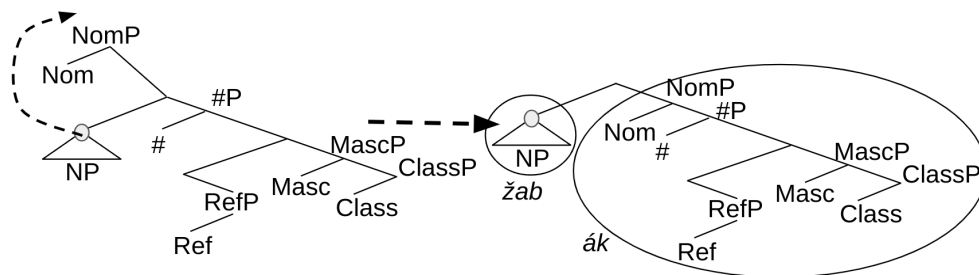
Nominative is the last feature present in the form of the masculine noun *žab-ák*, ergo the whole derivation has been successfully concluded. Over the course of the derivation, the first three steps of the algorithm were used and the practicality of Complex Left Branches (CLBs) was explored.

The feminine noun *žáb-a* is the next in line. Table (89) repeats the relevant lexicalization table. We can see that *žab* lexicalizes a larger part of the sequence than it did in *žab-ák* ('frog.M'), and right after the Feminine feature is merged, the morpheme *-a* joins the fray.

(89) Lexicalization table for *žab-ák* and *žáb-a*

ΔNP	Reference	Class	Masculine	Feminine	Number	Case
žab	ák				...	
žab				a		

The feminine form *žáb-a* uses the same features as *žab-ák*, with the only difference being the Fem feature. Because of the shape of the LI of *žab*, with the NP standing on the left branch higher up, this LI can lexicalize either the NP on its own or the whole sequence NP < Ref < Class < Masc. For that reason, the derivation of *žáb-a* is identical to *žab-ák*'s in steps (74) – (84). When Fem is merged afterwards, its presence allows for a matching of the tree with the *-a* ending. (90) visualizes Fem merged in syntax. The tree requires evacuation movement to achieve lexicalization.

(90)   When the derivation of *žáb-a* ('frog.Fem') deviates from the derivation of *žab-ák* ('frog.Masc') – Merging the Fem feature
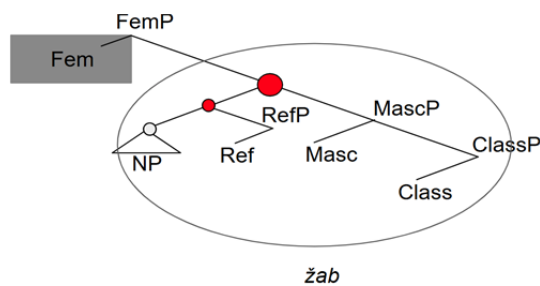
At that moment, the typical rescue operations (CLN-RC evacuation in (91) – the white node – pied-piping in (92) – the red node – try to save the derivation, yet they do not produce viable results.

(91)   CLN-RC evacuation of NP
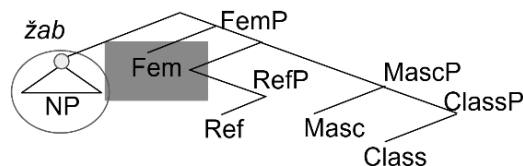
(92)   Pied-piping of a higher node
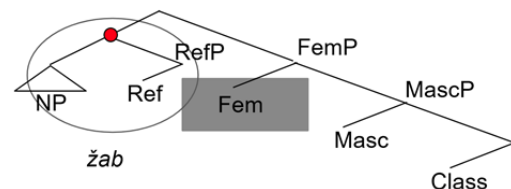
Finally, when an even higher node is pied-piped in (93), the tree finds a match amongst the LIs, and lexicalization is successfully reached.

(93)   *Žab-a* is lexicalized
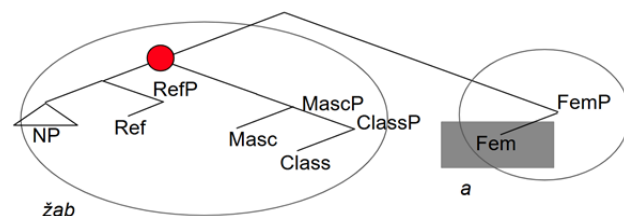
This concludes the step-by-step derivations of *žáb-a* ('frog.F') and *žab-ák* ('frog.M'). They work because the LIs of *žab* and *-ák* were designed to contain Complex Left Branches (CLBs). CLBs are a tool of syntactic geometry to increase the usefulness of LIs without postulating new rules for syntactic derivation. They follow from the logic of the algorithm and its evacuation movements.

5. Conclusion and discussion

This study has demonstrated how nanosyntax can be applied to the morphology of Czech nouns, specifically in modeling gender alternations through the interaction of stems and suffixes, including cases where multiple suffixes appear in sequence. By utilizing the functional sequence (fseq), matching, and the lexicalization algorithm, the analysis accounts for patterns such as *učitel → učitel-k-a* and *žáb-a → žab-ák* without appealing to lexical defaults or semantic-pragmatic labels.

This study illustrated it on Czech, but nanosyntax can systematically model gender morphology across languages. The framework naturally extends to defining structural patterns and variations, offering a precise approach to lexicalization within syntax. Future research could apply this model to further languages, to languages with more or fewer genders, particularly those with systematic gender alternations or derivational processes tied to gender, even when on the surface there do not seem to be strong patterns. By tracing the step-by-step operation of the algorithm, this analysis clarifies the role of nanosyntax in deriving complex morphological patterns.

Finally, the analysis of multifunctional endings in Czech (here applied on *-k* and hinted at for *-a*) shows that nanosyntax can capture morphological variability without extra rules. Russian exhibits comparable reuse of exponents: *-ka* can form both feminines (*student →student-ka*) and diminutives (*kniga → knizh-ka*). Likewise, *-a* is a common feminine ending but some masculines end in *-a*, as well (*dyady-a* 'uncle.M', *yunosh-a* 'youth.M') – parallel to Czech *hrdin-a*. Romanian similarly reuses the same vowel endings across gender/number: *-u* realizes both M.Sg and N.Sg, *-a* realizes F.Sg, and *-e* realizes both N.Pl and F.Pl (e.g., *le-u* 'lion.M.Sg', *teatr-u* 'theater.N.Sg', *teatr-e* 'theater.N.Pl', *fete* 'girl.F.Pl'). This suggests that the Czech patterns described here are not isolated and the nanosyntactic analysis would be warranted.

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Some Partial Considerations on Partial Control Instances in Romanian

Maria Aurelia Cotfas
University of Bucharest, Romania

Abstract

The paper looks at the possibility of Partial Control (henceforth, PC) instances in Romanian, a language which uses finite (subjunctive) complements in typical control contexts and where PC has therefore been deemed impossible. We show that PC effects can indeed be manifested in Romanian under *a putea* 'can', which we analyze as a neutral circumstantial modal in these contexts. We show, following Matsuda (2021), that these PC instances are sensitive to indexicality (viz., the current speech situation) and represent an interplay of (inclusion of) [+Speaker], [+Addressee] or both. We therefore identify three typical PC instances: a) 1st singular antecedent + 1st plural embedded reference (inclusion of current speaker); b) 2nd singular antecedent + 2nd plural embedded subject (inclusion of Addressee) and c) 2nd singular antecedent + 1st plural embedded subject (inclusion of both). This shows that in spite of the raising behaviour of most O(bligatory)C(ontrol)/E(xaustive) C(ontrol) verbs in Romanian (cf. Alboiu 2007, Cotfas 2012), there are contexts for which a control analysis needs to be maintained, and, more broadly, that PRO is to be maintained as an empty category and cannot be reduced to raising/movement.

Keywords: Romanian; finite control; partial control; infinitive complement; subjunctive complement; indexicality; associative semantics

1. Introduction

The present paper aims to consider apparent Partial Control instances in Romanian with the ability verb *a putea* 'can'. Such instances are quite intriguing and interesting to look at from (at least) two perspectives. Firstly, Romanian is a 'finite control' language (cf. Landau 2004 and seq.) – or a raising language, lacking proper control instances (cf. Alboiu 2007, Cotfas 2012)[1], so PC is theoretically unlikely. Secondly, even allowing for PC effects, the trigger is

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[1] Alboiu (2007) has argued earlier for a control-as-raising analysis, whereby the shared subject (first merged with the lower predicate) enters backward Agree with the matrix predicate – when C_{Low} subjunctives are at stake. For more details on her control-as-raising analysis, as well as the differences between what she calls Clow and Chigh subjunctives, we refer the reader to her work. Cotfas (2012) shows that typical OC triggers

unexpected, since modal verbs are non-attitudinal predicates which, according to the theory one chooses to adopt, either instantiate Exhaustive Control (cf. Landau 2000) or raising (Wurmbrand 2000, a.o.), but definitely not PC. Our aims are therefore to challenge these claims and to look at PC instances in Romanian, showing that they *are* allowed – albeit in limited circumstances. We propose to narrow down the exact constraints regulating these PC instances and show, following Matsuda (2021), that they are linked to indexicality.

The paper is structured as follows: in *Section 2*, we set the stage and discuss briefly what Partial Control is all about. We then move on, in *Section 3*, to look at finite control languages and discuss the possibility of PC in these languages. *Section 4* takes a closer look at the Romanian data with the modal *a putea* 'can', addressing issues concerning its selectional restrictions, the exact type of modality involved in PC constructions and attempting to delimit the (person and number) constraints on PC effects. *Section 5* draws the conclusions.

2. What is Partial Control?

Landau (2000) is the first to have discussed Partial Control (mainly for English), as a phenomenon whereby a syntactically singular subject (*John* in (1b)) functions as the controller of the (semantically) plural embedded PRO, when the infinitival clause contains a collective verb. The proof that PRO is (semantically) plural comes from independent clauses, where collective predicates (*gather, convene, meet, separate, break up*, etc.) require (at least) a semantically plural subject (1a).

(1)   a. Trump and Elon/The committee/*John *convened/met/gathered* at 6.
           b. John$_i$ *wanted/was hoping/promised* [PRO$_{i+}$ to *convene/meet* at 6].

PC effects are instantiated with matrix 'attitude' verbs, i.e., predicates reporting on the mental state or a communicative act of some individual (Pearson 2016). As such, PC refers to a control .controlee (PRO), which need not be identical to its controller, but merely include its reference. PC has been observed and analyzed in a number of (unrelated) languages (e.g. Russian, European Portuguese, Icelandic, German, French and Italian), where PC verbs take infinitival complements.

Ever since Landau (2000, 2004, 2013, 2015 & seq.), the literature on control has made a distinction within the O(bligatory) C(ontrol) class between PC (Partial Control) predicates and EC (Exhaustive Control) predicates. The two types of OC differ along two dimensions: a) the type of relation between PRO and its antecedent and b) the temporal reference of the embedded (non-finite) clause.

With respect to the first, EC predicates are non-attitudinal obligatory control predicates (implicative 'manage', modals, aspectuals) where PRO must match the reference of its

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such as (subject and object) implicatives (i.e., *a reuşi* 'manage', *a încerca* 'try'; *a obliga/forţa* 'oblige/force', *a încuraja* 'encourage', *a convinge* 'convince/persuade', etc.) can actually preclude control readings (i.e., allow disjoint embedded subjects), arguing for a tri-partite classification of Romanian subjunctives into Free (with desiderative verbs), Restricted (with subject and object implicatives) and Anaphoric subjunctives (with aspectual and modal predicates), which she argues are largely amenable to a (clasical) raising analysis.

controller entirely (i.e., PRO ≡ controller), so no collective predicates are allowed (2a). Conversely, PC predicates (desideratives, factives, interrogatives and epistemics) are attitudinal predicates which allow both EC readings, but also allow a superset-subset relation between PRO and its controller (PRO ⊆ controller), thereby allowing collective predicates in the complement clause (as in (1b) & (2b)).

(2)   a. John$_i$ *managed* [PRO$_i$ to write a poem] /*[PRO$_{i+}$ to <u>meet</u> at 6.]
         b. John$_i$ *hoped* [PRO$_i$ to write a poem.] /[PRO$_{i+}$ to <u>gather</u> at 5.]

Regarding the second difference, EC predicates impose strict temporal restrictions on the infinitival tense, disallowing any temporal mismatch ([-T]) (3a), whereas PC predicates allow independent temporal reference in their non-finite complement ([+T]).

(3)   a. *Yesterday*, Mary managed$_{+past}$ [PRO to arrive *tomorrow*.]
         b. *Yesterday*, Mary hoped$_{+past}$ [PRO to arrive *tomorrow*.]

Summing up, EC represents direct control of PRO by an antecedent in the main clause, due to the [-T], [-Agr] specification of the embedded infinitival, while PC are instances of control of PRO via the C head of the embedded clause, which is specified as [+T], [-Agr]. In English (and languages where these predicates select infinitive complements), the embedded clause is [-Agr] by virtue of its non-finiteness, which leaves the tense specification (the [+/-T] feature] as the key factor distinguishing EC from PC.

3. (Partial) Control in finite control languages

3.1. *What are finite control languages?*

Cotfas (2012) makes a distinction between 'infinitive' and 'subjunctive' languages. The former (English, German, Romance, etc.) select infinitive complements ([**-Agr**; +/- T]) in EC and PC contexts (4a), while the latter (languages belonging to the 'Balkan Sprachbund', Romanian included, as Balkan or East Romance) select subjunctives (with EC), sometimes even the indicative with some PC verbs ([**+Agr**; +/- T]) – due to diachronic (partial or total) loss of infinitives in object position (cf. Joseph 1983, Jordan 2009) – see (4b).

(4)   a. John managed/hoped [**to** write a novel.]

         b. Ion   a reușit/speră   [**să** scri**e**   un   roman.]
            Ion   managed/hopes   **sbj** write.**sbj-3sg** a   novel[2]

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[2]   Here is a list of the abbreviations used in the paper:
      Acc – Accusative case; [+Agr] – agreement; C-subjunctive = Controlled Subjunctive; Dat – Dative; DD – Direct Discourse; EC – Exhaustive Control; F-subjunctive = Free-subjunctive; ID – Indirect Discourse; Inf –infinitive; NC – No Control; NOC – Non-Obligatory Control; OC – Obligatory Control; PC – Partial Control; PE – preposition, pl – plural; sbj – the subjunctive particle *să* (or subjunctive inflection); sg – singular; refl –reflexive or the pronominal form *se* used with collective predicates, as in *a se întâlni* 'to meet'; *a se aduna* 'to gather/convene'.

Addressing the issue of finite control, Landau (2004) distinguishes between two types of Balkan subjunctives: Controlled (C) and Free (F). C-Subjunctives are selected by EC predicates and exhibit temporal anaphoricity and a complete match between PRO and its antecedent (so no PC allowed). F-subjunctives are instantiated with some PC verbs (mostly volitionals/desideratives), they exhibit temporal independence, and a *pro* type of subject, thereby they are able to obviate OC readings.

(5) a. Ieri,   Maria   a reuşit/   a început   să   scrie   *Ana   *mâine.
         yesterday   Maria   managed/   began   sbj   write-3sg   Ana   tomorrow

     b. Ieri,   Maria   spera   să   scrie   (sora ei)   (mâine)   o   scrisoare.
         yesterday   Maria   hoped   sbj   write-3sg   (her sister)   (tomorrow)   a   letter

Later on, Cotfas (2012) challenged this classification and argued instead for a tri-partite classification into Anaphoric vs Restricted vs Free Subjunctives. Of these, the author shows that only Anaphoric Subjunctives (selected by aspectual and modal verbs) display EC properties, but these lend themselves to a raising analysis (see also fn. 1). Landau (2013, 2015 & seq.) revisits his earlier claims and argues that the more traditional C- vs F-Subjunctives distinction can more accurately be expressed as a dichotomy between obligatory/exhaustive control (with EC verbs) and No Control (NC), i.e., instances where OC is not at stake.

Regardless of the approach one adopts, PC is deemed impossible in finite control languages first and foremost because of the [+Agr] specification of Balkan subjunctives. Moreover, since PC predicates select F-subjunctives (N(O)C), apparent instances of PC can always be cases of accidental (partial) co-reference between the main and the embedded subject, see (6).

(6) (Irina$_i$ a sosit în ţară şi)   Maria$_j$ speră [să se   întâlnească pro$_{i+j/j+k/j+(i)+k}$] (cu fratele$_k$ ei).
     (Irina arrived from abroad and)   Maria   hopes sbj se.refl-3sg   meet-3sg   (with her brother)
     'Irina$_i$ has arrived from abroad and Maria$_j$ hopes [PRO$_{j(+i)}$ to meet] /[her$_i$ to meet] her$_{i/j/(k)}$ brother.'

PC has been considered impossible in Romanian (Alboiu 2007, Cotfas 2012, Alexiadou et al. 2010, a.o), cf (7), from Alboiu (2007: 10), featuring *împreună* 'together' in the complement, which can also instantiate PC effects, on a par with collective predicates.

(7) a. *Eu vreau   [să   plec   *împreună.*]
         want-1sg   sbj   leave-1sg   together

     b. *Vreau   [să   plecăm   eu   *împreună.*]
         want-1sg   sbj   leave-1pl   I   together

There are, of course, independent explanations for why the examples under (7) are ungrammatical. In (7a), the collective *together* is incompatible with the 1st pers. singular marking on the embedded verb; in (7b), likewise, the singular pronominal subject ('I') is incompatible with the plural marking on the embedded predicate. The problem therefore seems to come down to the fact that subjunctives are always [+Agr], hence there is morphological mismatch between the singular controller and a plural-marked embedded (albeit covert) subject.

3.2. PC instances in unexpected circumstances

In spite of the evidence above, it has been recently shown that a finite control language like Greek may sometimes display PC with the modal *mporo* 'can', which typically selects a C-subjunctive.

(8)   Mporusa   na   sinandithume   tin   alli   Triti   (slightly adapted from Sevdali & Sheehan 2021: 330)
        could-**1sg**   sbj   meet-**1pl**   the   other   Tuesday

The authors claim that the same can happen in Romanian, in limited circumstances, i.e., with a 1sg or 3sg subject controlling a 1pl verb form (see Section 4.3 below for refinements regarding PC instances in Romanian).

(9)   a. Pot   să   ne   căsătorim   doar   la anul   [..]   (Sevdali & Sheehan 2021: 334)
           can-**1sg**   sbj   us-**1pl**   marry-**1pl**   only   at (next) year

        b. Ea   poate   să   ne   căsătorim   doar   la anul
           she   can-**3sg**   sbj   us-**1pl**   marry-**1pl**   only   at (next) year

PC is unexpected in such environments, since we are dealing with a typical non-attitude EC matrix predicate which selects anaphoric subjunctives (i.e., with no temporal or subject reference mismatch, as shown in (5) above). Such evidence therefore seems to weaken the link between PC, attitudinal triggers and temporal independence in the complement clause.

The proof that we are in the presence of true (Partial) Control comes first and foremost from the fact that – in spite of the possibility of superset-subset relations (see (8) and (9) above) – (totally) disjoint subjects are disallowed, as can be seen in (10) and (11).

(10)   *poro   na   fas   (Sevdali & Sheehan 2021: 330)
        can-**1sg**   sbj   eat-**2sg**

(11)   a. *Pot   să   mănânci
           can-**1sg**   sbj   eat-**2sg**

        b. *Poți   să   mănânc(e).
           can-**2sg**   sbj   eat-**sbj.1sg/3sg**

Moreover, raising cannot be at stake, due to the obvious disjoint morphological marking (1**sg** > 1**pl**), which precludes the type of raising analyses that can be argued for in some English infinitives. (e.g., subject-to-subject raising constructions with matrix unaccusatives like 'seem' and even with modals, cf. Wurmbrand 2000)

Another line of analysis would be to see whether the PC examples in (8) and (9) involve a covert comitative in the complement, along the lines proposed by Poole (2015: 15) for apparent instances of PC with 'meet' under 'can' in English. The author actually analyzes instances such as (12a) as raising, featuring the schema in (12b), and argues that the PC reading derives from the fact that the collective predicate 'meet' allows for a covert comitative (i.e., meet *with*), which thus gives us the superset reading.[3]

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3   While this analysis may work for 'meet', it does not with other collective predicates like 'gather' or 'convene', which do not allow such comitatives, cf. *John convened/gathered/assembled with his sister*. The type of

(12)   a. John can <u>meet</u> tomorrow.
        b. XP₁ can [t₁ meet <u>*(with y)*</u>]

While the covert comitative analysis might work for English, let us not forget that Romanian (and Greek) use finite complements (subjunctives), so in typical PC instances (subset>superset), the embedded predicate is morphologically marked as plural, such that the plural reading is due to morphology rather than a covert comitative.[4]

(13)   Aș putea   să   ne   vedem/întâlnim   mâine.
        could-**1sg**   sbj   us-**1pl**   see/meet-**1pl**   tomorrow
        'I could meet tomorrow.' (lit. 'I could that we meet/see each other tomorrow.')

4. Partial Control instances in Romanian

4.1. *A brief look at selectional and semantic properties*

Before we look at PC instances, let us have a brief look at the semantic and syntactic behaviour of *a putea* 'can'. As a 'subjunctive language', Romanian has limited usage of infinitive complements, but one environment where the infinitive freely alternates with the subjunctive is with *a putea* (see (14)). The (bare) infinitives, present in (15a, a'), involve restructuring (clitic climbing of the direct object feminine pronoun *o* 'her-Acc' in (15a) and long passive (15a')), unlike the subjunctive in (15b), which disallows clitic climbing.

(14)   Maria   poate   **veni**   la   cină   / **să**   **vină**   la   cină.
        Maria   can-3sg   come-**Inf**   to   dinner   / **sbj**   come-**sbj**.3sg   to   dinner
        'Mary can come to dinner.'

(15)   a. Maria   **o**   poate   suna   (pe Ana).   / a'.   Ana   poate   **fi**   sunată.
           Maria   her-Acc   can-3sg   call-**Inf**   (PE-Acc Ana)   Ana   can-3sg   be-Inf   called-fem.sg

        b. *Maria   **o**   poate   să   sune   (pe Ana)
           Maria   her-Acc   can-3sg   **sbj**   call-sbj.3sg   (PE Ana)

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collective predicate used in the complement is another variable for PC, for there are languages where it seems that only reciprocals allow such effects. But looking at such restrictions from within is not the purpose of the present article.

[4]   Collective predicates in Romanian allow the comitative alternation, but the comitative phrase is *obligatory* (both in simple clauses and in control environments)

(i)   a. Eu și   Maria   ne   -am întâlnit   ieri.
          I and   Maria   us-1pl   meet-1pl   yesterday

       b. Eu   m   -am întâlnit   ieri   *(cu Maria)
          I   me-**1sg**   met-**1sg**   yesterday   with Maria

(ii)   a. Vreau/Aș putea   să   mă   întâlnesc   mâine   *(cu ea).
          want / could-**1sg**   sbj   me-1sg   meet-1sg   tomorrow   with her

       b. Vrei/Ai putea   să   te   întâlnești   mâine   *(cu mine/ea)?
          want/could-**2sg**   sbj   you-2sg   meet-**2sg**   tomorrow   with me/her

Whether can + subjunctive instantiates Control or Raising arguably depends on the type of modality at stake. Following Wurmbrand (2000), who convincingly argues that (epistemic and deontic) modals display raising (vs control) behaviour, we take *a putea* in both (16a) and (16b) to behave as raising predicates (note that either the higher or the lower copy of the shared subject can be lexicalized). In both examples, the modal takes scope over the subjects ('the boy' or 'the cake'), as expected with raising verbs.[5] With root possibility (i.e., Subject-oriented ability), an Exhaustive Control analysis seems more plausible, since there are (thematic) restrictions on the type of matrix subject ([+person], alongside temporal anaphoricity and obligatory co-referent subjects in the complement in (17).

(16) a. (Băiatul) poate   să   fie   bolnav (băiatul). / Tortul   poate   să   fie   stricat (tortul).
         boy-the can.3sg sbj be-3sg sick   (boy-the) / cake-the can.3sg sbj be-3sg off   (cake-the)
         'The boy may be sick.' / 'The cake may be/have gone off.'

      b. (Tortul)   poate   să   fie   de ciocolată (tortul).   *(Maria nu se va supăra)*
         cake-the can-3sg sbj   be-3sg of chocolate (cake-the)
         'The cake can/may be chocolate cake.'   *(Mary won't mind)*

(17) Ion / Băiatul / *Tortul   poate   să   rezolve   ecuaţii de gradul2.
      Ion / boy-the / cake-the can-3sg sbj solve-3sg 2nd degree equations.
      'Ion/The boy/ *The cake can solve 2nd degree equations.'

The possibility of PC effects reinforces the Control analysis. Importantly, PC interpretations are impossible with (restructuring) infinitives; they can only occur with subjunctives containing plural-marked collective predicates (which in Romanian feature the *se* clitic, i.e., *a se întâlni* 'meet', *a se aduna* 'gather/convene', *a se vedea* 'see (each other)', *a se căsători* 'marry', etc.). Moreover, as suggested by one reviewer, these PC subjunctives also allow for a full-fledged CP, with an articulated left-periphery where the specific subjunctive complementizer *ca* is lexicalized with topicalized material, see (18), which is a modified version of (9) above.

(18) Ea   ar putea   **ca**   *abia la anul*   să   ne   căsătorim.
      she could-**3sg** that-sbj only (next) year sbj us-**1pl** marry-**1pl**

4.2. The type of modality in PC instances in Romanian

Having briefly discussed in 4.1 above the type of modality involved with *a putea* 'can', one question to address with respect to instances such as (9) and (13) above is whether the modality involved is truly that of ability – as in (17), which is what Sevdali & Sheehan (2020) seem to claim for the Greek *mporo*. However, rather than being purely abilitative (mental or physical), *a putea* 'can' in (9), (13) and (18) above does not focus on internal/intrinsic abilities of the main clause subject, but on external circumstances affecting the Main Clause subject

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[5]   For (16a), the paraphrase would be: "In view of the available body of evidence, there is a possibility that the boy is sick/is at home". For (16b), "In view of the (contextually-established) norms/requirements, it is allowed/permitted for the cake to be (made of) chocolate".

(which can be the speaker or otherwise). These 'circumstances', as they stand at the relevant Reference Time, might facilitate the embedded event for (at least) the (referent of) the main clause Subject.

It is therefore our intuition that what we are dealing with here in terms of modal semantics is the 'neutral/circumstantial use' of 'can', in the sense of Palmer (1990), who claims that 'neutral (or circumstantial) possibility' simply indicates 'the circumstances in which an event is possible' (Palmer 1990: 83)[6]. We thus argue for a circumstantial modal base (= what the state of the world is at a certain Reference Time (and conceivable ways in which it might evolve), seconded by a 'stereotypical' ordering source' illustrating 'the normal/expected course of events').

Unlike dynamic *a putea* 'can' in (17), circumstantial *a putea* 'can' in PC constructions does not seem to impose strict temporal anaphoricity either (next to also relaxing the embedded subject reference for an inclusion relation), allowing disjoint (future-oriented) adverbs, as shown in (19):

(19) [La cum arată programul meu **acum**], aș putea să ne vedem **săptămâna viitoare**.
      [judging by my schedule **right now**], could-**1sg** sbj us-**1pl** meet-**1pl** **week next.**
      ' … I$_i$ could meet$_{i+j}$ next week.'

4.3. *Delimiting the exact constraints on PC instances in Romanian*

The claim that we would like to put forth is that PC instances in Romanian seem to be sensitive to the current speech act event, since they seem to be allowed as long as embedded PRO includes the Speaker or the Addressee (or both).

The three PC patterns we identify in Romanian are the following (the first notation refers to the main clause subject specification, the second to the embedded one):

I. 1SG > 1PL → **(Eu > Noi // I > We),** where PROwe   = Speaker + Addresee / Speaker + others
                                              (- Addressee) / Speaker + Addressee +Others[7]

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[6] Note also, from this perspective, the quite frequent use of the conditional on *a putea* in many naturally-occurring examples featuring PC effects (see the examples quoted in fn.7-9 below).

[7] Here are more naturally-occurring examples:
   (i) […] [o sa fiu varza cu timpul si nu stiu cat de mult] **as putea să ne vedem /could-1sg sbj see-1pl**
                https://beforeandafterbrides.wordpress.com/2010/07/23/23-iulie-2010-cafeaua-de-vineri/
   (ii) […] [am curs de dans [joi]]. **As putea sa ne vedem** vineri sau duminica/ **could-1sg sbj see-1pl**
                https://tainacasatoriei.wordpress.com/2014/12/06/
   (iii) Dacă aveți nevoie, **aș putea să ne întâlnim în holul hotelului dvs.** dacă …. / **could-1sg sbj see-1pl**
                https://www.getyourguide.com/ro-ro/bari-l721/bari-tur-de-la-port-la-orasul-vechi-plimbare-si-
   (iv) […] i-am spus că **nu pot să ne vedem** pentru că am musafiri / **can-1sg sbj see each other-1pl**
                https://www.tpu.ro/dragoste-si-sex/heii-am-din-nou-o-intrebare-astazi-fratele-fostului-meu-iubit-
   A reviewer mentiones that examples (iii) and (iv) sound odd. Be that as it may, they are naturally occuring examples found online (see the sources).
   (v) se supara dacă aude ca **nu pot sa ne vedem** […] / **can-1sg sbj see each other-1pl**
                https://www.tpu.ro/dragoste-si-sex/buna-am-20-de-ani-si-sunt-cu-prietenul-meu-de-3-ani-insa-

(20) a. [Zilele astea am un program cam haotic și] nu prea pot să ne întâlnim
[these days I have a hectic schedule and] not really can.**1sg** sbj us-**1pl** meet-**1pl**
(https://www.reno.ro/Led-It-Up-Atelierul-de-LED-uri-auto-t306625.html)

II. 2SG > 2PL → (Tu > Voi // YouSG > YouPL), where PROyou = Addressee + others (- Speaker)[8]

b. […] **ai putea să vă întâlniți** la cină […]
could.**2sg** sbj you.**2pl** meet.**2pl** for dinner
(https://jurnalul.ro/amp/horoscop-saptamanal-26-februarie-3-martie-2024-957432.html)

III. 2SG > 1PL → (Tu > noi // You > We), where PRO$_{We}$ = Addressee + Speaker (+ others)[9]

c. Dacă **poti să ne întâlnim** în urmatoarele zile, [astept un răspuns]
if can.**2sg** sbj us-**1pl** meet-**1pl** in the next days [I'm waiting for an answer]
(https://diacritica.wordpress.com/2010/07/11/intrebari-si-raspunsuri/)

We draw on Matsuda (2021), who looks at PC in Japanese and contends that PC (and Split Control) derive not so much from the constraints imposed by the selecting predicate, but from the internal properties of PRO (though the semantics of the matrix predicate may still play a role). Drawing on Vassilieva (2005), who discusses associative plurals in various languages, Matsuda (2021) shows that PRO shares the same associative semantics as 1st and 2nd person pronouns: they both have *de se* readings and must be [+human]. More precisely, *we* in English does not necessarily signal a plurality of speakers, but it refers to the Speaker (*I*) + other individuals.

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[8] Here are more naturally-occurring examples. Quite interestingly, some of them do not even involve collective predicates in the complement, even though it is worth mentioning that such instances (see (i) & (ii)) are 'saved' or 'legitimated' by collective secondary predicates such as *împreună* 'together' or *amândoi* 'both':
(i) […] **ai putea să** *mergeţi* cu mașina în țară **sau** pur și simplu **să petreceţi timp** *împreună*
could-2sg sbj drive-**2pl** through the country or simply spend-**2pl** time together
https://jurnalul.ro/amp/horoscop-zilnic-5-iunie-2024-966662.html
(ii) […] **ai putea sa** *mergeti* un weekend undeva frumos ***amândoi*** […]
could-2sg sbj go-**2pl** away for the weekend somewhere nice just the two of you
https://www.tpu.ro/adolescenti/buna-tpu-peste-ceva-vreme-iubita-mea-o-sa-faca-18-ani-
(iii) **ai putea să vă întâlniți la cină și să ajungeţi să vorbiți** toată noaptea / **could-2sg sbj meet-2pl/talk-2pl**
https://jurnalul.ro/amp/horoscop-saptamanal-26-februarie-3-martie-2024-957432.html
(iv) **ai putea sa va întâlniti cu alţi părinţi** care au copii de varsta lui …/ **could-2sg sbj meet-2pl**
https://ghindoc.ro/acomodare-copil-gradinita/

[9] Here are more naturally-occurring examples:
(i) Dacă **poţi să ne întâlnim** in urmatoarele zile, astept un raspuns / **can-2sg sbj meet-1pl**
https://diacritica.wordpress.com/2010/07/11/intrebari-si-raspunsuri/
(ii) Dacă poţi săptămâna viitoare luni, **ai putea să ne întâlnim de la 7 sau 8 seara? / can-2sg sbj meet-1pl**
http://koala.cs.pub.ro/pipermail/bit-projects/2014-May/000020.html
(iii) Mihai, ce zici, **miercuri ai putea sa ne intalnim** la un suc? / **could-2sg sbj meet-1pl**
https://www.subarufanclub.ro/forum/index.php?topic=1880.40
(iv) Dacă ești din Iași, **ai putea sa ne vedem?** […] / **could-2sg sbj see each other-1pl**
https://www.mygarage.ro/jurnal-de-bord/525568-peugeot-508-rxh-4.html
(v) vin la Londra, **dacă ai putea să ne vedem**, aș vrea să-ți propun.. / **could-2sg sbj see each other-1pl**
https://www.andreearosca.ro/razvan-rusu-reteta-de-zacusca-de-100-000-de-euro-si-cum

There are two types of *we*: inclusive *we* (Speaker + Addressee + others) and exclusive *we* (Speaker + others, excluding the Addressee). Regardless of which type is at stake, this 'inclusion of others' presupposed in the meaning of the 1st person plural pronominal guarantees its associative semantics. PC PRO behaves in a similar way: just as *I* (= Speaker) is a subset of *we*, the controller (antecedent) in a control construction is a subset of PRO.

(21)   a. We are leaving   (*we* = I (+you) + others)
         b. I want/John wants [PRO to meet]   (PRO = I/John (+you)+ others)

Matsuda's analysis argues therefore for more independence for PRO, which is to say that control readings do not depend only on selectional restrictions from outside, but also on the associative semantics of PRO itself.

Let us first briefly look at Matsuda's (2021) claims for Japanese and then see how these can be adapted for the Romanian data (via English). The author discusses the phenomenon of force embedding in Japanese, whereby specific suffixes (optative, intentive, promissive, imperative, exhortative) are used on the embedded verbs selected by matrix attitude predicates (CP-level indexical agreement). We do not quote the exact examples here, for lack of space, but we give the relevant schema in (22), which should suffice for the argument at hand. The verbs on the left represent the matrix attitude verbs, and the notations to their right stand for the particular suffix which surfaces in the complement clause.[10] Note that the same predicate may be compatible with more force types (i.e., there is no bi-unique relation)

(22)   a. *Hope*   > OPT (optative suffix)
         b. *Decide* > INT (intentive)   →   these instantiate *Subject Control*
         c. *Order*   > IMP (imperative)   →   *Object Control*
         d. *Promise* > PRM (promissive)   →   *Subject Control*
         e. *Propose* > EXH (exhortative)   →   *Split Control*

While Matsuda's study focuses on Japanese, he does make some claims about English, arguing that force embedding also exists in languages where suffixes are not overtly lexicalized. Thus, the claim is that English PC complements also involve (non-declarative) force embedding, but covertly, triggered by virtue of the matrix control verbs. As such, the control constructions in (23a') and (23b') are the indirect discourse (ID) versions of the direct discourse (DD) structures in (23a, b).

(23)   a. 'You, leave!', Harry ordered Betty   (DD)
         a'. Harry$_i$ ordered Betty$_j$ [PRO$_j$ to leave.]   (ID)
         b. 'I will leave', Harry promised Betty   (DD)
         b' Harry$_i$ promised Betty$_j$ [PRO$_i$ to leave.]   (ID)   (Matsuda 2021: 152)

Covert force embedding is possible because the semantic features of [Speaker] ([S]) and [Addressee] ([A]) do not necessarily correspond to those of Speaker and Addressee of the Utterance context; they shift from root to embedded context. Whereas the values for the

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[10] The author shows that these complements are truly instances of embedding, in spite of the presence of these suffixes. For more details on the Japanese data, we prompt the readers to Matsuda's (2021) article.

subject in roots is anchored to Utterance/Speech Time ('you', addressee in (23a), 'I', Speaker in (23b)), the values for PRO are anchored to the reported speech event and the matrix attitude holder ('Betty' as the (shifted) addressee in (23a'), 'Harry' as the (shifted) Speaker in (23b')).

The notion of Speaker (as well as Addressee, for that matter) should therefore be taken to refer not merely to the actual Speaker of the speech event, but also, as a semantic feature, to the attitude holder of various mental states. Consequently, therefore, in English, PRO with a [S] or [A] feature does not fall under 1st or 2nd person, but 3rd (a 'shifted speaker'). In (23a'), a case of Object Control, the [A] feature on PRO is controlled by the 3rd person matrix direct object 'Betty', and in (23b'), a case of Subject Control, the [S] feature on PRO is co-referenced to the 3rd person matrix subject 'Harry'. All these features are specified as indexical features on a projection internal to PRO.

Under this view, the typology of Control structures in English would be the one in (24) below, broadly adapted on the basis of Matsuda's classification in (his) (35) (2021:149) and the author's examples (39) – (43) (Matsuda 2021:153).

(24) **Subject Control** > OPT (optative) force embedding (with *hope, want*)
  > INT (intentive) force embedding (with *decide*)
  > PRM (promissive) force embedding with *promise*)
  → **[+S] on PRO = MC Su (3rd person) (*shifted speaker*)**

  Object Control > IMP (imperative) force embedding (with *force, oblige, order*, etc.)
  → **[+A] on PRO = MC D.O. (3rd person) (*shifted addressee*)**

  Split Control > EXH (exhortative) force embedding (with *propose, suggest*)
  → **[+S], [+A] on PRO**

Bearing in mind the typology in (24) above, in PC instances (with matrix attitude predicates and embedded collective predicates), the [+S] specification on PRO does not indicate identical reference to the (actual or shifted speaker, *but mere inclusion*. Similarly, [- S] indicates exclusion of the (current or shifted) Speaker, [+A] indicates inclusion of the (actual or shifted) Addressee and [-A] indicates exclusion of the (actual or shifted) Addressee. In (25) below, both featuring PC, embedded PRO bears a [+S] feature which signals inclusion of either the actual Speaker (25a) or the shifted Speaker ('John').

(25) a. $I_{i(=actual\ S)}$ want [PRO_{i+} to break up.]
  b. $John_{i(=shifted\ S)}$ wants [PRO_{i+} to meet]

Let us now take a look at Romanian. Romanian seems to be an in-between case. On the one hand, it differs from both Japanese and English in that PC instances are not manifested with attitude predicates, as expected, but with a modal, which is a typical EC verb. On the other, like English, but unlike Japanese, there are no overt force embedding suffixes in the subjunctive complement. However, these instances show clear sensitivity to indexicality (that is, the actual conversational situation). As the examples below show ((26a-c)), these PC instances in Romanian involve an interplay between the [+S] and [+A] specification on embedded PRO.

The three patterns we have identified above may be equated to Matsuda's typology as follows:

I.   1SG > 1PL → PRM (promissive or INTentive)

(26)   a. Aș putea   [PRO$_{+currentS}$ să   ne   vedem   abia   pe   14.]
           could-**1sg**   sbj   us-**1pl** see-**1pl** only   on   14
           'I could meet on the 14th (not before).'

II.   2SG > 2PL → IMP (imperative)

       b. Poți/Ai putea   [PRO$_{+ current A}$ să   vă   întâlniți   mâine(./!/?)
           can/could-**2sg**   sbj   you-**2pl** meet-**2pl** tomorrow
           'Could you$_{sg}$ meet tomorrow?'

III.   2SG > 1PL → EXH (exhortative)

       c. Poți   (sau nu) [PRO$_{+ current S \& A}$ să   ne   vedem/adunăm   în   weekend   la   mine?
           can-**2sg** (or not)   sbj   us-**1pl** see/gather-**1pl** at   weekend   at   mine
           'Can you meet up at my place at the weekend?'

As also noted by Matsuda (2021) (for English and Japanese), in Romanian, too, these patterns nicely correlate with Portner's (2004) 'To-Do List' proposed for the correlation between various (root) forces and subject reference (see also Zanuttini et al. 2012). The pattern in (26a) (1sg>1pl) resembles a promissive force, which is about adding a property to the To Do List of the Speaker (+ associates); the pattern in (26b) (2sg>2pl) resembles an imperative force, whose role is to add the property denoted by the predicate to the To Do List of the Addressee (+ associates); the pattern in (26c) (2sg>1pl) is reminiscent of an exhortative, whose purpose is to add a property to the To Do List of both Speaker and Addressee (+ possible associates)

Even though a syntactic analysis of these constructions is not the immediate aim of this paper (we leave this for future research), the evidence discussed above could motivate a syntactic account of PRO along the lines proposed by Zanuttini et. al (2012) for Jussives, whose subjects are shown to correlate with imperative, promissive and exhortative forces. As such, PRO could reside in the Specifier position of a JussP between CP and TP and, as a minimal pronoun lacking person specification, receive its features under binding from the Juss° head ([+S] / [+A] / [+S, +A]).[11]

(27)   [CP C [PRO Juss° [TP T [vP …….]]]]

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[11] Juss comes in three varieties [1stpers/+S] / [2nd pers/+A] / [1st, 2ndpers /+S, +A], with a variety of C heads above (C$_{imperative}$, C$_{promissive}$, C$_{exhortative}$….) (cf Matsuda 2015a, b, 2017). Possible downsides of this account could be that there are too many varieties of Juss & C, as well as, as far as the minimal pronoun view (i.e., PRO devoid of person features), it is not clear why such a pronoun would be merged in the derivation before the merger of the Jussive head. We leave these issues for further investigation.

Before we conclude, let us briefly look at some examples involving non-deictic (3rd person) antecedents. Firstly, it is important to note that the **3sg > 3pl** pattern is not really relevant in Romanian, as subjunctive inflection for 3rd person is underspecified for number. That is, singular and plural subjunctive forms are identical, so there is no way of checking for embedded plurality morphologically. Moreover, as already shown above (see fn. 2), a comitative phrase is obligatory in such contexts.

(28) Maria nu poate să se întâlnească mâine *(cu Ana.)
      Maria not can-**3.sg** sbj refl-3sg/pl meet-**3sg/pl** tomorrow (with Ana)
      ??/*'Maria cannot meet tomorrow' / √ 'Maria cannot meet (with Ana) tomorrow.'

Taken in isolation, (28) is ungrammatical (without the comitative), though it could be coerced, given an appropriate context (but still, the PC reading may be accidental). That is, in (29), unlike (28), the collective predicate could work without the comitative phrase, as long as the wider context facilitates the identification of the *with*-PP (under the interpretation that 'Mary cannot meet with Ana'). Obviously, the context becomes perfectly grammatical in the presence of any comitative phrase, identifying either a discourse-salient DP or not.

(29) [Ana$_i$ i-a spus Mariei$_j$ [**că** nu poate *pro$_i$*
      Ana told Mary-Dat that not can-**3sg**
      [PRO$_{i+j(+...)}$ **să** se vadă mâine (cu ea$_j$ / cu Paul)]]
      sbj refl-3sg/pl see-sbj.3sg/pl tomorrow (with her / with Paul)
      'Ana$_i$ told Mary$_j$ that she$_i$ cannot meet tomorrow (with her$_j$/with Paul).'[12]

Other possible patterns involving 3rd person antecedents are the ones where the embedded verb is marked for either 1st person plural (**3Sg > 1Pl**)[13] or 2nd person plural (**3Sg > 2Pl**)[14]. In these cases, unlike the ones above, plurality is visibly (morphologically) marked in

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[12] The different notations for the empty subjects in (29), i.e, *pro* and PRO, are due to the fact that the first one (i.e., *pro*) is the empty subject of a finite (that/*că*) complement featuring 'can', selected by a verbum dicendi (*say*), so it can freely alternate with overt (disjoint) DP (here it retrieves *Ana* in the main clause), whereas the second one (PRO) is the null subject of a PC subjunctive selected by 'can', and is therefore able to retrieve both (necessarily) the matrix antecedent (i.e., the *pro* bound by Ana), as well as other relevant participants in the discourse situation (i.e., Mary, Paul, etc.) – as shown by the indices.

[13] Here are other naturally-occurring examples:
  (i) Mi-a spus ca **nu poate sa ne vedem**
      He told me that **cannot-3sg sbj us-1pl see-1pl**
                    https://www.gazetademaramures.ro/nu-i-poet-si-nu-l-inspira-catalin-chereches-1075
  (ii) […] voiam sa cumpar ceva, l-am sunat [….] *a zis* ca **nu poate sa ne vedem**
      I wanted to buy sth, I called him   **said-3sg that cannot-3sg sbj us-1pl see-1pl**
                    https://www.mygarage.ro/componente/214301-discutii-cele-mai-bune-oferte-ale-zilei-995.html
  (iii) Dupa ce […], **s-a dat lovit** **că** **nu poate sa ne vedem** decat sapt viitoare
      After ….   He just lay low and (said that) **cannot-3sg sbj us-1pl see-1pl** only next week
                    https://www.avocatnet.ro/forum/discutie_192859/Constatare-amiabila.html
[14] More naturally-occurring examples:
  (i) de fiecare dată găseşte un motiv pentru care **nu poate să vă vedeţi**
      Every time s/he finds a reason for which **cannot-3sg sbj you-2pl see-2pl**
                    https://www.fiibarbat.ro/cum-aduci-femeie-facebook-lumea-reala/

the complement clause. In the former, the Speaker feature is included on the embedded subject, in the latter, there is Addressee inclusion.

(30)   a.   Florin   nu   poate   să   ne   vedem   vineri   *(....așa mi-a zis ieri)*
            Florin   not   can-**3sg**   sbj   us-1pl   see-**1pl**   Friday   *(he told me so yesterday)*

       b.   Ioana   ar putea   să   vă   întâlniți   joi   *(.... m-a rugat să-ți spun)*
            Ioana   could-**3sg**   sbj   you-2pl   meet-**2pl**   Thursday   *(she asked me to tell you)*

As with the English examples in (23), (30a&b) represent Indirect Discourse (ID) variants of pattern I discussed above (1sg antecedent + 1pl embedded subject), with either inclusion or exclusion of the *current* speaker (i.e., the *I* of the current speech event). More specifically, the Direct Discourse (DD) variant of (30a) (Florin's actual words) is: *Nu pot să ne vedem vineri* 'I cannot meet$_{1pl}$ on Friday', such that the embedded 1pl/*we* here includes both the current speaker (*I*) and the shifted one (*Florin*), alongside possibly others (Addressee included or not). The DD variant of (30b) (Ioana's actual words) would be: *Spune-i Anei că aș putea să ne întâlnim joi* 'Tell Ana that I could meet$_{1pl}$ [her +] on Thursday', such that embedded 1pl/we here excludes the current Speaker (I), but includes the shifted one (Ioana) (alongside the Addressee and/or others). If anything, this interplay between current and shifted speaker features that we see in the Romanian data lends further support for Matsuda's (2021) claim that [+S] must include the speaker of *some* context (either root or shifted).

5. Conclusions

This paper has looked at Partial Control instances in Romanian, a language so far deemed to lack such interpretations. We have shown that PC effects obtain in unexpected contexts, i.e., with a matrix modal (*a putea* 'can'), a non-attitude predicate which selects untensed C-subjunctives. This seems to weaken the traditional link between PC and the type of matrix trigger (which is supposed to be attitudinal) – on the one hand, and, on the other, the correlation of PC to temporal independent embedded domains.

However, these issues needn't be problematic if we agree that in these particular contexts the modality of the trigger and the subsequent anaphoricity of the complement are not typical for OC/EC. We have argued for neutral circumstantial possibility (a la Portner 1990, 2004) (rather than dynamic ability), which seems to go hand in hand with what we might call an "appointment-like" semantics which further facilitates future temporal readings in the complement clause. Furthermore, following Matsuda (2021), the properties of PRO are (somewhat) independent from the matrix predicate and have more to do with the internal specifications on PRO and its inherent associative semantics, which it shares with 1st and 2nd person pronouns.

We have identified 3 possible PC patterns in Romanian, all sensitive to the [+S], [+A] features on the embedded subject: a) 1sg > 1pl (inclusion of current speaker, +/- Addressee,

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(ii) … nu răspunde la telefon, sau .. <u>*zice*</u>   că   **nu poate să vă vedeți**
   (s/he) doesn't answer the phone or says that **cannot-3sg sbj you-2pl see-2pl**
           https://www.reddit.com/r/CasualRO/comments/181egpa/help_sa_o_mai_primesc_inapoi/

+/- others); b) 2sg > 2pl (inclusion of Addressee, - Speaker, +/- others, and c) 2Sg > 1pl (inclusion of both Speaker and Addressee (+/- others). A preliminary inventory of corpora and speaker preferences seems to indicate that while the first and the last are quite unproblematic, the second is a bit more restricted– which may be indicative of the fact that the [+S] feature is stronger, when it comes to PC effects. Of course, further investigation is needed before a definite conclusion can be reached. What (we hope) can be concluded on the basis of all the above is that PC in Romanian is sensitive to the current speech event. Moreover, the availability of such instances in Romanian, a 'finite control' language, shows that a control analysis cannot be fully dismissed for subjunctive complements in control environments – even though typical control verbs have been shown either to obviate control (NC) or instantiate raising (cf. Alboiu 2007, Cotfas 2012). On a larger view, the availability of PC in Romanian brings further proof in favour of the existence of PRO as a null category and against the Movement Theory of Control (cf. Landau 2000, 2004, 2015, 2023).

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Teaching Language-Specific Preferences in the Native Language: An Interactive Web App for Prospective Teachers

Renate Delucchi Danhier[1] and Paula González Ávalos[2]
[1]TU Dortmund University, Germany; [2]appliedAI Institute for Europe, Germany

Abstract

Natural languages offer diverse means for conveying the same idea, with each language typically exhibiting a predominant way of selecting and packaging information, referred to as a language-specific preference. Cross-linguistic research on motion events has shown that native speakers tend to favor such patterns and intuitively recognize non-preferred lexicalizations, particularly in the domain of motion event description. Due to subtle differences in grammar and vocabulary, these preferences are language-specific.

Acquiring the language-specific preferences of a second or foreign language poses a challenge even for advanced learners, especially when these preferences diverge from those internalized in the native language. Language teachers, however, are often unaware of both the existence of such preferences and the difficulties they pose for learners. This study therefore aims (1) to enable prospective teachers to discover language-specific preferences through a bottom-up, data-driven approach, and (2) to raise awareness of the challenges involved in acquiring them.

Accordingly, the online application *LexiGraph* was developed to enable prospective German teachers to identify patterns in linguistic data. Using an interactive dataset, students explored the expression of motion events across languages and speaker groups. The app supports visual exploration and provides a threshold learning experience that fosters an engaging and intellectually challenging learning environment by encoding complex semantic and syntactic information.

Student feedback highlights the novelty of the technological approach, although some participants perceived the material as cognitively demanding. Developing an understanding of language-specific lexicalization patterns can support prospective teachers in working with language learners and contribute to more inclusive multilingual education.

Keywords: teacher training; motion event construal; web application; language awareness competence; digital humanities

1. Introduction

When talking about motion in space in any natural language, a specific situation can be expressed in various ways. However, the majority of speakers of a given language tend to encode the same information using recurring linguistic means, consistently selecting the same form–meaning constructions. This preference seems to arise because a particular way of packaging information aligns well with the grammar and lexicon of that language. Since grammatical and lexical systems differ across languages, so do optimal packaging strategies, giving rise to language-specific preferences in motion event construal.

Acquiring a language does not only involve learning its grammar and vocabulary, but also developing language-specific modes of thinking. The concept of *thinking-for-speaking* (Slobin 1991, 1996a) refers to the particular kind of thinking that takes place just before speaking, when speakers plan how to express information in a specific language. As Slobin (1996a: 89) notes, "each native language has trained its speakers to pay different kinds of attention to events and experiences when talking about them", depending on which features are grammaticalized in that language.

Learning the language-specific preferences of a target language that differ from those of one's native language constitutes a linguistic challenge even for advanced second-language users. Such L2 speakers often produce grammatically correct utterances but fail to conform to the preferred patterns of the target language. Instead, they frequently retain patterns from their first language, resulting in negative transfer (Alghamdi, Daller & Milton 2019; Antonijević & Berthaud 2009). These non-preferred constructions, while formally still grammatically correct, often sound peculiar to monolingual native speakers. Bilingual speakers may also produce utterances perceived as unusual by monolinguals, particularly in their non-dominant language. Because divergent preferences are not necessarily ungrammatical but merely less frequent, advanced learners rarely receive corrective feedback from teachers or other speakers.

In school contexts, bilingual pupils and advanced second-language learners would therefore benefit from teachers who understand language-specific preferences and can make them explicit through instruction. Unfortunately, most trained teachers remain unaware of the complexity of cross-linguistic differences in the domain of motion, leaving learners to navigate these subtleties largely on their own.

Although difficulties with motion verbs in second language acquisition have been documented for decades (e.g., Schlyter 1984; Schlyter & Viberg 1985), these insights have largely remained confined to research contexts and have rarely been integrated into teacher education or classroom practice. Schlyter's (1984) work on Swedish learners of French and Schlyter and Viberg's (1985) comparative study of French and Swedish show that learners struggle to acquire the lexical and semantic distinctions required to encode motion appropriately in an L2. Their findings point to typological and cross-linguistic influences that affect how motion is verbalized.

Our objective is therefore not to claim novelty in identifying this linguistic challenge, but to address its pedagogical invisibility. We aim to make prospective teachers aware of cross-linguistic differences in motion event construal, arguing that increased awareness of this

persistent learning barrier can enhance their ability to empathize with and support their future pupils.

Our pedagogical framework draws on the concept of *threshold learning* (Meyer & Land 2005; Land et al. 2010), which refers to transformative moments in which learners acquire new understandings that fundamentally change their way of thinking about a subject. Threshold concepts are often difficult to grasp and emotionally demanding, because they challenge prior assumptions and require a shift in perspective. Once internalized, however, they bring about irreversible cognitive and ontological change: learners not only acquire new knowledge, but also come to see the discipline differently. In language education, such concepts often involve recognizing hidden, language-specific constraints that native speakers apply unconsciously.

The *LexiGraph* application was designed to provoke precisely this kind of threshold learning experience. By confronting students with visually encoded data derived from authentic motion event descriptions, the interface initially appears complex and even disorienting. This deliberate challenge invites learners to explore the data, formulate hypotheses, and gradually uncover underlying linguistic patterns. The moment when the system's visual logic becomes transparent parallels the conceptual breakthrough central to threshold learning: implicit linguistic knowledge is transformed into explicit awareness of how languages differ in mapping meaning onto form. Moreover, the process of discovering hidden regularities in the corpus mirrors the inductive nature of first language acquisition. By engaging with this experience, prospective teachers (who completed their own language acquisition process long ago) are reminded of how demanding it is for learners to infer such subtleties from input alone, without explicit instruction.

2. Differences in the construal of motion events across languages

Research on motion events investigates how languages encode movement through grammatical and lexical means. In a motion event, an entity (the FIGURE) moves relative to a reference point (the GROUND), typically along a TRAJECTORY that begins at a SOURCE and ends at a GOAL. Cognitive linguistics models this structure using the Source–Path–Goal schema (Lakoff 1987), emphasizing the link between conceptualization and linguistic expression. Figure 1 illustrates how speakers select and organize information differently when describing the same situation.
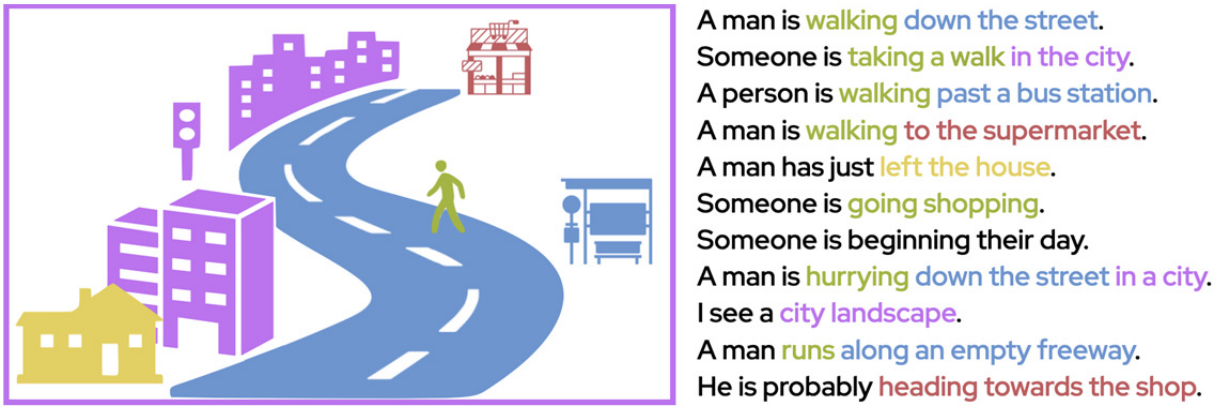
Figure 1: *Given the same situation, speakers have various options for selecting and organizing information for expression*

Consider the English sentence:

(1)   A man walks from his home across the street to the supermarket.
       FIGURE   GROUND   GROUND   GROUND
       A man   walks   from   his home   across   the street   to   the supermarket
               MANNER SOURCE   TRAJECTORY   GOAL

Here, *walk* encodes the MANNER of motion, while the prepositional phrases express the SOURCE, TRAJECTORY, and GOAL respectively. Languages differ in how they distribute semantic components between the verb and elements outside the verb, commonly referred to as satellites.

All examples of verbalization presented in Figure 1 capture the situation equally well; however, some sound more natural or less forced than others to native speakers of English. The sentences are ordered from top to bottom according to approximate frequency of use, ranging from most to least frequent, based on language production experiments (Stutterheim et al. 2012). To understand why some constructions sound less natural than others despite being grammatically correct, it is necessary to examine how lexis and grammar interact in the formation of complex constructions.

2.1. Lexicalization patterns

Languages vary systematically in how they integrate manner and path information into motion descriptions. Some languages favor verbs that encode manner (how something moves), while others rely primarily on verbs expressing path (direction or trajectory). German, like English, possesses a rich vocabulary of manner-of-motion verbs, such as *laufen, eilen, rennen, kriechen, schlendern, gleiten, stolzieren, stapfen, taumeln*, and *waten*, which parallel English *walk, dash, run, crawl, stroll, slide, strut, trudge, stagger*, and *wade*.

When speakers wish to convey several semantic components within a single sentence (as shown in Figure 1), only some of these can be encoded in the verb itself (often only one), while other information must be encoded elsewhere (outside the verb), for instance through prepositional phrases or adverbs. The systematic pairing of form and meaning used to express

complex information within a sentence, while respecting the lexical and grammatical constraints of a language, is called a *lexicalization pattern.*

Following Talmy's (2000) typology, German and English are classified as satellite-framed languages, meaning that the verb typically encodes manner, while path is expressed in an accompanying satellite such as a prepositional phrase or verb particle (*hinauslaufen, in das Haus gehen / run out, go into*). In contrast, verb-framed languages (e.g., Spanish and French) encode path in the verb (*entrar, salir*) and use additional elements for manner, if at all. English occupies an intermediate position: while it largely behaves as a satellite-framed language, it also contains path verbs of Romance origin (*enter, exit, ascend, descend*), which do not readily combine with satellites expressing manner (*?She entered the cave running*). German, lacking this Romance influence, relies more consistently on manner verbs combined with particles or prepositions (e.g., *Der Wolf läuft aus dem Wald hinaus*). Subsequent work has refined Talmy's binary typology to account for additional patterns observed cross-linguistically. Slobin (2004) and Chen and Guo (2009) proposed a third type, equipollently-framed languages, such as Chinese, in which both the verb and its accompanying element (often a directional complement) contribute equally to encoding manner and path (E-framing). Moreover, double-marking constructions (Bohnemeyer et al. 2007; Croft et al. 2010) describe cases in which both the verb and a satellite simultaneously encode path or direction (also referred to as double-framing). These refinements acknowledge that languages often combine multiple strategies rather than adhering strictly to a single framing type.

Cross-linguistic research has shown that such lexicalization patterns reflect language-specific preferences rather than absolute constraints (Slobin 2004; Croft et al. 2010). Both English and German employ multiple construction types; however, English tends to use satellite structures more freely and often focuses on manner, whereas German shows greater flexibility in encoding path through prefixes or compounds (e.g., *hinaus-, hinein-*). As a result, speakers of each language develop distinct intuitions about which combinations sound natural, even when several options are grammatically correct.

Interlanguage research provides further evidence for the persistence of L1-based lexicalization patterns in second-language learners. Hill (1992), analyzing the mental lexicon of Kenyan learners of English motion verbs, found that learners tended to group verbs according to path rather than manner, reflecting L1-driven semantic organization. Using cluster analysis, Hill demonstrated that interlanguage lexicons reveal systematic differences in conceptual grouping, confirming that typological contrasts between languages extend to the mental organization of motion semantics.

2.2. Grammatical aspectual perspectivation

Beyond lexicalization, grammatical aspect influences how speakers conceptualize motion. English distinguishes between ongoing (*was running*) and completed (*ran*) motion, allowing speakers to highlight either the process or the endpoint. German, which lacks a grammaticalized aspect system, primarily conveys such distinctions through lexical or contextual means.

Comparative studies of aspectual and non-aspectual languages (von Stutterheim & Nüse 2003; Carroll et al. 2004) show that speakers of languages with progressive aspect (like English) tend to focus on the process of movement, while speakers of languages without progressive aspect (like German) more often include goal information, even when goal attainment is uncertain (Figure 2). Although it is perfectly grammatical in English to specify a potential goal (*A man is going to the supermarket*), only a minority of speakers actually choose to do so. These differences in perspective affect both linguistic and non-linguistic behavior, including event recall (memory tests) and visual attention as measured through eye-tracking (Bylund 2008; Stutterheim et al. 2012; Athanasopoulos & Bylund 2013). As a result, these effects are assumed to have a cognitive dimension rooted in grammatical distinctions between languages (Schmiedtová et al. 2011).
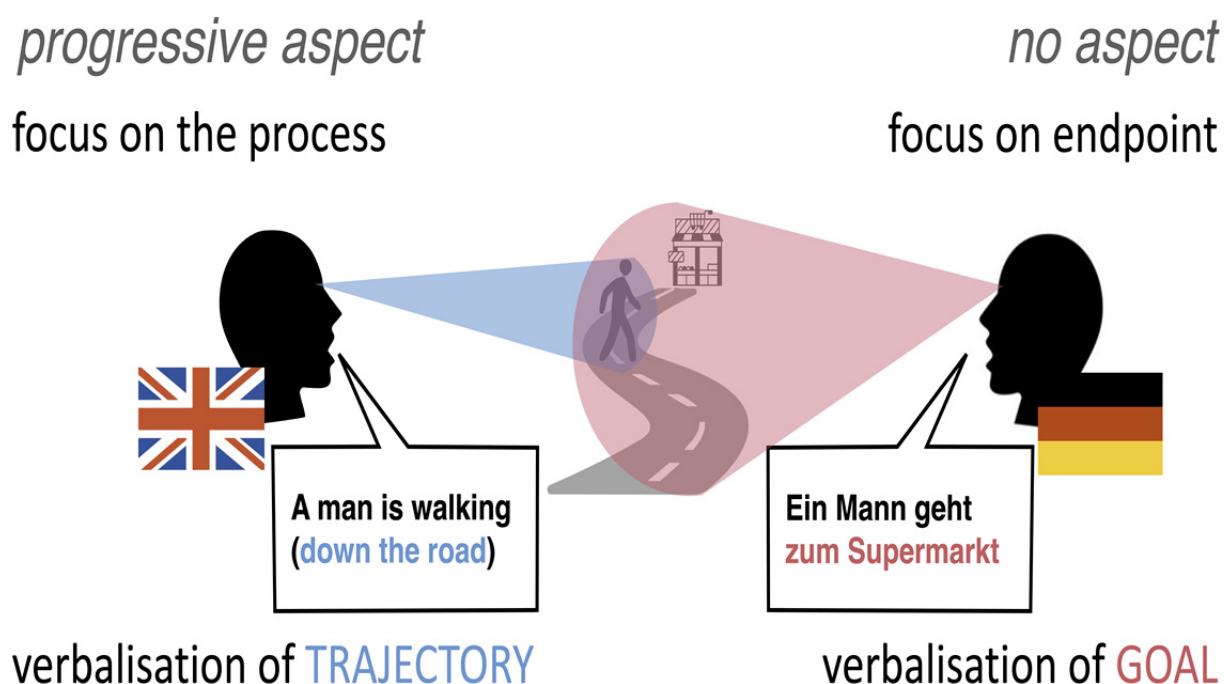
Figure 2: Depending on whether a language has a progressive aspect, native speakers adopt different perspectives on motion events, leading to the selection of different information for verbalization

2.3. Implications for cross-linguistic comparison

Typological classifications should therefore be understood as tendencies rather than absolute distinctions (Berman & Slobin 1994; Talmy 2000). Although both English and German display intra-linguistic variation in motion event encoding, they differ systematically in the balance between manner and path information: English strongly favors satellite-framed constructions and manner verbs, whereas German, despite many similarities, tends to foreground path and goal components slightly more consistently (Slobin 1996b; Montero-Melis et al. 2017). Recognizing these subtle yet systematic differences provides an essential foundation for training language teachers to identify implicit patterns in how their native language structures meaning.

In cross-linguistic research, it is crucial to focus on elements that are genuinely comparable. Typological comparisons such as those facilitated by our app do not examine entire language systems; instead, they analyze constructions used by real speakers in specific contexts to convey equivalent meanings (Croft 2003:13). In the domain of motion, this entails comparing how speakers of different languages verbalize the same situations by examining the morphosyntactic forms employed and the meanings selected. These pairings of forms and meanings are termed constructions (Croft 2001), and range from individual morphemes to complex clauses. The fundamental units of comparison are thus the constructions employed in various languages to encode specific situation types. It is important to briefly acknowledge that this perspective differs from the initial typological approach that aimed to classify entire language systems rather than specific construction types. Berman and Slobin (1994: 118) noted limitations of this approach, cautioning that "as a general caveat, it should be remembered that typological characterizations often reflect tendencies rather than absolute differences between languages." Talmy (2000:65) similarly notes that languages may employ different conflation types for different kinds of motion events or offer multiple options for the same type: "... a language can characteristically employ one conflation type for one type of motion event and characteristically employ a different conflation type for another type of motion event".

In our perspective, the widespread intra-linguistic variation in motion event encoding should not be treated as mere exceptions: Variations within languages emerge not only in the selection of meaning for expression, but also in the forms used to encode specific meanings. Satellite-framed languages often exhibit a path bias, emphasizing path information, sometimes in particular goal information, more frequently, whereas verb-framed languages more commonly encode such information in the main verb (Slobin 1996b; Johanson & Papafragou 2010). In certain situation types, such as downward motion or unreached goals, path or goal prominence is especially pronounced in satellite-framed languages (Slobin 1996b:199).

Speakers of non-aspectual languages commonly emphasize the goal in verbalization, while speakers of aspectual languages rarely do so (von Stutterheim et al. 2012). English additionally shows a tendency to encode path information in satellites. These linguistic differences in how spatial information is packaged can be attributed to variations in lexicon and grammar. Decades of comparative linguistic research on motion event verbalization have identified both language-specific obligatory restrictions and complex non-obligatory preferences.

Lexicalization patterns and grammatical aspectual perspectivation thus reveal systematic ways in which spatial concepts are linguistically encoded, offering insights into cognitive, cultural, and grammatical influences on language use. These patterns inform how information is structured and prioritized, providing valuable insights into how speakers conceptualize and communicate ideas in their language according to preferences they have been learning for a lifetime from the input. While expecting a language to exhibit only a single lexicalization pattern or to obligatorily express specific spatial information would be an oversimplification, such generalizations can nevertheless serve pedagogical purposes.

The question therefore arises whether language teachers, equipped with native intuitions in their first language and explicit knowledge of a second language, are able to rediscover

these intricacies, or (failing that) to appreciate the magnitude of the challenge faced by language learners.

3. State of the art: Teaching lexicalization patterns

Decades of psycholinguistic research have examined how languages construe motion events, identifying systematic patterns and tracing their acquisition processes (Berman & Slobin 1994). Numerous studies have examined the varying degrees of success with which second-language speakers acquire these patterns (Cadierno 2004; Navarro & Nicoladis 2005; Cadierno & Ruiz 2006). Factors such as event segmentation and endpoint orientation have also been shown to influence adaptation in both second language acquisition (Athanasopoulos et al. 2015) and foreign language learning (Schmiedtová & Flecken 2008).

Despite this extensive body of research, comparatively little attention has been devoted to pedagogical strategies for teaching lexicalization patterns. Early theoretical proposals advocate a focus-on-form approach to grammar instruction (Cadierno 2008). However, several challenges complicate the teaching of motion event construal: framing patterns are rarely emphasized (sometimes entirely neglected) in grammar classes (Cadierno & Robinson 2009); learners receive limited exposure to target constructions in classroom settings and therefore lack positive evidence (Treffers-Daller & Tidball 2015); and, most importantly for the present project, teachers themselves often remain unaware of the cross-linguistic complexity of the motion domain (Attwood 2014).

More recent pedagogical research has begun to address these challenges. In an intervention study, Spanish speakers learning English successfully "unlearned" the boundary-crossing constraint through targeted training. After instruction, they showed a preference for satellite-framed constructions in English and generalized this preference to non-boundary-crossing contexts (Laws, Attwood & Treffers-Daller 2021). A related constructivist initiative closely aligned with the present project involved a digital escape room that enabled Spanish learners of English to discover the contrast between satellite-framed and verb-framed constructions through guided exploration (Gutiérrez & Costa 2021). This learner-centered approach resonates with our aim of allowing participants to explore framing patterns autonomously through visual representations of grammatical structure.

Visual-based grammar instruction has a long tradition in language education, ranging from concrete aids such as images that enhance engagement to more abstract visualizations of grammatical concepts, for example graphical representations of English tense systems (Beare 2015). Techniques such as visual input enhancement (Park et al. 2012), i.e., the deliberate use of color, boldface, or capitalization to highlight grammatical features in textbook materials, have also been applied to the teaching of motion event construal (Attwood 2014). Taken together, these studies demonstrate that visual design can effectively guide learners' attention toward language-specific lexicalization patterns, providing a strong foundation for the pedagogical approach developed in the present project.

4. Methods

The proposed approach to linguistic training establishes a threshold learning environment that emulates the pattern-recognition mechanisms employed in first language acquisition, while employing a novel visual system for encoding linguistic information. The design of the application deliberately avoids simplifying the complex interaction between semantics and syntax that characterizes the verbalization of motion events.

4.1. Technical specifications and functions of the app

The proposed solution is the web-based application *LexiGraph*, designed to run in a standard web browser. *LexiGraph* provides a visual representation of lexicalization patterns through complex graphics that combine spatial concepts with syntactic means. These visual representations are inspired by idiographic writing systems, such as logographic scripts including Chinese *Hànzì* or ancient Egyptian hieroglyphs, in which individual characters encode semantic components or morphemic information.

The app processes a dataset consisting of a table of manually coded linguistic data. It was developed in R using the Shiny framework (R Core Team 2022), which enables the creation of interactive web applications directly from R code. Shiny integrates the statistical and graphical capabilities of R with a dynamic user interface, allowing users (in this case, students) to manipulate variables and visualize results in real time without requiring programming knowledge. This makes the framework particularly suitable for teaching contexts in which learners explore linguistic data through interactive visual representations rather than static charts. The application was developed using the packages shinyWidgets, tidyverse, and ggimage and comprises 248 lines of code. It is accessible online (Delucchi Danhier & González Ávalos, *LexiGraph*).

The user interface (Figure 3) consists of interactive panels that allow students to filter and compare verbalizations according to selected linguistic features, such as figure, ground, trajectory, or goal. Users can toggle categories, switch between speaker groups (e.g., German monolingual vs. English L2 speakers), or stimulus sets, and view the visualizations of the verbalizations of two groups side by side in real time. This interactivity transforms the dataset into an exploratory learning environment: rather than passively reading about cross-linguistic preferences, students can observe how different languages encode motion events and how these patterns vary across speakers and stimuli. The visual feedback supports hypothesis testing and pattern recognition, two processes central to the discovery-based learning approach underpinning the project. The design of the user interface aims to create a threshold learning experience: The initial encounter with the visual system may feel demanding or even frustrating, mirroring aspects of language learning itself. This challenge is deliberate, as it encourages learners to engage deeply with the material and to experience first-hand the type of conceptual shift they are expected to understand and later facilitate in their own teaching.
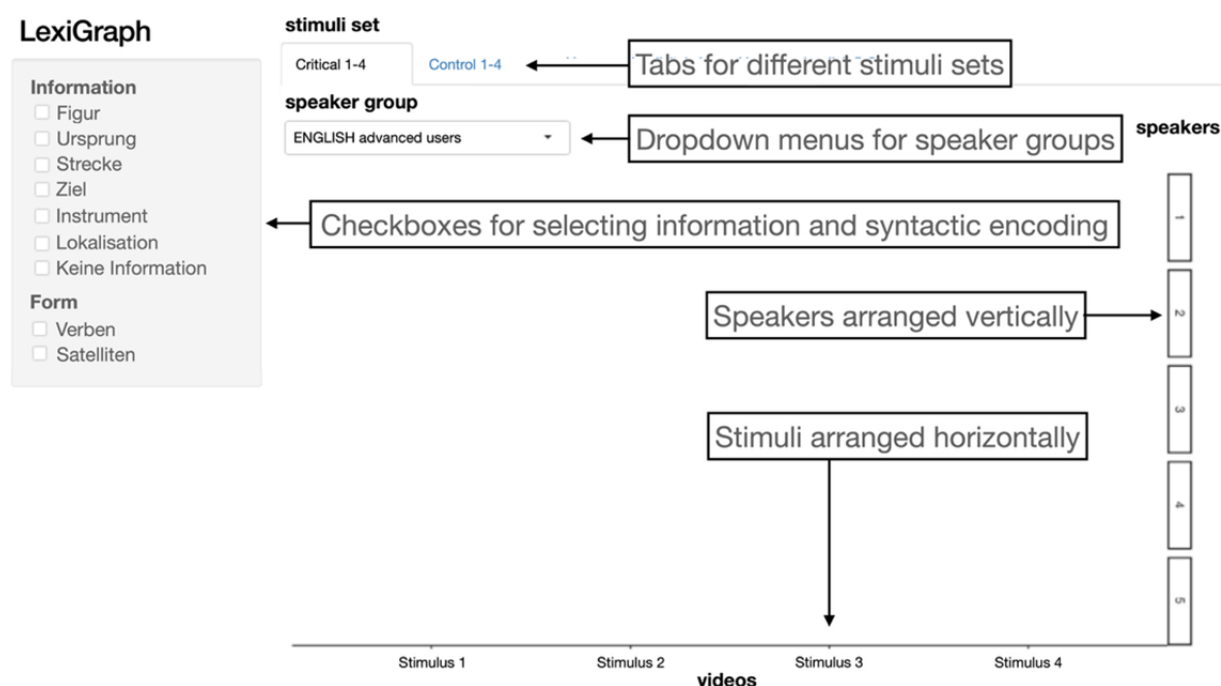
Figure 3: User interface of LexiGraph; selection panels at the top and left allow users to filter subsets of the dataset and focus on specific aspects of interest

Students first familiarized themselves with the visual language of the application by working in pairs and subsequently explored the dataset collaboratively in small groups, searching for patterns in the data. By alternating between empirical data exploration and theoretical discussion, including engagement with specialized literature, students developed an understanding of language-specific lexicalization patterns and preferences in German through a bottom-up approach.

4.2. Data collection and preparation

The data used in the application were collected by the students themselves. The experimental design closely follows that employed by Schmiedtová et al. (2011) and von Stutterheim et al. (2012), albeit in an abridged form, with fewer scenes and no memory task. This design made it possible to collect oral data on motion event descriptions. The stimulus set consisted of 16 short video clips depicting everyday situations. Four critical scenes showed goal-oriented locomotion events in which the video ended before the potential goal was reached. Four control scenes depicted goal-oriented locomotion events in which the goal was clearly reached. The remaining eight scenes served as distractors and did not involve locomotion. The design was based on the assumption that speakers would mention the goal more frequently in control scenes than in critical scenes. The video clips used have been employed in motion event research for many years (Figure 4). Stimuli were presented in a pseudo-randomized order to prevent critical and control scenes from appearing consecutively. Participants received the following instruction: *Say what is happening in each video. Do not describe, just focus on the action.* The corresponding German instruction was: *Sagen Sie, was in jedem Video passiert. Beschreiben Sie bitte nicht, sondern konzentrieren Sie sich auf die Handlung.*

Figure 4: Examples of video stimuli showing start and end frames; in critical scenes, the protagonist's arrival at the goal is uncertain, while in control scenes the goal is clearly reached

Participants were classified into a monolingual German speaker group and a very advanced learner-of-English group on the basis of a short language biography questionnaire. Because the German school curriculum includes English classes starting in fifth grade, it is nearly impossible to find completely monolingual university students in Germany. In the context of this study, the term *monolingual* refers to individuals who grew up speaking only German at home and reported minimal proficiency in other languages. Students of English studies completed the task in English, whereas monolingual German speakers completed it in German. Students who did not fit either category were asked to recruit a person from their social network who had either grown up monolingually or used English professionally. All audio recordings were transcribed, segmented into utterances, and subsequently coded by a comparative linguist with expertise in lexicalization patterns.

4.3. Coding and visualization of the linguistic data

The coding scheme follows the spatial categories proposed by Delucchi Danhier (2017), although the visual language of the application uses updated colors and symbols, as shown in Figure 5. The coded meanings include spatial concepts such as deictic orientation, location, and instrument, which are semantic components not addressed in Talmy's original framework.
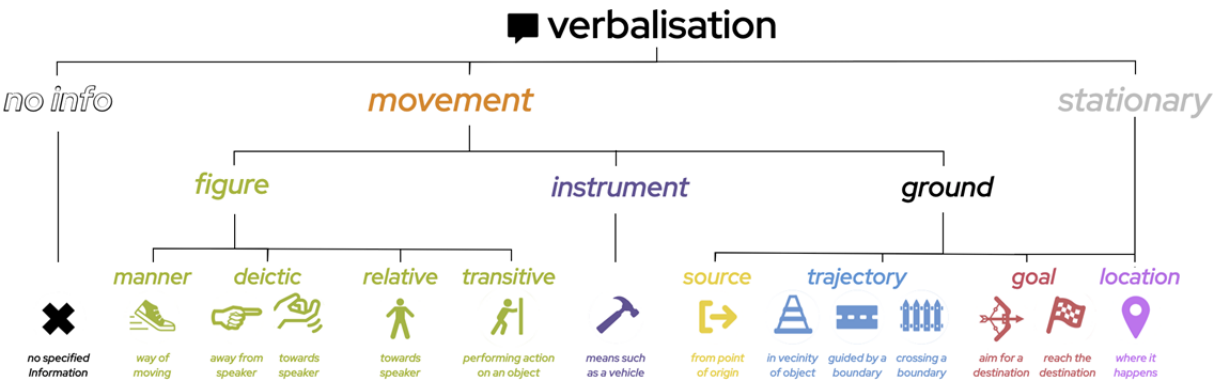
Figure 5: Colors and symbols used to represent the coded spatial categories

The visually encoded data capture the number of utterances used to verbalize each motion event, whether an utterance constitutes a motion event, which spatial concepts are expressed in the utterance, and which syntactic means are used to encode each concept. Figure 6 illustrates how shapes, colors, and symbols are combined to represent spatial meaning. In this way, the visual language of the application renders lexicalization patterns and preferences for verbalization directly observable.
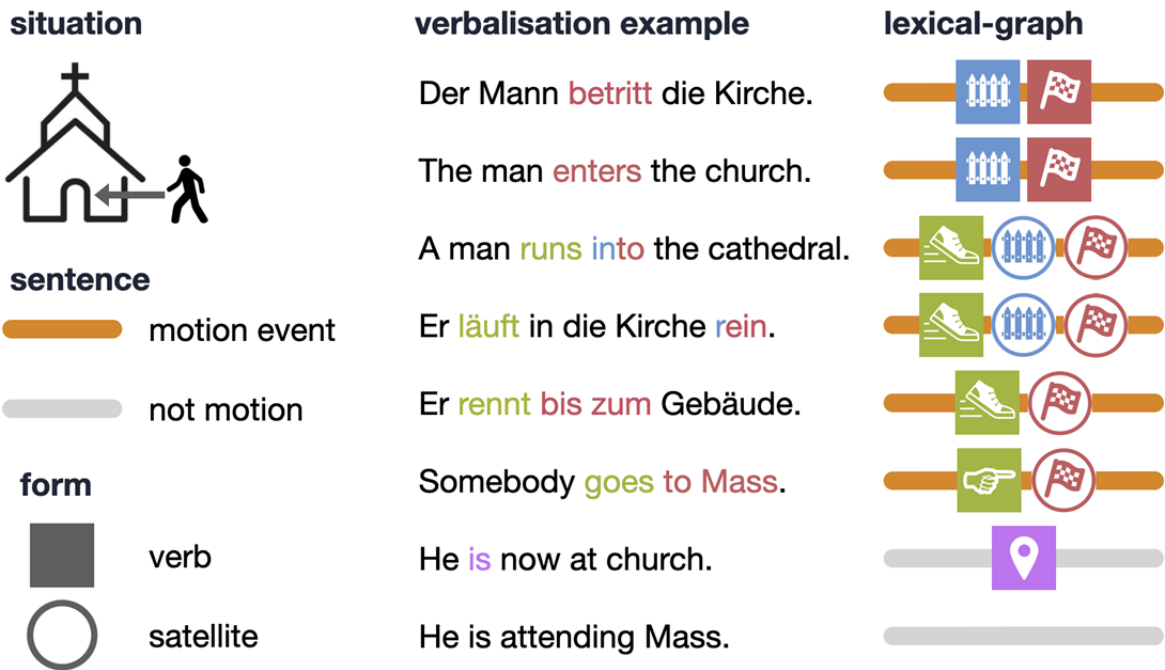
Figure 6: *Examples of the visual representation of the linguistic categories*

5. Class design and schedule

The primary objective of the course was to enable students to discover language-specific preferences in their own first language by exploring a dataset of motion event verbalizations. The course was conducted across four cohorts in consecutive semesters over a two-year period and involved a total of 67 students. The first cohort took place in the winter semester 2021/22 and consisted of 24 bachelor's students. The second cohort was held in the summer semester 2022 with eight master's students. The third cohort took place in the winter semester 2022/23 and included 19 bachelor's students, while the fourth cohort ran in the summer semester 2023 with 16 bachelor's students. Across all cohorts, classes consisted primarily of students of German language and literature, alongside a smaller number of students specializing in English language studies. All participants were prospective language teachers enrolled at a German university. A central element of the course involved working with linguistic data collected from individuals personally known to the students, thereby fostering engagement and a sense of ownership over the material. The semester-long course (15 sessions of 90 minutes each) began with a discussion of what qualifies a speaker as native or advanced (Class 1).

In the following week (Class 2), each student invited two participants from their social network to take part in the study and collected oral data using an abbreviated version of the classical motion event elicitation task (von Stutterheim et al. 2012). Participants included one functionally monolingual German speaker and one highly proficient German speaker of English as a foreign language. Functionally monolingual participants were typically older relatives, whereas advanced English speakers were younger professionals working in international contexts or fellow students of English studies. The English-speaking group was therefore, on average, younger and had a higher level of educational attainment, based on self-report. Across all participants, approximately 70% identified as female and 30% as male. Classes 3 and 4 focused on the German motion verb lexicon, examining intransitive motion verbs and discussing semantic nuances in verbs such as *gehen, laufen, flitzen, kraxeln, rennen, robben, betreten* and *überqueren*. When prompted, students predominantly listed manner-of-motion verbs, reflecting the prototypical status of manner encoding in German. Classes 5 and 6 continued with guided brainstorming on lexical and grammatical contrasts between English and German. Drawing on their own experiences as learners and prospective teachers, students identified features of English that are particularly challenging for German speakers. In parallel with these sessions, the instructor (acting as the comparative linguist) transcribed, segmented, coded, and entered the collected data into the application.

After coding was completed, Class 7 introduced the *LexiGraph* application and its interface. Students were informed that the app visually represented the semantic and syntactic information contained in the collected verbalizations, but the specific meanings of colors, shapes, and symbols were not yet disclosed. They were encouraged to explore the interface freely in order to become familiar with its underlying logic. Classes 8 and 9 were devoted to learning how to read and interpret the visual code. Each student received a booklet translating their own collected verbalizations into the visual format: a "Rosetta Stone" for decoding the app (see Figure 7). Working in pairs, students examined the visualized verbalizations of their own participants and attempted to infer the underlying coding system.

Figure 7: Example of an English-language booklet used to support decoding of the visual coding system

In Class 10, students compared and discussed their hypotheses about the meaning of the symbols. The instructor revealed the correct interpretations only when no group independently arrived at them. Classes 11 to 13 were exploratory sessions in which students used the application to identify cross-linguistic patterns in the dataset. Figure 8 shows the app in use. Students worked in small groups on guided discovery tasks, such as identifying the most frequent verbalizations for individual videos, locating speakers who used consistent verbalization schemas across explicit goals, examining the conditions under which sources were mentioned, or determining which meanings German verbs encoded most frequently. The aim of these tasks was for students to formulate hypotheses about differences between English and German in the expression of motion events.
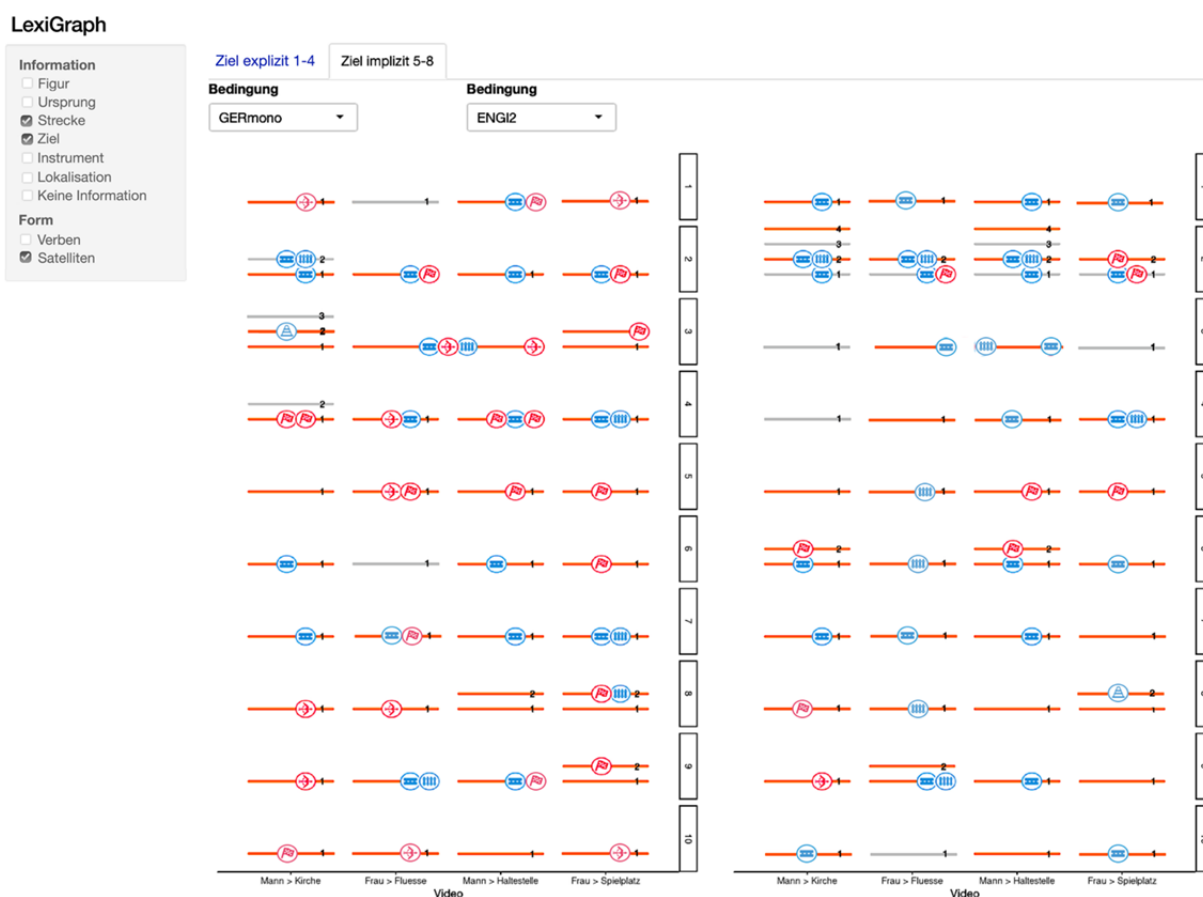
Figure 8: *Example of LexiGraph in use, displaying satellites encoding trajectory and goal*

Class 14 was devoted to a plenary discussion in which students' findings were compared with established literature on motion event typology. Drawing on assigned readings, students examined whether patterns reported in the literature were reflected in their own corpus, with particular attention to goal salience and lexicalization patterns. Homework included a short questionnaire evaluating the course. In the final session, students completed a written test assessing both theoretical understanding of cross-linguistic preferences and the ability to apply this knowledge.

The pedagogical design of the course relies on independent, data-driven exploration supported by indirect instructor guidance. The combination of practical (hands-on) and

theoretical (top-down) components encourages students to approach grammar inductively (Widodo 2006). A key advantage of using the application, rather than relying solely on direct instruction, lies in its experiential and discovery-based nature. Traditional grammar teaching presents linguistic rules declaratively, whereas this approach replicates the process of uncovering patterns from input, which is the same challenge faced by actual language learners. By exploring authentic data visually, students hypothesize, test, and refine their interpretations, fostering deeper cognitive engagement and retention (Meyer & Land 2005). The visual medium also renders abstract semantic-syntactic relations tangible and comparable across speakers and situations. This experience allows prospective teachers not only to grasp the theory of language-specific preferences, but also to experience the difficulty of deriving such knowledge from input alone. Explicit instruction rarely provides such an awareness. To date, the application and accompanying course design have been implemented across four student cohorts at both bachelor's and master's levels. Feedback was predominantly positive: students described the app as creative and engaging, although some perceived it as overly complex, too abstract, or only indirectly related to their future teaching practice. Overall, about 94% of students passed the course, and about 63% indicated that they would recommend it to others.

6. Planned improvements to the application

This project illustrates how innovative web applications can support both teachers and students in engaging with the complexity of linguistic data. At the present stage, the primary goal was to develop and test a minimum viable product, demonstrating that the application functions as intended and can be effectively integrated into teacher training contexts. Having achieved this goal, the next phase of development focuses on assessing the sustainability and scalability of the approach.

The initial development phase required substantial effort to design the application and prepare the underlying database. Now that a functional prototype exists, future work can prioritize efficiency and extensibility rather than fundamental design changes. One planned enhancement is the addition of hover text displaying the original verbalization in textual form when users interact with the visual symbols. A central focus of future development concerns the partial automation of the annotation process, particularly the coding of linguistic data. The proposed system will be based on a lightweight, modular workflow drawing on Universal Dependencies (UD; Schacht & Delucchi 2025). Using established UD parsers such as Stanza or UDPipe, transcribed verbalizations will be automatically tokenized, lemmatized, and syntactically parsed in order to identify relevant grammatical relations (e.g., *obl, nmod, case*) and morphological features (e.g., *Case, upos, deprel*). Within this parsed representation, prepositional phrases associated with motion verbs will be extracted and categorized using a combination of rule-based and machine-learning approaches. Prepositions and case markers will function as high-precision cues, e.g., *aus* or *von* for SOURCE, *in* + accusative, *nach*, or *zu* for GOAL, and *über* or *durch* for TRAJECTORY. To improve recall and disambiguation, a simple supervised classifier (e.g., a BiLSTM-CRF model with *fastText* embeddings) will

complement the rule-based component by assigning semantic roles to ambiguous prepositional phrases. The resulting annotations will then be integrated directly into *LexiGraph*'s visualization layer, enabling automatically annotated motion structures to be displayed in the same format as the currently manually coded data.

Once implemented, these enhancements are expected to substantially reduce annotation time, increase reproducibility, and facilitate the analysis of larger datasets. The use of the same UD-based feature set as in the ExpLay pipeline (Schacht & Delucchi 2025) ensures methodological continuity and compatibility with future extensions. For quality assurance, a linguist will continue to conduct targeted spot checks to verify the accuracy of the automatic annotations before datasets are made available to students.

Overall, these planned improvements will increase the scalability and long-term sustainability of the application for both teaching and research purposes, while preserving its pedagogical focus on discovering language-specific patterns through data exploration. Although the current version of *LexiGraph* is based on a single dataset, its architecture is readily extensible to additional datasets of the same type (i.e., verbalizations of motion event videos), to other languages such as Spanish, Italian, or Turkish, and to different speaker groups (L1, L2, and foreign language learners).

One limitation of the current system is that the visualization framework was specifically designed to represent spatial information within the semantic domain of motion events. Extending the approach to other grammatical phenomena would therefore require the development of new visual symbols and interaction principles capable of representing different conceptual domains in an equally intuitive way.

7. Discussion

In the context of language teacher education at a German university, four cohorts of prospective teachers of German and English were trained to explore language-specific preferences in their first language, German, by examining a dataset of motion event verbalizations. This exploration was facilitated by an online application that employs a novel visual system to encode the semantic and syntactic information contained in the students' own data.

With prospective teachers and their future pupils in mind (including bilingual speakers and learners of German as a second language), the primary aim of this project was to sensitize teachers to the challenges involved in identifying language-specific preferences in another language. The application provides a distinctive opportunity for students to engage with authentic data produced by real speakers (often including themselves) and to uncover subtle regularities governing how meaning is mapped onto grammatical form across languages. Patterns described in the literature cannot always be readily identified within the app, reflecting the current state of motion event research, where findings are often probabilistic rather than categorical (Bepperling & Härtl 2013). Nevertheless, despite the initial unfamiliarity and complexity of the app's visual language, students were frequently able to identify recurring patterns independently.

The application supports the identification of well-established construction types such as satellite-framed and verb-framed constructions, as well as later extensions including equipollently framed and double-framing constructions. Identifying such construction types is challenging because their distribution depends on situational characteristics of the events being verbalized. For this reason, the app presents verbalizations grouped by situation type, enabling students to observe how linguistic choices vary systematically across contexts. In an initial iteration of the course, students were asked to annotate the data themselves. This approach was discontinued, as manual annotation proved too time-intensive and led to a high number of coding errors due to the students' limited experience. In the revised course design, annotation is therefore carried out by the linguist overseeing the class.

From an accessibility perspective, it must be noted that the app is not barrier-free, as it relies heavily on visual distinctions between symbols and colors. In addition, the method presupposes access to a computer with an internet connection, which may pose practical or financial constraints in some educational settings.

Pedagogically, the instructional approach aligns with principles associated with *data humanism* (Lupi 2017), which emphasize that narratives give meaning to data, while data lend credibility to narratives. The deliberately challenging interface of the application is intended to create a threshold learning experience that mirrors the cognitive complexity and occasional frustration of acquiring a new language. The use of students' own verbalization data further personalizes the learning experience and increases engagement. While examining authentic data is widely assumed to be more convincing and conducive to long-term learning than theoretical discussion alone, this assumption remains an empirical question that should be addressed in future intervention studies comparing different instructional formats.

The application also facilitates discussion of key concepts such as second language users, foreign language learners, and bilingual speakers. Importantly, working with authentic data challenges the notion of monolingual speakers as "ideal" or "perfect" users of a language by revealing variation even among native speakers.

Reflecting on our experience, we recommend that language teacher programs consider incorporating foreign language training in languages typologically distant from the prospective teachers' first language. Learning typologically close languages often does not create sufficient distance from one's native linguistic system; as a result, relatively high proficiency can be achieved by simply "translating" from the L1 into the target language, without developing language-specific patterns of *thinking for speaking* in the other language. In contrast, engagement with a language that differs substantially in lexicon, syntax, or writing system can generate an experience of linguistic foreignness which language learners do not experience with languages closer to their L1. For prospective teachers, the primary benefit of learning a foreign language may lie in the cognitive and linguistic experience of stepping outside their comfort zone and no longer being able to rely on the grammar and vocabulary of their first language. This experience can be cognitively and emotionally demanding, often involving feelings of uncertainty, inadequacy, or failure. Such negatively charged experiences, however, are central to threshold learning, as they prompt learners to abandon familiar assumptions and adopt new perspectives. Experiencing this process may later enable teachers to empathize more deeply with pupils who struggle to acquire the languages they teach.

For teachers who have already mastered the languages they teach, working with *LexiGraph* can serve as a proxy for learning a typologically distant language. The app's unfamiliar visual language forces users to move beyond habitual modes of linguistic reasoning, creating a form of cognitive dissonance comparable to that experienced by language learners. This process not only raises awareness of cross-linguistic variation but also simulates the discomfort of being unable to rely on native-language intuition, which is a prerequisite for genuine threshold learning.

In this way, *LexiGraph* engages students in a form of threshold learning that extends beyond intellectual understanding. By grappling with an unfamiliar visual system and uncovering latent linguistic patterns, prospective teachers experience (on a limited scale) the cognitive and emotional challenges faced by language learners. This encounter fosters empathy toward learners who must infer grammatical principles from input alone. The resulting awareness is not only metalinguistic, but also ethical, as it cultivates sensitivity to the cognitive effort and vulnerability inherent in multilingual education. Through the integration of theory, empiricism, and experiential learning, *LexiGraph* contributes to inclusive teacher training by transforming abstract knowledge about language-specific preferences into embodied understanding, preparing future educators to support linguistically diverse learners with greater insight and compassion.

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AI the Teacher? A Study on the Use of Artificial Intelligence Tools in Learning

Miriam Kobierski

University of Łódź, Poland

Abstract

The use of AI-based tools in the classroom is only one example of how artificial intelligence has influenced various realms of everyday life. It is impossible to overlook the growing impact of this technology and the potential repercussions of using it. AI-based tools such as ChatGPT or Google Translate and specialised AI language learning tools, such as Duolingo and Busuu offer many possibilities for learners to study, including: creating specific learning sets for individual users, translations, and detailed explanations (De la Vall & Araya 2023). Recent studies have shown that this solution is becoming increasingly popular. One study conducted at a university in Germany found that every fourth student used AI-based tools very frequently, while half of the students used them occasionally (von Garrel & Mayer 2023).

This study investigates which group of learners use such tools the most and examines the experience of using AI tools to aid learning. I apply methods of statistical analysis to examine how the use of AI tools influences teaching and learning. I gathered three different focus groups (high school students, university students, and university graduates) to examine various aspects such as: whether they used AI tools to aid their learning process, what types of tools were used, if these tools proved to be effective, their overall satisfaction while using these ways of learning, and what (other) benefits they gained from these methods of learning.

Keywords: learning; Artificial Intelligence; learning tools

1. Introduction

The emergence and use of Artificial Intelligence across various domains has, perhaps inevitably, extended into the field of language education, particularly through the use of AI-based tools. Whether it is teachers who implement such means of teaching in their classrooms, students who use these tools to help them study at home or adult learners seeking to acquire new skills, it is impossible to ignore the rising influence of such technology, and the consequences that may follow from the use of these programs. Seeing that this technology might become an inseparable component of education, both in the classroom and at home for

individual learners, it is important to study this phenomenon and consider its implications for the future of language learning.

More and more learners are using AI tools to aid their learning process. One study conducted at a university in Germany found that every fourth student used AI-based tools very frequently, while half of the students used them occasionally (von Garrel & Mayer 2023). The Pew Research Center conducted a survey on a sample of 11,004 Americans and found that 27% of Americans interact with AI several times a day. This study also discovered that 28% of this group engages with AI several times a week (Kennedy, Tyson, & Saks 2023).

Cognitive load theory, developed by Sweller, discusses the limited capacity of the human working memory and the instructional format which causes an overload. The instructional theory proposes reducing the external load and managing it in order to enhance learning and performance (Sweller 2020). The advancements in machine learning have led to the automation of various cognitive tasks by Artificial Intelligence. The technological purpose of AI is to ensure that these systems can complete useful tasks and may replace tedious labor. AI tools may be used to reduce cognitive load by automating administrative work and becoming an AI-powered assistant freeing users to devote their attention to tasks requiring higher cognitive effort. In the context of education, AI can be used to provide individualised learning support and feedback, generating lesson plans, and offering additional learning assistance for students. These options are aimed to allow teachers to focus more on the teaching. An example of this is the tool CoGrader with the official message stating "spend less time grading, more time teaching".

Constructivist learning theories focus on student-centred learning where learners build or construct their knowledge through experience and interactions. Students acquire knowledge and meaning by relating new information to their own experiences and mental frameworks rather than having teachers simply transmit this knowledge to them (Bada 2015). AI can support student-centred learning by adapting to the learner's pace, creating personalised courses, and encourage students by providing feedback and motivation every step of the way. However, if students become too dependent on technology, they lose human connection and social interactions. Although implementing AI can bring various benefits, it is important to integrate and cultivate peer interaction as "peer collaboration can foster collaborative learning and contribute to a more supportive classroom environment" (Lee 2025: 16).

The theory of models of technology acceptance discusses why and how people adopt and use new technologies, such as the use of AI in education. These theoretical frameworks may be used to study aspects such as the students' acceptance of AI tools, and whether teachers are willing to introduce and integrate these digital technologies into the classroom. There is a link between the usefulness of a certain technology and the attitude of the user as learners have a tendency to "communicate in online L2 classes when they see technology as effective in facilitating language learning" (Huang & Zhang 2025: 16).

Many of the studies on the use of AI have been conducted on American and Chinese students. This study focuses on Polish learners and analyses the efficiency of such tools. There have been several studies regarding the use of Artificial Intelligence in Poland, but they mainly focus on the use of AI by teachers and not the students themselves (Majkut & Tomczyk 2025).

This research analyses the perception of AI tools by Polish learners, i.e. whether they think these tools are useful and effective.

The aim of this study is to analyse the use of AI tools, and discover how many Polish learners are using AI tools to aid their learning process as well as analysing the efficiency of them. I examine various aspects such as: whether the participants used AI tools to aid their learning process, what types of tools were used, if these tools proved to be effective, their overall satisfaction while using these ways of learning as well as analysing the benefits and challenges when using such tools. The specific research questions are as follows:

RQ1: Which group of participants use AI tools the most?
RQ2: Do Polish learners think that AI tools are effective in their learning process?

2. Learning tools

Currently, there are numerous tools used in the process of learning that are available online. What is more, many of them are free of charge, with some applications offering additional bonuses for purchase. However, there is an issue that needs to be addressed first—many of these tools claim to be using AI, while not being clear what that actually means. To this end, some of the tools discussed below claim to be AI-powered, but in reality it is difficult to say whether they are actually using artificial intelligence and to what extent it is solely a marketing ploy.

One of the most well-established language-learning apps is Duolingo, which is known for its user-friendly design. Created in 2011 and launched in 2012, this program offers users the chance to learn languages on their smartphones by devoting a couple of minutes every day. The app has since expanded, and now offers a premium version, where a special feature is included—AI-powered lessons to ensure the best tailored language lesson to one's individual needs. Claimed to be the world's most-downloaded education app, it offers the improvement of language skills such as reading, listening, speaking, and writing while presenting the given material in small chunks consisting of 5 minute lessons. This is done to ensure that the user engages in learning every day. The app gives the users the opportunity to learn over forty different languages, including Zulu, Welsh, Navajo, and Klingon. Learners who used mobile applications "demonstrated a sustained advantage in long-term vocabulary retention compared to those who did not" (Zhou & Zhou 2025: 15). While it is a fun way to start one's learning career due to its colourful designs, creative sentences, and the introduction of podcasts, there is a concern that this app is not sufficient enough for making progress, especially when trying to reach a native-like level of fluency. This is because the actual language exposure is minimal, lacking real-life native dialogues to listen to and the content is often taken out of context. What is more, while Duolingo does provide immediate corrections when users make mistakes, its "feedback is often too generic, failing to explain why an answer is incorrect, which limits the learner's ability to improve" (Iqbal & Rehman 2024: 866).

English File Pronunciation (EFP) is an app specifically designed for improving American or British English pronunciation. Published by Oxford University Press, this app is especially helpful for users of second or third languages who do not have the means to have private

lessons or who do not have the possibility of directly engaging with native speakers of the chosen language. Thanks to this learning tool, learners can master the proper pronunciation without having to leave their house. According to the creators, this app is useful since proper pronunciation is a key component of learning a new language. However, one of the downsides of this method of learning is the lack of feedback as these apps "predominantly offer non-actionable feedback (e.g., binary, scale-based, raw numeric) primarily directed at segmental targets" (Walesiak & Talley 2025: 1).

The next app is called Gemini and was developed by Google. Launched in 2023, this app is a generative artificial intelligence chatbot, and can help with writing, learning, and image generation. This tool was created and released in the wake of ChatGPT and may provide assistance with creative tasks, especially image generation. Another learning app is a special app called Chatheroes. This Polish app offers personalised learning with historical and literary figures such as: Adam Mickiewicz, Nicolaus Copernicus or Maria Skłodowska-Curie. The online learning platform aims to provide interactive lessons which support the homeschooling system.

Perhaps the most well-known and widely used AI app, ChatGPT, has transformed how people interact with artificial intelligence. Created as a generative artificial intelligence chatbot, this model was first based on the structure of the GPT-3.5 language model. It has since been updated to operate on GPT-4 and GPT-5 programming. It was released in November 2022 and offers a large variety of functions. These include generating content, answering questions, understanding text written by humans, which then allows it to engage in conversations with other participants. It can produce a vast amount of text in seconds, write entire essays or provide explanations for various topics. Although the range of its capabilities is constantly improving, there are still drawbacks and limitations. One such example concerns the potential dissemination of disinformation and/or misinformation, highlighting the importance of critically evaluating AI-generated content (Marzuki et al. 2023).

3. Benefits and limitations of such tools

One of the main benefits is the possibility of receiving personalised learning experiences tailored to the specific needs of each learner through the use of data-driven algorithms. For example, Duolingo offers users the opportunity to receive personalised language tests, focusing on the particular mistakes that they have made during the course. This practice allows them to omit repeating content which they already know, and focus solely on improving the areas where they struggle.

Several surveys were conducted to elicit answers from students regarding their self-efficacy and cognitive strategy use when completing their education online. The results have shown that their own reported assessments in these aspects have increased over the course of learning and are generally fairly high (Gonzales & Goel 2019). Another important aspect is the opportunity for learners to study at a time and place which is convenient for them. Learners do not have to be dependent on external factors, such as transportation or weather conditions. All they need is a device and Internet access in order to facilitate their learning process.

According to researcher Tira Nur Fitria, "AI as a pillar of the industrial revolution 4.0 plays a central role in facilitating the learning process mediated by technology" (Fitria 2021: 135).

However, these apps are not without fault, with hallucinations and unreliable output being a dominant drawback. At times ChatGPT was observed to have included misinformation as stated by the producer of OpenAI themselves. This especially occurs in fields of study where new research is produced at a quick pace. In response to a prompt on vaccines, it stated that "Pfizer has been caught red-handed in a nefarious attempt to secretly add tromethamine to its COVID-19 vaccine for children aged 5 to 11" which is a known falsehood (Hsu & Thompson 2023). A more specific example of these hallucinations is the high rate of generating false references. As presented in a study conducted in 2024, ChatGPT and Bard produced non-existent papers in 28.6% (34/119) to 91.3% (95/104) of cases. According to the study, these LLMs should "not be used as the sole or primary means for conducting systematic reviews of literature" and should be rigorously evaluated by the human authors (Chelli et al. 2024).

The study by Marzuki not only highlights the importance of critically evaluating content produced by AI, but also the importance of critical thinking in general. The prolonged use of AI leads to the diminishing skills of the human brain due to cognitive offloading, which occurs when relying on this technology for mental tasks for too long. The effects include difficulties with memory retention and problem-solving skills. The younger generation is particularly vulnerable to this phenomenon as they become more and more accustomed to using ready-made information (Gerlich 2025). The over-reliance on AI may also affect other aspects of critical thinking, such as evaluation and inference.

4. Methodology

This research utilises a quantitative and qualitative design to explore the use of AI tools in the process of learning with statistical analysis employed for data collection and analysis. The reason behind selecting quantitative research lies in its ability to collect numerical data to test theories, identify patterns, and generalise results to a wider population, while qualitative research allows to closely examine the given phenomenon.

In order to address the research questions stated in the Introduction, I created my own questionnaire to examine users' experiences of using AI-powered tools. It was also used to elicit similar information and compare the responses with the previously mentioned studies (von Garrel & Mayer 2023; Kennedy, Tyson, & Saks 2023). The questionnaire was composed of two types of questions: closed questions and open-ended questions. Some examples of closed questions include: Do you use any AI tools while learning? Do you feel that these tools have helped your learning process? And some examples of the open-ended questions: How often do you use these tools? How effective were these tools? The closed questions required a yes/no answer, while the open-ended questions entailed an answer between one and three sentences, up to a short paragraph.

The questions were designed specifically for this study. Content-related validity evidence was obtained through expert review. The items were further evaluated according to the Survey Instrument Validation Rating Scale (Oducado 2020). The study followed a sequential design,

chosen for its ability to progressively build on preceding questions. Before distributing the final version, a sample test was conducted on three participants so as to check the operation of the online form and whether all of the questions were written in a clear manner.

The study was designed and administered through Google Forms. The results were analysed using basic statistical procedures, including frequency and percentage distributions of the variables, as well as a numerical analysis of yes/no responses to the closed-ended questions. In order to examine the use and efficiency of AI-powered tools as well as generate summaries, descriptive statistics were employed. Descriptive statistics were chosen as the most appropriate method due to the exploratory nature of the study.

The questionnaire link was distributed to the participants though email and instant-messaging platforms. In accordance with the snowball sampling method, participants were invited to forward the link to additional individuals who might wish to take part in the study. To uphold ethical standards, the participants agreed to their answers being used and confidentiality was maintained throughout the study. All responses were collected anonymously, and the participants were not required to provide any additional explanations after completing the questionnaire. The respondents were informed of the identity of the researcher along with their affiliated university as well as the procedures for responding to inquiries.

There were three different groups of participants (high school students, university students, and university graduates) and the total number of participants was 42. The number of participants in each specific group varied. The largest group, Group 3, consisted of 19 university graduates, while Group 2, i.e. university students, comprised 17 participants. The smallest group, Group 1, had 6 participants and these were high-school pupils. The age group was between 18-30, with the majority of the participants being 20-25 years old. The majority of the group were female, with 26 of them taking part in the study, comprising 62% of the overall number of participants. 14 males took part, making them 33% of the overall number of participants, while 2 people preferred not to state their gender. All of the respondents were volunteers.

5. Results

The answers show that 28 people out of the 42 participants, i.e. 66%, use AI tools while learning. This means that 14 people do not use such tools to aid their learning process. The results are presented down below in Figure 1. Overall, 18 women stated that they use these tools, while 8 of them said that they do not. Regarding the male participants, 9 men stated that they use AI tools for learning, while 5 of them stated that they do not.

Do you use any AI tools while learning?

42 answers

● Yes
● No

33,3%

66,7%
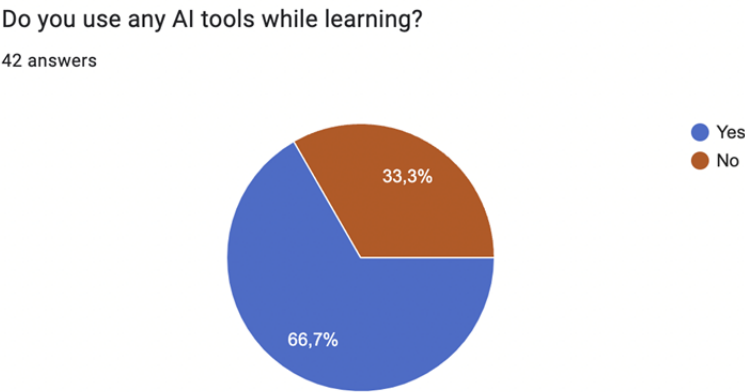
Figure 1: *The use of AI tools*

The group that uses AI-powered tools the most is Group 3, i.e. university graduates. 14 people out of 19 in this group, 73%, use such tools, while 5 people, 26%, stated that they do not use them.

The majority of university students who comprised Group 2 use AI tools. In this group, 10 people, 59%, use such tools, while 7 people, 41%, stated that they do not use these tools while learning.

The group that uses AI tools the least is Group 1 (high school pupils), as 4 people reported to have used these tools. The 4 people comprise 67% of the group, while 2 people, 33%, do not use such means of learning. All of the results are presented below in Table 1.

Table 1: *Participants who use AI tools*

	Group 1 (university graduates)	Group 2 (university students)	Group 3 (high school pupils)
Participants who use AI tools	73% (14 participants)	59% (10 participants)	67% (4 participants)
Participants who do not use AI tools	26% (5 people)	41% (7 people)	33% (2 people)

Concerning the different tools that were mentioned by the participants themselves, ChatGPT emerges unrivalled as the most frequently used tool. This program was mentioned 19 times among the responders. The other most popular tools that were mentioned include: Duolingo, Quizlet, Gemini, Pronounce, DeepL, and Perplexity.

Overall, 14 people in this study declared that they do not use AI-powered tools to aid their learning process. For some people it is not necessary to use these tools, because they do not need to use them in their profession. Four participants said that they prefer traditional ways of learning, i.e. learning by heart or learning solely from textbooks, while 8 people stated that these tools make mistakes so they need to fact-check everything on their own, making it actually more time-consuming.

One of the main reasons for not using these tools was the lack of trust: "I believe there are much better tools for learning, and I do not trust AI to provide me with real information, because it is only an algorithm that can't verify if something is true or not. When it comes to making lists and notes, I prefer to do it myself because it's good for remembering new things"

(Participant 3, Group 2), with another person providing the reason of "lack of trust in computers in anything beyond mathematics or so" (Participant 33, Group 2). The third person also highlighted the lack of trust: "I do not trust ChatGPT to correct my sentences correctly every single time I study a new language. It's hard for me to verify its authenticity" (Participant 20, Group 3).

Another reason is that the participants felt that they did not have to use them in order to help their learning process. One person stated that "I did not have any opportunity. I know some of my friends use AI for school or university essays or projects, but I never felt a need to do so" (Participant 26, Group 2). Another respondent said that "I like doing part of the research rather than getting ready answers from AI, plus I do not feel that the things I learn can be enhanced with AI" (Participant 34, Group 3). Yet another participant declared that "in the case of the field of study I am studying (technical physics), first of all, you need to learn a lot of information by heart or practice solving tasks. Most of the necessary information is provided in university classes or in the literature recommended by the instructors. In this case, using AI is not necessary as it is not able to learn for me. I once tried to use ChatGPT for a project with LabView, but the chat did not quite handle the program and its help was useless" (Participant 23, Group 2).

The last reason was the incompetence of these programs. One participant stated that "I mostly prefer tutorials or study videos on YouTube. Generally I use AI tools if I am looking for the answer and not when i want to learn something" (Participant 6, Group 2). Another person claimed that the tools "have been ineffective in the past" (Participant 11, Group 3).

The majority of the participants, 28 people, declared that they use AI-powered tools while learning. The main reasons include their ability to rephrase and simplify difficult topics, assist with research, and support language learning. As mentioned above, a frequently-appearing reason for using such tools is the ability to explain difficult topics—"I use AI tools to provide me with multiple choice tests and practices on the topics I want to learn. I also use chatGPT to simplify certain topics or definitions I do not understand and learn in smaller chunks" (Participant 4, Group 2). Another person said that they mainly use AI tools to "consolidate all the information, making it accessible and understandable. This means, instead of searching for a topic and opening a significant amount of tabs, I just ask the tools to provide me with the key-points, relevant information, consolidated in a short period of time" (Participant 42, Group 3). The next participant claimed that "they facilitated the learning process and provided easy definitions and explanations of complex concepts" (Participant 14, Group 2).

The following reason is the help these tools provide when conducting research. The first participant stated that "they mainly helped me with research on literature, its interpretations and creators" (Participant 5, Group 2), while another one said that "it searches answers to specific questions, I can inquire about everything instead of looking for another article hoping to find the answer, checks for me whether the information is definitely in line with current knowledge, whether it is supported by scientific research or not" (Participant 8, Group 3). A following respondent stated that "ChatGPT allows for an easier search of information related to certain topics" (Participant 12, Group 3), while another said that they "spend less time on searching the useful literature and more time on analysing the literature" (Participant 41, Group 2). One person declared that these tools were useful in the sense that they were able to

provide a different insight into questions, while another claimed that they "serve as a guide in which direction I should proceed with my research" (Participant 21, Group 3).

Another reason is the fact that these tools help when trying to learn a new language. One participant provides a specific example of such a tool: "Pronounce helps me in language studying, mostly with pronunciation and speech production" (Participant 40, Group 3). Another respondent said that "Duolingo uses AI to create lessons and is where I learn Portuguese. It allowed me to have basic conversations with my partner's family" and that "Youtube and Spotify podcasts have AI-driven recommendations and they help me develop language skills" (Participant 38, Group 3). The next respondent said that they use AI tools "when I need an explanation of something that I don't understand, for example when learning a language to explain a rule" (Participant 39, group 3).

There were also other reasons, related either to work or to learning in general. These include drafting more professional emails, and according to one participant, "chatGPT helps me with negotiation tactics that I need for work" (Participant 38, Group 3). These tools can also be used to teach about current events and historical periods, and help find answers to everyday questions. One respondent provided a specific example of DeepL, which "helps me when a text related to study or professional activities is written in another language, and when I need to read either quickly or I don't know the language in which it is written" (Participant 40, group 3), while another stated that these tools had "helped me by systematising my knowledge and repeating the material I had learned" (Participant 15, Group 3).

5.1. The frequency of tool use

When asked how often the participants use such tools, the answers were varied. 20% of the participants stated that they use them everyday, with one person saying that they use them several times a day. A couple of times per week was also a popular choice, as 27% of the participants provided this answer, with one person saying that they have the subscription. 20% of the participants use such devices once in two weeks, while 23% of the respondents claimed that they use them sporadically. One participant said that they do not use these tools regularly and that "it depends. I can use it once a week when learning myself and 10 times a week when preparing materials" (Participant 20, Group 3). However, one participant reported trying such tools a few times before ultimately discontinuing their use, while another reported rarely using them for learning. The results are gathered in Table 2.

Table 2: *Frequency of tool use*

Everyday	Several times a day	A couple of times per week	Once in two weeks	Sporadically	Rarely
20%	2%	27%	20%	23%	8%

5.2. The efficiency of AI tools

Another important question in this study was the question of the efficiency of AI-powered tools. The opinions were divided, as some people fully agreed that these tools are effective, while others did not have such positive reactions.

Regarding the group that considered such tools to be effective, some of the reasons include: the matter of saving time, the ability to develop both professionally and personally, as well as aiding the process of understanding various concepts. According to one participant, these tools are "very effective and provided me with a wide range of information. Additionally, it almost always provides more than just a one simple answer and provides several points of view" (Participant 12, Group 3). Another said that "AI tools are effective in helping me develop personally and professionally, that's through the algorithm designed specifically for my needs that keeps me engaged and interested" (Participant 38, Group 3), and one claiming that the tools "answer questions in great detail and are rarely wrong" (Participant 17, Group 3). Others stated that it helps with sorting information and underlining the most important parts in a given paragraph.

The people who did not think that these tools are effective provided some common answers: that the given information is not always correct, meaning that the users had to fact-check them themselves. In addition, sometimes these programs would provide irrelevant information or facts that did not relate to the given topic or prompt. Another reason was that some of the participants believe that it is better to do research on their own, rather than rely on external tools. One participant stated that "those tools are good to automate workflow and find fast answers but if you need to make something more involving then doing research on your own is far more important" (Participant 19, Group 3). The next respondent said that "the downside is that sometimes the information given is not correct and I double check using google or other sources" (Participant 4, Group 2). Some participants thought that the tools would be more efficient, with another saying that the tools were not effective at all because "they always missed the point, for example giving incorrect information or pulling out irrelevant details in the case of the quiz-making AI" (Participant 11, Group 3). Another person agreed, claiming that they "still need to control, if the AI does and writes everything right. That's because I'm a control freak and can rely only on myself" (Participant 41, Group 2) or that "some results, unfortunately, were pure nonsense" (Participant 35, Group 3).

5.3. Other benefits and challenges

Several benefits and advantages of such tools have already been discussed, including the ability to save time and help conduct research, as well as aiding the language learning process. However, the participants agreed that these tools may be used in other ways as well and brought forward a multitude of different answers, ranging from improving their personal lives to providing mental support.

The most considerable benefit discussed was the amount of time the participants saved thanks to these tools. Since they did not have to search for the materials or literature overview themselves and received the answers to their inquiries at once, they had more time to focus on

other aspects, such as analysing the presented materials. Some other answers include: "self confidence as I know that my statements are correct" (Participant 31, Group 2), "the chance to practise with tools that are becoming more common in workplaces and in our life in general" (Participant 6, Group 2), "I discovered how to make my revising process more efficient" (Participant 35, Group 3), and "the feeling of keeping up with the rest of the world" (Participant 40, Group 3). One participant explained that they treated ChatGPT as their own private psychologist, as they were able to gain a new insight into their problems, and had the opportunity to voice their concerns whenever they wished to do so. They felt as if they always had "somebody" to talk to and felt that they were being heard.

The challenges noticed by the participants include the problem of spreading misinformation and the fear of such tools being wrongly used. One participant responded that the "future looks bright with dark clouds in the sky. AI is a tool like a hammer or a saw, it poses its dangers like other tools and it is only on our hand to regulate it and use it reasonably and responsibly" (Participant 1, Group 2). Another one stated that they fear that "overly relying on AI tools could discourage students and people overall from thinking creatively, developing their own skills and understanding concepts on a deeper level" (Participant 11, Group 3). Several participants also reported feelings of frustration due to not receiving the correct answer despite multiple attempts.

5.4. *Overall levels of satisfaction*

27 people expressed high levels of satisfaction, while 11 participants expressed dissatisfaction with using AI tools, and 4 people said that they experienced an average level of satisfaction. Concerning the last group of participants, one such person stated that "I am not quite satisfied with their ability to see details and execute on them" (Participant 9, Group 1), while another said that "fifty fifty satisfied because of some of the mistakes it makes" (Participant 30, Group 2). The last participant stated that in general "my feelings are mixed - I think it is an amazing invention that leads to development in many areas of life. However, I also believe that it does not lead to personal development, quite the opposite. People using AI in college, for example, are taking away less skills and information by getting the same grades they used to have to learn a lot more for" (Participant 23, Group 2).

Regarding the first group where the participants expressed high levels of satisfaction, a large amount of arguments were provided. Ranging from the issue of time-saving aspects, increasing productivity, and decision-making, the majority of participants have concluded that their experience with using such tools was satisfactory. One respondent stated that the tools "help you to think outside the box, and can also help you create art" (Participant 7, Group 1), while another said that they "are really helpful and can have a positive impact on learning new things/skills when used in a proper way" (Participant 15, Group 3). The following respondent stated that they are "really satisfied with AI tools, they're helpful, and I use them a couple of times a day. Sometimes they feel a bit addicting because they learn your habits really quickly and know how to keep you engaged, but overall, they make my life easier" (Participant 38, Group 3), while another said that "AI can do a lot of things and it's incredible,

it is also interesting for me to see how it evolves" (Participant 39, Group 3). One participant expressed ample gratitude for the apps, saying that "I love it, it fascinates me every time I use it and I feel immense gratitude for having it in my life" (Participant 8, Group 3).

A number of different reasons can be observed regarding the dissatisfaction with using AI tools, with the most prominent one being the mistakes these tools make. One participant claimed that "even though it's getting upgraded all the time, it won't give you human answers when it comes to essays etc" (Participant 29, Group 2). Another respondent stated that "the things that AI undertakes cost more overall than if a human did them, and they do them worse" (Participant 16, Group 3). One respondent stated that "mostly I was not satisfied with using AI, I think it was unable to give me the answers I needed" (Participant 23, Group 2). The results are gathered below in Table 3.

Table 3: Levels of satisfaction

High levels of satisfaction	Dissatisfaction	Average level of satisfaction
27 participants (64%)	11 participants (26%)	4 people (10%)

6. Discussion and conclusions

As seen above, these tools can be used for a variety of different purposes, with each user being able to tailor these functions and capabilities to their own individual needs. Such tools help users who may not have the means to participate in the ways of traditional learning.

The results of this study show that in this particular group of Polish learners, the majority of participants are using such tools to aid their learning process. It was observed in various age groups, including high school students, university students, and university graduates. As seen in the presented results, the answer to **RQ1** is that AI tools are being used the most by Group 3, which consists of university graduates, while over half of university students are using AI tools.

The majority of university graduates use AI tools not only as a means of learning, but also to develop other skills not directly related to their studies, such as nursing techniques or learning musical chords. Several participants use these tools as personal assistants, making them a major component in their daily life. They use it for learning, for work, and for other purposes, while high-school students use it mainly for school or entertainment purposes. The apps used most frequently by university graduates are ChatGPT, Bard, and Perplexity.

Regarding the second research question (**RQ2**), the majority of the participants think that AI tools, are in fact, effective, with almost 70% of the participants having stated that these tools have helped their learning process. Based on the results from the study, it may be concluded that the use of AI tools will increase in the future, with more and more users looking for alternative ways of learning. However, the participants also mentioned the lack of trust in these tools, especially in the sense of providing accurate information, the declining ability of critical thinking, and the importance of doing research on their own. Although there are some drawbacks mentioned, the creators of ChatGPT are constantly introducing new

improvements and increasing the amount of tasks that may be automated, suggesting that these tools will likely become more effective and useful in the future.

The study mentioned in the Introduction showed that every fourth student used AI-based tools very frequently, while half of the students used them occasionally (von Garrel & Mayer 2023). The second study discussed in the Introduction found that 27% of Americans interact with AI several times a day (Kennedy, Tyson, & Saks 2023). My results demonstrate that 20% of Polish learners in this group use AI-powered tools several times a day, while 27% use them a couple of times per week. However, 23% of the respondents use them sporadically. Due to the growing popularity of these apps and the constant introduction of upgrades, it may be surmised that the number of people using these apps on a frequent basis will rise.

A number of participants use these tools for various other reasons than strictly enhancing their learning process, including learning new skills and seeking psychological assistance, showing that these tools can be used in other ways besides research-purposes.

Several aspects regarding the use of AI tools have been discussed, including specific examples, the benefits, and the efficiency of the previously mentioned methods of learning. Although these apps can be used to facilitate the learning process, there is a risk of misinformation and generating non-existent references, meaning that users still need to fact-check the information produced by these apps. Currently, AI is viewed more as a tool rather than actively replacing teachers, yet its role in education is expected to grow considerably in the near future. Consequently, it is crucial for educators to develop a comprehensive understanding of these systems as students are already relying on them as part of their regular learning activities.

7. Limitations of the study

One of the limitations of this study is the sample group. For future research, it would be more useful to have a larger group of participants as it would allow for more inferential conclusions about a larger group of learners. Furthermore, the questionnaire would be expanded to gather more data about the use of AI tools, the efficacy of these systems as well as analysing the consequences of the prolonged use of Artificial Intelligence.

Because the questionnaire was conducted online and all of the answers were anonymous, I could not interact with the participants. If a person gave insufficient answers, I could not ask them for any specifics, further clarifications or more elaborated answers.

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Investigating Academic Writing Workload Among English Department Students: A NASA-TLX Analysis of Gamified Instruction

Monika Łodej

Jan Kochanowski University, Poland

Abstract

This study investigates the workload experienced by English Department students in a gamified academic writing task. The NASA Task Load Index (NASA-TLX) serves as the primary instrument for analyzing workload distribution across six dimensions: mental demand, physical demand, temporal demand, performance, effort, and frustration. Additionally, the study examines its correlation with self-reported perceived learning and learning outcomes. Data collected from 23 Master's students in Poland indicate a moderate overall workload, with effort and frustration emerging as the primary contributors. While students reported improvements in citation mastery, perceived workload did not exhibit a significant correlation with final grades. The findings suggest that gamification can enhance student engagement without imposing excessive cognitive strain.

Keywords: academic writing; workload; higher education; English Medium Instruction (EMI); gamification

1. Introduction

Academic writing is a core skill in higher education, particularly in tasks that emphasize precise language, structured argumentation, and critical engagement with sources, such as writing essays, term papers, and MA theses. The workload associated with academic writing can be significant, particularly for English Department students, who are expected to develop complex analytical skills and adhere to rigorous citation standards. This challenge becomes even greater for students for whom English is the medium of instruction, particularly those from non-Anglophone educational systems where academic writing conventions differ, for example, students who write in English but were educated in a different linguistic and cultural tradition. These students often navigate academic conventions that may differ significantly from those in their home education systems, where rhetorical structures, citation practices, and expectations for argumentation can vary. Consequently, they face additional cognitive

load in simultaneously mastering course content and expressing their ideas in an acquired language, which can make the writing process even more demanding.

Research indicates that English Medium of Instruction (EMI) students struggle with organizing information effectively and complying with style guides, thus reflecting differences in academic conventions between their native and target educational contexts. These students often encounter difficulties in adjusting their writing styles to align with academic expectations, which can differ significantly from those in their home countries (Liu 2005). Consequently, the academic writing workload for these students may extend beyond content mastery to include the ongoing negotiation of language, discourse conventions, and cultural expectations within their field. For instance, Lin (2015) found that many English Language Learner (ELL) students struggled to adjust their writing styles to align with American academic thought patterns, as they tended to think in their first language and apply its rhetorical structures when composing English essays. This difficulty was found to arise due to the fact that writing patterns are deeply embedded, both cognitively and culturally, making adaptation a time-consuming process. Additionally, Amano et al. (2023) revealed that non-native English-speaking researchers require significantly more time to read and write English-language papers compared to their native-speaking counterparts, indicating a higher cognitive load and extended workload. In sum, non-native English-speaking students face a multifaceted academic writing burden that goes beyond language proficiency. They are required to navigate different writing conventions, adapt to unfamiliar citation standards, and bridge diverse academic expectations, all while managing an increased cognitive load.

The reported challenges faced by English Department students in academic writing, especially those dealing with English as a Medium of Instruction, highlight the need for an examination of how instructional strategies can help reduce the cognitive load. Although gamification has been adopted in language learning (e.g., gamified vocabulary acquisition), its impact on the workload in academic writing remains underexplored. Similarly, while writing load has been discussed in terms of cognitive effort, few studies have applied an empirical workload measurement framework such as NASA-TLX, which measures not only cognitive but also physical and emotional factors. Therefore, this research, by applying the NASA Task Load Index (NASA-TLX) to this specific learning context, aims to evaluate whether gamified academic writing instruction can mitigate the perceived cognitive demands experienced by EMI students. Understanding the workload distribution across different types—mental demand, physical demand, temporal demand, performance, effort, and frustration—helps provide a comprehensive evaluation of the cognitive, physical, and emotional challenges faced during the academic writing task.

2. Academic writing and cognitive load in higher education

Writing workload is considered to be triggered by multiple factors, including cognitive demands, cultural demands, and linguistic proficiency. As observed by Flower and Hayes (1981), the process of writing involves a series of distinct cognitive activities that writers coordinate while composing a text. These activities are not linear but operate within a hierarchical structure where one process can be embedded within another. Writing is

fundamentally a goal-directed cognitive task, shaped by the writer's evolving network of objectives. Writers set their own goals in two primary ways: by establishing overarching goals and sub-goals that reflect their developing sense of purpose and, at times, by modifying or even redefining these goals based on insights gained during the writing process. Specifically, university-level academic writing classes can call for students to engage in tasks that demand high levels of cognitive effort, such as research, synthesis of sources, and adherence to formal writing rules (Hyland 2018).

Building on this, Sweller (1988) emphasized in the Cognitive Load Theory (CLT) that the efficiency of learning and cognitive performance is affected by the way information is processed in working memory. The CLT (Sweller 2010) provides a useful framework for understanding the challenges students face in academic writing. According to this theory, learners experience three types of cognitive load: intrinsic, extraneous, and germane. Intrinsic cognitive load relates to the natural complexity of information, such as organizing ideas and constructing arguments. Extraneous cognitive load depends on how the instruction is designed and comes from unnecessary difficulties, such as unclear instructions or unfamiliar formatting requirements, which make writing harder than necessary. Germane cognitive load focuses on knowledge and is related to the mental effort that helps students develop writing skills and improve their understanding, such as practicing academic writing conventions and refining their arguments. Writing, being a cognitively demanding task, imposes intrinsic cognitive load due to its complexity, extraneous cognitive load when poorly designed instructional methods interfere with the writing process, and germane cognitive load when cognitive resources are effectively allocated toward developing structured and meaningful written content. When cognitive overload occurs, writers may struggle to balance idea generation, organization, and revision. Therefore, effective instructional strategies should aim to optimize cognitive load by reducing unnecessary cognitive strain and allowing writers to focus on higher-order skills such as argumentation, coherence, and refinement.

Akin and Murrell-Jones (2018) aimed to close the gap in academic writing by exploring how the cognitive load theory can enhance academic writing instruction in higher education. The study identified key challenges students face, including difficulties in synthesizing theory and application, selecting appropriate scholarly resources, and managing the cognitive demands of academic writing. Using qualitative research methods, the study examined existing instructional practices and suggested new strategies to improve academic writing and concluded that explicit writing instruction is often lacking, leaving students without structured support to develop critical thinking and effective writing skills. In addition, it highlighted that students struggle with specific aspects of sentence structure, argument organization, citation styles (such as APA), and overall writing coherence. Writing instructors reported that many students do not fully utilize feedback, leading to persistent issues in writing quality. To explain these challenges, it is essential to emphasize the importance of reducing extraneous cognitive load, such as unclear instructions and redundant tasks, optimizing intrinsic load by tailoring assignments to students' expertise, and increasing germane cognitive load to enhance students' ability to process and apply academic writing principles. The key findings reveal that explicit academic writing instruction is essential but often missing, leaving students without the necessary guidance to develop their writing skills

effectively. Many students struggle to understand and apply course content in writing, as they face challenges in bridging the gap between their cognitive processes and the demands of academic writing.

Following from that, Wang (2024) emphasizes causal-chain windowing as a cognitive process that shapes how writers highlight causes and effects to guide readers' attention. This theory suggests that writers selectively 'window' causes and effects, directing focus and influencing how events are interpreted. Given an appropriate context, readers can infer missing elements of a narrative, while different ways of framing the same scene can evoke varied responses. Causal-chain windowing theory has practical applications in writing instruction, as it enhances both static descriptions in expository writing and dynamic elements in narrative writing. Wang (2024) explores this perspective through two key aspects: windowing of attention and causal chaining. The former helps students modify sentence structures and organize paragraphs, while the latter aids in choosing precise language to express clear causal relationships. By integrating these principles into writing instruction, Wang (2024) suggests that causal-chain windowing can help students produce more structured, coherent, and engaging texts.

Jinhui and Samu (2024) examined the writing of Chinese students through the theory of distributed cognition, which posits that cognitive processes are not confined to individuals but are distributed across people, media, and the environment. Using a three-draft process, learners initially relied on individual cognition but faced challenges such as uncertainty in topic selection, structural issues, and limited idea development. In the second draft, access to external cognitive resources—such as online dictionaries and reference materials—helped clarify misunderstandings, refine sentence structures, and improve coherence. By the third draft, the integration of automated feedback, peer reviews, and teacher comments fostered collaborative learning, leading to noticeable improvements in vocabulary richness, sentence complexity, and content organization. These findings highlight that a distributed cognition approach enhances writing proficiency by allowing learners to refine their work through interactive, technology-driven, and socially supported processes. This suggests that integrating external cognitive resources and structured feedback mechanisms into writing instruction can help students overcome writing challenges more effectively, ultimately fostering stronger composition skills.

In practical terms, Arliyanti and Hapsari (2022) highlighted that while process-based writing has been widely studied and applied in higher education, there is still a limited understanding of how cognitive strategies are employed in this approach. Therefore, they designed a study conducted with two English language education students from a private university in Yogyakarta to explore how EFL undergraduate students used cognitive strategies in process-based essay writing. The findings revealed that both participants used different writing strategies in the planning stage of the essay writing process. One student organized her writing using an outline, whereas the second student used keywords to organize his writing. This study suggests that when teaching process-based essay writing, language teachers or lecturers should be aware of the different stages of students' cognitive strategies, especially during the planning stage.

The cultural demand, on the other hand, is seen by Flower (1994) as being integrally inscribed in cognitive theory through the idea that writing is embedded in socially literate practices that require writers to respond to external expectations and discourse norms. Flower argues that social expectations, discourse conventions, and the writer's personal goals and knowledge become inner voices. The tension among these forces often creates the hidden logic behind student writing. Writers therefore navigate the tensions between personal meaning-making and the broader cultural frameworks that dictate how texts should be structured, interpreted, and valued. This aligns with the idea that literacy is not just about individual expression but about adapting to the communicative norms of specific communities. Flower's theory of negotiation highlights how writers internalize cultural and discourse conventions as 'inner voices' shaping their writing decisions. This means that cultural demand manifests as both an external constraint and an internalized expectation—writers must reconcile their personal rhetorical choices with cultural norms and social expectations. The process of negotiation allows writers to engage with, resist, or reshape these cultural forces, leading to meaning-making that is both personal and socially situated. In essence, Flower's framework suggests that cultural demand is not just a backdrop but an active force in writing. It influences how students construct meaning, adopt discourse conventions, and position themselves within academic and social contexts, making writing a site of tension, conflict, and adaptation to cultural literacy expectations.

In the same vein, the study by Rahmat and Whanchit (2024) aimed at exploring the writing process from the social-cultural theory, revealed that, contrary to popular beliefs, writing is not a solitary process. Writers use language to communicate with the people around them, both for content and as an audience to their work. The study found that the writing process can be considered a social-cultural task in several ways. Specifically, it revealed a strong positive relationship between language use, zone of proximal development, and social interaction. The valuable insights for teaching writing strategies based on the study's findings emphasize the importance of organization, review, and communication in writing. Clear structure and organization in writing tasks are observed to be essential for clarity, and reviewing one's own work can significantly enhance this clarity. Writing serves not only to present content clearly but also to engage the reader, with language use acting as a tool for effective communication. Cognitive skills such as planning ideas before writing play a crucial role, and employing brainstorming and outlining techniques can facilitate this process. The study also highlights the value of social interaction, with engagement during challenging writing tasks helping students feel more confident and reducing anxiety. Collaborative writing activities and peer feedback foster this social engagement, contributing to a more supportive learning environment. Furthermore, the positive relationships between language use, zone of proximal development, and social interaction suggest that writing tasks should be designed to provide appropriate scaffolding, guiding students through tasks that are just beyond their current abilities. These insights underline the significance of combining cognitive, social, and language-use strategies in writing instruction to enhance student engagement, reduce writing-related stress, and improve overall writing skills.

Linguistic proficiency is also found to contribute to writing workload (Aizawa et al. 2020). The data collected from Japanese undergraduate students reveal that linguistic

proficiency is shown to significantly influence writing workload in EMI settings. Students with higher English proficiency, as measured by TOEIC scores, experienced fewer challenges in academic tasks, including writing. This is because they could more easily understand course material and express their ideas clearly in writing. Although the study didn't identify a specific proficiency threshold, it revealed that students with lower proficiency faced greater challenges in writing tasks, resulting in a heavier workload. The paper also highlights that other factors, such as prior content knowledge, motivation, and the classroom learning environment, also impact students' ability to manage writing tasks. Therefore, students with lower language proficiency may require more time and support to complete writing tasks effectively, leading to an increased workload. Similar conclusions were yielded from the data obtained from graduate students with EMI in Kazakhstan (Tajik et al. 2024), which found that many students struggle with various aspects of academic writing due to low English proficiency, as well as specific challenges in academic writing such as style, documentation practices, and paraphrasing. Additionally, the findings that highlight insufficient exposure to English in earlier stages of their academic journey, along with gaps in available language and writing support, are also considered contributing factors. The paper concludes that these challenges, in turn, reflect broader tensions between policy goals for English Medium Instruction and the practical realities faced by students.

The lack of academic English skills of EMI, as a contributing factor, has also been observed in Icelandic students enrolled in the English Department. The so-termed "hidden challenge" (Ingvarsdóttir & Arnbjörnsdóttir 2014, in Arnbjörnsdóttir 2017: 77) was reported to be caused by an overconfident perception of students' English proficiency by university officials and by the students themselves. This situation arose from the Department of English's objective to quickly elevate students to a level of academic English that enabled them to engage with a curriculum and instruction based on English as a native language norms. The challenges students faced highlighted the need to adapt teaching and learning practices, as they differed from those encountered in their previous EFL-focused environments with limited writing experience. Research revealed that students' struggles in this new context, where English functioned as an additional language, underscored the importance of targeted instructional approaches. Based on the data, an intensive approach aimed at addressing the English academic literacy needs of students entering the University of Iceland was introduced. The approach reached its goals by fostering awareness of writing conventions, teaching when and how to apply strategies, improving revision skills, and encouraging persistence in rewriting until the text authentically reflected the author's ideas. Ultimately, the research demonstrated that through writing, students gained an understanding of English academic texts, which enhanced their reading skills.

It is to be observed that non-native English-speaking students often struggle with paraphrasing due to limited lexical and syntactic flexibility (Keck 2006). Academic English requires a level of linguistic proficiency that allows for meaning retention while modifying sentence structure, which can be particularly challenging for L2 learners. Research suggests that students with lower proficiency are more likely to rely on direct quotations or slightly modified sentences from sources, sometimes leading to textual plagiarism (Chandrasoma et al. 2004). Additionally, the complexity of citation styles, such as APA, MLA, and Chicago, can

create further difficulties for students unfamiliar with the nuances of attribution in English academic discourse (Hyland 2018). Recognizing this, universities worldwide have started implementing strict plagiarism detection systems. However, non-native students often report feeling anxious about these systems, fearing unintentional plagiarism due to differences in cultural expectations (Liu 2005). In addition, studies indicate that students who receive explicit instruction on plagiarism, citation techniques, and academic integrity policies demonstrate improved writing performance and greater confidence in source use (Bretag 2013). Institutions that integrate culturally sensitive plagiarism education, rather than punitive approaches, help students transition more effectively into Western academic writing norms (Introna et al. 2003).

In sum, academic writing workload in EMI contexts is shaped by cognitive, linguistic, and cultural demands, creating significant challenges for non-native English-speaking students. Beyond cognitive strain, students are expected to navigate unfamiliar rhetorical structures, adapt to new citation standards, and reconcile differences between their previous academic training and EMI expectations. Research highlights that distributed cognition, process-based writing, and scaffolding can help manage workload by easing the transition to new academic norms. Additionally, gamification has been explored as a strategy to reduce perceived workload by increasing engagement (Pitura 2022) and providing structured, interactive learning experiences (Turula 2021). However, without targeted support, EMI students often experience increased mental effort, frustration, and time pressure, making academic writing a persistent challenge.

3. Research aims and rationale

Higher education students often experience high workload levels due to multiple academic and extracurricular activities (see e.g., Chambers 1992; Jääskeläinen et al. 2022; Kember 2004; Kyndt et al. 2013 for reference). Specifically, academic writing is a cognitively demanding process that requires students to engage in complex tasks such as critical thinking, argument development, and synthesis of multiple sources. The study performed on university students in Saudi Arabia showed that the complexity of academic writing assignments, combined with the pressure to meet institutional expectations, can contribute to students excessive burnout (Al Murshidi 2014). For students studying in English-Medium Instruction (EMI) settings, academic writing presents additional challenges due to the requirement to operate in a non-native language (ref. Knoch et al. 2015). A Polish study on the cognitive load involved in learning academic words through writing composition confirms this proposition, as it revealed that "if learners are under heavy cognitive load, as in this study, sentence writing may be more conducive to lexical learning than essay writing" (Silva et al. 2021: 1168). In addition, studies have found that EMI students often struggle with producing clear and concise text, recognizing the relevance of writing to their academic needs, practicing effective strategies at different stages of the writing process, following the writing conventions of the English academic community, and composing and revising an expository essay (Arnbjörnsdóttir 2017). Furthermore, the move to the Anglophone writing conventions can create challenges for students, as they may struggle to adapt to unfamiliar structures as well as stylistic and

citation norms, including plagiarism, which can impact their academic performance and confidence (Tajik et al. 2023).

While there is existing research on the general difficulties faced by EMI students or students in broader academic contexts (e.g., struggles with clarity, structure, and adherence to academic conventions), few studies have specifically examined how writing workload influences English Department students' engagement with academic writing tasks. The present study fills this gap in the literature by focusing specifically on Polish higher education EMI students and their unique struggles with writing workload in academic writing. Additionally, this is the first study on English Department students that looks specifically at the effects of the application of gamified instruction in an academic writing class. Thus, the study aims to investigate the workload experienced in a gamified academic writing task.

To achieve this aim, the following research questions were formulated:

1. What is the general workload experienced in a gamified academic writing task?
2. How do different workload subscales contribute to overall workload perception in a gamified academic writing task?
3. Is there a correlation between NASA-TLX workload perception, self-reported citation mastery improvement, and final course grades?

While previous research has explored general challenges faced by EMI students, this study provides a deeper understanding of how workload impacts English Department students' ability to effectively engage with academic writing tasks. By examining this group in detail, the study offers insights into the specific demands they face and suggests strategies for managing these challenges to improve their writing outcomes.

4. Method

A cross-sectional study was conducted in the Department of English at a mid-sized Polish university. Data were collected using a Google Form survey, which was distributed to participants through a convenience sampling technique. This study employs a quantitative research design to examine the relationship between workload perception, perceived learning, and academic performance. Data were collected from three sources: student-reported workload (NASA-TLX), perceived citation mastery (Likert scale), and instructor-provided final grades. The following variables were analyzed: (a) Independent Variable: NASA-TLX Workload Scores (student-reported effort), (b) Mediating Variable: Citation Mastery Improvement (self-reported perceived learning), and (c) Dependent Variable: Final Course Grade (instructor-provided score). By integrating multiple data sources, the study provides a structured analysis of workload, perceived learning, and academic performance when mastering APA citations.

4.1. Participants

The research sample comprised 23 students enrolled in the first year of Masters's program in English with a concentration in either TESOL or translation studies. The ratio of female to male students was 17 (74%) to 7 (26%). The limited sample size corresponds directly to the total number of first-year Master's students in English enrolled at the time of the study. The actual available student population determined the sample size, ensuring the inclusion of all eligible participants.

4.2. Instrument

This study uses the NASA Task Load Index (NASA-TLX) to assess task workload. The index (NASA Ames Research Center 1986; Hart & Staveland 1988) consists of two parts. Part one evaluates participants' cognitive load and task complexity by assessing six aspects of workload and ranking their contribution to the overall experience using a 20-point scale (e.g., 1 = very low, 20 = very high workload). The six dimensions include six questions evaluating different workload aspects: mental demand (cognitive effort), physical demand (bodily exertion), temporal demand (time pressure), effort (exertion to meet task demands), performance (self-assessed success), and frustration (stress, irritation, or dissatisfaction). Part two involves ranking the six workload dimensions by requiring participants to compare them in 15 paired comparisons. For each pair, participants identify which dimension had a greater impact on their overall workload. Additionally, a five-point Likert scale question is included to measure students' perceived knowledge gains in citation mastery: "To what extent did this task help you master citation types?" This allows participants to self-assess their learning experience and the perceived impact of the gamified task. Finally, final course grades are provided by the instructor, who also served as the researcher.

4.3. Study design and procedure

The research was conducted during the winter semester of the 2024/2025 academic year as part of a 30-hour academic writing course, providing students with an opportunity to develop their in-text citation skills in APA format. To enhance collaborative learning, the instructor designed a gamified task that allowed students to practice the citation techniques before submitting a final graded assignment. Students worked in groups of four during a single gamified class session lasting 80 minutes, focusing on different types of direct and integrated quotations, paraphrasing, and summary citations. The task followed a step-by-step instructional format, guiding students through challenges designed to reinforce proper APA citation practices in an engaging and competitive manner.

5. Results and interpretation

In this study, descriptive statistics, Pearson's correlation coefficient, and correlation matrix with p-values were used to analyze workload perception in a gamified academic writing task and to measure students' perceived knowledge gains in citation mastery. Mean and standard deviation were computed for both weighted and unweighted NASA-TLX scores to assess overall workload and compare subjective versus objective perceptions. Pearson's correlation analysis examined the relationships between workload subscales and overall workload perception. The correlation matrix further explored associations between NASA-TLX workload scores, citation mastery improvement, and final course grade, providing insight into the statistical significance (p-values) of these relationships.

First, descriptive statistics were calculated (Table 1) to determine the general workload level, with a further distinction between objective (unweighted score) and subjective (weighted score) assessments. The data indicates a moderate overall workload with differences between objective and subjective assessments. The unweighted NASA-TLX score (M = 24.79, SD = 3.78) suggests that when all workload subscales were treated equally, students experienced a moderate level of workload. However, the lower weighted NASA-TLX score (M = 21.27, SD = 7.24) indicates that when students assigned importance to different workload factors, they generally perceived the task as less demanding. The greater standard deviation in weighted scores points to more variability among students in their workload perception.

Table 1: *General workload perceptions*

Score Type	Mean Score	Standard Deviation
Unweighted NASA-TLX	24.79	3.78
Weighted NASA-TLX	21.27	7.24

These findings indicate that students experienced the workload differently depending on whether it was measured objectively or subjectively. When all workload components were weighted equally, the task appeared moderately demanding. In contrast, when students rated which aspects felt most important, their perceived workload decreased. This suggests that students differentiated among workload dimensions rather than perceiving the task as uniformly demanding. Some participants may have focused more on time pressure, while others emphasized the effort required. Consequently, individualized weighting of workload components produced lower overall scores, reflecting diverse perceptions of what made the task demanding.

Next, descriptive statistics (Table 2) and Pearson's correlation coefficients (Table 3) were calculated to examine the contribution of individual NASA-TLX subscales to overall workload perception. The Performance score (M = 2.89, SD = 0.51, reverse-coded) indicates that students felt they performed well on the task. This suggests that the perceived success contributed the least to students' overall sense of workload. In contrast, Temporal Demand (M = 14.82, SD = 4.90) and Effort (M = 11.52, SD = 3.46) emerged as the strongest contributors to perceived workload, suggesting that students experienced notable time pressure and needed to exert sustained effort to achieve the task objectives. The workload

associated with Frustration (M = 8.65) and Physical Demand (M = 8.26) was medium, indicating that students generally experienced a moderate level of emotional strain and physical effort during the task. Finally, the relatively low Mental Demand score (M = 6.75, SD = 3.10) indicates that the task required moderate cognitive effort but was not overwhelmingly difficult.

Table 2: Subscale statistics

NASA-TLX Subscale	Mean Score	Standard Deviation
Mental Demand	6.75	3.10
Physical Demand	8.26	4.22
Temporal Demand	14.82	4.90
Performance	2.89	0.51
Effort	11.52	3.46
Frustration	8.65	5.14

Note. The *Performance* subscale was reverse-coded so that lower scores indicate better perceived performance (greater success) and higher scores indicate poorer perceived performance. The original (non-reversed) scores had a mean of 17.11 (*SD* = 0.51).

Additionally, analysis of standard deviations offered insight into workload variability. The low SD for performance (0.51) suggests consistent confidence in task completion. Mental demand (SD = 3.10) and effort (SD = 3.46) showed low variability, indicating a shared perception of cognitive workload. However, the higher SDs for physical (4.22) and temporal demand (4.90) suggest that some students felt significantly more time pressure and physical strain than others. The highest variability in frustration (SD = 5.14) indicates a wide range of emotional responses, with some students experiencing high stress while others found the task smooth and manageable.

These findings provided a foundation for correlation analysis, further exploring relationships between workload components and overall workload perception in the gamified learning environment. Pearson's correlation coefficient was used to determine the strength of relationships between each workload subscale and students' overall workload perception. The results (see Table 3) reveal that different subscales contributed to workload perception to varying degrees, with Effort and Frustration emerging as the strongest contributors.

Table 3: Correlation between NASA-TLX subscales and Overall Workload

NASA-TLX Subscale	Pearson's *r*
Mental Demand	0.55
Physical Demand	0.51
Temporal Demand	0.63
Performance	0.62
Effort	0.80
Frustration	0.76

Note. Correlations were calculated using the original (non-reversed) *Performance* scores, where higher values indicate poorer perceived performance.

Among all workload components, Effort (r = 0.80) and Frustration (r = 0.76) showed the highest correlations with overall workload. This suggests that students who perceived the task as requiring significant effort or who experienced frustration were more likely to report a higher overall workload. The strong relationship with *Effort* indicates that the amount of work students felt they had to invest to maintain their performance played a crucial role in shaping their workload perception. Similarly, the high correlation with Frustration highlights the emotional impact of the task, suggesting that students who found it stressful or difficult to manage were more likely to perceive it as demanding. Meanwhile, Temporal Demand (r = 0.63) and Performance (r = 0.62) demonstrated moderate correlations with overall workload. The correlation with Temporal Demand suggests that time pressure influenced workload perception, though it was not the most significant factor. Notably, the correlation with Performance was based on the original (non-reversed) scores, meaning that higher values reflect poorer perceived performance. Therefore, students who felt they performed less effectively also tended to report a greater workload.

Finally, Mental Demand (r = 0.55) and Physical Demand (r = 0.51) were the least correlated with overall workload. The relatively lower correlation with Mental Demand suggests that while students engaged in cognitive processing, they did not perceive the task as highly demanding from a cognitive standpoint. Similarly, the weaker correlation with Physical Demand indicates that students did not experience substantial physical strain while completing the task. Overall, the correlation analysis highlights that Effort and Frustration were the primary drivers of workload perception, while Temporal Demand and Performance had moderate associations. Mental and Physical Demand had the weakest correlations, indicating that the task was neither excessively difficult nor physically strenuous. These results that students' perceptions of workload were shaped more by their emotional response and the effort they had to exert rather than purely by time constraints, cognitive load, or physical strain.

In the final step, a correlation matrix with statistical significance (Table 4) was performed to investigate the correlation between three variables: a NASA (TLX) performance, self-reported citation mastery improvement, and a final course grade.

Table 4: Correlation matrix with p-values

	NASA (TLX) Workload Score	Citation Mastery Improvement	Final Course Grade
NASA (TLX) Workload Score	1.000 (p=1.00)	0.525 (p=.03)	0.037 (p=.86)
Citation Mastery Improvement	0.525 (p=.03)	1.000 (p=1.00)	0.261 (p=.32)
Final Course Grade	0.037 (p=.86)	0.261 (p=.32)	1.000 (p=1.00)

The correlation analysis revealed a statistically significant, moderate positive relationship between the overall NASA-TLX Workload Score and students' self-perceived improvement in citation mastery (r = .53, p = .03), suggesting that those who invested more cognitive and emotional effort in the gamified task reported greater perceived gains in mastering citation types. In contrast, both the correlations between the workload score and the final course grade

(r = .04, p = .86), and between citation mastery improvement and the final grade (r = .26, p = .32), were weak and not statistically significant. These results indicate that perceived workload and perceived citation improvement were not reliable predictors of actual academic performance. The findings suggest that students who felt the gamified writing task required more effort (both cognitively and emotionally) also tended to perceive greater improvement in their citation skills. However, these self-perceptions did not translate into higher final course grades. In other words, while the task may have been effective in raising students' awareness of their own learning progress, particularly in citation mastery, it did not have a measurable impact on their overall academic performance. This, in turn, suggests a disconnect between students' subjective learning experiences and the objective grading criteria used in the course, possibly due to other assessment components not directly related to the task.

6. Discussion and conclusion

The present investigation is inscribed in the current research line of academic workload perception and instructional design in EMI contexts, particularly in relation to gamified approaches in higher education. In reference to the first research question that aimed at investigating the general workload experienced by English Department students during a gamified academic writing task, the analysis indicates that students experienced a moderate level of workload while engaging in the gamified academic writing task. The findings reveal that the general workload related to academic writing was moderate, meaning the task was challenging but not overwhelming. Subjective perceptions of workload that students experienced in academic writing played a role, as they identified certain aspects as more demanding than others. These findings suggest that the gamified academic writing task effectively engaged students without imposing excessive cognitive strain. The consistency in workload invested in academic writing perception across students also indicates that the task was well-structured and balanced.

The second research question examined how workload subscales (Mental Demand, Physical Demand, Temporal Demand, Performance, Effort, and Frustration) contributed to the overall workload invested in academic writing. The analysis revealed that Effort and Frustration were the strongest correlates of perceived workload. This suggests that students experienced the task as requiring considerable effort and emotional involvement. Their sustained engagement in improving citation accuracy may have triggered frustration when they encountered skills that were still underdeveloped and required additional practice. Temporal Demand and Performance also showed moderate associations with overall workload. This indicates that time pressure and perceived performance played notable, though less dominant, roles in shaping workload perceptions. The competitive and structured nature of the gamified session, where students gained points for accuracy and timely submission, may have moderated their sense of time pressure. Finally, Mental Demand and Physical Demand had the weakest correlations with overall workload. When situated within the context of an academic writing classroom, the findings indicate that students reported minimal engagement in cognitive and perceptual processes such as reasoning, decision making, memory recall, visual attention, and information seeking during the task. Similarly,

they did not report experiencing any substantial physical demands related to the task workload, including sustained gaze, typing, scrolling, verbal interaction, or gesturing. Overall, the findings suggest that the experience of workload in this academic writing context was primarily influenced by students' perceived effort and emotional responses, while cognitive and physical demands appeared to play a more limited or secondary role. This pattern highlights the importance of affective and motivational factors in shaping students' experiences of academic tasks and points to the need for instructional approaches that attend not only to cognitive complexity but also to the emotional and self-regulatory dimensions of student engagement.

Addressing the third research question, which examined the relationship between students' perceptions of workload, self-reported improvement in citation mastery, and final course grades, the study explored how students' subjective experiences of task demands might relate to their perceived academic development and performance outcomes. The results suggest that students who reported higher workload levels also tended to report greater improvements in citation mastery, as indicated by a moderate and statistically significant positive correlation. It is possible that students who perceived the academic tasks as more demanding may have engaged more purposefully in the learning process, which could have contributed to their perceived improvement in applying APA citation conventions. However, this perceived improvement in citation skills did not show a statistically significant association with final course grades. Furthermore, there was no meaningful correlation between perceived workload and final course performance, which suggests that other variables such as prior academic knowledge, the structure of course assessments, or the specific roles students adopted during the gamified activity may have influenced final outcomes.

Given these insights, future research on writing workload experienced by English Department EMI students might extend to investigating various instructional strategies, such as peer tutoring, flipped classrooms, and differentiated instruction. This would allow researchers to observe which of these strategies most efficiently balance the workload invested in academic writing and enhance engagement without increasing frustration that could hinder gains in knowledge and skills. Additionally, longitudinal studies could explore how repeated exposure to gamified academic tasks influences long-term writing development and academic performance. While gamification can be an effective means of engaging students and improving specific writing skills, such as citation, instructors might consider how different workload components (effort, frustration, and time pressure) interact to shape students' overall experiences. By adapting gamified activities, for example, by reducing time constraints or increasing opportunities for peer collaboration, instructors can better align instructional design with students' cognitive and emotional needs. This, in turn, can contribute to creating a more supportive learning environment and facilitate a smoother, more confident transition to Anglophone academic writing conventions. Finally, it is important to note that the limited sample size, which includes only students enrolled in a specific course and the total number of first-year students in the Master's programme, constrains the generalizability of the findings. Thus, future research involving larger and more diverse cohorts is needed to validate these conclusions and further refine pedagogical approaches.

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Back to Normality? A Bibliometric Analysis of L2 Vocabulary Research 1989–93

Paul Meara

Swansea University and University of Oxford, UK

Abstract

This paper is the latest in a series of studies published in *LingBaW* that contribute towards a historical review of research into L2 vocabulary acquisition. This instalment uses an author co-citation analysis (Small: 1973) to examine the research on L2 vocabulary acquisition published in 1993. Two analyses are presented. The first analysis provides a context for the 1993 data. It looks at work that was being cited in a five-year window covering 1989–93. The second analysis is a more detailed account of the 1993 research on its own terms. These analyses suggest that a surge in psycholinguistic research identified in 1992 may be a transient feature of the field. 1993 exhibits a return the patterns noted in our earlier studies, where the most significant influences come from an applied linguistics perspective.

Keywords: L2 vocabulary acquisition; vocabulary research; bibliometric; author co-citation

1. Introduction

This paper is the thirteenth instalment in a series of studies in which I have been attempting to map out the development of L2 vocabulary research over the last 50 years (cf. Meara 2024). These reports are based on the research outputs listed in the Vocabulary Acquisition Research Archive (VARGA) database (Meara n.d.), a comprehensive collection of research papers that has become the main reference source for research into L2 vocabulary acquisition. Previous reports covered the period 1982–92. The present report takes this historical overview another step forward by analysing the new research which appeared in 1993.

In my last report (Meara 2024), I noted that the 1992 outputs amounted to a marked change of direction from my earlier reports. The picture that had been developing since 1982 showed a steady growth in the number of research outputs, and the emergence of identifiable clusters in the bibliometric maps that signal developing trends in the L2 vocabulary research. In 1992, however, these trends were seriously disrupted: the 1992 bibliometric map was no longer dominated by influencers from the tradition of Applied Linguistics. Rather, the most-

cited influencers in 1992 all came from a more psycholinguistic tradition, asking different questions and relying on highly technical experimental research methods which had previously played only a limited and minor role. What we might call "main stream" L2 Vocabulary Research was reduced in 1992 to a small cluster exhibiting few co-citation links with the much larger psycholinguistics cluster.

At the time, I questioned whether this dramatic change of course was a permanent feature of the research, or just a temporary blip. A preliminary assessment of the 1993 data suggests that "normality" has been restored: the burst of activity in L2 psycholinguistics has retrenched and themes identified in our earlier studies have re-emerged. Indeed, as we will see, most of the new influencers who appeared in the 1992 mapping have disappeared in 1993, being replaced by more familiar names.

This report begins with an overview of the research published in the five-year window 1989–93, and continues with a more detailed exploratory account of the 1993 publications. As usual, the analyses that follow use the Author Co-citation method developed by Small (1973). Small's methodology is described in detail in Appendix 1 for the benefit of readers who are not yet familiar with the approach used in these reports.

2. Part 1: The 1989–93 data set

The basic statistics of the 1989–93 data set are summarised in Table 1, alongside the 1988–92 data for comparison. The table shows that the 1989–93 corpus is considerably larger (17%) than the 1988–92 corpus. We can also identify a significant increase in the number of authors who contribute to the data set. As usual, most of the authors identified make just one contribution to the corpus: the proportion of authors in this category remains steady at about 81% in 1989–93. The number of prolific authors – authors who contribute six or more outputs to the data set - has slightly increased in 1989–93.

Table 1: The basic statistics of the 1988–92 and the 1989–1993 research outputs

	1988–92	1989–93
Total outputs	628	734
Unique authors	633	731
Prolific authors (6+ contributions)	12	15
Authors making a single contribution	512	573

Table 2: The prolific authors in the 1988–92 and 1989–1993 research outputs. (Prolific here is defined as a contribution to at least six outputs)

	1988–92	1989–93
10+	Meara (21) Laufer (18) Vermeer (10)	Laufer (20) Meara (20) Vermeer (11) Nation (10)
9		Arnaud
8	Broeder	
7	Carter Johns McCarthy Nation Zimmerman	Appel Broeder
6	Appel Arnaud Palmberg	Abe Bogaards Decoo Hartmann Hulstijn Schouten-van Parreren Weltens Zimmerman

Table 2 lists the most prolific authors in the 1989–93 data. This prolific author list is slightly larger than the equivalent list for 1988–92 – a reflection of the general increase in the number of outputs appearing in each successive year. Four authors have dropped out of this list (Carter, McCarthy, Johns and Palmberg), and seven new authors have joined the list (Abe, Bogaards, Decoo, Hartmann, Hulstijn, Schouten-van Parreren and Weltens. Abe was based in Japan, and hints at a growing Japanese interest in Vocabulary Acquisition research. His work is mostly concerned with the development of communicative vocabularies. Bogaards and Hartmann represent the dictionary use strand of research. Decoo's work is mainly concerned with CALL and vocabulary. Weltens' papers all deal with vocabulary loss – a new theme to appear in this series of maps. Schouten-van Parreren and Hulstijn are mainly concerned with how L2 readers handle unknown words.

The analysis that follows uses the author co-citation method developed by Small (1973) (see Appendix 1). By convention, not all outputs are included in author co-citation analyses. Book chapters and papers published in journals are included, but other types of output (monographs, theses, computer programs, and so on) are not. The rationale for these exclusions is that book chapters and journal papers tend to have a consistent approach to citation of other people's work while the other types of output often take a different approach to citing their sources. These different practices distort the statistical trends in the data. Theses, for example, usually reference enormous numbers of sources, whereas journal papers are typically more sparing in their approach. The next step in our analysis therefore involves pruning the corpus to generate a smaller data set that consists of journal articles and book chapters (the *eligible data set)*. The results of this pruning process are reported in Table 3. The table shows a modest increase in the number of eligible outputs in the 1989–93 data set, and a similarly small increase in the number of authors contributing to the data set. The number of unique authors who are cited in this dataset is 6055 – an increase of 16% over the 1988–92 figure of 5210, a figure that we previously noted was already very large. As usual, the authors cited only once make up the largest part of the data (3920 cases). The complete distribution is shown in Table 4.

Table 3: The main characteristics of the 1988–1992 and the 1989–1993 eligible data sets

	1988–92	1989–93
Number of outputs in the eligible data set	464	542
Number of authors contributing to the eligible data set	421	743
Number of influencers cited in the eligible data set	5210	6055

Table 4: The number of cases cited N times in the 1989–93 data set

FREQ	75+	74	73	72	71	70	69	68	67	66	65	64	63	62	61
Cases	2			1			1								
FREQ	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46
Cases					2					1		1		1	
FREQ	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
Cases	2	1	1		1	2	1	2	4	3	2	3	5		
FREQ	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Cases	4	6	3	4	2	1	5	8	9	11	4	12	8	13	12
FREQ	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Cases	14	21	31	22	28	31	39	69	64	103	137	210	377	851	3920

Table 5 lists the most frequently cited sources in this data set. This table shows that the number of authors cited at least 40 times has increased in the 1989–93 data set. Nation and Laufer both show very large gains: Nation's citations have increased by 26%, while Laufer's citations have increased by 50%. Sinclair has dropped out of the list, but in his place we have seven new entrants: RC Anderson, Schouten-van Parreren, Gairns, Redman, Nagy, McCarthy and AD Cohen.

Table 5: The most frequently cited authors in the 1988–92 and the 1989–93 data sets

1989–92	1989–93
Nation (76)	Nation (102)
Meara (74)	Meara (83)
Carter (54)	Laufer (72)
Krashen (49)	Carter (69)
Laufer(48)	Krashen, Richards (56)
Richards (46)	RC Anderson (51)
Sinclair (44)	Schouten-van Parreren (49)
Lockhart (43)	Lockhart (47)
	Gairns, Redman (45)
	Nagy (44)
	McCarthy (43)
	AD Cohen (40)

Table 6: The principal statistics of the 1988–92 and the 1989–93 eligible data sets

	1988–92	1989–93
Inclusion Threshold	16	19
Sources included	103	105
New Influencers		20
Lost Influencers	18	

The analysis that follows is based on the co-citations among the most frequently cited authors in the 1989–93 data set. It is normal practice in author co-citation studies to work with the 100 or so most frequently cited authors. The data in Table 4 suggest that we can get close to this conventional figure if we adopt an inclusion threshold of 19 citations in the data set. This threshold identifies a set of 105 highly cited authors to work with. For simplicity, we will refer to this set as a list of influencers. In our analysis of the 1988–92 data set, 103 influencers met an inclusion threshold of 16 citations. The 1989–93 data set is therefore very comparable to the 1988–92 data set in terms of size, but slightly more demanding in its threshold (138 influencers in the 1989–93 data set meet the threshold we used in our 1988–92 analysis with 16 citations or more). These characteristics are summarised in Table 6.

Again, the rate of churn between the two data sets is relatively small. 18 highly cited authors that appear in the 1988–92 dataset no longer meet our inclusion threshold (Bejoint, D Clarke, Coltheart, R Ellis, Greenbaum, Hartmann, Hornby, Johns, D Meyer, Olshtain, Putseys, Renouf, Ruddy, Rudzka, Sharwood-Smith, Wallace, Widdowson and Zimmerman), while 20 new entrants appear as Influencers in the 1989–93 data set (JR Anderson, Baddeley, Carrell, Coady, Cummins, Delaney, de Groot, Freebody, Johansson, Kroll, Lorge, McLaughlin,

Morgan, Obler, Rinvolucri, Schvaneveldt, NS Segalowitz, Seidenberg, Stanovich and Sternberg). These cases will be discussed in Section 3.

The co-citations among the 105 influencers in the 1989–93 data set were mapped using the Gephi software package (Bastian, Heymann & Jacomy 2009). Co-citations which appear only once in the data set are ignored: Gephi identifies 2728 co-citation links that appear in the data set at least two times. In the analysis that follows, I asked Gephi to generate a spanning tree map, based on the strongest co-citations within the data set. The methodology for building spanning trees is explained in more detail in Appendix 3. The spanning tree approach is less informative than the complete mappings that I presented in earlier reports but it has a number of advantages – the obvious advantage being that the spanning trees are much easier to read and interpret than the complete maps. A more subtle advantage is that the maps in my earlier reports were based on arbitrary inclusion thresholds, and these made it difficult to compare a map based on one set of data with another map derived from a different set of data. Working with spanning trees avoids these arbitrary criteria: each spanning tree maps the most cited influencers in a particular data set. Spanning trees for successive time periods are more directly comparable with each other, and changes over time are easier to identify in this format.

Figure 1 shows the basic mapping of the 1989–93 data set. This map shows the 105 influencers who are cited at least 19 times in the data set. Each influencer appears as a node in the map; the size of a node indicates how many other nodes it is connected to.
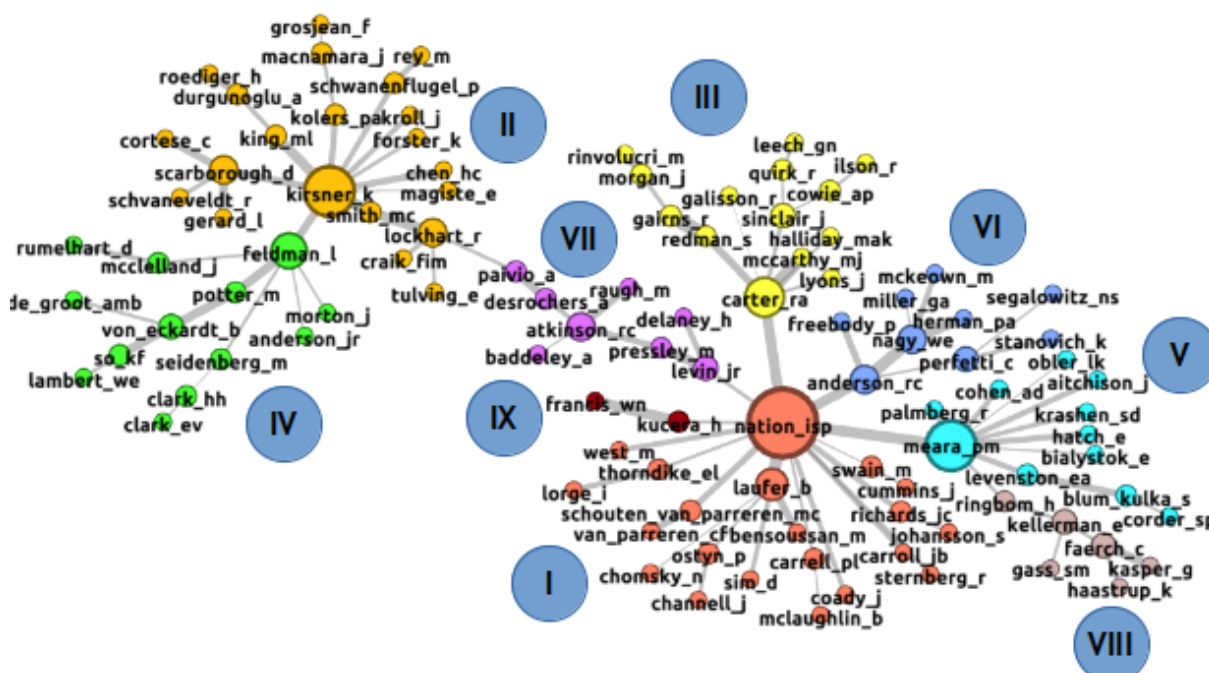
Figure 1: *A spanning tree map of the 1989–93 data set. The map contains 105 nodes with at least 19 citations in the data set. Colours indicate the nine thematic clusters identified by Gephi. Nodes are sized according to how many connections they have with other nodes.*

Gephi identifies nine clusters in this map.

The largest cluster, **Cluster I** (21 members), is dominated by Nation, who replaces Meara as the central node in this map. We can identify a word frequency theme in this cluster (West

and Thorndike & Lorge) and also a sub-cluster centred on Laufer. This cluster is larger than the main cluster that we identified in the 1988–92 mapping, despite some of the subclusters developing into clusters in their own right.

Cluster II, centred on Kirsner (15 members) is essentially the same group of influencers that appeared as Cluster III and cluster VII in the 1988–92 map. A significant addition to this cluster is Judith Kroll.

Cluster III (14 members), focused on Carter and Sinclair, is a group of linguists whose main interests lie in descriptions of English and corpus linguistics. This group of influencers also appeared in the 1988–92 mapping, but here it also includes Gairns & Redman and Morgan & Rinvolucri – influencers with a strong and direct interest in vocabulary pedagogy.

Cluster IV (13 members) focussed on Feldman, is essentially the same as cluster VI in the 1988–92 map, with the important additions H Clark and EV Clark (L1 vocabulary acquisition) and of AMB de Groot.

Cluster V (11 members focussed on Meara) makes up the remnants of Cluster II in the 1988–92 map. This cluster is much less central than it was in last year's mapping, largely due to the loss of the Israeli sub-cluster, which has now become part of Cluster I.

Cluster VI (9 members) is a new cluster focussed on Nagy and RC Anderson. This cluster mainly consists of L1 reading specialists.

Cluster VII (8 members) is a group of psychologists whose main focus is the use of imagery and mnemonics for learning vocabulary. A significant addition to this group is Baddeley, whose work on memory is an important emerging theme in this map.

Cluster VIII (6 members) is a group of predominantly Scandinavian researchers, mainly interested in lexical transfer.

Gephi also identifies **Cluster IX**, a cluster consisting of two members – Kucera and Francis. This frequency count is probably best seen as part of the frequency count subcluster that we identified in Cluster I.

Table 7 summarises the main features of this map, and provides comparison figures for the equivalent map covering the 5-year window 1988–92.

Table 7: *The main thematic clusters in the 1988–92 data set*

cluster	1988–92	1989–93
I	Vocabulary learning theory (18)	Vocabulary teaching and reading (21)
II	Vocabulary teaching and reading (17)	Bilingual Word recognition (21)
III	Bilingual word recognition (15)	Corpora, Discourse and Dictionaries (14)
IV	Corpora and Discourse (12)	Performance of bilinguals (13)
V	Lexical error and transfer (9)	L2 vocabulary learning theory (11)
VI	Psycholinguistics (9)	L1 reading (8)
VII	Performance of bilinguals (7)	Imagery, Mnemonics and Memory (8)
VIII	Imagery and Mnemonics (6)	Lexical error and transfer (6)
IX	Dictionaries and their use (5)	Kucera & Francis (2)
X	Applications of Semantics (4)	

The two maps are actually very similar: the thematic clusters identified in the 1988–92 map are easily recognizable in the 1989–93 map, but some subtle shifts in the structure of the field

can also be identified. The main change is that the biggest cluster is now dominated by Nation. The largest cluster in the 1988–92 map has fractured into two smaller clusters (Cluster V and Cluster VIII). Some of the smaller clusters in the 1998–92 map have coalesced into larger clusters (Cluster IV and Cluster III in the 1989–93 map). A set of influencers dealing with L1 reading has emerged as a cluster in its own right (Cluster VI). A number of other minor changes can also be identified: there is some growth in the imagery and mnemonics cluster (Cluster VII); the L1 acquisition subcluster (Clark & Clark) has relocated to the psycholinguistics cluster (Cluster VI); the lexical transfer cluster seems to have shrunk; and Ostyn & Channell, the only survivors of cluster X in 1988–92, have been absorbed into the main L2 vocabulary pedagogy cluster (Cluster I). The bilingual word recognition cluster that we identified as an anomaly in the 1988–92 map seems to have grown in importance, and now makes up Cluster II in the 1989–93 map.

The 1989–93 map seems to fall into four main sectors. Clusters II and IV are methodologically reliant on experimental studies of bilingual speakers. Cluster III uses applied linguistics methodology, particularly corpus analysis. Cluster VI stands out as a set of L1 reading specialists whose work has strongly influenced L2 vocabulary research, and is particularly closely associated with Cluster I. The remaining clusters are linked by a methodological concern with L2 learners.

Table 8: *The strongest co-citation links in the 1988–92 and the 1989–93 data sets. Persistent links that appear in both lists are shown in* **bold**.

1988–92	1989–93
Kirsner ~ Smith 32	**Gairns ~ Redman 45**
Carter ~ McCarthy 32	**Carter ~ McCarthy 40**
Gairns ~ Redman 32	**Laufer ~ Nation 37**
Kirsner ~ Lockhart 30	Anderson ~ Nagy 36
King ~ Smith 29	**Kirsner ~ Smith 34**
Meara ~ Nation 29	Kucera ~ Francis 33
Laufer ~ Nation 27	**Meara ~ Nation 33**
Faerch ~ Kasper 26	Nagy ~ Herman 32
	Lockhart ~ Perfetti 32
	Carter ~ Nation 32

Table 8 lists the strongest co-citation links in this data set. The pattern here broadly reinforces the features that we noted in Figure 1. Most of the strong co-citations that we identified in the 1988–92 data set persist into 1989–93, with a particularly strong showing from Gairns & Redman. Of the new entries in the 1989–93 list, Anderson~Nagy and Herman~Nagy signal the increasing influence of L1 reading studies for L2 reading, while the Carter~Nation link underlines the continuing influence of corpus studies on L2 vocabulary research. A number of strong links in the 1988–92 data fail to make it into the 1989–93 list. Two of these (Kirsner~Lockhart and King~Smith) contributed to the importance of the Bilingual Word Recognition cluster in the 1988–92 data set. Their loss hints that the prominence of this cluster may be temporary. More important is the loss of the Faerch~Kasper co-citation, which was a significant feature of the Scandinavian research cluster.

3. Part 2: The 1993 data in more detail

We now turn to a more detailed analysis of the research published in 1993.
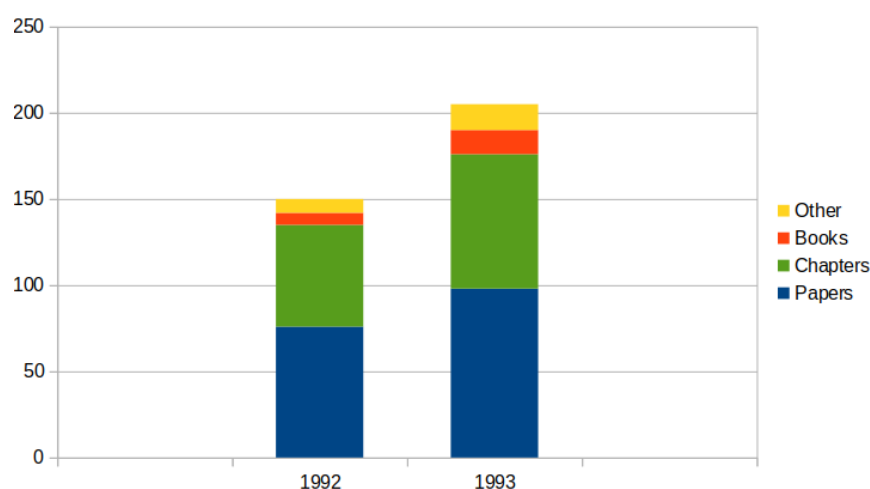
Figure 2: *The number of outputs published in 1992 and 1993 categorised by output type*

Figure 2 shows the publications that appeared in 1993 by output type, alongside the equivalent data for 1992. The obvious point to make here is that 1993 shows a large increase in the number of outputs, with an especially marked increase in the number of papers that appear as book chapters. The number of book length treatments appearing in 1993 is about twice the number that appeared in 1992. The fourteen 1993 items are listed in Table 9.

Table 9: *The fourteen book length items that appeared in 1993*

Arnaud, PJL and P Thoiron. *Aspects du vocabulaire.*[Aspects of Vocabulary.] Lyon: Presses Universitaires de Lyon. 1993.

Börner, W and K Vogel (eds.). *Wortschatz und Fremdsprachenerwerb.*Bochum: ASK. 1993.

Chapelle, J and M Claes (eds.). *Proceedings of the first international conference on memory and memorization in acquiring and learning languages.* Louvain la Neuve. 1993.

Huckin, T, M Haynes and J Coady (eds.). *Second Language Reading and Vocabulary.* Norwood, NJ.: Ablex. 1993.

Schreuder R and B Weltens (eds.). *The Bilingual Lexicon.* Amsterdam:John Benjamins. 1993.

Cribbin, L. 150 × false friends: typische Wortschatzfehler deutsch–englisch. München. 1993.

Kühnel, H. Typische Fehler Italienisch (3000 "falsche Freunde" italienisch und deutsch). Berlin 1993.

Leiste, D, C Döll and AM Tereso Domingos. *Typische Fehler Portugiesisch und Deutsch.*Berlin. 1993.

Daams-Moussault, A. *Nouveau vocabulaire de base PLUS.*Kerkrade: Uitgeverij NIB. 1993.

Harrison, WF and D Winters Welker. *Spanish Vocabulary Book: a new approach to vocabulary building.* Austin: University of Texas Press. 1993.

Lewis, M. *The Lexical Approach.*Hove: Language Teaching Publications. 1993.

Löschmann, M. *Effiziente Wortschatzarbeit.* [Efficient vocabulary training.] Frankfurt/Main: Lang. 1993.

Picoche, J. *Didactique du vocabulaire français.*Paris: Nathan. 1993.

Panzer, B. (ed.) Aufbau, Entwicklung und Struktur des Wortschatzes in den europäischen Sprachen. Motive, Tendenzen, Strömungen und ihre Folgen. Frankfurt/M.: Lang, 1993.

The first five items are thematic collections of chapters that report work on vocabulary acquisition. Most of this work was first presented at conferences that took place in 1991 or

1992. The next three items are collections of False Friends in specific language pairs. **Daams-Moussault** is a pedagogical word list for L1_Dutch learners of French. **Harrison & Winters Welker** is mainly concerned with the use of mnemonics for learning a 2000-word Spanish vocabulary. **Lewis** is an important pedagogical statement about the importance of vocabulary in language learning that will become Increasingly significant in future years. I was unable to obtain a copy of **Löschmann** due to ongoing issues at the British Library. This book appears to look at the psychological and linguistic theory that underpins currently used vocabulary exercises, with a particular emphasis on learning strategies, teaching strategies, semanticisation techniques and vocabulary tests. The final chapter proposes some new pedagogical approaches exploiting the possibilities afforded by new media.

Table 10: Items published in 1993 that fall into the Other category

Theses

Al-Hazemi, HA. *Low-level EFL vocabulary tests for Arabic speakers.* PhD Thesis. University of Wales. 1993.

Grendel, M. Verlies en herstel van lexikale kennis. [Loss and recovery of lexical knowledge.] Doctoral Dissertation, Katholieke Universiteit Nijmegen. 1993.

Hasselgren, A. Right words, wrong words and different words. Masters Thesis. University of Bergen. 1993.

Luo J. *A study of the effects of marginal glosses on the reading comprehension of intermediate college students of French.* Doctoral dissertation. University of Pennsylvania, Philadelphia, PA. 1993.

Mol, M. *Deducing words from context: a video-taped training project in reading strategies for the English central examination.* Doctoraalscriptie: Vrije Universiteit Amsterdam. 1993.

Newton, J. The relationship between pedagogic tasks, interaction and language learning. PhD thesis: Victoria University of Wellington. 1993.

Todd, HF. The effectiveness of multimedia technology in the acquisition of Spanish vocabulary. PhD Thesis. University of Pennsylvania. 1993.

Zhang, X. English collocations and their effect on the writing of native and non-native college freshmen. PhD Thesis. Indiana University of Pennsylvania. 1993.

Other formats

Arnaud, PJL. Mille lapsus. Unpublished manuscript CRTT, Université Lumière-Lyon 2. 1993.

Daams-Moussault,A and FMM Blaauw-Holtzappel. *DocentenBrochure: Nouveau vocabulaire de base, Nouveau vocabulaire de base PLUS, Nouveau vocabulaire francais, Livrets de controle.* Kerkrade: Uitgeverij NIB. 1993.

Qian Dawei. Teaching and learning vocabulary in a second language. An annotated bibliography. Ontario: OISE. 1993.

Toya, M. Form of explanation in modification of listening input in L2 vocabulary learning Occasional Paper 23. Honolulu: Department of ESL, University of Hawaii at Manoa. 1993.

Tréville, M-C. Role des congénères interlinguaux dans le developpement du vocabulaire réceptif. Quebec: Centre International de Recherche en Aménagement Linguistique. 1993.

Watanabe, Y. Effects of increased processing on incidental learning of foreign language vocabulary. Occasional Paper 24. Department of ESL, University of Hawai'i at Manoa. Honolulu. 1993.

Yang, L and T Givon. Tracking the acquisition of L2 vocabulary: the Keki language experiment. Eugene Or.: Institute of Cognitive and Decision Sciences. University of Oregon. Technical Report 93–11. 1993.

Picoche is a companion volume to her 1992 book (Picoche 1992) but the 1993 text deals more explicitly with L2 pedagogy. **Panzer** is principally concerned with loan words from the Slavic languages into German, and touches only rarely on the implications for L2 learners of German.

The **Other** category in Figure 2 is mainly composed of theses and unpublished reports. The eight theses recorded for 1993 are listed in Table 10. All these theses are cited in later publications, but readers should note that the VARGA database does not routinely monitor publications of this type, and the actual number of theses that appeared in 1993 is probably larger than this list of eight suggests. A small number of other output types also appeared in 1993. **Arnaud** is a collection of 1000 (mostly lexical) errors made by L1 French learners of English. **Daams-Moussault** is a teachers' handbook that accompanies the word list described in Table 9. **Qian** is an annotated bibliography. **Toya, Treville, Watanabe** and **Yang & Givon** are unpublished pieces that I was not able to obtain a copy of.

A total of 249 individual authors can be identified in the 1993 data set. Table 11 lists the number of authors according to the number of outputs that they contribute to. The most important feature in this table is that the number of contributing authors has increased significantly compared with 1992. In 1992, we identified 185 contributing authors; in 1993, this figure has risen to 249, a increase of just over 20%. As usual, most authors (205) contribute to only a single output. However, the number of authors contributing to two outputs has almost doubled, and there is a very significant increase in the number of authors contributing to three outputs (only one in 1992, but nine in 1993). This year, the most prolific author is Paul Nation (five outputs). Haynes (a new entry in the prolific author lists) contributes to four outputs. The nine authors contributing to three outputs in 1992 are: Arnaud, Coady, Huckin, Laufer, Meara, Schouten-van Parreren, Schreuder, Vermeer and Weltens. The prominence of Dutch researchers is striking here.

Table 11: The number of authors contributing to N outputs in 1993

N outputs	8	7	6	5	4	3	2	1
Cases in 1993				1	1	9	33	205
Cases in 1992				1	2	1	18	163
Lotka's estimate			6	8	13	23	51	

Table 12 lists all the prolific authors who published in 1993. (Here "prolific" means more than two contributions to the data set.) Only Arnaud, Laufer, Meara and Vermeer have a presence in both lists: the majority of the prolific authors identified in 1992 no longer qualify for inclusion in the 1993 list, and the majority of the 1993 prolific authors are new. Three other features in the 1993 list are worth noting. Only five of the prolific authors from 1992 have any kind of presence in the 1993 data set: Schouten-van Parreren is a familiar figure from earlier years; Hulstijn contributed to two outputs in the 1993 data set; de Groot, Grainger and Thomas & Wang contributed to a single output in 1993. The two most prolific authors in 1993 (Nation and Haynes) have not appeared in our previous prolific author lists. The appearance of edited collections that deal specifically with L2 vocabulary topics is a new and important development in the field; of the new appearances in the list, Huckin, Haynes & Coady and Schreuder & Weltens are editors of books of this type (cf. Table 9). Lotka's estimate is discussed in Appendix 3.

*Table 12: The prolific authors in 1992 and 1993. (Here, "prolific" means more than one contribution to the data.) The majority of the authors who counted as prolific in 1992 are no longer listed as such in 1993. Authors appearing in both lists are shown in **bold**.*

1992	1993
Laufer, Meara, Arnaud, Bejoint, de Groot, Grainger, Harrington, Hartmann, Hulstijn, Leffa, Löschmann, Verneer, Doctor & Klein, McLaughlin & Heredia, Thomas & Wang, Pearson, Umbel, Oller & Fernandez	Nation, **Arnaud, Laufer, Meara, Vermeer,** Schouten-van Parreren, Schreuder & Weltens, Huckin, Haynes & Coady,

3.1. The data sources

The VARGA data base (Meara n.d.) identifies 176 items published in 1993 that were eligible for inclusion in the analysis that follows. Fifteen of these outputs were not traceable, mostly because of a data breach at the British Library that led to temporary suspension of the British Library On Demand service. These outputs are listed in Table13. Most of these items were chapters in books that were not obtainable in other UK libraries. The remaining 162 outputs (88 journal articles and 74 book chapters) make up the data set that is analysed in the report that follows. For space reasons, I have not listed all these items in the report. However, interested readers can identify these included items by accessing the VARGA database at https://www.lognostics.co.uk/varga and entering the search terms 1993 **JA}** and 1993 **CH}.** Code JA} identifies journal articles, and CH} identifies book chapters.

Table 13: Items published in 1993 that were not traceable

Beheydt, L. Vocabulaireverwerving. Een alternatieve visie. In: R Trampus-Snel (ed.), *Nederlandse Taal-, Vertaal- en Letterkunde.* Trieste. 1993.

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Volmert, J. Internationalismen – unter Aspekten des Fremdsprachen- und Zweitsprachenerwerbs. In: A Katny (ed.) *Beiträge zur Sprachwissenschaft: Sozio- und Psycholinguistik. Probleme des Deutschen als Mutter-, Fremd- und Zweitsprache.* Ed. Andrzej Kątny. Rzeszów 1993. 67–82.

3.2. The analysis

The first step in our analysis is to identify the authors who are cited most frequently in this data set, the Significant Influencers. These data are summarised in Table 14. The table shows that a total of 2860 influencers are cited with 2065 influencers being cited only once in the data set. The equivalent figures for 1992 are 2033 and 1511: the figures indicate that the number of influencers cited in the 1993 data set has increased by about 40%, with the proportion of authors cited only once remaining stable at 74%. The most frequently cited influencers in the 1993 data set are Nation (cited in 41 outputs), Laufer (cited in 29 outputs), Carter (cited in 25 outputs), RC Anderson (cited in 24 outputs), Meara (cited in 23 outputs), Nagy (cited in 21 outputs), JC Richards and Schouten-van Parreren (both cited 20 times), Krashen (cited 18 times), Gairns & Redman (cited 17 times), AD Cohen (cited 16 times) and JB Carroll, Herman, Kucera and MJ McCarthy (each cited 15 times). This list of Highly Cited Influencers shows a remarkable shift from the previous year's data. In the 1992 data set, we identified 10 Very Significant Influencers. Only one of these appears as an Influencer in the 1993 list; the other nine **do** appear in the 1993 data, but with a greatly reduced profile (see Table 15). The most cited influencers for 1993 are listed in Table 16. Of these, only Nation appeared in the 1992 Most Cited Authors list. All these Influencers are familiar from earlier reports, but all of them have significantly increased their presence in the 1993 data. This analysis strongly confirms that 1992 should indeed be treated as an anomalous year and that 1993 is basically a return to normal.

Table 14: *The number of Influencers cited N times in the 1993 data set*

N	30+	29	28	27	26	25	24	23	22	21
sources	1	1				1	1	1		1
N	20	19	18	17	16	15	14	13	12	11
sources	1		1	2	1	4	2	4	10	4
N	10	9	8	7	6	5	4	3	2	1
sources	12	10	13	33	35	50	87	133	386	2065

For the next step in our analysis, we eliminate influencers who are only infrequently cited in the data set, and work in more detail with a reduced set of highly cited authors. By convention, it is customary to work with a set of about 100 highly cited authors, but our analyses of both the 1992 and the 1991 data used a lower figure (78 sources in 1991 and 76 sources in 1992), and in the interests of continuity, it is useful for us to work with a comparable figure from the 1993 data set. The data reported in Table 14 suggests that the closest we can get to this target in the 1993 data is a set of 71 influencers who all recorded at least eight citations in 1993. This inclusion threshold is a substantial increase on the threshold used for our 1992 report (six citations), which reflects the increase in the overall number of outputs that make up the data set. The general features of the 1993 data set are summarised in Table 15, along with the corresponding figures for 1992. Table 16 records the performance of these influencers in the 1992 data set.

Table 15: *The most cited influencers in 1992 and their citations in the 1993 data set*

	Kirsner	Kolers	Lockhart	Smith	Feldman	King	Nation	v Eckardt	Potter	CHen
1992	20	18	17	17	16	16	16	15	14	14
1993	4	8	10	4		8	41	7	7	4

Table 16: *The most cited influencers in 1993 and their citations in the 1992 data set*

	Nation	Laufer	Carter	Anderson	Meara	Nagy	Richards	Schouten	Krashen	Gairns	Redman
1993	41	29	25	24	23	21	20	20	18	17	17
1992	16	11	8	3	12	8	6	6	12	2	2
1991		11	12		15		11		8	9	9

Figure 3 shows a mapping of the 71 authors who are cited at least 8 times in the 1993 data set and identifies cases where these authors are frequently co-cited. In the interests of simplicity only edges that have a weighting of four or more have been included in this mapping
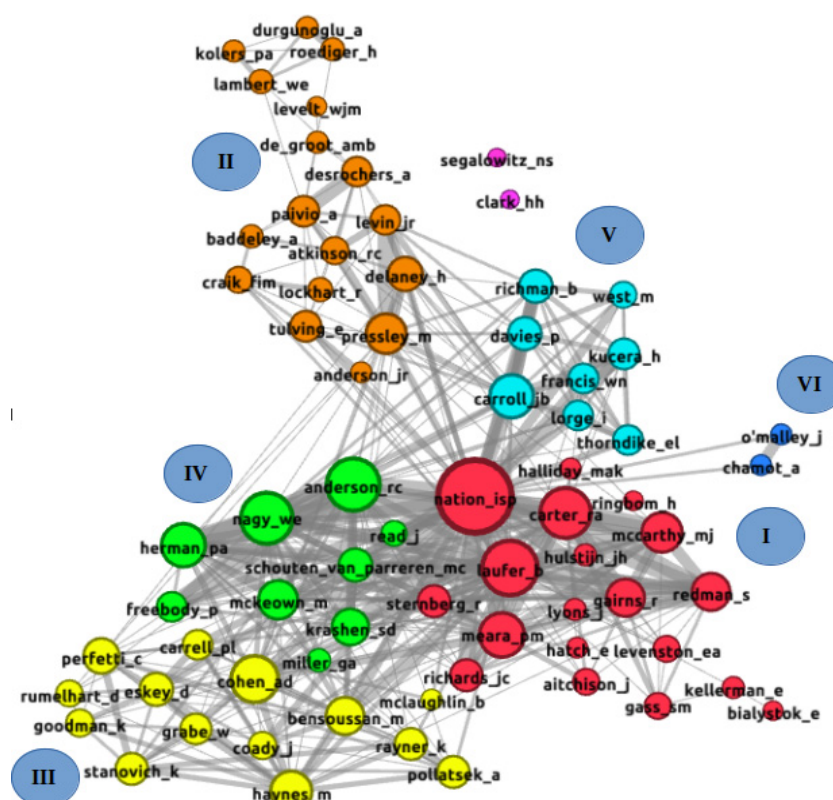
Figure 3: *The co-citations between the 71 most significant influencers in the 1993 data set*

Table 17: *The main features of the 1992 and 1993 eligible data sets*

	1992	1993
Influencers included	76	71
Inclusion Threshold	6	8
New Influencers		40
Lost Influencers	45	

Readers who are familiar with this series of reports will immediately recognise that this mapping looks very different from the 1992 mapping discussed in our last report. The 1992 mapping was completely dominated by a surprisingly large number of psycholinguistic sources, with research in the tradition of applied linguistics reduced to a small cluster on the edge of the main mapping. At the time, we queried whether this was a change of direction, or a temporary blip. The mapping in Figure 3 seems to confirm that the 1992 data was indeed an anomalous blip, and the 1993 mapping looks much more like the 1991 mapping reported in Meara (2023). The 1993 data set sees the return of some familiar themes that we have seen in earlier mappings.

The main feature to note in Figure 3 is the central role of Nation. Nation played only a relatively minor role in the 1992 mapping, but here he has emerged as by far the Most Significant Influence in the field. This rise to prominence is almost entirely due to citations of Nation's seminal text book *Teaching and Learning Vocabulary* (Nation 1990). Other features worth noting in this map are the very strong co-citations between Cluster I and Cluster IV, the very few co-citations between Cluster II and Cluster III, the re-appearance of a word count cluster (Cluster V) and the emergence of a new cluster pointing to strategy research (Cluster VI)

One effect of this return to "normality" is that there is once again a huge turn-over in the list of influencers appearing in the map. Of the 76 names that appear in our mapping of the 1992 data set, only 31 also play a role in the 1993 data set; more than half the names in the 1993 mapping are new (see Table 18).

Table 18: changes in the composition of the 1992 and 1993 data sets

Influencers appearing only in the 1992 list (45)
ALTARRIBA BALOTA BEAUVILLAIN BESNER CARPENTER CHADHA CHEN COLLINS COLTHEART CORTESE CURLEY DAVELAAR FELDMAN FORSTER GERARD GRAINGER GROSJEAN HO JAIN KING KIRSNER KROLL LEUNG MACNAMARA MAGISTE MCCLELLAND MEYER NAS NEELY NG PARADIS POTTER REY RUDDY SCARBOROUGH SCHVANEVELDT SCHWANENFLUGEL SEIDENBERG SHARMA SINCLAIR MC SMITH SNODGRASS SO STEWART VON_ECKARDT

Influencers appearing in both lists (31)
ANDERSON ANDERSON ATKINSON BADDELEY BIALYSTOK CARTER DESROCHERS DE_GROOT DURGUNOGLU FRANCIS HERMAN KELLERMAN KOLERS KRASHEN KUCERA LAMBERT LAUFER LOCKHART MCLAUGHLIN MEARA MILLER NAGY NATION PAIVIO PRESSLEY RICHARDS ROEDIGER RUMELHART SCHOUTEN_VAN_PARREREN SEGALOWITZ WEST

Influencers appearing only in the 1993 list (40 : previously unlisted sources shown in **bold**)
AITCHISON BENSOUSSAN **CARRELL** *CARROLL* **CHAMOT CLARK COADY** *COHEN CRAIK* **DAVIES** *DELANEY* **ESKEY FREEBODY** *GAIRNS* **GASS** *GOODMAN* **GRABE HALLIDAY** *HATCH* **HAYNES HULSTIJN LEVELT** *LEVENSTON LEVIN* **LORGE** *LYONS MCCARTHY MCKEOWN* **O'MALLEY** *PERFETTI* **POLLATSEK RAYNER READ** *REDMAN* **RICHMAN** *RINGBOM* **STANOVICH** *STERNBERG* **THORNDIKE** *TULVING*

As usual, the complexity of this map makes it difficult to analyse in detail, and for this reason, a simplified version is provided in Figure 4. This simplified mapping is a spanning tree in which every node in the data set is shown with only its strongest connection to other nodes.

The main structural features to note in this mapping are the central role of Nation, the relatively unstructured nature of Cluster I, the emergence of Laufer, Pressley, Carter and Haynes as secondary hubs, and the marginal position of Cluster VII.

Gephi's formal analysis of this spanning tree in Figure 4 identifies eight thematic clusters in the data.

Cluster I, the largest cluster in the data set (28 members), is predominantly concerned with L2 reading, but it can probably be best seen as comprising five sub-clusters. Thorndike & Lorge, Kucera & Francis, Carroll, Davies & Richman and West are word frequency counts for English. Eskey, Goodman, Coady and Rumelhart are reading specialists. Clark, Lyons and Hatch focus on semantics. Meara, Schouten-van Parreren, Ringbom and Read are loosely linked by an empirical methodology focus.
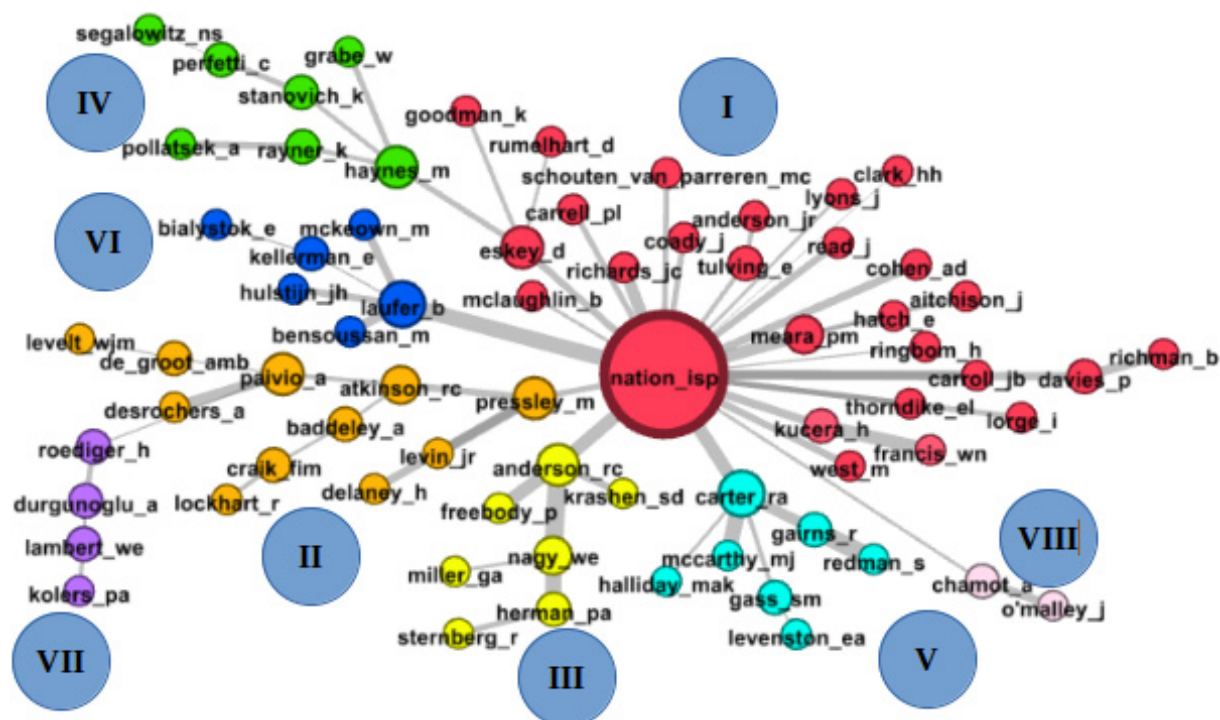
Figure 4: A spanning tree analysis of the 1993 data set

Cluster II (11 members), mainly focussed on Pressley, is principally concerned with memory effects in L2 vocabulary acquisition. The prominence of this cluster probably reflects the publication of the conference proceedings edited by Chapelle and Claes.

Cluster III (7 members), focussed on Anderson, is essentially an L1 reading cluster.

Cluster IV (7 members), centred on Haynes, is a set of L1 reading researchers whose work mainly focusses on the psychology of reading. Pollatsek & Rayner are an early example of studies involving eye-movements in reading.

Cluster V (7 members), centred on Carter, is a set of sources whose main focus is the linguistics of vocabulary acquisition.

Cluster VI (6 members), centred on Laufer, is a set of L2 vocabulary researchers, mainly interested in lexical inferencing.

Cluster VII (4 members), centred on Roediger, is a set of North American researchers mainly concerned with bilingual lexicons and memory structures.

Cluster VIII, the smallest cluster in this data set (2 members), signals the importance of learning strategies in this year's data set.

The clusters are summarised in Table 19.

Table 19: The clusters identified in the 1991 and 1992 data sets

Cluster	1992	1993
I	Formal models of lexical storage (14)	L2 reading (27)
II	More formal models of lexical storage (13)	Imagery, Mnemonics and L2 vocabulary acquisition (11)
III	Vocabulary uptake and inferencing (13)	L1 Reading (7)
IV	Performance of bilinguals (11)	Psychology of L2 reading (7)
V	Chinese/French (4)	Linguistic approaches to vocabulary (7)
VI	Translation effects in bilinguals (4)	Lexical inferencing and transfer (6)
VII	Imagery and Mnemonics (4)	Bilingual lexicons and memory. (4)
VIII	Memory processes and skilled reading (4)	Strategies in L2 vocabulary learning (2)
IX	Cognate effects (3)	
X	Word Frequency Count (2)	

Table 20: The strongest co-citation links in the 1991, 1992 and 1993 data sets

Link Weight	1991	1992	1993
17		Kirsner~Smith	Nagy~Anderson **Gairns~Redman**
16		Lockhart~Smith	
15		King~Smith Feldman~Smith	**Nation~Laufer** **Carter~McCarthy** Nagy~Herman
14		Potter~von Eckardt Kirsner~Kolers	
13		Kirsner~von Eckardt	Nation~Anderson **Kucera~Francis** Nation~Carter Anderson~Freebody
12		Gerard~Scarborough Kirsner~Scarborough Jain~King Feldman~So	**Nation~Meara** Nation~Richards
9	Gairns~Redman		
7	Carter~Meara Carter~McCarthy Carter~Aitchison Nation~Laufer Nation~Meara		
6	Nation~Schouten-van Parreren Raugh~Atkinson Levin~Pressley Kucera~Francis		

The strongest co-citation links in Figure 4 are listed in Table 20, along with the equivalent data for the 1991 and 1992 data sets. The table shows a marked increase in the number of strong co-citations from 1991 to 1993. Strong co-citations in 1993 that also appeared in 1991

are shown in **bold.** The very strong co-citation links joining Gairns & Redman, Nation & Laufer, Carter & McCarthy and Nation & Meara were already present in the 1991 data.

4. Discussion

The simplest account of the changes that have taken place between 1992 and 1993 is that the sudden surge in psycholinguistic research recorded in 1992 was an aberration, and that 1993 represents something of a return to normality. In reality, things are more complicated than this simple picture suggests. In the early 1990s, research ran on a five- or six-year cycle. A significant paper would get published in year X; then it would take another couple of years for readers to react to the original paper and submit follow-up papers in year X+2; these papers would then be rewritten in year X+3 following a lengthy review process; finally, the new version would eventually appear in print in year X+5 or X+6 after another lengthy period waiting in a publication queue. Some journals were notoriously slow in getting accepted articles into print, and a delay of two years was not considered unusual - a stark contrast with the rapid turnaround which characterises more recent research. By way of an example, Umbel, Pearson, Fernández and Oller (1992) - which went on to become a much-cited paper – was cited only twice in 1993, three times in 1994, and once in 1995, and in each of these cases, the author of the citing article was one of the authors of the original paper. It is not entirely surprising, then that the psycholinguistic work cited in 1992 is not frequently cited in 1993. However, we might expect another psycholinguistic ripple to appear in the data for later years.

At the same time, the re-appearance of applied linguistic research in the 1993 map should not be interpreted as the status quo being re-instated. Between 1991 and 1993, we can see a decline in the importance of computational approaches to describing English, and a shift towards lexical inferencing and L2 reading processes. The one feature that maintains a strong presence across all three years concerns the role of mnemonics and imagery in L2 vocabulary learning. Strategies for learning vocabulary emerges as a new theme in the 1993 data set.

Four other features in the 1993 maps are worth highlighting. The first of these features is the dramatic rise of Nation. In 1991 Nation appeared in relatively weak links with Meara and Schouten-van Parreren. In 1992, he does not appear in the list of the strongest co-citation links. In 1993, more than half the strong citation links involve Nation, and he appears as the central focus of the largest cluster in the 1993 map. All the clusters in this map eventually lead to Nation. It is difficult to understate how spectacular this refocussing is.

The second feature worth noting is the emergence of Laufer as a Very Significant Influencer. Her co-citations with Nation were modest in 1991. In 1992, she appears as a weak co-citation with Nation. In 1993 she appears in a very strong co-citation link with Nation, and as the focus of a cluster that contains some of the most important influencers in the vocabulary research so far: Bensoussan, Bialystok, Kellerman, Hulstijn and McKeown. This cluster feels like an important growth point for future years.

The third point worth noting is the importance of Nagy and Anderson in the 1993 maps. The co-citation that links Nagy and Anderson is one of two outstandingly strong links in

Table 20, and the core of Cluster III in Figure 4. This cluster is unusual in that it is strongly linked to Nation, but the members of the cluster are not predominantly L2 researchers. Rather they make up a group of influencers who mainly write about L1 reading.

The fourth point worth noting is the continued importance of Gairns and Redman in 1993. This collaboration - a text first published in 1986 – provided the strongest co-citation link in the 1991 data set. In 1993, it still provides the strongest co-citation in the data set. Sixteen different authors are responsible for the 17 co-citations of Gairns & Redman recorded in Table 20. It is very unusual for a text of this type to be cited so extensively and so consistently.

Although the overall picture for 1993 looks fairly stable, two features suggest that new developments might be in sight on the horizon. Firstly, the 1993 data set includes a substantial number of psychologists working on second language learners. Examples of this are Bahrick, Bahrick, Bahrick and Bahrick (1993), Ellis and Beaton (1993a, 1993b), Service and Craik (1993) and Tinkham (1993). These authors all work on disparate areas of L2 vocabulary acquisition, however, and since they do not cite each other, they do not appear as an identifiable methodological cluster in the 1993 maps. Nonetheless, taken together they look like an alternative take on L2 vocabulary acquisition, and we might predict that this feature will become more prominent in future years.

Secondly, and perhaps more importantly, 1993 sees the appearance of two papers that introduce new formal testing instruments. Paribakht and Wesche (1993) present a self-report tool, the *Vocabulary Knowledge Scale* (VKS), which will become one of the most widely used tools in future research. Read (1993) is the first of a series of studies in which Read outlines his *Word Associates Test*. This tool is designed to test vocabulary depth in a reliable and efficient way, a feature of vocabulary knowledge that has received little attention up until this time. The reason these developments are important is that most previous work has relied on one-off testing materials which vary from paper to paper. This practice makes it almost impossible to construct a coherent narrative out of the increasing number of empirical studies appearing in our data sets. The emergence of "standard" testing tools feels like an important step towards standardisation of the field. (cf. Meara 1993).

5. Conclusion

The 1993 data set has confirmed that the huge shift in focus reported in 1992 seems to be a temporary phenomenon. The psycholinguistics group focussed on Kirsner still appears in the 1989–1993 five-year map, but it does not seem to have developed into a serious, permanent reconfiguration of the field. The split between Applied Linguistic approaches to vocabulary acquisition and more psycholinguistic approaches remains an important characteristic of the research.

The field continues to grow in 1993, and some significant new influencers are appearing in the updated maps. Nation's book *Teaching and Learning Vocabulary* (Nation 1990) is beginning to have an impact on the pattern of citations in 1993, and we can expect this seminal book to be even more influential in coming years. At the same time, some important

influencers from previous years no longer appear in the 1993 map. Corder is perhaps the most important loss, suggesting as it does a decline in the importance of the Department of Applied Linguistics at Edinburgh University. The new focus for L2 research seems to be Wellington, New Zealand.

In summary, 1993 is not a pivotal year for L2 vocabulary research. However, the data suggests that 1993 is not just a return to the status quo either. Nation has become firmly established as the Most Significant Influencer in the field, but overall traditional Applied Linguistic approaches vocabulary seem to becoming less influential than they were in our earlier reports, and new strands of enquiry led by psychologists look as though they might become increasingly influential in future years.

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Appendix 1

The co-citation methodology

In brief, the analyses focus on the authors cited in the bibliographies of a list of papers published in the relevant time frame, and identify sets of authors who are frequently cited together. These frequently cited authors are deemed to be **Influencers.** Usually, a small number of very strong co-citation clusters emerge from this approach, and we take these clusters to be indications of important research themes in the dataset. The maps developed for this report follow the same format as last year's report, where I used spanning trees (see Appendix 3) based on only the strongest links between the influencers being cited. Readers of this series of reports will realise that the data sets we are describing are becoming increasingly complex as time goes on, and much more difficult to map in a helpful, intuitive way. The spanning tree approach provides a possible solution to this problem.

Appendix 2

Lotka's model

Lotka (1926) suggested that there might be a straightforward relationship between the number of authors who contribute a single paper to a field and the number of authors who make multiple contributions to the field. Suppose, for example, that we have 250 authors who each make a single contribution to a data set, then it would be unusual to find only one author who makes two contributions, and it would likewise be very unusual to find a single author who makes twenty contributions, while no other authors make more than one contribution to the data set. Lotka suggested that the expected relationship could be described as a power law:

$$E_N = T / N^x$$

where   T is the total number of authors who contribute a single paper to the data set,

N indicates 2, 3, 4, 5... outputs,

and

E_N is the expected number of authors contributing to N outputs.

In practice, the value of x (the exponent in Lotka's formula) is usually around 2 – that is, a value of 2 for this exponent gives a fair approximation to what happens in real life. So, for a data set in which 250 authors contribute to just one paper in the data set Lotka's model predicts that we can expect $250/2^2 = 63$ authors who contribute to two papers in the data set, $250/3^2 = 28$ authors who contribute three papers to the data set, $250/4^2 = 16$ authors making four contributions to the data set, and so on as shown in the table below.

Table A: *An illustration of Lotka's Law with x = 2 and N_1 = 250*

contributions	10	9	8	7	6	5	4	3	2	1
Expected E_N	2	3	4	5	7	10	16	28	63	250

Clearly, this model predicts that the number of papers an active researcher might be expected to produce falls off rather quickly. Empirical tests of what has become known as "Lotka's Law" do seem

to work well. However, the model works best when we are dealing with well-established fields, and very large data sets. The single year data sets that I have discussed in this series of papers are not a close match to Lotka's expectations, but the larger 5-year data sets are generally a better fit to the power law model. In both cases, however, we get a much better fit when the value of N^x is raised above 2. For example, we get the best fit for the 1989–1993 data set when x=2.75. This is lower than the equivalent figure for 1988–92 (x=2.9), though both figures need to be treated with some caution because the data sets are relatively small. Higher values of x seem to be typical of immature, highly volatile fields. Generally speaking, the exponent values we find for the L2 vocabulary research literature are higher than we would normally expect, with a downward trend, and the continued fall in the 1989–93 figure seems to suggest that the field is becoming increasingly "normal".

The data for 1989–93 are displayed below. The table shows the number of authors contributing to N outputs in 1989–93. 578 authors contribute just a single publication in this period. The table also shows how any authors would be expected to make N contributions, given this figure when x=2.

contributions	20	19	18	17	16	15	14	13	12	11
Actual 89–93	2									1
Lotka's model	*1*	*1*	*1*	*2*	*2*	*3*	*3*	*3*	*4*	*5*
contributions	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
Actual 89–93	1	1		2	7	9	10	27	87	578
Lotka's model	*6*	*7*	*9*	*12*	*16*	*23*	*36*	*64*	*144*	

It is worth noting here that the 1989–93 data is still disproportionately made up of authors who contribute to a single output, and despite the marked increase in the number of authors contributing to two and three outputs, the actual figures are still about half the of the expected value. Also worth noting are the contributions made by Laufer and Meara. Their twenty contributions each in 1989–93 are best described as heroic.

Appendix 3

Spanning trees

The maps presented in this paper are a simplification of the maps that appeared in the earlier papers in this series. The earlier maps tried to capture the relationships between the Influencers by including any co-citation link which was stronger than a chosen threshold value – for example, we might include any link with a weighting of 8 occurrences or more in the data set. The threshold values were chosen to avoid cluttering up the visuals with very weak connections, but they varied from one report to another, and were essentially arbitrary.

In this paper, I have adopted an alternative solution to this problem, by displaying the data in the form of a spanning tree. In this alternative approach, we start with a list of authors, a list of all the co-citation links between them, ordered by their weight, and an empty map containing no nodes. We then build a map by working through the ordered list of links, and following the steps outlined in an algorithm developed by Prim (Prim: 1957). Starting with the strongest link, we add nodes and edges to the empty map as long as the new edge does not lead to a cycle. That is, if we have a new edge A ~ B, and our tree does not already contain a link (direct or indirect) between node A and node B, then we add the edge A ~ B to the map, adding new nodes as necessary. The map grows in a piecemeal way at

first, adding pairs of strongly connected nodes to the map, but eventually, the algorithm finds a set of links that connects each node to another by its strongest connection.

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Polish Modal Ellipsis

Nadia Modrzejewska
University of Gdańsk, Poland

Abstract

Over the past years, Modal Ellipsis (ME) has been the focus of some cross-linguistic investigations in languages such as Spanish (Dagnac 2010, Fernández-Sánchez 2023), Dutch (Aelbrecht 2010), French (Authier 2011), and Czech (Gruet-Skrabalova 2017), among others. Initially, it was considered to involve a null proform – a silent pronominal element standing in for the missing complement (Brucart 1999, Depiante 2000). More recent analyses, however, argue that this elliptical construction should be analysed as PF-deletion. According to this approach, the ellipsis site has a full syntactic structure deleted at Phonetic Form. In this paper, I propose that Polish ME follows the PF-deletion pattern, specifically targeting the complement of VoiceP. To test this hypothesis, I examine three diagnostics – extraction, case connectivity effects, and syntactic mismatches. The data reveal that Polish ME allows extraction and exhibits case-matching effects between the remnant and the elided structure. These findings provide compelling evidence that Polish ME involves an underlying syntactic structure deleted at PF.

Keywords: ellipsis; modal verbs; Polish; PF-deletion

1. Introduction

The interpretation of linguistic expressions relies on the mapping between sound and meaning. However, many constructions disrupt this correspondence. These fall under the category of ellipsis – a phenomenon, in which a part of the syntactic material is missing. This paper examines a type of ellipsis that allows the omission of the complement of a modal verb, known as Modal Ellipsis (ME). The examples of Polish ME are illustrated in (1a) and (1b).[1]

(1) a. On zjadł   całą   paczkę chipsów, chociaż   nie powinien   ø.
         he eat.PST.3SG whole   bag   crisps.ACC even though   not should.PST.3SG
         'He ate a whole bag of crisps, even though he shouldn't.'

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[1] The following abbreviations are used in the paper: 1, 2, 3 – first, second, third person, Mod – modal verb, ACC – accusative, NCA – Null Complement Anaphora, ACD – antecedent-contained deletion, NOM – nominative, ASP – aspect, PF – perfective, DAT – dative, PL – plural, DP – determiner phrase, PRS – present tense, FUT – future tense, PST – past tense, GEN – genitive, PTCP – participle, IMPF – imperfective, REFL – reflexive, INF – infinitive, SG – singular, ME – Modal Ellipsis, TP – tense phrase.

     b. Przesłali   jej wszystkie dowody,   które mogli   ø.
         send.PST.3PL her all   evidence.ACC that   could.PST.2PL
         'They sent her all the evidence they could.'

One of the central questions regarding elliptical phenomena is the nature of the structure present in the gap (marked with ø). There are two main lines of investigation. The former, known as PF-deletion, assumes that there is a silent syntactic structure which is deleted at Phonetic Form (Hankamer 1979, Sag 1976, Merchant 2001). This approach is illustrated in (2a) and (2b), where the unpronounced material is crossed out. In the alternative theory, the gap contains an atomic element, often referred to as a null proform (Fiengo and May 1994, Lobeck 1995). A representative case of this is Null Complement Anaphora (NCA), as shown in (2c), where the missing material is interpreted as a silent pronoun (Depiante 2000).

(2)   a. Frank has visited this museum, but Mary hasn't ø=~~visited this museum~~.
      b. David kissed someone, but we do not know who ø=~~David kissed~~.
      c. Mary didn't take me to the cinema, although she promised ø.

In the literature on Spanish, ME has initially been analysed as a phenomenon falling under the category of Null Complement Anaphora (NCA), and thus classified as an elliptical construction involving a null proform (see Depiante 2000, Brucart 1999). However, recent investigations argue that ME should be considered as a case of deletion ellipsis. This stance has been supported by Dagnac (2010) for French and Spanish, Aelbrecht (2010) for Dutch, Authier (2011) for French, Gruet-Skrabalova (2017) for Czech, and Fernández Sánchez (2023) for Spanish. The main argument in favour of these analyses is that extraction from within the ellipsis site is possible, a characteristic of deletion ellipsis.

    This article contends that Polish ME is derived through PF-deletion. The key factors supporting a deletion account include extraction and case connectivity effects. Additionally, the syntactic mismatch test is applied to define the scope of the ellipsis. The paper is structured as follows: Section 2 presents Polish modal verbs. Section 3 explores the behaviour of Polish ME with respect to the established criteria, providing data that support its PF-deletion analysis. Section 4 investigates the scope of the ellipsis, and Section 5 concludes the discussion.

2. Polish modal verbs

There are five 'core' modal verbs in Polish, namely *móc* 'can', *mieć* 'have to, must, be said, be claimed', *musieć* 'must, have to', *powinien* 'should, be supposed', *winien* 'should, be supposed' (Jędrzejowski 2015: 126–129). These verbs differ in both morphological and grammatical properties, which makes defining a precise class of Polish modals particularly challenging. For instance, *móc*, *musieć*, and *mieć* inflect for person, tense, and number. In contrast, *powinien* and *winien* inflect only for person and number, and crucially, they are defective as they lack infinitival and participial forms. Therefore, the primary criterion for identifying modal verbs is their ability to convey epistemic and deontic modality (Jędrzejowski 2015, Kaleta 2020). The former reflects the speaker's knowledge or beliefs about a proposition, while the latter encodes

notions such as obligation, permission, ability, duty, or volition (Zagona 2008: 276). For a detailed account of Polish modal verbs evaluated against these two modal bases, see the analysis in Jędrzejowski (2015: 127–130).

This paper explores ME in the context of four 'core' modal verbs in Polish: *móc*, *mieć*, *musieć*, and *powinien*, illustrated in (4), (5), (6), and (7), respectively.[2] The verb *winien* is excluded from the present analysis due to its limited use in contemporary Polish.

(4)　móc 'can'
　　a.　Art. 97 mówi,　　　kto　może　　　wykonywać　czynności lotnicze,　　A
　　　　Art. 97 say.PRS.3SG who　can.PRS.3SG perform.INF　activities　aeronautical　and
　　　　dokładnie　kto　nie　może　　　ø.
　　　　precisely　who　not　can.PRS.3SG
　　　　'Article 97 states who can perform aeronautical activities – or more precisely, who cannot'.
　　　　　　　　　　　　　　　　　　　　(NKJP, *Sprawozdanie stenograficzne z obrad Sejmu RP*, 2002)

(5)　mieć 'have to, must, be said, be claimed, be supposed'
　　a.　A:　Miał　　　　　　przecież ojciec grać　　　w　wista.
　　　　　　suppose.PST.3SG after.all father play.INF　in　whist
　　　　B:　Miałem　　　　　ø, miałem　　　　ø, ale　nie　miałem　　　z　　kim.
　　　　　　suppose.PST.1SG　suppose.PST.1SG,　but　not　have.PST.1SG with　who
　　　　A:　'After all, father, you were supposed to play whist.'
　　　　B:　'I was, I was, but I had no one to play with.'　　　　　　　　(NKJP, *Teatr 3*, 1974)

(6)　musieć 'must, have to'
　　a.　Ten　z　　kolei może　　　　rozpatrzyć　reklamacje, ale　nie　musi　　　　　ø.
　　　　this　from turn can.PRS.3SG consider.INF　complaints but　not　must.PRS.3SG
　　　　'This one, in turn, can consider the complaints, but doesn't have to.'　　(NKJP, *Metropol*, 2001)

(7)　powinien 'should, be supposed'
　　a.　Sławek nie zmieniał　　　nic　　w następnych scenach, chociaż　powinien　　ø.
　　　　Sławek not change.PST.3SG nothing in following　scenes　although should.PST.3SG
　　　　'Sławek did not change anything in the following scenes, although he should have.'
　　　　　　　　　　　　　　　　　　　　(NKJP, *Gwiazdy mają czerwone pazury*, 1998)

In essence, all the examples illustrating Polish ME involve deontic modal verbs. In contrast, the distribution of ME with epistemic modals appears to be significantly more restricted. As noted by Drubig (2001) for English and Authier (2011) for French, ME is generally not attested with epistemic modals, as shown in (8). This view is also supported by McDowell (1987) and Depiante (2000), among others.

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[2]　Bondaruk (2015) claims that the verb *dać się* 'give się' can also receive a modal reading; however, its interpretation is strictly deontic. Hence, it is not taken into consideration in this study. Nevertheless, it is crucial to note that Polish ME can also occur with this semi-modal:
(i)　Tych　książek nie da　　　　się szybko przeczytać, ale　tamte opowiadania się da　　　　　ø.
　　These books　not can.PRS.3SG się quickly read.INF　　but　those　short stories　się can.PRS.3SG
　　'These books can't be read quickly, but those stories can be.'

(8)   a. John must wash his car every day and Peter must ø too.   (*epistemic/deontic)   (Drubig 2001:30)

    b. *La police doit   arriver   dans cinq minutes et   (*epistemic/deontic)
       the police must.PRS.3SG arrive.INF in   five   minutes and
       l'ambulance   doit   ø   aussi.
       the ambulance must.PRS.3SG   also
       'The police must arrive in five minutes and the ambulance must also.'   (Authier 2011: 193)

The following Polish examples demonstrate instances of ME with epistemic modals. Some of these, such as (9c) and (9d), appear more acceptable and may reveal variation in speaker judgments. Notably, there remains a marked contrast in acceptability between ME with deontic versus epistemic modals – a pattern similarly observed by Aelbrecht (2010: 49). While a full explanation for the restricted distribution of ME with epistemic modality lies beyond the scope of this paper, it should be addressed in future research.[3]

(9)   a. *Świeci   się   światło w   pokoju, więc Alicja musi   już   być   w
       shine.PRS.3SG REFL light   in   room   so   Alicja must.PRS.3SG already be.INF at
       domu, a   Piotrek jeszcze nie może   ø.
       home but Piotrek yet   not can.PRS.3SG
       'The light is on in Alicia's room, so Alicja must already be at home and Piotrek couldn't yet.'

    b. ??Od nowego roku Maria miała   pracować zdalnie, a   Karolina nie miała   ø.
       from new   year Maria suppose.PST.3SG to work.INF remotely but Karolina not suppose.PST.3SG to
       'From the new year, Maria was supposed to work remotely, and Karolina wasn't supposed to.'

    c. ?Tomek twierdzi,   że zrobił   już   zakupy, ale nie mógł   ø, bo
       Tomek claim.PRS.3SG that do.PST.3SG already shopping but not can.PST.3SG   because
       sklepy są   zamknięte.
       shops   be.PRS.3PL   closed
       'Tomek claims that he has already done the shopping, but he couldn't, because the shops are closed.'

    d. ?Ania mówi,   że nie zgubiła   kluczy, ale musiała   ø,   bo
       Ania say.PRS.3SG that not lose.PST.3SG keys   but must.PST.3SG because
       znalazłam   je   na drodze.
       find.PST.1SG them on the road
       'Ania says that she didn't lose the keys, but she must have as I found them on the road.'

3. Criteria

The main arguments in favour of PF-deletion analysis of Polish ME include extraction and case connectivity effects.[4] In order to support a deletion analysis, ellipsis should permit extraction and

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[3] Authier (2011) suggests that the ungrammaticality of ME with epistemic modals is related to topicalisation. He posits that the complement of the modal verb in French must be able to undergo topicalisation; if this is not possible, elision is not allowed. This observation correlates with the claim that, unlike deontic modals, epistemic modals are incompatible with topicalisation in French (see Authier 2011: 199-203). Further research will determine whether this observation can be extended to Polish.

[4] A number of early studies, notably by Grinder and Postal (1971) and Bresnan (1971), argue that the so-called "missing antecedents" phenomenon supports a PF-deletion analysis of ellipsis. Their core claim is that if a pronoun can refer to an element inside an elided clause, then that clause must contain syntactic structure at some level. This is illustrated in (ii), where the pronoun in the final clause refers back to the elided DP 'a

display case matching between the remnant object and the ellipsis site. Additionally, the syntactic mismatches test is applied. Although this test is not a definitive diagnostic for the existence of an internal structure, it may still be useful for approximating the scope of the ellipsis. This paper investigates three types of mismatches, namely voice, aspect, and tense asymmetries.

3.1. Extraction

Extraction has been demonstrated to be the most effective mechanism for investigating the presence of an internal structure. When elliptical construction permits various A- or A-bar movements, it suggests the presence of a silent syntactic structure. That is because elements can only be extracted if there exists a syntactic position from which they can move. English VPE, for instance, permits wh-movement, as demonstrated in (10). The wh-phrase moves from its underlying position, extracting out of the ellipsis site before the verb phrase undergoes deletion. This behaviour indicates that English VPE has an internal structure that can host the trace of a wh-phrase. In contrast, constructions involving null proforms do not allow A- or A-bar movements, as they do not contain the internal structure needed for the extraction. This is demonstrated in (11), where *do-it* anaphora fails to allow extraction due to the absence of such a structure.

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camel'. Since indefinites under negation, like the first instance of a camel, cannot normally bind pronouns (Hankamer and Sag 1976), the logical antecedent must come from the ellipsis site.

(i)   a. I've never ridden a camel, but Ivan's ridden a camel$_i$, and he says it$_i$ stank horribly.
       b. I've never ridden a camel, but Ivan has ø, and he says it$_i$ stank horribly.

(Hankamer and Sag 1976: 403)

However, this test has been widely debated. While Polish ME appears to behave similarly, its local equivalent of deep anaphora, *zrobić to* 'do it', also licenses pronouns referring to an elided constituent, as illustrated in (ii), thereby undermining the predicted contrast. Given that such deep anaphora is not assumed to involve internal syntactic structure, these findings challenge the test's reliability.

(ii) a. Henryk   nie   mógł   kupić   nowego   aparatu,   ale   Ania   mogła   ~~kupić nowy aparat~~$_i$ i
          Henryk   not   can.PST.3SG   buy.INF   new   camera   but   Ania   can.PRS.3SG   and
          korzysta   z   niego$_i$ codziennie.
          use.PRS.3SG   of   it   every day
          'Henryk couldn't buy a new camera but Ania could and she uses it every day.'

      b. Henryk   nie   mógł   kupić   nowego   aparatu,   ale   Ania   to   zrobiła   i
          Henryk   not   can.PST.3SG   buy.INF   new   camera   but   Ania   it   do.PST.3SG   and
          korzysta   z   niego$_i$ codziennie.
          use.PRS.3SG   of   it   every day
          'Henryk couldn't buy a new camera but Ania did it and she uses it every day.'

Moreover, Merchant (2013), building on Hardt (1993), shows that English do-so anaphora, typically analysed as null proform, permits missing antecedents as well, see the example in (iii).

(iii) Jerry wouldn't read a book by Babel, but Meryl has done so and it was pretty good.   (Merchant 2013a: 541)

While some searchers (e.g., Authier 2011) maintain the test's usefulness, others (e.g., Ziat 2018, Miller et al. 2020, Fernández-Sánchez 2023) question its importance due to cross-linguistic variation and inconsistent interspeaker judgments. For these reasons, this paper does not rely on the missing antecedents test as diagnostic evidence.

(10)   I know which film she watched, but I don't know which she didn't [$_{vp}$ ~~watch t~~$_{which}$].

(11)   *I know which film she watched, but I don't know which she didn't do it.

Polish ME is compatible with several types of A-bar movement, as exemplified in (12). This includes wh-movement in (12a) and (12b), ACD (Antecedent-Contained Deletion) in (12c), free relatives in (12d) and topicalisation in (12e) and (12f). These examples provide strong evidence for the presence of a silent syntactic structure within the ellipsis site, thereby supporting PF-deletion analysis of this phenomenon.

(12)   a. Zgadnij,   kto   musi   posprzątać po   imprezie, a   kto   nie musi   ø.
           guess.PRS.2SG who must.PRS.3SG clean.INF   after party   and who not must.PRS.3SG
           'Guess who has to clean up after the party and who doesn't have to.'

       b. Pamiętam,   komu miałam   przekazać   wiadomość, a
           remember.PRS.3SG who   suppose.PST.1SG to convey.INF message   and
           komu nie miałam   ø.
           whom not suppose.PST.3SG to
           'I remember who I was supposed to give message to, and who I wasn't supposed to.'

       c. Nie robimy   wszystkich badań, które   powinniśmy   ø.
           not do.PRS.1PL all   tests which   should.PRS.1PL
           'We don't do all the tests that we should.'

       d. On   pomoże   komu(kolwiek) będzie   mógł   ø.
           he   help.PRS.3SG whoever   be.FUT.3SG can.FUT.3SG
           'He'll help whoever he can.'

       e. Ona chce   przeczytać jakąś książkę, ale "Zbrodni i   Kary"
           she want.PRS.3SG watch.INF   some book   but Crime   and Punishment
           nie powinna   ø,   bo   jest   jeszcze za młoda.
           not should.PRS.3SG   because be.PRS.3SG   still   too young
           'She wants to read a book, but she shouldn't read "Crime and Punishment" because she's still too young.'

       f. Ola chce   wypić   jakiś sok, ale pomarańczowego nie może
           Ola want.PRS.3SG drink.INF some juice but orange   not can.PRS.3SG
           ø,   bo   jest   już   przeterminowany.
                because be.PRS.3SG already   expired
           'Ola wants to drink some juice, but she can't drink orange juice because it's already expired.'

3.2. Case connectivity effects

Case connectivity effects, such as case matching between a remnant object and its correlate in the ellipsis site, provide another strong argument for the existence of a silent syntactic structure. The underlying assumption is that the remnant object receives case from the elided clause before it undergoes the ellipsis. For instance, in sluicing, the wh-remnant must exhibit the same case as its correlate in the antecedent clause. This implies that the remnant receives its case from within the elided structure and undergoes movement prior to ellipsis. Since case assignment requires the presence of syntactic structure, we must assume that the remnant escapes deletion by moving out of the ellipsis site, which retains the necessary case-assigning configuration, as is illustrated in (13). The verb *schmeicheln* 'flatter' assigns dative; hence, only

the dative *wem* is grammatical in the sluiced clause. The ungrammaticality of *wer* (nominative) and *wen* (accusative) confirms that the sluiced structure retains the case-assignment properties of the ellipsis site.

(13) Er   will   jemandem   schmeicheln, aber sie   wissen   nicht, (*wer
     he   want.PRS.3SG someone.DAT flatter.INF but   they know.PRS.3PL   not   who.NOM
     /*wen)   wem   [er t_wem smeicheln   will].
     who.ACC who.DAT   he   flatter.INF want.PRS.3SG
     'He wants to flatter someone, but they don't know who.'   (Merchant 2001: 146)

Polish ME exhibits case connectivity effects, as demonstrated in (14). In (14a), the topicalised noun *kryminału* 'crime novel' appears in the genitive case, rather than the accusative case assigned by the verb in the matrix clause. This is due to the genitive of negation, a well-attested phenomenon in Polish, whereby objects that would otherwise receive the accusative case are marked with the genitive under the scope of negation. Crucially, this alternation is preserved under ellipsis, indicating that the remnant receives case from the ellipsis site that contains case-assigning syntactic structure.

(14) a. Adrian chciał   przeczytać jakąś książkę, ale (*kryminał)
        Adrian want.PST.3SG   read.INF   some   book   but *crime novel.ACC
        kryminału   nie   może   [przeczytać], bo   jest   za   młody.
        crime novel.GEN not can.PRS.3SG read.INF   because be.PRS.3SG   too   young
        'Adrian wanted to read a book, but crime novels he can't, because he's too young.'

     b. Kasia nie przeprosiła   koleżanek, ale (*Ani)   Anię   powinna
        Kasia not apologise.PST.3SG friends   but Ani.GEN Anię.ACC   should.PRS.3SG
        [przeprosić],   bo   to jej najlepsza przyjaciółka.
        apologise.INF because   it her best   friend
        'Kasia didn't apologise to her friends, but she should to Ania, because she is her best friend.'

     c. Adrian zaprosił   niektóre dziewczyny do domu, ale nie chce
        Adrian invite.PST.3SG some   girls   to house but not want.PRS.3SG
        powiedzieć,   (*które)   których   nie   mógł.
        say.PRS.3SG   which.ACC   which.GEN   not   can.PST.3SG
        'Adrian invited some girls over, but he doesn't want to say which ones he couldn't.'

3.3. Syntactic mismatches

3.3.1. Voice mismatches

According to Hankamer and Sag (1976), surface anaphora does not allow syntactic mismatches. This claim aligns with sluicing, an example of PF-deletion ellipsis, that does not tolerate voice mismatches between the elided constituent and its antecedent. This is shown in (15), where the combination of a passive antecedent and an active elided site yields an ungrammatical string.

(15) *The car was stolen but we don't know who ø=~~stole the car~~.

Nevertheless, this test alone is insufficient to support PF-deletion analysis of ME. For instance, English VPE, despite having a silent syntactic structure (Aelbrecht 2010), allows certain voice mismatches, as exemplified in (16).

(16) a. There was really no one at the meeting who could answer the question the way it should be ~~answered~~.
       b. The system can be used by anyone who wants to ~~use it~~.

<div align="right">(Merchant 2013b: 3)</div>

To account for the discrepancy between sluicing in (15) and VPE in (16), Merchant (2013b: 14–15) attributes this phenomenon to differences in the position of the syntactic head encoding voice. Namely, in VPE, VoiceP is higher than the nodes computing identity. Therefore, VoiceP is not targeted by the ellipsis. Sluicing, which involves the deletion of TP, does not permit voice mismatches because VoiceP is contained within the elided TP.

   The two sets of examples in (18) and (20) show that Polish ME rules out voice mismatches. In other words, constructions with a passive antecedent and an active elided site, as well as those with an active antecedent and a passive elided site, are not permitted. To help establish this contrast clearly, parallel examples matching in voice are provided in (17) and (19) to confirm that the ungrammaticality of the mismatched cases stems from the voice clash. Following Merchant (2013b), I assume the ungrammaticality of examples involving voice asymmetries to indicate that the ellipsis site includes VoiceP.

(17) a. Policjant   nie ukarał   kierowców, chociaż mógł   ø.
         policeman not fine.PST.3SG drivers   although can.PST.3SG
         'The policeman didn't fine the drivers, although he could have.'
         (ACTIVE ANTECEDENT-ACTIVE ELLIPSIS SITE)

      b. ?Kierowcy nie zostali   ukarani   przez policjanta, chociaż mogli   ø.
         Drivers   not be.PST.3PL fine.PTCP.3PL by   policeman   although could.PST.3PL
         'The drivers weren't fined by the policeman, although they could have been.'
         (PASSIVE ANTECEDENT-PASSIVE ELLIPSIS SITE)

(18) a. *Policjant   nie ukarał   kierowców, chociaż mogli   ø.
         policeman not fine.PST.3SG drivers   although can.PST.3PL
         'The policeman didn't fine the drivers, although they could have been.'
         (ACTIVE ANTECEDENT-PASSIVE ELLIPSIS SITE)

      b. *Kierowcy nie zostali   ukarani   przez policjanta, chociaż mógł   ø.
         Drivers   not be.PST.3PL fine.PTCP.3PL by   policeman   although can.PST.3SG
         'The drivers weren't fined by the policeman, although he could have.'
         (PASSIVE ANTECEDENT-PASSIVE ELLIPSIS SITE)

(19) a. Żołnierz nie uwolnił   jeńców, chociaż myślę,   że   powinien   ø.
         soldier   not free.PST.3SG captives although think.PRS.1SG that should.PST.3SG
         'The soldier didn't free the captives, although I think he should have.'
         (ACTIVE ANTECEDENT - ACTIVE ELLIPSIS SITE)

      b. Jeńcy   nie zostali   uwolnieni   przez żołnierza, chociaż myślę,   że powinni   ø.
         captives not be.PST.3PL free.PTCP.3PL by   soldier   although think.PRS.1SG that should.PST.3PL
         'The captives were not freed by the soldier, although I think they should have.'
         (PASSIVE ANTECEDENT - PASSIVE ELLIPSIS SITE)

(20) a. *Żołnierz nie uwolnił   jeńców, chociaż myślę,   że   powinni   ø.
        soldier   not free.PST.3SG captives although think.PRS.1SG that should.PST.3PL
        'The soldier didn't free the captives, although I think they should have been freed.'
        (ACTIVE ANTECEDENT - PASSIVE ELLIPSIS SITE)

     b. *Jeńcy nie zostali   uwolnieni   przez żołnierza, chociaż myślę,   że   powinien   ø.
        captives not be.PST.3PL free.PTCP.3PL by   soldier   although think.PRS.1SG that should.PST.3SG
        'The captives were not freed by the soldier, although I think he should have freed them.'
        (PASSIVE ANTECEDENT - ACTIVE ELLIPSIS SITE)

3.3.2. Aspect mismatches

In the literature on ME, the main focus is given to voice mismatches. Nevertheless, in Polish, another distinctive grammatical feature needs to be analysed. Polish verbs can be divided according to aspect. Almost all verbs, including infinitives, can be classified as imperfective or perfective. The imperfective form emphasises the ongoing or habitual character of an action. The perfective form indicates a completed action and is marked morphologically, for instance, by adding a prefix or suffix (Milczarski 2021: 72) as in *sprzątać*.IMPF – *posprzątać*.PF 'to clean'.

Interestingly, despite the lack of voice mismatches, it is possible to find examples of aspect asymmetries. The complement of the modal verb within the gap can be interpreted as perfective, even though the antecedent is imperfective, and vice versa. This phenomenon is illustrated in the examples provided in (21) and (22). For instance, in (21a), the antecedent verb *sprzątam* 'I clean' is imperfective, emphasizing a habitual action. However, the elided material, interpreted as *posprzątać* 'to clean up', is perfective, indicating a completed action.

(21) (IMPERFECTIVE ANTECEDENT - PERFECTIVE ELLIPSIS SITE)
     a. Teraz codziennie **sprzątam**   sypialnię, bo   w zeszłym miesiącu nie
        Now   every day   clean.PRS.IMPF.1SG bedroom because last   month   not
        mogłem   [jej **posprzątać**] ani   razu.
        can.PST.1SG her clean.INF.PF   even once
        'Now I clean the bedroom every day because last month I couldn't even once.'

     b. Maria **robi**   zakupy, bo   ja wczoraj nie mogłam   [ich **zrobić**].
        Maria do.PRS.IMPF.3SG shopping because I yesterday not can.PST.1SG them do.INF.PF
        'Maria is doing the shopping because I couldn't yesterday.'

(22) (PERFECTIVE ANTECEDENT - IMPERFECTIVE ELLIPSIS SITE)
     a. Maria **zrobiła**   zakupy, więc ja już   nie muszę   [ich **robić**].
        Maria do.PST.PF.3SG shopping so   I   already not must.PRS.1SG them do.INF.IMPF
        'Maria did the shopping so I don't have to.'

     b. ?Właśnie **posprzątałam**   sypialnię. Niestety,   nie mogłam   [jej **sprzątać**]
        just   clean.PST.PF.3SG bedroom unfortunately not can.PST.1SG her clean.INF.IMPF
        na bieżąco, bo   miałam   za   dużo   pracy.
        regularly   because have.PST.1G too much work
        'I've just cleaned the bedroom. Unfortunately, I couldn't regularly because I had too much work.'

    c. Kasia **poszła**   do sklepu, chociaż w tym momencie nie powinna   [tam
        Kasia go.PST.PF.3SG to shop   although at that moment   not should.PRS.3SG there
        iść].   Jest   już   późno, a   ona   miała   odpoczywać.
        go. INF.IMPF be.PRS.3G already late   and she   suppose.PST.3SG to rest.INF
        'Kasia went to the store, even though she shouldn't be at that moment. It's already late, and she was
        supposed to be resting.'

3.3.3. Tense mismatches

A third type of mismatch involves tense mismatches. The elided infinitive allows its antecedent to be in the past tense as in (23a), present tense in (23b), and future tense in (23c).

(23)   a. Ania **ugotowała**   obiad, bo   Marek nie mógł   [go ugotować].
          Ania cook.PST.3SG dinner because Marek not can.PST.3SG it   cook.INF
          'Ania cooked dinner because Marek couldn't.'

       b. Ania **je**   popcorn, chociaż nie miała   [go jeść].
          Ania eat.PRS.3SG popcorn although not suppose.PST.3SG it   eat.INF
          'Ania is eating popcorn, although she wasn't supposed to.'

       c. Janek **posprząta**   jutro   dom, żeby   Kasia nie musiała   [go posprzątać].
          Janek clean.FUT.3SG tomorrow house so that Kasia not must.PST.3SG it   clean.INF
          'Janek will clean the house tomorrow so that Kasia won't have to.'

To summarise, the results of the syntactic mismatches test show a mixed pattern. While Polish ME clearly blocks voice mismatches, it appears to tolerate mismatches in tense and aspect.

4. Proposal

Before presenting the analysis, it is important to outline the theoretical assumptions regarding ellipsis licensing. Following Aelbrecht (2010) and Merchant (2001), I assume that (i) ellipsis is licensed due to the Agree relation between [E]-feature and the licensing head, (ii) the [E]-feature allows the material to be elided at PF. The [E]-feature is specified for each type of ellipsis in a given language and carries an uninterpretable feature [uF], which must match the category feature [CAT] of the head that licenses the ellipsis. Once this Agree relation is established, the uninterpretable feature is checked, activating the [E]-feature. This activation triggers deletion of the complement of the head at PF.

Based on these assumptions, I argue that in the case of Polish ME, the [E]-feature is located on the head of VoiceP. This placement has significant consequences: it predicts that the ellipsis will delete the complement of VoiceP, and that the licensing head – ModP – must merge above VoiceP and establish an Agree relation with [E]. I further propose that the [E]-feature in this context bears [uMod], an uninterpretable modal feature, which must be checked against a matching [Mod] feature on a deontic modal verb, as illustrated in (25).

To motivate this syntactic configuration, I adopt the extended verbal projection for Polish proposed by Ruda (2014) and Jędrzejowski (2015): TP-ModP-AspP-VoiceP. This structure

accounts for the behaviour of modals as well as the interaction between ellipsis and aspect or voice mismatches. Numerous researchers (e.g., Zabrocki 1979, Witkoś 1996) argue that Polish modal verbs are base-generated within the VP, as most of them inflect for tense, person, and number. However, they differ from prototypical verbal heads in that they cannot undergo passivisation. Furthermore, Polish modal verbs cannot be stacked - i.e. they cannot co-occur as shown in (24). Due to their properties and for the sake of clarity, I assume that Polish modals occupy their own functional projection, ModP.

(24)   *Ja muszę móc obejrzeć te filmy.
         I must.PRS.1SG must.INF watch.INF these films
         (Intended:) 'I must be able to watch these films.'

This structure helps explain the results of the analysis. The syntactic mismatches test supports the view that ellipsis in Polish ME deletes the node containing VoiceP. As Merchant (2013) argues for sluicing, voice mismatches are disallowed because VoiceP is included in the ellipsis site. Similarly, Polish ME does not permit voice mismatches, indicating that ellipsis targets a node containing VoiceP. However, aspect mismatches are allowed. This asymmetry can be explained by the fact that AspectP c-commands VoiceP – it remains outside the ellipsis scope.

(25)

ModP
├── M
│   [CAT[Mod]]
└── AspP
    ├── Asp
    └── VoiceP
        ├── Voice
        │   E[INFL[uMod]]
        └── ellipsis site
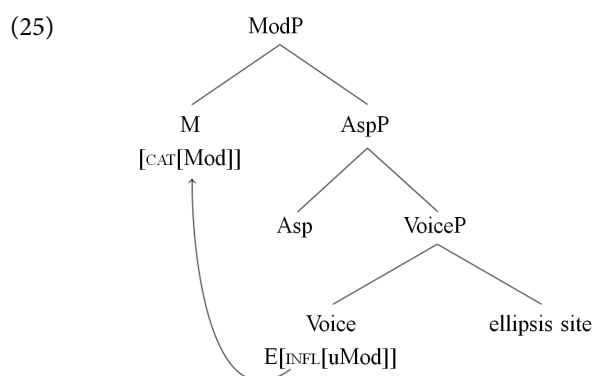
The resulting structure for the sentence in (26a), repeated from (1b), is illustrated in (26b). This configuration aligns with Czech ME, where VoiceP has likewise been analysed as the head bearing the [E]-feature which, once activated, deletes its complement (Gruet-Skrabalova 2017).

(26)   a.   Przesłali   jej   wszystkie dowody,   które mogli   ø.
             send.PST.3PL   her   all   evidence.ACC that   could.PST.2PL
             'They sent her all the evidence they could.'

       b.   Przesłali jej wszystkie dowody, [CP które_i [TP pro [ModP mogli [AspectP ~~VoiceP [vP [VP przesłać t_i]~~]]]]]]]]

5. Conclusion

This paper has investigated the properties of Polish Modal Ellipsis (ME) with regard to three diagnostics: extraction, case connectivity effects, and syntactic mismatches. The results point to ME as a type of deletion ellipsis. In particular, the possibility of extraction and case

matching effects indicate that ellipsis involves an internal structure that is left unpronounced. The mixed results from the mismatch tests – i.e., blocking voice mismatches while permitting aspect and tense asymmetries – suggest that the ellipsis site includes VoiceP but excludes higher projections such as AspP. Based on this evidence, I argue that Polish ME involves PF-deletion of the VoiceP node. To capture these patterns, I have proposed that the [E]-feature responsible for ellipsis licensing is hosted by the modal head in ModP, which checks its uninterpretable feature [uMod] via Agree relation with VoiceP, thereby triggering deletion of its complement. The proposed analysis aligns Polish ME with similar patterns observed in languages such as Czech (Gruet-Skrabalova 2017).

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Metaphoric Sense Developments in the Names of Places of Worship in Contemporary American English

John G. Newman[1] and Sylwester Łodej[2]

[1]University of Texas Rio Grande Valley, USA; [2]Jan Kochanowski University, Poland

Abstract

This paper offers an account of the metaphorical extension of the names of religious houses of worship such as *temple*, *church*, *mosque*, and *synagogue* in contemporary American English, reflecting processes of linguistic secularization. Using data from the *Corpus of Contemporary American English* (*COCA*), the study investigates how the meanings of religious terms enter into secular domains, signalling shifts in societal perceptions of religious experience. The findings show that *temple* and *church* frequently undergo metaphorization, appearing in phrases like *temple of learning* and *church of football*, where non-religious modifiers drive semantic extension. These terms increasingly denote secular places characterized by human passion, knowledge, and community, disclosing broader patterns of cultural engagement that evidently mirror religious practices and behaviours. In contrast, *mosque* and *synagogue* demonstrate greater resistance to metaphorical extension, retaining religious denotations more typically. The study identifies SOCIETY, CULTURE, and LIFESTYLE as the principal domains for metaphorical extension, suggesting an alignment between linguistic secularization and usage shifts into non-religious contexts. Conversely, domains such as SPORT, TECHNOLOGY, and MILITARY show minimal metaphorical usage, reflecting the selective nature of this process. The results underscore the role of metaphor in bridging sacred and secular spheres, demonstrating how language adapts in order to reflect evolving cultural frameworks. By applying Conceptual Metaphor Theory and insights from cultural linguistics, this research advances our understanding of linguistic metaphorization, and more particularly secularization, as significant drivers of semantic change.

Keywords: secularization; metaphor; semantics; corpus; culture

1. Introduction

Languages are living entities which evolve in response to cultural, societal, and ideological shifts. One striking reflection of such evolution is the development of secular metaphoric senses in lexemes that historically bore meanings specific to religious domains within lexicons. The names of places of worship, such as *temple*, *church*, *mosque*, and *synagogue*, have

long served to denote spiritual and communal places. However, in contemporary American English, these terms have exceeded their original religious spheres, and have entered into new areas of metaphorical usage that reveal broader linguistic, and perhaps cultural, transformations. This paper investigates these developments, and it also proposes that if American society is indeed undergoing general secularization, as some historians and sociologists have argued (Berger 2002; Moore 1989; van der Tol and Gorski 2022, etc.), the new metaphoric senses identified here can be considered linguistic evidence of that cultural transformation.

The primary focus of this study is on the metaphorical extensions observed in the nominal phrase type *RELIGIOUS-PLACE of NOUN*, such as *church of film*, *church of food*, or *church of football*. These constructions reflect a novel semantic shift where, in this case, *church* comes to signify 'a centre or venue of an activity' or 'a facility dedicated to a specific purpose.' Interestingly, while this usage of *church* is increasingly prevalent in contemporary discourse, it has yet to be formally recognized by major lexicographic sources. The phenomenon echoes a more established pattern observed in the lexeme *temple*, as seen in expressions like *temple of art*, *temple of learning*, and *temple of science*. The *Merriam-Webster Dictionary* already acknowledges this metaphorical extension for *temple*, defining it as 'a place devoted to a special purpose.'

The historical roots of this metaphoric shift date back at least to the late 18th century. The earliest instance recorded in the *Oxford English Dictionary* is seen in the phrase *temple of fame* (*The temple of fame is the shortest passage to riches and preferment* in 'Junius', Stat Nominis Umbra (1772) vol. II. lix. 275). Such verification shows something of the dynamic nature of linguistic metaphorization and its role in shaping contemporary meanings. That there are parallels between the metaphorical developments of *temple* and *church* begins to suggest that a broader cognitive and cultural mechanism is at work, wherein religious terminology is repurposed to describe secular domains of human activity.

Drawing on empirical data from the *Corpus of Contemporary American English* (*COCA*), this study investigates the frequency, distribution, and conceptual domains associated with the metaphoric senses of *temple* and *church*, as well as those of *mosque*, *synagogue*, and certain other terms for places of worship. The evidence adduced indicates that while *temple* and *church* have readily adopted secular metaphors, the other terms examined have demonstrated greater resistance to such semantic shifts. These disparities highlight that lexical interrelations, religious and other, are determined in complex ways by frequency effects, collocational tendencies, and even extralinguistic, cultural forces.

2. Linguistic secularization and semantic change

The secularization of religious terminology has been the subject of increasing academic interest, though it has, in the main, been examined more as a sociological (Casanova 1994; Berger 1999; Norris & Inglehart 2004; Davie 2007; Bruce 2011) or a historical process (Chadwick 1975; McLeod 2000; Taylor 2007), surmised to reflect broader societal shifts in which sacred concepts are appropriated into secular domains. Empirical research on the

semantic secularization of English terms is scarce. Most relevant studies have investigated other languages. Examples of such include Yadin and Zuckermann (2010), which, while focusing on Hebrew, demonstrates the ideological secularization of particular sacred terms. Rabin (1965) also explores secularization patterns in Hebrew, but does draw parallels with the evolution of religious terminology in English. Moreover, much of this research focuses on secularization in cultural or sociological contexts, leaving a notable gap in the linguistic examination of religious lexis, no less so in English terminology than elsewhere. Łodej and Newman (2014) as well as Newman and Łodej (2014) provide important analyses of this phenomenon, demonstrating how the adjectives *divine* and *holy* have transitioned from their original religious contexts to more secular and figurative uses. This highlights a gradual shift away from explicitly religious associations in these lexemes, and could be a reflection of a greater cultural secularization, that is, taken generally, a reduced significance of religion in society and in the minds of individuals (cf. Berger 2002). The hypothesis that American society at large has been undergoing secularization, at least as regards Christianity (and more debatably religiosity), dates back at least to the 19th century (Moore 1989), and has come to the fore among historians, sociologists, and other researchers in recent years (Parsons 1974; Moore 1989; Bruce 1996; Berger 2002; Smith 2003: Hallin and Mancini 2004; Casanova 2006; de Graaf 2013; Voas and Chaves 2016; van der Tol and Gorski 2022; etc.).

Lakoff and Johnson (1980) argue that metaphor is a fundamental aspect of human cognition, with linguistic metaphors expressing deeper conceptual structures. Kövecses (2009) builds on these ideas, refining Conceptual Metaphor Theory (CMT) to account for cultural and contextual variations in metaphor usage. More recent contributions, such as Kövecses's Extended Conceptual Metaphor Theory (2020), expand upon the dynamic role of metaphors in shaping human thought, language, and culture.

This progressive approach aligns with research in cultural linguistics, as advanced by Sapir (1921), Whorf (1940), Lévi-Strauss (1958 [1963]), Wierzbicka (1996) and Sharifian (2017). As Sapir (1921: Chapter X) plainly states: "language does not exist apart from culture, that is, from the socially inherited assemblage of practices and beliefs that determines the texture of our lives". While Sapir laid the groundwork by asserting that language and culture are inseparable, Sharifian has expanded on this view to highlight culturally situated knowledge and collective cognitive structures. The century-long gap between their contributions, the maintenance of that proposition, confirms its utility for understanding how language reflects cultural frameworks.

Conceptual Metaphor Theory, as refined by Kövecses (2009), intersects with cultural linguistics by demonstrating how metaphors draw from shared cultural experiences. This theory suggests that metaphors map abstract experiences onto more concrete domains, informing the metaphorization of religious terms. For example, metaphors like *temple of learning* or *church of football* illustrate how sacred terms are recontextualized to describe secular activities and places. Cognitive semantics (Rosch 1978; Lakoff & Johnson 1980; Jackendoff 1983; Langacker 1987; Sweetser 1990; Talmy 2000) provides a critical framework for understanding the metaphorical extension of religious lexis into secular domains. By emphasizing the relationship between language and experience, cognitive semantics allows for the analysis of how abstract concepts are grounded in concrete experiences. By combining

insights from cultural linguistics and conceptual metaphor theory, this study explores how religious lexemes of contemporary American English have semantically undergone secularization and suggests that this process may, supporting arguments for American secularization, evidence a parallel process at the societal level.

Historical perspectives on semantic change also provide valuable context for understanding the evolution of religious lexis. Although the adaptation of religious terms forms part of a broader trajectory of language evolution, the process reflects patterns observed across various domains. Foundational works by Meillet (1906), Stern (1931), and Ullmann (1957) outline general patterns of semantic shift influenced by societal and cultural factors. While these studies do not focus explicitly on religious terminology, their frameworks offer insights that can be applied to shifts in religious language.

Blank (1999) extends this discussion by exploring the cognitive and typological motivations behind lexical change, highlighting processes, some related to the respective prestige of innovative speakers, which may contribute to the secularization of religious terms. Traugott and Dasher (2001) further elaborate on semantic change theories, emphasizing the role of societal values in driving language evolution. Although their work addresses broader linguistic shifts, it provides indirect insights into the ways religious terminology may adapt over time.

3. Methodology

This study adopts a corpus-based methodology to investigate the metaphoric extensions of religious lexemes in contemporary American English. Drawing on the *Corpus of Contemporary American English* (*COCA*), which encompasses over one billion words from diverse genres (spoken, fiction, newspapers, academic texts, TV/movie subtitles, blogs, and magazines), the research benefits from a rich dataset showing linguistic trends across registers and contexts. The corpus's diachronic structure (1990–2019) enables tracking of linguistic shifts over time, providing a robust foundation for identifying emerging patterns of metaphorical use.

This study investigates the lexical field of religious place names, and examines six common nouns representing such names: *temple*, *church*, *cathedral*, *shrine*, *mosque*, and *synagogue*, and it traces their metaphorical applications in secular domains. These particular nouns were selected because, unlike certain other terms of this small field (e.g. *sanctuary*), they were cross-listed as synonymous in both *The Oxford American Writer's Thesaurus* (2004: 141, 917, etc.) and the *Merriam-Webster Thesaurus* (https://www.merriam-webster.com), and they yielded measurable *of-phrase* data in *COCA*. Key phrases such as *church of NOUN* and *temple of NOUN* serve as focal points, and with non-religious modifiers (e.g., *church **of film**, temple **of music***) both represent and drive these semantic shifts. Through *COCA's* concordance and collocation tools, the study extracts instances of these metaphorical phrases, mapping their distribution across conceptual fields, including those of ART, CULTURE, LIFESTYLE, BUSINESS, EMOTION, SPORT, TECHNOLOGY, and SOCIETY. This

distribution highlights how religious terminology permeates multiple areas of life, reflecting the diverse ways in which the religious lexicon is repurposed in secular discourse.

The metaphorical senses identified are analysed within the frameworks of Conceptual Metaphor Theory (Kövecses 2009; 2020) and cultural linguistics (Sapir 1921; Lucy 1992; Palmer 1996; Boroditsky 2011; Sharifian 2017). This dual approach ensures that metaphorization is examined from both cognitive and cultural perspectives, enabling a comprehensive understanding of how religious lexis adapts to secular contexts. Head-modifier combinations are scrutinized to reveal the mechanisms through which non-religious contexts facilitate the metaphorization process.

Preliminary inspection of the data indicates a significantly greater frequency of metaphorical extension in *temple* and *church* than in the other terms. The comparative token frequencies of the respective nouns are doubtless partly responsible for this mismatch. These two terms are by far the most frequent in the data, compared to the other lexemes. Domains such as SOCIETY and LIFESTYLE emerge as fertile sites for this metaphorization, reinforcing the notion that secular modifiers reveal and drive semantic extension from the religious to the secular.

4. Results and discussion

As a starting point for the analysis of the data culled, we set out the primary, pre-extension, religious meanings of the lexemes considered (definitions given in the *Oxford English Dictionary* for places, not congregations, etc.). In the order treated in this section, the nouns of this study which represent places of worship are:

temple   *A building used for religious worship.*
church   *A building for public (Christian) worship.*
cathedral   *The principal church of a diocese.*
shrine   *A place where worship is offered or devotions are paid to a saint or deity.*
mosque   *A Muslim place of worship.*
synagogue   *A building or place of meeting for Jewish worship and religious instruction.*

Looking specifically to *church* and *temple*, the lexemes yielding by far the most secular-sense data (at 146 unique metaphorical head-modifier phrases and 129 such phrases respectively), we see the two leaders in the larger process of semantic sense extension in this set of lexemes. With the exception of *temple*, which is discussed first because it underwent metaphorization earliest, the subsections below are arranged in descending order of attested metaphorization. The total number of *COCA* data, including non-metaphorical instances, is given for each lexeme.

4.1. *temple (201)*

The term *temple* is frequently employed in metaphorical noun phrases such as *temple of literature*, *temple of photography*, *temple of music*, *temple of fame*, *temple of food*, *temple of*

decorum, *temple of meat*, *temple of success*, *temple of speed*, and *temple of amusement*. Again, from a cognitive semantics perspective, these expressions illustrate a conceptual mapping from, in this case, the source domain of *temple* - evoking veneration, sanctity, and communal gathering - to an array of target domains (e.g., cultural pursuits, personal ambition, and leisure activities). The entrenched phraseological pattern of *temple of X* leverages the high salience of the *temple* schema to frame diverse experiences in terms of sacredness, reverence, or ceremonial significance. For instance, *Temple of Literature* situates an environment of learning and scholarship within a sacralized conceptual place, or space:

(1)   She had a thick book in her hand, the place marked with her forefinger, and Manh suspected she'd spent the day at the **Temple of Literature**. (2004, FICTION: The Kenyon Review)

The phrase *temple of photography* spotlights the artistic devotion and specialized equipment that define a dedicated creative environment:

(2)   You've developed an eye. It'll serve you just as well with the living pictures, I suppose, he added with one of his characteristic sniffs. During October, equipment began to disappear from the **Temple of Photography**, a piece at a time. (1993, FICTION: Homeland)

Similarly, *temple of music* discloses the almost sacred status of musical performance venues in the cultural imagination:

(3)   Opera fans in Venice are growing anxious for a very, speedy reopening of the city's **temple of music**. (2000, SPOKEN: NPR Morning)

The expression *temple of fame* draws on the path-like quality of ambition, suggesting obstacles and ultimate glory:

(4)   The road that leads to the **temple of fame** has many setbacks and, for the same reason, it is so glorious to overcome them. (2018, ACADEMIC: Early American Literature)

Food-oriented metaphors such as *temple of food* elevate culinary experiences to quasi-religious rites:

(5)   A friend who finally dined at Chez Panisse, after trying unsuccessfully for two weeks to get a reservation, marveled at the bountiful display of immaculate produce on the entrance table. "I feel like we entered the holy **temple of food**, and this must be the holy water, " he whispered as we went to our table. (1993, NEWS: San Francisco Chronicle)

In *temple of decorum*, the sanctification of social refinement and propriety becomes central:

(6)   The maitre d' here had wanted to stop them at the door, whether for lack of neckties or worse was unclear, but one look from his father, followed by her bright appeasing smile, convinced him it would be less fuss to seat and serve them. This **temple of decorum** was nowhere near the university or his surrounding stomping grounds. (2012, WEB: allaboutspike.com)

By contrast, *temple of meat* celebrates gastronomic indulgence and craftsmanship:

(7)   Chi Spacca, the country's most high-minded new **temple of meat**, has a peerless pedigree. In 2006, Mario Batali partnered with pasta doyenne Nancy Silverton to create L. A.'s Pizzeria Mozza. (2014, MAGAZINE: Esquire)

Meanwhile, the phrase *temple of success* frames personal or professional achievement as a hallowed pursuit:

(8)   There are no open doors to the **temple of success**. Everyone who enters must forge his own way. Grand success waits patiently for anyone who has the fortitude and determination to seize his share of the American dream. (1992, MAGAZINE: Black Enterprise)

The phrase *temple of speed* extends this sacralization to motorsport venues, portraying them as honoured grounds of racing:

(9)   Circuit organizers said that 65,360 spectators turned out for the Friday practice. Monza, the so-called **temple of speed** where the Italian Grand Prix takes place would be happy to see so many. (2012, BLOG: rendezvous.blogs.nytimes.com)

Lastly, *temple of amusement* underlines the heightened status of places of entertainment:

(10)   The phrase 'The finest theater in Harlem' can be aptly applied to this redecorated and refurbished **temple of amusement**, read a newspaper ad announcing its opening. (1991, NEWS: Associated Press)

These *temple of X* constructions indicate how the lexis of sacred places of worship finds fertile ground in a variety of secular domains. By framing literature, music, food, or success in the language of devotion and sanctity, speakers highlight the communal or transcendent value of these pursuits, reinforcing a cultural model that frames certain worldly experiences as almost holy.

4.2. church (240)

As with *temple*, the term *church* appears in a broad range of secular metaphorical expressions, including *church of journalism*, *church of hype*, *church of champions*, *church of football*, *church of disco*, *church of technology*, *church of vinyl*, *church of writing*, and *church of pastry*. Drawing on the *church* schema, these constructions invoke a sense of communal belonging, ritualistic devotion, and doctrinal fervour - features mapped from the domain of religious worship onto various cultural, social, and even culinary contexts. By framing such activities as forms of "worship," these metaphors highlight the deep emotional and collective investment people place in media, sports, technology, or creative endeavours, paralleling the pattern observed with *temple*. For example, *church of journalism* characterizes a contentious media debate in quasi-religious terms:

(11)   Meantime, I'm puzzled by the holy war this debate has become. Mr. Owens dismissively refers to the **Church of Journalism**, but the religious fervor can be found almost exclusively among those like him, including Jeff Jarvis and Clay Shirky, who have nothing at stake themselves but are determined to convince those of us who do have skin in the game how wrong we are. (2012, WEB: www.cjr.org)

A playful sense of reverence emerges in *church of hype*, depicting the spectacle surrounding the Super Bowl:

(12) Like every American over the age of 6 months, I feel a patriotic duty to the Super Bowl. I am an acolyte in the **church of hype** that precedes the game. (2007, NEWS: Houston Chronicle)

Meanwhile, *church of champions* invokes the dramatic public scrutiny of a prominent figure:

(13) After an onslaught of social media criticism about offering prayers but no shelter in his **church of champions**, Osteen agreed to open Lakewood's doors. (2017, NEWS: Houston Chronicle)

In a similar way, *church of football* frames an enduring sports legacy within the language of priesthood and devotion:

(14) Clearly, it is the conclusion of a former head of the FBI and the head of what will always be known at Penn State as the Freeh Commission, that these men looked the other way on Jerry Sandusky, a high priest of the **church of football** at Penn State for 30 years. (2012, WEB: articles.nydailynews.com)

An entertainment venue dubbed the *church of disco* signals a nocturnal, music-centered gathering place:

(15) Late that night in the **Church of Disco**... Stanford invited everyone he knew to a party to introduce a new fragrance - Fallen Angel. (1998, TV: Sex and the City)

By contrast, *church of technology* underscores a clash between technological determinism and broader societal values:

(16) All we are saying to you Technocrats is we don't belong to your **Church of Technology**. Saving the world with technology, at the expense of the health of the people, is not part of our religion. (2012, BLOG: www.dailypaul.com)

Cultural tastes and passions also find expression in *church of vinyl*, reflecting the communal reverence around the collection of music:

(17) Money is in short supply. Brokeland Records,? the **church of vinyl**,? is threatened by a megastore to be built by the fifth-richest black man in America, an all-pro quarterback named Gibson? (2012: WEB: www.miamiherald.com)

An intellectual or creative pursuit gains almost spiritual stature in *church of writing and reading*:

(18) They provoke and instruct and entertain, they even clarify, but a deeper means of thinking can often be expressed better in a story, a poem, a play, or a novel. I am aware that such a position is, perhaps, essentially romantic, but I believe in the **church of writing and reading**. (2012, BLOG: www.newyorker.com)

Finally, *church of pastry* elevates Viennese confections to a realm of sweet devotion:

(19) And in every way - from a regenerative coffee and sweet roll at Cafe Landtmann (Sigmund Freud's favourite hangout, where he began scribbling notes for "On the Interpretation of Dreams ") to a

communion-by-sugar at Demel, Vienna's legendary high **church of pastry**. (2003, NEWS: Atlanta Journal Constitution)

Collectively, these *church of X* examples highlight how religious lexis is co-opted to emphasize shared passion, communal participation, and the quasi-sacred nature of culturally prized activities. This pattern underscores the broader conceptual tendency to map elements of sanctity, ritual, and congregation onto secular pursuits, revealing both the adaptability of language and the cultural importance of these metaphorical formations.

4.3. *cathedral (72)*

As was seen of *temple* and *church*, the term *cathedral* is frequently employed metaphorically in various noun phrases, including *cathedral of art*, *cathedral of learning*, *cathedral of shopping*, *cathedral of trees*, and *cathedral of victuals*. From a cognitive semantics perspective, these metaphorical extensions illustrate conceptual mapping between the source domain of *cathedral* - as evoking grandeur, reverence, and structural significance - and different target domains (e.g., in education, commerce, nature, and consumption). The recurrent patterning of *cathedral of X* corresponds to entrenched phraseological structures, wherein the high salience of the *cathedral* schema supports the conceptualization of diverse experiential domains in terms of spatial, cultural, and affective magnitude.

For instance, *cathedral of learning* positions an educational institution as an intellectual and architectural monument, as illustrated in the following example:

(20)   Locally, the Czech-American community plans to mark the Hus anniversary in September with a program at the Czechoslovak Nationality Room - where a portrait of Hus is displayed - in the University of Pittsburgh's **Cathedral of Learning**. (2015, NEWS: Pittsburgh Post-Gazette)

Similarly, the phrase *cathedral of art* frames a theater as a culturally sacralized space, reinforcing its status as an institution of aesthetic significance:

(21)   It was my mission in this first five years to make this community accept this theater as an important institution and to turn the bad feelings they had about Don around. […] I mean here was this **cathedral of art** that I was just given, with enough money to run it well. (2003, NEWS: Denver Post)

In commercial discourse, the collocation *cathedral of shopping* capitalizes on the metaphorical extension of sacred spaces to consumer culture, conceptualizing high-end retail stores as places of ritualized consumption:

(22)   Aware of her husband's infidelities, Mrs. Santacruz apparently took her revenge on his bank account: she shopped. "Yeah, she said it was better than sex with her husband," Mr. Blarek testified. "Bloomingdale's was the mother **cathedral of shopping**. Saks Fifth Avenue, all the better stores. (1998, NEWS: New York Times)

Similarly, the phrase *cathedral of trees* draws on the grandeur associated with cathedrals, transferring the idea of a sacred space to the realm of towering trees:

(23)   But it was hard to take those whispers seriously amid the bucolic splendor of Edens Glen, and the whispers were too faint to scale the high, ivy-covered walls that girded the Oak Hollow Country Club, whose **cathedral of trees** seemed to buttress the very sky. (2010, FICTION: Club Rules)

Lastly, the expression *cathedral of victuals* extends the metaphor to the domain of food consumption, conceptualizing a supermarket as a vast space of culinary abundance:

(24)   Screeching to a halt mid-aisle in the vastly bright **cathedral of victuals** known as the Olney Shoppers Food Warehouse, the customer leans, elbows on cart handles, studying the merits of this unexpected benison. (1997, NEWS: Washington Post)

Taken together, these phraseological constructions illustrate the productive use of the *cathedral* schema in conceptual metaphor and lexicalized figurative expressions. The metaphor systematically extends across domains, reinforcing the pervasiveness of spatial and cultural salience in cognition and language.

4.4. *shrine (60)*

Similarly to *temple*, *church*, and *cathedral*, the term *shrine* also manifests metaphorical extensions in contemporary American English. While *shrine* typically denotes a sacred site dedicated to a holy person or entity, it also appears in secular contexts such as *shrine of democracy*, *shrine of flowers*, and *shrine of rock 'n' roll*. As with the other religious lexemes discussed, these constructions align with the broader process of semantic extension from a religious domain to secular spheres, highlighting how *shrine* can evoke reverence, devotion, and memorialization even in non-religious settings. For instance, *shrine of democracy* reimagines Mount Rushmore as a consecrated space symbolic of American political ideals:

(25)   And as work on Washington continued, tourists began making the trek to see the strange sight in the Black Hills. In the first year alone, 27,000 people visited Mount Rushmore, now billed as "the **shrine of democracy**." (2002, TV: American Experience)

Likewise, a *shrine of flowers*, *balloons and teddy bears* constructed outside a nightclub in the wake of tragedy conveys a communal homage to loss and remembrance:

(26)   Civil rights leader and presidential candidate Al Sharpton visited the nightclub Monday night to console family who had erected a makeshift **shrine of flowers**, **balloons and teddy bears** outside. (2003, NEWS: Chicago Sun-Times

In academic discourse, *shrine of facts* frames a highly regarded repository of information as an object of collective veneration:

(27)   To the contrary, now the center itself has been affected and so too the '**shrine of facts**' most highly agreed upon by all community members (be they of a society or nation-state, an avant-garde movement, a Vienna Circle). (2017, ACADEMIC: Philosophy Today)

Lastly, *shrine of rock 'n' roll* casts a music-filled space as a sanctum for celebrating artistic performance:

(28)   I'm not sure I can relate. I have something to show you. Let's step in the room where it grows. A **shrine of rock 'n' roll**. (2009, TV: Cupid)

These *shrine of X* examples reveal a continuity in how religious terms can be repurposed to convey deep social or emotional significance. *Shrine* undergoes a secular shift, indicating that what was once primarily tied to ritual worship now transcends its original boundaries.

4.5. mosque (12)

In contrast to *temple*, *church*, *cathedral*, and *shrine*, the noun *mosque* preserves its distinctly religious meaning, exhibiting no extension into secular contexts within the data surveyed. The available attestations, such as *Mosque of al-Guyushi*, *Grand Mosque of al-Nuri*, and *mosque of Imam Husayn* (cf. 32–34), remain rooted in references to genuine Islamic sites, reflecting actual places of worship and their historical or cultural importance. In the examples here, *mosque* does not participate in broader secularization.

(29)   Fayoum Mosques The Mashhad of al-Guyushi (al-Juyushi): Known as the **Mosque of al-Guyushi** Known as the **Mosque of al-Guyushi** by Jimmy Dunn writing as Ismail Abaza. One of the oldest Muslim monuments in Egypt sits high up on the plateau of the Muqattam hills overlooking the cemetery of Cairo, as well as Cairo itself. (2012, WEB: www.touregypt.net)

(30)   This is where the Abbasids had built their city and where the **Grand Mosque of al-Nuri** had been, which ISIS had taken over, and where so many of the beautiful old mosques and buildings had been. And those will never be rebuilt. (2019, SPOKEN: NPR Fresh Air)

(31)   Visiting The Sacred Sites Of Shia Islam. "She wants you to take her picture," a man said when the old woman in the black abaya came up to me. We were standing in the **mosque of Imam Husayn** in Karbala, Iraq. This is one of the holiest shrines for Shia Islam. (2012, BLOG: www.gadling.com)

All of the references remain anchored in religious, historical, and cultural discourse specific to Islam, rather than adopting metaphorical or figurative usage in non-religious domains. Consequently, the case of *mosque* underscores how certain religious terms resist the sort of linguistic secularization seen with the other lexemes discussed above.

4.6. synagogue (10)

In a manner similar to that of *mosque*, the term *synagogue* does not exhibit secular extension in contemporary American English. While nouns like *temple* and *church* are often repurposed in phrases like *temple of food* or *church of football*, the term *synagogue* retains its traditional religious denotation in the *COCA* data. The limited instances of *synagogue* that do appear, such as *synagogue of Satan* and *synagogue of Anti-Semites*, continue to reference explicitly religious or doctrinal settings rather than metaphorical or cultural domains. For example:

(32)   "Jesus Christ tells John in Revelation 2:9 'I know the blasphemy of them which say they are Jews and are not, but are the **Synagogue of Satan**.'" (2012, WEB: assemblyoftrueisrael.com)

(33) "[…] we have meditated on the 'Bread of Life' discourse that Jesus pronounced in the **synagogue of Capernaum** after feeding thousands of people with five loaves and two fishes." (2012, WEB: wdtprs.com)

(34) We pray to Moses here, Elder! If you guys love Moses so much, why don't you marry him?! We accept all denominations of Judaism here at Scouts, Elder. But your **synagogue of Anti-Semites** is too strange! Get out and do not return! You are no longer welcome here!" (1999, TV: South Park)

Each of the instances reaffirms *synagogue* as a place, or space, of religious practice or conflict, indicating its resistance to metaphorical usage in secular contexts. Consequently, *synagogue* does not appear to undergo substantial linguistic secularization, maintaining its original denotation rather than branching into metaphorical or nonreligious domains.

4.7. Categorization of the target domains

Clearly, *temple* and *church* underwent the metaphorization in earnest before the other lexemes, and, if alignments like *temple of shopping – cathedral of shopping* and *church of liberalism – shrine of democracy* are any indication, the pair may well have been analogically targeted for secularization by *cathedral*, *shrine*, etc. For these reasons, and because the great bulk of the *COCA* data across conceptual domains features *temple* and *church*, we will detail only those two nouns in this section.

The *COCA* data revealing metaphorization in *temple* and *church*, *temple of SECULAR-CONTEXT-NOUN*, *church of SECULAR-CONTEXT-NOUN*, etc. fall into five conceptual domains, SOCIETY, CULTURE, LIFESTYLE, EMOTION, and MORALITY. Of these, only three registered more than 10 metaphorized phrases: **SOCIETY** (*temple* 17, *church* 30; total 47); **CULTURE** (*temple* 19, *church* 15; total 34); and **LIFESTYLE** (*temple* 16, *church* 12; total 28).

Domains showing the least amount of secular metaphor, those logging the fewest phrases in *COCA* (low single digits) are SPORT, TECHNOLOGY, TIME, and MILITARY. This may suggest that secular extension in religious lexis is less pervasive in contexts that emphasize precision and functionalism over symbolic expression.

As a final point here, it should be emphasized that the modifiers themselves play a crucial role in facilitating the metaphorical extension of religious terms. Non-religious modifiers, such as *music*, *food*, or *film*, act as catalysts that recontextualize *church* or *temple* into secular domains. For instance, *church of food* clearly evokes a space dedicated to culinary practices, conceivably paralleling the communal and reverential connotations of traditional religious institutions. These modifiers not only expand the semantic range of religious terms but also reflect societal trends that position secular interests within frameworks traditionally reserved for spiritual devotion. This pattern aligns with broader linguistic trends where domains of high personal or cultural significance adopt religious terminology to convey heightened importance.

5. Conclusions

The study highlights the increasing metaphorical extension of religious terminology, reflecting processes of linguistic secularization in contemporary American English. An analysis of the terms *temple*, *church*, *cathedral*, *shrine*, *mosque*, and *synagogue* reveals distinct patterns in their semantic evolutions.

The data adduced indicate that *temple* and *church* are significantly more productive in the process of metaphorization than are any of the other four lexemes examined, appearing frequently in non-religious contexts with modifiers such as *of food*, *of music*, and *of football*. These metaphorical extensions signal a shift whereby the religious terms are appropriated to signify places of communal or passionate activity in secular life.

In contrast, *mosque* and *synagogue* have largely resisted metaphorical extension, showing a stronger preservation of their traditional religious meanings. The rarity of secular modifiers paired with these terms suggests cultural sensitivies and distinct social boundaries that limit their metaphorization.

The study also reveals that metaphorical extensions concentrate within certain conceptual domains, here notably SOCIETY, CULTURE, and LIFESTYLE. These domains represent arenas where secular engagement is distinctly characterized by communal, voluntarily habitual, even ritualistic processes, recalling to some extent religious engagement and religious processes themselves, and perhaps also indicating that, overall, the linguistic secularization process is manifestly gradual. Admittedly, the domains of SPORT, MILITARY, and perhaps TECHNOLOGY today, conceivably share one or more of these characteristics, but yielded few phrasal attestations. This is likely the result of comparative developmental stage and associated productivity level. These domains most probably have not been eligible for long enough to generate plentiful evidence. Ancillary analysis with greater time depth, and perhaps also with data from related corpora, would likely confirm or dispel this supposition.

If in fact American society is undergoing measurable secularization, a decline in the significance of not just Christianity but religiosity generally (de Graaf 2013), and if the presupposed interrelations between language, cognition, and culture are in fact actual (Sharifian 2017), the secularization of religious lexis can be considered to mirror secularization in contemporary American society. The pervasive use of *temple* and *church* in non-religious contexts can be seen to confirm as much, and, indeed, that use underscores the fluid boundaries between sacred and secular spheres, reflecting shifts in collective identity and cultural priorities. Moreover, this greater cognitive phenomenon highlights the adaptive capacity of language to encapsulate societal transformation, reinforcing the notion that metaphorical extension is not merely a linguistic process but a reflection of changing value systems. By tracing these patterns, this study contributes to ongoing discussions in cultural linguistics and cognitive semantics, providing insight into how language evolves alongside cultural paradigms.

Certainly, it remains to investigate additional religious terms of English from a similar perspective, and even to expand the investigation to take in evidence from other languages; both, in an effort to confirm or refute the findings here, and, ultimately, to discover broader, cross-language patterns of metaphorization.

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Phonological Relations Between Palatalizers and the Phonemic System: A Case Study on Czech

Anna Poĺomská

Masaryk University, Czech Republic

Abstract

This paper examines palatalization in Czech, focusing on its behaviour in the domain of noun-deriving suffixes. It argues that Czech palatalization is not an assimilatory process, but a repair mechanism triggered by structurally and lexically deficient phonological units, referred to as *palatalizers*. These units lack an independent phonetic counterpart and can be identified only through their systematic phonological effects. The analysis proposes that palatalizers and phonemes form a coherent, interactive system whose interrelations determine the surface outcomes of palatalization. The study first introduces a new typology of Czech palatalization patterns, then rejects the assimilatory interpretation and develops a model in which palatalizers are reconstructed as independent but deficient phonological objects. The analysis adopts the framework of Substance-Free Phonology, which allows phonological processes to be modelled without direct dependence on phonetic data. This approach is particularly suitable given that palatalization exhibits widely varying phonetic realizations across languages. Building on this, the paper specifies the internal structure of palatalizers and the representation of their deficiency, and proposes a computational mechanism that predicts the interaction between palatalizers and target consonants. The resulting model predicts which phonemic classes undergo palatalization and which resist it.

Keywords: palatalization; repair; substance-free; Czech

1. Introduction

This paper investigates the phonological behaviour of palatalization in Czech, focusing specifically on the domain of noun-deriving suffixes. The central claim challenges the traditional assimilatory approach to palatalization, arguing that this process is non-assimilatory in Czech and functions as a repair mechanism for illicit phonological objects: palatalizers. We propose a model in which these palatalizers are independent but deficient phonological units, whose properties must be derived from their systematic phonological behaviour. Our goal is to demonstrate that palatalizers and phonemes form a coherent system that interacts to determine the resulting surface form.

The paper is structured as follows. Section 2 introduces a novel typology for organizing Czech palatalization data in the nominal domain. This organization reveals systematic distinctions, showing that palatalization treats coronal plosives and fricatives differently (Section 2.1), and provides evidence for two phonologically distinct types of the consonant /r/ based on its syllabic position (Section 2.2). Crucially, this section demonstrates how the varying interaction of consonants with palatalizers divides the entire phonemic inventory into distinct phonological classes.

Section 3 argues against the traditional assimilatory view by presenting empirical cases in which palatalization occurs without an overt phonological trigger. This supports the conclusion that the process is driven by an independent phonological unit that remains invisible in the surface form.

Section 4 develops the idea that palatalizers lack an independent phonetic counterpart and, without the repairing process of palatalization, cannot be pronounced. It follows that palatalizers are not directly visible in the surface phonetic form; only their palatalizing effects can be observed. Consequently, their internal structure must be reconstructed solely on the basis of their systematic phonological behaviour.

Section 5 summarizes a related theoretical approach that explains the deficiency of the palatalizer as the absence of a crucial structural property. While Cavirani and Vanden Wyngaerd (2024) assume that this deficiency arises from the lack of association with syllabic structure, we assume that palatalizers are deficient because they lack one of the basic phonological features. As a result, they form phonological structures that are theoretically possible but have no phonetic counterpart in the lexicon, because the language simply does not contain such units. Our own formalization of this deficiency and the corresponding repair mechanism is presented in Section 6, which determines the phonological features required to capture the observed contrasts (Sections 6.1 and 6.2) and defines the structural and lexical representation of the palatalizer's deficiency (Section 6.3). It also introduces a computational mechanism for modelling the interaction between palatalizers and target consonants (Section 6.4). Section 7 summarizes the main findings and outlines directions for future research.

2. New organization of data uncovers palatalization patterns in Czech

When analysing palatalization, it is essential to organize the data systematically, as poorly organized data can obscure key patterns and relationships. Without clear structure, regularities remain hidden, preventing the identification of consistent patterns. In this study, we propose a new way of organizing palatalization data in Czech, specifically in the domain of noun-deriving suffixes[1], aiming to uncover new patterns in the representation of palatalization.

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[1] Palatalizing processes in Czech are not confined to the domain of *noun-deriving suffixes*. They also occur with *verb-deriving suffixes* and within *declensional morphology* (case endings). These three morphological domains share a common basis but differ in several domain-specific properties, which makes it necessary to treat them separately. In all three, palatalization yields parallel outcomes for coronals (*t, d, n*) and labials (*p, b, f, v*), while sibilants (*s, z*) and velars (*k, g, x, h*) behave differently. Some *verb-deriving suffixes* can trigger palatalization of

In Czech, palatalization occurs synchronically at morphological boundaries. This paper focuses specifically on instances where it is triggered by noun-deriving suffixes. The interaction between these suffixes and stem-final consonants gives rise to systematic phonological alternations. Table 1 presents a typology of these alternations, based on three assumptions: first, each morphological unit is associated with a single palatalizer; second, two distinct morphological units may share the same palatalizer and thus trigger the same palatalizing effect; and third, in each palatalizing context, some consonants undergo palatalization while others do not. The table does not provide an exhaustive list of suffixes but offers a representative overview of all attested palatalization patterns in this morphological domain. Due to space constraints, only one example per phoneme class is included. However, if one phoneme from a given class undergoes palatalization, all other members of that class exhibit the same behavior under the same process.

In Table 1, we present four suffixes, which differ with respect to the palatalization effect triggered in their presence. Firstly, we introduce the derivational suffix *-yně*, which does not involve any palatalization at all. This is illustrated in the column no-PAL marked by the red shape of the cells and the sign "X". This suffix is included in the table to demonstrate that not all derivational suffixes in the nominal domain trigger palatalization. In contrast, the remaining three columns contain derivational suffixes whose presence triggers palatalization.

Table 1: *Czech palatalization patterns in the domain of noun-deriving suffixes*

palatalizer type	no-PAL	PAL0	PAL1	PAL2
derivational suffix	*-yně* feminine derivative nouns or toponyms	*-ek* nouns bearing a property of the source word	*-ice* female zoonyms	*-ě / -e* juvenile zoonyms
COR3 [s z]	X *	X *pa*[s] – *pá*[s]*ek* "waist" – "belt"	X *pe*[s] – *p*[s]*ice* "dog"	X *hu*[s]*a* – *hou*[s]*e* "goose"
LAB [p b f v]	X *hra*[b]*ata* – *Hra*[b]*yně* "counts" – name of town	X *výro*[b]*a* – *výro*[b]*ek* "production" – "product"	X *sla*[v]*ík* – *sla*[v]*ice* "nightingale"	√[pj] *čá*[p] – *čá*[pj]*ě* "stork"
COR2 [t d r₂]	X *hospo*[d]*ář* – *hospo*[d]*yně* "homesteader" – "female homesteader" X *cho*[r]*ý* – *Cho*[r]*yně* "ill" – name of town	X *žlu*[t]*ý* – *žlou*[t]*ek* "yellow" – "yolk" X *veče*[r] – *veči*[r]*ek* "evening" – "party"	√[c] *levhar*[t] – *levhar*[c]*ice* "leopard" √[r] *ještě*[r] – *ještě*[r]*ice* "lizard"	√[ɟ] *mla*[d]*ý* – *mlá*[ɟ]*ě* "young/cub" √[r] *ku*[r] – *ku*[r]*e* "hen/cock"
COR1 [r₁]	X *ob*[r] – *ob*[r]*yně* "giant" – "female giant"	√[r] (*v*)*nit*[r]*o* – *vnit*[r]*ek* "inner self" – "interior"	√[r] *tyg*[r] – *tyg*[r]*ice* "tiger"	√[r] *tyg*[r] – *tyg*[r]*e* "tiger"
VEL & LAR [k g x ɦ]	X *žá*[k] – *žá*[k]*yně* "pupil" – "female pupil"	√[ʒ] *je*[ɦ]*la* – *je*[ʒ]*ek* "needle" – "hedgehog"	√[ʃ] *hro*[x] – *hro*[ʃ]*ice* "hippo"	√[tʃ] *ptá*[k] – *ptá*[tʃ]*e* "bird"

sibilants, unlike *noun-deriving* or *declensional suffixes* (e.g. *zku*[s]-*i-t* 'to examine' > *zkou*[ʃ]-*en* 'examined'). Case endings, by contrast, show a qualitatively distinct type of velar palatalization, producing *alveolars* (e.g. [k] > [t͡s]) rather than *palatals* (e.g. [k] > [t͡ʃ]). Since this article aims to introduce a new method for analysing palatalization, it focuses on *noun-deriving suffixes*, the least complex of the three domains. The same approach can be (and will be) applied to *verb-deriving* and *declensional suffixes* but doing so would require a more detailed and contrast-rich analysis. Developing such an extension lies beyond the scope of this paper, whose aim is not to resolve Czech palatalization as such, but to demonstrate a way of approaching it that can yield new insights into its behaviour.

Table 1 shows that the resulting palatalization effect varies depending on the suffix attached. Thus, in column PAL0, only velars, laryngeals[2] and coronals of the first type are palatalized, which is demonstrated by the data in the green cells with the sign "✓". The remaining consonants do not undergo palatalization when attached to the suffix *-ek* which is marked by the red shade of the cells and the sign "X". In column PAL1, all velars, laryngeals and coronals of the first type and second type are palatalized when the suffix *-ice* is attached, simultaneously, all labials and coronals of the third type resist palatalization in this context. As for column PAL2, all velars, laryngeals, coronals of the first and second type and labials are palatalized when the suffix *-ě/-e* is attached, and the only class of consonants resisting PAL2 are coronals of the third type.

In addition to distinguishing the three major places of articulation (velars/laryngeals, coronals, and labials), the patterns summarized in Table 1 reveal an important point about the internal structure of coronals. When viewed through the lens of palatalization, coronals do not form a uniform class. Their behaviour allows us to divide them into three distinct subclasses, which we label COR1, COR2, and COR3.

We begin by showing the relevance of manner of articulation. As Table 1 demonstrates, coronal plosives /t d/ (which form COR2) and their fricative counterparts /s z/ (which make up COR3) do not pattern alike under the various palatalization processes. Coronal plosives are considerably more susceptible to palatalization in Czech, whereas fricatives show a much higher degree of resistance. We claim that this difference in palatalizability provides evidence that COR2 and COR3 must be treated as separate classes. To support this division, we will draw on palatalization data from other languages, which point in the same direction.

Turning to the difference between COR2 and COR1, we argue that Czech has two phonologically distinct types of /r/, which we label $/r_1/$ and $/r_2/$. COR2 includes the coronal plosives /t d/, the coronal and the sonorant $/r_2/$, while COR1 contains only a single consonant: the sonorant $/r_1/$. The data reveal that syllabic position plays a role in palatalization. PAL0 applies to those instances of /r/ that occur as part of a branching onset ($/r_1/$). When /r/ forms the onset on its own ($/r_2/$), it resists PAL0 and palatalizes only in the context of PAL1 or PAL2, together with the coronal plosives and the nasal. To account for this contrast, we propose to distinguish two variants of the Czech /r/ phoneme, defined by their position within the syllable. Our argumentation will draw on theories of branching onsets, which predict different phonological behaviour for /r/ depending on its syllabic position. Unlike in the case of COR2 and COR3, however, we cannot support this split by appealing to cross-linguistic palatalization patterns, as no language is currently known to exhibit the same contrast. This is

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[2]　There are two conflicting types of evidence regarding whether Czech /ɦ/ and /x/ should be classified both as velars, or rather whether /ɦ/ is a laryngeal and /x/ a velar, as in German (Trubetzkoy 1969). On the one hand, it has been argued that /ɦ/ and /x/ belong to the same class of velar consonants, since /ɦ/ undergoes devoicing to [x] under the influence of a voiceless obstruent in regressive voicing assimilation. From this perspective, /ɦ/ and /x/ form a voicing pair and thus belong to the same phonological class. On the other hand, when /x/ becomes voiced in regressive assimilation under the influence of a following voiced obstruent, it surfaces as [ɣ], which would suggest that /ɦ/ and /x/ do not form a voicing pair. We leave this debate open, since /ɦ/ and /x/ behave identically with respect to palatalization, and resolving this issue lies beyond the scope of the present paper.

not surprising, given how few languages both allow branching onsets with special behaviour of sonorants and also have palatalization processes that affect sonorants. Polish would be the closest candidate for such a system, but to our knowledge, no such evidence has been documented in the available literature.

The following subsection will focus on the contrast between COR2 and COR3 and examine how cross-linguistic palatalization patterns support treating these two groups as phonologically distinct.

2.1. *Palatalization treats plosives and fricatives differently*

Czech palatalization data show that coronal plosives and coronal fricatives behave differently: the plosives /t d/ undergo palatalization under PAL1 and PAL2, while the fricatives /s z/ do not. This suggests that the coronal series must be divided into two groups, COR2 and COR3, and raises the question of whether this distinction is supported cross-linguistically.

Evidence from other languages confirms that this type of split is not unique to Czech. Bateman (2007: 286) reports that in Tohono O'odham, coronal plosives /t d/ palatalize in the presence of the vowels /i e u/, while the coronal fricative /s/ does not. A similar asymmetry is found in Polish: Czaplicki (2013: 27) shows that in the context of the suffix -*em*, velar plosives /k g/ palatalize, while the velar fricative /x/ remains unchanged. Malambe (2006: 123) describes a parallel split in siSwati (Bantu): when the suffix -*iw*- is attached, labial plosives palatalize, whereas labial fricatives do not. The opposite pattern also exists: Chen (1973: 182) reports that in the Lesbian dialect of Greek, coronal fricatives palatalize before the glide /y/, while coronal plosives do not.

These cross-linguistic patterns confirm that the Czech division between COR2 and COR3 is not arbitrary: plosives and fricatives often differ in how they interact with palatalization processes. This confirms that separating these two coronal groups in Czech is not only justified but also expected.

A second set of cases supports the same conclusion, showing that the systematic difference between plosives and fricatives may lie not only in whether palatalization applies, but also in how it applies. Specifically, it may result either in full palatalization or in secondary palatalization.

Munteanu (2017) and Bateman (2007) report that in Moldovan (a dialect of Romanian), labial plosives and labial fricatives behave differently when they occur before the adjectival plural marker -*i*: the plosives undergo secondary palatalization, while the fricatives undergo full palatalization. A parallel pattern is found in Standard Romanian, where /s z/ undergo full palatalization, whereas /t d r/ undergo secondary palatalization before any *i*- or *e*-initial suffix.

Further examples are given in Bateman (2007). In Nupe (Nigeria), coronal plosives, fricatives, and affricates behave differently when they occur before the front vowels /i/ and /e/. Fricatives and affricates undergo full palatalization, while plosives undergo secondary palatalization. In Mandarin, coronal segments show a similar asymmetry before the high front vowels /i/ and /y/. Dental affricates and /s/ undergo full palatalization, whereas the remaining coronals undergo secondary palatalization. In Carib (Brazil), the suffix -*ila*/*ile* triggers

different outcomes depending on the preceding consonant. Fricative /s/ undergoes full palatalization, while plosives /t d/ undergo secondary palatalization. In Yagua (Peru), a similar pattern is found when the relevant consonants occur at a morphological boundary preceding the glide /y/. Fricative /s/ is fully palatalized, while plosive /t/ undergoes secondary palatalization.

Taken together, these cases show that the contrast between plosives and fricatives is not an accidental property of individual languages but a recurrent pattern in how palatalization operates cross-linguistically. This strongly suggests that treating the two manners of articulation as having different phonological representations is both empirically motivated and necessary for an adequate model of palatalization. In the Czech system, the distinction observed in Table 1, where coronal plosives and coronal fricatives participate in different palatalization processes, fits squarely within this broader tendency. Although it may seem non-intuitive at first glance, the Czech coronal domain must therefore be divided into two groups, COR2 and COR3, because their palatalization behaviour clearly diverges.[3] To make this distinction explicit and to reflect the broader generalizations discussed above, we will refer to COR3 as SIB from this point on. This relabelling is also reflected in the updated version of Table 1, where the tag COR3 has been replaced with SIB.

Table 2: *Czech palatalization patterns in the domain of noun-deriving suffixes (COR3 replaced with SIB)*

palatalizer type	no-PAL	PAL0	PAL1	PAL2
derivational suffix	*-yně* feminine derivative nouns or toponyms	*-ek* nouns bearing a property of the source word	*-ice* female zoonyms	*-ě / -e* juvenile zoonyms
SIB [s z]	X *	X *pa*[s] – *pá*[s]*ek* "waist" – "belt"	X *pe*[s] – *p*[s]*ice* "dog"	X *hu*[s]*a* – *hou*[s]*e* "goose"
LAB [p b f v]	X *hra*[b]*ata* – *Hra*[b]*yně* "counts" – name of town	X *výro*[b]*a* – *výro*[b]*ek* "production" – "product"	X *sla*[v]*ík* – *sla*[v]*ice* "nightingale"	√[pj] *čá*[p] – *čá*[pj]*ě* "stork"
COR2 [t d r₂]	X *hospo*[d]*ář* – *hospo*[d]*yně* "homesteader" – "female homesteader" / X *cho*[r]*ý* – *Cho*[r]*yně* "ill" – name of town	X *žlu*[t]*ý* – *žlou*[t]*ek* "yellow" – "yolk" / X *veče*[r] – *veči*[r]*ek* "evening" – "party"	√[c] *levhar*[t] – *levhar*[c]*ice* "leopard" / √[r] *ještě*[r] – *ještě*[r]*ice* "lizard"	√[ɟ] *mla*[d]*ý* – *mlá*[ɟ]*ě* "young/cub" / √[r] *ku*[r] – *ku*[r]*e* "hen/cock"
COR1 [r₁]	X *ob*[r] – *ob*[r]*yně* "giant" – "female giant"	√[r] *(v)nit*[r]*o* – *vnit*[r]*ek* "inner self" – "interior"	√[r] *tyg*[r] – *tyg*[r]*ice* "tiger"	√[r] *tyg*[r] – *tyg*[r]*e* "tiger"
VEL & LAR [k g x ɦ]	X *žá*[k] – *žá*[k]*yně* "pupil" – "female pupil"	√[ʒ] *je*[ɦ]*la* – *je*[ʒ]*ek* "needle" – "hedgehog"	√[ʃ] *hro*[x] – *hro*[ʃ]*ice* "hippo"	√[tʃ] *ptá*[k] – *ptá*[tʃ]*e* "bird"

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[3] We do not currently know why the contrast between plosiveness and fricativeness in Czech is distinguished specifically within the coronal series. However, cross-linguistic patterns suggest that this kind of behaviour tends to be localized in just one of the three basic phonemic groups. In Czech, it is the coronals; in languages like siSwati, it appears to be the labials; and in Polish, the velars. While we do not explore this issue further here, it likely reflects a deeper structural property of phonological systems. What we do assume to be cross-linguistically stable, however, is the possibility of grouping phonemes into such categories and constructing tables similar to the one presented here for Czech. Based on such structural patterns, it is possible to build language-specific analyses which may differ in their details but are founded on the same core principles, developed in the following sections.
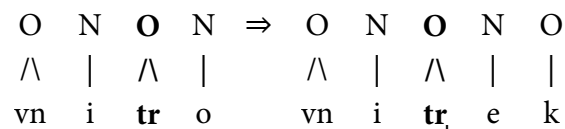
Having established the motivation for distinguishing COR2 and SIB, we now turn to the second issue: why we propose that Czech /r/ must be split into two phonologically distinct subtypes $/r_1/$ and $/r_2/$, and why $/r_1/$ forms a distinct phonological group from COR2.

### 2.2. Palatalization reveals two phonologically distinct /r/s in Czech

Table 2 clearly shows that /r/ displays two different patterns, which strongly suggests that we are dealing with two phonologically distinct objects. This line of reasoning aligns with Kaye's (2005) *epistemological principle*, which holds that phonological identity is revealed through observable phonological behaviour. In other words, if there is a segment which behaves in two distinct and systematically predictable ways, then it corresponds to two separate phonological objects.

As shown in Table 2, $/r_1/$ undergoes palatalization in all three contexts: PAL0, PAL1, and PAL2. In contrast, $/r_2/$ is affected only by PAL1 and PAL2. This indicates that $/r_1/$ and $/r_2/$ must be treated as phonologically distinct, since they differ systematically in their behaviour with respect to palatalization. The next question is whether this difference is predictable. Crucially, there is a consistent phonological factor that unifies the distribution: only those instances of /r/ that form a branching onset with a preceding consonant are targeted by PAL0 (these are labelled r_1, see 1a). In contrast, /r/ that appears in a simple onset position is not affected by PAL0 (these are labelled $/r_2/$, see 1b).

(1)   a. /r/ in the branching onset is palatalized by -ek (O=onset, N=nucleus)

O   N   **O**   N   ⇒   O   N   **O**   N   O
/\ | /\ | /\ | /\ | |
vn   i   **tr**   o   vn   i   **tr̪**   e   k

   b. /r/ in the simple onset is not palatalized by -ek (O=onset, N=nucleus)

O   N   O   N   **O**   ⇒   O   N   O   N   **O**   N   O
| | | | | | | | | | | |
v   e   tʃ   e   **r**   v   e   tʃ   iː   **r**   e   k
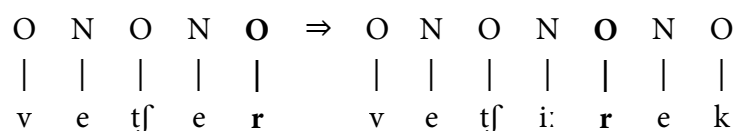
Because the examples illustrating this pattern in the domain of nominal derivational suffixes are relatively few in number, we supplement the analysis with data from a different morphological domain: nominal declension. Specifically, we turn to the masculine vocative suffix *-e*, where the same syllabic conditioning of /r/-palatalization can be observed. As shown in Table 3, only /r/ that forms a branching onset with a preceding consonant undergoes palatalization, while /r/ in a simple onset position does not. This provides direct evidence that the syllabic position of /r/ in Czech has a phonological effect on whether palatalization applies or not.

Table 3: *Distribution of /r/-palatalization in the context of vocative suffix -e based on syllabic position*

| /r/ in the branching onset is palatalized by *-e*			/r/ in the simple onset is not palatalized by *-e*		
NOM.SG.	VOC.SG.		NOM.SG.	VOC.SG.	
bra[tr] ⇒	bra[**tr**]**e**	"brother"	tvo[r] ⇒	tvo[**r**]e	"creature"
šva[gr] ⇒	šva[**gr**]e	"brother in law"	kašpa[r] ⇒	kašpa[**r**]e	"clown"
o[br] ⇒	o[**br**]**e**	"giant"	upí[r] ⇒	upí[**r**]e	"vampire"
ma[xr] ⇒	ma[**xr**]e	"poser"	ca[r] ⇒	ca[**r**]e	"tsar"

These data show that although the two surface variants of /r/ are phonetically identical, they display systematically different phonological behaviour with respect to palatalization. This difference is not random but follows from their syllabic position and is therefore phonologically conditioned. We have thus shown that the two variants of /r/ can be treated as distinct phonological objects.

We now turn to the question of what might underlie this distinction and how it relates to the special status of /r/ in branching onsets.

The ability of /r/-sounds to form a branching onset has been already intensively studied in phonological models such as Strict CV (Scheer 2004). This property is formally represented through the mechanism of *infrasegmental government* (Scheer 1999), a development of earlier *constituent government* proposed by Kaye, Lowenstamm & Vergnaud (1990).

The crucial part of Scheer's infrasegmental government, relevant to our proposal about Czech /r/, is that when /r/ follows an obstruent, a special relationship between the two is established. Scheer models this within the framework of Element Theory (Kaye, Lowenstamm & Vergnaud 1985, Backley 2011) as element sharing between the two consonantal positions, where /r/ shares its melodic elements with the preceding obstruent. The original idea was that the obstruent lacks some elements, which can be provided by the following sonorant /r/. In doing so, they form a special phonological constituent: the branching onset.[4] See the model in (3).

(3)   Model of infrasegmental government[5] in Scheer (1999)

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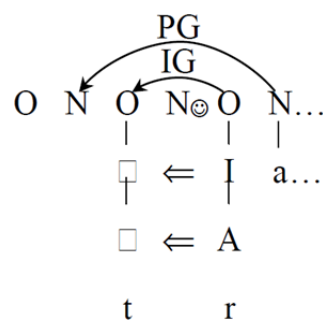
4   Other consequences of this configuration will not be discussed here but are described in detail in Scheer (1999) and Scheer (2004). Our focus will instead be on the nature of infrasegmental government itself and how it can be understood.

5   Annotation of the model: O = onset, N = nucleus, IG = infrasegmental government, PG = proper government.

However, even after 20 years, Scheer & Cyran (2018) acknowledge that the true nature and conditioning of infrasegmental government still remain to be fully understood. Nevertheless, we observe a shift in how infrasegmental government is represented: attention has gradually turned to the nucleus (vocalic) position between the consonants forming the branching onset. In earlier models, this position was entirely suppressed, as it was overshadowed by the operation of infrasegmental government and did not participate in any government relations (we can see in (3) that N inside the branching onset is "happy" to be omitted from government relations). In contrast, in the structure shown in (4), this position plays an active role: although being empty, it governs the preceding vocalic position and at the same time licenses the adjacent consonantal position occupied by the obstruent of the branching onset.

As we can see, what is collectively referred to as infrasegmental government turns out to be a highly complex procedure. It involves not just a relation between two consonantal positions, but rather a configuration of four positions – two consonantal and two vocalic– and their governing and licensing properties.

(4)　　Model of infrasegmental government[6] in Scheer & Cyran (2018)

$$CV_0 \quad C \quad V_1 \quad C \quad V_2 \dots$$

trip
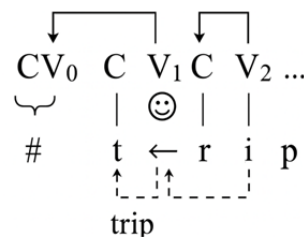
Since in this newer model, the intervening vocalic position acquires a unique status not shared by other empty V slots — specifically, it gains the ability to govern the preceding empty V position (V_0), and like other occupied V slots, it is not governed by the following V position (V_2) — this raises the question of with which position exactly the melodic material provided by the sonorant /r/ is shared. Is it truly the preceding C slot already occupied by the obstruent that receives this material (scenario in 5a), or could it instead be the intervening empty V slot (scenario in 5b)? The latter seems plausible, especially given that this V position now behaves as if it is associated with subsegmental content. Moreover, if the obstruent in a branching onset were indeed receiving some shared material from /r/, we would expect it to undergo some phonological modification, but to our knowledge, this never happens. The only position that shows unexpected behaviour or signs of modification is precisely the intervening vocalic position.

(5)

a. *transfer of elements according to model in Scheer (1999)*	b. *transfer of elements according to model in Scheer & Cyran (2018)*
C　V　C　V　C　V t　⇐　r　i　p	C　V　C　V　C　V t　⇐　r　i　p

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[6] Annotation of the model: C = consonantal slot, V = vocalic slot, ⟵ = proper government, ⟵⋯ = licensing.

Whether the melodic material of /r/ is linked to the preceding C slot (scenario 5a) or to the intervening V slot (scenario 5b), both scenarios imply that /r/ shares its subsegmental content with another position. This brings us to a broader theoretical question: what exactly is the nature of what has traditionally been described as element sharing? Is the emergence of branching onsets best captured as a case of shared phonological content, or might an alternative model be more appropriate? In what follows, we argue that the traditional assumption of sharing presents a fundamental problem. If the subsegmental material were truly shared, the identity of /r/ should remain unchanged — /r/ in a branching onset would then behave identically to /r/ in a simple onset in subsegmental processes, since sharing should not alter the phonological properties of the segment that provides the material. Yet Czech /r/-palatalization in branching onsets contradicts this expectation. The behaviour of /r/ under PAL0 suggests that what has been described as sharing may in fact involve full transmission of phonological material to the adjacent position. Only such transmission results in a modified subsegmental profile for /r/ in branching onsets, which explains its sensitivity to PAL0 and contrasts with the stability of /r/ in simple onsets.

What we conclude is that $/r_1/$ can be analysed as a positional allophone of $/r_2/$.[7] The contrast between the two is not arbitrary but systematically conditioned by syllabic structure and reflected in their subsegmental representation. When we come back to our data set in Table 2, this finding provides further support for treating COR1 as phonologically independent from COR2. To make this distinction fully explicit, we relabel COR1 as R, referring to those instances of /r/ that occur in branching onsets. Since COR3 has already been relabelled as SIB and COR1 as R, there is no longer a need to maintain the label COR2 – we now refer to this remaining group simply as COR. The updated labelling is reflected in Table 4.

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[7] More on the special behaviour of /r/ and rhotic phonemes with respect to syllable structure can be found, for example, in Chabot (2019) or Wiese (2011). Further, we do not treat examples of palatalization that interact with syllable structure as "fake" palatalization, as proposed by Scheer & Ségéral (2001). It is quite common for palatalization to show such interactions, whether they are triggered by hiatus resolution or by parametrically defined settings for consonant clusters in a given language (Kirundi, Latvian, Moldavien, Xhosa, Somali, Tswana, Zoque, etc.).

Table 4: *Czech palatalization patterns in the domain of noun-deriving suffixes (COR1 replaced with R, COR2 replaced with COR)*

palatalizer type	no-PAL	PAL0	PAL1	PAL2
derivational suffix	*-yně* feminine derivative nouns or toponyms	*-ek* nouns bearing a property of the source word	*-ice* female zoonyms	*-ě / -e* juvenile zoonyms
SIB [s z]	X *	X *pa*[s] – *pá*[s]*ek* "waist" – "belt"	X *pe*[s] – *p*[s]*ice* "dog"	X *hu*[s]*a* – *hou*[s]*e* "goose"
LAB [p b f v]	X *hra*[b]*ata* – *Hra*[b]*yně* "counts" – name of town	X *výro*[b]*a* – *výro*[b]*ek* "production" – "product"	X *sla*[v]*ík* – *sla*[v]*ice* "nightingale"	√[pj] *čá*[p] – *čá*[pj]*ě* "stork"
COR [t d r₂]	X *hospo*[d]*ář* – *hospo*[d]*yně* "homesteader" – "female homesteader" X *cho*[r]*ý* – *Cho*[r]*yně* "ill" – name of town	X *žlu*[t]*ý* – *žlou*[t]*ek* "yellow" – "yolk" X *veče*[r] – *večí*[r]*ek* "evening" – "party"	√[c] *levhar*[t] – *levhar*[c]*ice* "leopard" √[r] *ještě*[r] – *ještě*[r]*ice* "lizard"	√[ɟ] *mla*[d]*ý* – *mlá*[ɟ]*ě* "young/cub" √[r] *ku*[r] – *ku*[r]*e* "hen/cock"
R [r₁]	X *ob*[r] – *ob*[r]*yně* "giant" – "female giant"	√[r] *(v)nit*[r]*o* – *vnit*[r]*ek* "inner self" – "interior"	√[r] *tyg*[r] – *tyg*[r]*ice* "tiger"	√[r] *tyg*[r] – *tyg*[r]*e* "tiger"
VEL & LAR [k g x ɦ]	X *žá*[k] – *žá*[k]*yně* "pupil" – "female pupil"	√[ʒ] *je*[ɦ]*la* – *je*[ʒ]*ek* "needle" – "hedgehog"	√[ʃ] *hro*[x] – *hro*[ʃ]*ice* "hippo"	√[tʃ] *ptá*[k] – *ptá*[tʃ]*e* "bird"

A closer look at the Czech data reveals that, in the context of palatalization, the class labelled VEL & LAR becomes indistinguishable from the class R. Specifically, both sets of segments undergo palatalization in exactly same morphological environments (PAL0, PAL1 and PAL2). Just as /r₂/ patterns with coronals (/t d/), /r₁/ patterns with velars and laryngeals (/k g x ɦ/). For this reason, the data table is further simplified by collapsing R and VEL & LAR into one unified phonemic group. Since the resulting label would otherwise be too complex and impractical for repeated use, we abbreviate this group as VLR. The final version of the table is given below as Table 5.

Table 5: *Czech palatalization patterns in the domain of noun-deriving suffixes (VEL & LAR + R replaced with VLR)*

palatalizer type	no-PAL	PAL0	PAL1	PAL2
derivational suffix	*-yně* feminine derivative nouns or toponyms	*-ek* nouns bearing a property of the source word	*-ice* female zoonyms	*-ě / -e* juvenile zoonyms
SIB [s z]	X *	X *pa*[s] – *pá*[s]*ek* "waist" – "belt"	X *pe*[s] – *p*[s]*ice* "dog"	X *hu*[s]*a* – *hou*[s]*e* "goose"
LAB [p b f v]	X *hra*[b]*ata* – *Hra*[b]*yně* "counts" – name of town	X *výro*[b]*a* – *výro*[b]*ek* "production" – "product"	X *sla*[v]*ík* – *sla*[v]*ice* "nightingale"	√[pj] *čá*[p] – *čá*[pj]*ě* "stork"
COR [t d r₂]	X *hospo*[d]*ář* – *hospo*[d]*yně* "homesteader" – "female homesteader" X *cho*[r]*ý* – *Cho*[r]*yně* "ill" – name of town	X *žlu*[t]*ý* – *žlou*[t]*ek* "yellow" – "yolk" X *veče*[r] – *večí*[r]*ek* "evening" – "party"	√[c] *levhar*[t] – *levhar*[c]*ice* "leopard" √[r] *ještě*[r] – *ještě*[r]*ice* "lizard"	√[ɟ] *mla*[d]*ý* – *mlá*[ɟ]*ě* "young/cub" √[r] *ku*[r] – *ku*[r]*e* "hen/cock"
VLR [k g x ɦ r₁]	X *ob*[r] – *ob*[r]*yně* "giant" – "female giant" X *žá*[k] – *žá*[k]*yně* "pupil" – "female pupil"	√[r] *(v)nit*[r]*o* – *vnit*[r]*ek* "inner self" – "interior" √[ʒ] *je*[ɦ]*la* – *je*[ʒ]*ek* "needle" – "hedgehog"	√[r] *tyg*[r] – *tyg*[r]*ice* "tiger" √[ʃ] *hro*[x] – *hro*[ʃ]*ice* "hippo"	√[r] *tyg*[r] – *tyg*[r]*e* "tiger" √[tʃ] *ptá*[k] – *ptá*[tʃ]*e* "bird"

With the data organization now complete, we are in a position to move from empirical description to theoretical assumptions. The next step is to examine how the observed patterns of palatalization can inform our understanding of the underlying mechanism that drives these processes.

The following section examines the assumption that palatalization often results from assimilation to a visible trigger, and argues that this assumption does not hold for Czech.

3. Czech palatalization is not assimilation

There are two major approaches to palatalization. The first is the traditional one, developed since the 1960s, which treats palatalization as an assimilatory process and therefore models it in terms of *feature spreading* or *feature sharing* between the participating segments. This view originates in Chomsky and Halle's *The Sound Pattern of English* (1968: 421–425) and was later elaborated in autosegmental, mainly Feature Geometry frameworks, most notably by Clements (1991) and Hume (1992).

The second, more recent approach, advocated primarily by phonologists working within Optimality Theory, moves away from the assumption that palatalization must be assimilatory. Within this view, palatalization is interpreted as the repair of phonologically illicit sequences, that is, sequences of units whose co-occurrence violates markedness constraints and therefore must be adjusted. Representative analyses include Jurgec (2016), Iosad & Morén-Duolljá (2010), Bateman (2007), Rubach (2003, 2000), among others. In this line of work, palatalization is no longer treated as an assimilatory process but more generally as a repair process. However, even though these analyses reject the classic assimilation scenario, their repair strategies ultimately produce outputs that are, in effect, assimilatory. The segments involved violate constraints that disfavour the adjacency of highly dissimilar elements, and the "repair" consists precisely in altering them so that they become compatible. Thus, despite departing from explicitly assimilation-based models, these approaches end up realizing an assimilatory outcome, nonetheless.

A key limitation of the assimilatory approach is that assimilation requires a *source of assimilation*. For palatalization to be assimilatory, there must be a segment that supplies the relevant feature(s). This is unproblematic when palatalization occurs next to segments that are independently expected to trigger it, such as front vowels or glides. The problem arises when palatalization appears without such triggers, or even next to segments that are featurally incompatible with palatalization, such as low back vowels or even labial glides. Such cases are attested across languages, and once they are acknowledged, the assimilatory scenario cannot be maintained; there is simply no segment that could function as the source of assimilation. Supporters of the assimilatory approach tend to treat these cases as marginal exceptions, but as the literature on palatalization grows, the number of such non-assimilatory contexts increases as well. Examples include Bennett & Braver (2020, 2015) on Xhosa (Bantu), Munteanu (2017) on Moldovan (Romance), Beranová (2009) on Czech (Slavic), and Malambe (2006) on siSwati and Tschiwenda (Bantu), or Ohala (2011) on Tswana (Bantu) among others.

Perhaps, instead of insisting on a uniform input of palatalization that fits pre-established expectations, we should acknowledge that palatalization may be manifested in more than one way – sometimes in the form that has been repeatedly observed and reinforced in the literature (and which goes nicely with the assimilatory story), and sometimes in ways that are less anticipated. This variation, however, should not lead us to classify the latter cases as deviant or unnatural. Rather, such cases should be treated as additional pieces of evidence that contribute to a more comprehensive and empirically grounded model of palatalization.

In our approach, we do not classify some cases of palatalization as more or less natural. We treat all cases alike, without assigning them different theoretical status based on how expected or typical they seem. Our analysis is based on a third, less widespread approach to palatalization, which also builds on the idea that palatalizers are defective phonological objects that need to be repaired. However, this repair is not based on the competing phonological constraints[8], as in Optimality Theory, where the outcome of palatalization aims to violate as few constraints as possible. Instead, it is based on the idea that certain logically possible phonological structures may be undesirable or strongly marked in the language, and the language seeks to repair them. In most cases, it is assumed that the palatalizer lacks some property that can be provided by the consonant it attaches to.

An important difference compared to previous assimilatory models is that the palatalizer, as a defective structure, is not copied, spread, or shared, because such operations would not repair it. They would simply spread something defective and cause even more trouble. On the contrary, in order to become licit, the palatalizer must move from its original position to a different one and merge with another object. This is a completely different process from assimilation, since assimilation does not displace phonological structure from one position to another. Unlike in Optimality Theory approaches, the motivation for this process lies in the violation of a single rule, which could be conceptualized as a parameter or a principle. It is not a matter of a complex set of constraints being violated. Rather, there is only one violation, but it is fatal in a given language. Further details will be provided in Sections 5 and 6.

In the following section, we first turn to Czech data that demonstrate why palatalization in Czech cannot be modelled as assimilation. There are cases where palatalization occurs even in the absence of a traditionally expected trigger, such as a front, high, or palatal segment.

4. Palatalizers remain hidden behind the surface

The view that palatalization processes are not assimilatory and might be unrelated to the quality of the vowel following the palatalized consonant has been present in the Slavic literature on the topic since the 1980s. Among others, this position is found in works by Dressler (1985), Szpyra (2003, 1992), Gussmann (2007, 1992), Iosad and Morén-Duolljá (2007), etc.

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[8]   There are, in fact, existing analyses of palatalization that combine the notion of the palatalizer as a floating segment with the idea that palatalization is driven by multiple interacting constraints, see Zdziebko (2015, 2018, 2022, 2023).

However, in some branches of Slavic linguistics, it is claimed that palatalization is tightly connected to the presence of front vowels or glides (Rubach 2011, 2003; Kochetov 2011; Ćavar 2004; Bhat 1978). If this were true in Czech, all derivational suffixes should begin with a front vowel or a glide to be able to trigger palatalization. However, when we examine the inventory of palatalizing suffixes in Czech, we find that palatalization is also triggered by suffixes that do not begin with these phonemes. The following table provides illustrative examples.

Table 6: *Czech palatalizing derivational suffixes without front or high vowels*

palatalizer type	PAL0	PAL1
suffix	***-ka*** feminine nouns	***-an*** demonyms
SIB [s z]	**X** ***černovla*[s]*ý – černovlá*[s]*ka*** "black-haired" – "black-haired woman"	**X** ***Texa*[s] *– Texa*[s]*an*** "Texas" – "Texan"
LAB [p b f v]	**X** ***zlatoko*[p] *– zlatoko*[p]*ka*** "gold digger" – "female gold digger"	**X** ***Evro*[p]*a – Evro*[p]*an*** "Europe" – "European"
COR2 [t d r₂]	**X** ***pacien*[t] *– pacien*[t]*ka*** "patient" – "female patient" **X** ***dokto*[r] *– dokto*[r]*ka*** "doctor" – "female doctor"	✓[c] ***Egyp*[t] *– Egyp*[c]*an*** "Egypt" – "Egyptian" ✓[ř] ***Alži*[r] *– Alži*[ř]*an*** "Algeria" – "Algerian"
VLR [k g x ɦ r₁]	✓[ř] * ✓[ʃ] ***divo*[x] *– divo*[ʃ]*ka*** "savage" – "female savage"	✓[ř] ***Kyp*[r] *– Kyp*[ř]*an*** "Cyprus" – "Cypriot" ✓[tʃ] ***Ameri*[k]*a – Ameri*[tʃ]*an*** "America" – "American"

Table 6 shows two distinct palatalizing suffixes. The first begins with a consonant, while the second starts with a central vowel. Neither of these suffixes contains front vowels, yet both induce palatalization. In a phonological model where only front vowels and glides are believed to trigger palatalization, this raises the question of how palatalization can occur without their presence, more specifically how suffixes *-ka* and *-an* are able to trigger palatalization without containing a front vowel or a glide. The answer to this question is that they cannot trigger palatalization in such a phonological model. Even if we consider that it is only a subset of features, enabling front vowels and glides to cause palatalization, there is no phonological reason to attribute these features to both velars and central vowels, aside from the desperate attempt to assign these phonemes an ability to palatalize.

Following this, we conclude that the *palatalizing effect of derivational suffixes in Czech is independent of the phonemic composition of the suffix*. Although there is a strong correlation between the presence of front vowels in the suffix and the occurrence of palatalization, this correlation does not entail a causal relationship. And since only a subset of palatalization processes can be classified as assimilation processes with the required overt trigger, we exclude the possibility that palatalization in Czech is assimilatory in nature, and we will therefore not model it as an assimilatory process.

Consequently, we are no longer compelled to identify an overt trigger that directly causes the palatalization effect. This frees the analysis from the need to look for overt phonological triggers (such as front vowels or glides) in the suffix itself as the cause of the change. At the same time, however, this move comes with a commitment: we can no longer rely on the suffix itself to reveal any reliable clues about the internal structure of the palatalizer associated with it. Nor can we derive the shape of the palatalizer solely from the resulting palatalized consonant, since the shape of the palatalizer is obscured on the surface by merging with the target consonant. This means that we must acknowledge that the palatalizer is essentially invisible at the surface level, or at the very least, we cannot rely on surface evidence alone to predict its composition. This brings us back to Kaye (2005) and the relevance of his epistemological principle. The phonological properties of the palatalizer must be inferred from its behaviour in the system, since that behaviour offers the only reliable evidence we have.

Adopting this perspective admittedly creates additional work: if we separate the palatalizer from the suffix and acknowledge its *invisibility* on the surface, we are left with the more difficult task of uncovering its true identity based only on indirect phonological evidence. However, this added complexity is a small price to pay for resolving a more fundamental theoretical issue. By rejecting the assimilatory view of palatalization, we avoid relying on a model that is not supported by empirical data. As shown not only in Czech but also in many other languages (examples are provided in the previous section), the observed facts do not match the predictions of an assimilatory analysis. The additional analytic effort is justified by the realization of a theory that more accurately captures the attested patterns.

Since the surface forms of the suffixes do not play an active role in identifying the trigger of palatalization, we no longer need to include them in our typology. Their segmental makeup is not what drives the phonological process and therefore listing them does not contribute to the core generalizations. This brings us back to our dataset in Table 6.

Following this logic, we modify the headings of Table 6 to reflect only the types of palatalizers, since (as we emphasize) it is the palatalizers, not the suffixes, that are responsible for the palatalization effect. To simplify the overall picture, we also remove the individual examples from Table 6. By doing so, we eliminate all morphological and phonetic traces from the phonological processes under examination. The result of these changes is presented in Table 7.

Table 7: Czech palatalization patterns in the domain of noun-deriving suffixes

palatalizer type	no-PAL	PAL0	PAL1	PAL2
SIB [s z]	X	X	X	X
LAB [p b f v]	X	X	X	✓[pj bj fj vj]
COR [t d r₂]	X	X	✓[c ɟ r₂]	✓[c ɟ ɲ r₂]
VLR [k g x ɦ r₁]	X	✓[t͡ʃ ʒ ʃ ʒ r₁]	✓[t͡ʃ ʒ ʃ ʒ r₁]	✓[t͡ʃ ʒ ʃ ʒ r₁]

Table 7 shows that Czech has three different palatalizers in the morphologically defined domain of noun-deriving suffixes: PAL0, PAL1, and PAL2. A fourth possible type, no-PAL, illustrates that some suffixes are not associated with any palatalizer and therefore do not trigger palatalization. These palatalizers are independent phonological objects that operate separately from the suffixes they are part of, and their most salient property is that they remain completely hidden behind the surface phonetic form.

The following section introduces the analysis of Cavirani & Vanden Wyngaerd (2024), which builds directly on the idea that palatalization is not a process of feature sharing, spreading or copying, but rather a process in which hidden phonological material is transferred from one position to another. Material that is treated in phonology as capable of such movement is typically referred to as *floating*. In the floating account, the material is not merely shared or duplicated across segments, but instead undergoes a full displacement: it starts in one position and ends up in another. In the case at hand, the palatalizer is initially located within the suffix. However, it cannot be realized in that position. As a result, it shifts to a neighbouring segment, specifically the final consonant of the stem, where realization becomes possible. There, it attaches to the host and surfaces together with it, giving rise to the palatalization effect.

## 5. Palatalization repairs illicit phonological objects

Whenever suffixes appeared not to contain the expected triggers, phonologists posited abstract phonological units associated with these suffixes that could supply the necessary features. This gave rise to proposals involving so-called *floating* segments.

When attempts were made to ground their existence more firmly, the focus often turned to historical explanations rather than synchronic evidence – as in Szpyra (2003) or Rubach's (2019) account of floating segments as reflexes of Proto-Slavic yers. The underlying logic was simple: if no suitable triggers are visible on the surface, they must be present covertly, and thus the floating segment was argued for. Conversely, in cases where visible triggers were present, no additional floating segments were assumed. Over time, however, the idea that palatalization may involve covert floating palatalizers began to spread.

A broader application of floating segments can be found, for example, in Cavirani & Vanden Wyngaerd (2024) for Czech, in Bennett & Braver (2015) for Xhosa, in Zdziebko (2015, 2017, 2023), and Gussmann (2007, 1992) for Polish, etc. Since the study by Cavirani & Vanden Wyngaerd (2024) comes closest to our proposal, we will briefly present it here.

Cavirani & Vanden Wyngaerd (2024) propose that each palatalizing suffix in Czech is associated with a floating palatalizer. This palatalizer, not linked to any syllabic position, is considered structurally defective. When it comes into contact with a stem-final consonant, the floating material seeks an anchor and attaches to the final segment of the stem. In doing so, it both triggers palatalization and resolves its structural deficiency by becoming licensed through this attachment. An example of this process is shown in the diagram below.

(6)   Model of palatalization in the context of comparative suffix -ej- (Cavirani & Vanden Wyngaerd 2024)
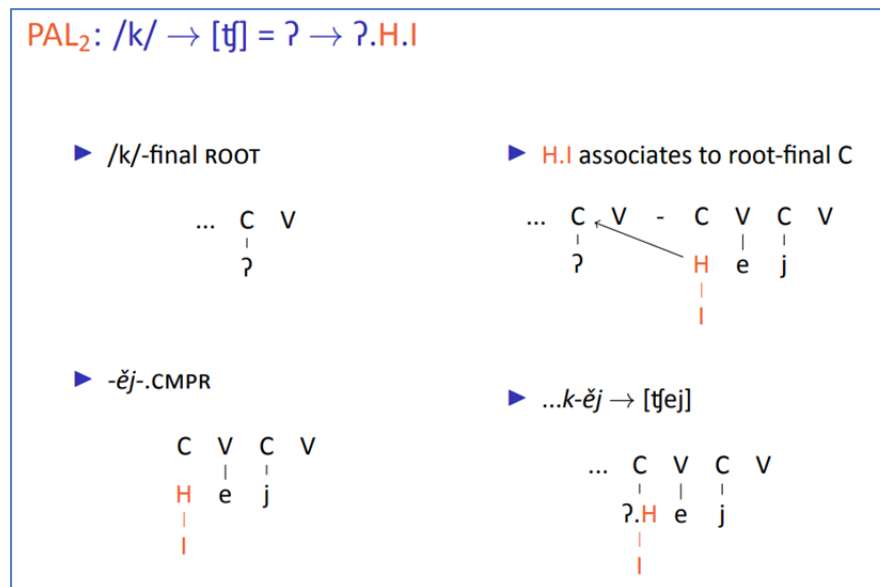
In the diagram, the floating palatalizer is marked in orange. Its floating status is indicated by the absence of an association line to any syllabic position. Once the suffix is attached to a stem, the floating material comes into contact with a consonant that can license association by providing a stable syllabic anchor. In the course of association, the floating palatalizer merges with the consonant, and together they form a palatalized output.

Cavirani & Vanden Wyngaerd derive the element structure of the palatalizer from the outcome of palatalization. First, since the result is a palatal consonant and the element associated with palatality is |I|, the palatalizer contains |I|. Second, the outcome is an affricate (a consonant that, unlike the original segment, includes a fricative component), to account for this fricativization, the palatalizer also contains the element |H|[9]. The velar /k/ represents an ideal target for such a palatalizer, as it is underspecified for both of these elements and thus readily incorporates them. In contrast, segments already specified for either of these elements are more likely to resist palatalization, since they absorb the palatalizer without undergoing any change. An example is the coronal fricative /s/, which is specified for three elements |A|, |I| and |H| and therefore resists palatalization.

This observation points to a broader generalization: *phoneme size matters* (comparably to Pöchtrager 2019; Onuma & Nasukawa 2020). Segments that are only weakly specified, meaning those that contain fewer elements, are more susceptible to palatalization, as they readily incorporate additional material. Conversely, segments that are strongly specified and already contain multiple elements are more resistant, since there is less space for the palatalizer to contribute anything new. In such cases, the palatalizer is absorbed by the consonant without producing any visible change. Cavirani & Vanden Wyngaerd also show that the outcome of palatalization depends on the internal composition of the palatalizer. In their analysis, the palatalizer PAL$_1$ includes only one element |I|, whereas PAL$_2$ includes two

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[9]   And this is precisely where we see that Cavirani & Vanden Wyngaerd recognize the role of fricativity in the palatalization process discussed in Section 1. They interpret it as a property that needs to be added, which in their analysis leads to the conclusion that the fricative element |H| is part of the palatalizer.

elements |H| and| I|. The number of elements contained in the palatalizer plays a crucial role. A palatalizer with more elements can affect a broader range of consonants, while one with fewer elements influences a narrower range of phonemes that are structurally simpler.

This means that when palatalizers and phonemes come into contact, they are evaluated against each other. If the palatalizer is sufficiently large, in the sense that it contains enough elements (= has enough strength to influence/overwrite the adjacent consonant), it can trigger palatalization of the target consonant. However, this happens only if the target consonant is sufficiently small, meaning it contains too few elements (= is too weak to resist palatalization). In such cases, the consonant incorporates new material from the palatalizer, and changes into a different segment.

The palatalization process, as defined here, is built on asymmetrical oppositions between phonemes and palatalizers. Either the palatalizer is larger (that is, stronger), in which case it forces the consonant to change and become palatalized (see 7a), or the consonant is larger (or at least equally specified), in which case it absorbs the palatalizer and no surface change occurs (see 7b).

(7)

 a. **PAL > consonant** ⇔ absorption of PAL **induces the palatalization** of the consonant

    e.g. PAL_1 > /k/ ⇔ absorption of PAL_1 (|H| + |I|) induces
    the palatalization of /k/ (?) to [tʃ] (|H| + |I| + |ʔ|)

 b.   **consonant ≥ PAL** ⇔ absorption of PAL **has no effect** on the consonant

    e.g. /s/ ≥ PAL_1 ⇔ absorption of PAL_1 (|H| + |I|) has
    no effect on /s/ (|H| + |I|+|A|)

In a system like this, we can speak of two opposing forces: the strength of the palatalizer to induce change and the strength of the consonant to resist it.

Furthermore, the palatalizers are modelled in such a way that they are subsets/supersets of each other. So, when speaking about PAL_1 and PAL_2, either PAL_2 is the superset of PAL_1, or PAL_1 is the subset of PAL2. This is crucial in case, PAL_1 and PAL_2 overlap in the palatalizing effect they cause. In Czech (go back to the Table 7), we see that palatalization of VLR is uniform across PAL0, PAL1 and PAL2, and that palatalization of COR is uniform across PAL1 and PAL2. The outcome of palatalization is the same for all three contexts, the only thing in what these three palatalizers differ is the scope of palatalization. It is this scope that allows us to compare palatalizers to one another. The logic is straightforward: the larger the palatalizer, the broader its palatalization scope, and the larger the consonant, the greater its resistance to palatalization. This assumption holds for Cavirani & Vanden Wyngaerd, as illustrated in (8a), and for our Czech data as shown in (8b).

(8)

     a. PAL_2 > PAL_1 b. PAL2 > PAL1 > PAL0
        /s/ > /k/   SIB > LAB > COR > VLR

This type of comparison would not be possible if the representations of individual palatalizers were constructed independently. The advantage of Cavirani & Vanden Wyngaerd's approach lies precisely in how the entire system is internally connected.

This approach offers a more insightful attempt than previous approaches, as it derives the identity of the floating material directly from the behaviour of the palatalizing process. Unlike other analyses, which assume a shallow interpretation of the floating feature as something front, non-back, palatal or coronal (within the Element Theory |I| or |A|), this account reflects a deeper consideration of what the floating material actually is. Rather than taking the presence of palatalization as evidence of some generic palatalizing feature, it identifies the internal structure of the palatalizer based on the phonological properties of both the input and the output.

This is precisely the perspective we aim to replicate, and it is exactly why Table 7 is structured the way it is. The organization of the data reflects the strength of each palatalizer in relation to specific phoneme types, as well as the resistance of individual consonants to different palatalizers. By presenting the data in this way, we capture both dimensions of the interaction and make it possible to analyse the structure of the palatalization system in a principled manner.

A limitation of Cavirani & Vanden Wyngaerd's analysis is that they do not explore how exactly the defectiveness of the floating palatalizer is evaluated. Since their representational system relies on elements, there should be no principled problem in associating the palatalizer to any empty syllabic position, as a palatalizer represented by elements ought to be pronounceable on its own. What is missing, then, is a clearly stated reason why the palatalizer is defective in the specific sense that it cannot create its own association line to an empty syllabic position. If we understand their proposal correctly, the reason is simply that the palatalizer is, by definition, floating, and therefore incapable of doing so.

Nevertheless, the idea of a dynamic model that evaluates the interaction between a palatalizer and the target consonant is compelling. It aligns well with language systems in which palatalizers differ in their scope, that is, in the range of consonants they are capable of affecting.

Following Cavirani & Vanden Wyngaerd, our approach rests on four principles. First, we assume that all palatalizing contexts involve independent palatalizers. Second, the palatalizer is assumed to have an illicit status (this will be modelled in the subsection 4.3). Third, we derive the internal structure of palatalizers solely from their phonological behaviour with respect to the consonants they target. We take into account both types of evidence: cases in which the palatalizer overwrites the consonant, as well as those in which it does not. Subsequently, the outcome of palatalization depends on the mutual relation between the consonant and the palatalizer, which may be either as in (8a), or as in (8b).

The third point will be examined presently.

6. Palatalizers and phonemes form a coherent system as they compete for what surfaces

In this section, we examine the internal structure of the palatalization system as revealed by the patterns illustrated in Table 7 (repeated here as Table 8) and grounded in the theoretical

assumptions introduced earlier. The data show that the behaviour of individual palatalizers is not random but systematically reflects the phonological properties of the consonants they apply to. At the same time, the resistance of consonants to palatalization reveals key aspects of the palatalizers themselves. The resulting system thus shows a high degree of structural coherence: the properties of palatalizers and phonemes respond to each other in regular and systematic ways.

Table 8: Czech palatalization patterns in the domain of noun-deriving suffixes

palatalizer type	no-PAL	PAL0	PAL1	PAL2
SIB [s z]	X	X	X	X
LAB [p b f v]	X	X	X	✓[pj bj fj vj]
COR [t d r$_2$]	X	X	✓[c ɟ ɽ$_2$]	✓[c ɟ ɲ ɽ$_2$]
VLR [k g x ɦ r$_1$]	X	✓[tʃ ʒ ʃ ɽ$_1$]	✓[tʃ ʒ ʃ ɽ$_1$]	✓[tʃ ʒ ʃ ɽ$_1$]

In Table 8, we observe that depending on the type of palatalizer, different groups of consonants are palatalized. In the case of no-PAL, we observe no palatalization effect. In the case of PAL0, PAL1 and PAL2, we observe three palatalization effects[10] which differ in their extent: the greater the extent of the change (i.e. the more classes of consonants are palatalized), the stronger palatalizer. PAL0 triggers palatalization only in VLR, making it the weakest palatalizer. Contrastively, PAL2 triggers palatalization in all phoneme classes except SIB, making it the strongest palatalizer. In between PAL0 and PAL2, PAL1 occurs. While it does not reach the strength of PAL2 due to its inability to palatalize LAB, it is stronger than PAL0 as it is able to palatalize VLR and COR. Following this, we propose a scale (see Scheme 1) that reflects the *strength* of individual palatalizers.

Scheme 1: Strength of the palatalizers

> PAL2   >   PAL1   >   PAL0

This scale results from the new arrangement of data concerning palatalization patterns in Czech and will be crucial to our analysis of palatalization. However, this represents only part of what can be inferred from Table 8. The other aspect becomes clear when we examine the

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[10] Table 8 shows that when we compare the Czech palatalizers, we naturally observe that each has a different palatalization scope, since each is capable of affecting a different subset of consonants. At the same time, we should also note that the effects they produce overlap across certain consonant classes. That is, all three palatalizers – PAL0, PAL1, and PAL2 – cause the same qualitative change in all VLR consonants, and PAL1 and PAL2 produce the same qualitative change in all COR consonants. They thus match in the kind of palatalizing effect they induce but differ in how far this effect can reach. This is precisely why, following Cavirani & Vanden Wyngaerd (2024), we assume that a structural relationship exists among the palatalizers. In the following section, we aim to make this relationship explicit when claiming that palatalizers form their own phonemic class, see Table 9.

issue by comparing palatalized and non-palatalized consonants, specifically considering their *resistance* to palatalization. In Table 8, we see that some consonants are completely resistant to palatalization, while others show varying degrees of resistance. The data reveals that VLR phonemes are the easiest to palatalize, as they are incapable of resisting any of the palatalization processes triggered by PAL0, PAL1, or PAL2. In contrast, SIB phonemes exhibit the highest resistance, as they are never palatalized by noun-deriving suffixes. LAB phonemes fall into the second most resistant class, being palatalized only by PAL2, and COR phonemes are the second least resistant, as they are palatalized by two palatalizers. Following this, we construct a descending scale of resistance to palatalization for Czech consonants, as shown in Scheme 2.

Scheme 2: *Scale of phonemes´ resistance*

SIB		LAB		COR		VLR
[s z]	>	[p b f v]	>	[t d r_2]	>	[k g ɦ x r_1]

The scale highlights differences in how Czech phonemes respond to palatalization and provides a foundation for analysing these patterns in the nominal domain. In what follows, we turn to the interaction between the two scales. By examining how the strength of individual palatalizers aligns with the resistance of different phoneme classes, we gain further insight into how the system operates as a whole.

We will examine how palatalizers and phonemes interact and contribute to this system, ultimately demonstrating that they function cohesively as part of it.

Building on this, we begin by examining the relation between the palatalizer and the consonant it affects, which is asymmetrical if we base our model of palatalization on the assumption that the palatalizer either overwrites the consonant, or the consonant absorbs the palatalizer, i.e. either (8a) or (8b), as in Cavirani & Vanden Wyngaerd (2024). When the palatalizer successfully palatalizes the consonant, it is considered stronger, which we phonologically evaluate in terms of feature richness: the palatalizer includes at least one more feature than the consonant it palatalizes. Conversely, when the palatalizer fails to palatalize the consonant, it is either equally strong or weaker than the consonant, which we again evaluate in terms of feature richness: the palatalizer includes at most as many features as the consonant that resists it. In both cases, the asymmetry between these two phonological units remains clear.

Our goal now is to combine Scheme 1 and Scheme 2 by comparing the asymmetrical relationships between the palatalizers and the given groups of phonemes.

Thus, if VLR are palatalized by PAL0, it follows that PAL0 is stronger than this group of phonemes. Conversely, if PAL0 fails to palatalize COR, it is either weaker than or, at most, equally strong as this group of phonemes. To summarize, the incorporation of PAL0 into Scheme 1 using inequality symbols (">" and "≥") looks as follows.

Scheme 3: *Incorporation of PAL0 into the scale of phonemes´ resistance*

SIB	>	LAB	>	COR	≥	**PAL0**	>	VLR

By comparing the strength of the palatalizers PAL1 and PAL2 with the resistance of consonants to palatalization, we can establish the following asymmetries. PAL1 is clearly stronger than COR, as COR undergoes palatalization under its influence. However, since PAL1 cannot palatalize LAB, it must be either weaker than or, at most, equally strong as LAB. A similar analysis applies to PAL2. We know that PAL2 can palatalize labials but cannot palatalize sibilants, which helps determine its relative position on the scale. The resulting hierarchy is represented in Scheme 4.

Scheme 4: *Incorporation of three palatalizers into the scale of phonemes´ resistance*

SIB	≥	**PAL2**	>	LAB	≥	**PAL1**	>	COR	≥	**PAL0**	>	VLR

A more fine-grained specification of the phonological properties of individual phonemic groups than what is presented in Scheme 4 cannot be derived directly from our data. Once this hierarchy is established and given that not all asymmetries within it are sharply contrastive, the question arises of what features, and how many, are necessary to adequately capture palatalization processes in this domain while avoiding any additional contrasts not supported by the hierarchy.

6.1. What features?

We draw all information about palatalization from its phonological behaviour. However, this behaviour is not stable with respect to phonetic substance. Across languages, it is highly variable and often contradictory. As a result, phonetic substance cannot be relied upon when constructing general phonological representations.

Substance-based models might offer an adequate account of a specific language, but they lose explanatory power when applied cross-linguistically. The variability lies in substance, not in the underlying principles of palatalization. What remains stable across languages is the structural logic of the process, not the phonetic details.

For this reason, we adopt a model in which phonology is not directly based on substance. The substance-free model (Chabot 2022, Iosad 2017, Reiss 2017, Scheer 2014, Cyran 2014) treats phonological features as abstract[11] entities whose identity is defined by their

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[11] As one of the reviewers correctly observes, there is no univocal phonological interpretation for palatalizing units, except for their ability to trigger palatalizing effects. This observation captures exactly the methodological position adopted in this paper. The only aspect of palatalizers we can objectively identify is what they do – that is, their capacity to produce phonological effects in particular environments. The goal of this study is to model palatalization as it is instantiated in the grammar of a particular language, assuming, that once speakers acquire the language, they also acquire the set of phonological features (in the configuration required for native-like production). The ontological status of these features – what they are "in reality" – is a question for a different kind of research. Within the substance-free framework, we explicitly

phonological behaviour. These features are independent of phonetic content within the phonological module. The pairing of phonological features with phonetic substance takes place in the lexicon, where each language defines its own mappings.

(9)

Phonological primitives	Lexical mapping
α	α → substance A
β	β → substance B
γ	γ → substance C
δ	δ → substance D
ε	ε → substance E
Phonology	**Lexicon**

6.2. How many features?

To determine how many features are required for an adequate representation of the palatalization processes outlined in Table 8, we must first establish the principle on which we argue for the presence of any given feature. As we have seen in the previous subsection, this cannot be done on the basis of the phonetic quality of the segments involved. Our analysis is grounded in the theory of Substance-Free Phonology, which follows the *epistemological principle* (Kaye 2005), later reformulated by Dresher (2015) as the *activity principle*. According to this view, only those contrasts that are active in the phonological computation are considered relevant. Any other distinctions, even if phonetically plausible, are set aside for the purposes of this analysis.

Based on the phonological behaviour of palatalization in Table 8, we treat as phonologically relevant the contrasts between individual phonemic classes, since they show distinct responses to palatalization. These classes include SIB, LAB, COR, and VLR (from Scheme 1). We also recognize contrasts between individual palatalizers: PAL2, PAL1, and PAL0 (from Scheme 2). Lastly, the interaction between segment groups and palatalizers themselves are considered contrastive: that is, the behaviour of VLR with respect to PAL0, PAL1, and PAL2; COR with respect to PAL1 and PAL2; and LAB with respect to PAL2.
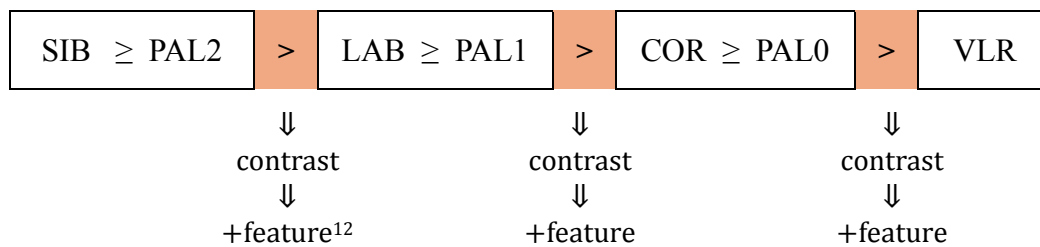
At the same time, we acknowledge that the behaviour of palatalization processes does not provide sufficient evidence to establish contrasts between PAL0 and COR, PAL1 and LAB, or PAL2 and SIB. Since these pairings do not trigger any phonological behaviour that would justify an additional contrast, we treat them as indistinct within the system so far. This is fully in line with the epistemological (or activity-based) approach: if there is no observable activity in the domain under investigation, then no feature should be introduced to distinguish the

refrain from seeking access to the true nature of phonological features, acknowledging that such access may in principle be unattainable. Consequently, we can only deduce how many features are needed, and how they must be structured, to account for the phonological behaviour observed. For a more extensive discussion on the nature of phonological features, see Veer, Botma, Breit, & van Oostendorp (2023).

segments involved. In other words, we do not assume a feature unless the phonological system itself gives us a reason to postulate it.

Scheme 5: *Calculating the Feature Inventory Based on Three Phonological Contrasts (preliminary)*

SIB $\geq$ PAL2	>	LAB $\geq$ PAL1	>	COR $\geq$ PAL0	>	VLR

⇓		⇓		⇓		
contrast		contrast		contrast		
⇓		⇓		⇓		
+feature[12]		+feature		+feature		

To summarise, the comparison above requires us to establish three distinct contrasts, which leads us to posit three abstract phonological features: α, β, and γ. Assuming that velars are cross-linguistically underspecified, we represent their feature slot with the empty set symbol ($\emptyset$). COR and PAL0 differ from VLR, so they acquire the feature γ. LAB and PAL1 also differ from VLR and thus receive γ as well, but since they also differ from COR and PAL0, they additionally receive β. Finally, SIB and PAL2 differ from all the previous classes – VLR, COR and PAL0, and LAB and PAL1 – and to reflect this, they are assigned α on top of β and γ.

Scheme 6: *Representing phoneme classes and palatalizers (preliminary version with three contrastive features acknowledged)*
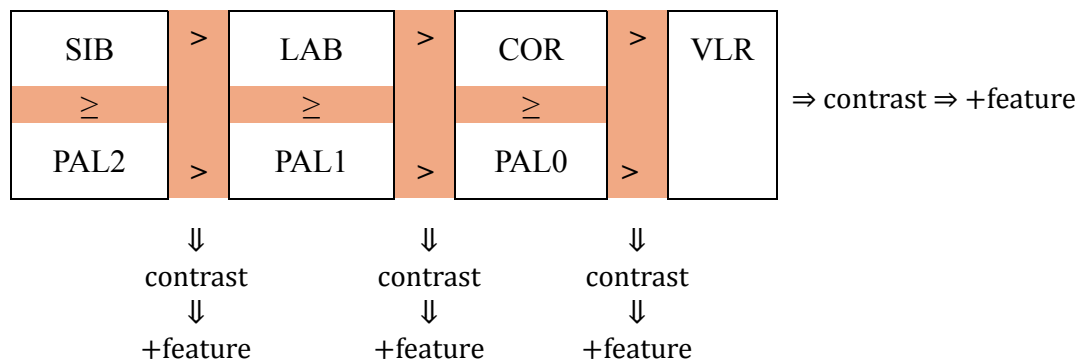
SIB $\geq$ PAL2	>	LAB $\geq$ PAL1	>	COR $\geq$ PAL0	>	VLR
$\alpha+ \beta+\gamma+\emptyset$		$\beta+\gamma+\emptyset$		$\gamma+\emptyset$		$\emptyset$

However, there is one further contrast that must be captured: the contrast between palatalizers and all other consonants. Unlike regular consonants, palatalizers represent illicit phonological structures that require repair. To reflect this distinction in our model, we must encode a difference between palatalizers (illicit objects that must undergo repair) and other consonants (licit objects).

6.3. *How to represent the deficiency of the palatalizer with respect to other phonemes?*

In our approach, we build on a similar idea to that proposed by Cavirani & Vanden Wyngaerd (2024), namely that the object responsible for triggering palatalization is illicit or deficient. From this perspective, it is natural to assume that palatalizers miss something that regular consonants possess. This contrast is straightforwardly modelled by positing another contrastive feature that is present in all consonants but absent in palatalizers.

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[12] "+feature" is an abbreviation for "add feature". It does not mean the positive value of some feature.

Scheme 7: *Calculating the feature inventory based on four phonological contrasts*

SIB	>	LAB	>	COR	>	VLR
≥		≥		≥		
PAL2	>	PAL1	>	PAL0	>	

⇒ contrast ⇒ +feature

⇓   ⇓   ⇓

contrast   contrast   contrast

⇓   ⇓   ⇓

+feature   +feature   +feature

Since this feature determines whether a segment can surface independently, it suggests that it plays a fundamental role in licensing pronounceability. It is also assumed to be present even in the least specified class of consonants in our system –VLR – which has remained fully underspecified up to this point. Based on these two observations, we position the new contrastive feature (ε) which differentiates phonemes from palatalizers; see Scheme 8.

Scheme 8: *Representing phoneme classes and palatalizers (four contrastive features acknowledged)*

SIB	>	LAB	>	COR	>	VLR
$\alpha+\beta+\gamma+\varepsilon$		$\beta+\gamma+\varepsilon$		$\gamma+\varepsilon$		ε
≥		≥		≥		
PAL2	>	PAL1	>	PAL0	>	
$\alpha+\beta+\gamma+\varnothing$		$\beta+\gamma+\varnothing$		$\gamma+\varnothing$		$\varnothing$

By introducing the feature ε, we first establish that phonological objects that bear it are capable of independently associating to the syllabic structure and can therefore be pronounced on their own. Second, by its absence, we establish that phonological objects lacking this feature lose this capacity, which necessitates the application of a repair process (i.e. palatalization). Third, phonological objects that contain the feature ε are exactly the ones that can serve as suitable targets for the palatalizer. This is precisely why palatalizers move towards these objects: they supply the missing material and thus repair the palatalizer's deficiency.

6.4. How to compare palatalizers with target consonants?

Up to this point, we have established how many contrastive features are needed to differentiate between palatalizers and target consonants. However, this by itself does not tell us how to model the interaction between the two. The central claim of this section is that palatalizers and target consonants form a coherent and highly interactive system. Crucially,

we should be able to compare their internal phonological representations in order to predict the outcome of their interaction.

As we outlined earlier, palatalization can either result in a visible phonological effect (8b) or be phonologically absorbed without any surface reflex (8a). To capture this, we need a mechanism that allows us to evaluate the relative strength of the palatalizer with respect to the target consonant. Following Cavirani & Vanden Wyngaerd (2024), we model both palatalizing strength and resistance to palatalization in terms of feature richness: the more features a palatalizer contains, the stronger it is; conversely, the more features a target consonant contains, the greater its resistance to palatalization.

This interaction is best captured if both types of the phonological objects, palatalizers and target consonants, are defined over the same set of contrastive features. Only under this assumption can their featural representations be directly compared without additional assumptions or arbitrary stipulations (e.g. this feature takes precedence, or that feature/element is headed etc.). When the palatalizer is featurally richer than the consonant, it overwrites the original consonant producing a palatalizing effect. When it is poorer or equally rich, it is absorbed with no surface effect. What we now turn to is the question of how this comparison can be formally implemented in the model.

When we work with grammatical features, we can either define them as independent units that are structurally unrelated – such features form unordered sets. Or we can define them as mutually connected units that are structurally dependent on each other – such features form ordered sets, more commonly referred to in linguistics as *hierarchies*.

Because we aim to build a truly coherent phonemic system, the interdependence of individual features is crucial for us. For this reason, we prefer a hierarchical organization of features over independent feature sets. By taking this step, we also partially follow Cavirani & Vanden Wyngaerd (2024), who adopt a hierarchical organization of features anchored in the framework of Feature Geometry. This framework uses partially ordered sets, grouping features into three main branches: Place, Manner, and Laryngeal. Features (in their case, elements) can interact within branches but not across them, resulting in a system that is only partially ordered. However, as shown in Section 1.1, features from different branches do in fact interact: palatalization involves both features lexically paired with the place node (COR, but not VLR or LAB) and features lexically paired with the manner node (plosive, but not fricative), and this interaction underlies the distinct resistance of SIB and COR segments, but does not reveal any difference among fricatives and plosives in VLR or LAB. This indicates that we need a system in which features are not separated into disjoint subsets but form a fully ordered structure that allows interaction across all features.

That is why we propose that all phonological features can be organized into a feature hierarchy, within which each feature establishes its relation to the others. Phonological units are thus represented as hierarchically structured feature representations. In order to compare phonemic classes with one another and without postulating any additional rules, these representations are modelled cumulatively.
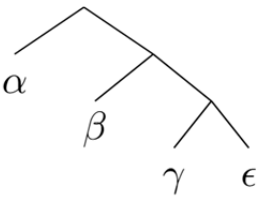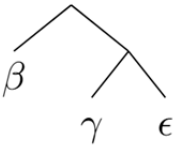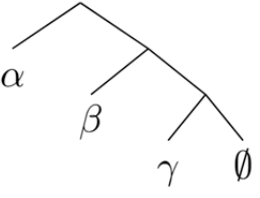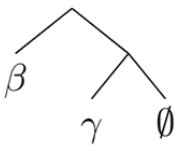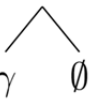
Assuming a hierarchy of features $\alpha > \beta > \gamma > \varepsilon$, we can capture the increasing resistance to palatalization across phoneme classes as in Scheme 9. VLR consonants, which are the least resistant to palatalization, contain only the lowest feature ε. COR consonants, which show

greater resistance, contain ε and γ. LAB consonants contain ε, γ, and β, and SIB consonants, which are the most resistant, contain all four features: ε, γ, β, and α, and there features are structurally organized.

Palatalizers, by contrast, lack the base feature ε, which models their structural deficiency and inability to surface independently. Their internal structure accumulates strength from PAL0 to PAL2: PAL0 contains only γ, PAL1 contains γ and β, and PAL2[13] contains γ, β, and α. This increase in featural content corresponds to an increasing ability to trigger palatalization.

Scheme 9: *Hierarchical representations of phoneme classes and palatalizers (four contrastive features acknowledged)*

The structural representation given in Scheme 9 can be equivalently expressed using the tabular format in Table 9. This format captures the same hierarchical relations in a more compact way.

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[13] One of the reviewers points out that comparing palatalizers to phonemic classes leads, for instance, to the conclusion that PAL1 structurally resembles labials – effectively making it a type of labial palatalizer. We do not consider this problematic. As already noted, labial triggers of palatalization are attested, albeit rarely, both in Bantu languages (e.g. Xhosa, siSwati) and in the European context (e.g. Moldovan). The fact that one of the palatalizers structurally parallels labials is therefore not unexpected. Moreover, PAL1 is still not identical to labials: unlike them, it lacks the licensing feature ε and is thus structurally deficient. Even though our analysis is framed within a substance-free model, we may still ask whether the structural parallels between palatalizers and phonemic classes align with typologically attested palatalization patterns. And indeed, they do: PAL0 corresponds to COR, which links naturally to phonetic coronalization; PAL2 corresponds to SIB, which aligns with stridency-based palatalization. Once we accept that palatalization processes vary in naturalness, these parallels appear entirely unproblematic. What this ultimately shows is that phonological modelling based on phonetic substance alone leads to unnecessary complications in the analysis of palatalization. By removing substance from the phonological component, we obtain a structurally coherent and cross-linguistically plausible system.

Table 9: *Hierarchical representations of phonemic groups and palatalizers (four contrastive features acknowledged)*

phonemic class		abstract phonological features			
SIB [s z]		α	β	γ	ε
LAB [p b f v]			β	γ	ε
COR [t d r₂]				γ	ε
VLR [k g x ɦ r₁]					ε
PAL	PAL2	α	β	γ	
	PAL1		β	γ	
	PAL0			γ	

The cumulatively layered featural representations proposed here allow for direct comparison between individual phonemes, as they are constructed on the basis of a single (shared) feature hierarchy. Each additional feature changes the interpretation of the entire structure. A phonological object containing only the feature ε is, in the lexicon, paired with a phonetic representation corresponding to a velar, laryngeal, or rhotic consonant (i.e. VLR). If one additional feature γ is present, the structure is interpreted as COR; if β is added, the result is LAB; and with the addition of α, the structure is interpreted as SIB. In this model, the phonological primitives are the abstract features α, β, γ, and ε, universally ordered in the hierarchy $\alpha > \beta > \gamma > \varepsilon$. Phonology combines these primitives into hierarchical structures, some of which have a phonetic counterpart in the lexicon, and some of which do not. Those that do can surface independently; those that do not (such as palatalizers) require a repair process to become pronounceable.

   For the sake of precision, this cumulative perspective requires an update of the earlier schematic representation in (9), which is revised accordingly in (10) to reflect the cumulative organization of features assumed here.

(10)

Phonological primitives	Lexical mapping		
α	$[\,\alpha\,\,[\,\beta\,[\,\gamma\,[\,\varepsilon\,]]]]$	$\rightarrow$	SIB
β	$[\,\beta\,[\,\gamma\,[\,\varepsilon\,]]]$	$\rightarrow$	LAB
γ	$[\,\gamma\,[\,\varepsilon\,]]$	$\rightarrow$	COR
ε	$[\,\varepsilon\,]$	$\rightarrow$	VLR
hierarchy:	$[\,\alpha\,\,[\,\beta\,[\,\gamma\,[\,\emptyset\,]]]]$	$\rightarrow$	!!!
$\alpha > \beta > \gamma > \varepsilon$	$[\,\beta\,[\,\gamma\,[\,\emptyset\,]]]$	$\rightarrow$	!!!
	$[\,\gamma\,[\,\emptyset\,]]$	$\rightarrow$	!!!
Phonology		**Lexicon**	

With all the representations in place, this model allows us to make clear predictions about which consonants undergo palatalization in specific palatalizing contexts.

In the following section, we briefly turn to the computational mechanism that compares the representation of the palatalizer with that of the target consonant, and based on this comparison, determines whether palatalization will occur or not.

6.5. How to compute the interaction in the proposed system?

When a palatalization context arises with PAL0 present, the palatalizer, being unable to surface on its own, searches for a segment that can license its pronunciation. In our system, this requires the presence of the feature ε, which only target consonants possess. If the target is a VLR consonant, the palatalizer is absorbed and contributes additional featural material not previously present in the consonant. As a result, the target undergoes a structural change, yielding a surface palatalization effect. In contrast, when the target belongs to one of the other phonemic classes (SIB, LAB, COR), the palatalizer is also absorbed, but this has no effect on the featural structure: the palatalizer does not contribute any new material, and thus no palatalization occurs.

Scheme 10: *Computing palatalization with PAL0*

phonemic class		phonological features				palatalization X or ✓
SIB	[s z]	α	β	γ	ε	**X** [s z]
LAB	[p b f v]		β	γ	ε	**X** [p b f v]
COR	[t d r_2]			γ	ε	**X** [t d r_2]
VLR	[k g x ɦ r_1]			γ	ε	✓[t͡ʃ ʒ ʃ ʐ ɽ]
PAL	PAL0			γ		

In our model, this repair takes the form of merging an illicit phonological object with a licit one. If the illicit object contributes no new features, no surface change occurs; if it contributes new material, a change is triggered. This surface reflex is what we interpret as palatalization.
In the other palatalizing context, the palatalizer PAL1 is structurally richer than PAL0, as it contains two features (β and γ). Like before, it cannot surface independently and therefore searches for a target that contains the licensing feature ε. If such a target is found, PAL1 attaches to it.

In the case of VLR consonants, which only contain ε, the palatalizer contributes two extra features: β and γ. As a result, the structure of the target consonant is enriched and changes its quality – palatalization occurs. In the case of COR consonants, which contain γ and ε, the palatalizer contributes one extra feature: β. Again, the target acquires new material and changes its quality – palatalization occurs.

In the case of LAB consonants, which already contain both β and γ, the palatalizer is absorbed without contributing any new structure. The quality of the consonant remains unchanged and no palatalization occurs. The same holds for the SIB class, which contains

even more structure (α, β, γ, ε). Since the palatalizer adds nothing that the target consonant does not already have, no palatalization takes place.

Scheme 11: Computing palatalization with PAL1

phonemic class		phonological features				palatalization X or ✓
SIB	[s z]	α	β	γ	ε	**X** [s z]
LAB	[p b f v]		β	γ	ε	**X** [p b f v]
COR	[t d r₂]		β	γ	ε	✓[c ɟ r̝]
VLR	[k g x ɦ r₁]		β	γ	ε	✓[t͡ʃ ʒ ʃ ʒ r̝]

PAL	PAL1		β	γ	

In the third palatalizing context, the palatalizer PAL2 is structurally the richest of the three, containing three features: α, β, and γ. Like the previous palatalizers, PAL2 cannot surface independently and must attach to a segment containing the licensing feature ε. Once this condition is met, PAL2 merges with the target consonant.

In the case of VLR consonants, which contain only ε, PAL2 contributes three new features: γ, β, and α. This results in a fully enriched structure, and the quality of the consonant changes significantly – palatalization occurs. In the case of COR consonants, which already contain γ and ε, PAL2 still contributes two additional features: β and α. Since new structure is added, palatalization again takes place. In the case of LAB consonants, which contain β, γ, and ε, PAL2 only adds α. This feature is not present in the original target consonant, so the structure changes and palatalization effect arises. However, in the case of SIB consonants, which already contain α, β, γ, and ε, PAL2 contributes no new featural material. As a result, the structure of the target remains unchanged, and no palatalization occurs.

Scheme 12: Computing palatalization with PAL2

phonemic class		phonological features				palatalization X or ✓
SIB	[s z]	α	β	γ	ε	**X** [s z]
LAB	[p b f v]	α	β	γ	ε	✓[pj bj fj vj]
COR	[t d r₂]	α	β	γ	ε	✓[c ɟ r̝]
VLR	[k g x ɦ r₁]	α	β	γ	ε	✓[t͡ʃ ʒ ʃ ʒ r̝]

PAL	PAL2	α	β	γ	

In this article, we have developed representations and computations that reflect only the contrasts arising from the internal structure of palatalizers and target consonants. Once a third variable is introduced – namely, the nature of the palatalization output (i.e. not just whether palatalization occurs, but what form it takes and thus what new contrasts it

introduces) – additional features will come into play, and the overall model will necessarily become more complex.

However, these issues will be addressed in future work, as this article does not provide sufficient space to cover all aspects of the system in its full complexity. In addition, two other morphological contexts in which palatalization arises in Czech – the verbal and the declensional domains, introduced at the beginning of this article – remain to be modelled within the same methodology. Once these domains have been analysed, the results will allow us to begin constructing a new representation of the Czech phonological system: one based solely on phonological behaviour. This, we argue, brings us closer to a genuine model of phonology – and to a more accurate picture of how phonology actually works.

7. Conclusion

This paper examined the phonological behaviour of palatalization in Czech, focusing on the morphologically defined domain of noun-deriving suffixes. The central claim is that palatalization in Czech is a non-assimilatory process that functions as a repair mechanism for illicit phonological objects: palatalizers. The proposed model posits that palatalizers are independent but phonologically and lexically deficient units, whose properties should be derived solely from their phonological behaviour.

Section 2 presented a systematic organization of Czech palatalization data within the nominal domain. The analysis showed that Czech consonants form distinct phonological classes depending on how they interact with palatalizers. One of the key findings was that palatalization affects coronal plosives and fricatives differently, dividing the coronal series into two classes: COR (coronal plosives /t d/, more susceptible) and SIB (coronal fricatives /s z/, more resistant). Further, the data revealed two systematically different phonological objects corresponding to the consonant /r/, labelled /r_1/ and /r_2/, whose distinct behaviour is consistently conditioned by syllabic position. The variant /r_1/, found in a branching onset, undergoes palatalization in PAL0, PAL1, and PAL2 contexts, while /r_2/, which appears in a simple onset, is only affected by PAL1 and PAL2. This results in a modified subsegmental profile for /r_1/ that explains its differential sensitivity to PAL0. Eventually, the data showed that /r_1/ patterns with the VEL & LAR which resulted in their consolidation into the unified VLR phonemic group.

Section 3 provided the theoretical and empiritcal motivation for rejecting the assimilatory analysis. We argued that assimilation accounts for only a subset of the processes commonly grouped under the label of palatalization. Since palatalization in Czech (as well as in many cases cross-linguistically) occurs without any "appropriate" overt trigger, the assimilatory approach fails to capture the full range of the data. Rejecting this analysis also removes the need to locate a trigger in the surface form of the suffix and thus avoids imposing unnecessary constraints on its underlying representation.

Section 4 has acknowledged the invisibility of the palatalizer at the surface, committing the analysis to reconstruct its internal structure solely from its phonological behaviour within the system.

Section 5 introduced the core theoretical assumption that the palatalizer is an illicit phonological object that cannot surface in its original position and therefore triggers palatalization as a repair process.

Section 6 examined the internal structure of the Czech palatalization system by analysing the interaction between three types of palatalizers (PAL0, PAL1, PAL2) and four classes of consonants (VLR, COR, LAB, SIB). The section first introduced two scales: a scale of palatalizers´ strength and a scale of target consonants´ resistance. These were derived directly from the empirical data and then combined into a unified hierarchy that reflects the asymmetrical relationships among them. The palatalizers were treated as structurally deficient phonological objects that cannot surface on their own and therefore require repair through merger with a licit phonological segment. This repair mechanism was formalised as the transfer of structural material from the palatalizer to the target consonant, which could lead either only to the absorption of the palatalizer by the target consonant or to the absorption of the palatalizer followed by the palatalization of the target consonant.

In order to model this interaction, the section adopted a representational system based on distinctive features introduced according to the epistemological (activity-based) principle. Only distinctions that are phonologically active – i.e. visible through systematic effects in phonological behaviour – are encoded. The analysis resulted in a cumulative featural hierarchy with four distinctive features (α, β, γ, ε), ordered relative to one another. Phonemic classes were represented as structures of these features, ranging from minimally specified (VLR: ε) to maximally specified (SIB: $\alpha+\beta+\gamma+\varepsilon$). Palatalizers were represented as structures lacking one of the fundamental features (ε): PAL0 (γ), PAL1 ($\beta+\gamma$), and PAL2 ($\alpha+\beta+\gamma$).

This system allowed for a direct comparison of structure between the palatalizer and the target consonant. When the palatalizer contributed at least one feature that was not already present in the target consonant, palatalization occurred. When no new feature was added, no palatalizing process was observed. This interaction was defined without appealing to phonetic substance and instead relied on fully abstract phonological features ordered in the featural hierarchy: $\alpha > \beta > \gamma > \varepsilon$. Without hierarchical organization, the mapping between fully abstract phonological features and their phonetic counterparts would become impossible.

So far, our analysis focused exclusively on the presence or absence of palatalization and did not take into account variation in output forms. Additionally, it left aside the verbal and declensional morphological domains in Czech. These aspects are left for future research. Other directions for future research include, first, enriching the current model with contrasts arising from variation in the output of palatalization, as this study focused primarily on the conditions under which palatalization occurs. Second, the same methodology should be applied to other morphological domains in Czech (specifically, verbal and declensional suffixes) thereby enabling a full reconstruction of the Czech phonological system grounded entirely in phonological behaviour.

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Understanding Secondary School Students' Motivation to Learn Spanish

Katarzyna Roszkowska
University of Silesia in Katowice, Poland

Abstract

Taking into consideration the crucial role of motivation in learning foreign languages, the author of this text, who is also a high school Spanish teacher, decided to conduct a study whose aim was to discover which factors motivate high school students to learn this language and how students' motivation changes depending on the time they have been learning the language.

The study involved two groups of high school students whose third language was Spanish (after Polish and English). The first group included first-year students aged approximately 15-16, and the second group included third-year students aged approximately 17-18. A total of 30 people took part in the study (15 in the first group and 15 in the second group). The research tool used in the study was a survey including several parts, which was inspired by the survey created by Zoltán Dörnyei and Ema Ushioda in 2021, included in the book *Teaching and Researching motivation*. The students were asked to respond to sixteen statements based on a Likert scale, where each number from 1 to 5 represented a different level of agreement.

Having analysed the survey results, one could come to the conclusion that first-year students are much more motivated to learn Spanish than third-year students. The results from this part were as follows: Year I – 45.55% of students motivated; Year III – 31.68% of students motivated. Therefore, it is necessary to eliminate demotivating factors and support situations that motivate students in order to teach Spanish to high school students as effectively as possible.

Keywords: motivation; high school; third language

1. Introduction

Motivation is an essential element of the teaching process. Acquiring a second language is much easier when it is high. A motivated student is more patient and tolerant of making their own mistakes. On the other hand, according to Dörnyei and Ushioda (2021), low motivation causes discouragement to perform various tasks and improve one's skills. Due to the undeniable importance of high motivation in a teaching process, it is essential to ensure that students are always willing to work and acquire new knowledge.

This article aims to explore how high school students' motivation changed over time. The author seeks to determine whether students' motivation to learn Spanish after nearly three years remained the same as at the beginning. This insight is not only of academic interest but also has practical implications.

2. Explaining motivation

In this part of the article some theoretical background is going to be provided, the types of motivation are going to be described, and the aim of the research is going to be explained.

2.1. Theoretical background

The definition of motivation was presented, among others, by Cruz (2021), who explained that motivation is a quality that everybody desires, but it is challenging to maintain while working towards achieving a goal. In addition, as explained by Valhondo (1995), the concept of motivation has been approached and defined from multiple perspectives. Ochsenfahrt (2012), in her book, indicates that it is difficult to define the term "motivation" because it is a multifaceted term, and it is not possible to provide just one exact meaning. The author explains that motivation can be described as someone's general desire or willingness to do something. She also acknowledges that, mainly due to social or psychological factors that give purpose to human behaviour, motivation can be explained as a stimulus for action toward a desired goal. There is a factor that combines both definitions: an objective. That means that a person is motivated when they want to achieve or improve something. According to Gardner and Lambert (1972), there are three components of motivation in the context of learning foreign languages: desire to achieve a goal, genuine effort, and attitudes toward language learning. Motivation can also be treated as a characteristic that measures the duration of an activity a human being performs.

Ardila (2001) indicates that motivation is crucial in learning. The author states that this phenomenon comprises three components: exploration, knowledge of results, and possibilities. This perspective is also shared by Ledesma de la Mora and Guadalupe (1979), who point out that the knowledge acquired depends on the student's level of motivation. In addition, the authors identify the most critical general characteristic of motivation. Firstly, they realize that seeing or observing motivation is impossible. It can only be deduced based on someone's behaviour. Secondly, there is a strong connection between motivation and interest, suggesting that motivation can be influenced by cultivating interest. Introducing more interesting activities can not only attract attention but also cause an increase in motivation. A high level of motivation helps individuals to persist in their activities or adjust their behaviour to achieve their goals. As it is presented by Mercer and Dörnyei (2020), motivation is strongly connected with active involvement which is crucial while conducting lessons in contemporary classrooms.

2.2. Types of motivation

According to Gallardo (2018), we can recognise different types of motivation. The author explains the differences between intrinsic and extrinsic motivation, positive and negative motivation, personal and social motivation, as well as long-term and short-term motivation.

2.2.1. Intrinsic and extrinsic motivation

The main difference between intrinsic and extrinsic motivation is the personal attitude towards the case. According to Woolfolk (2006), the first type of motivation is an internal and natural tendency to explore knowledge and learn new things. It is an innate curiosity for novelty. An example of this type of motivation is exploring knowledge based on interests. Ledesma (1977) explains that motivation is intrinsic when the knowledge of the subject is a sufficient reward for a person learning it. Extrinsic motivation, however, occurs when completing a task serves only to achieve a goal. It is possible to list many examples of this type of motivation. A person may want to study to earn more, get a promotion at work, complete their studies with good grades, or even, for children, receive praise from a teacher or parents. As Woolfolk (2006) indicated, in this type of motivation, we are not interested in the subject itself. It merely serves as a means to obtain something else.

2.2.2. Positive and negative motivation

According to Leiva (2021), positive motivation arises when an individual wants to obtain a benefit. On the other hand, negative motivation arises when an individual wants to avoid a punishment, leading them to complete the task out of fear. Furthermore, as indicated by Naidu and Krishna Rao (2008), negative motivation aims to control the adverse effects of workers and induce them to work positively. It is based on the concept that they should be punished if someone does not achieve the desired results. Punishments and reprimands are the most popular ways to evoke anxiety and, as a result, improve performance.

2.2.3. Personal and social motivation

There is also a difference between personal and social motivation. As Gallardo (2018) indicated, personal motivation is also known as primary motivation. This type of motivation is also intrinsic, and it can be characterized by the fact that the reward is aimed at satisfying an individual's own needs. Social motivation, on the other hand, is also known as secondary motivation. This type of motivation can be characterized by the desire to ensure the well-being of others. Socially motivated people generally want to achieve a feeling of security, respect, a sense of belonging, or social recognition.

Ocaña-Fernández (2019), however offers a different definition of primary and secondary motivation. According to the author, primary motivation is driven by basic needs. This type

arises naturally and is regularly reactivated. Secondary motivation, on the other hand, is explained as a phenomenon related to learned needs like friendship, love, or fame.

2.2.4. Long-term motivation and short-term motivation

There is also a distinction between long-term motivation and short-term motivation. The first one appears when the goals that somebody wants to achieve are distant, and the second one occurs when the goals are to be achieved within a short time.

3. Characteristics of teaching Spanish

Taking into consideration the characteristics of teaching Spanish, it is crucial to outline the main features of this language. Benítez Pérez (2009) identifies the fundamental issues related to the teaching of the Spanish language as a foreign language (FL). Firstly, he considers what kind of vocabulary should be taught during Spanish classes. The author believes that the type of vocabulary taught is more important than how Spanish vocabulary is taught. The author emphasizes that the key is to choose the vocabulary that would be most useful. On average a Spanish native speaker uses two thousand words, which is enough for he or she to communicate freely. Educated speakers, on the other hand, typically use about five thousand words. This suggests that vocabulary frequently used by native speakers of the language should be preferably taught first, so that these people who learn Spanish could master the ability to speak as soon as possible.

The question of which pronunciation pattern should be taught is also somewhat controversial. The type of pronunciation that is considered most prestigious is the one used in the Iberian Peninsula. For this reason, it is often adopted by Spanish teachers and is much more popular than the widely used varieties in South America. From a practical standpoint, this is not a particularly useful approach. The pronunciation used in the Iberian Peninsula is certainly considered exemplary, but its use can lead to minor misunderstandings when communicating with the majority of Spanish speakers worldwide.

Furthermore, it is worth noting that a Spanish-speaking teacher may not be able to adjust their pronunciation to suit the needs of their students. As a result, students are often exposed to just one specific pronunciation. It could be beneficial to introduce students to the range of pronunciations in the Spanish-speaking world. Students should be aware of the regions where they may encounter different pronunciations, thereby avoiding potential confusion.

The author of this article believes that every teacher should consider the situation of his or her students and teach them the pronunciation and vocabulary that will be most useful to them. According to Paulson (2013), this case may be simplified by comparing different Spanish words and structures to the ones used in the students' native languages. He indicates that it is crucial to raise students' awareness of the similarities between words in their native language and their Spanish counterparts.

4. The study

The present study aims to determine what factors motivate high school students to learn Spanish as a FL and if their motivation level increases or decreases over time. The author wanted to point out the aspects that encourage students to learn Spanish, as well as those that limit their motivation. The motivation level of students who were in the first year was assessed and compared with the motivation level of another group who began learning Spanish nearly three years earlier and were in the third year at the time of the research. Therefore, this study's goal was to determine whether third-year and first-year students remain as motivated to learn Spanish as when they started or if their motivation has decreased or increased. The research questions were as follows:

- Q1: Does students' motivation to learn Spanish increase or decrease between first and third year?
- Q2: What short-term and long-term motivational factors encourage students to learn Spanish?
- Q3: What factors discourage students from learning Spanish?

4.1. Participants

Two groups of students took part in the research. They were the students of one of the high schools in Opole (a city in southwestern Poland). The FL teaching pattern in the school is as follows: English is taught at an advanced level as a mandatory language. It is obligatory for students to study a second FL of their choice. Apart from Spanish, there are languages such as German, Italian, French, German, and Russian that can be chosen. Spanish and German are taught at different levels: it is possible to learn the language at the elementary level or to choose the higher level. French, Russian and Italian are taught only at the elementary levels.

It should be noted that Spanish is the most frequently chosen language as the third taught language in this school (Polish and English are obligatory). Most students start learning Spanish from the initial level, and in the following years, they decide not to take the Matura exam (the Polish national high school leaving exam, required for university admission-similar to the British A-levels) in this subject. To investigate the variability of motivation among students, two research groups were examined. In total, there were thirty participants. The participation in the study was voluntary.

The first group was composed of fifteen first-year students from three different classes. The profiles were biological, humanistic, and linguistic. All the students in this group began to learn Spanish in September (the same school year as the research was conducted). This language was new to them because they had not had prior instruction in this language.

The second research group was formed by fifteen third-year students who attended the same secondary school. Their profile was humanistic, which means that they were learning history and social studies at the extended level when the research was conducted. This group of students also began to learn Spanish at high school and they had not received Spanish classes during primary education.

The two research groups were taught by the same Spanish teacher and attended Spanish classes twice a week.

4.2. Instruments

In order to investigate the level and sources of motivation among students, the author of this article created a survey with sixteen questions of different nature (fifteen of them were closed-ended while one of them was open-ended).

The first twelve questions were closed-ended and used a Likert scale. The students had five options to choose from and indicate whether they agreed with a statement. A rating of five indicated that the student agreed with the presented statement. A rating of four corresponded to "I rather agree", while three indicated "I have no opinion about it." Choosing two meant the student partially disagreed with the statement, and one indicated complete disagreement. These closed-ended questions referred to the level of motivation among students to learn Spanish and the level of interest in Spanish culture and language. Apart from closed-ended questions, the survey also contained an open-ended question related to the aspects that most discourage students from learning Spanish. By adding an open-ended question in the survey, students could express their opinions on Spanish lessons, present their attitudes towards the subject, and explain what factors motivate or demotivate them when learning Spanish.

The survey also included two multiple-choice questions. The first referred to long-term motivation, where students had to indicate which factors motivated them to learn Spanish. Students could choose among the aspects such as the desire to choose a specific field of study in the future, the desire to acquire a specific profession in the future and the possibility to travel without problems to Spanish-speaking countries.

The second multiple-choice question addressed aspects related to short-term motivation and classroom environment. Students had the opportunity to choose options such as the kindness of the teacher, cooperation with other students, individual work, the help received from the teacher and other students, presenting exciting elements of the lesson, such as films and songs, introducing interesting vocabulary, the possibility of performing additional tasks, obtaining positive grades, having enough time to absorb the material, and having tests announced in advance to allow for preparation.

Finally, there was also a sentence to fill in where the students were asked to indicate whether they were more, equally or less motivated than when they started learning Spanish. The survey also contained an open-ended question in which the students had to enumerate the factors which discourage them from learning Spanish.

4.3. Procedure

Participation in the study was voluntary. The author of this research, who was also their Spanish teacher, created the survey online using Google Forms. When there was an equal

number of answers from both the first-year students and the third-year students, access to the survey was closed.

4.4. Data analysis and results

The data analysis method which was used was the descriptive analysis. The author of this article decided to use percentages and visualise the detailed data with the use of tables. There are the results presented below.

4.4.1. Closed-ended questions (Likert Scale)

This section presents the results of the first part of the survey, which consisted of closed-ended questions. In the first question the students had to respond to the general sentence, "I am motivated to learn Spanish." This example clearly shows that third-year students were much less motivated to learn Spanish than first-year students.

Table 1: "I am motivatied to learn Spanish"

	Disagree	Rather disagree	No opinion	Rather agree	Agree
Year 1	6,7%	20%	26,7%	20%	26,7%
Year 3	2%	40%	33,3%	0%	6,7%

Table 1 shows the results based on the third-year students' answers and the results based on the first-year students' answers are very different. Among the first-year students, the most frequently chosen responses were: "I have no opinion" and "I agree." In the group of third-year students, the vast majority, representing 40% of the total (six people), chose the option: "I rather disagree."

The second statement in the survey concerned receiving good grades in Spanish. The responses in Table 2 clearly show that both first- and third-year students want to receive good grades. In both research groups, the option "I agree" was chosen by 46.7% of those who were surveyed.

Table 2: "It is important to have good grades in Spanish for me"

	Disagree	Rather disagree	No opinion	Rather agree	Agree
Year 1	0%	13,3%	20%	20%	46,7%
Year 3	13,3%	13,3%	0%	26,7%	46,7%

The third statement that the students had to consider was: "Improving my language skills is important for me." The purpose of including this statement in the survey was to investigate if students were willing to learn Spanish more and thus use it better. Based on the responses, improving language skills is critical both for first-year students and for third-year students. 46.7% of respondents from the first year stated that improving language skills is crucial for them. Another 26,7% chose the option: "I rather agree." In the third class, 33.3% of

respondents stated that they agree with the statement and another 33,3% indicated that they rather agree. The exact results are shown below in Table 3.

Table 3: "Improving my language skills is important for me"

	Disagree	Rather disagree	No opinion	Rather agree	Agree
Year 1	0%	13,3%	13,3%	26,7%	46,7%
Year 3	6,7%	13,3%	13,3%	33,3%	33,3%

In the fourth statement of the survey, the students were asked if they were interested in Spanish. According to the survey results, Spanish is a much more interesting language for first-year students than for third-year students. The vast majority of the third-year students (46.7%) did not have an opinion about this issue. 26.7% of third-year students were not interested in Spanish as a language. Data is reported in Table 4.

Table 4: "I am interested in the Spanish language"

	Disagree	Rather disagree	No opinion	Rather agree	Agree
Year 1	13,3%	13,3%	20%	33,3%	20%
Year 3	26,7%	6,7%	46,7%	13,3%	6,7%

In the fifth statement of the survey, the students had to answer whether they were interested in Spanish culture. In both groups, students' answers were positive. In the first year, the option: "I agree" was chosen by 40% of the students, and in the third year by 46.7% (results are presented in Table 5).

Table 5: "I am interested in Spanish culture"

	Disagree	Rather disagree	No opinion	Rather agree	Agree
Year 1	6,7%	13,3%	20%	20%	40%
Year 3	13,3%	13,3%	13,3%	13,3%	46,7%

In the sixth statement of the survey, the author of this study wanted to examine the involvement of students in Spanish classes. Students had to decide if they agreed with the statement: "I like to speak up during Spanish lessons." Most students from both groups who participated in the research stated that they disagreed with this statement. However, the responses of the first-year students were more varied (see Table 6). In the third year, more than half of the students said they disliked contributing to Spanish classes. In the first year, such a statement was given by only 33.3%. Also, it is essential to mention that 26.7% had no opinion on this issue.

Table 6: "I like to speak up during Spanish lessons"

	Disagree	Rather disagree	No opinion	Rather agree	Agree
Year 1	33,3%	20%	26,7%	6,7%	13,33%
Year 3	53,3%	13,3%	26,7%	0%	6,7%

In the seventh statement of the survey (see Table 7), students were asked whether they perceived progress in their language skills in relation to their use of Spanish. In the first year, 26.7% of the students said they noticed the development in their language skills. The exact number of students stated that they did not have an opinion on the issue. Among third-year students, 46.7% said they did not see any progress. The same number of students stated they had no opinion on the issue.

Table 7: *"I observe the development of my language skills"*

	Disagree	**Rather disagree**	**No opinion**	**Rather agree**	**Agree**
Year 1	13,3%	20%	26,7%	13,3%	26,7%
Year 3	46,7%	0%	46,7%	6,7%	0%

The eighth survey statement regarded students' willingness to do additional tasks as homework. The answers to this statement were very diverse in both research groups (see Table 8).

Table 8: *"I like doing extra tasks from the Spanish classes"*

	Disagree	**Rather disagree**	**No opinion**	**Rather agree**	**Agree**
Year 1	6,7%	33,3%	33,3%	13,3%	13,3%
Year 3	26,7%	20%	20%	13,3%	20%

In the following statement (Table 9), students were asked if they were interested in participating in additional Spanish classes. The vast majority of students in both groups indicated they were not interested in a proposal of this type. In both groups, 46.7% of both groups selected the option: "I disagree."

Table 9: *"I would like to participate in additional Spanish classes"*

	Disagree	**Rather disagree**	**No opinion**	**Rather agree**	**Agree**
Year 1	46,7%	13,3%	20%	13,3%	6,7%
Year 3	46,7%	20%	20%	6,7%	6,7%

The tenth statement of the survey focused on students' plans to achieve language proficiency. The answers by the groups were different. Most first-year students said they plan to be fluent in the future. 33.3% chose the option: "I agree," and another 20%: "I rather agree." The answers in the third year were negative. There were 33.3% of students who said that having graduated from high school, they would not be interested in learning the language in order to speak fluently in the future. Another 20% said they probably would not want to become competent in the future (see Table 10).

Table 10: *"I would like to speak Spanish fluently in the future"*

	Disagree	**Rather disagree**	**No opinion**	**Rather agree**	**Agree**
Year 1	6,7%	13,3%	26,7%	20%	33,3%
Year 3	33,3%	20%	26,7%	13,3%	6,7%

In the eleventh statement of the survey, students had to indicate whether they liked attending Spanish classes. The vast majority of first-year students selected 5 or 4 corresponding to the options "I agree" and "I rather agree." The responses of the third-year students were completely different. The majority indicated that they did not like attending these classes. Detailed data on the responses of both groups are presented in the Table 11.

Table 11: *"I like Spanish lessons"*

	Disagree	Rather disagree	No opinion	Rather agree	Agree
Year 1	13,3%	13,3%	26,7%	33,3%	13,3%
Year 3	13,3%	33,3%	13,3%	26,7%	13,3%

The last statement asked the students to indicate whether Spanish lessons were stressful. Most of the third-year students said they had no opinion. However, most of the first-year students indicated that Spanish lessons were not stressful for them. The opinions of the first group and the third are quite divided. 13% of first-year students disagree with the statement that they find Spanish classes stressful. Another 27% indicated that they tended to disagree.

Table 12: *"Spanish classes are stressful for me"*

	Disagree	Rather disagree	No opinion	Rather agree	Agree
Year 1	13,3%	26,7%	26,7%	20%	13,3%
Year 3	26,7%	6,7%	40%	13,3%	13,3%

Another closed-ended question in the survey asked to what extent the first and third-year students were motivated to study Spanish. The students had to determine whether they were less, equally, or more motivated than when they started learning Spanish. 60% of third-year students said they were less motivated. In contrast, the majority of first-year students (66.7%) indicated that their motivation remained the same as when they began learning, approximately six months prior to the study (see Table 13).

Table 13: *"I am… motivated to learn Spanish"*

	More	Equally	Less
Year 1	6,7%	66,7%	26,7%
Year 3	0%	40%	60%

4.4.2. Long-term motivation factors

There were also two questions regarding both long-term motivation factors and short-term motivation factors in the context of Spanish learning. Firstly, the students were asked to indicate the long-term motivation factors that most encouraged them to learn Spanish. The respondents could choose between factors such as the desire to select a specific university in the future, the desire to have an excellent job, and the desire to travel. The students could choose all the options that applied to them. As shown in Table 14, the most frequently chosen

factor in the two groups was a desire to travel. Furthermore, the aspiration to secure an excellent job in the future was more important for the first-year students than for the third-year ones.

Table 14: *"What motivates you most?"*

	University	Work	Travel
Year 1	13,3%	46,7%	80%
Year 3	6,7%	33,3%	93,3%

4.4.3. Short-term motivation factors

In the second multiple-choice question, students were asked to choose which factors related to short-term motivation were the most important to them. Options included a good atmosphere in the Spanish classes, the teacher's positive attitude, the possibility of cooperation with other students, individual work, and the teacher's willingness to help.

Table 15: *"What motivates you most while having Spanish classes?"*

	Atmosphere	Teacher's positive attitude	Teacher's help	Cooperation with other students	Individual work
Year 1	80%	67%	40%	20%	0%
Year 3	26,7%	40%	40%	40%	0%

As Table 15 shows, the most motivating factor while having Spanish classes among first-year students was atmosphere in the classroom. The second most frequent answer was teacher's positive attitude. The answers of third-year students were more divided. Both atmosphere in the classroom and teacher's positive attitude were not as motivating for them as for first-year students.

The students could also indicate other factors that motivated them. There was a multiple-choice question used. The majority of first-year students indicated that a sufficient amount of time to learn is the most motivating factor for them, while in the case of third-year students using songs and videos during Spanish classes was the most important. The other specific information is presented in Table 16.

Table 16: *"What are the additional factors that motivate you?"*

	Songs and videos	Additional tasks	Sufficient amount of time to learn	Good grades	Attractive vocabulary
Year 1	33,3%	6,7%	60%	46,7%	20%
Year 3	66,7%	20%	53%	60%	26,7%

4.4.4. Summary

To summarize the data collected in the closed-ended questions, which were created using a Likert scale, the author of the article calculated the average of responses that showed that the

students were motivated to learn Spanish (responses rated 4 and 5). The author added the percentage of responses to the statements in which the students agreed that the level of their motivation increased. The data presented below shows the proportion of students in both groups who were motivated in this regard.

- The first-year students: 45.55%
- The third-year students: 31.68%

As can be seen, the motivation of 15-year-old students in their first year of secondary school is almost 14% higher than that of 17-year-old students in their third year. This means that in this particular case as students learn Spanish, their motivation decreases.

4.4.5. Open-ended question

The last part of the questionnaire consisted of an open-ended question. The students had to indicate which aspects discouraged them the most from learning Spanish. The first-year students mentioned aspects such as introducing too many issues in a short time. The first-year textbook contained an overwhelming amount of new content that was very difficult for beginners. The amount of teaching material that the teacher had to introduce was too large in comparison with the number of hours of the subject per week. This was the most frequently mentioned factor in the first-year students' survey responses. They also indicated that the subjects included in the school curriculum were too numerous and that they needed more time to acquire their knowledge. For this reason, they needed help to acquire the material accurately and, therefore, to use the time in the lesson most efficiently. Another discouraging element that the first-year students often mentioned was the large number of tests and quizzes. The students mentioned that they had to review the material often at home and spend much more time learning Spanish than they would have liked. The last aspect that first-year students often mentioned as a demotivating factor was the relatively complex Spanish grammar. They pointed out that the inflection and conjugation of verbs were very difficult to learn and, consequently, made the learning process tiring. They noted that, unlike learning Spanish vocabulary, learning Spanish grammar required much time and work, which often leaded to frustration and resentment.

Additionally, one student expressed the belief that teaching Spanish in high school involved too much grammar. The same student indicated that they would be more motivated if they could learn more vocabulary necessary for an ordinary conversation instead of learning grammar. Furthermore, he or she suggested that putting greater emphasis on sentence structure and developing speaking skills in Spanish than Spanish grammar would increase their motivation.

The responses obtained from the third-year students also showed that they felt that too many topics were introduced during Spanish lessons. The students responded that there was so much material that they could not adequately prepare for other subjects, especially for the subjects that they chose to take their Matura exam. In their surveys, the third-year students said they sometimes had too little time to learn the required material in Spanish, and they complained that tests were performed too frequently. Among their answers, some participants

questioned the need to know Spanish grammar. The respondents believed that too many tenses were not used daily.

Furthermore, there were many comments regarding verb conjugation. The students pointed out that it took much work to learn verb's conjugation, especially at the beginning. Furthermore, the students pointed out that while constructing a sentence, too many grammatical aspects always had to be considered, which made it easier to make a mistake. In some surveys, third-year students stated that working with the textbook seemed monotonous and they would prefer to learn by playing.

4.5. Discussion

Having analysed the results presented above, introducing videos and songs as lesson elements was much more necesarry for third-year students than for first-year students. The author of this article believed that this was because of the fact that older students had to acquire much more knowledge in a variety of subjects, and they missed learning through games. For this reason, almost 70% of third-year students indicated using audiovisual materials, such as videos and songs, as a factor that encouraged them to learn Spanish. On the other hand, the first-year students who had just started secondary school were much more aware that high school education differed from primary school education and did not contain the elements of playing. The other confirmation that first-year students were much more motivated to learn Spanish was that they wanted to prepare well for tests. The students appreciated the fact that they would be notified about the term of the tests with plenty of notice. There was 60% of the first-year students who appreciated that tests and exams were given on predetermined dates and that they were announced in advance. This aspect was also significant for the third-year students because more than 50% indicated that it was an essential factor for their motivation. For students in both research groups, it was also essential to obtain good grades. We could observe that the first-year students were much more motivated to learn than the third-year students, who would prefer to participate in enjoyable and effortless Spanish lessons.

Also, one could conclude that initial stages of learning Spanish were characterised by a dynamic development of linguistic skills, which did not develop so dynamically during the further stages of learning. This might happen because, having reached a specific language level, it became increasingly difficult to fill the knowledge gaps. Additionally, students were less motivated and involved in learning than initially.

On the basis of the data included in Table 15, we could conclude that individual work was not a factor that motivated students, regardless of their level of Spanish language proficiency. In both research groups, there was no person who would identify the possibility of doing individual work as a motivating factor for learning Spanish. On the other hand, students liked to work and do tasks in groups. A positive atmosphere in Spanish classes was much more important for first-year students. It was also the factor pointed out by this group of students most frequently: 80% of first-year students indicated the positive atmosphere during Spanish classes as a motivating factor for learning the language. Also, a large proportion of first-year students (67%) identified the teacher's positive attitude as a factor that made them more

motivated to learn Spanish. Among third-year students, it was impossible to distinguish a specific factor that would be the most motivating for them. There were 40% of third-year students who indicated factors such as the teacher's positive attitude and willingness to help and the possibility of working in groups with other students.

The open-ended question confirmed the author's previous thesis that the students attending the third year of high school had been already very tired of learning and they had longed for a less demanding way of acquiring knowledge. Another demotivating factor that third-year students often mentioned was that Spanish classes often took place in the last lesson. Because of that, they were often tired after the day, and they lacked the strength to continue their learning. The respondents believed that if Spanish lessons were held earlier, it would be easier for them to concentrate on the topic and work more actively and efficiently.

The motivation which appeared among both the first-year learners and third-year learners could be described as positive. Due to the fact that the atmosphere during classes was pleasant, there were no tasks that would be done by the students out of fear. According to the data presented in Table 12, the minority of students was stressed during Spanish classes, which indicated that their motivation could be described as positive.

Unfortunately, the amount of data presented in the survey was not sufficient to clarify if the type of motivation presented by the students in both groups could be characterised as personal or social. This topic could serve as a solid foundation for additional studies.

Moreover, students were discouraged mainly by complicated grammar, short amount of time to acquire knowledge (these factors were selected mostly by the students who attended the first year), the lack of games during classes and being tired and overwhelmed by the knowledge which needs to be acquired before Matura exam from other subjects, so there was no time to study Spanish (these answers were indicated by the third-year students).

Having analysed the survey results, it was clear that high school students' motivation in this particular case had declined over time. According to the research, while students' proficiency levels increased, their motivation decreased. Many first-year students were very motivated to learn Spanish. They knew that learning required sacrifices and they were prepared to master the material despite difficulties. They were also often interested in Spanish culture and considered Spanish a beautiful language. Most respondents planned to master the Spanish language well and use it in contact with foreigners, in their future work, and during their travels. First-year students were usually satisfied with the way of teaching.

Third-year students were much less motivated to learn Spanish. Although they were more proficient (mastering many tenses, grammatical structures and vocabulary)-they expressed little interest in the Spanish language and culture. Most third-year students said they did not find Spanish classes as attractive as they had found initially. Furthermore, only a small percentage wanted to continue their Spanish studies after high school to become more proficient.

The author suggests that third-year students' reduced motivation to learn Spanish might also be due to the fact that they treated this subject as supplementary. For this reason, they preferred to use their time to master their skills and acquire knowledge from the subjects they would be examined about in their Matura exam. Because of that, their interest in the Spanish language and their desire to improve their language skills declined.

5. Conclusions

Answering the questions presented at the beginning of the article, the author would like to indicate that students' motivation to learn Spanish decreased in this particular case. Among short-term motivational factors there was positive atmosphere during classes and teacher's positive attitude (both indicated by first-year students). Among long-term motivational factors there was mostly the willingness to travel (which had been selected by both first-year students and third-year students). It showed that the type of motivation which appeared with more frequency among the two groups was extrinsic motivation (they wanted to learn Spanish in order to travel). A significant difference was observed between the demotivating factors identified by first-year and third-year students. First-year students indicated that they aimed to achieve the best possible academic results and, therefore, expressed a need for more time to master the material. They also reported that the number of subjects introduced was overwhelming. In contrast, third-year students indicated that a more motivating approach would involve learning through play and placing greater emphasis on Spanish vocabulary rather than on Spanish grammar.

Despite the difficulties, teachers must ensure that students' motivation increases from its initial level or (at least) remains at the same level. Research has shown which motivation techniques students find most effective. It has also been possible to identify which factors affect students negatively in terms of their motivation. With this knowledge, it becomes possible to reduce the barriers to learning Spanish within the school environment, thereby enhancing the overall effectiveness of instruction. This information might serve as a guide for teachers aiming to improve their methods and strategies to maximise students' motivation. Nevertheless, it should be emphasised that the findings of the present study should not be overgeneralised. The research groups were relatively small; therefore, the results cannot be considered representative and cannot reflect the situation in the whole educational surrounding. It should be also noted that the findings might more accurately reflect the overall situation in schools if the study was conducted across multiple schools and grade levels, and involved classes taught by a range of different teachers.

Recognising the need for more research on motivation to learn Spanish, the author hopes this article will inspire further research. It would be appropriate to find out what motivates students from different schools and environments in order to develop effective learning models that could benefit both beginners and more advanced language learners.

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Appendices

Survey

Klasa: I//III

Zaznacz, w jakim stopniu zgadzasz się z poniższymi stwierdzeniami.

5- zgadzam się

4- raczej się zgadzam

3- nie mam zdania

2- raczej się nie zgadzam

1- nie zgadzam się

1. Jestem zmotywowany/ zmotywowana do nauki języka hiszpańskiego ....

2. Zależy mi na zdobywaniu dobrych ocen z języka hiszpańskiego ....

3. Doskonalenie kompetencji językowych jest dla mnie istotne..............

4. Interesuję się językiem hiszpańskim.................

5. Kultura hiszpańska wydaje mi się interesująca..............

6. Chętnie zabieram głos w dyskusji na lekcjach języka hiszpańskiego..........

7. Dostrzegam swoje postępy w doskonaleniu umiejętności językowych...........

8. Chętnie podejmuję się wykonania dodatkowych prac............

9. Jestem zainteresowany/ zainteresowana uczęszczaniem na dodatkowe zajęcia związane z językiem hiszpańskim..............

10. W przyszłości planuję osiągnąć biegłość językową.............

11. Lubię uczęszczać na zajęcia języka hiszpańskiego...............

12. Lekcje języka hiszpańskiego są dla mnie stresujące...................

Zakreśl maksymalnie trzy aspekty dotyczące motywacji długoterminowej, które najbardziej Cię dotyczą:

- chęć zdobycia nowej wiedzy

- chęć zdobywania dobrych ocen

- chęć podjęcia określonego podjęcia określonego kierunku studiów

- chęć zdobycia dobrego zawodu w przyszłości

- możliwość porozumiewania się z obcokrajowcami w tym języku
- chęć podróżowania

Zakreśl maksymalnie pięć aspektów dotyczących motywacji krótkoterminowej, które Cię najbardziej motywują:
- dobra atmosfera na lekcjach języka hiszpańskiego
- życzliwość nauczyciela
- współpraca z innymi uczniami, praca grupowa
- praca indywidualna
- gotowość pomocy ze strony nauczyciela
- gotowość pomocy ze strony innych uczniów
- wprowadzanie ciekawych elementów takich jak piosenki i filmy w trakcie zajęć
- wprowadzanie interesującego mnie słownictwa
- możliwość wykonywania dodatkowych zadań
- uzyskiwanie pozytywnych ocen
- wystarczająca ilość czasu na przyswojenie materiału
- fakt, że kartkówki są zawsze zapowiadane

Wymień aspekty, które najbardziej Cię najbardziej zniechęcają do nauki języka hiszpańskiego:
....

Zakreśl odpowiednie słowa, tak aby dotyczyły Ciebie:
Jestem tak samo/bardziej/mniej zmotywowany/zmotywowana, jak na początku mojej przygody z językiem hiszpańskim.

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The Interconnection between Perspective-Taking Process and World-Creating Predicates in Language Use

Denis Shuvalov

Szeged University, Hungary

Abstract

Perspective-taking (PT) is a fundamental cognitive faculty that enables individuals to understand and engage with others' viewpoints. This paper focuses on overt linguistic items that directly signal perspectival shifts. Central to this investigation are world-creating predicates, such as verbs of cognition (e.g., *think*, *believe*) and utterance (e.g., *say*, *tell*), which contribute to the construction of perspectivity in language. Drawing on attributional semantics, this study argues that these predicates differ in their relation to PT: while predicates of utterance merely express another's perspective, predicates of cognition more actively require the speaker to adopt that perspective. Through contextual analysis, the paper demonstrates how these predicates operate along a private-public domain continuum, with implications for identifying actual PT occurrences in discourse. Ultimately, it has been demonstrated that predicates establish perspectivity in two distinct ways, depending on their degree of egocentricity. For example, predicates of cognition (*think*, *believe*) belong to the private domain and lead to *actual occurrences of PT*, as they compel the speaker to adopt another's perspective — to "put themselves in someone else's shoes". In contrast, predicates of utterance (*say*, *tell*) belong to the public domain and indicate *merely the linguistic expression of a perspective* without requiring the speaker to adopt it. In other words, these predicates simply attribute verbally expressed content to an "I" distinct from the speaker. Additionally, a five-level partial ordering has been proposed to capture gradations between the extremes of the private-public domain.

Keywords: perspective-taking; world-creating predicates; attributional semantics

1. Introduction

1.1. *A brief introduction to PT; hypothesis, and goal*

In the literature, various definitions of the phenomenon of PT exist. Most researchers agree that PT is a cognitive faculty enabling us to view or experience events from another person's

perspective (Johnson, 1971; Duan, 2000) and to interpret and predict others' behaviour (Zhang, 2013: 4; Carpendale & Lewis, 2006). Nonetheless, certain ambiguities arise when discussion turns to the topology of PT. Some researchers distinguish between perceptual (e.g., visual), cognitive, and affective PT (Tjosvold, 1977; Kurdek, 1975), and note that empathy, despite being closely related, remains a distinct phenomenon (Galinsky et al., 2008: 378; Healey, 2018; Stietz, 2019). Healey (2018) further divides PT into two components: cognitive and affective. The former relates to thoughts and beliefs, whereas the latter deals with emotions and feelings. Tjosvold (1977: 680) underscores this distinction, highlighting that cognitive PT serves to identify the reasoning of others during controversy. By contrast, Parker and his colleagues (2008: 4) do not separate affective and cognitive components of PT, coining the term "active PT" and defining it as an attempt to an impartial understanding of thoughts, motives, and feelings of others as well as the reason they experience them the way they do. This notion of PT serves as the theoretical starting point for the current study and, at the same time, introduces additional challenges, particularly regarding ongoing debates about the fundamental mechanisms underlying PT. It remains unclear whether PT is automatic, subconscious, and unintentional or whether it is a conscious and deliberate endeavour requiring cognitive effort on the part of those involved (Bezuidenhout, 2013). From Parker et al.'s (2008: 5) PT is intentional, conscious, and goal-directed, as it involves mental exertion emphasizing that it requires effort and engages specific brain regions associated with higher-order cognition. Indeed, several neuroscience studies provide strong evidence that particular regions of the brain are implicated in PT (Ruby & Decety, 2001; Healey, 2018; Bacha-Trams, 2020; Waytz & Mitchell, 2011).

Despite the absence of an exhaustive descriptive model elucidating how PT functions, the ability to take another person's perspective during an interaction is highly beneficial and fulfils a fundamental role in understanding other interactants (Johnson, 1971). In doing so, it helps maintain effective communication and can even enhance the overall quality of interaction. For instance, Parker et al. (2008) demonstrated that active PT enriches mutual understanding among interactants. Individuals who endeavoured to comprehend others tended to convey their messages in a clear and accessible manner, thereby facilitating smooth communication and also reducing the likelihood of aggression.

PT exerts a profound impact on prosocial behaviour. For example, Parker and colleagues (2008) presented research indicating that PT is a key factor in reducing stereotypes, prejudices, and discrimination directed towards specific groups, modifying conflicts so that they become less personal and more manageable, and encouraging helping behaviours. All of these merits have been reported as beneficial in the workplace (Parker et al., 2008; Zappalà, 2016). Grant and Berry (2011) concluded that employees who were asked to consider the perspectives of colleagues, supervisors, customers, or suppliers filtered out less relevant ideas and presented those more likely to resonate with others, thereby increasing the profit from communication.

PT is also regarded as an advantageous instrumental competence in resolving conflicts, conducting negotiations (de Forsberg & Reichenbach, 2021; Boca et al., 2018; Galinsky et al., 2008), and participating in controversies (Tjosvold, 1977, 1978, 1980). Taken as a whole, the capacity for PT profoundly affects the social dimensions of human life. Traces of this

phenomenon extend from the fundamental moral development of humans (Ittyerah, 1990; Timmerman, 2014; Walker, 1980) to the aforementioned basic ability to initiate and sustain social interaction.

Given the crucial role of PT in interactions, including verbal ones, it is hypothesised that PT holds distinct implications for language use. Accordingly, the goal is to determine the nature of the relationship between the cognitive concept of PT and language use per se.

1.2. Structure of the paper

In line with the stated goal, the following outline has been adopted.

Section 1 addresses the notions of the PT process, its conceptual understanding in academic literature, and terminological discrepancies. Particular emphasis is placed on the vital role PT plays in human interactions, including sustaining clear communication, diminishing aggression, fostering prosocial behaviour, guiding moral development, and facilitating negotiations. Following this introduction to PT, a hypothesis and a goal are proposed.

Section 2 explores predicates hypothesised to be associated with PT, since the so-called "world-creating" predicates are responsible for establishing perspectivity in language use. Perspectivity, in turn, encompasses two aspects: perspectivisation and subjectification which are closely related yet differ according to who serves as the active subject in discourse: the speaker or another participant.

Predicates do indeed create perspectivity, although they do so in varying ways. This variation is influenced by the predicate's position on a spectrum extending from the inner private domain to the external public domain. Section 3 elaborates on these points and offers evidence supporting a twofold relationship between the PT concept and perspectivisation in language use.

Further, the paper deepens the private–public domain distinction by introducing interim levels between the aforementioned extremities. This taxonomy is proposed as a heuristic for assessing the degree to which different predicates signal the speaker's engagement in actual PT.

The final section summarises the conclusions.

2. Attributional semantics concerns

According to attributional semantics, certain categories of predicates, especially world-creating ones such as cognitive and utterance predicates, are responsible for creating perspectivity (Sanders & Spooren, 1997: 97).

World-creating predicates first clearly theorized in the late 1970s, notably by James McCawley (1978) in a semantic context. McCawley's work and a parallel study by Mochizuki (1980) on Chinese established the basic idea that certain predicates open up new worlds in semantics. McCawley illustrated that verbs such as *dream, imagine,* or *suppose* cause their

complements to be evaluated in an alternative world (for instance, a dreamed or imagined scenario) rather than the actual world of the speaker. For example:

(1)   Alice imagined that unicorns were in her garden.

This does not imply unicorns exist in the real world; but it suggests that they do in Alice's imagined world. Throughout the 1980s, the concept was absorbed into both formal semantics (often under *intensionality* and *opacity*) and cognitive semantics (under *mental spaces*). Barbara Lewandowska-Tomaszczyk (1985) introduced the idea that negation and counterfactuality operate through *alternative reality*, anticipating Fauconnier's (1985) full development of Mental Spaces Theory. Marie-Laure Ryan (1991) extended this shift into narratology, showing how texts systematically cue layered fictional realities. Later, Paul Werth (1999) formalized this insight in Text World Theory, proposing that linguistic structures like tense, modality, and intensional verbs initiate nested "text worlds" within discourse.

However, the traditional possible worlds semantics approach with alternative worlds, has faced criticism. Alberti and Kleiber (2012) offer a compelling alternative through their ReALIS (Reciprocal and Lifelong Interpretation System) framework. They argue that the conventional approach, which treats possible worlds as primitives in semantic theory, suffers from significant issues, notably the "granularity problem". Thus, the notion of world-creation moved from metaphysical models toward cognitive-discursive models, emphasizing mental simulation and perspectivisation rather than static alternative realities.

Despite the ongoing disputes about the nature of the concept of mental spaces, this paper does not intend to cover these points and rather use classical naming of verbs that create mental spaces. Accordingly, I refer to these expressions as "world-creating predicates" in the tradition of McCawley (1978) and Farkas (1992), acknowledging that they require the interpreter to construct alternative representational domains: imagined, desired, believed, or hypothesized.

Perspectivity can be conveyed in language use through various linguistic techniques, such as the selection of certain pronouns, the frequent mention of a referent (serving as a deictic centre), the use of mental-state or perception verbs, direct or indirect speech, particular word orders, modal verbs, reflexive verbs, negation, irony (Dancygier & Sweetser 2012), and numerous others.[1] Each of these techniques requires its own analytical approach, which falls beyond the scope of the current paper. Particular attention here is devoted to the so-called *world-creating predicates* — linguistic items whose complements construct alternative

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[1] For a comprehensive inventory of linguistic mechanisms involved in creating perspectivity, see Rzhevskaia (2014), who outlines a wide range of devices used in conflict discourse, and Lu & Verhagen (2016), who examine viewpoint shifts across languages through parallel text analysis, highlighting both universal and language-specific perspectivizing strategies. In addition to these mechanisms, recent formal cognitive and pragmasemantic studies have highlighted the crucial role of sentence types (such as declaratives, imperatives, and optatives) and discourse markers in constructing perspectivity. In particular, the ReALIS framework and associated works (Alberti & Kleiber, 2012, 2014; Alberti et al., 2016; Kleiber et al., 2016) provide a dynamic model of how sentence mood and inferential markers signal shifts in viewpoint and epistemic stance. These contributions underscore that not only lexical items but also grammatical and discourse-level features play a vital role in perspective-taking.

perspectives within discourse. These predicates, such as those expressing cognition or desire, play a crucial role not only in establishing perspectivisation, but also in compelling the speaker or listener to adopt or simulate viewpoints distinct from their own thereby generating deeper interest in the connection between PT and its linguistic markers. This process aligns with cognitive theories such as *Theory of Mind*, which posits the capacity to attribute mental states to others, and *simulation theory*, which suggests that understanding others involves mentally simulating their perspective (Deonna & Nanay 2014) Thus, world-creating predicates are not merely grammatical tools but gateways to exploring the cognitive underpinnings of perspectivity in language use.

For instance, desiderative predicates such as *want* and *wish* contribute to perspectivisation by requiring the speaker to represent another individual's desires, thus embedding their internal viewpoint into discourse (Neitzel & Penke 2021; Tager-Flusberg 1992). Similarly, perceptual predicates like *see* imply access to another's sensory experience, and engaging with such verbs often entails simulating the subject's perceptual viewpoint. Studies in embodied cognition show that language comprehension involves mental simulation of perceptual experience, suggesting that perceptual predicates invoke mental simulation akin to actually perceiving (Anderson & Dillon 2023; Liu 2024; Schwarzkopf et al. 2011). Furthermore, linguistic research on visual perspectivisation emphasizes that perceptual predicates signal the existence of alternative visual viewpoints and require awareness of such perspectival shifts (Vogels et al. 2023). Overall, these techniques generate multiple perspectives in the discourse and thus enhance compositional integrity and enable readers/listeners to experience different points of view.

World-creating predicates are so termed because their complements introduce a new mental space within the speaker's utterance. For instance, in:

(2)   John believes it is raining.

the speaker adopts John's version of reality (i.e., where it is raining) rather than representing the speaker's own (Brentari et al. 1992). In this utterance, there are effectively two worlds: the first encompasses the time and place in which the speaker produces the statement, while the second comprises John's belief that it is raining, including any spatiotemporal parameters from John's perspective.

These world-creating predicates refer to various possible worlds. In the sentence:

(3)   Oscar believes that I have an elder sister

the predicate *believe* and its complement *I have an elder sister* belong to Oscar's world of beliefs. In a similar vein, the predicate *want* in

(4)   John wants someone to help him

encapsulates the realm of John's desires (Wilson 1984: 415).

Sanders and Spooren (1997: 91) argue that all utterances are subjective and demonstrate two aspects of perspectivity in language: *perspectivisation* and *subjectification*. The first aspect is "restricted to subject other than the speaker", bounded to a subject *in* a discourse, i.e., a

character who the discourse is about; whilst the latter is bounded to the subject *of* discourse, i.e., the speaker. Each aspect can be signalled by specific linguistic forms. Subjectification arises, for example, when the speaker expresses an attitude towards information attributed to another discourse participant, as in *Surely, Robert is in the library.* Here, the speaker's certainty is conveyed by the adverb *surely.* Sanders and Spooren (1997: 91) list several linguistic markers that produce subjectification, including epistemic modality (*Robert must be in the library*), subjective *I*-embedding[2] (*I think that Robert is in the library*), predictions (*Robert will be in the library*), conditionals (*If Ann understood it correctly, Robert is in the library*), and evaluative reflections (*Surprisingly, Robert is in the library*).

On the other hand, perspectivisation may be conveyed simply by presenting a person as an active subject without revealing their inner discourse, as in *Mary likes flowers,* which is the most implicit form of perspectivisation. The most explicit form is demonstrated by direct quotation (*Jan said: "At this moment a bear is coming towards my kitchen."*) or indirect quotation (*Jan said that at that moment a bear was coming towards his kitchen.*). In general, whenever world-creating predicates assign thoughts, beliefs, or speech to a discourse subject, perspectivisation is generated (Sanders & Spooren 1997).

So, as it can be noticed, there are some linguistic means which can assist to identify the perspectivity in the language use. Since subjectification reflects only the speaker's own attitude towards the information assigned to someone else, the present study focuses more on perspectivisation, where the speaker conveys information from someone else's point of view. Moreover, expression of perspective and PT are always linked to the subject other than the speaker, and therefore the concept of perspectivisation in the language use is assumed to be closely related to the PT phenomenon. Hence, the next task is to comprehend where the speaker actually takes the perspective of others and how it can be determined in their speech.

3. The twofold nature of predicates: PT occurrence vs. expression of perspective

3.1. *Internal-external domain of world-creating predicates*

As mentioned in the previous section, world-creating predicates are responsible for perspectivisation and are therefore expected to be the primary linguistic items involved in the phenomenon of PT. So, let us dwell upon predicates in detail.

As Sanders and Spooren (1997: 89) observe, both verbs of utterance (e.g. *say*, *tell*) and cognition (e.g. *believe*, *think*) contribute to perspective creation in discourse, though presumably in different ways. Compare the following examples:

(5)   Kate said she is in Budapest.

(6)   Kate thinks aliens exist.

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[2] Sanders & Spooren (1997: 106) note that I-embedding such as *I think*, *I believe* can combine both subjectification and perspectivisation.

In the example (5), the predicate *said* primarily functions to convey information attributed to Kate — namely, that *Kate is in Budapest*. In contrast, the example (6), involving the predicate *thinks*, requires the speaker to adopt Kate's perspective. This is so because there is no inner discourse explicitly expressed by Kate such as in (7):

(7)   Kate **said** that she thinks aliens exist

that would attribute this belief to her directly. Instead, the speaker presents the information from Kate's point of view. In this sense, (6) implies that the speaker is representing Kate's perspective, rather than simply reporting it.

From the above examples, it can be inferred that verbs of utterance and verbs of cognition function in distinct ways. The former merely express a linguistic perspective, whereas the latter serve as actual indicators of the occurrence of a PT process.

Dahl (1979) differentiated predicates according to their level of egocentricity. He proposed a scale ranging from private (internal) to public (external) for ranking predicates. For instance, predicates of cognition (e.g. *think*, *believe*, *know*) are considered egocentric (private), as the judgement of the truth value of what is thought or believed is accessible solely from the agent's point of view. In contrast, predicates of action (e.g. *give*, *take*) or those denoting physical location can, according to the logic of Dahl's theory, be classified as belonging to the public domain, since the truth value of such statements is directly accessible from the external environment.

Similarly, Shinzato (2004: 879) concludes that both *think* and *say* originate from the mental, private domain, but represent it differently. *Think* refers to the internal and assumes no audience, whereas *say* externalises the internal and presupposes an audience. Thus, applying Dahl's ranking of predicates, we can infer that predicates of utterance publicly manifest the inner mental domain or, in our terms, express perspectivity. When the perspective of others is overtly expressed, there is no need to adopt this perspective merely for the sake of cognitive economy.

However, predicates of cognition present a more opaque and complex case. As noted above, they describe internal mental states that are not directly accessible, and therefore the speaker must, to some extent, exert cognitive effort[3] to consider the perspective of the individual to whom a mental state is being ascribed. There are several possible explanations for why speakers tend to adopt others' perspectives when attributing mental states.

Firstly, speaking about another person's mental states inherently generates a degree of responsibility for the information conveyed. This responsibility is not only epistemic, ensuring accuracy in representing another's perspective, but also pragmatic, aligning with Grice's Cooperative Principle (Grice 1975). According to this principle, speakers are expected to make their contributions as informative, truthful, relevant, and clear as required by the communicative context. For example, the statement such as (8):

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[3]   The notion of **cognitive effort** is used here to account for the varying degrees of mental processing required to interpret different perspectivised sentences including assigning mental states to other agents. Numerous studies support the cognitively effortful nature of PT process (e.g., Apperly, 2012; Frith & Frith, 2006; Rossnagel, 2000;).

(8)   John thinks that the stock market will plummet.

implicitly invokes Gricean maxims, particularly the Maxim of Quality (providing truthful information) and the Maxim of Relevance (providing information pertinent to the discourse). When the interlocutor responds with (9),

(9)   Why does he think so?

the speaker is expected to provide a relevant, well-founded justification of John's belief. And the possible expectation of that question motivates the speaker to adopt John's perspective in advance, supposedly even prior to articulating the statement, to ensure the explanation will be both accurate and contextually appropriate. Moreover, in striving to adhere to the Maxim of Clarity, the speaker must reconstruct John's reasoning in a way that is comprehensible and coherent from John's own point of view. Therefore, adopting another's perspective is not merely an enhancement that improves clarity; rather, it is a necessary step to fulfil the usual norms of effective conversation as described by Grice's Cooperative Principle. Failure to do so risks violating conversational norms. While these considerations are intriguing, they fall outside the scope of the present paper.

A further supporting account comes from the so-called hybrid simulation theory, which suggests that the attribution of mental states to others is underpinned by imagining oneself in the situation of the other (Deonna 2011: 7). Moreover, many studies include verbs of mental states as part of the assessment of PT abilities (Tager-Flusberg 1993; Dodd et al. 2011; Montoya-Rodríguez 2019). For instance, research conducted by Neitzel and Penke (2021) utilised mental state verbs as indicators and measures of PT ability, suggesting that the two are interconnected. However, the authors did not differentiate between verbs of utterance (e.g. *say*) and verbs of cognition (e.g. *think*).

Now let us return to the earlier examples. If one says "Kate thinks aliens exist.", one attributes a mental state (thinking) to another person, namely Kate. In doing so, the speaker is expected to adopt Kate's perspective.

To clarify these subtle distinctions, we may frame the sentence (6) within a broader linguistic context (10).

(10)   Kate is constantly collecting information about extraterrestrial civilisations, calling on others to be prepared for their arrival. She thinks aliens exist.

In this context, *She thinks aliens exist* is more than a mere inference from the preceding sentence. Rather, in terms of Palacas (1993), it constitutes a simulation of Kate's viewpoint by the speaker — or, in our terms, the speaker's adoption of Kate's perspective. The first sentence offers observable facts (Kate's actions) which function as premises for the inference drawn in the second sentence. Based on the factual premises, the speaker then infers that *She (Kate) thinks aliens exist;* to put it differently, one attributes a mental state (thinking) to an agent (Kate).

Conversely, we can imagine a situation in which *Kate thinks aliens exist* is treated as a known fact, such as when it is common knowledge (whether via background information or

repeated mention) that Kate holds such a belief. In that case, the predicate functions as an expression of perspective rather than as evidence of actual PT, as shown below:

(11)   Kate is constantly collecting information about extraterrestrial civilisations, calling on others to be prepared for their arrival. She said that she thinks aliens exist.

Here, the final sentence overtly presents a fact or statement — in other words, it verbally expresses the perspective of Kate by the speaker. There is no need for the speaker to infer, imagine, or adopt Kate's perspective, as she has already expressed her belief herself. Nevertheless, the sentence remains perspectival in a linguistic sense, since the predicate is attributed to Kate, not the speaker.

Let us now consider an example from Palacas (1993: 240):

(12)   In his disturbed condition, John wallows in guilt, real and imagined. For example, John regrets <u>having killed his father</u>, but his father isn't dead; I just had lunch with him.

In this example, the verb phrase *having killed his father* signals the inclusion of John's simulated point of view by the speaker. However, not all complex predicates can be used as explicit indicators of PT; the linguistic context plays a vital role. From the context we can infer that John did not kill his father, because: 1) the speaker denied that, and 2) the speaker had lunch with him. So, the proposition of the murder is not true from the speaker's position. Thus, the proposition *John killed his father* is false from the speaker's point of view, but true from John's.

Without contextual cues, this perspectival layering becomes ambiguous, as in (13):

(13)   John regrets having killed his father.

Here, it is unclear whether the speaker is adopting John's perspective or simply stating a fact. Hence, while complex predicates can serve as indicators of PT, their interpretation must be grounded in context. Villatte et al. (2009: 125) similarly argue that the truth value of propositional content plays a role in perspective-taking. Consider the sentence (14):

(14)   Paul thinks that Mary is not there.

Paul thinks is true, while *Mary is not there* may be false. Understanding this sentence requires the hearer to adopt Paul's perspective: from Paul's point of view, Mary is absent, though she may not be from another's. It is also possible that both propositions (*Mary is not there* and *Paul thinks*) are false. In this case, the speaker has attempted to take Paul's perspective by assigning him a mental state, but this attempt has failed.

Although this paper focuses on explicit linguistic items indicating PT, it is also important to consider cases where PT is indicated by syntactic relationships between sentences, as in the examples from Palacas (1993: 249):

(15)   Chomsky no longer believes in multiple transformations. Instead, he believes that there is just one transformation.

(16)   Chomsky no longer believes in multiple transformations. Instead, there is just one transformation.

Palacas claims that only the second version (16), viz. the second sentence in it, reports the simulated point of view of Chomsky by the speaker. Indeed, the second sentence in (16) does not overtly state that the thoughts expressed belong to Chomsky but rather implies that they do. The second part of that text is a continuation of what Chomsky believes and framed into the direct speech. This is unlike the first example, wherein both sentences, predicates of mental state are assigned to Chomsky, however, they are not simulations of Chomsky's mind by the speaker. These snippets clearly illustrate the difference between the expression of perspective and genuine PT occurrence. Even though the verb *believe* is a cognition verb and typically signals PT, in this instance it marks only the expression of perspective and not a simulated point of view. The explanation lies in context. Chomsky is a publicly known figure whose views are widely accessible via published works and public discourse. Accordingly, these beliefs are no longer private and fall within the public domain according to Dahl's (1979) ranking. Moreover, since Chomsky published his ideas, the truth value of the given predicates is accessible and verifiable by the audience. Thus, context has shifted the function of the predicate from indicating PT process to signalling the mere expression of perspective.

The difference between the actual PT occurrence and the mere expression of perspective is also reflected in the comparison of the predicates of action and inner mental states.

(17)   Maria baked a cake yesterday.

(18)   Maria believes the cake was good.

In (17), the predicate *baked* belongs to the external domain. The action is observable and its truth value can be directly verified. Although this sentence involves perspectivity (it attributes an action to someone other than the speaker), there is no PT but a mere expression of perspective. In contrast, (18) involves the internal domain. The predicate *believes* denotes a mental state whose truth value is opaque to external observers. Thus, the speaker must take Maria's perspective to express the content of (18), which constitutes an instance of actual PT.

In addition, some more elucidations must be provided regarding (17) and (18). First, in (18), while the speaker attempts to adopt Maria's perspective, this does not guarantee success. What matters is the presence of the attempt to take the perspective. Second, the tense of the sentence influences interpretation. While the domain of action predicates is largely unaffected by tense (*Maria is baking*, *Maria bakes*), the same cannot be said for cognition verbs, as shown in (19):

(19)   Maria believed the cake was good.

In this case, it is unclear whether *believed* belongs to the private or public domain without additional context mirroring the ambiguity noted in examples (15) and (16). The above examples mostly reflect two extreme points within the internal-external domains. The next part is devoted to delineating intermediate categories.

4. Intermediate categories within internal-external domain

To capture gradations between private and public domains, I propose a continuum of five levels. Each level reflects how epistemically accessible the predicate's content is to outside observers (and thus how much perspective-taking or inference is required). Below I define each level with examples:

Level 1: Deeply Private Internal States. These predicates denote a subject's inner cognition or unexpressed reasoning, entirely hidden from others unless voluntarily revealed. Examples include cognitive verbs like *think, believe, imagine, doubt, plan, realize, conclude,* etc. Such verbs describe an "internal reality" in the mind of the subject . For instance, if we say

(20)   Alice believes that the solution is correct.

that belief exists only in Alice's mind; an observer cannot directly see or hear a belief. As Dahl (1997, 1979) explains, mental predicates depict the subject's internal reality remaining in the private domain. Shinzato (2004) similarly argues that a verb like *think* represents an internal counterpart to speaking, essentially "the same phenomenon" as saying but kept private. At this deepest end of the continuum, the opacity of the state is highest – only the thinker has direct access to the content, making these predicates highly perspective-bound. An external person must use PT to infer such states. This category denotes what has been discussed earlier – the ***actual occurrence of PT.***

Level 2: Internal Affective or Experiential States. This category includes predicates for emotions, desires, and certain sensory experiences that originate internally but may produce outward cues. Examples: *fear, enjoy, love, hate, hope, want, feel (an emotion), be happy, be angry,* etc. These states are still primarily private (one can silently be afraid or love someone without others knowing), yet they often manifest in observable ways (facial expressions, tone of voice, physiological reactions). For instance:

(21)   John is afraid of the dark.

describes an internal fear. John's fear itself is inaccessible to observers except via indirect signs (e.g. John's trembling or avoidance behavior). Compared to pure cognition, emotions and desires can be slightly more epistemically accessible because humans readily read emotional cues; however, they remain subjective. Deonna and Nanay (2014) emphasize that emotions are "essentially perspectival," bound up with the subject's individual appraisal and motivations. Thus, to understand an emotion predicate about someone, observers must still adopt or simulate that person's viewpoint (e.g. know their goals or sensitivities) albeit with some help from expressive clues. This places affective predicates slightly closer to the public side than pure thoughts, but they are still largely internal states requiring inference.

Level 3: Semi-Private Subjective Assessments. Between internal feelings and overt speech acts, we find predicates that encode a subject's evaluative stance or epistemic attitude, which might be expressed in language or deduced from context. These include verbs of judgement, opinion, or knowledge that straddle the line between the internal and public domain. Examples: *find* (as in "Alice finds the movie boring"), *consider, suspect, assume, know,*

remember, forget, decide, agree, prefer. Such predicates often imply an internal state with some outward manifestation or consequence. For instance:

(22)   Bob suspects that his neighbor is lying.

The suspicion is private, but Bob might act warily, giving observers partial evidence of his mental state. Knowledge predicates (*know, remember*) are internally held, yet they pertain to factual content in the world and often become evident through behavior (e.g. if Bob knows the password, we'll see him enter it correctly). These states are *potentially* more accessible than Level 1 or 2 because they frequently surface in discourse: people voice opinions, make judgments, or demonstrate knowledge. Indeed, certain cognition verbs shift toward the public domain when their content is epistemically accessible to others through inference. For instance, if Alice just shared the answer or consistently acts like she knows it, we can safely say that "Alice knows the answer". Pragmatically, we treat some of these states almost as public if common evidence exists (consider how saying "I suspect…" or "I believe…" in conversation externalizes an internal attitude as a public claim). Still, unlike full speech acts, subjective assessments retain an element of privacy – they reflect the subject's personal stance, and others must **evaluate how reliable or shared that stance is**. Thus, Level 3 predicates occupy a middle ground: they are about the mind but commonly expressed or evidenced in communication, reducing some guesswork.

Level 4: Communicative Acts (Speech Act Verbs). This category covers predicates that describe utterances or communicative actions, which inherently reside in the public domain of observable language, even though they originate from an internal intent. Examples: *say, tell, ask, announce, promise, confess, argue, exclaim, admit, deny*. When we use such a verb, we refer to something the subject did outwardly with words. For instance:

(23)   Carol said that she was tired.

(24)   Dan promised to help.

These acts are directly perceptible to others (one can hear or read what Carol said or note that Dan uttered a promise), so the core event is public. The important point is that with speech predicates, the content that was private is now explicitly shared or at least observable as an utterance. As a result, PT is easier in one sense: an observer doesn't have to infer that the subject has a thought; the subject literally voiced it. However, speech act predicates still carry perspective nuances. They can indicate the subject's pragmatic intent or attitude (for example, *promise* implies commitment and *confess* implies admitting a fault, which signal internal states like intention or guilt). These subtleties mean that while the surface action (speaking) is public, understanding the full implications can require mind-reading of the speaker's goals or sincerity. They are actions *of* communication, socially visible and usually taken at face value in terms of occurrence (if Dan promised something, we all heard the promise). The cognitive effort here mostly involves interpreting *how* the speech act was meant (pragmatics), rather than wondering *whether an act occurred* or *what content is in the subject's mind* — the content is overtly expressed. Empirical work in discourse analysis supports this placement: even individuals with autism (who typically struggle with inferring mental states) often handle

direct speech quotations well in narratives (Stirling et al. 2009), suggesting that reporting *what someone said* poses less PT challenge than reporting *what someone privately thought*. Several studies, including Tager-Flusberg & Sullivan (1995), Brown et al. (2012), and Geelhand et al. (2020), found that autistic and neurotypical children were equally competent in using social, modal, and evaluative terms when telling stories. However, describing characters' unspoken thoughts proved to be more challenging for the first cohort. This contrast underscores that speech act predicates, being public events, require a lower threshold of mindreading.

Level 5: External Public Actions. At the far end of the continuum are predicates describing purely observable behaviours or events with no direct mental content in the description that earlier were mentioned as pertaining to the public domain. These are ordinary action verbs or event verbs: *run, eat, kick, build, laugh, cry (action), pick up, drive*, etc. Such predicates refer to what an outside observer can directly see or hear without needing inside knowledge. For example:

(25)   Emma kicked the ball.

(26)   Frank is laughing.

Everyone present can perceive these actions. PT effort is minimal here in terms of ascertaining what happened, because the information is available through standard perception. These predicates are thus firmly in the public domain. However, I note that even observable actions can involve subtle perspective considerations: actions can imply intentions or emotions (*laugh* might imply joy, *cry* might imply sadness — though *cry* as an action can also be a deliberate performance or caused by wind in one's eyes, etc.). But crucially, the verb itself in this category does not encode the perspective or mental state. Compared to all earlier levels, Level 5 predicates place the least cognitive load on PT processes because they deal with the objective layer of an event (what physically transpired) rather than the subjective layer (why or how it was experienced). This is reflected in language development and clinical observations (Capps 2000; Ronfard & Harris 2014): children describe actions earlier and more easily than thoughts or feelings, and individuals with theory-of-mind deficits often focus on describing visible behaviors in narratives while omitting internal motivations. In sum, public action verbs anchor the continuum's extreme where information is maximally shared and verifiable in the immediate context, requiring minimal mental state inference to understand the predicate. Thus, this extreme level does not signify **actual PT occurrence,** but rather **merely the linguistic expression of a perspective** of another person.

4.1. Partial ordering note

The above levels are arranged from most private (Level 1) to most public (Level 5). I should stress that this is a conceptual continuum, but some predicates might not slot neatly into a single linear hierarchy. Thus, a strict total order may give way to a **partial ordering**. For instance, are emotions (Level 2) **always** more accessible than knowledge states (Level 3)? It may depend on context and specific verbs. This gradations serve as a useful heuristic, but certain predicates

could be ordered differently on a different scale. For example, *see* (a perception verb) is an interesting borderline case: seeing is a private sensory experience (only I directly see what I see), yet it's caused by an external stimulus and others can usually tell if I am looking at something. One might place *see* between Levels 3 and 4 (internal perception but with an external target), illustrating that not every verb falls strictly into one slot. Thus, consider the continuum a flexible **partial ordering by degree of "innerness",** rather than an absolute ranking.

In sum, the line between "private" and "public" predicates is not fixed – context and **epistemic accessibility** can shift how a predicate is interpreted on the private-public scale. In other words, a predicate typically classed as private may appear more public in a context where evidence for it is readily available, and vice versa.

5. Conclusion

According to Sanders and Spooren (1997), all utterances are inherently subjective and involve two types of perspectivity: *subjectification* and *perspectivisation*. Each type is associated with specific linguistic markers that signal the nature of perspectivity involved. *Subjectification* refers to the speaker's attitude towards information attributed to others, while *perspectivisation* relates more directly to the process of PT itself, as it entails adopting another individual's point of view.

Having outlined several issues within the field of attribution semantics, I concluded that predicates of mental states function as key indicators of this perspectivising process. Within this class, subgroups such as predicates of utterance and predicates of cognition reveal perspectivisation in distinct ways. It has been shown that perspectivity in language is a twofold phenomenon. On the one hand, through world-creating predicates of utterance, the speaker conveys another's perspective without necessarily adopting it. In such cases, the speaker merely reports an observable act (e.g. an utterance), which belongs to the public domain and therefore requires no perspectival shift.

On the other hand, when employing predicates of cognition, the speaker is compelled to adopt the other's perspective, as attributing a mental state necessitates an effort to simulate the agent's point of view. Mental states are not directly accessible; they belong to the private domain of the individual. Hence, for the speaker to accurately ascribe a mental state, they must attempt to see the world from that individual's perspective.

Thus, two dimensions of the PT process emerge: the *expression* of perspectivity and the *occurrence* of PT. The distinction between these aspects has been explored. Taking someone's perspective involves metaphorically "putting oneself in the other's shoes", while expressing someone's perspective consists merely in reporting information attributed to another party. Notably, predicates of cognition may shift their function depending on contextual factors: from signalling an actual perspectival shift to simply expressing perspectivity. The context determines whether the predicate remains within the private domain or moves towards the public one, thereby allowing us to classify it as an indicator of one of these two aspects.

To further refine this distinction, a five-level partial ordering has been proposed, mapping predicates along a continuum from the private to the public domain. This taxonomy

serves as a heuristic for capturing nuanced differences in perspectivity, illustrating that not all predicates fit neatly into binary categories. By introducing interim levels, the scale accounts for predicates that lie between fully internal mental states and externally observable acts, thereby offering a more fine-grained tool for identifying where actual PT process occurs and where perspectivity is merely expressed.

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"Bloody + Emotions" – An Investigation into the Australian Exclamations and Expletives

Małgorzata Szymańska
University of Zielona Góra, Poland

Abstract

Australian variety of English is known as very informal, often associated and even synonymous with slang. Hunter (2004: 5) wrote that Australians tend to be informal in their speech and behaviour, and one aspect of this informality is the extensive usage of slang.

One of the most prominent indicators of this informality is the adjective *bloody* used as an element of an everyday speech as a component of various compounds to intensify the speaker's message or in numerous exclamations.

The purpose of this paper is to present the partial results of a survey carried out among young Australian Speakers with a view to investigating the case of *bloody* used as an intensifier, expletive and a part of a compound as well as to present other expletives and exclamations in current use.

The study sheds light on the most typical compounds used in exclamations as well as on the current state of *bloody* in comparison with other expletives.

Keywords: Australian; bloody; expletive; emotions; context

1. Introduction

In the early beginnings of the convict settlement in Australia, Australian variety of English was perceived as a "corrupt" variety (Baker 1978: 3) in which "nasal twang" was a common feature of speech (Moore 2008: 73), speech that was contaminated with slang – a term that encapsulated any form that diverged from the Standard and was a threat to the "grand imperial English tongue" (Damousi 2014: 76).

Furthermore, early accounts of the English language in Australia point to another characteristic trait which was vulgarity. William Kelly – the author of *Life in Victoria* (1859), felt obliged to apologize for the use of the word *bloody*, explaining that "general conversation amongst the middle and lower classes at the antipodes is always highly seasoned with it" (Kelly 1859: 54). Similarly, H.W. Haygarth – the author of *Bush Life in Australia* (1848),

claimed that "profane swearing prevails throughout the interior of New South Wales to an extent hardly conceivable, but by those who have not actually witnessed [sic] it" (cited in Baker 1978: 195).

The features of Australian English that were distinguished in the beginning of English in Australia, namely slang, frequent swearing, the Great Australian Adjective, remained a significant part of Australian English and in time were presented as the key characteristics setting Australian English apart.

Moreover, Australian vernacular is often synonymous with slang. Baker (1941, citedy by Moore 2014: 95) states that "[s]lang is too small a word to describe the evolution of a new way of speaking, of a national idiom". Furthermore, Delbridge (2001: 314) states that slang and colloquialisms are the key and most characteristic elements "in the Australianness of AusE". Lastly, Coleman (2012: 218) summarizes that "Australian English is, by its nature, so informal that it's impossible to distinguish meaningfully between slang and colloquialisms, while popular writers often label all distinctively Australian words (and sometimes also pronunciations and grammatical features) as slang".

The synonymity of slang and Australian English resultued in the abundance of dictionaries (e.g. Hunter 2004; Rowe 2005; Lambert 2008), presenting the most characteristic Australian English expressions. Unfortunately, they rarely remark on the actual frequency of use of these phrases.

Therefore, the aim of this paper is to present the case of the Great Australian Adjective used as an intensifier, expletive and a part of a compount to voice different emotions as well as to present other expletives and exclamations in current use. The data presented are an excerpt of a larger study on varoius phrases and expressions perceived as typical or even stereotypical of the Australian variety of English. The paper is organized as follows: in Section 2 I substantiate the claim that swearing is an inherent feature of Austalian English, in Section 3 the research methodology is presented and the results are given in Section 4. Section 5 gives the conclusions.

2. Swearing and the Australian variety of English

Swearing has been a significant feature of the Australian variety of English to such an extent that the first sentence describing *Australia* in Hughes' *An Encyclopedia of Swearing* (2006: 13) states that "[o]f all the global varieties of English, the Australian is most noted for the liberal use of swearing and profane language". Furthermore, Laugesen in her recent book entitled *Australia in 100 Words* states that swearing is common across all languages, but "Australians are renowned for being skilled in the art" (Laugesen 2024: 155).

The unparalleled proclivity towards swearing reflects the convict origins of the English settlement in Australia where the majority of convicts came from the London area (Fritz 2007: 20). Their dialect held prestige in the colony, forcing the newcomers to adapt and adopt the local speech. In the words of Rev. Polehampton:

> [a]s swearing is an unusually common habit among the colonists new arrivals often endeavour, and must successfully, too, to become proficient in this early acquired art, and soon add the stock of oaths peculiar to the colony (and very peculiar some of them are) to the "home" vocabulary.
>
> (Rev. A. Polehampton 1862 cited in Baker 1978: 194)

The oaths used by the convicts "commonly included curses such as damn, bloody, and bastard" (Laugesen 2024: 156). Since then the perception of taboo has changed and phrases that were considered blasphemous are devoid of that trait. Swearing has become more secular-oriented to subsequently relate more frequently to bodily functions (Allan and Burridge 2006: 106). The culminating point of modern foul language has been the *f-word*, which also began to appear on television in various collocations (Allan and Burridge 2006: 106).

Swearing involves the use of taboo "in insults, epithets, and expletives" to release in a cathartic manner the tension related with the feelings of anger, frustration or in a situation where the speaker is surprised by something (Hughes 2006: 7; Allan and Burridge 2009: 362).

Various scholars point to a particular inclination of Australians towards the use of the "four Bs", namely *bloody, bugger, bastard* and *bullshit* (Baker 1978, Laugesen 2024). Although these words are not of Australian coinage and are used in other English-speaking countries, they have a particular resonance in Australia.

Wierzbicka (1997: 217) states that these words are "an important means of self-expression, self-identification, and effective communication with others" whereas Laugesen (2024: 156) mentions that the four Bs have "become closely identified with Australian ways of swearing, and often expressing Australian attitudes to life".

The presence of *bloody* and the intensity of its use among the first English settlers in Australia have been commented on in the early recollections of English visitors coming to Australia. Although Wilkes (2008: 36) states that *bloody* is "by no means distinctively Australian, but has always been conspicuous enough in the colloquial language to be seen as such by overseas visitors", it was noted in *Travels in New South Wales* by Alexander Marjoribanks that "the word bloody is the favourite oath in that country" (Marjoribanks 1847: 57-58). Marjoribanks even went as far as to count the number of times *bloody* would have been used in the course of life of a bullock driver the writer had the doubtful pleasure of meeting and the result was astonishing – the bullock driver would have used this "disgusting word" 18,200,000 times (Marjoribanks 1847: 58).

Burridge (2005: 126) claims that *bloody* was falsely derived from an oath *By our Lady* and, therefore, associated with taboo and bad language. Butler (2009: 29) supports this view and presents evidence indicating that in the beginning *bloody* served simply as an adjective. The negative connotations associated with the word were further fostered by the structure of the early Australian society and the frequent use of the word among the inferior and unwanted class – the convicts.

Regardless of the true origins of *bloody* as taboo, Burridge (2005: 126) points out that "linguistic truth isn't an issue here – speakers' perceptions are what matters. So *bloody* became unmentionable, often rendered invisible".

Despite the fact that nowadays *bloody* is used mostly as an intensifier (Collins 2012: 77), Wierzbicka (1997: 220) believes that

[t]he "great Australian adjective" epitomizes some of the characteristic features of the traditional Australian ethos, and in particular, unwillingness to describe feelings and the tendency to say "bad things" and to use "bad words" – not only to express negative opinions and negative feelings but also to express "good feelings." It epitomizes the traditional Australian cult of "toughness" and rebelliousness.

Lambert (2008: 9), on the other hand, strips *bloody* of all its glory ascribed by Wierzbicka by stating that it became a "weary, worn-out, ageing prize fighter, no longer packing a punch. Lost its championship belt to that vicious upstart, the F-word, back in the 1960s".

Although the views on *bloody* may vary, it became the reason of a heated debate in 2006 when Australia Tourism decided to incorporate it in their tourism campaign commercial which relied heavily on stereotypes related to Australia. The commercial ended with a punchline "So where the bloody hell are you?". Unfortunately, the commercial met with severe criticism in the United Kingdom and was banned as a result. The ban was subsequently lifted but the commercial was allowed to be aired only after watershed. However, the British Advertising Standards Authority decided the punchline was too offensive and required all the billboards along the motorways in the UK to be removed[1].

3. Method

In 2018, a total of 1,017 respondents were surveyed in a sociolinguistic study entitled the "Aussie Slang Survey", the aim of which was to verify whether phrases presented as prime examples of Australian slang are still in use among Australians. To that end, an online questionnaire composed of 41 questions was disseminated among Australian students gathered in university community social media groups[2].

The choice of young adults as the target group of the research was dictated by the fact that despite taking up the responsibilities that come along with adulthood, they are the best ambassadors of Australian English due to their increased mobility. Young adults participate in student exchange programs that give them the opportunity to not only study at a different university in Australia but to continue their studies abroad. They travel and at the same time they promote Australian English simply by using it.

The majority of the respondents (70%) were females aged between 18 and 24 years old (66%). The respondents were predominantly high school graduates enrolled in their bachelor's degree studies (37%) or students who had already obtained their bachelor's degree (42%). Furthermore, 98% of the respondents confirmed to be domestic students whose primary language was English (97%)[3].

Unsurprisingly, the majority of the participants came from those areas of Australia where the population density is the highest, i.e. Victoria (46.51%), New South Wales (29.3%), and

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[1]   Available at https://web.archive.org/web/20160315091147/http://www.smh.com.au/news/travel/bloody-ad-ban-incredibly-ludicrous/2007/03/28/1174761533507.html

[2]   Research carried out for the purpose of my Doctoral Dissertation: Szymańska, M. 2022. G'day Mate! A Sociolinguistic Study of Australian Slang. Ph.D. diss., Wrocław, University of Wrocław.

[3]   The aim of questions regarding student type (domestic or international) and primary language was to differentiate between Australians and foreign students participating in a student exchange programs.

Queensland (13.77%). The remaining states were represented by fewer participants, *i.e.* Western Australia (5.8%), South Australia and Australian Capital Territory 1.67% each, Tasmania (0.59%) and Northern Territory (0.39%).

The survey focused on 23 phrases that were divided into four categories representing features of everyday communication, namely greetings (e.g. *G'day* or *How're you going?)*, forms of address (such as *cobber, digger, mate, etc.*), exclamations (e.g. *bloody oath, bugger, crikey, stone the crows*) and farewells (e.g. *hooray, hooroo*). The expressions and their definitions were taken from *Macquarie Best Aussie Slang* (Lambert 2008) with permission of the Macquarie Dictionary Publishers an imprint of Pan Macmillan Australia PTY LTD.

In order to allocate the phrases listed in *Macquarie Best Aussie Slang* (2008) to each category, the definitions and explanations of the phrases had to contain certain keywords, specifically: 'greetings', 'address' (and its derivative forms), 'exclamation' (including its derivative forms and/or an exclamation mark), and 'goodbye'.

In each part of the questionnaire, the respondents were asked whether they regarded the phrases in question as being in current use, if and with what frequency they used the phrases, and what were the connotations a phrase evoked. Furthermore, the participants were asked about the acceptability of the use of a phrase depending on the level of formality in a given context.

The structure of the questionnaire allowed the respondents to go back to the previous questions if need be or to proceed forward without forcing them to provide an answer, as this solution negates the rule of voluntariness and results in a higher dropout rate (Dillman et al. 1998: 11; Décieux et al. 2015: 311).

The respondents were able to navigate their progress on a progress bar visible throughout the entirety of the questionnaire. This is a common practice used in online questionnaires that allows for a further decrease in dropout rate (Dillman et al. 1998: 12). Furthermore, each section of the survey was preceded by a short introduction informing the respondents about their task and the time required to complete that section.

The survey design encouraged the participants to provide their comments on individual phrases.

3.1. *Bloody + emotions*

The question related to the use of *bloody* as an intensifier across a range of emotions was included in the section devoted to exclamations.

The respondents were asked to provide the second element of a compound containing *bloody* with regard to 13 emotional states (see Figure 1. below). There was no limit on the number of options one respondent could provide for each emotion.

24. From what I hear, **bloody** is a category in itself ;) What words do you usually use in combination with **bloody** to express:

	bloody + a word of your choice!
sadness	
anger	
fear	
exasperation	
annoyance	
condescension	
disapproval	
irony	
surprise	
amazement	
approval	
joy	
happiness	

Figure 1: Question 24

In addition, the respondents could refrain from providing answers to every emotion listed in the question and focus instead on contributing compounds for emotional states of their choice.

3.2. Insight into other common expletives

The participants were also asked to provide their own responses regarding phrases, exclamations used in an informal conversation to emphasise a statement. This open question encouraged the respondents to state their preferred options without any constraints and without placing *bloody* in the centre of attention. The aim of this question was to investigate which phrases are at present dominant in informal conversation among Australian young adults.

28. What phrases, exclamations do you and your friends use in an <u>informal</u> conversation to emphasise your statement?

Figure 2: Question 28

Furthermore, the participants were asked to provide their preferred alternatives to *damn*. This question served the purpose of verifying whether *damn* is indeed synonymous with *bugger* as it is indicated by Lambert (2008: 15): "4. as an exclamation, damn! blast! As in *Bugger him, I'm going home*. Or when you drop your Vegemite toast and it lands face down on the floor, *Bugger!*"

Although the question had a different purpose, the obtained results shed light on the current preferences regarding the choice of intensifiers and expletives.

4. Results

The number of responses provided by the participants differed across the emotions listed; however, it is clearly visible from Table 1. that the respondents contributed significantly more options when expressing anger (723).

Table 1: Number of responses and compounds per emotion

	sadness	anger	fear	exasperation	annoyance	condescension	disapproval	irony	surprise	amazement	approval	joy	happiness
responses	495	723	490	569	647	401	481	342	516	514	453	411	438
compounds	51	51	42	59	59	65	68	58	47	51	48	47	49

Every answer given by the respondents was carefully analysed and the options provided were subsequently categorised. Therefore, the total number of compounds used when conveying, for example, anger was only 51 even though the number of responses was the highest for this emotion. The sum of compounds found to indicate annoyance and exasperation was 59 (each) and irony – 58. Surprisingly, the largest number of compounds was found with regard to voicing disapproval and condescension (68 and 65 respectively). The number of *bloody* compounds for the remaining emotions oscillated between 42 and 51.

As seen in Table 2. *bloody hell* is used to express every emotion. It is the most dominant and at the same time the most versatile exclamation. It is worth noting that the gap between *bloody hell* and a compound with the second highest score is incomparable. Nevertheless, *bloody oath* seems to be applicable to voice several emotions as well, as it received the second highest score.

Although the focus was placed on the three most numerous options of compounds, *bloody ripper* (22) is an interesting form that could be investigated further.

Table 2: The most common compounds and their count

	bloody hell		
sadness	310	sad (23)	awful (17)
anger	557	idiot (23)	pissed off (15)
fear	379	scared (25)	scary (16)
exasperation	473	oath (18)	idiot (7)
annoyance	506	idiot (24)	annoying (20)
condescension	204	idiot (63)	dickhead (11)
disapproval	284	idiot (54)	dickhead (14)
irony	181	oath (25)	great (12)
surprise	414	oath (28)	good (5)
amazement	344	oath (45)	amazing (24)
approval	143	oath (94)	great (19)
joy	147	oath (57)	good (34)	ripper (22)
happiness	152	oath (56)	awesome (28)

There were a few instructive comments among the responses as well. The authors of these statements suggested that, if used to express anger, the phrases containing *bloody* could be directed at a person, to insult them (the orthography and punctuation are given in their original version):

(27) a. *(insult - eg bloody poms. used semi jokingly) or hell*
      b. *any sort of expletive if directed at someone, e.g. cunt, dickhead etc.*
      c. *bloody is sometimes used in place of 'f*cking'. It's used to emphasise something in anger, exasperation or annoyance - usually*

Furthermore, the respondents signalled that non-linguistic communication devices, *i.e.* facial expression, are important in conveying the intended meaning (2b). Moreover, they also provided the context in which a certain exclamation could be used while voicing their annoyance (2c).

(28) a. *bloody hell! what is his problem?*
      b. *Bloody hell! (With an angry facial expression.)*
      c. *shit (as an adjective e.g it'a so bloody shit that I have to go to work tomorrow*

The participants were asked to further provide those exclamations that they use among their friends to intensify their statement, to which 695 respondents decided to provide an answer. Subsequently, the phrases were classified into 370 variants that were further grouped into nine main categories. In categorising the variants the following factors were taken into account: a keyword inthe phrase, i.e. the *f-word*; a reference to religious terms or name-calling. Items that were not otherwise allocated, were labelled as 'general'.

The first category concerns the word *bloody* and it included 16 phrases. The most frequently mentioned was *bloody* itself (111), followed by *bloody hell* (50) and *bloody oath* (14). The category of *f-word* phrases was nearly twice as large as the *bloody* category. Out of 30 variants, the most frequently mentioned exclamations were *fucking* (96) and *fuck* (81). Moreover, also popular in this category were euphemistic versions of the *f-word*, namely *freaking* (28) and *far out* (24).

The respondents were keen to provide additional information on the manner in which to emphasise a statement. A few respondents indicated that the level of formality is of importance when choosing a phrase for emphasis (3a and 3b) or that the use of a swear word is just the Australian way (3c and 3d).

(29) a. *Well, depends on how well I know the person... Person I know well or is a friend: 'f*cking' Person I don't know well or is a work colleague: 'freaking' or 'friggin''*
      b. *Mostly swear words which are the most typical Aussie thing, fucking hell, or "that's fucked" are the most common ways of emphasising something, they're used in most informal situations and some people, including myself, tend to swear a lot even in more formal situations*
      c. *Kind of a broad question.*
          We swear a lot. Typically the choice to emphasis things is 'fuck' or 'fucking.' When we're being particularly forceful we might say, 'Don't be a dumbcunt' or 'Don't be a shitcunt.'
      d. *Australians love the word fuck.*
          Fuck!
          Fits any situation

Another group of phrases used to intensify a statement within the more informal context that centre around a single word, is the group consisting the word *shit.* This was also the most frequently indicated choice (33) by the respondents. The second most favoured exclamation was *holy shit* mentioned by 20 participants. Other phrases indicated by the respondents were *no shit* (8) and *I shit you not* (7).

Although the remaining exclamations in this category were mentioned only once or twice, a few of them were quite interesting, for example *shittin ducks*, *up shit creek without a paddle*, *shithouse* or *sure as shit.*

Several participants provided a more detailed response in which they indicated other common exclamations and their meaning (4a) or differentiated between conveying a positive or negative message (4b).

(30) a. *'I shit you not...' Is commonly used. I don't personally say this but its very commonly used as an alternative to 'I'm not joking'*

b. *Typically I rely more on tone or hand movement, it would depend on what I was emphasising, for example something negative would likely be emphasised with 'bloody hell' or 'shit' whereas something positive would more likely be emphasised with 'woah'.*

The respondents confirmed the preference towards the *f-word* and *shit* as the chosen intensifiers and expletives when asked to provide an alternative to *damn.*

Although the purpose of this question was to investigate whether the respondents would indicate *bugger* as the favoured substitute, the results show that out of 953 comments, *bugger* appeared only 231 times. This number of instances is still significantly higher than the number of comments in which the respondents chose *bloody* (11) or *bloody hell* (106) as alternatives to *damn.*

Furthermore, out of 130 identified phrases, the one phrase that alone was mentioned 412 times was *shit.* The second most frequently suggested option was *fuck* (382). Interestingly, it is the *f-word* and its derivatives that comprise the largest group of phrases consisting of 22 variants mentioned in a total of 522 responses.

The participants provided also an insight into the use of swearwords that may be considered as alternatives to *damn* (5a) or even referred to celebrities using and promoting Aussie Lingo (5b).

(31) a. *shit, damn, aw fuck, fuckin hell, bloody hell, aw piss off, aw fuck off, what the fuck, what the shit, fuckin shit, (please note, there is no g in fuckin because we don't say it, a common thing in Australian English is we omit saying the g in 'ing' ending words)*

b. *Fuck! Also you should look up Nick Cummins if you haven't already because he says the most outrageous Australian things*

c. *Bugger. However aussies swear a lot so often they are used instead of damn.*

d. *"Damn it, or a curse word like f it or f*
Most aussie will use a curse word"

e. *Would rather not right on a survey hahaha*

The above results may indicate a shift towards less Australian-specific terms. However, this change should be studied further.

5. Conclusions

The Australian variety of English, like every language, evolves and undergoes constant changes, where new linguistic forms appear and others become obsolete. The results of the study carried out on more than a thousand respondents provide a novel and valuable insight into the correlation between the expression of emotions and the use of compounds containing the Great Australian Adjective. Moreover, the study cross-examined the status of *bloody* against other expletives indicated by the Australian young adults.

The study on Aussie slang shows that *bloody* – the hallmark of Australian English, remains in current use. Furthermore, the study found that *bloody hell* is the most favoured exclamation when expressing both positive or negative emotions. In addition, the respondents pointed out that they use insults as terms of endearment in the case of positive emotions, but when *bloody* is used to express a negative emotion with a word like *idiot* or *dickhead*, it is intended to offend or intimidate a person. Of course, the tone of voice is crucial in every case.

These findings seem to correlate with views presented by Burridge (2010: 131) who stated that *bloody* as an intensifier "may simply be a marker of excitement or exuberance". Wierzbicka (1997: 219) also claims that *bloody* is not "restricted to negative feelings" – it can also serve to convey admiration or other positive feelings. According to other linguists (e.g. Hughes 2006: 34), the versatility of *bloody* is due to the "loss of intensity" as a result of its overuse. Nevertheless, the results indicate that, even if *bloody* has lost in its intensity, it is a well-established expression in the Australian everyday speech.

Although *bloody* is still present in the speech of young Australian adults, depending on the context and level of formality, it slightly gives way to other forms such as the *f-word* or *shit*, common in other English-speaking countries.

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The CIPP-TRS Corpus: Corpus Construction and Preliminary Analyses

Laura Tagliaferro[1], Ludovica Fiorentino[1], Raffaele Guarasci[2], Luigi Franzese[3], Viviana Maria Saia[3], Giancarlo Spennato[3], Felice Iasevoli[3], Roberto Vitelli[3], Andrea de Bartolomeis[3], Francesca M. Dovetto[1]

[1]DSU, University of Naples Federico II; [2]ICAR-CNR; [3]Department of Psychiatry, University of Naples Federico II, Italy

Abstract

Schizophrenia, a neurodevelopmental disorder, significantly affects cognitive and linguistic functions, often resulting in disorganized speech, reduced syntactic complexity, and impaired discourse cohesion. While previous corpora have explored linguistic disruptions in schizophrenia, no dataset has systematically distinguished between treatment-resistant schizophrenia (TRS) and non-treatment-resistant (non-TRS) speech patterns. This study presents the CIPP-TRS Corpus, an annotated collection of transcribed speech from 20 individuals with schizophrenia (10 TRS, 10 non-TRS), alongside a control group of 10 neurotypical speakers. By analyzing peri-linguistic (e.g., interjections, pauses) and paralinguistic (e.g., breath patterns, output modalities) features, we investigate the linguistic manifestations of schizophrenia across these subgroups. Our preliminary findings suggest that TRS patients exhibit richer peri-linguistic markers, and increased hesitation phenomena, while non-TRS patients demonstrate greater lexical retrieval difficulties. Moreover, TRS individuals struggle more with temporal processing, particularly when recalling past events or engaging with past retellings, reinforcing theories on Theory of Mind (ToM) impairments and lived-time disturbances in schizophrenia. The CIPP-TRS Corpus represents a crucial step toward identifying linguistic biomarkers of schizophrenia and its treatment-resistant subtype. Future research will expand the dataset and incorporate prosodic, syntactic, and pragmatic analyses to refine our understanding of speech pathology in schizophrenia, with potential applications in clinical diagnostics and therapeutic interventions.

Keywords: Schizophrenia; treatment-resistant; corpus linguistics; disfluencies; lived time

1. Introduction

In recent years, research on schizophrenia has increasingly focused on the complex relationship between language symptoms and illness itself. Language disturbances, including disorganized speech and difficulties in coherence, have raised important questions about their

role in diagnosis, symptom progression, and underlying cognitive mechanisms (de Boer et al. 2020).

Despite this, research focusing on Italian remains limited (Dovetto & Gemelli 2013; Pennisi 1998, 2022). To address this gap, this study presents and analyzes the CIPP-TRS Corpus (*Italian Corpus of Patients with Treatment-Resistant Schizophrenia*), which comprises spoken interviews with both treatment-resistant (TRS) and non-treatment-resistant (non-TRS) patients. Language abnormalities affect up to 80% of individuals with schizophrenia, impacting multiple levels of linguistic structure — semantics, syntax, phonology — and ultimately leading to significant pragmatic difficulties. These challenges manifest as alogia, poverty of speech, increased pausing, monotone speech, tangentiality, derailment, and reduced coherence. The resulting communicative impairments can hinder the ability to establish and maintain social relationships, often contributing to social withdrawal and isolation.

TRS accounts for about 30% of schizophrenia cases, significantly impacting both patients and caregivers (de Bartolomeis et al. 2022). In this regard, the CIPP-TRS breaks new ground by being the first to systematically distinguish between TRS and non-TRS speech patterns. This distinction is not just a methodological novelty; it is a crucial step toward understanding the linguistic markers of TRS, paving the way for improved diagnostics, tailored therapeutic strategies, and deeper insights into the cognitive and communicative disruptions unique to this population. As in many areas of theoretical and computational linguistics, the scarcity of resources poses a significant challenge, particularly in specialized domains. To bridge this gap, we developed the CIPP-TRS Corpus from scratch, ensuring a structured, annotated, and linguistically rich dataset for both clinical and computational applications. Notably, this corpus is the first to systematically differentiate between TRS and non-TRS speech patterns— a methodological advancement with critical implications. By identifying the linguistic markers specific to TRS, this work lays the foundation for improved diagnostics, tailored therapeutic strategies, and a deeper understanding of the cognitive and communicative disruptions characteristic of this patient population. Among the linguistic features, in this study we particularly took into account traits denoting a difficulty in speech programming, such as paralinguistic and peri-linguistic indicators (De Mauro 2008), and the presence of pauses.

Our hypotheses are that (a) TRS shows more fragmented discourse and richer peri-linguistic and paralinguistic phenomena, and that (b) pauses are more present in TRS patients due to the severity of their condition. Moreover, literature widely documents a difficulty in moving across the line of time (Minkowski 2004), which can directly signify that questions regarding future and/or hypothetical events could be deemed as challenging for patients.

The first part of the analysis will examine peri- and paralinguistic phenomena, which involve elements pertaining to oral language-systems with a focus on interjections 'eh' and 'beh' as expressions of discourse-related fillers. These elements may indicate programming difficulties in speech or function as emotionally driven markers reflecting heightened speaker involvement. Additionally, we provide a preliminary investigation into silent pauses as potential indicators of hesitation, particularly in relation to patients' ability to envision themselves in past situations.

2. Aim and research questions

This study aims to identify potential differences between two patient groups, namely treatment resistant patients (TRS) and non-treatment resistant patients (non-TRS), by comparing their linguistic patterns to a healthy control group (HC). By incorporating both qualitative and quantitative analyses, the research seeks to provide a comprehensive understanding of how linguistic markers vary across these populations.

The research aims to answer different questions:

a) Are there substantial differences in the language production of the two groups of patients, namely TRS and non-TRS compared with the HC group? If so, are there substantial differences involving the production of peri-linguistic and paralinguistic phenomena in the three groups examined?

b) Is there a most frequent occurrence of specific type of interjection? Are there some recurrent patterns?

c) Are pauses, as important predictors of difficulties and dysfunctionality in speech programming, more frequent in the TRS group?

3. Background and related works

Schizophrenia is a chronic and complex brain disorder with a multifactorial etiology, affecting approximately 24 million people worldwide (WHO 2022). In particular, treatment-resistant schizophrenia (TRS) occurs in 30% of patients, persisting despite at least two adequate trials of antipsychotic medication (Potkin et al. 2020). TRS is associated with more severe symptoms, greater functional impairment, and a significant burden on patients and caregivers. In such cases, the second-generation antipsychotic clozapine is considered the gold standard treatment, especially for those experiencing neuromotor side effects from other medications.

Considering the two patient cohorts, only one similar study is currently available (de Boer et al. 2020). To date, no other freely available corpus of pathological schizophrenic speech— expertly labeled with linguistic annotation for automatic analysis—is known, except for two projects: the CIPPS Corpus (Dovetto & Gemelli 2013) and the C-ORAL-ESQ Corpus (*Corpus Oral de Esquizofrênicos*) (Raso et al. 2023). Particularly in relation to the CIPPS Corpus, various analyses were conducted considering pragmatical to interactional approaches (Dovetto & Gemelli 2013). Other studies like Pennisi (1998, 2022) offered an interdisciplinary approach that integrates linguistic, cognitive, and philosophical perspectives. Additionally previous studies focused on pausing patterns as a diagnostic tool for identifying language-related disturbances (Çokal et al. 2019). Furthermore, schizophrenia is linked to cognitive and social impairments, notably deficits in Theory of Mind (ToM) (Doody et al. 1998). Frith (1992) suggested ToM overlaps with pragmatics, which involves interpreting a speaker's intentions through various cues like language, gestures, and expressions. Impairments in these areas complicate understanding non-literal language, such as irony and metaphor (Abu-Akel 1999; Langdon et al. 2002). While the exact impact of ToM deficits on social competence is debated, factors like motivation, interest, and engagement also play a role.

4. Materials and methods

This section illustrates the criteria used for data collection and the annotation process. In particular, the construction of the corpus is described and details concerning the annotation process are motivated. The basic workflow is presented in Figure 1.
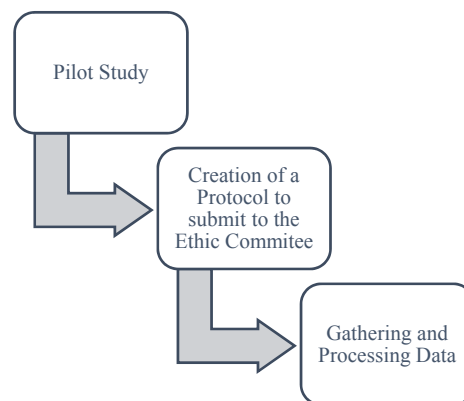
Figure 1: Workflow

4.1. Participants and selection parameters

The sample consisted of three groups of equal numbers of subjects affected with TRS, non-non-TRS, and Italian native-speaking healthy controls (HC). The TRS and non-TRS groups' members are currently being treated at the Department of Neuroscience, Reproductive Sciences, and Odontostomatology, Integrated Department of Clinical care, Section on Psychiatry and Clinical Unit of Psychiatry and Psychology of the Azienda Ospedaliera Universitaria of Federico II, Naples. The individuals who took part in the experiment were aged between 18 and 65 years old with an average of 11.6 years of schooling. All participants signed an informed consent for personal data protection and were assessed using the following assessment procedures:

- PANNS – Positive and Negative Scale
- BACS – Brief Assessment Cognition Schizophrenia Scale
- Mini International Neuropsychiatric Interview (MINI plus) – DSM 5

Patients were evaluated using the PANSS and BACS scales to explore correlations between linguistic abnormalities, symptomatology, and cognitive traits. To rule out underlying psychiatric conditions, the HC group was validated with the MINI Plus scale. Specific inclusion and exclusion criteria were established for both clinical and HC groups as listed below in Table 1.

Table 1: *Inclusion and exclusion criteria adopted to collect data*

Groups	Criteria	
	Inclusion	*Exclusion*
TRS **non-TRS**	1. Subjects aged between 18 and 65 years old. 2. Subjects who provided valid written informed consent. 3. Subjects affected by schizophrenia, both responsive (10 non-TRS) and non-responsive to treatment (10 TRS).	1. The presence of other psychiatric conditions, such as bipolar disorder or major depressive disorder. 2. The presence of organic pathologies that compromise language production and articulation. Suffering from intellectual disability, severe systemic disease (poor prognosis; or having severe disability), psychiatric condition secondary to general medical condition or substance abuse. 3. Failure to provide informed consent.
HC	1. Subjects aged between 18 and 65 years old. 2. Subjects who provided valid written informed consent. 3. Subjects who do not have specific psychopathological conditions.	1. The presence of bipolar disorder and depression or other major psychiatric disorders. 2. The presence of diseases that could affect articulation and speech production. 3. Persons with disabilities or suffering from systemic pathologies. 4. Being under the influence of drugs. 5. Failure to provide informed consent.

4.2. Assessing emotional valence in semi-structured interview

We organized a 15-minute semi-structured interview, in which a series of questions from a set of 61 were asked in a randomized order. This project utilized the same materials employed in de Boer and colleagues (2020), whose set of questions was translated and adapted into the Italian language. For their study, the Dutch group considered the set as 'neutral', as the questions concerned general life experiences, underlining that the topics with marked emotional valence such as 'quality of life' and 'health' were avoided.

Before recording, we assessed whether the set was perceived as neutral or emotionally connotated by randomly selected healthy participants from our target population. We created a Google survey where each translated question was followed by six randomized options corresponding to basic emotion, i.e., happiness, anger, surprise, sadness, fear, and no emotion (Ekman 1972), to minimize bias. The survey was completed by 50 students (24 humanities, 26 medical residents), and the results (see Figure 2) indicated that most questions were perceived as emotionally driven, likely due to their tendency to elicit positive memories.
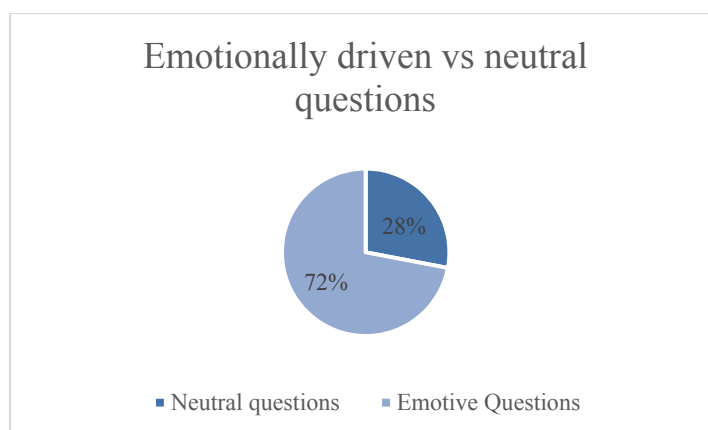
Figure 2: *Results on emotionally driven questions*

4.3. Question optimization for the interview protocol

To determine the optimal order for presenting questions to patients, we examined their nature and structure. Since the questions varied in content, we identified the following topics:

- Hypothetical questions (imaginative unrealistic events)
- Questions regarding the past (i.e., childhood and youth)
- Questions regarding the present with reference to vacation, free time, family, hobbies, work etc.

Since the groups of questions for each topic were different in numbers, we opted to present them in a randomized order for each participant in order to prevent potential biases related to question sequencing. The randomization was performed on excel and each question was treated as a path to follow.

When the interviewee seemed particularly engaged in responding to a given question, the interviewer deemed it necessary to ask for more information that could not be explicitly found in the questions' list. For instance, if the interviewee said that he practiced another sport like tennis instead of swimming lessons when they were young, along the same course of questions associated this topic, the interviewer would have adapted the subsequent requests for details in further asking *"Ti piaceva fare lezioni di tennis? Perché? Cosa trovavi più difficile? Cosa preferivi di questo sport?"*. This course of action allowed the interview to become more natural and provide something as close as possible to the spontaneity of spoken conversations.

Following de Boer's protocol (2020), the nature of each session as to analyze the interviewees' speech was disclosed after the interview took place.

The recordings took place at the AOU Federico II in a silent room, where the interviewer and interviewee sit opposite each other separated by a desk on which we positioned the recorder[1].

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[1]   We employed recorder Zoom H4n Pro which features high-quality stereo microphones that capture clear and natural audio with a resolution of 24-bit/96kHz.

4.4. Annotation criteria

The starting point for the choices of the current tag set were provided by the experience of the CLIPS and CIPPS Corpus as well as the more recent CIPP-ma (Corpus di Italiano Parlato Patologico della Malattia di Alzheimer [2]). Following analogous Italian corpora of neurotypical and non-neurotypical spontaneous speech allows the comparison of data and can spread some light on pathological speech uses in Italian.

The aim of our investigation was to be able to easily isolate *peri-* as well as *paralinguistic phenomena*. Hence, we opted for a simplification of the tag-names as well as their xml counterparts when applying regular expressions. According to De Mauro's distinction (2008), *peri-linguistic* phenomena involve those elements feebly framed or not-at-all framed within the oral or written language-system. Nonetheless, they are carriers of prosodic cues such as interjections, filled pauses and other disfluency phenomena.

Paralinguistic phenomena are elements that do not belong to language but to other semiotics areas and accompany linguistic production, such as gestures, vocal tone (e.g., screaming, whispering etc.), proxemics, and speech rate. In our study, due to the limitations of voice recordings, we relied on notes from doctors and firsthand observations of the interviews to identify these phenomena. Descriptions of these events were recorded in the "<note> … </note>" section at the end of each turn where the phenomenon occurred.

The phenomena division is reported below in Table 2:

Table 2: Peri- and paralinguistic phenomena

Phenomena	Type	Exempla
Peri-linguistic phenomena	False starts (new planning)	colora+ / a colori (CIPP-TRS, TRSD010)
	Fragmented words	il latte con i cerea+ (CIPPS-TRS, non-TRSF01)
	Repetition of same words	{<repetition> po<oo>r+ portare </repetition>} (CPP-TRS, TRSD01)
	Primary interjections	<ah> <beh>
	Filled pauses	<eeh>, <ehm>
	Empty pauses	<pause dur="0,504s"/>
	Elongations	pa<aa>rla<aa>ndo (CIPP-TRS, non-TRSE)
	Vocal phenomena	i.e., generic phenomena, <vocal>
	Interruption within the lexical word	tem_po<oo> (CIPP-TRS, non-TRSE01)
Paralinguistic phenomena	Laugh, giggle, tongue click, lip smacking, whispering, screaming, inspiration and exhale	Non verbal phenomena that may occur with the enunciative act or interrupt it.

Excerpts from two transcriptions:

F#4: **<inspiration>** Dunque mi piacerebbe parlare se potessi **<inspiration>** con**<nn>** la signora **<ehm>** **<inspiration>** **<eeh>** Giorgia**<aa>** Meloni perché io tendo a destra **<inspiration>** **<lip smacking>** e**<ee>**

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sono**<oo>** **<uu>**un**<nn>** / mi do {**<repetition>** del+ del+ del+ **</repetition>**} dell' *inte_ttuale perché ho scritto pure per**<rr>** questo**<oo>** **<inspiration>** giornale il secolo d' Italia **<pause** <u>dur="0,509s"</u>**/>** **<inspiration>** **<eeh>** mi piacerebbe **<dd>**d+ dialogare con lei**<ii>** rispondere**<ee>** alle sue domande**<ee>** e**<ee>** essere dei suoi insomma **<pause** <u>dur="0,278s"</u>**/>** **<inspiration>** nel mio poco

[Well, I would like to talk, if I could, with miss ehm eeh Giorgia Meloni, because I sway to the right and I am a / I think of myself as an inte_ctual because I wrote for this newspaper Il Secolo d' Italia eeh I would like to converse with her, answer her questions and be one of hers, basically, in my small way]

(CIPP-TRS, non-TRSB01)

G#39: Come ha imparato a nuotare ?
[How did you learn to swim?]

F#40: **<inspiration>** Mio padre **<pause** dur=<u>"1,127s"</u>**/>** **<inspiration>** lui m' ha insegnato a nuotare **<pause** dur=<u>"0,345s"</u>**/>** ma nuotavo bene **<pause** dur=<u>"0,911s"</u>**/>** **<inspiration>** vasche su vasche **<pause** dur=<u>"1,296s"</u>**/>** **<inspiration>** pure cinquanta sessanta vasche alla volta da cinquanta metri **<pause** dur=<u>"0,679s"</u>**/>** **<inspiration>** **<pause** dur=<u>"1,030s"</u>**/>** **<inspiration>** **<pause** dur=<u>"0,713s"</u>**/>** **<eh>** **<pause** dur=<u>"0,798s"</u>**/>** ce ne vuole per farlo mo**<oo>** se n' è scesa tutta la muscolatura non farei manco un chilome+ **<inspiration>** **<vocal>** andavo alla piscina di **<surname>** **<ehm>** **<pause** dur=<u>"0,334s"</u>**/>** **<inspiration>** anni fa **<inspiration>** che poi conobbi anche in un' occasione **<pause** dur=<u>"2,049s"</u>**/>** non è male come persona devo dire la verità , molte volte queste persone**<ee>** **<pause** dur=<u>"0,742s"</u>**/>** **<inspiration>** dello spettacolo sembrano diverse invece**<ee>** fu molto disponibile forse faceva pure i suoi interessi {**<whispering>** inso+ **</whispering>**} **<inspiration>** però **<pause** dur=<u>"0,430s"</u>**/>** **<inspiration>** **<pause** dur=<u>"0,521s"</u>**/>** è una persona educata **<exhale>**

[My father. He taught me to swim but I swam well, tanks upon tanks, even fifty sixty fifty meter tanks at a time, eh it takes a lot to do it my muscle tone has decreased, I wouldn't even do a kilome+ <vocal> I went to the swimming pool of <surname> ehm years ago. I later met him on one occasion too, he's not a bad person, I have to tell the truth, a lot of times these people in the entertainment industry seem different, he was very amicable instead, maybe he was pursuing his own interests basic+]

5. Results

The following section presents the analysis on peri- and paralinguistic phenomena as well as a detailed analysis on interjections and pauses in past questions.

5.1. Peri- and paralinguistic phenomena

The first data that were drawn from our corpus concerned peri- and paralinguistic phenomena as well as pauses in order to evaluate eventual difficulties in planning and discourse management (de Boer et al. 2020). The data extracted from our sample size is shown in Figure 3, where the TRS group shows the percentage of peri-linguistic phenomena on the total token production.

These results may be linked to the concepts of fluency and disfluency (Lickley 2015), as patients' texts contain a higher occurrence of elements that are either loosely integrated or only partially framed within the language system (De Mauro 2008), including disfluencies. While effective communication is often associated with a perfectly structured and smoothly

delivered message, real-life oral interactions are naturally filled with disfluent phenomena, which may—but do not necessarily—lead to conversational breakdowns (Lickley 2015).
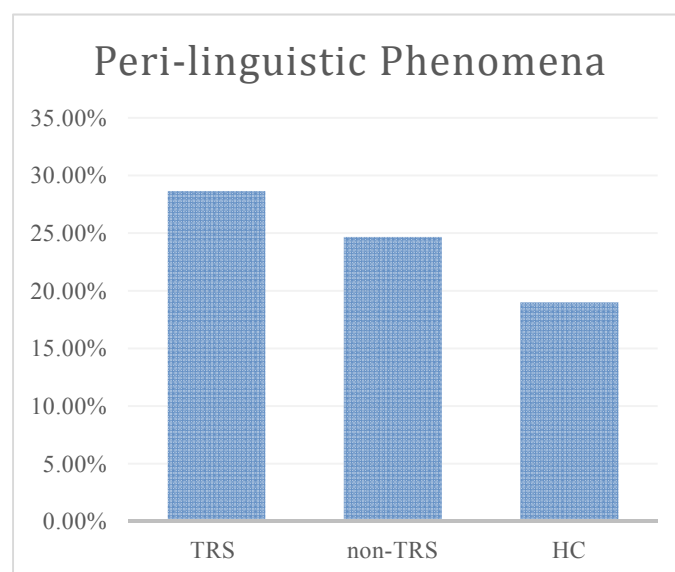
Figure 3: The data were normalized based on a factor of 10, in accordance with the standard technique used in the literature. This normalization allows for a more accurate comparison across different datasets and ensures that the results are not skewed by variations in token production rates.

Note that despite the small sample size due to the difficulty and high cost of time and resources for the acquisition, transcription, and annotation phase, results are promising, considering this is preliminary work. Extracted measures need to be validated on a large scale, but it exceeds the purpose of this work, aiming to validate the methodology.

In order to ensure robust results to validate our methodology, we have taken into account two different statistical tests well-known in the literature, namely Newman-Keuls and Dunnett's tests (Masumi et al. 2024; Dybowski et al. 2025), for they have proven very reliable in comparing small-scale datasets with heterogeneous data (Jiang et al. 2023).

First, we used the Newman-Keuls test as an exploratory follow-up which allows us to examine pairwise comparisons more closely (Table 3). Since Newman-Keuls is less strict than other post hoc tests like Tukey's HSD, it is more sensitive to potential differences that other scales might have missed. This helps us identify trends between groups (TRS, non-TRS, and HC) that could be useful for future research, even if they are not statistically confirmed in this dataset.

Table 3: Neuman-Keuls test, peri-linguistic phenomena

Groups (peri-linguistic phenomena)	Difference	Test Statistic	p-value	Significant
HC vs non-TRS (df = 2)	-267.3333	0.2475	0.8668	*No*
HC vs TRS (df = 3)	-442.0000	0.4092	0.9553	*No*
non-TRS vs TRS (df = 2)	-174.6667	0.1617	0.9128	*No*

Furthermore, we employed Dunnett's test because of the small dataset when comparing multiple groups such as (TRS and non-TRS) to a single control group HC (Table 4). In this

regard, compared to stricter tests like Scheffé's or broader tests like Tukey's HSD, Dunnett's test reduces the chance of false positives while still being sensitive to meaningful differences.

Table 4: *Dunnett's Test, peri-linguistic phenomena*

Group vs. Group (Contrast) (peri-linguistic phenomena)	Difference	Test Statistic	p-value	Significant
non-TRS vs HC	267.3333	0.1750	0.9778	*No*
TRS vs HC	442.0000	0.2893	0.9411	*No*

Neither test yielded statistically significant differences, indicating that the observed variations in our data are not strong enough to be considered meaningful. Interjections are a natural component of normative speech, frequently appearing in everyday communication and serving important pragmatic functions. However, their excessive presence can lead to fragmented discourse, potentially impacting fluency. This phenomenon has been observed in the non-TRS group compared to the HC group and, to an even greater extent, in the TRS group. The increased frequency of interjections in these populations may reflect underlying cognitive or linguistic difficulty, influencing overall speech planning.

5.1.2. Interjections

We conducted a sampling study to determine whether the occurrence of *eh* functions as a discourse-related filler indicating programming difficulty or as an emotionally driven marker reflecting the speaker's heightened involvement in the conversation.

We analyzed all the occurrences of the interjections *eh* and *beh* in a sample made of 50 turns for each group (see Figure 4).
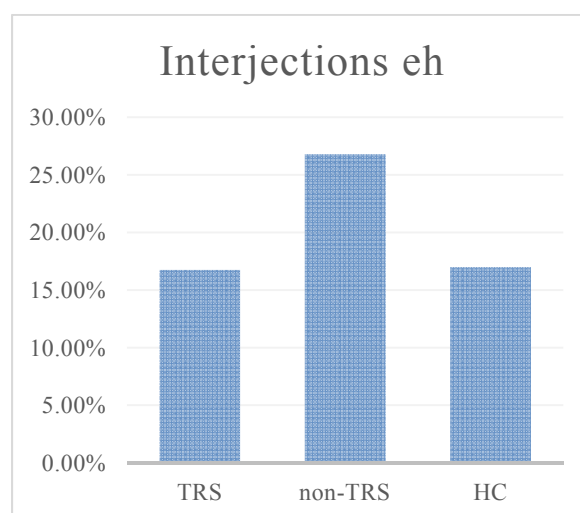
Figure 4: *Interjections eh in 10 TRS, 10 non-TRS and 10 HC percentage on the total interjections produced*

While the three groups tend to produce more *eh* than *beh*, non-TRS group also uses the interjection *eh* more frequently, compared to the other groups. *Eh* is an expression typically linked to a sense of discomfort; when speakers are unsure it's common to hear phrases like

"*eh, non lo so*" [Eng. *eh, I don't know*]. An increased use of *eh* may suggest that patients have difficulty finding words, maintaining a natural flow in their speech, or explaining their ideas. This result is consistent with de Boer et al. (2020) and it may depends on the type of medications which impact the patients' linguistic production.

The non-TRS group produced about 10% more *eh* compared to HCs and TRS.

The totality of the occurrences of <eh> seem to underline a difficulty in discourse planning (Bazzanella 1995). Furthermore, while 67% of the occurrences extracted convey the speaker's emotional load which we associate with a sense of discomfort as reported in the examples below, 33% of cases are used as a filler in order to keep the floor.

(1)   Dime+ / me ne dimentico quindi non sapre+, **eh**, boh credo che mi metterei a posto e poi (devoid of emotional load)
        [Forg+ / I forget about it so I wouldn't kno+ eh, boh that I would settle down]

(2)   Come? *Bi+ *bi+ ehm scusi beauti+ beaut+ beu+ *bi+, **eh**, beautifu+ beaut+ *bi+ *bil+ ehm mi aiuti eh per cortesia (emotional load)
        [What? *Bi+ *bi+ ehm sorry beauti+ beaut+ beu+ *bi+, eh, beautifu+ beaut+ *bi+ *bil+ ehm, help me please]
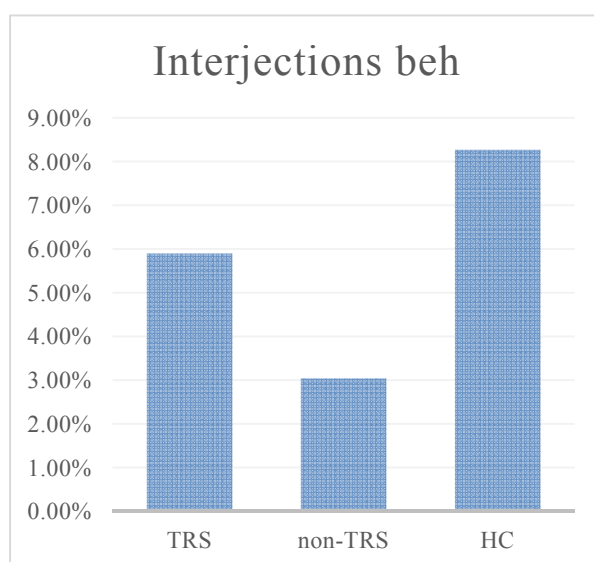
Figure 5: Interjections beh in 10 TRS, 10 non-TRS and 10 HC percentage on the total interjections produced

Poggi's (1995) taxonomy serves as a reference framework for interpreting *beh* as an amplified expression of doubt or hesitation. Bazzanella (1995) theorizes that *beh* reflects the speaker's sense of inadequacy, prompting them to soften their response in terms of relevance, pertinence, and exactness.

The occurrences of <beh> subsume an 'esercitive function', where it holds a clarificatory/explicative value. In the other 15% of cases, the interjection <beh> plays the role of a discourse marker, which signals a brief halt related to indecision or disagreement.

(3)   Mi rallegra mi diverte m+ / *ai *fini mi diverte, **beh**, eeh dottore questa è una domanda da (disagreement related to the fact that the speaker does not know what to say).
        [It lights me up, it cheers me up i+ / *at the *ends it cheers me up **beh**, eeh, doctor this is a question]

(4)   La cosa migliore, la più divertente ? **Beh** ho visto un mio amico che / che sta fuori da tanti anni
        (explicative value).
        [The best thing, the most fun ? Beh, I saw a friend of mine that/ that has been abroad for years]

In contrast, the HC group used *beh* more extensively. As native Italian speakers, we associate *beh* with a moment of word-searching, often followed by clarification or reformulation.

5.2. Silent intervals

While interjections like *eh* can signal a planning difficulty, another common marker of such difficulties is the use of pauses, which serve as a strategic tool for speakers to manage cognitive load and speech production. Silent intervals are reported below. Greater overall production of silent pauses was observed in both groups of patients that can be linked to a disruption in speech production and delayed processing (de Boer et al. 2020; Çokal et al. 2019).

In particular, the non-TRS group shows higher numbers in terms of production of both short silent pauses and long silent pauses, which could be related to a difficulty in lexical retrieval (Allen et al. 1993) as widely documented within the pathology, as well as an overall sense of uncertainty.

Notably, our findings indicate a higher occurrence of pauses within the non-TRS group, reinforcing their connection to speech planning disruptions.

Distribution of pauses

	TOT Pauses	Short Pauses (SP)	Long Pauses >1 sec.(LP)	Filled Pauses
TRS	37.28%	26.94%	10.22%	10.29%
non-TRS	42.33%	28.09%	14.18%	10.28%
HC	36.36%	25.19%	11.14%	14.33%
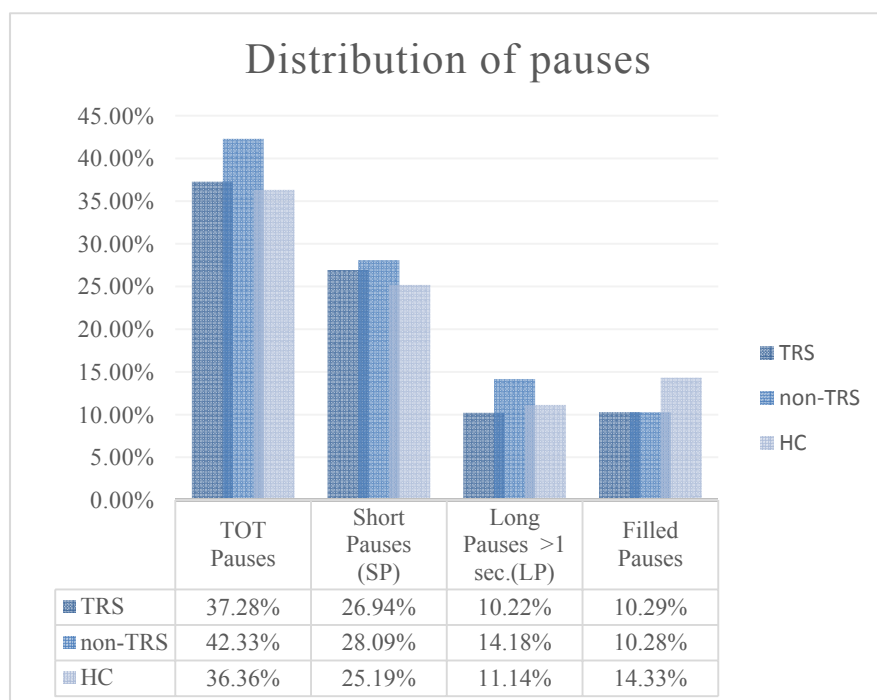
Figure 6: *Distribution of Pauses, namely empty and filled pauses e.g., eeh and ehm. This number is expressed as a percentage of the total number of disfluencies produced.*

The higher percentage of filled pauses produced by HCs can be interpreted following Matsumoto and colleagues (2020), who obtained similar findings. He associates the greater

production of filled pauses with the speaker's intention to maintain his communicative turn while pausing to reprogram his speech.

Upon a more subtle verification, we report that filled pauses are evenly distributed across parts of speech in all three groups, indicating that they do not specifically occur before any particular word type.

Interestingly, in our data set, the TRS group produced half of filled pauses at the beginning of the turn, compared to both HCs and non-TRS patients[3], hence pointing to a possible difficulty in signaling their intent to speak (Rose 1998).

5.3. Paralinguistic features

Regarding paralinguistic features, our findings (Table 5) are consistent with those of Dovetto and Gemelli (2013), who noted that a patient with *Wahnstimmung* frequently interrupted their speech with pauses and deep breaths. This disrupted flow of discourse reflects the cognitive and emotional strain often experienced in such conditions, underscoring the significance of paralinguistic elements in communication.

Table 5: Paralinguistic phenomena in 10 TRS, 10 non-TRS and 10 HC. These percentages are normalized on token number.

	TRS	**non-TRS**	**HC**
Inspiration	52.80%	67.00%	64.84%
Exhale	13.14%	12.85%	5.49%
Tongue clicks	3.74%	2.31%	3.02%
Lip smacking	9.83%	8.43%	5.26%
Throat clearing	0.30%	0.26%	0.11%
Whispering	9.70%	4.22%	5.04%
Screaming	0.30%	0.40%	0.00%
Giggle	3.62%	3.56%	12.43%
Laugh	0.72%	0.40%	1.12%

One possible explanation for the high occurrence of breaths (both inhaling and exhaling) in the non-TRS group, which also produced more and longer pauses, is that these phenomena are linked to increased cognitive effort and speech planning demands. Breaths, like pauses, can serve as a mechanism to manage speech production, particularly when speakers face difficulties in formulating their utterances. The frequent and prolonged pauses in this group may indicate a need for more time to structure speech, while the accompanying breaths could reflect the physiological effort involved in sustaining communication under such conditions.

The TRS speech seems to be characterized by a greater presence of whispering phenomena, consisting of voicelessness, increased airflow, reduced pitch variations and soft volume (Tartter 1989). This result might display issues in maintaining prosodic stability,

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[3] The normalized percentage of filled pauses at the beginning of the conversational turn amounts to 1.13% in TRS, 2.2% in non-TRS and 3.46% in HCs.

possibly due to increased cognitive load or uncertainty during speech production. Such variations in pitch could signal hesitation, reduced confidence, or a struggle to maintain fluency, further reinforcing the idea that paralinguistic features play a crucial role in managing communication, especially in challenging speaking conditions.

5.4. Pauses in past questions

ToM, i.e., the ability to recognize, predict, and interpret others' mental states, is essential for social interaction and goal-directed behavior. It enables individuals to integrate multiple sources of information to infer intentions and navigate communication effectively. ToM is closely linked to pragmatics, which governs understanding beyond literal meaning through language, gestures, and context.

Research indicates that ToM is impaired in schizophrenia (Doody et al. 1998), affecting the ability to relate intentions to actions and monitor social cues (Frith 1992). This impairment contributes to pragmatic difficulties, particularly in irony and metaphor comprehension (Abu-Akel 1999; Langdon et al. 2002).

Furthermore, schizophrenia disrupts temporal cognition, as patients struggle to conceptualize time, favoring spatial relations instead (Minkowski 2004). These deficits highlight ToM's role in both social competence and one's perception of lived time.

Following this line, we investigated the production of pauses in past questions which highlighted longer pauses and greater hesitation when discussing past situations, pointing to challenges in lexical retrieval and overall temporal processing.

Table 6: *Normalized silent intervals for past questions. Number of pauses/tokens (max. 1)*

	TRS	non-TRS	HC
Past	0.758	0.439	0.061

This pattern appears to stem from social withdrawal, as individuals become absorbed in themselves, their beliefs, and the immediacy of the present. Their difficulty in expressing experiences beyond the 'now' highlights a sense of temporal dislocation, where thoughts seem suspended and motionless, contributing to the idea that schizophrenia is marked by a distinct atemporality. This is consistent with studies that have shown that individuals with schizophrenia often struggle with recalling and narrating past events, exhibiting impoverished autobiographical narratives and disorganized temporal sequencing (Mediavilla et al. 2021). Although the difference between TRS and non-TRS does not seem numerically significant, this result lays the foundation for further analyses on a larger sample.

6. Conclusion and future work

This study introduced the CIPP-TRS Corpus, the first corpus explicitly designed to differentiate between TRS and non-TRS in spoken language. This study aimed to identify potential differences between the two patient groups by comparing their linguistic patterns to

a healthy control group (HC). By incorporating both qualitative and quantitative analyses, the research sought to provide a comprehensive understanding of how linguistic markers vary across these populations.

Our hypotheses were that (a) TRS showed more fragmented discourse and richer peri-linguistic and paralinguistic phenomena, and that (b) pauses were more present in non-TRS patients, but due to the severity of their condition, the TRS group displayed longer pauses for past questions. Moreover, literature widely documents a difficulty in moving across the line of time (Minkowski 2004), which can directly signify that questions regarding future and/or hypothetical events could be deemed as challenging for patients.

In the end, the research hypotheses were partially disconfirmed. Although differences in the spontaneous linguistic production of TRS patients and non-TRS patients have been highlighted, these do not always indicate more severe linguistic impairment in TRS patients. By analyzing peri- and paralinguistic features, we identified preliminary trends highlighting disruptions in speech planning, lexical retrieval difficulties, and temporal disorientation in TRS and non-TRS patients. While both patient groups exhibited increased disfluencies, interjections, and pauses, our findings suggest that the non-TRS group appeared more compromised than TRS for what concerns the amount of silent intervals and a higher production of interjection '*eh*' during the interview. These results, while aligned with de Boer and colleagues (2020), suggest that evaluating the linguistic production of patients requires not only considering the severity of the condition but also the type of medication used for treatment. This aspect will be further examined and clarified in the next phase of the study.

These observations align with theory of mind (ToM) impairments and the lived-time hypothesis, reinforcing the notion that individuals with schizophrenia, particularly those with TRS, experience temporal and cognitive rigidity that affects their ability to process past and future events. Although this is a pilot study, aimed at validating the methodology and tested at the moment on a small-scale dataset, results are promising, and this corpus represents an essential first step toward a more nuanced understanding of linguistic markers of schizophrenia.

Beyond its theoretical contribution, the CIPP-TRS Corpus may have useful clinical implications. The linguistic markers identified in this research—such as disfluencies, hesitation patterns, and signs of temporal disorientation—show promise as non-invasive indicators that could complement existing clinical assessment methods. With further validation in larger samples, such markers might help improve the early detection of schizophrenia and contribute to distinguishing treatment-resistant from non-resistant profiles, thereby supporting timely intervention. Longitudinal tracking of these features could also provide additional information on treatment response and functional outcomes, alongside traditional clinical scales. Although preliminary, linguistic analysis may also hold potential for assisting differential diagnosis with other conditions that present overlapping symptoms, as well as for highlighting specific functional impairments without the need for invasive or costly procedures (e.g., fMRI, MRI, CT).

Moving forward, we plan on expanding the corpus size to refine our statistical analyses and incorporating prosodic, syntactic, and pragmatic features to deepen our understanding of speech disturbances in schizophrenia. Future studies will also investigate disfluency clustering,

speech rate variations, and the positioning of interjections to differentiate TRS and non-TRS speech profiles. Further research will delve into various types of interjections, not only based on their type but also on their position within speech, as recurring patterns or specific co-occurrences may open new research directions.

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Girl Math or Nonsense? – (De)valuation and (In)visibility of Women in Social Media Slang

Angelika Żak
Maria Curie-Skłodowska University, Poland

Abstract

The study aims at presenting the phenomenon of the devaluation of women and their invisibility in youth-oriented language. The main focus of this research is social media and comments found in apps such as TikTok or X, which are some of the most popular social media platforms among teenagers. Language, just like a living organism, constantly changes to fit the needs of society, and since nowadays women are no longer only mothers and wives, the speech should reflect this phenomenon. The data is juxtaposed with women's stereotypes found in the most popular proverbs. Therefore, upon examining the data, one is able to discover both changes and similarities between these two. The question posed in the article is whether slang still highlights the greatness of men and the weakness of women, just like the language used to present. Consequently, the main principle of the study is to establish whether any changes are happening with regard to the inclusivity of younger generations' everyday speech. In other words, the objective of the article is to illustrate how patriarchal society affects slang, along with teenagers' beliefs, as well as to present how the young generation breaks the cycle of stereotypical and sexist speech.

Keywords: devaluation of women; invisibility of women; patriarchy; slang; social media

1. Introduction

Language is one of the most powerful human inventions that supports mental capacity. It is a system of communication that allows one to reflect the reality and other people, as well as to influence them, consciously or unconsciously (Niedzwiecki 1993: 3). Since there is a strong relationship between language and society, it is no surprise that those two shape each other. One may state that language is a living organism that has the tendency to develop and change in order to fit its users and their needs (Szpyra-Kozłowska 2021). Therefore, the fact that people have been living in a patriarchal society for centuries may still be visible in the language they speak, as through language one communicates and expresses their beliefs. What is more, as it is claimed by McGlone and Pfiester (2014), even if people do not believe that the stereotypes are linked to social identities, they still know these exist and affect others, as well

as themselves (2014: 112). It may be declared that the tongue one speaks tends to be sexist and leads to 'the reification of women because it refuses 'to take account of their changing role and this (sexist) use of language perpetuates, more or less consciously, a practical and/or psychological disparity between sexes' (Niedzwiecki 1993: 15).

Therefore, it should come as no surprise that the language also represents some negative connotations connected with women. Due to the ignorance of women, as well as defining them as inferior, one may come across various articles that present the phenomenon of making men the main concern. As a result, female-gendered aspects tend to appear two times less (e.g. Dockum et al. 2021). Thus, it is important to mention the notion of the invisibility of women (Szpyra-Kozłowska & Karwatowska 2004: 35) that may lead to an exclusion from the social domain. Consequently, 'in language as in the social environment, women are rendered transparent, non-existent, invisible and there is and indirect message that they should keep quiet' (Niedzwiecki 1993: 3). All of these is also reflected in discrimination in a daily life, where unequal income or inequality of treatment limits women to less important and stops their social progress.

Nevertheless, one is able to notice that feminist movements have deeply influenced language since more people are in favour of the alteration of everyday speech. Many try to be more inclusive and bring an end to gender inequality. Most particularly, 'some younger women have returned to many of the concerns raised by second wave feminism and are challenging sexism and misogyny in all it forms' (Coates 2016: viii). However, the most prominent change in the language may be perceived in the youngest generations that tend to question societal views and expectations. These are also people who may be the quickest in change, especially linguistic ones, since most of them are teenagers (Szpyra-Kozłowska 2021). What is more, the usage of social media among the youngsters influences their communication and interactions, making their tongue more flexible.

Taking into consideration the role of language and how it reflects reality, this article examines slang expressions mostly found on social media and used by the younger generation in the context of the portrayal of women. The methodology I employ for this purpose consists of the comparison of the aforementioned depiction to the image of females presented in stereotypes and proverbs, which may be considered the oldest forms of language utterances. As a result, one is able to notice the changes that have happened throughout the years, as well as some similarities. The research is aimed at establishing the role of women in contemporary slang, together with social media that mostly popularise such language.

2. The history of woman and her stereotypes

In order to understand the importance of language in creating the worldview, one has to reckon upon the very basic level, namely, the word woman. According to Harper (n.d.), the lexeme originates from 'Old English *wimman*, […] an alteration of earlier *wifmen*'. It consists of two parts *wif + man*, where the former is an older version of 'woman', and the latter means 'human being'. What is interesting, Century Dictionary states that 'it was thought necessary to join *wif*, a neuter noun, representing a female person, to *man*, a masc. noun representing

either a male or female person, to form a word denoting a female person exclusively'. The result seems preposterous since both parts may describe females. Moreover, in contemporary meaning, the second part means a male human, thus it highlights the dependence. Additionally, according to the Oxford English Dictionary, the word may be used derogatorily in terms of 'qualities traditionally attributed to the female sex, as weakness, fickleness, vanity, etc', as well as in comparison with *lady*, placing *woman* as a lower rank in society (Oxford University Press n.d.).

Those negative connotations may also be found in stereotypical English proverbs and sayings. Nonetheless, to acknowledge the impact of stereotypes on society and language, one has to consider their definition. The word, translated from Greek, means 'pattern or rubber stamp' (Slipachuk et al. 2024: 172). What is more, according to Walter Lippmann, the most prominent scholar regarding stereotypes, stated that those are 'images in heads' that influence the way people think and behave. The linguist also suggested that some words 'induce certain associations which are not necessarily consistent with the meaning of these words' (Krawiec 2012: 49). Those hidden interpretations are usually based on the stereotypes that one can come across. Additionally, Jerzy Bartmiński points out that 'the linguistic stereotype (linguistic worldview) appears as a certain set of beliefs, more or less fixed in language, which depicts the traits of objects in the extralinguistic world' (ibid.: 48).

Particularly important aspects regarding stereotypes are culture and society. Most researchers claim that those patterns are culturally transmitted and socially embedded. Such a view may help to understand how, till those days, people have been prejudiced against one another for different reasons. It may also suggest that humans have no impact on how they portray others; it all depends on the language they speak and the culture they were raised in. What is more, such a verbalisation of stereotypes helps express the social reality (ibid.: 49). Associations are expressed in 'everyday conversations, news reports, political and corporate discourse and educational materials' (ibid.), thus they play a huge role in daily lives, subconsciously or consciously. As is stated by Jerzy Bartmiński in one of the interviews, a stereotype is a kind of creation of a word image corresponding to human needs (Stowarzyszenie Brama Grodzka – Teatr NN 1998). Therefore, gender stereotypes reflect 'generalised ideas and beliefs about typical behaviour of men and women' (Slipachuk et al. 2024: 171). Those are embedded in the language; thus, they represent social consciousness.

Stereotypical views about sexes did not appear from nowhere; they were modified throughout centuries. Some of them were imposed naturally due to various social roles, yet most of them were adapted by people, mostly men (Boskovic Markovic & Alčaković 2013: 4). Today, they are passed on by parents from a very young age, with the physical environment reinforcing those patterns. What is more, Mass Media, which has a huge role in the contemporary world, 'has a great potential to inform knowledge and educate young people' (Bai 2022: 178), as well as emphasise gender roles, encouraging children to value those. However, one has to acknowledge that most languages were shaped by patriarchy, thus they may still highlight the traditional view of inequality between the sexes. For example, as it was discussed, 'men [are portrayed] as superior leaders (e.g. Powell & Graves 2005) and women as superior cultivators of personal relationships (e.g. Vogel et al. 2003)' (McGlone & Pfiester 2014: 126). Moreover, as was stated by Szpyra-Kozłowska (2021) in the languages analysed to

date, the depiction of men is more favourable than that of women. Additionally, in the case of social features, it is said that 'women are expected to adapt to androcentric norms' (Coates 2016: x), yet if they are successful in it, they are seen 'as aggressive and confrontational, as un-feminine' (ibid.).

The society, since ancient times, has had a characteristic depiction of women; they 'were seen as the person who should take care of their homes' (Bai 2022: 179). What is more, they were to be *beautiful*[1]. Interestingly, in ancient China, the leading aspect of an ideal woman was her fertility and ability to have a family (ibid.). To find the best examples of sex's patterns, one may go through proverbs that seem to carry on social beliefs for ages. As it was said by William Penn, an English writer, 'the wisdom of nation lies in their proverbs' (Rani & Ranjha 2020: 36). Additionally, a saying 'is a "form of informal teaching" that outlines behaviours based on the normative standards set by the "group consensus" […], used for shaping actions, for social control and conflict resolution' (Kuzmanovska et al. 2022: 5346). One may observe that just like stereotypes, proverbs are controlled by society, thus by the patriarchy. Such a characteristic is seen through sayings, most of which present a negative depiction of women (e.g. Kuzmanowvska et al. 2022 and Rani & Ranjha 2020).

Based on The Oxford Dictionary of Proverbs (fifth edition) and The Oxford Dictionary of English Proverbs (third edition), Rani and Ranjha (2020) categorised proverbs into six groups:

1. as negatively fragile, beautiful and sexual objects;
2. as unintelligent, unproductive and gullible;
3. as wilful and evil;
4. as burdensome;
5. as loquacious;
6. as a negative and positive homemaker.

The first group includes proverbs like *a woman is the weaker vessel* or *woman and a cherry are painted for their harm*. Both examples present women as delicate and weak, especially compared to men. What is more, cherry is used as a metaphor for intercourse (ibid.). The second group presents *a woman's answer is never to seek* or *women in state affairs are like monkeys in glass-shops*. Comparing women to animals, especially monkeys that are known to be troublesome, makes them be seen as careless and unintelligent. It clearly indicated that females should not be included in politics due to their stupidity. Moreover, the former expression stressed the indecisiveness. The third group includes *a bad woman is worse than a bad man* and *women are the devil's nets*. Women portrayed in those proverbs are capable of great evil; they are compared to bad men or even the devil. What is more, one may also find proverbs that present women as soulless, such as *the souls of women are so small, that some believe th' have none at all*. The next category presents *marry your son when you will, your daughter when you can*, where the female is presented as a burden for her family, even considering such an important decision as marriage. The penultimate group presents *many*

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[1] The concept of being *beautiful* seems to have been changing throughout time in various societies. Those beauty standards tend to be exaggerated and unachievable. Nonetheless, women for ages have tried to adjust themselves to fit in as the 'norm' (Bai, 2022).

women, many words, many geese, many turds and *women will have the last word.* Those highlight the gossiping habit and talkativeness, comparing women to geese that make loud noises. Interestingly, as was presented by Coates (2016), 'boys take up more 'verbal space' than girls (Swann 1992: 68). The results of research on classroom interaction parallel those for adult interaction in public contexts: boys talk far more than girls' (2016: 192). Last but not least, women are portrayed as homemakers, *a home without a woman is like a barn without cattle.* At first glance, the expression seems positive, yet, considering a male-focused society, one is able to notice that it devalues women in the family life and house, and it would not be such a negative aspect if women did not have to fight for their rights to be somebody else rather than only mothers and wives.

Nevertheless, the stereotypes of women have been changing, and even when 'beautiful appearance and the characteristics of being mothers are their advantages [those] should not be the agents that hinder their development' (Bai 2022: 181). With the developments of today's world and equal education, women are able to seek new opportunities and pursue better jobs. Nonetheless, some claim that the progress that females are advocating for should be adjusted so they can become 'the ideal companion of a man' (ibid.: 179). Thus, ideal women are not seen as independent individuals. Considering contemporary characteristics of females, one is able to notice that appearance plays the first fiddle. Women are to be 'white, thin and cute' (ibid.), and all those patterns are promoted by social media, where the norm is being attractive. What is more, according to the research conducted by Boskovic Markovic and Alčaković (2013), women are mostly emotional, attractive and complicated. Additionally, they are intelligent, communicative and independent, yet also insecure and strict. One may notice some changes comparing stereotypes included in proverbs to more contemporary patterns, yet there are still some similarities that degrade women.

However, the stereotypes, just like language, are constantly changing to fit society; thus, the prejudice may change due to the feminist approach of younger generations. Even though stereotypes still seem to rule the tongue, on a daily basis, things are slowly developing. Keeping in mind stereotypes and their history, one may proceed to the analysis of slang and how it is important with regard to language and changing it.

3. Slang and the development of the language

As was stated before, some stereotypes may also be found in media, including social media and the language used there, mostly slang. Yet, firstly, one has to acknowledge what slang is. One could say that slang is an interesting phenomenon of language (Izmaylova, Zamaletdinova, & Zholshayeva 2017). It has been developing for many years, yet it constantly adapts to reflect people's changing lives and experience (e.g. Coleman 2012). But to understand what slang really is, one has to acknowledge Julie Coleman, who referring to the Oxford English Dictionary, states that it is 'the special vocabulary or phraseology of a particular calling or profession; the cant or jargon of a certain class or period' (ibid.: 12), what is more it is 'language of a highly colloquial type, considered as below the level of standard educated speech, and consisting either of new words or of current words employed in some

special case' (ibid.). Both of those definitions highlight the most important aspect of the semantics of slang, i.e. meaning association with a certain group of people. One could say that there are many versions of slang depending on the group using it. Another definition of the term concerned is that 'slang is an ever-changing set of colloquial words and phrases that speakers use to establish or reinforce social identity or cohesiveness within a group or with a trend or fashion in society at large' (Trimastuti 2017: 65). Such understanding once again emphasises the idea of social closeness, as well as informal style of such speech and the importance of not only words but also phrases.

One may conclude that particular slang is not understood by people outside this social circle, showing in that way their solidarity. It is also a way of dividing 'the insiders from the outsiders, a way for a group to separate itself linguistically from other groups' (ibid.). Additionally, one can say that 'slang is the diction that results from the favorite game among young and lively of playing with words and renaming things and actions' (Izmaylova, Zamaletdinova, & Zholshayeva 2017: 76). What is highlighted here is the strong association of slang with teenagers and young adults, and what comes with it is the Internet that plays a major role in the development of colloquial speech (ibid.). Just as was stated before, the media are an important aspect of reshaping and emphasising social roles, including stereotypes. As was stated by Kövecses (2006), slang seems to be used mostly by 'macho men' who have 'extreme views and negative biases against women, as well as ethnic groups, homosexuals, fat people and short people, to name just a few cases' (Kövecses 2006: 151). Nonetheless, in the contemporary world, slang is used by almost everybody, yet it does not mean that it has become more equal. In the next section, against this theoretical background, I will analyse the most popular among teenagers' words and phrases, comparing them to the stereotypes found in proverbs.

4. The depiction of women in social media slang

Starting the analysis, one has to bear in mind that not all of the slang expressions are prone to have a positive or negative depiction of women; some of them do not even consider the gender of the object. The very first example, mostly popular on the social media app called TikTok, where people post short videos, is *girl math*. According to the website Know Your Meme, it is a slang term popularised in the summer of 2023 to explain how women spend their money and misvalue goods (Know Your Meme n.d.). The trend originated from TikToker @samjamessssss, who posted a video justifying her purchases, such as 'if you return an item for $50 and then spend $100 on another item, it's like only spending $50'. The concept spread all over other media, such as X (previously known as Twitter), now with over two hundred posts with such a hashtag on TikTok[2]. The trend was supposed to be humorous and harmless (Figure 1 and 2) with females celebrating womanhood and addressing other aspects of femininity, such as financial autonomy and light-hearted decision-making.

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[2]   Data collected on May 1st, 2025.

You forgot: buying one thing for $500 is spending $500 but making a bunch of little purchases in a day that add up to $500 isn't $500

2023-08-28   Reply   ♡ 98.4K ⎗

My girl math is like "I changed nail salon so I pay 30€ less so if I buy a pair of shoes for 30€ I technically got it for free" 🫣

2024-08-22   Reply   ♡ 96 ⎗

my girl math is buying concert tickets a year before the concert and then when the time comes it's free 🥰

2024-08-19   Reply   ♡ 2,219 ⎗

• 13 Jul

GIRL MATH is going shopping & being super excited to go home to see what you got even though you just saw it in the store

Figure 1: Comments under some videos that promote the positive side of the trend

Figure 2: A comment on X that appears while searching for the phrase

Nonetheless, it gained fame for presenting girls as irrational, stupid, as well as cruel (Figure 3). What is more, it became the target of men, who, in misogynistic statements, expressed their negative beliefs about women. Till this day, even though one may see a lot of videos in favour of women, celebrating femininity, there are lots of comments from males, claiming 'it's not logical'[3].

Blake ✔   • 20h

Girl math is a woman treating you like you're her boyfriend for two months then telling you she's not ready for anything.

♡46   ⇄55   ♡493   �III 14.5K

Figure 3: A comment on X posted by a man

Therefore, one may conclude that such an instance of slang may be compared to the second group of proverbs, namely, women as unintelligent, unproductive and gullible. Just like in the case a hundred years ago, women are seen as ignorant and simple-minded, yet one has to highlight the fact that this perspective is not acknowledged by everybody, as it may be the case with sayings. One may notice that from a woman's point of view, such a trend gathers them together to celebrate their similarities.

Looking at the youngest generations' slang, one may also see the ones that are straightforwardly belittling women, such as *Bop*. According to Urban Dictionary (n.d.), the word has two meanings, one referring to 'a good song' (Figure 4), and the other one, often used in collocation Bop female, describing 'any woman that you can sleep with easily'.

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[3]   Interestingly, the negative feedback of the trend led to the development of another slang phrase, *boy math*. The male version of maths criticises toxic behaviour and misogyny, instead of their irrationality. What is more, it is used to shame men for their harmful actions towards women.

Figure 4: A post on X describing a piece of music as 'bop'

According to Merriam-Webster (2025), it refers to a person who is perceived as promiscuous, yet it is mostly used to portray females. Even though the word was popularised in the 2000s as referring to catchy songs, it reached its popularity peak between 2024 and 2025 (according to Know Your Meme n.d.) with the latter meaning. It originates from a song entitled "Lala Bop" by rapper Almighty Rexxo from 2021, which was later used in a single word form. With over four hundred thousand videos on TikTok, the slang is mostly used by men to downgrade women and present them as sexual objects (Figure 5), as well as a way to describe a porn star (Figure 6).

Figure 5: Comments under one of the videos on TikTok describing a female influencer

Figure 6: One of the posts on X featuring photos of half-naked women

The trend started to spread out, and any female who is visible on social media is called a bop, even though she does not display her private life there. Nonetheless, the phenomenon may be seen through other similar words, such as *h*e*, when men constantly describe in such a way females that do not fit their standards or dress in a certain way or other different aspects, for instance a video on TikTok with the description 'if she's shy, she a h*e". Summing up, bop is used as an offensive and misogynistic word expressing hatred towards women with many sexual partners, thus it may be compared to the first group of proverbs where females are presented negatively as sexual objects. Nonetheless, it has to be highlighted that most of the comments are made by male individuals.

Another example of poor representation of females is the word, Karen. According to Merriam-Webster Dictionary, the term refers to 'a privileged, indignant, or discriminatory woman'. It displays the portrait of a middle-class, middle-aged white woman who insults other people, very often making racist statements. While it is uncertain when the name started describing a negative character, the early instances in modern culture appeared after the release of the film Mean Girls[4] in 2004, where the meme 'Oh My God, Karen, You Can't Just Ask Someone Why They're White' appeared (according to Know Your Meme n.d.). Nevertheless, the word has been constantly in use ever since, with its peak of popularity in June 2025. With over two million videos on TikTok, the trend portrays angry white women usually yelling at somebody without any reason (Figure 7 and 8). What is more, during COVID-19, the term was broadly used to describe women harassing people of colour (according to Know Your Meme n.d.).
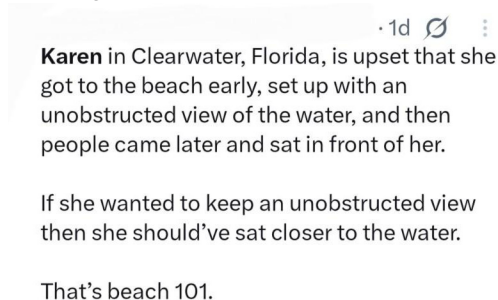
Figure 7: A post on X describing typical 'Karen' behaviour

Figure 8: A comment under one of the videos on TikTok presenting Karen in the shop

Nevertheless, the word is heavily prejudiced and may affect women who are able to speak up about their truths. Even if the image is very often exaggerated, one has to remember to differentiate between discriminatory people and those fighting for their rights (Figure 9). At the same time, one has to highlight that the term is also used to describe men (Figure 10). Therefore, even if the word is negative and derogatory, contrary to previous examples, it does include men who behave in such a way. Summing up, the word may be understood in terms of the mixture of groups three and four of proverbs, which present women as burdensome and evil, and indeed, *Karens* presented in comments and videos most often are in the wrong towards what they say, yet, the word should not become even broader so it starts naming every middle-aged white female.

Figure 9: One of the comments on X showing an ambiguous perspective towards 'Karen'
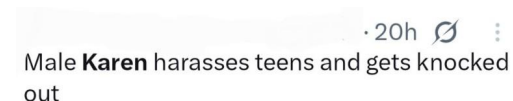
Figure 10: A comment on X presenting Karen as male

Nonetheless, one may be able to notice some examples that stand in opposition with the stereotypes presented in the proverbs. One of such instances is *who is this diva?,* also known as

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[4]   Dir. Mark Waters.

this diva or *look at this diva* (Know Your Meme n.d.). According to Merriam-Webster (n.d.), the catchphrase refers to 'a usually glamorous and successful female performer or personality'. Nonetheless, it also refers to other celebrities and subjects that embrace their femininity and queerness (according to Know Your Meme n.d.). Some claim that the phrase refers to the popular song by American singer Beyoncé, namely 'Diva' from 2008, where she sings 'Diva is a female version of a hustla' (Beyoncé n.d.), yet the meaning there may be ambiguous due to the negative connotations. In its present definition, the phrase originated in 2023 on X, but spread all over other media, creating different versions acknowledging confidence and the feminine side (Figure 11 and 12).

Figure 11: *A post on X presenting a woman as strong and confident*

Figure 12: *A post on X presenting a male confident in his clothing*

Interestingly, the trend is not only used to describe females but also animals and even men who are not overly masculine and are able to find their soft side (Figure 13 and 14). The trend often portrays people posing in a more feminine style or wearing flamboyant clothes, such as Drag Queens.

Figure 13: *A post on X presenting a man posing just like the woman beside him*

Figure 14: *A post on X presenting a dog as a 'diva'*

The videos on TikTok portray different individuals presenting their clothing, winning some kind of competition or just being confident in what they are saying, what they do and who they are. What is more, the trend stands in opposition to the most well-known definition of the word *diva*. One may notice that, for instance, Cambridge Dictionary claims that in 'usually disapproving [manner, it describes] a person who is difficult to please and behaves as if they are very special or important' (Cambridge University Press n.d.). It has to be highlighted that, based on that example, one may conclude that the new generations create new meanings of already embedded words in language, at the same time expanding the language.

Another positive depiction is presented in the phrase *main character energy*. According to Dictionary.com (n.d.), it is 'a characteristic that describes how a person prioritizes themselves and their own happiness […], typically associated with high self-confidence, self-respect, and self-love'. The slang originated on TikTok, with over three hundred thousand posts right now, yet it started appearing all over social media. The videos mostly display people making bold decisions, being happy, dressing how they want and being confident in their lives. Presenting people living their best life trend presents mostly women (among the top 10 videos, only 1 presenting a man) which does not exclude males and even appreciates them as confident (Figure 15). What is most important to highlight here is no negativity under the trend. Used mostly by females, it was also adapted by men and is now non-binary in terms of usage and portrayal (Figure 16). Importantly, it has not turned into a kind of toxic masculinity trend, where men tend to call other males feminine. Instead, men are celebrating their lives just like women do.
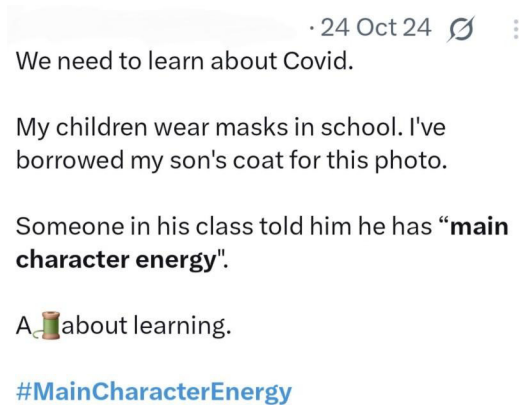
Figure 15: A post on X addressing a man as the 'main character'

Figure 16: A male user on X emphasising how all people are main characters

Moreover, the usage of this phrase emphasises the positivity and self-awareness among all genders. It is about being ambitious and determined about the goals (Figure 17) and spreading this aura among other people. While considering women, the trend helps them celebrate womanhood and uplift their spirits in every way possible (Figure 18). The phrase stands with the opposition regarding the stereotypes presented by the third category, namely, women as evil and wilful, presenting them from a wholesome and positive perspective.
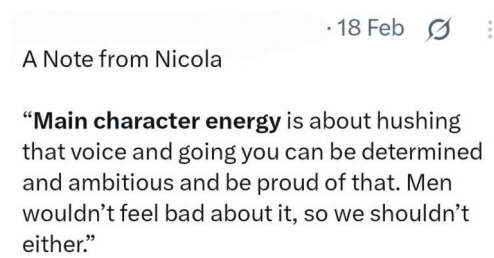
Figure 17: A quote on X from actress Nicola Coughlan celebrating womanhood by means of this trend

Figure 18: A post on X presenting one of the influencers

Last but not least, one may find instances of the invisibility of women in slang (in contrast to the previous example). One of such examples is popular among teenagers, the acronym *G.O.A.T* (often spelt and pronounced as *goat*), meaning 'greatest of all time'. According to Know Your Meme (n.d.), it originates from rapper LL Cool J and his studio album of the same name, released in 2000. Interestingly, it has been popular since his commercial success, yet it reached its peak of popularity in September 2024. What is more, the phrase was commonly used to describe sports players[5] and their achievements; however, it has been used all over social media as a way of referring to anybody considered the best at certain skills. In usage from the early 2000s, the phrase had reached over eight million videos on TikTok. Nonetheless, the portrayal of humans as the greatest of all time is mostly reserved for male footballers, like Cristiano Ronaldo or Lionel Messi (Figure 19).

Figure 19: Comments on TikTok praising male footballers as G.O.A.Ts

Additionally, from all the top posts found on X, one is able to find some sportsmen and male singers (Figure 20 and 21), yet no females. That instance may clearly suggest that women are excluded from such a title, even though they achieve great things in sport and other industries. One may think of a reason why any female is not considered the greatest of all time, yet, once again, it may be the result of living in a patriarchy and emphasising the greatness of men.

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5   The first sportsperson to be called *G.O.A.T.* was the boxer Muhammad Ali.

Figure 20: *A post on X describing one of the singers as the greatest*

Figure 21: *A post on X describing a wrestler as the G.O.A.T*

5. Conclusion

The object of this article pertains to the portrayal of women in social media slang with the aim of establishing similarities and differences, as well as changes compared to other forms of language used to this day, namely proverbs. I went through sayings since they may be considered the oldest forms of language expressions, since most of them were created centuries ago. Therefore, they serve as a pattern for the analysis of slang that may be considered the most recent part of the tongue used among people, especially younger generations. Firstly, sayings tend to present women in terms of objects, as unintelligent, burdensome and loquacious, as well as the evil source (Rani & Ranjha 2020). Such representation may be established on women's invisibility in medieval times and later on, till the 20th century. Nonetheless, in terms of slang expressions, the analysis has been focused on the ones that mostly suit the categories of sayings and may be compared to them.

What may come as a surprise is that slang, as well as sayings, either devalues or excludes women from the picture, sometimes making them visible and appreciated, mostly with the addition of including men. Does it mean that we retrograde in terms of the inclusive language and the equality of genders? I would not come to such a conclusion, since language constantly changes and may develop into a completely different path. Through apps such as TikTok or X, one is able to notice some of the changes happening in language since the younger generation is a pioneer in the alternation of speech. One could say that social media may be regarded as a repository of new words, new usages of embedded ones, as well as patterns of change. What is more, women may be seen, and society may take into consideration their beliefs, as well as those regarding inclusive language. Men are able to notice some other attitudes and therefore,

reckon upon those beliefs and replace the patriarchal mindsets, as well as make small changes regarding the language. Does it all mean that changing the language may help change the world we live in? Maybe it can help, yet, firstly, people must accept the significance of bias-free speech. That is why it is essential to analyse such movements as Feminist Language Reform that were already implemented in Sweden, Switzerland or Austria and have been constantly spreading since the 1960s and '70s.

Interestingly, languages tend to become more inclusive and value both genders equally, yet people have to accept it, so it will be devoid of unnecessary sexism. One has to highlight that the phenomenon influences the language and negative perspective of the female gender, as well as placing men in the centre of the tongue, considering only their perspective (Szpyra-Kozłowska 2021). One may also say that the language in terms of slang still hides the 'woman' dimension in contemporary society (Niedzwiecki 1993).

What is more, it needs to be recognised that this text should be treated as a part of a large-scale study and, therefore, cannot be regarded as an exhaustive one, as it presents only a couple of examples from Gen Z social media slang. Therefore, other more positive examples should also be taken into consideration, as well as other languages.

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Partitive and Counting Phrases in Polish: A Nanosyntactic Analysis of Syncretism

Lukáš Žoha

Masaryk University, Czech Republic

Abstract

This paper investigates syncretism in Polish pseudo-partitive and counting phrases, where different forms of the same noun appear in context as 'a piece of apple', 'two apples', and 'five apples'. These contexts exhibit three distinct syncretism patterns: AAB, ABC, and ABA, depending on whether suffixes are repeated or differ across forms. The analysis focuses on how suffixes signal distinctions in number and countability, drawing on the nanosyntactic framework. By applying the Lexicalization Algorithm, the paper shows how noun structures grow incrementally and how suffixes compete for lexicalization. Special attention is paid to the ABA pattern in feminine nouns, where the same suffix appears in the genitive singular and genitive plural, but not in the nominative plural – a configuration rarely attested cross-linguistically. The findings provide evidence for fine-grained syntactic structure and illustrate how syncretism patterns reflect the underlying functional sequence.

Keywords: pseudo-partitives; counting; nanosyntax; syncretism; *ABA

1. Introduction

This paper examines syncretism in Polish pseudo-partitive and counting phrases, focusing on the structure of noun forms in each pattern. As shown by Falco and Zamparelli (2019), pseudo-partitive phrases denote subsets (e.g., *a piece of an apple*). Counting phrases, by contrast, pair numerals with the nouns they quantify (Bultnick 2005), e.g., *two apples*. In Polish, the case and number form of the noun depends on the associated numeral (Franks 1994): low numerals (2, 3, 4) require the nominative plural, forming *low-counting phrases*, while high numerals (5 and above) require the genitive plural, forming *high-counting phrases*. Alongside these, pseudo-partitives appear in the genitive singular and express part–whole relations. These three contexts exhibit a non-trivial syncretism that forms the core empirical puzzle addressed in this paper.

Two patterns from Polish are illustrated below. The first one, AAB in (1), shows syncretism between the first two phrases, while the second pattern, ABC in (2), shows no syncretism at all:[1]

(1) AAB (Native speaker)   (2) ABC (Native speaker)
 a. kawałek   **jabłk-a**   a. kawałek   **ziemniak-a**
     a.piece.NOM   apple.N-GEN.SG   a.piece.NOM   potato.M-GEN.SG
     'a piece of apple'   'a piece of potato'
 b. dwa   **jabłk-a**   b. dwa   **ziemniak-i**
     2.NOM.N   apple.N-NOM.PL   2.NOM.M   potato.M-NOM.PL
     'two apples'   'two potatoes'
 c. pięć   **jabłek-ø**   c. pięć   **ziemniak-ów**
     5.NOM   apple.N-GEN.PL   5.NOM   potato.M-GEN.PL
     'five apples'   'five potatoes'

In (1), syncretism occurs between the pseudo-partitive, (1-a), and low-counting phrases, (1-b), marked by the shared suffix -*a* for GEN.SG and NOM.PL. However, the high-counting phrase, (1-c), lacks an overt marker (marked as -*ø*).

(2) shows no syncretism between pseudo-partitive, low-, and high-counting phrases. Yet, the suffix -*a* appears in both pseudo-partitive phrases, (1-a) and (2-a). This is summarised below, (3):

(3) Patterns

	Pseudo-partitive	Counting	
		Low	**High**
AAB	jabłk-a	jabłk-a	jabłek-ø
ABC	ziemniak-a	ziemniak-i	ziemniak-ów

Suffixes in pseudo-partitive and low-counting phrases often correspond, particularly when these two phrase types are adjacent in the morphological paradigm. The occurrence of syncretism between non-adjacent members (pseudo-partitive and high-counting phrases) is rare. This relationship would lead to the ABA pattern, which has garnered attention in linguistic theory due to its implications for the structure of morphosyntactic hierarchies. Bobaljik (2012) and Caha (2009) have suggested that ABA patterns are rare or unattested (thus also *ABA) in domains, such as case syncretism and adjective comparison.

Although *ABA patterns seem to be rare, they do occur within languages. For instance, Polish is a language, where a systematic *ABA occurs, (4):

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[1] The list of the used abbreviations is as follows: CL = classifier, F/FEM = feminine, GEN = genitive, GEND = general gender / neuter, M/MASC = masculine, MASS = mass feature, NP = noun phrase, NOM = nominative, N = neuter, PAUC = paucal, PL = plural, quant = quantificational element, SG = singular

(4)   ABA (Native speaker)
    a.   kawałek   **pomarańcz-y**
            a.piece.NOM   orange.F-GEN.SG
            'a piece of orange'
    b.   dwie   **pomarańcz-e**
            2.NOM.F   orange.F-NOM.PL
            'two oranges'
    c.   pięć   **pomarańcz-y**
            5.NOM   orange.F-GEN.PL
            'five oranges'

Pomarańcza 'orange' is feminine, and it takes the GEN.SG suffix *-y* in pseudo-partitive phrases. In low-counting phrases, the NOM.PL suffix *-e* appears. Finally, in high-counting phrases, the *-y* suffix reappears, now indicating GEN.PL. The consistent application of this pattern across the entire declension type (Bielec 1998) leads to classify it as a systematic instance of *ABA.

(5) summarises the data from (1), (2), and (4):

(5)   Patterns

	PSEUDO-PARTITIVE	COUNTING		PATTERN
		LOW	HIGH	
jabłk	-a	-a	-ø	AAB
ziemniak	-a	-i	-ów	ABC
pomarańcz	-y	-e	-y	ABA

The noun in pseudo-partitive phrases, as in (1-a) and (2-a), represents a minimal subset lacking the atomic layer, making it mass-like (Borer 2005; Rothstein 2010).

In low-counting phrases, (1-b) and (2-b), nouns must contain an atomic layer that allows them to be counted. This behaviour is similar to classifier languages, where a classifier is added when a noun is enumerated (Allan 1977).

The patterns in (5) suggest that the triplet pseudo-partitive < low-counting < high-counting can yield an ABA configuration when ordered like this. This order, however, is not the only logically possible one. Alternative orderings, such as low-counting < pseudo-partitive < high-counting or high-counting < pseudo-partitive < low-counting, would avoid the ABA pattern. These would place the pseudo-partitive form between the low-counting and high-counting one. Yet, while these alternatives are morphologically coherent, they do not reflect the structural containment that underlies the functional sequence adopted here. In this sequence, pseudo-partitive phrases are structurally the smallest, low-counting phrases add countability, and high-counting phrases introduce additional quantificational structure. For this reason, I maintain the ordering pseudo-partitive < low-counting < high-counting as syntactically motivated, despite the morphological alternatives.

The suffix *-a* seen in (5) occurs in the AAB pattern and in pseudo-partitive phrases within both the AAB and ABC patterns. In contrast, it is absent in the ABA pattern, where the suffix *-y* appears instead. In low-counting phrases, three suffixes are observed. In high-counting phrases, on the other hand, the suffixes *-ów* (ABC) and *-y* (ABA) are used, while the noun in AAB lacks an overt suffix.

High-counting phrases, (1-c) and (2-c), add a layer of structural complexity. These phrases satisfy the needs of high numerals often involving distributive or cumulative interpretations (Krifka 1992; Rothstein 2017).

The paper focuses on the distribution of the three patterns, the structure of the nouns within each pattern, and the structure of each pattern compared to each other. To address these questions, I adopt the framework of Nanosyntax, a theory that unifies morphology and syntax by using abstract, hierarchically ordered features (Caha et al. 2023; Starke 2009).

The structure of the paper is as follows: Section 2 introduces the background on the Nanosyntax approach and features used in the analysis. Section 3 applies the Lexicalisation Algorithm to elucidate the structures and distribution of syncretism patterns. Section 4 concludes.

2. Nanosyntax and number

Nanosyntax extends the cartographic approach by exploring the smallest components of syntactic structure. It follows the "one feature – one head" principle, where each syntactic head corresponds to a single semantic feature (Cinque & Rizzi 2008; Kayne 2005).

A key innovation is phrasal lexicalization, which links entire syntactic configurations directly to morphemes in the lexicon (Caha 2009; Starke 2009). Central to Nanosyntax is the functional sequence (fseq), a universal hierarchy of syntactic features forming their own syntactic head (Starke 2009).

This section uses Nanosyntax to examine Polish pseudo-partitive and counting phrases. The features MASS, CL, PAUC, and QUANT define key distinctions in noun phrase structure and align with specific layers of the fseq, (6).

At the base lies the NP. The triangle marks the presence of lower features, which I do not use for explaining the syncretism patterns.

Above NP, there are features representing grammatical gender: GEND, MASC, and FEM. GEND acts as a general gender or as a marker for neuters. MASC and FEM specifically denote the masculines and feminines, respectively.[2]

Above the gender, there is CLASS following Janků and Starke (2019) as well as Janků's dissertation (2022). It is split there into two separate features, CL1 and CL2. According to Janků (2022), these features, observed in Romance and Czech (and potentially other Slavic languages), may be related either to gender below or to number above. In my research, I treat these features as a single entity, referred to as CLASS, for a straightforward reason: keeping them unified simplifies the structures. The distinct markings arise from the use of a classifier within my functional sequence, abbreviated as CL. As there are features above CLASS, and number features, the CLASS feature seems to belong among gender features, as Janků and Starke predict.

---

[2] The hierarchical arrangement of gender features — GEND < MASC < FEM — is supported by the findings of Jakobson (1984) or Corbett (1991). They contend that feminine forms are more marked than masculine forms, necessitating a more intricate internal structure. Additionally, the neuter gender is seen as the least marked, lending credibility to the sequence GEND < MASC < FEM.

(6)   Functional sequence
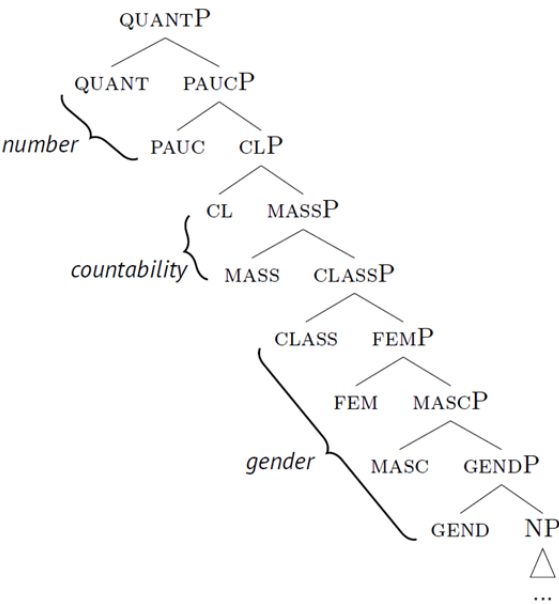
The features above CLASS are used to distinguish pseudo-partitive, low-counting and high-counting phrases. Above CLASS, there are two features – MASS, and CL – distinguishing countability. The MASS feature suggests that nouns in pseudo-partitive constructions are structurally minimal, appearing as mass nouns (Borer 2005). This concept is further reinforced by Rothstein (2010), who highlights the reliance of pseudo-partitive constructions on the mass/count distinction. To address this, Caha (2022) proposes CL(ASSIFIER), which enables the conversion of mass-like nouns into countable forms. However, as illustrated in (7), CL(ASSIFIER) alone fails to account for the patterns observed in both low- and high-counting phrases.

While Borer (2005) proposes a separate projection DIV to derive count nouns from mass nouns, this paper does not include DIV as an independent functional head. Instead, the CL projection is assumed to fulfil the relevant structural role of marking countability. This choice aligns with the broader insight adopted from Borer – namely, that countability is structurally derived – but diverges from her implementation by replacing DIV with a more fine-grained sequence of projections. As discussed in Žoha (2025a), Czech (and Polish) numerals such as 2–4 versus 5+ require additional structure beyond the mass/count contrast, which CL can accommodate without the need for a distinct DIV head.

(7)   Applying MASS and CL

	PSEUDO-PARTITIVE	COUNTING		PATTERN
		LOW	HIGH	
jabłk	-a	-a	-ø	AAB
ziemniak	-a	-i	-ów	ABC
pomarańcz	-y	-e	-y	ABA
	[MASS]	[MASS] [CL]	[MASS] [CL]	

Exponents at lower cycles can be overwritten by other lexicalisations at higher cycles. Thus, the low- and high-counting phrases contain MASS, which is overwritten by CL. However, CL

alone does not differentiate the phrases. Notably, each phrase exhibits distinct number forms. At first glance, pseudo-partitive phrases appear with the noun in the singular, while in both low- and high-counting phrases, the noun occurs in the plural. However, why do counting phrases exhibit two distinct sets of suffixes?

This can be explained by introducing an additional grammatical number: the paucal, an approximate number covering small amounts, which is employed with low numerals instead of the plural (Corbett 1993; Harbour 2014; Nesset 2019). Incorporating the paucal helps explain the existence of two sets of suffixes observed in counting phrases. In low-counting phrases, the paucal, PAUC(AL), is employed, while in high-counting phrases, the plural, QUANT(ITY), replaces it. This distinction has been noted in works such as Franks (1995) and Pesetsky (2013). (8) illustrates these observations:

(8)   Applying MASS, CL, PAUC and QUANT

	PSEUDO-PARTITIVE	COUNTING		PATTERN
		LOW	HIGH	
jabłk	-a	-a	-ø	AAB
ziemniak	-a	-i	-ów	ABC
pomarańcz	-y	-e	-y	ABA
	[MASS]	[MASS] [CL]	[MASS] [CL]	
		[PAUC]	[PAUC] [QUANT]	

Several observations can be made from the table. First, the suffix *-a* must include MASS, CL, and PAUC, as it is used in low-counting phrases. However, its structure must prevent it from attaching to the noun *ziemniak* in the low-counting phrase. The next issue is observed within the AAB pattern. In high-counting phrases, no overt suffix appears, meaning the root itself must accommodate all features up to QUANT. Another point concerns the ABA pattern. The suffix *-y* must appear with only MASS in pseudo-partitive phrases, but in high-counting phrases, it needs to include all features from MASS to QUANT.

Finally, there is the issue regarding the singular number. The fseq in (6) includes PAUC and QUANT to represent grammatical number. The missing number is the singular. It is evident that the singular must be placed below the paucal, as the default number for counting. The question is whether the singular is a unique feature, SG, or if it is already projected along with the classifier, CL. I will leave this question open, as it is beyond the scope of this paper.

To conclude, consider (9), where simplified nouns' structure in each phrase can be found. (9-a) shows pseudo-partitive phrases going only up to MASS, in (9-b) low-counting phrases up to PAUC, and in (9-c) the most complex structure of high-counting phrases up to QUANT.[3]

---

[3]   Although case features may also play a role in suffix distribution, this study concentrates on number and gender, with the role of case left for future investigation.

(9)   a.   Pseudo-partitive   b.   Low-counting   c.   High-counting

```
  a. MassP              b.      PaucP                c.       QuantP
       △                      ╱    ╲                       ╱      ╲
      ...                  Pauc    CLP               Quant      PaucP
                                  ╱  ╲                         ╱    ╲
                                 CL   MassP               Pauc      CLP
                                        △                          ╱  ╲
                                       ...                       CL    MassP
                                                                        △
                                                                       ...
```

In the following sections, I will analyze each pattern in detail, employing Nanosyntax to clarify the structure of each, with a particular focus on MASS, CL, PAUC, and QUANT.

3. Structure of the patterns

This section examines the structure of the three syncretism patterns identified: AAB, ABC, and ABA. The analysis focuses on the features MASS, CL, PAUC, and QUANT. At the core of this hierarchy is MASS, which derives a mass noun from the root. The addition of CL enables the noun to be countable, while PAUC and QUANT differentiate between low- and high-counting phrases, respectively. These features are crucial for understanding the structural differences among examined phrases.

To formalize the derivations, the Lexicalization Algorithm (Caha et al. 2023) is employed. This Algorithm merges features, testing whether the resulting structures are identical to the ones of the used morphemes or if further "rescue operations" are needed to ensure compatibility.

Each subsection is dedicated to one of the syncretism patterns, offering an explanation of the specific pattern, syntactic structures corresponding to the morphemes involved, and step-by-step derivations illustrating the feature-merging and lexicalization processes.

The examined patterns consist of the features from functional sequence repeated in (10):

(10)   Functional sequence
       NP < GEND < MASC < FEM < CLASS < MASS < CL < PAUC < QUANT

The table below, (11), shows the formal structure of each used pattern. The table is divided into lexical entries for roots (top) and suffixes (bottom), with features marked as part of each morpheme's lexicalization. To aid readability, suffixes are listed separately, but in later tables (e.g., (13)), roots and suffixes are combined explicitly.

(11)   Structure

NP	GEND	MASC	FEM	CLASS	MASS	CL	PAUC	QUANT	PATTERN
pomarańcz									ABA
ziemniak									ABC
jabłk									AAB
							-a		
							-e		
								-y	
								-ów	
							-i		

While the suffixes in (1), (2), and (4) clearly express case (e.g., GEN.SG, NOM.PL), this paper focuses on number and gender features only. Case is assumed to be a higher layer in the functional sequence, projected above QUANT (e.g., Caha 2022). As such, it is not explicitly included in the lexicalization tables, which concentrate on sub-case features. A full account of case–number interactions would allow for a more precise treatment of this issue but lies beyond the present scope.

As shown in the first part of the table, the noun *pomarańcz* 'orange' contains all features up to CLASS, like the noun *ziemniak* 'potato', except that the absence of FEM (indicated in black) marks *ziemniak* as masculine. The bare root *jabłk* 'apple' includes all features (except MASC and FEM) and appears in high-count phrases.

These three nouns can co-occur with five distinct suffixes. The suffix *-a* appears in pseudo-partitive and low-counting phrases within the AAB and ABC patterns, encompassing features from CLASS to PAUC. Similarly, the suffix *-i* in low-counting phrases of the ABC pattern spans MASC to PAUC, while *-e* in the ABA pattern spans FEM to PAUC. The remaining suffixes, *-ów* and *-y*, terminate in QUANT, as they occur in high-count phrases. The suffix *-y* is feminine, beginning at FEM, whereas *-ów* is masculine and begins at MASC, bypassing FEM.

The following subsections delve into the precise structural composition of each noun and suffix, detailing their respective derivations. Specifically, they explain the processes by which these nouns and suffixes are formed.

3.1. AAB

In this section, I focus on the AAB pattern: how to derive the noun *jabłk* 'apple' and the suffix *-a* occurring in the pseudo-partitive and low-counting phrases, and how to ensure that the suffix disappears in the high-counting phrase.

The relevant data for this section from (1) are repeated as (12):

(12)   AAB (Native speaker)
    a.   kawałek   **jabłk-a**
           a.piece.NOM   apple.N-GEN.SG
           'a piece of apple'
    b.   dwa   **jabłk-a**
           2.NOM.N   apple.N-NOM.PL
           'two apples'
    c.   pięć   **jabłek-ø**
           5.NOM   apple.N-GEN.PL
           'five apples'

As seen from the data in (12), both a root and a suffix must be dealt with. The structure of both – the noun *jabłk* 'apple' and the suffix *-a* – is detailed below, (13):

(13)   Lexicalization table

NP	GEND	MASC	FEM	CLASS	MASS	CL	PAUC	QUANT	
jabłk									'apple'
					-a				P-PART
							-a		LOW
									HIGH

The lexicalization table shows the interaction of morphological features in deriving the forms of *jabłk* 'apple' in the context of pseudo-partitive, low-, and high-counting phrases. The light grey cells represent the root *jabłk*, containing all the necessary features for high-counting phrases. The composition of the suffix *-a* in darker grey is included in pseudo-partitive and low-counting phrases.

The progression from the table to the syntactic trees highlights how the morphological composition translates into hierarchical representations. The structure of the noun *jabłk* 'apple' and the suffix *-a* is shown in (14). These syntactic trees – called lexical entries within Nanosyntax – represent the structure of the morphemes stored in the lexicon.

(14)   Lexical entries

As shown in (14-a), the lexical entry for *jabłk* 'apple' contains all the features (excluding MASC and FEM as *jabłk* is neuter), as the root is used in high-counting phrases. Furthermore, this complex lexical item is needed to explain why the high-counting form is lexicalized by the root alone while pseudo-partitive and paucal require suffixes (Caha et al. 2023). It can generate the correct output of the inserted features, as the structure for the suffix *-a* is contained within the root of the noun.

The lexical entry for *jabłk* in (14-a) features a Complex Left Branch (CLB, e.g., Starke 2018), which plays a crucial role in accounting for this type of AAB pattern. Specifically, the high-counting form *jabłek* is lexicalized by the root alone, without any suffix, while pseudo-partitive and low-counting forms require suffixal material. This asymmetry poses a paradox under the Lexicalization Algorithm, which favors direct lexicalization (by the root) over suffixation. Without a CLB, the root would incorrectly be able to lexicalize smaller portions of the structure as well, and suffixes like *-a* would never be inserted. The CLB resolves this by allowing the root to match only the full high-counting structure (up to QUANT), but not any of the intermediate projections, which are then lexicalized by suffixes. In this sense, CLBs

enforce a kind of lexicalization cutoff: they make the root available only for the largest relevant structure, ensuring that smaller cells in the paradigm are lexicalized differently.

Derivations, within the Nanosyntax framework, are the step-by-step syntactic processes that generate structures from the functional sequence of features. As Nanosyntax assumes that every feature corresponds to an independent head in syntax, derivations involve merging, moving, and lexicalizing (checking if structures are identical as lexical entries of morphemes stored in the lexicon) these heads according to the Lexicalization Algorithm (Caha et al. 2023), (15):

(15)   Lexicalization Algorithm (Caha et al. 2023: 41), version 1 of 4
         a. Merge F and lexicalize.

The derivation of the AAB pattern begins with assembling GENDP by merging GEND for neuters and NP, representing the root of the noun, (16). Following the first step of the Lexicalization Algorithm, every newly merged structure must be lexicalized. This involves searching the lexicon for an entry that is identical. If a match is found, the structure is lexicalized as the morpheme corresponding to the lexical entry, as demonstrated in (17) for *jabłk*:

(16)

GENDP
⟋⟍
GEND   NP
         △
         ...

(17)

GENDP
⟋⟍
GEND   NP
         △
         ...

jabłk
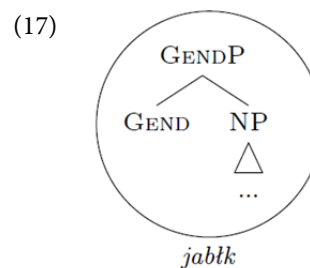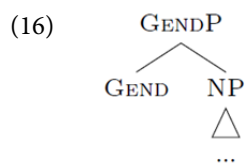
(16) depicts the initial step of the derivation, where GENDP is merged with NP, while (17) illustrates the lexicalization process, in which the lexicon is checked for a matching (= identical) lexical entry. Although the structure in (16) does not exactly match the lexical entry for *jabłk* in (14-a), it can still be lexicalized as *jabłk* because it satisfies the Condition on Matching, (18):

(18)   Condition on Matching (Caha et al. 2023: 18)
         A lexically stored constituent L matches a syntactic phrase S iff S is identical to L.

According to this condition, the structure in the derivation, (16), must be contained within the lexical entry, (14-a). This requirement is met, allowing the structure to be lexicalized as *jabłk*.

To this state of the derivation, the structure could be lexicalized. While merging CLASS, the lexicalization is not possible, as the tree in (19) does not have the identical space structure as the lexical entry in (14-a), thus it cannot be lexicalized as *jabłk*:

(19)

```
        ClassP
       /     \
   Class    GendP
           /     \
        Gend     NP
                 △
                 ...

              jabłk
```
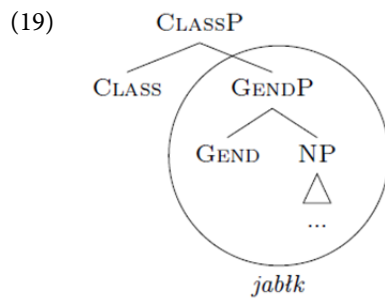
If lexicalization fails after merging a feature, a rescue movement becomes necessary (so named because it "rescues" the derivation). To account for this, an updated version of the Lexicalization Algorithm incorporating rescue movement is introduced in (20):

(20)   Lexicalization Algorithm (Caha et al. 2023: 41), version 2 of 4
        a. Merge F and lexicalize.
        b. If fail, evacuate the closest labelled non-remnant constituent and lexicalize.

The rescue movement operates on a straightforward principle: a constituent must be moved above the newly merged feature to resolve the failure. This constituent must meet three specific conditions: it must be closest to the merged feature, it must have a label and it must be a non-remnant, meaning nothing from this constituent was moved out.

The closest labelled non-remnant constituent is GENDP, which lexicalizes *jabłk*. Its evacuation, (21), ensures that *jabłk* is preserved while a new branch for the suffix *-a*, with the bottom feature CLASS, is formed, (22).

(21)

```
        GendP              ClassP
       /     \            /      \
   Gend      NP       Class     GendP
             △                 /     \
             ...            Gend      NP
                                      △
                                      ...
```

(22)

```
     GendP              ClassP
    /     \            /
 Gend      NP       Class
           △
           ...              -a

        jabłk
```
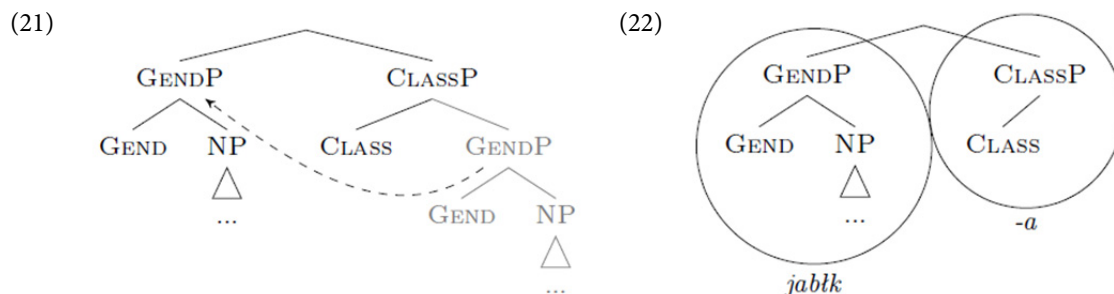
Next, MASS is merged, as it is required for nouns in pseudo-partitive phrases. Upon its merge, (23), and after evacuating GENDP, (24), the resulting structure corresponds to the noun in the pseudo-partitive phrase *kawałek jabłk-a* 'a piece of apple', (25).

(23)

```
            MassP
           /     \
        Mass    GendP         ClassP
               /     \        /
           Gend      NP    Class
                     △
                     ...            -a

                  jabłk
```

(24)

(25)
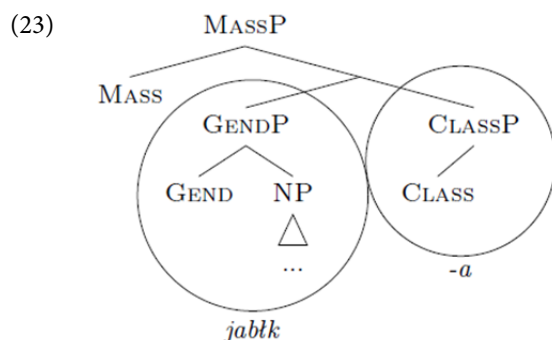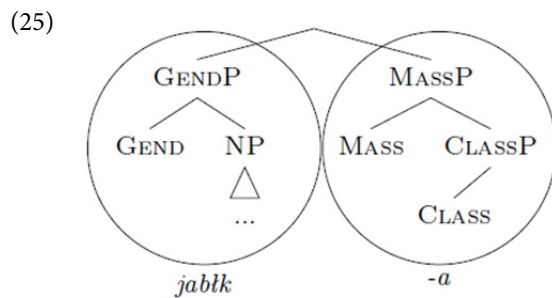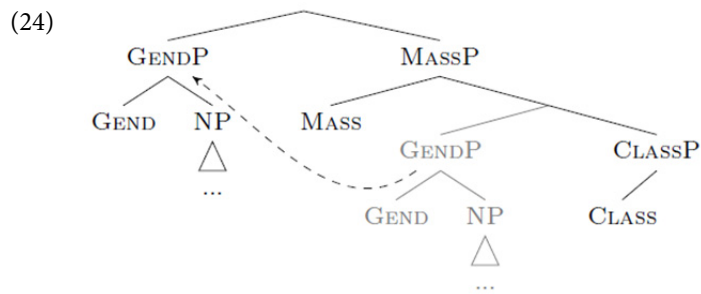
Following analogous steps, the noun in the low-counting phrase *dwa jabłk-a* 'two apples' is derived by sequentially merging CL, which adds countability, and PAUC, which adds the paucal number required in such phrases, (26).

(26)
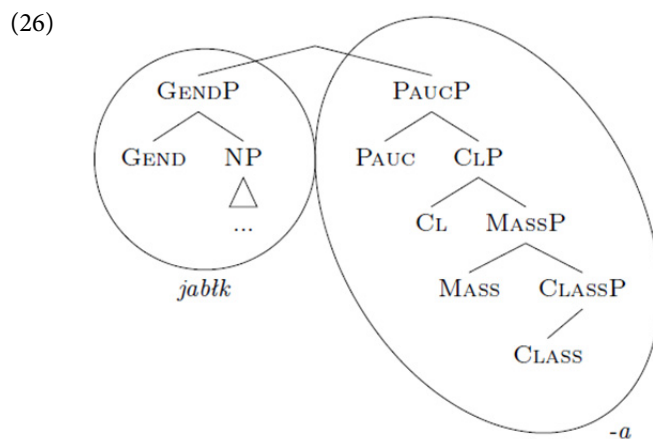
For the noun in the high-counting phrase *pięć jabłek-ø* 'five apples', QUANT, representing plural, must be merged, (27). Since lexicalization fails at this stage, the evacuation of GENDP is necessary, (28), resulting in the structure in (29).[4]

---

[4] The vowel *e* in *jabłek* is traditionally analysed as a yer (a reduced vowel) that either deletes or surfaces as *e* depending on phonological context. For discussion see Scheer (2012).

(27)

```
              QuantP
      Quant
            GendP              PaucP
      Gend    NP        Pauc    ClP
             △
             ...              Cl    MassP
         jabłk
                           Mass    ClassP
                                 Class
                                              -a
```

(28)

```
      GendP              QuantP
  Gend    NP'      Quant
         △              GendP        PaucP
         ...        Gend    NP    Pauc    ClP
                           △
                           ...       Cl    MassP
                                  Mass    ClassP
                                        Class
```

(29)

```
      GendP              QuantP
  Gend    NP        Quant    PaucP
         △
         ...            Pauc    ClP
                              Cl    MassP
                           Mass    ClassP
                                 Class
         jabłk
```
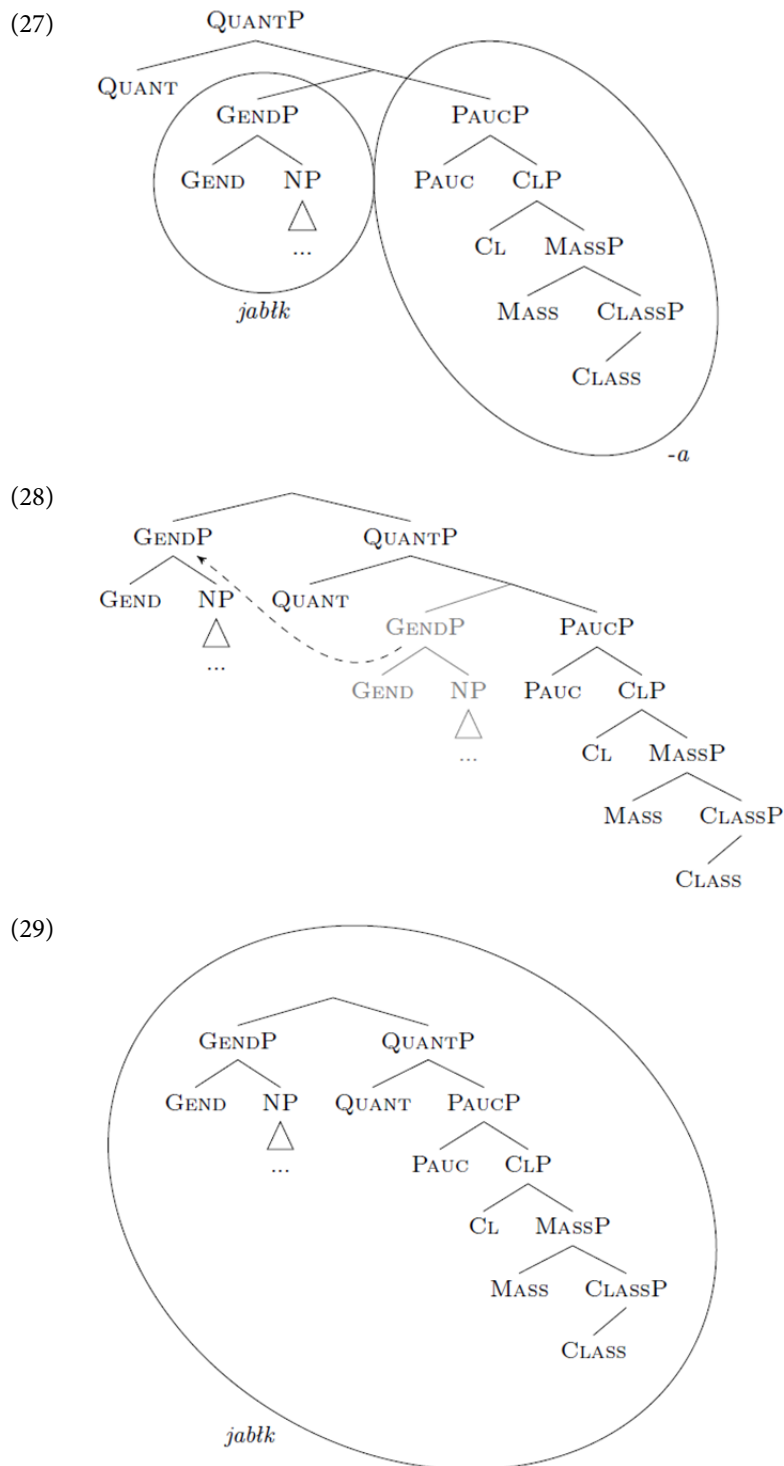
The AAB pattern demonstrates adjacent syncretism between pseudo-partitive and low-counting phrases, using the same suffix -*a* involving features from CLASS up to PAUC. High-counting phrases, however, lack overt markers, thus the root itself must accommodate the features of the root – NP and GENDP – but also the features from the high-counting context – from CLASS up to QUANT.

The derivation in (29) illustrates a particular type of lexicalization, where the root *jabłk* lexicalizes the entire structure up to QUANT without the need for an overt suffix. This behaviour corresponds to what Blix (2021) refers to as a "levelling" derivation: the root

lexicalizes a superset of the features lexicalized by competing suffixes and thus blocks them from insertion. In the terms of Nanosyntax, the lexical entry for *jabłk* contains a movement-derived tree, which allows it to match larger feature structures via the Condition on Matching. This contrasts with roots such as *ziemniak* and *pomarańcz*, whose lexical entries are limited to lower segments of the functional sequence (up to CLASS). As a result, they rely on suffixes like *-ów*, *-i*, *-e*, or *-y* to lexicalize higher layers.

3.2. ABC

This section addresses the derivation of the ABC pattern, which exhibits no syncretism. For ease of reference, the relevant data from (2) are repeated below, (30):

(30)   ABC (Native speaker)
    a.   kawałek   **ziemniak-a**
           a.piece.NOM   potato.M-GEN.SG
           'a piece of potato'
    b.   dwa   **ziemniak-i**
           2.NOM.M   potato.M-NOM.PL
           'two potatoes'
    c.   pięć   **ziemniak-ów**
           5.NOM   potato.M-GEN.PL
           'five potatoes'

This pattern occurs exclusively among Polish masculines. The derivation must account for the structure of *ziemniak* 'potato' and its three suffixes: *-a* for pseudo-partitive constructions, *-i* for low-counting phrases, and *-ów* for high-counting phrases. The suffix *-a* is particularly challenging, as it appears in the AAB and ABC patterns. Its structure must accommodate both contexts. The core analytical challenge in the ABC pattern lies in the paucal cell, where suffixes *-a* and *-i* appear in a complementary distribution depending on gender. In neuter nouns like *jabłko*, the suffix *-a* lexicalizes CLASS up to PAUC, while in masculine nouns like *ziemniak*, *-i* lexicalizes MASC up to PAUC. Since both suffixes target the same structural slot (PAUC), the derivation must ensure that *-i* blocks *-a* in the masculine paradigm. This requires a careful design of lexical entries: *-a* must be unable to lexicalize MASC, and *-i* must be constructed so that it includes MASC as a necessary feature. This gender-based lexical competition is crucial to the ABC pattern and underlies the complexity of the derivation in this section.

    The structure of the relevant morphemes is summarised in the table below, (31):

(31)   Lexicalization table

NP	GEND	MASC	FEM	CLASS	MASS	CL	PAUC	QUANT	
ziemniak									'potato'
					-a				P-PART
							-i		LOW
								-ów	HIGH

The table illustrates the structure of the morphemes interacting in the derivation of the ABC pattern. The noun *ziemniak* 'potato' carries features up to CLASS, excluding FEM (indicated by the black cell), as *ziemniak* is masculine. The suffix *-a* retains the same structure as in the AAB pattern. The suffix *-i*, appearing only in the ABC pattern's low-counting construction, starts from MASC and ends at PAUC. The suffix *-ów*, appearing in high-counting contexts, starts from MASC and ends to QUANT.

Although a more straightforward, right-branching structure might suffice for the *ziemniak* paradigm, the analysis presented here adopts a complex lexical entry with a left branch in order to block the suffix *-a* from appearing in low-counting contexts with masculine nouns. The suffix *-a*, which lexicalises from CLASS up to PAUC in the *jabłk* paradigm, lacks the MASC feature and is therefore unable to lexicalise MASC up to PAUC. In contrast, *-i* does lexicalise MASC up to PAUC, allowing it to appear exclusively in masculine low-counting phrases. To ensure that *-i* is inserted in the presence of *-a*, the root *ziemniak* is assigned a lexical entry that forces the derivation to choose *-i* in the masculine low-counting context. This design aligns with the morphological opposition between *-a* and *-i*, rooted in gender, and reflects the observed distribution.

The exact syntactic structures of these morphemes are provided in (32):

(32)   Lexical entries
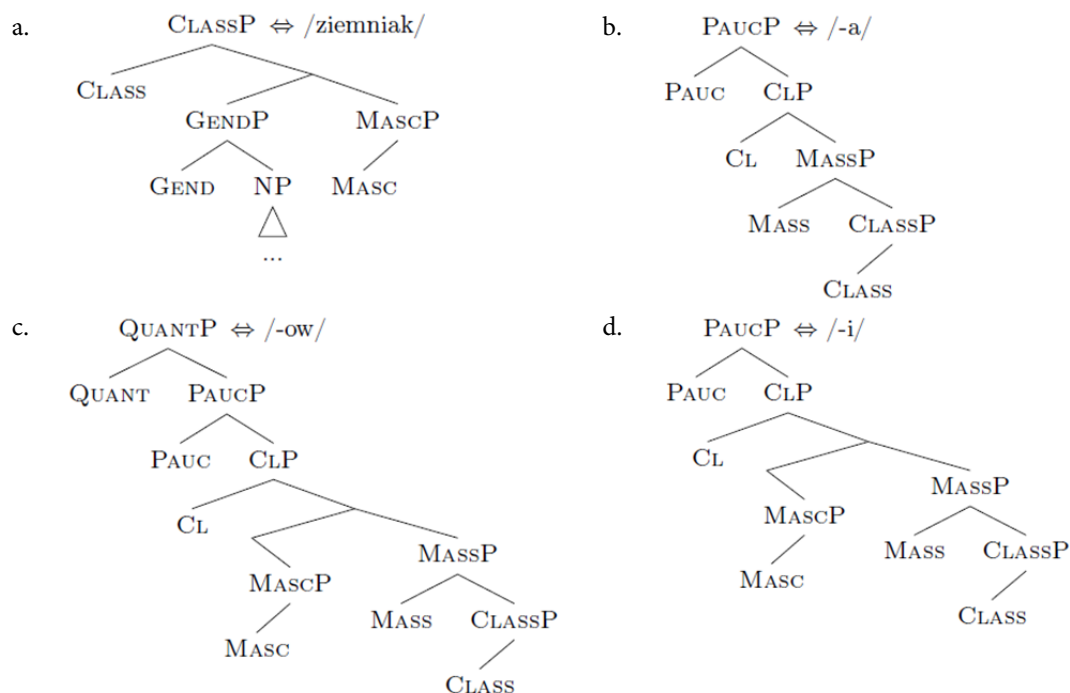
The derivation begins with the merging of GEND and NP, (33), where the structure is lexicalized as *ziemniak*, (34):

(33)

GENDP

GEND   NP

(34)

GENDP

GEND   NP

ziemniak
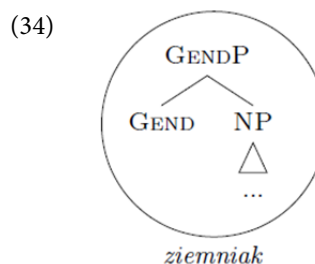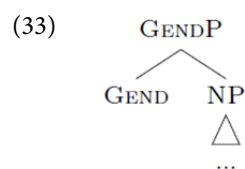
At the point where MASC is merged, (35), lexicalization fails because no identical entry, such (32-a), exists. As a result, rescue movement is triggered: the closest non-remnant constituent – GENDP – is evacuated, (36). Then, the structure is successfully lexicalized as *ziemniak*, (37):

(35)

MASCP

MASC   GENDP

GEND   NP

ziemniak

(36)

GENDP   MASCP

GEND   NP   MASC   GENDP

GEND   NP

(37)

GENDP   MASCP

GEND   NP   MASC
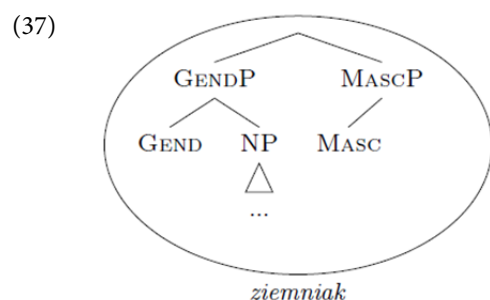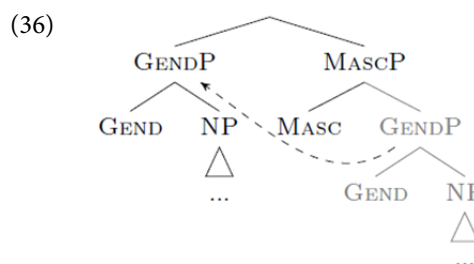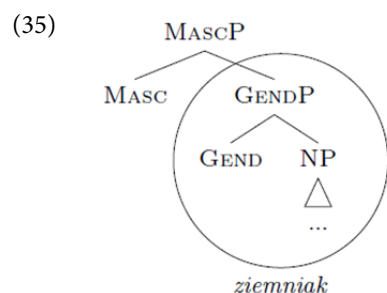
ziemniak

The next step involves merging CLASS, (38). At this stage, the structure can be immediately lexicalized as *ziemniak*, (39):

(38)

CLASSP

CLASS

GENDP   MASCP

GEND   NP   MASC

ziemniak

(39)

CLASSP

CLASS

GENDP   MASCP

GEND   NP   MASC
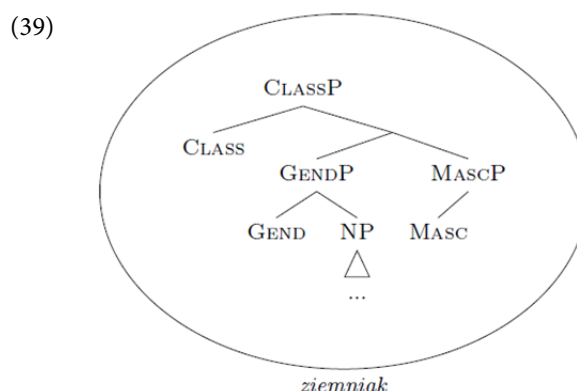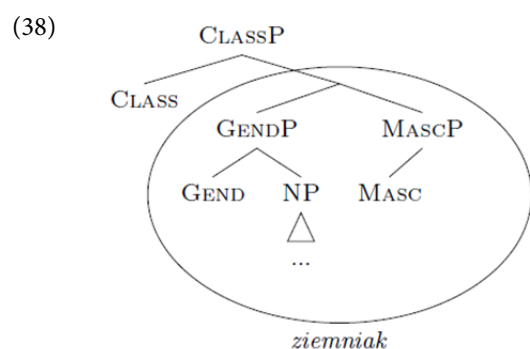
ziemniak

Next, the MASS feature is merged to derive the structure for the pseudo-partitive phrase: *kawałek ziemniak-a* 'a piece of potato', (40).

At this point, lexicalization fails again, requiring the evacuation of CLASSP being the closest non-remnant constituent , (41). However, this evacuation does not resolve the lexicalization issue either, (42).

(40)

ziemniak

(41)

(42)

ziemniak
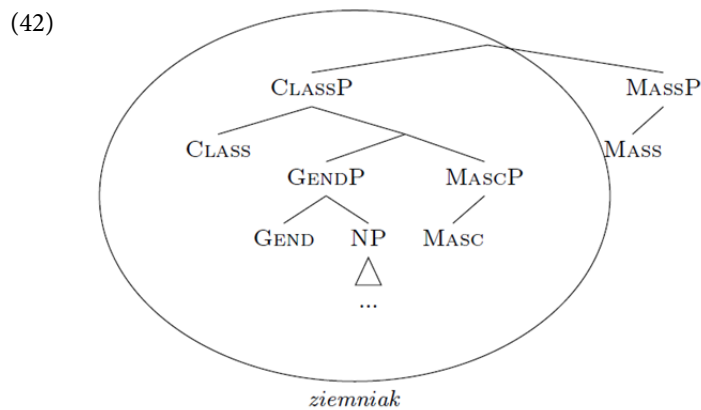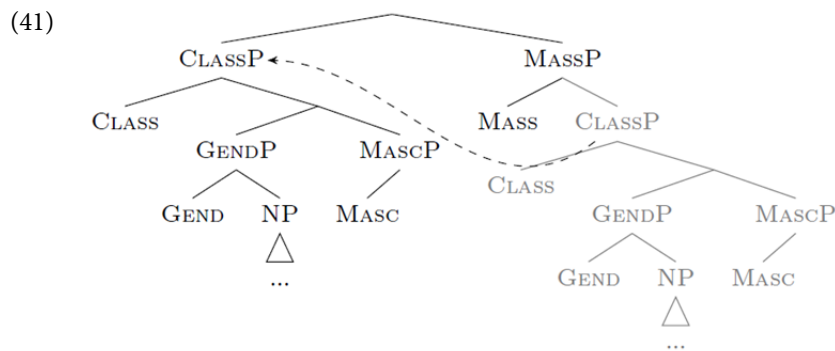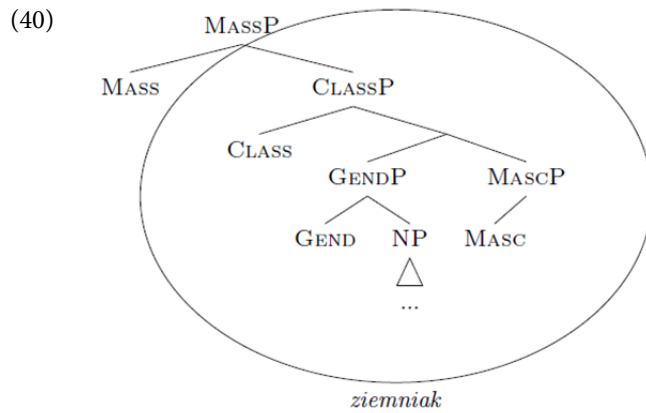
If lexicalization fails after the first rescue movement, i.e., evacuation, a second rescue movement must be applied. This step requires the evacuation of the immediately dominating constituent. In essence, this means that the closest labelled non-remnant constituent takes its sister node and evacuates with it above the newly merged feature. This procedure is also called pied-piping and it aligns with the updated version of the Lexicalization Algorithm, (43):

(43)   Lexicalization Algorithm (Caha et al. 2023: 41), version 3 of 4
  a. Merge F and lexicalize.
  b. If fail, evacuate the closest labelled non-remnant constituent and lexicalise.
  c. If fail, evacuate the immediately dominating constituent and lexicalise (recursive).

The problem with the structure in (40) is that pied-piping cannot be done as CLASSP does not have a sister node to pied-pipe (the newly merged feature cannot be involved), the only possible option was evacuation, (41). If pied-piping proves ineffective (or is not realizable as in (40)), backtracking, the final step of the Lexicalization Algorithm, applies. See (44) for the updated and the last version of the Lexicalization Algorithm:

(44)   Lexicalization Algorithm (Caha et al. 2023: 41), version 4 of 4
        a. Merge F and lexicalize.
        b. If fail, evacuate the closest labelled non-remnant constituent and lexicalise.
        c. If fail, evacuate the immediately dominating constituent and lexicalise (recursive).
        d. If fail, go back to the previous cycle, and try the next option for that cycle (Starke 2018: 245).

Backtracking requires the derivation to return to the previous cycle – in this case, to the merging of the preceding feature (CLASS) – and attempt the next option outlined in the Lexicalization Algorithm. When CLASS was merged, (38), no rescue movement was employed; thus, the next step now involves evacuation of GENDP. (45) shows going back when merging CLASS, (46) the evacuation and (47) the unsuccessful lexicalization.

(45)

(46)

(47)
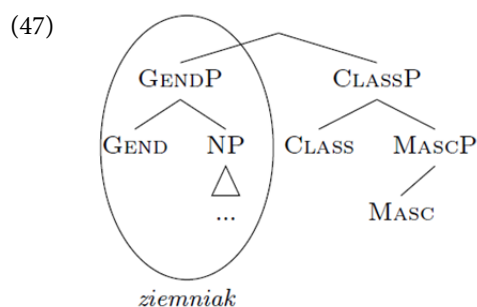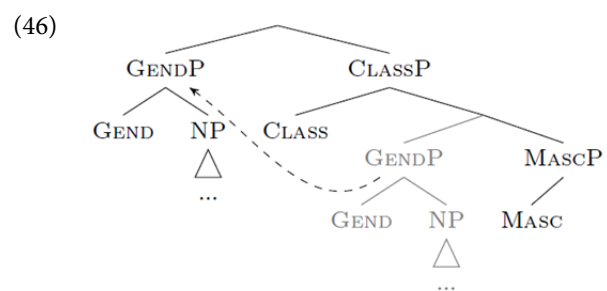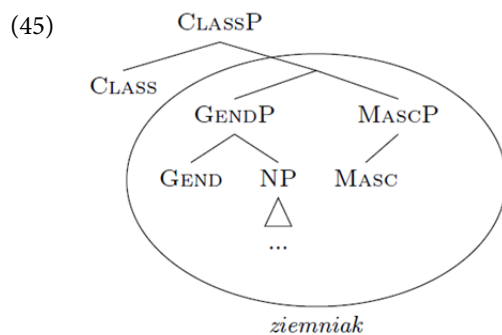
As seen, evacuation of the closest labelled non-remnant constituent does not help, thus pied-piping as the next rescue movement applies. Emerging from (45), pied-piping is applied in (48). GENDP is the closest labelled non-remnant constituent and it can pied-pipe its sister, i.e., MASCP. The gray circles serve as visual aids to indicate which constituent is being moved during pied-piping. They are auxiliary and do not actually exist in the real syntactic structure.

(48)
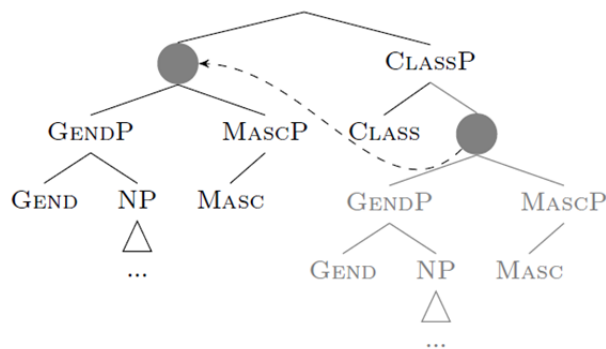
(49)
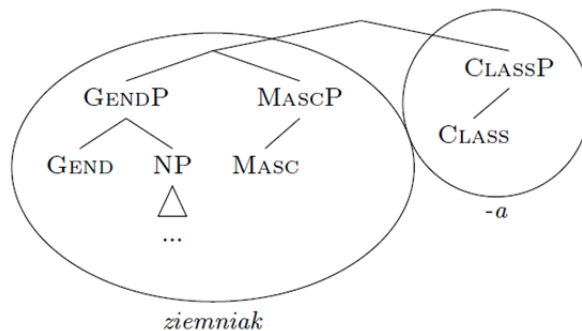
The structure in (49) lexicalizes as *ziemniak* and *-a*, due to the Elsewhere Condition, (50):

(50)   Elsewhere Condition (Kiparsky 1973, cited from Caha et al. 2023)
       In case two rules, R1 and R2, can apply in an environment E, R1 takes precedence over R2 if it applies in a
       proper subset of environments compared to R2.

As the Condition says, in case of two competing lexical entries, the one with less features wins, thus the structure in (50) lexicalizes as *-a*.

   To derive the noun from pseudo-partitive phrases: *kawałek ziemniak-a* 'a piece of potato', MASS needs to be merged, (51):

(51)
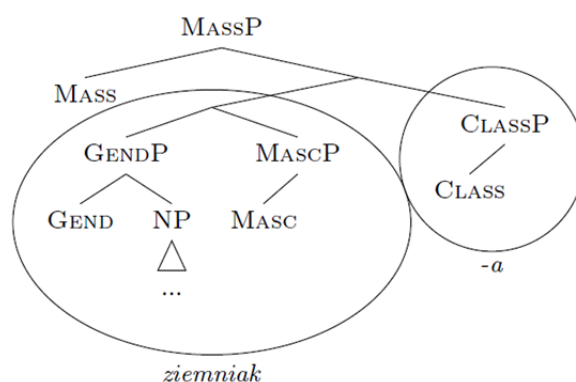
The structure in (51) cannot be lexicalized, thus the rescue movements are triggered. The first one being the evacuation of GENDP. However, its evacuation does not help with lexicalization, (52), thus pied-piping is employed, (53), leading to *ziemniak* and *-a*, (54), from the pseudo-partitive phrase *kawałek ziemniak-a* 'a piece of potato'.

(52)
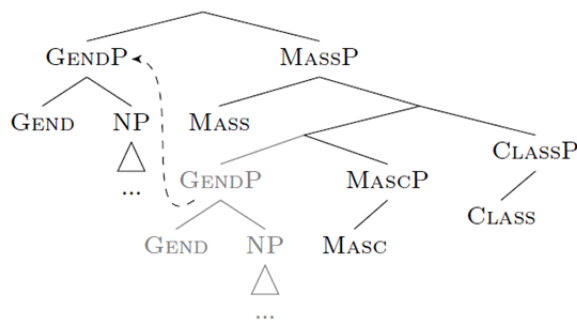
(53)
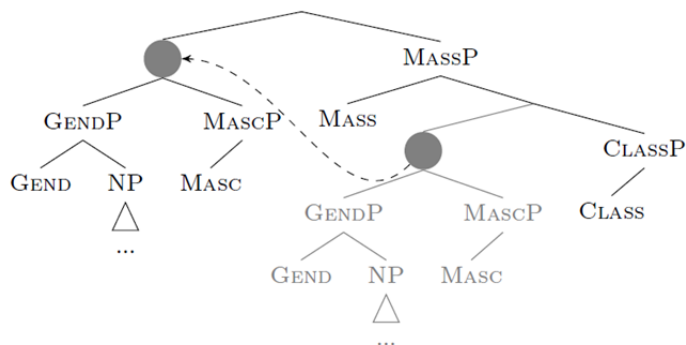
(54)
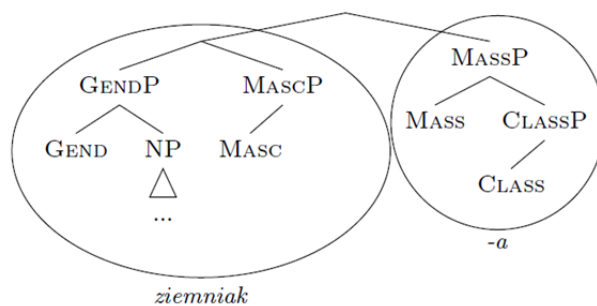
To derive the noun from low-counting phrases, CL and PAUC must be merged. Upon merging CL, (55), lexicalization fails, necessitating a rescue movement. Thus, GENDP is evacuated, (56). The resulting structure allows for lexicalization as *ziemniak* and *-i*, (57). This is the step when the magic happens. With this sub-extraction, the shape of the whole suffix changes and it is identical to the *-i* suffix required for the low-counting context within the ABC pattern.

(55)
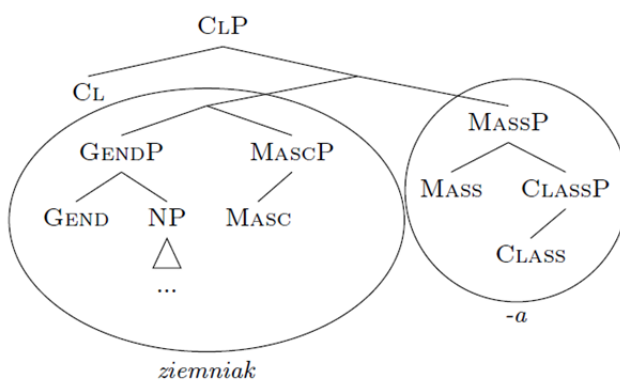
(56)
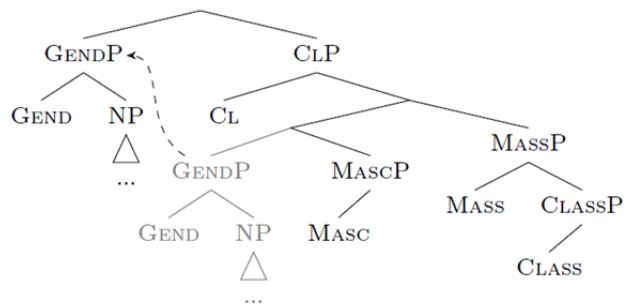
(57)
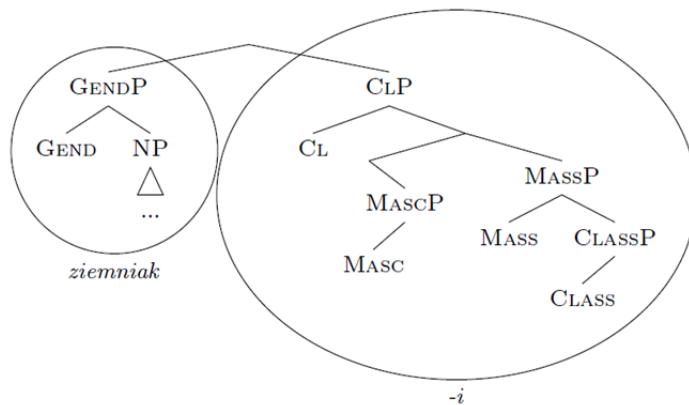
The same step is applied when merging PAUC: GENDP is evacuated, resulting in (58), the structure of the noun in the low-counting phrase: *dwa ziemniak-i* 'two potatoes'.

(58)
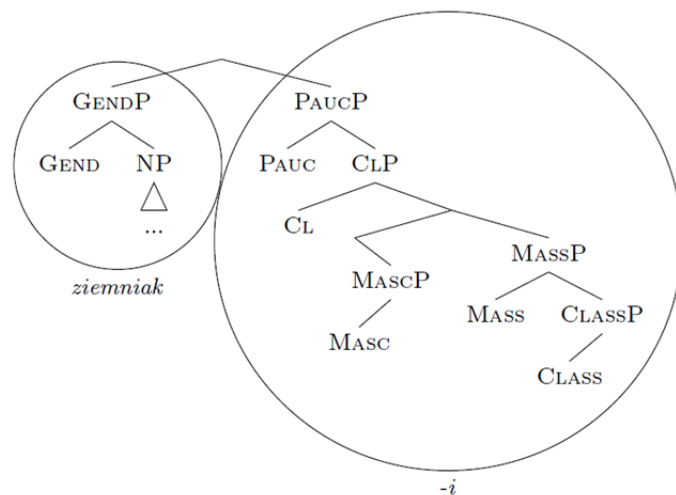
This specific form of the *-i* suffix ensures that it appears exclusively with masculine nouns, unlikethe *-a* suffix, which is restricted to neuter nouns.

To derive the noun from the high-counting phrase: *pięć ziemniak-ów* 'five apples', QUANT must be merged. With analogous steps – evacuating of GENDP – the resulting structure, (59), shows *ziemniak* and *-ów*.

(59)
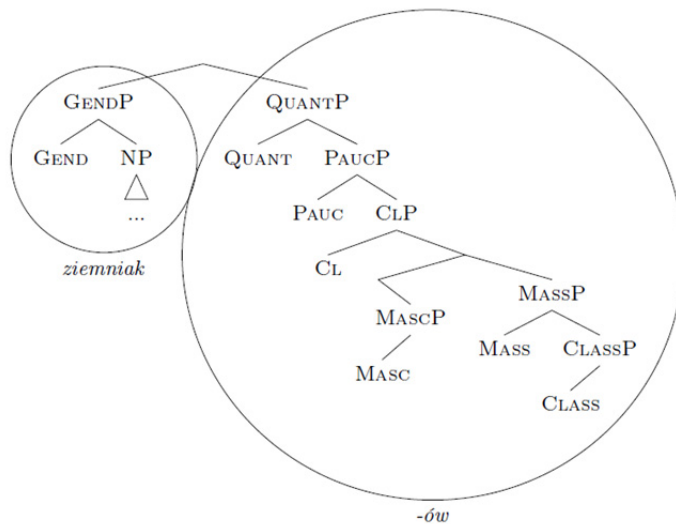
This pattern faces a challenge due to the suffix *-a*, appearing in pseudo-partitive phrases of both patterns, but is absent in low-counting phrases, where *-i* appears instead. The structure of each suffix must allow it to appear in the appropriate context. The structure of *-a* allows it to appear in pseudo-partitive phrases for both patterns but prevents it from appearing in low-counting phrases within ABC. The *-ów* suffix, having no rival, can adopt the structure of *-i* and incorporate QUANT, as it is used in high-counting contexts.

3.3. ABA

The final observed syncretism pattern is ABA. While often labelled ABA due to its structural shape, this pattern differs significantly from other cases discussed in the literature. For instance, Bobaljik (2012) analyses ABA patterns in adjectival morphology, where the root alternates (e.g., good – better – *goodest), and such cases are typically handled in Nanosyntax by root suppletion and backtracking. Similarly, Cortiula (2023) discusses verbal ABA-like patterns in Friulian, which involve root alternations and are often described as pseudo-ABA (e.g., Middleton 2020).

In contrast, the Polish ABA pattern examined here shows no alternation in the root. The root remains constant across all three cells, and the variation arises solely in the suffix: it follows an Ax–Ay–Ax pattern. This makes the Polish case a different analytical challenge, requiring a different solution than suppletion - or root-based analyses. For this reason, we retain the label ABA descriptively, while recognising that it represents a distinct subtype of syncretism patterns, one where the suffix – not the root – alternates in a non-monotonic way. The relevant Polish data, originally presented in (4), are repeated in (60):

(60) ABA (Native speaker)
    a.   kawałek   **pomarańcz-y**
         a.piece.NOM   orange.F-GEN.SG
         'a piece of orange'
    b.   dwie   **pomarańcz-e**
         2.NOM.F   orange.F-NOM.PL
         'two oranges'
    c.   pięć   **pomarańcz-y**
         5.NOM   orange.F-GEN.PL
         'five oranges'

The order partitive < paucal < high-counting assumed in this analysis is not derived from surface syncretisms, but from the internal structure of the quantified noun phrase. In the Polish ABA paradigm, exemplified by *pomarańcz-y* (GEN.SG), *pomarańcz-e* (NOM.PL), and *pomarańcz-y* (GEN.PL), the suffix *-y* appears in the first and third cells, with *-e* intervening in the paucal context. This pattern necessitates a structural sequence where the paucal cell is sandwiched between the partitive and the high-counting cell. The syntactic motivation for this ordering lies in the functional sequence assumed here: partitives project only up to MASS, paucals add CL and PAUC, and high-counting phrases further extend the structure with QUANT. This cumulative architecture has been independently supported by derivational and morphological diagnostics presented in Žoha (2025b), and underpins the ABA configuration discussed below.

    The structure of each morpheme used is summarised below, (61):

(61)   Lexicalization table

NP	GEND	MASC	FEM	CLASS	MASS	CL	PAUC	QUANT	
pomarańcz									'orange'
					-y				P-PART
							-e		LOW
								-y	HIGH

While the lexicalization table illustrates the morpheme structure, it does not convey the spatial configuration. The lexical entries below, (62), provide this structural representation:

(62)   Lexical entries

c.   PaucP ⇔ /e/

d.   PaucP ⇔ /-a/

e.   QuantP ⇔ /-ow/

f.   PaucP ⇔ /-i/

To fully account for intermediate steps, lexical entries for the suffixes *-a* and *-i* are included.

The derivation begins by merging and lexicalizing compatible features until encountering Fem, where no match occurs, (63). This necessitates the evacuation of MascP, (64), as the closest labelled non-remnant constituent. Once this is done, the structure can be lexicalized as *pomarańcz*, (65).

(63)

pomarańcz

(64)

(65)

pomarańcz

(66)
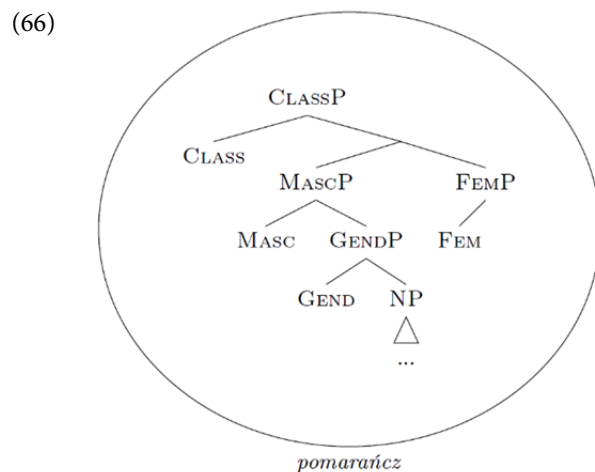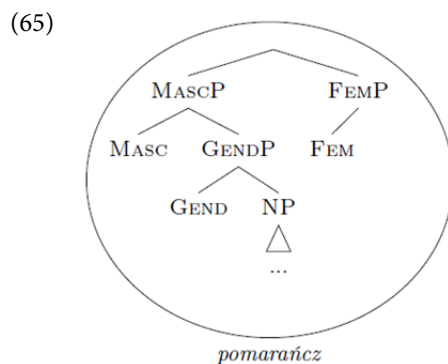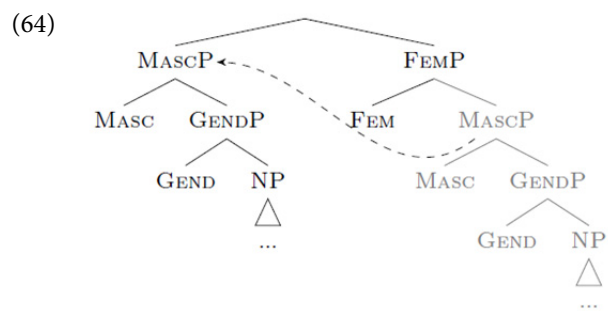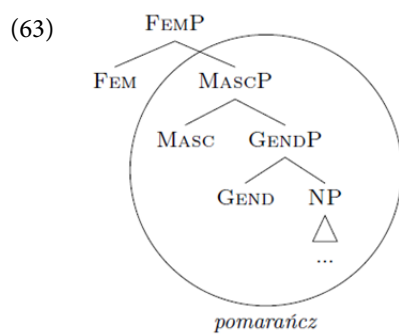
pomarańcz

The last step to derive the full structure of the root noun *pomarańcz* is merging CLASS. Since no rescue movement is required, the whole structure can be lexicalized as *pomarańcz*, (66).

When deriving the noun from pseudo-partitive phrases, MASS must be merged, (67). As it cannot be lexicalized, evacuation of CLASSP is triggered, but failing to achieve lexicalization, (68).[5]

(67)

MASSP

MASS   CLASSP

CLASS

MASCP   FEMP

MASC   GENDP   FEM

GEND   NP
△
...

pomarańcz

(68)

CLASSP ←----   MASSP

CLASS   MASS   CLASSP

MASCP   FEMP----   CLASS

MASC   GENDP   FEM   MASCP   FEMP

GEND   NP   MASC   GENDP   FEM
△
...   GEND   NP
△
...
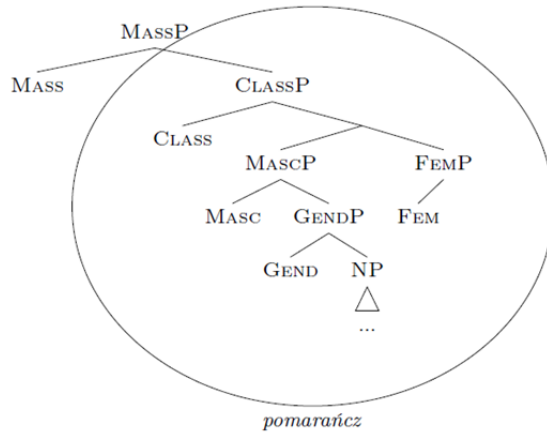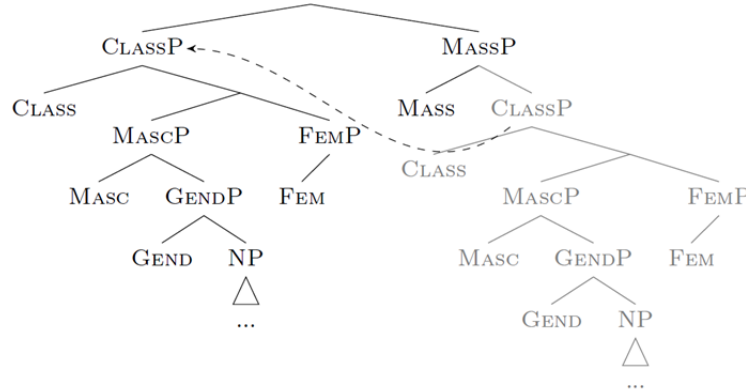
As rescue movements are ineffective, backtracking applies, requiring the derivation to return to the previous cycle – the merging of CLASS – and try the next step. When merging CLASS, no rescue movement was needed; thus, evacuation of MASCP is involved. (69) shows going back to merging CLASS, (70) the evacuation and (71) the lexicalization as *pomarańcz* and *-y*.

(69)

CLASSP

CLASS

MASCP   FEMP

MASC   GENDP   FEM

GEND   NP
△
...

pomarańcz

(70)

MASCP ←----   CLASSP

MASC   GENDP   CLASS

GEND   NP   MASCP   FEMP
△
...   MASC   GENDP   FEM

GEND   NP
△
...

---
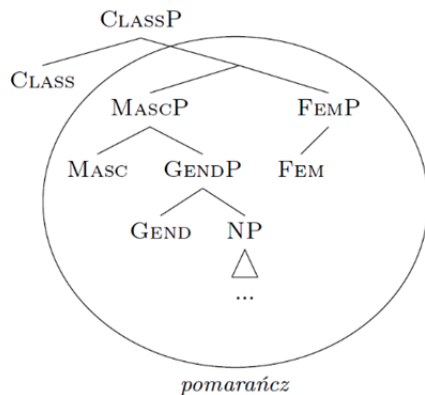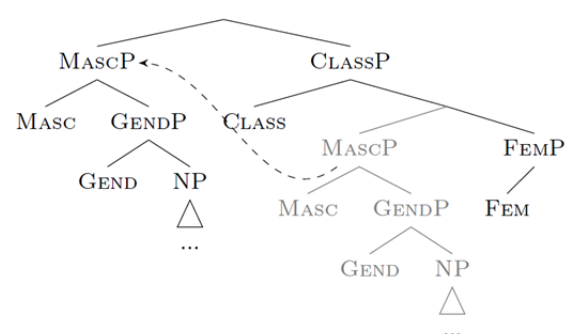
[5] A reviewer has suggested a movement of MASCP. This, however, would be considered as a special type of "depth" sub-extraction as discussed with Pavel Caha (p. c., 2025). For the needs of this paper, I stick with sub-extractions as known in the Lexicalization Algorithm proposed in Caha et al. (2023).

(71)
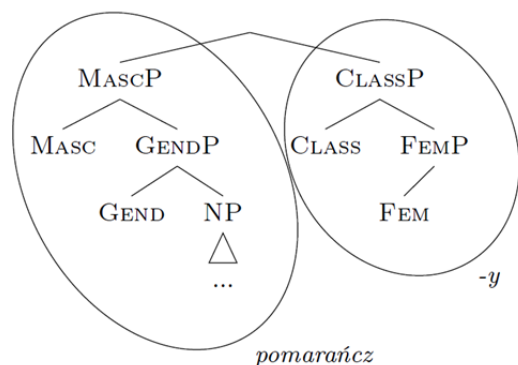
When merging MASS, evacuation of MASCP is employed, resulting in (72) used in the pseudo-partitive phrase: *kawałek pomarańcz-y* 'a piece of orange'.

(72)
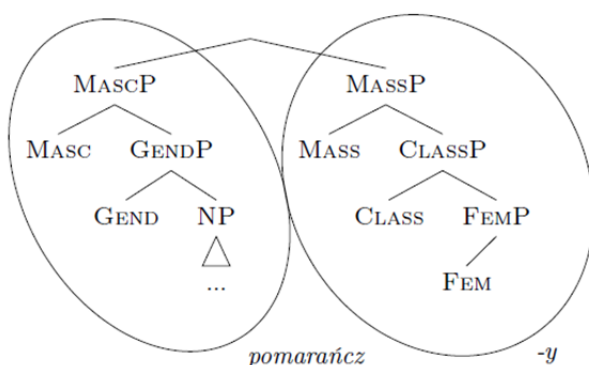
In low-counting phrases, the structure of the noun requires the merging of CL and PAUC. As shown in (73), simply merging CL does not make the structure lexicalizable. Neither the evacuation of MASCP resolves the issue, (74), nor pied-piping, (75); thus the structure remains unlexicalizable.

(73)
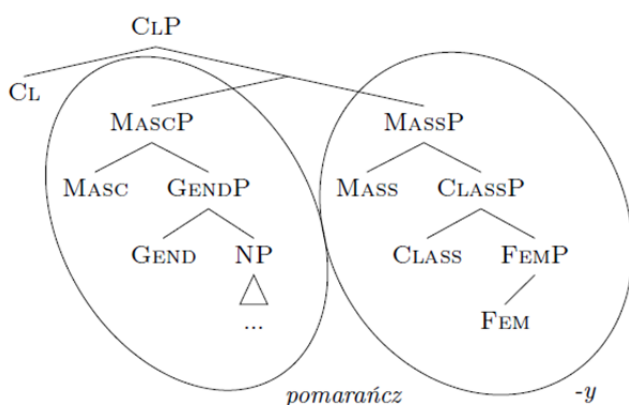
(74)
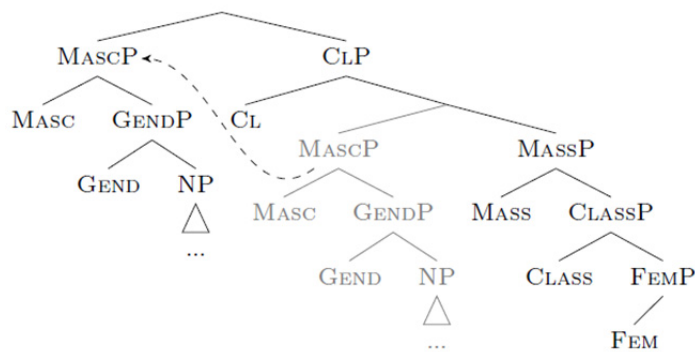
(75)
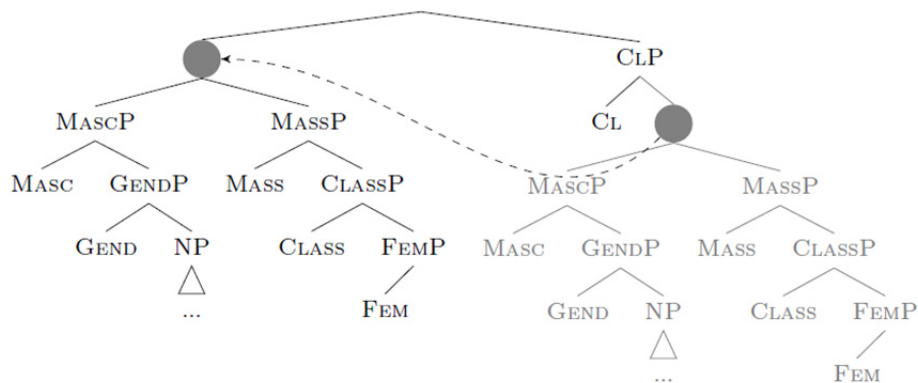
The last option to rescue the derivation is backtracking, i.e., to go back when merging MASS, (76). The previous step was evacuation, thus now pied-piping is required, (77).

(76)
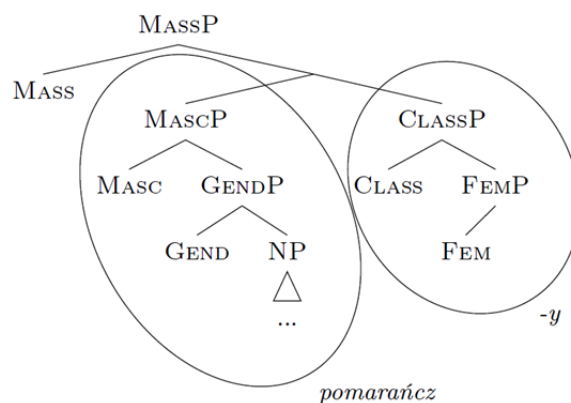
(77)
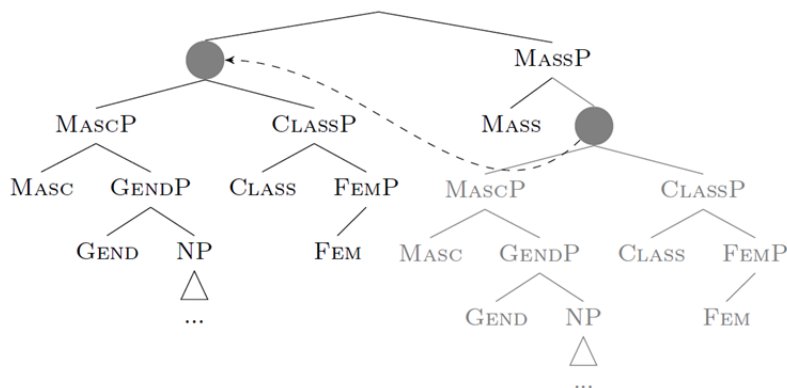
Pied-piping in (77), does not lead to a lexicalization, thus backtracking to merge CLASS is needed, (78). The previous step was an evacuation, (70), thus now pied-piping is required, (79):

(78)

(79)
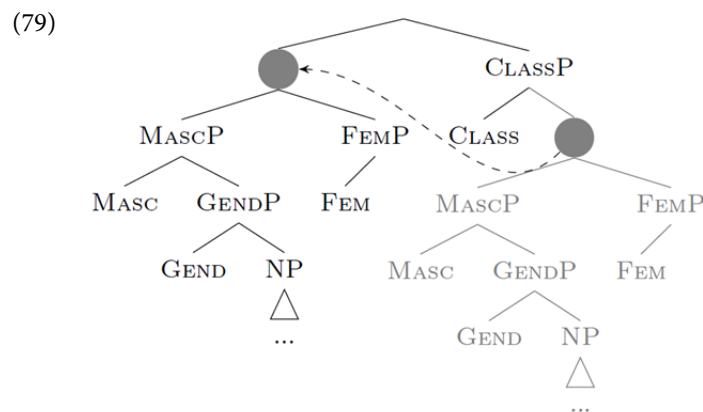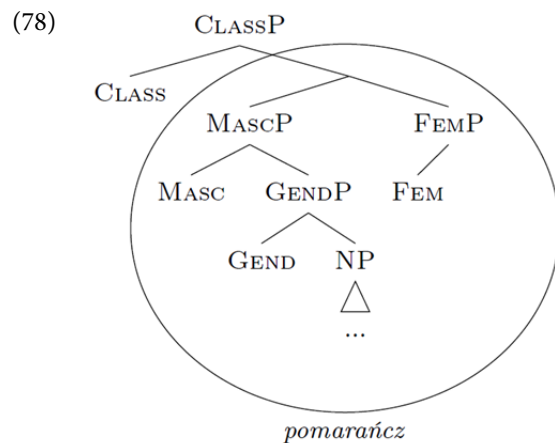
(80) shows the successful lexicalization of the derivation as *pomarańcz* and *-a*. Although *-a* is not the target suffix, the derivation can proceed as long as there is a match with lexical entries.

(80)
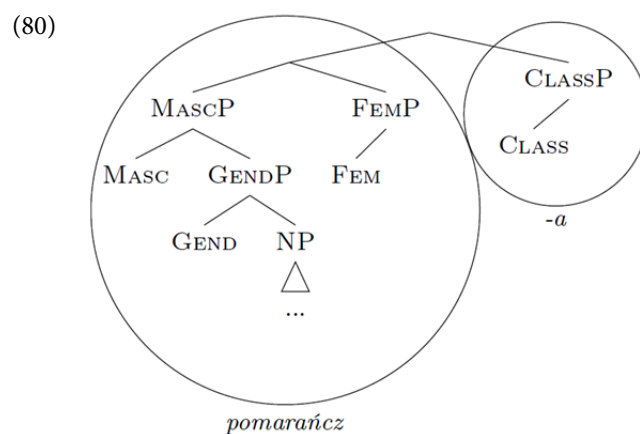
The very same steps, i.e., pied-piping, are followed when merging MASS resulting in (81):

(81)
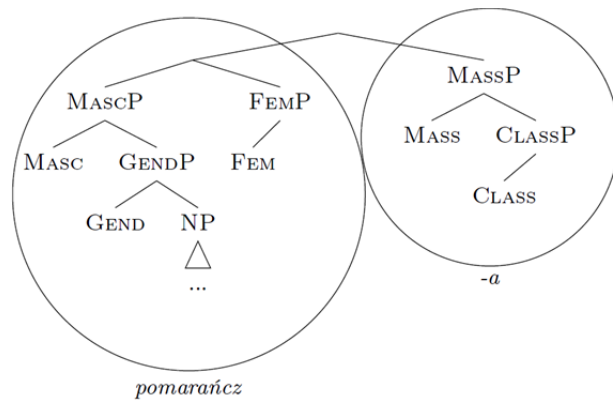
In the next step, CL is merged, (82). As the structure cannot be lexicalized, the closest labelled non-remnant constituent must be evacuated (MASCP), (83), resulting in *pomarańcz* and *-e*, (84).

(82)
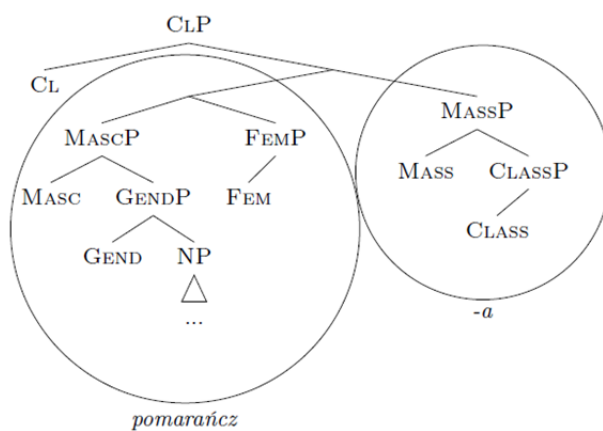
(83)
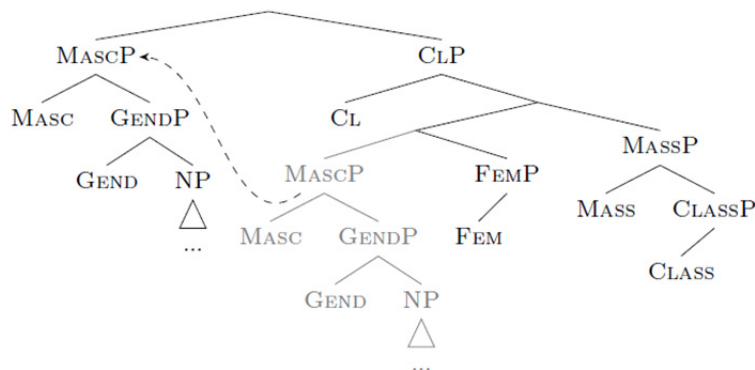
(84)
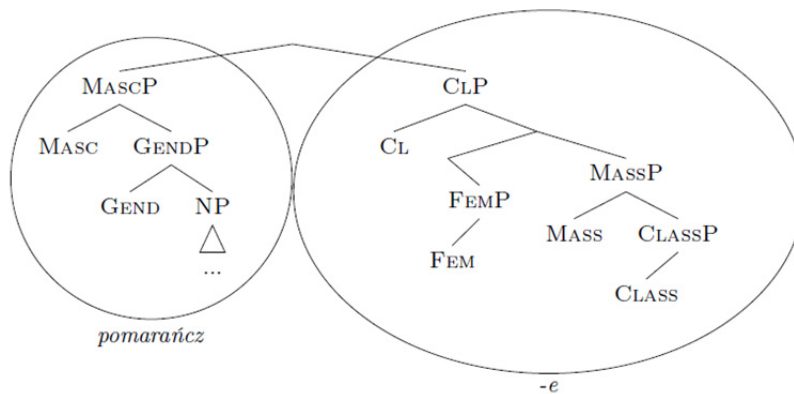
The same steps follow after merging PAUC, i.e., evacuation of MASCP resulting in (85), the structure of the noun in the low-counting phrase: *dwie pomarańcz-e* 'two oranges'.

(85)
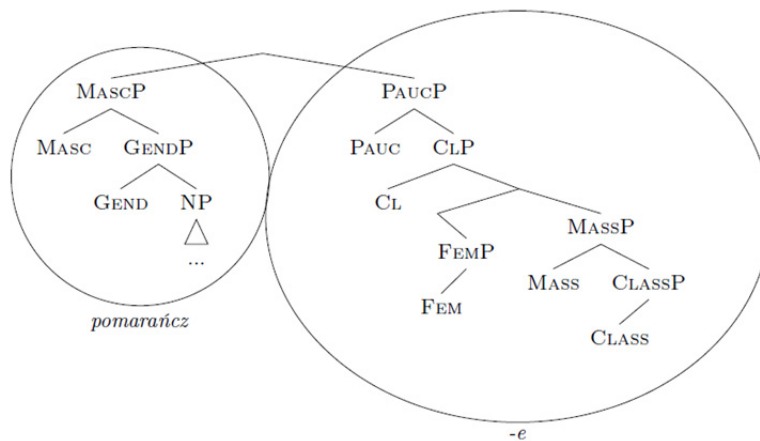
When merging QUANT, (86), to derive the noun from high-counting phrases, there is no possible lexicalization, thus rescue movements must be applied, but none of them work (see (87) for the evacuation of MASCP and (88) for pied-piping).

(86)
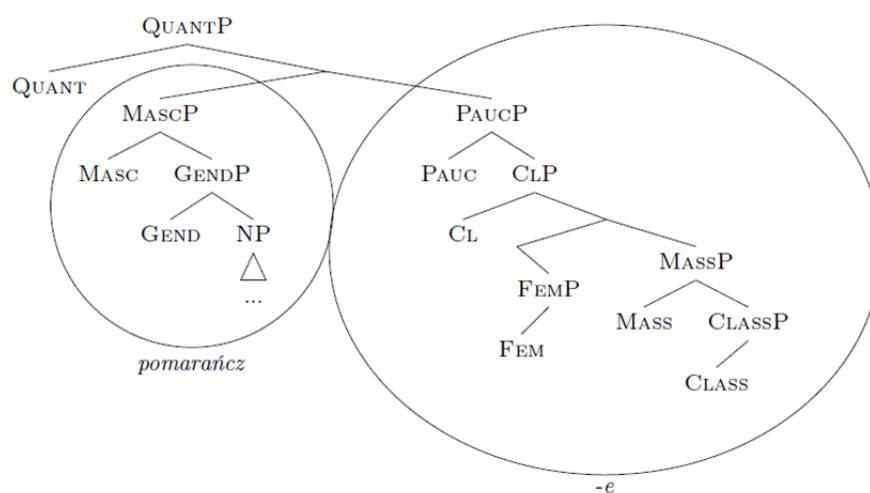
(87)
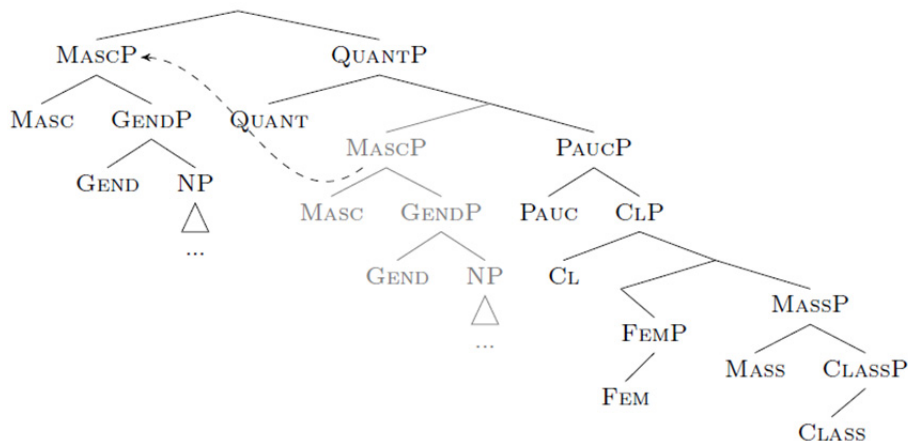
(88)
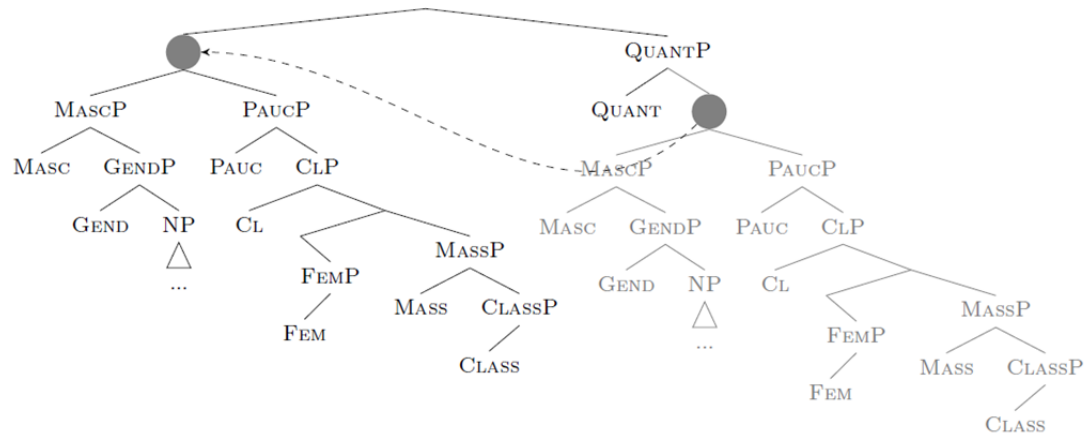
The only remaining step is backtracking. In the following paragraph, I describe the steps leading to a lexicalizable structure, the whole backtracking can be seen in the Appendix.

When merging PAUC, no rescue movement leads to a successful lexicalization, thus, more backtracking is required, i.e., merging CL with the same effect. The unsuccessful attempts continue until merging MASC, (89). The next step is evacuation of GENDP, (90), leading to successful lexicalization, (91), as *pomarańcz* and *-i*.

(89)

(90)

(91)
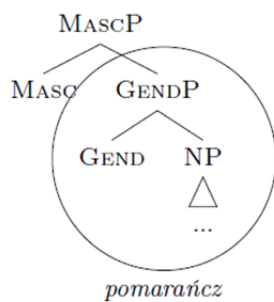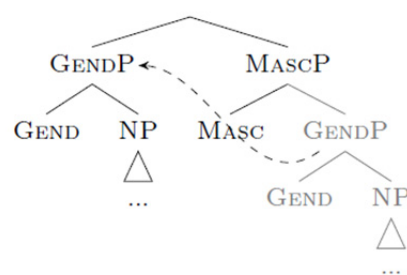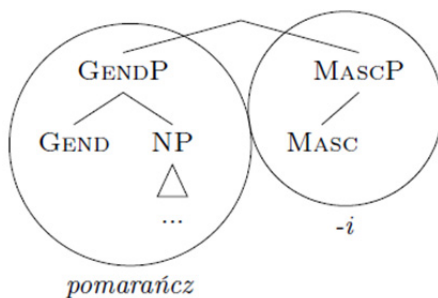
After these steps, the derivation proceeds as usual, i.e., merging the following feature being FEM, (92). The structure cannot be lexicalized, therefore the rescue movements are triggered, at first evacuation of GENDP, (93), leading to an unsuccessful lexicalization, thus pied-piping is triggered, (94), lexicalizing the structure as *pomarańcz*, *-i* and *-e*, (95). Even though the result includes two suffixes, this is not problematic: as long as each substructure matches an independently stored lexical entry, the derivation can proceed without violation of the Lexicalization Algorithm.

(92)

(93)

(94)

(95)
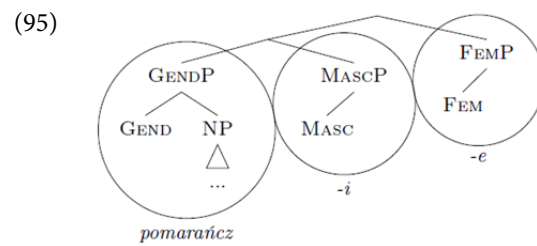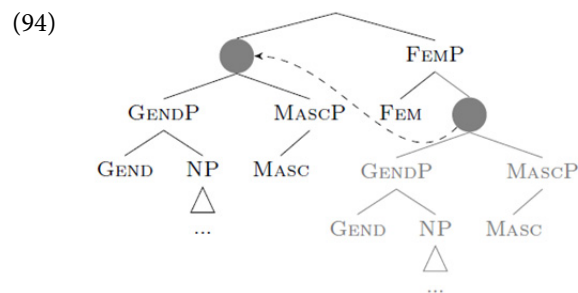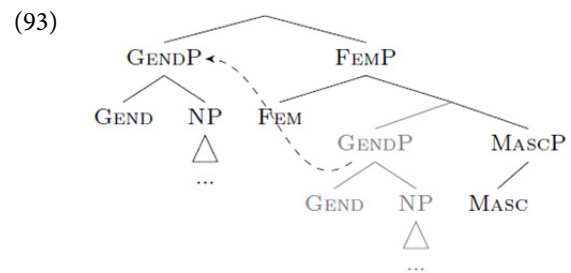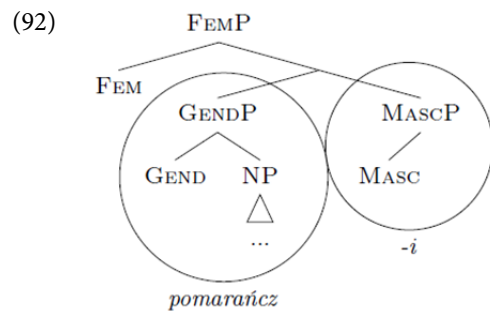
The derivation proceeds with merging CLASS, (96), requiring pied-piping, (97), (because evacuation does not lead to successful lexicalization) still resulting in *pomarańcz*, *-i* and *-y* in (98).

(96)

(97)
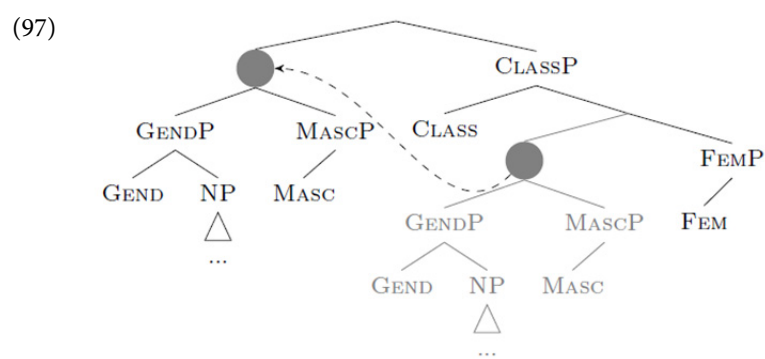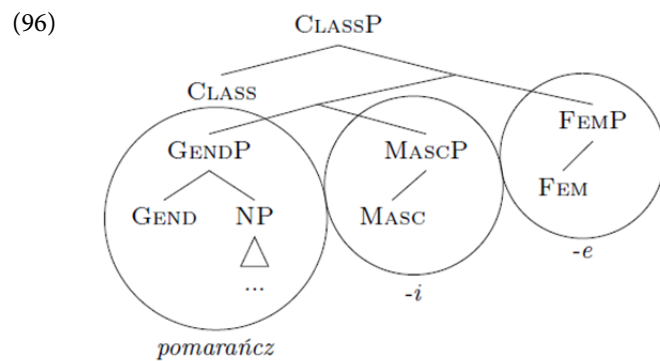
(98)
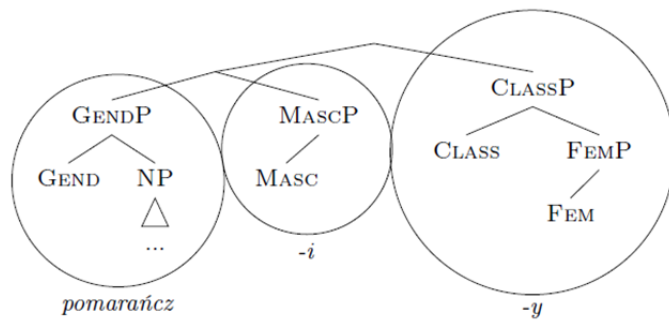
The very same steps are followed after merging MASS resulting again in *pomarańcz*, *-i* and *-y* in (99).

(99)
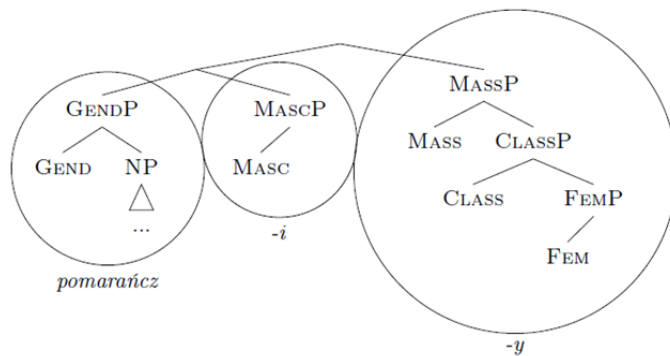
With merging the next feature, CL, (100), evacuation of GENDP is required, (101), leading to *pomarańcz* and *-y*, (102). This step brings the derivation to the target suffix *-y*, which structurally subsumes the previous lexicalizations.

(100)
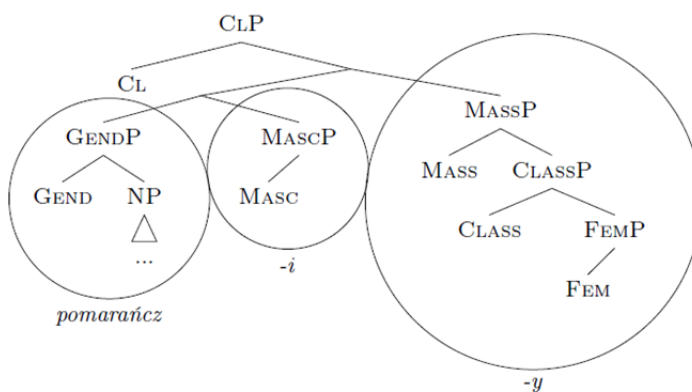
(101)
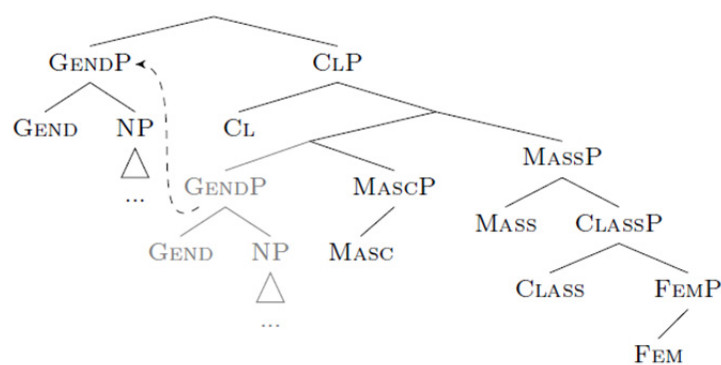
(102)
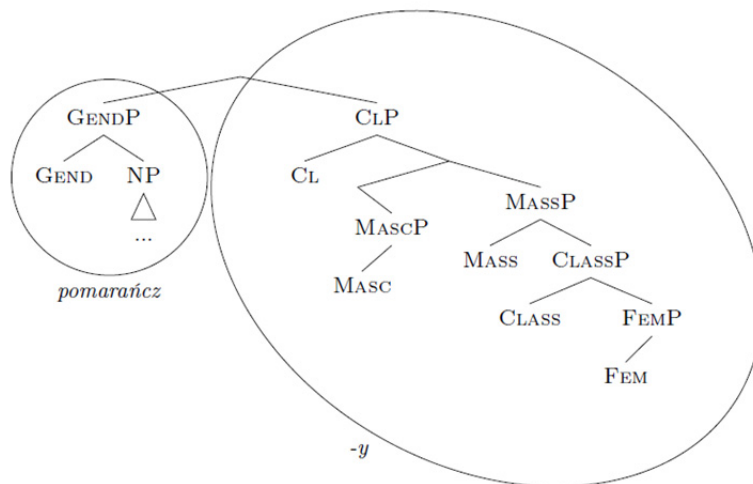
The same steps are applied, i.e., merging PAUC and evacuation of GENDP and merging QUANT and evacuation of GENDP, leading to the structure of the noun in the high-counting phrase *pięć pomarańcz-y* 'five oranges', (103):

(103)
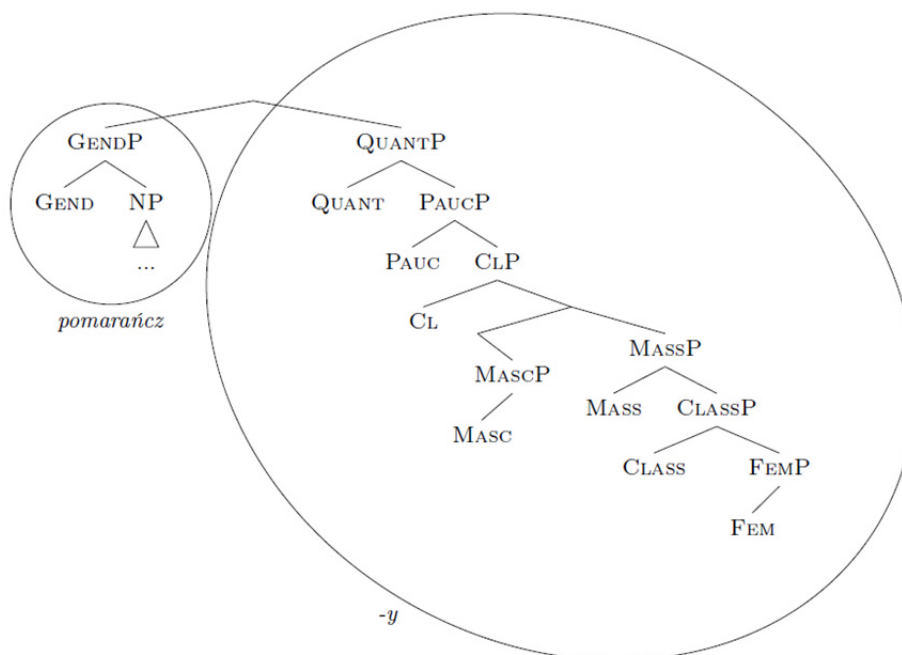
This section showed the solution to ABA as it is the most complex pattern with no adjacent syncretism. It challenges the theory as *-y* appears in the pseudo-partitive and the high-counting contexts overlapping the low-counting phrases, where *-e* appears.

4. Conclusions

This paper has explored the syncretism patterns in Polish pseudo-partitive and counting phrases, using Nanosyntax to analyze the structure of the nouns. Regarding suffixes, three syncretism patterns occur: AAB, ABC and ABA.

AAB and ABC align with expectations of adjacent syncretism, where morphological markers distinguish between pseudo-partitive, low-counting, and high-counting phrases. ABA, however, challenges theoretical assumptions about its unattested nature (*ABA), offering evidence of its systematic occurrence in the Polish feminine declension. This finding not only validates the potential of *ABA configurations but also underscores the importance of structural hierarchies in determining syncretism patterns.

The use of the Lexicalization Algorithm was instrumental in modelling the structure of each pattern. By merging features incrementally and applying rescue movements when necessary, the study demonstrated how Polish nouns adopt specific suffixes to accommodate pseudo-partitive, low-counting, and high-counting contexts. The analysis also highlighted the role of features like MASS, CL, PAUC, and QUANT in shaping the structural and functional distinctions across these phrases.

Appendix: ABA backtracking

This section examines the backtracking after merging QUANT, (86), due to the failure of rescue movements to aid lexicalization. Initially, when PAUC is merged, (104), the subsequent operation involves pied-piping, (105).

(104)
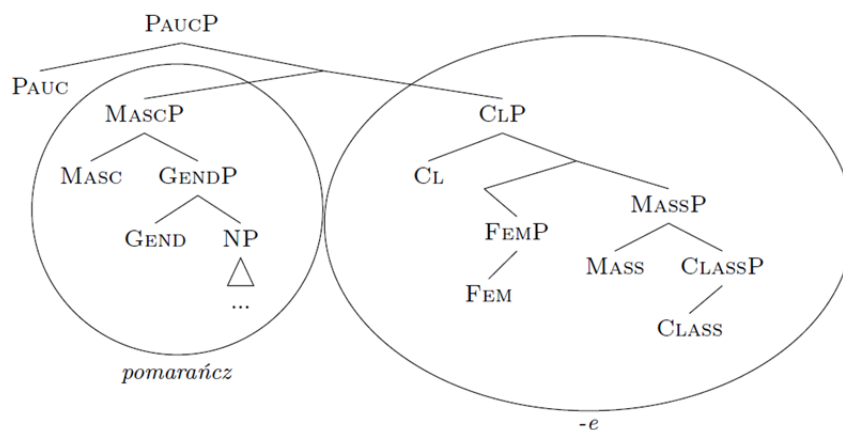
(105)
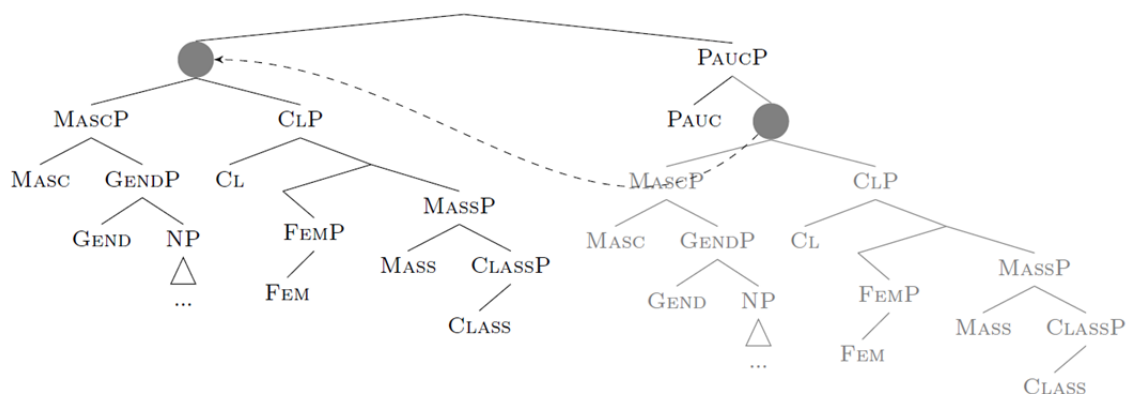
Since pied-piping does not lead to a successful lexicalization, backtracking becomes necessary beginning by returning to the point of merging CL, (106).

(106)

CLP

CL

MascP   FemP

Masc   GendP   Fem

Gend   NP

△

...

MassP

Mass   ClassP

Class

-a
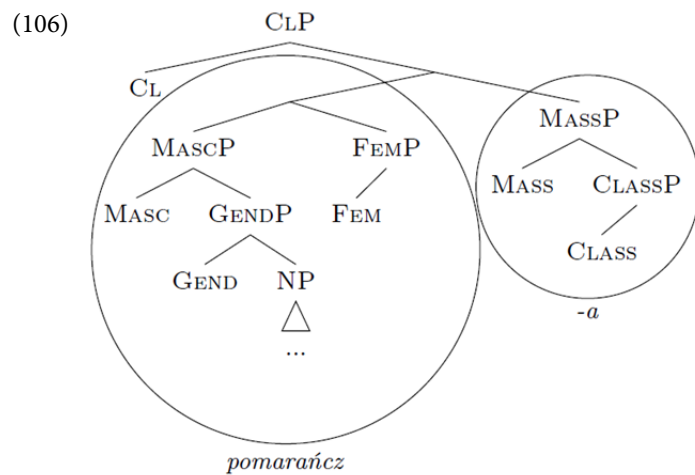
pomarańcz

At this stage, pied-piping is made, (107), instead of evacuation, (101).

(107)

CLP

MascP   FemP   CL

Masc   GendP   Fem

Gend   NP

△

...

MascP   FemP

Masc   GendP   Fem

Gend   NP

△

...

MassP

Mass   ClassP

Class
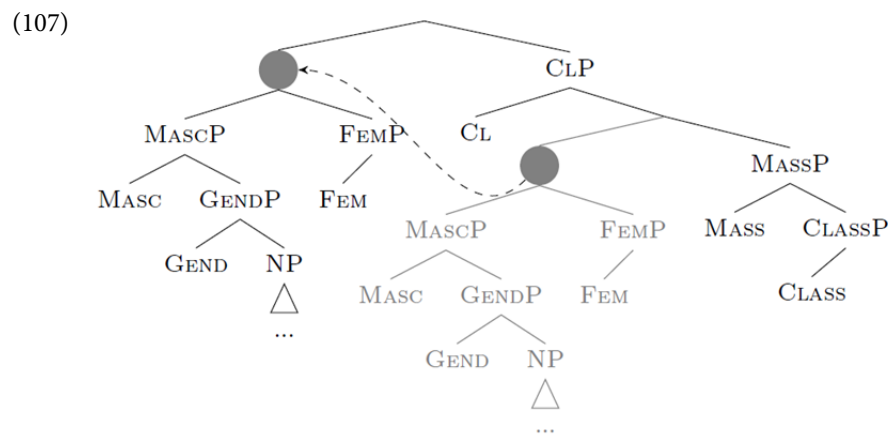
As shown in (108), the structure can be lexicalized as *pomarańcz* and *-a*. Lexicalization remains possible until PAUC is merged, (109), but fails with the addition of QUANT, (110).

(108)

MascP   FemP

Masc   GendP   Fem

Gend   NP

△

...

CLP

CL   MassP

Mass   ClassP

Class

-a

pomarańcz
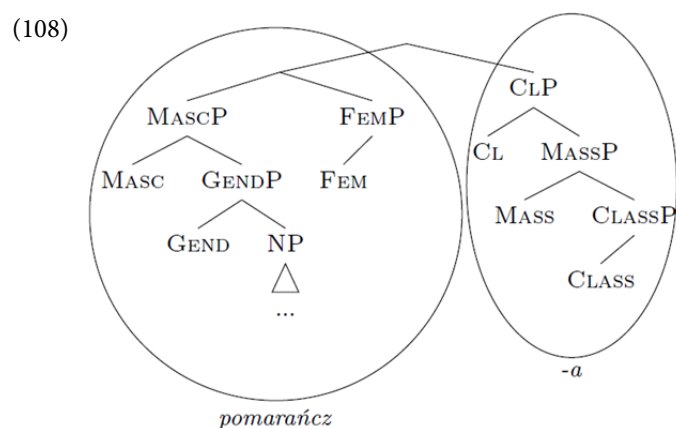
(109)
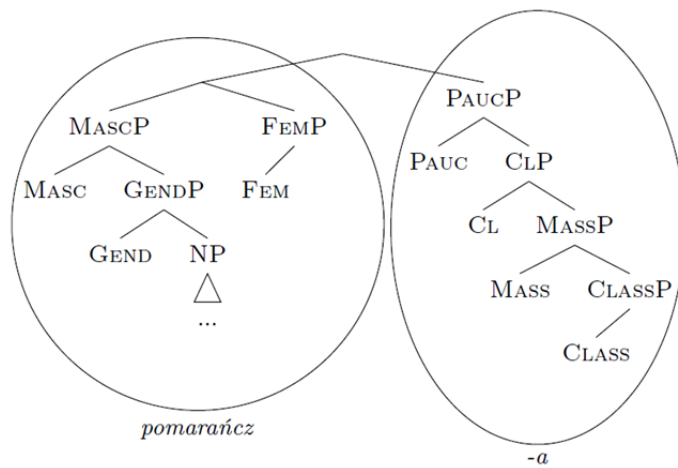
(110)
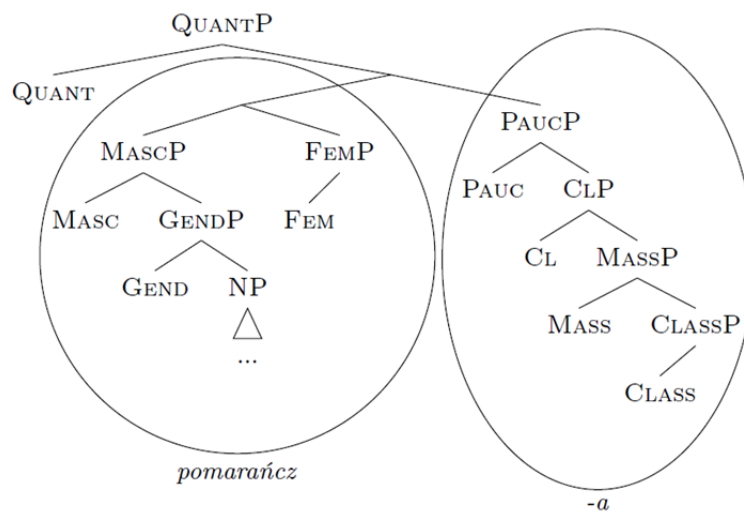
The rescue movements, (111), (112) and (113), fail to rescue the derivation, thus backtracking to merging PAUC is required, (114).

(111)
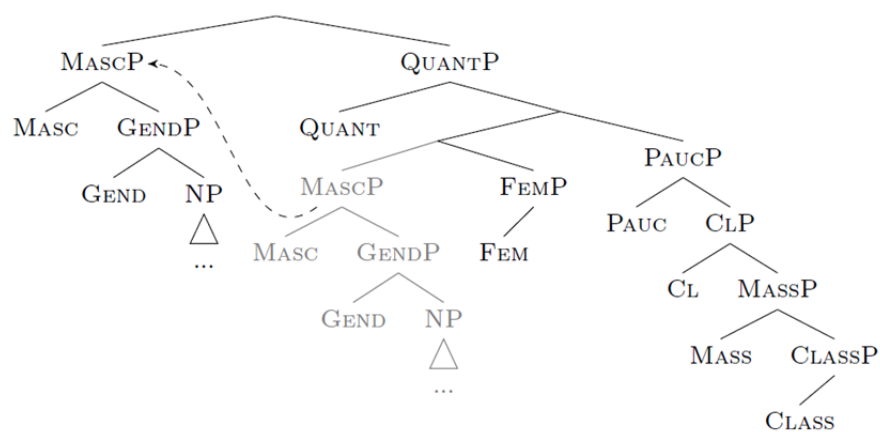
(112)
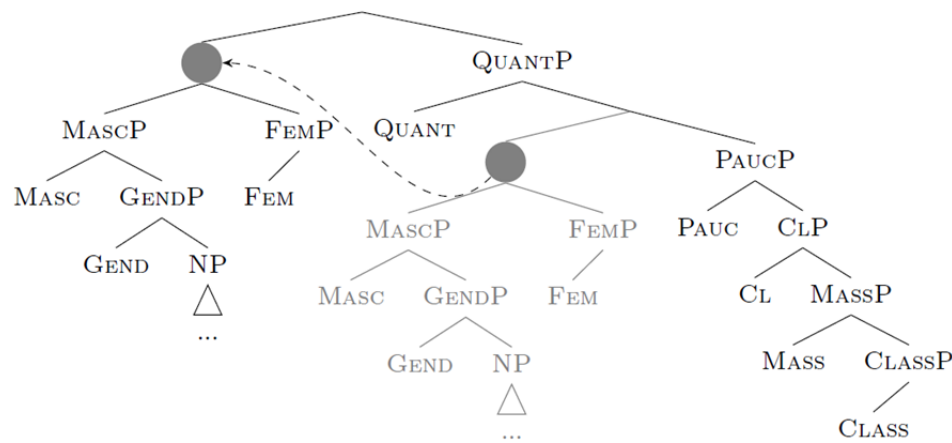
(113)
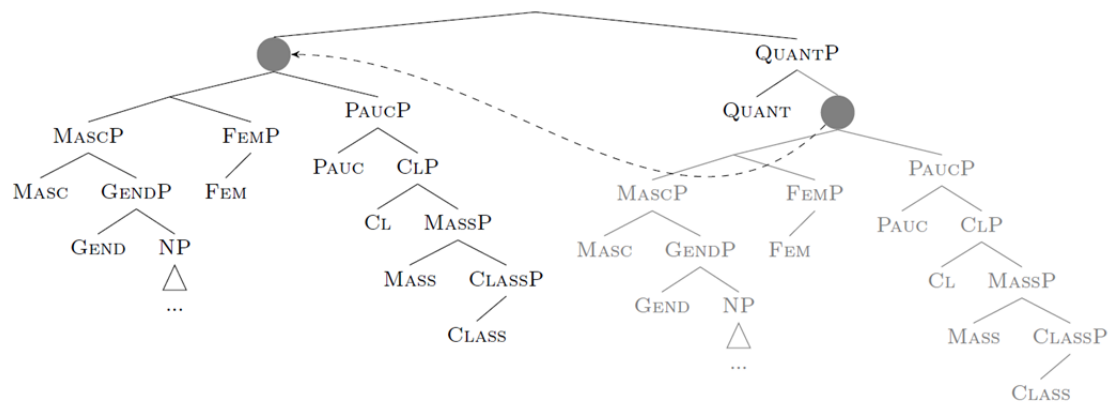
(114)
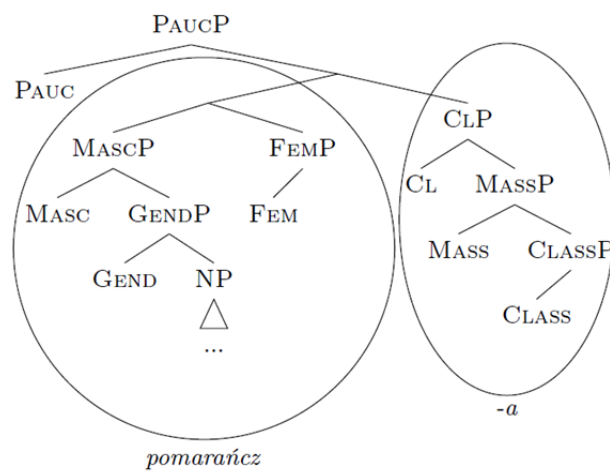
Even after backtracking to Pauc, the derivation cannot be rescued, (115), (116) and (117), necessitating further backtracking to merging Cl, (118).
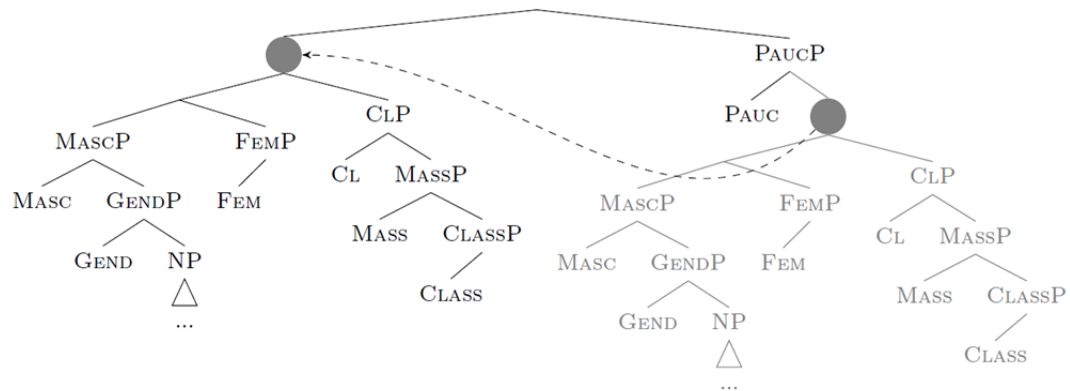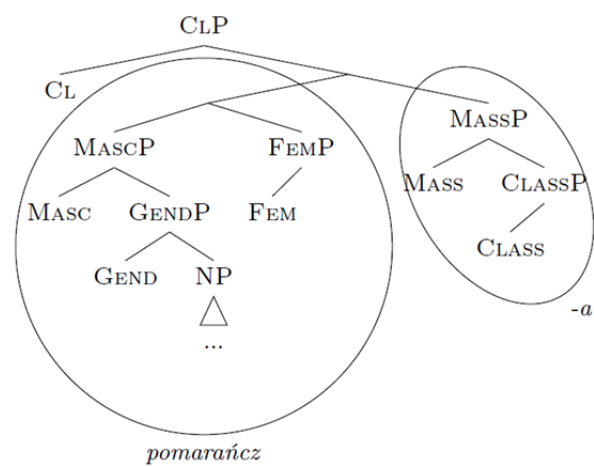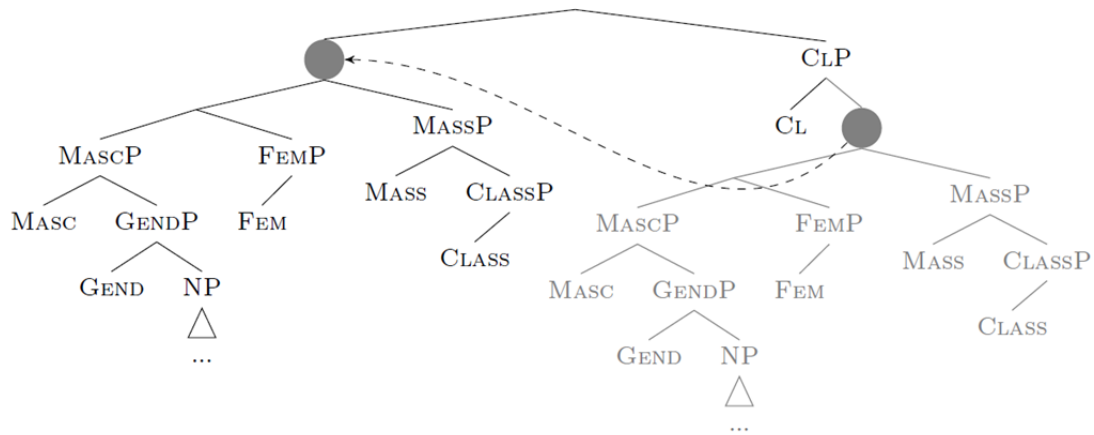
(115)
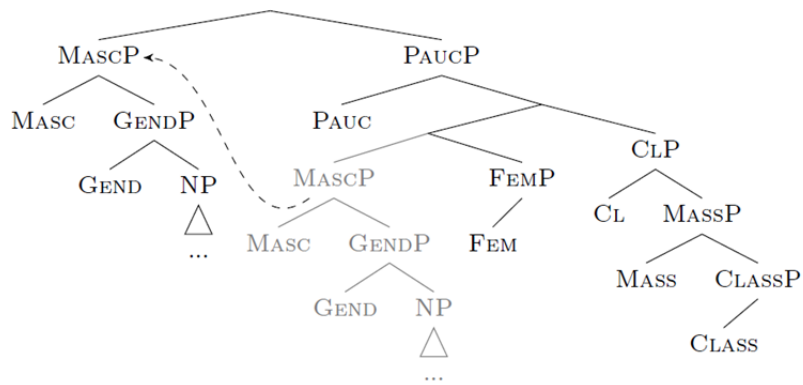
(116)
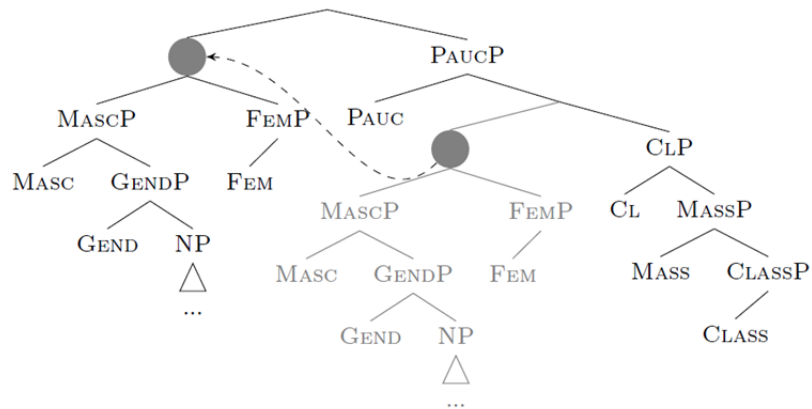
(117)

(118)

At this point, pied-piping, previously executed in (107), is revisited. Despite its recursive nature, an additional instance of pied-piping is performed, (119). However, even this repeated operation does not succeed in resolving the derivation.
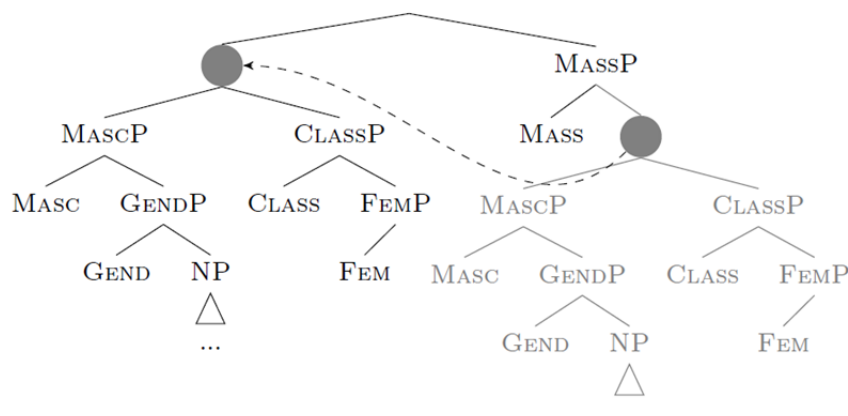
(119)

Thus backtracking to merging MASS is required, (120), and the next step is also pied-piping, (121), which does not help with the lexicalization.

(120)
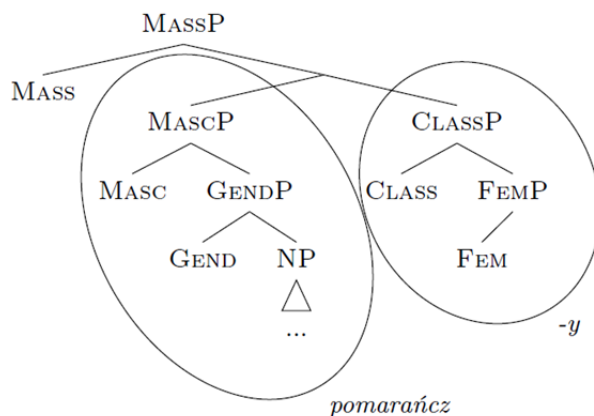
(121)

Consequently, more backtracking is needed, i.e., to merging CLASS. The problem now is that all the options for CLASS have been tried (evacuation in (70) and pied-piping in (79)), thus backtracking to merging FEM is triggered with the same effect (evacuation in (64), pied-piping was not possible). The next step is to backtrack to merging MASC as shown in (89).

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