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Spreading digital literacy via Minimal English. The concept of 'class' in Swift programming language

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Abstract
The article aims at providing explications of the concept of a class, as it is implemented in the Swift programming language offered by Apple. The explications are framed in Minimal English, which is based on the theory of Natural Semantic Metalanguage. Detailed analysis of the Swift concept of class leads to four distinct core explications of the programming construct in question and the related feature that Swift classes possess, namely the concept of property. The article's primary purpose is to offer a more smooth experience with programming, especially with beginners in mind. Their initial exposure to programming might face several challenges due to the complicated digital jargon of the documentation. Minimal English is implemented to ease the learning curve and promote digital literacy as one of the most fundamental skills in today's world.

Keywords: programming, Swift language, Natural Semantic Metalanguage, Minimal English

1. Introduction

If literacy today might be taken for granted, digital literacy still has a long way to be considered a widespread skill available to everyone. In a well-researched book, *How Was Life? Global Well-being since 1820*, which is a selection of commentaries on world literacy seen from several alternative viewpoints and time frames, the authors try to pin down the actual gain which goes together with language competence and state the following:

> 'Literacy and education are crucial variables determining well-being, since they not only directly influence a person's intrinsic agency, but also indirectly affect well-being in material (e.g. per capita income and wages) and immaterial terms (e.g. lower crime rates, higher life expectancy).'
>
> van Leeuwen and van Leeuwen-Li (2014: 98)

It is particularly interesting to situate literacy in this combined context of gains and their intrinsic opposition. While oscillating between the two poles, material gains vs immaterial gains, it is tempting to conclude that the very skill of becoming literate, which is essentially yet another area of knowledge one can take the effort to master, can lead to tangible results. Not only do they provide change to the general well-being of the humankind but also have the

potential to enrich the physical reality as they translate literacy into a better social status of an individual. Investigating different planes of literacy in ancient Greece, Rosalind Thomas seems to give special attention to the tangible results on which the promotion of literacy had to necessarily concentrate: "for literacy to take root in a society, it has to have meaning, it needs to have obvious and valuable uses, to be 'relevant' or empowering in some way" (Thomas 2009: 13). It would not be far-off to presume that, historically, literacy has been the type of skill that allowed people to enjoy being 'upwardly mobile'. Educators' role in promoting the immediate advantages that go together with acquiring the ability to read and write is beyond dispute. David Olson, discussing the 'literacy hypothesis', which he understands as: "the bold claim that the invention, adoption, and application of a new mode and technology of communication, namely writing, altered the social practices of the society as well as the cognitive processes of those so affected" (Olson 2009: 386), appears to reiterate the underlying role played by educators: "the literacy hypothesis received a ringing endorsement from educators. It confirmed the long-held belief that early education, centered on learning to read and write, was a universally valid goal" (Olson 2009: 387).

Few would argue that the contemporary idea of literacy assumes a far broader meaning and is hardly limited to acquiring an essential skill set allowing one to communicate with words. Rijpma observes that "in respect to basic education, the world has progressed from low to near-universal literacy attainment" (Rijpma 2014: 251), and, echoing van Leeuwen and van Leeuwen-Li, declares that "education is important for well-being because improved access to information is of intrinsic importance, but also because there are indirect effects through the impact of education on other well-being indicators, such as income, health and political stability" (Rijpma 2014: 251). The contemporary world offers other stimuli for 'upward mobility'. Becoming a digitally literate participant of life creates many more opportunities for an individual, not only from the perspective of sheer income capability but also from the viewpoint of challenging the traditional modes of cognitive processes attached to reasoning and categorizing the digital data described with the use of a natural language. Both the seasoned programmers and everyday users of digital applications can make sense of the digital information that is open to manipulation – it is part and parcel of their everyday digital experience. However, readability, considered from the vantage point of a programmer, as opposed to a user, initiates an entirely different set of cognitive processes. Wierzbicka remarks that "every language has lexically encoded some scenarios involving both thoughts and feelings and serving as a reference point for the identification of what the speakers of this language see as distinct kinds of feelings" (Wierzbicka 1999: 15). The assumption is that as long as one agrees that there is a scenario for conceptualizing and expressing feelings in natural languages, an equivalent scenario has to exist for conceptualizing and expressing the specific type of information encoded in a meaningful line of code to a programmer and a user. They, however, involve two distinct planes of 'meaningfulness' – the user enjoys the performance of an application, its usefulness together with a visual appeal is what matters the most. At the same time, a programmer is most typically concerned with the logic of an application, its natural 'flow' encoded in lines of code that he/she conceptualizes before translating it into a user-friendly expression, i.e. the performance. The scenario does not change. It is the reference point that is different. It can be said that a different kind of focus is at play for the respective groups of participants of the digital literacy

phenomenon. It is conditioned by different needs which the respective groups are interested in pursuing. On the one hand, users seek functionality and performance that would meet their individual needs. On the other hand, programmers pursue the aim of exploring diversified ways in which the individual needs of users can be satisfied. To achieve this result, programmers are conventionally expected to employ the tools available to them in the form of knowledge about how to make one line of code communicate with other lines of code in a given digital application. It is the scenario that programmers are required to comprehend, unlike in the case of users who, very frequently, rely on their intuition while working with a digital application.

In one of her books, Wierzbicka is seen to be keen on addressing the 'native speakers' intuitions' as both the first step and the final step for testing the hypotheses she puts forward: "objective data, such as those that occur in contemporary linguistic corpora, cannot interpret themselves, and to make sense of them one still needs to consult ones' semantic intuitions" (Wierzbicka 2010: 20), or elsewhere: "although the figures involved are small, these results are consistent with native speakers' intuitions, which […], allow us to formulate two generalizations […]" (Wierzbicka 2010: 305). Apart from showing Wierzbicka's approach to her research agenda, these and many other passages appearing in the book can indeed shed some light on the similar experience that digital literacy has to offer. As long as linguists are customarily expected to study languages from the 'under-the-hood' perspective, native speakers are often unable to explain why a language rule they apply intuitively and, more importantly, correctly takes a specific form of a given kind. It seems that the phenomenon of digital literacy can be considered from a similar context – programmers acquire knowledge about what occurs 'under the hood' once a digital application is initiated and can read and add new lines of code to change the behaviour of a programme. In contrast, users accept the performance of an application without having to understand the nuts and bolts or the technical configuration of the application. What connects these two distinct types of digital literacies (programmers' vs users') is their direct usefulness which translates into potential immediate gains, including financial benefits. It is the same example of usefulness mentioned by Thomas in the context of traditional literacy developed in ancient Greece – both offer true promise for a different, better life, as the new skill is directly relevant to humankind's condition.

The pressure on usefulness is also voiced by Tariq Rashid – an ardent advocate of computer literacy: "many education curricula have been updated to ensure that children are digitally literate, equipped to participate in a digital economy, able to develop their own technology ideas, and be better-informed consumers and citizens" (Rashid 2019: 6). What Rashid means is not only confined to transforming oneself into a proficient user of a plethora of digital applications available on the market but rather being able to develop the crucial skills that would significantly enhance the understanding of how this very specific digital market is arranged. According to Rashid, "coding is considered by many to be as essential as reading and writing" (Rashid 2019: 6), and one may be tempted to add one of the essential types of literacies that one should contemplate mastering in the 21st century.

Apart from school curricula, there are nowadays several various private market initiatives aimed at spreading knowledge about programming. Various coding boot camps (e.g. Coder Academy, General Assembly, FireBootCamp, Le Wagon, to name just a handful of similar enterprises in Australia alone) are currently becoming extremely attractive to programming

enthusiasts, which testifies that the importance of digital literacy is growing at an unprecedented rate. Boot camps are often successful in demystifying the complex idea of programming and can be very effective in terms of future employability, they are often overly expensive and, at many times, fail to be tailored to the cognitive needs of school children who are less concerned with market competitiveness, and more enticed to pursue the creative aspect of programming.

This market void has recently been filled with coding coursebooks aimed directly at schoolchildren who only take their first steps in this area (Prottsman 2019; Vorderman et al. 2014; Woodcock 2016a, 2016b). They, however, rely heavily on visual content which accompanies the explanations related mainly to the basic logic behind the projects which are being discussed. At this stage of a learning path, the idea of entertaining a thought of covering a set of more complex programming constructs, including, for example, Object-Oriented Programming, is hardly justifiable. However, since illustrations of programming concepts, which due to their very nature are highly artificial, take place with the use of a natural language such as English, the prerequisite for these linguistic illustrations is that a language employed to discuss these artificial concepts (i.e. the logic of programming as well as programming concepts) has to be clear, unambiguous and comprehensible. Object-Oriented Programming, with which the concept of class is commonly associated, is most often omitted in programming coursebooks for children, and there is a good reason for it – it is very abstract and poses a genuine challenge even to more experienced programmers. On the other hand, 'classes' provide far broader functionality to a digital application and mastering the intricacies of 'classes' and other Object-Oriented Programming concepts can significantly benefit future job prospects in a digital market.

This paper assumes that Object-Oriented Programming can be explained using a natural language, e.g. English, Chinese, Russian, etc., which, additionally, can be simple, transparent and not off-putting to school children. The help can come from a reduced version of English, Chinese, Russian, etc. The idea of language reductionism has been promoted by researchers working within the framework of Natural Semantic Metalanguage, especially Anna Wierzbicka and Cliff Goddard. Their relatively recent project is known under the name of Minimal English (just as there can be Minimal Chinese, Minimal Russian, etc.), and the following study relies on the theoretical tenets proposed by researchers involved in this particular project. The case study is focused on one of the Object-Oriented Programming concepts, namely a 'class', as it is implemented in Apple's Swift programming language.

2. Minimal English revisited

Minimal English stems from the theory of Natural Semantic Metalanguage.[1] NSM has received wide recognition and has been discussed extensively throughout the past four decades (most recent NSM and Minimal English studies include Goddard 2018a, 2018b; Goddard and Wierzbicka 2014; Wierzbicka 2014, 2010). Minimal English is based on the assumption that each natural language possesses a set of words and, consequently, a set of related concepts these

[1] Hereafter referred to as NSM.

words encapsulate, which have a universal or near-universal meaning. In one of her recent books, Wierzbicka calls it "a neutral framework for comparing meanings across cultures" (Wierzbicka 2014: 16) and, indeed, neutrality and translatability are probably the two keywords that highlight the core part of hypothesis the researchers working within the framework of Minimal English are seen to formulate. Goddard and Wierzbicka imply precisely this, stating the following: "since Minimal English has its counterparts in Minimal Chinese, Minimal Russian, Minimal Finnish, and so on, expressing oneself in Minimal English facilitates translatability into one's home language, if that is a language other than English" (Goddard and Wierzbicka 2018: 23). Therefore, the underlying assumption behind the theory is the idea of possible cross-translatability between any number of natural languages without a loss of meaning which is typically associated with a transfer of meaning from one language to another. According to the theory of NSM and its superset version, Minimal English, this can be achieved with the help of any natural language (not limited to English only) suitably adapted to operate on a tested number of more simple concepts, separated from the vast pool of vocabulary available in a given natural language. Thus, the dream of faithful translation becomes a reality as it can be supported with a viable theory. A theory based on extensive research has involved continuous testing and the subsequent modifications that the theory underwent along the way as new data kept emerging.

It is beyond the scope of this paper to address in detail the stages of the development of NSM, especially the history behind the long and arduous task of establishing the final and definite version of NSM. Of historical note is what Goddard shares in one of his publications: "the Minimal English project has emerged from, and in a sense rests upon, the findings of a program of linguistic research known as NSM (Natural Semantic Metalanguage)" (Goddard 2018c: 29). Additionally, Goddard highlights the fact that it is a highly systematic study of meaning that "places words and meaning at the very centre of language study" (Goddard 2018c: 29). NSM is essentially a reduction-oriented analysis of meaning where a fixed set of 65 words are regarded as universal concepts which, if translated to other natural languages, retain the same meaning as the words they were translated from. A complete list of updated 65 semantic primes, as they are sometimes alternatively referred to, can be conveniently accessed via the official Natural Semantic Metalanguage website.

Biegajło notes that NSM "is simply a tool made of any natural language (the assumption being that semantic primes connote the same meaning, regardless of the language they are translated into) which is used to talk about less simple concepts found in those languages" (Biegajło 2019a: 10). It convincingly recapitulates the underlying tenets of the framework. The problem with NSM, however, lies elsewhere and was succinctly pointed out by another Polish scholar, Roman Kalisz, who observed that: "the explications that rely solely on primes are vague, which is the opposite of what they are meant to achieve" (Kalisz 1998: 56), where explications are meant to be understood as the vital instrument in defining the meaning of a given concept. Over the years, as more voluminous amounts of data became available to the NSM community, the project evolved to embrace this setback. In order to secure the readability of the explications and also in an attempt to address the intrinsic and natural cognitive expectations of the human mind, which, most typically, strives to receive meaning which is unconvoluted and transparent, the NSM researchers proposed what is called 'semantic molecules'. According to Goddard, "the

principle was clear enough: certain complex terms were needed as 'concept-building' elements" (Goddard 2018c: 51), thus partly eradicating the frequently striking vagueness of the NSM explications. Simultaneously, trying not to compromise the core assumptions of the NSM theory, it was fundamental that in search of the actual list of semantic molecules, they have to be able to be explicated into primes, "so there is no danger of circularity and no compromise of the reductive principle" (Goddard 2018c: 50). In other words, semantic molecules are regarded as near-universals, 'near-primes', although, technically, they do not belong to the selected category of the 65 semantic primes which are part of NSM. However, they are considered necessary, firstly, to write explications of more complex concepts and, secondly, to complement the readability of the explications. A complete account of the developments involving testing and selecting the final, tentative version of the list of semantic molecules can be found primarily in Goddard (2018c).

Eventually, as Goddard admits, "the Minimal English project began to take shape in 2013" (Goddard 2018c: 61), and the key assumption that goes together with the inception of Minimal English is that "the NSM research community had accumulated enough knowledge and experience about semantic variation and cross-translatability that it was now practical to adapt NSM into a user-friendly tool for thinking and communicating outside the confines of Anglo English" (Goddard 2018c: 61). Strictly speaking, it is turning the forty-year research within the NSM framework into a more practical and less theoretical endeavour that would potentially serve the needs of a wider audience, unlimited to scholars and the world of academia. A complete set of lists grouped into selected thematic categories, including words and the related concepts 'allowed' in Minimal English, can be found in Goddard and Wierzbicka (2018). This paper rigorously follows the proposed vocabulary sets, and all the explications that follow are based on a collection of words presented there.

3. The documentation of Object-Oriented Programming vs a natural language

According to the updated version of the Swift documentation provided by Apple, "*structures* and *classes* are general-purpose, flexible constructs that become the building blocks of your program's code" (Apple 2020: 345, original emphasis). In essence, Swift's structures and classes share a standard set of features that, from the perspective of their core application, are intended to represent one of the critical components of a computer program. It is the building blocks into which structures and classes are transformed that make them essential components of an application because when the code of a program is executed, whether it is a building block or a single line of code, it triggers a series of specific instructions that an electronic device should execute. Incorrect code or no code at all means that a device cannot make sense of the instructions at hand or that it remains idle because there are no instructions to be interpreted by a device interpreter. Common sense suggests that the internal arrangement of Swift structures and classes must not only be understandable to an electronic device in order for them to be fully usable but must also usually occupy a clearly specified place within a body of code if they are intended to be constructs that are 'general-purpose' and 'flexible'. Programmers often refer to such a collection of rules as the syntax of a programming language, and Apple's

documentation is no different in acknowledging a fundamental significance to the syntax of both structures and classes: "you define properties and methods to add functionality to your structures and classes using the same syntax you use to define constants, variables, and functions" (Apple 2020: 345). Biegajło notes that "any given app is essentially a collection of data that can be stored in various types of containers whose contents can be freely manipulated" (Biegajło 2019b: 246), and structures together with classes, but also properties, methods, constants, variables and functions, to name just a few of the most common programming concepts, are no exception in this respect. A syntax error or an inappropriate distribution of a building block leads to an app crashing. Only extensive trial-and-error practice can lead an aspiring developer to integrate various programming concepts into a unified and functioning program. This is why novice programmers often fail at the beginning of their programming experience and eventually often give up the challenge to learn the tricks of the trade too early. It seems hardly helpful for them to read passages of the following kind:

> 'Structures and classes in Swift have many things in common. Both can: define properties to store values, define methods to provide functionality, define subscripts to provide access to their values using subscript syntax, define initializers to set up their initial state, be extended to expand their functionality beyond a default implementation, conform to protocols to provide standard functionality of a certain kind.'
>
> Apple (2020: 346)

As long as an experienced programmer can easily translate the list of capabilities inherent in structures and classes into a meaningful piece of valid information, beginners would most likely be confused by the overwhelming jargon they are forced to make sense of.

The following example from Apple's guide proves that this practice is not just occasional:

> 'Classes have additional capabilities that structures don't have: inheritance enables one class to inherit the characteristics of another. Type casting enables you to check and interpret the type of a class instance at runtime. Deinitializers enable an instance of a class to free up any resources it has assigned. Reference counting allows more than one reference to a class instance.'
>
> Apple (2020: 346)

Being precise and thus avoiding syntax errors when writing code in any programming language is equally important as providing clear-cut definitions or explanations about what a selected piece of code is set to do. These, however, seem to be two entirely different areas of activity. If syntax comprehension is about language competence, documentation of the code's behaviour needs to have a certain didactic angle attached to it, which, most typically, rarely go hand in hand, as evidenced by the two passages above. Donald Knuth, who, according to a research profile available at the Stanford University website, is widely credited as the father of the analysis of algorithms, noted the following as early as 1984:[2]

> 'The past ten years have witnessed substantial improvements in programming methodology. This advance, carried out under the banner of "structured programming", has led to programs that are more reliable and easier to comprehend; yet the results are not entirely satisfactory. My purpose in the present paper is to propose another motto that may be appropriate for the next decade, as we attempt to make further progress

[2] Under the title "Literate programming", the paper appeared in 1984 and was later reprinted in the collection of papers quoted in this article.

> in the state of the art. I believe that the time is ripe for significantly better documentation of programs, and that we can best achieve this by considering programs to be works of literature. Hence, my title: "Literate Programming".'
>
> Knuth (1992: 99)

In other words, Knuth implies that computer programs[3] should be written in clean code that would be readily interpretable by electronic devices as well as human beings. The mathematician further elaborates on what literate programming points to: "the practitioner of literate programming can be regarded as an essayist, whose main concern is with exposition and excellence of style" (Knuth 1992: 99). Knuth made his statement perhaps slightly too heavily laden in metaphor, nonetheless, it is an evocative illustration of the central assumption that is being suggested, i.e. a code needs documentation. It is an absolute must for it to be well-written and therefore readable to professionals and non-professionals alike.

Apple proudly boasts that Swift is "an industrial-quality programming language that's as expressive and enjoyable as a scripting language" (Apple 2020: 2), and it, indeed, belongs to a small group of programming languages that offer comparably more friendly experience than other common languages. Swift is devoid of many typical features that other languages contain, which makes it significantly more readable to humans, but at the same time, it does not lose the various functionality and can be employed to perform a number of complex tasks within a computer program and beyond. Unfortunately, the complex digital jargon found in the documentation seriously hinders potential programming enthusiasts from recognizing the full scope of Swift's applicability and, consequently, creates unnecessary barriers to understanding the concepts at play 'under the hood' of computer programs. Natural Semantic Metalanguage, combined with the functionality of Minimal English, can play a significant role in making visible advances in bridging the gap between the code's logic and the code's documentation. The ensuing discussion is primarily concerned with Swift's concepts of a class, as an exemplary concept of Object-Oriented Programming, and a directly related concept by which a class can be identified, namely the concept of property.

4. Documentation written in Minimal English?

To understand the functionality of a class code in Swift, it is necessary to re-emphasize that all programming activity involves traffic of data. Biegajło notes that "users can manipulate data – change their contents, add new items, delete unnecessary parts, or remove them altogether, and, essentially, store them in memory of a device" (Biegajło 2019a: 7) and, therefore, the opening question in the context of Swift classes would be to provide the most general characteristics for a class creation, with a clear implication that, once introduced into a code, it can be populated with data. One critical remark to make at this point refers to what has already been said about selected distinctive capabilities only Swift structures and classes are said to possess. No other programming concept in Swift can accept what Apple identifies as properties and methods. They are complex concepts. At least one of them would require further explanation, but simultaneously, their introduction to the explication of the general characteristics of a Swift

[3] The label, 'computer program', is understood here as an application launched on any electronic device.

class would help determine the preconditioned essence of the concept of class, i.e. its unique capacity to accept properties. Below is a proposed explication of the concept of a Swift class:

class (general characteristics):
a. something
b. someone can say many things about something else with this something
c. there can be/are (many) things (properties) inside this something

Component (a) ("something") verifies the fact that a class is unlike any animate object, it cannot make decisions, it is fundamentally a 'general-purpose', 'flexible construct' that is seen as a specific type of object created to store various types of data, as is further elaborated by component (b) ("someone can say many things about something else with this something"). The third component of the explication intends to differentiate classes from other programming constructs (e.g. variables, constants, functions, loops, etc.). It refers to the concept of property as distinctive programming construct that only classes and structures share in common. If the explication of a class is to be viable, the explication of the concept of property has to accompany the one above and is provided in later sections of this paper. Technically, if a programming concept offers data storage and, among many other things, it can accept properties, it is safe to assume that a Swift programmer works either with a class or with a structure.

Another essential feature that Swift classes are distinguished by is using a specific heading, otherwise technically labelled a keyword that indicates we are dealing with a class. Apple declares that "structures and classes have a similar definition syntax. You introduce structures with the 'struct' keyword and classes with the 'class' keyword" (Apple 2020: 347), and the intuitive denotation that the respective keywords carry greatly simplifies the overall experience of working with a Swift code. Apple offers an exemplary blueprint for both programming concepts:

```
struct SomeStructure {
// structure definition goes here
}
class SomeClass {
// class definition goes here
}
```

Apple (2020: 348)

Based on these remarks, below is a tentative version of the explication outlining the application of the 'class' keyword:

the *class* keyword
a. before all other things in this thing, there is the word "class"
b. because of this, this thing is a class

The explication consists of only two succinct components. It is readable and easy to follow, which is especially helpful for beginners. Component (a) simply postulates that to create a class, all that is required is a specific Swift keyword, i.e. a 'class' keyword. Component (b) stipulates

that once the keyword is introduced, one deals with a programming construct called a Swift class.

Swift documentation also suggests that "whenever you define a new structure or class, you define a new Swift type" (Apple 2020: 348) which means that data can be encapsulated in several specific categories that are governed by a collection of syntactic rules. These and prior explanations collectively can serve as the basis for the explication, which outlines the consistent method of creating a specific type of Swift class.

Apple continues its commentary, pointing out that: "both [i.e. classes and structures] place their entire definition within a pair of braces" (Apple 2020: 347) which allows for a definition of the syntax of classes, as they are typically used in Swift:

defining a *class* type X
a. there is one word (X) after the word "class"
b. (it is before the "opening brace") if someone writes this word (X), this someone makes a class of kind X
c. after this, someone can do something with this class/someone can say something about this class
d. it is like this:
e. something is on two sides of a class
f. on one side, it is something like this: "{"
g. it is called "an opening brace" of a class
h. after this, there can be many things ("properties") that are part of this class
i. after these things ("properties"), it is something like this: "}"
j. it is called "a closing brace" of a class
k. after this, there cannot be things ("properties") that are part of this class

The opening component introduces the notion which is a part of an imprinted functionality of Swift classes and allows a programmer to create a specific instance of a class, which turns it into a specific type of a class ("if someone writes this word (X), this someone makes a class of kind X"). In most cases, the class type depends on the word that follows the 'class' keyword and can be composed of any number of characters that do not have to imply any meaning whatsoever. However, the advised practice widely shared among programmers is to give the type a specific, recognizable name that would greatly ease the navigation through the code, especially if the code requires (and, virtually, it almost always does) changes in the future. Thus, both components ("(a) there is one word (X) after the word "class" " and "(b) (it is before the "opening brace") if someone writes this word (X), this someone makes a class of kind X") are meant to satisfy this unwritten rule and implement the 'word' as a potential candidate to become a type of class, instead of a random set of characters which, as has been suggested, is also possible. The part "opening brace" does not belong either to the NSM set or to minimal language. Therefore it has been included in the quotation marks. Their meaning and significance for the composition of a Swift class need to be accounted for in the definition of a class. Once the class type is established, the class can be incorporated into a code and used and, more importantly, reused throughout the lifecycle of a programme (component (c)).

The braces mentioned in Apple's documentation illustrate that Swift class' scope is determined by an opening brace and a closing brace, respectively. Anything that falls beyond these confines is not part of the specific class in question; however, it can be part of another class that is located before or after the location of a given class. The three components ((d)–(g))

hint at this unique feature of Swift classes which programmers would read as the start of the abstract scope of a class.

Component (d) ("it is like this:") introduces the steps that need to be taken to create a class. Component (e) ("something is on two sides of a class") indicates that in order to create a class, according to the rules set by Swift, we are required to include something before it and after it. Components (f) ("on one side, it is something like this: "{" ") and (g) ("it is called 'an opening brace' of a class") demonstrate what is needed to start the scope of a class.

The four closing components ((h)–(k)) imply the end of the scope of a class. As classes can accept a number of programming constructs, as long as they can hold and manipulate data, for readability reasons, only one of them has been implemented into the explication, namely the concept of property. The word 'property' is not part of Minimal English and has been included in quotation marks. It is meant to indicate that a separate explication exists, namely that if 'property'. The concept of property has to be included in the explication of a class because it allows delineating the functionality of Swift classes from other constructs available in Swift. Finally, component (k) ("after this, there cannot be things ("properties") that are part of this class") shows that anything that falls beyond the class does not and cannot belong to the scope of a given class.

Before moving on to the discussion of the explication of a Swift concept of class, first, an explication of the concept of property has to considered. Property is seen here as one of the distinct members of Swift classes. It is therefore unique to classes only (although, technically, structures, mentioned earlier, copy the behaviour of classes in this respect; however, addressing this dual functionality of Swift properties is beyond the scope of this paper). The uniqueness of properties depends solely on whether they are inside a class or outside a class, as it critically conditions both the naming conventions and their scope. Once inside a class, property is accepted by a class as its member and is considered a fully-fledged example of a property. If, however, it is moved outside the scope of a class, a Swift class ignores it entirely, but its functionality is not lost, and the property turns either into a variable or a constant.[4] Apple explains that "a property declaration in a class is written the same way as a constant or variable declaration, except that it is in the context of a class" (Apple 2020: 27).

The concept of variable and the concept of constant in Swift were analyzed with the application of NSM by Biegajło (2019a). The study showed that Swift variables and constants need to have two distinct explications to illustrate the core difference between them regardless of their apparent similarity. Below are explications of the Swift concepts of variable and constant:

variable (var) of kind X:
a. there can be something inside it
b. this something inside is one thing of kind X
c. this something inside cannot be two things of kind X
d. many things of kind X can be inside it at many different times
e. one thing at one time, another thing at another time.

Biegajło (2019a: 14)

[4] For a detailed discussion of Swift variables and constants from the perspective of NSM, see Biegajło 2019a.

constant (let) of kind X:
a. there can be something inside it
b. this something inside is one thing of kind X
c. this something inside cannot be two things of kind X
d. at all times this one thing is always the same thing.

Biegajło (2019a: 15)

As variables and constants are essentially "examples of unique labels, i.e. containers capable of storing data" (Biegajło 2019a: 12), both opening components (a) ("there can be something inside it") in the explications above point explicitly to that interpretation – variables and constants in Swift can hold data. Furthermore, both variables and constants "store precisely one value at a given time in the lifespan of an application" (Biegajło 2019a: 13) and, as Apple implies, "once you've declared a constant or variable of a certain type, you can't declare it again with the same name, or change it to store values of a different type" (Apple 2020: 59). Therefore, components (b) ("this something inside is one thing of kind X") and (c) ("this something inside cannot be two things of kind X") of the two explications contain a direct reference to the mentioned characteristics of variables and constants – they can accept only one value at a time, and, similarly to the behaviour shown by Swift classes, due to the in-built Swift functionality, these values, have to necessarily be of specific 'kind', i.e. they have to be ascribed a certain type (e.g. a string, a number, a Boolean value (i.e. a value which evaluates to true or false), etc.), depending on the type of value that is inside a variable or a constant. Eventually, the two closing components in the case of a variable ("(d) many things of kind X can be inside it at many times" and "(e) one thing at one time, another thing at another time"), and one closing component in the case of constant ("(d) at all times this one thing is always the same thing") is where the two concepts unmistakably differ. Variables in Swift are prone to change as long as they conform to the initial type they were declared with ("many things of kind X") and the Apple documentation clearly suggests that stating: "you can change the value of an existing variable to another value of a compatible type" (Apple 2020: 59). Once an application containing a variable with a value inside is run, it can simply accept an infinite number of other values of the same type. This is not the case with respect to constants in Swift, as is evidenced by a changed design of the respective explication ("at all times this one thing is always the same thing") because "a constant is principally an example of an immutable container" (Biegajło 2019a: 15). One final comment has to address the keywords used for introducing variables and constants into a Swift code – they are 'var' and 'let' respectively and, unlike in the case of a 'class' keyword, they were implemented into the very title of the explications, which goes on to show how flexible NSM and Minimal English can be in an attempt to suit personal preferences.

In light of these remarks, we can now try to propose an explication of property in Swift:

property (var/let) of kind X:
a. it can be like this:
b. there can be something inside a class
c. this something can be a property
d. a property is like a variable inside a class
e. if it is not a variable, it is a constant

Having adopted the blueprint used for the explications of the concept of variable and the concept of constant, the explication of the concept of property assumes some prior exposure to the dichotomy between variables and constants. The title of the explication of property suggests two keywords available that allow creating properties that can share the typical characteristics of variables and constants ('var' vs 'let', mutability vs immutability). Additionally, properties in Swift, just as is the case with variables and constants, need to be of a specific type ("of kind X"). Component (a) ("it can be like this:") points to the fact that properties might appear in a class, however, a class does not necessarily have to contain property to keep the characteristics of a class. It can accept other programming constructs typical to Swift classes and allow for significant variability in this respect. Component (b) ("there can be something inside a class") seems self-evident; a class can accept different data containers, one of which is, uniquely, a property (component (c) "this something can be a property"). The closing components (d)–(e) ("a property is like a variable inside a class" and "if it is not a variable, it is a constant") make us assume that properties copy the behaviour of variables and constants, i.e. one the one hand, they can store different values, they are open to accepting other values, as long as that other value is of a type compatible with the substituted value (behaviour characteristic to variables), on the other hand, they accept only one value, of one specific type which cannot be manipulated with after it was declared (behaviour characteristic to constants).

5. Concluding remarks

One of the underlying challenges that Object-Oriented Programming poses is that multiple complex concepts are in constant dialogue, creating a sophisticated arrangement where digital communication can take place. An echo of that is sent out by Apple stating that: "the additional capabilities that classes support come at the cost of increased complexity" (Apple 2020: 347) and, due to the constraints of this paper, only selected and most fundamental issues related to Swift classes are discussed. They include explications of general characteristics of Swift classes, the 'class' keyword, types of classes and how to create them, the syntax of classes, and the concept of property as one of the distinct features of Swift classes. The proposed explications are by no means fixed or final and are open to further amendments; however, they are a perfect starting point to pursue the project of rewriting selected programming documentation in Minimal English with the view of transforming it into more user-friendly explanations, especially with school children in mind. As has been mentioned in the opening paragraphs of this paper, classes share some of their core functionality with another Swift construct, namely structures, and to arrive at a comprehensive account of the usability of classes, structures would also have to be addressed with greater detail in the later stages of this project. To embrace digital literacy at a satisfactory level, this project could potentially develop into a self-contained reference book which would be focused on discussing selected programming concepts in a fashion that would emulate Anna Wierzbicka's retold Biblical Gospels, rewritten in Minimal Polish and Minimal English (Wierzbicka 2017, 2019). The obvious strength behind Wierzbicka's project is that the Gospels are not recounted exclusively in explications, but are a combination of explications and a narrative form that different minimal versions of natural languages can support.

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Tree pruning in the structural approach to vowel reduction and lenition

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Abstract
The article scrutinises several vowel reduction and lenition phenomena by employing a model of syntax-like structural representations, i.e. Government Phonology 2.0. In contrast to the standard GP model, whereby lenition and vowel reduction can be viewed as shortening, element suppression or status switching, the structural approach employs the procedure of tree pruning with a heavily limited role of melodic annotation. This paper will take a closer look at node removal with special attention to its trajectory. In particular, two basic directionalities are considered: top-down and bottom-up. The former has been proposed to account for vowel reduction whereby the highest positions are deleted retaining the head and potentially its sister. The acquisition of plosives and fricatives points to the latter trajectory, which disposes of nodes closer to the head. However, the choice of positions that are targeted in weak contexts might be also related to the inherently encoded hierarchy of terminal nodes within the constituents in question.

Keywords: vowel reduction, lenition, structure, tree pruning, phonological representation

1. Introduction

Models of phonological representation that utilise privative units recognise lenition and vowel reduction as a loss, suppression or deactivation of melodic content in weak prosodic positions. Government Phonology addresses this issue by assigning weak positions less licensing power to sustain melodic primes (Harris 1990, 1994, 2005). In effect, this process becomes defined as shortening of long segments, simplification of complex expressions by suppression of some elements and changing the status of head elements to non-heads (cf. Backley 2011: 50–54, 184–194). An innovative approach put forward by Pöchtrager (2006), the so-called GP 2.0, adopts a structural model of phonological representation and considers reduction a structural simplification by means of node removal. In this view, two directions of such tree pruning can be proposed: top-down or bottom-up. This paper aims to establish whether any of these approaches can be favoured by investigating several phenomena occurring in weak positions across languages. The paper is organised as follows: section 2 outlines the tenets of GP 2.0 with special attention to the structural organisation of representations; section 3 presents the process

of tree pruning in language acquisition, as proposed by Úlfsbjörninn (2008). In section 4, some vowel reduction phenomena are analysed employing GP 2.0 structures with special attention paid to the directionality of tree pruning. Section 5 includes several remarks with regard to lenition.

2. The structural model of phonological representation – Government Phonology 2.0

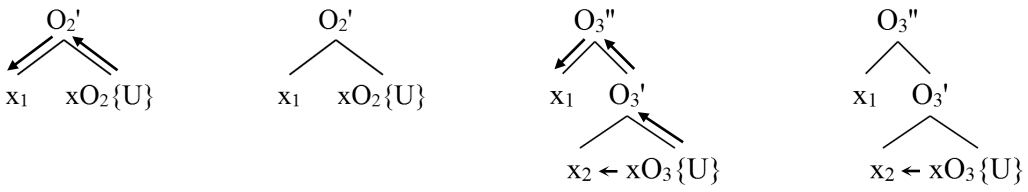
GP 2.0, developed by Pöchtrager (2006), Pöchtrager and Kaye (2010; 2013) and Živanović and Pöchtrager (2010), is a twenty-first-century offshoot of Government Phonology, in that it is a non-derivational model, which makes no distinction between phonological and phonetic representations, and it follows a set of basic principles, including the Minimalist Hypothesis (Kaye 1992: 141), Licensing Principle (Kaye 1990: 306) and Projection Principle (KLV 1990: 221). The divergence from the standard framework is to use tree diagrams borrowed and adapted from the Minimalist Program in syntax (Chomsky 1995). Apart from that, GP 2.0 uses three privative elements as proposed within Element Theory, namely I, U and L, whose phonetic correlates can be defined as follows:[1]

(1)

prime	phonetic correlates
I	palatality, "dIp" pattern – low F1 coupled with high spectral peak (convergence of F2 and F3)
U	labiality, "rUmp" pattern – low spectral peak (convergence of F1 and F2)
L	nasality, VOT lead

Beside these primes, phonological information is expressed by means of structural configurations and relationships between nodes.[2] The elements h (noise) and ʔ (occlusion) are in GP 2.0 replaced by projections. In other words, the representations are composed of more than one position. In effect, fricatives comprise two terminal nodes under a single projection (2a–b), while plosives have three positions in a double-layered projection (2c–d). The correlates of H (VOT lag) are encoded in the licensing relationship between the head (xO) and the highest complement (x_1), i.e. m-command represented in a form of arrows running along the projection lines (2a,c). Licensing in the form of control (the arrow between x_2 and xO_3 in 2c–d) assures that the terminal node x_2 in plosives is sanctioned by the head.

(2) a. [f] b. [v] c. [p] d. [b]

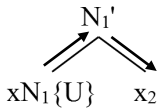


Additionally to voicelessness, m-command assures the length of vowels, hence the representation of a long monophthong with the head xN_1 licensing the complement x_2, as shown in (3):

[1] The descriptions of "dIp" and "rUmp" acoustic patterns come from Harris (1996).

[2] For arguments in favour of such a treatment, see Pöchtrager (2006, 2010) and Pöchtrager and Kaye (2010, 2013).

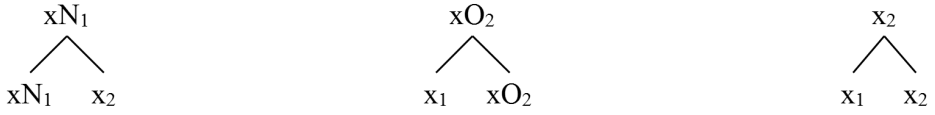
(3) [u:]



In each of the above representations, one position is assigned the status of the head. It is marked by O or N, depending on whether the structure in question stands for a consonant or vowel, respectively. Terminal nodes can be annotated with melodic primes I, U or L, which are understood as position properties.

Due to the exceptional behaviour of coronals and non-low vowels (cf. Pöchtrager 2006, Pöchtrager and Kaye 2010), in GP 2.0 the element A is proposed to be replaced by adjunction, i.e. a split node with an additional position, as in (4).

(4) Adjunction



Besides the projecting structures and complex configurations presented above, short vowels and glides are represented within the GP 2.0 model by single positions, namely, non-projecting heads, as in (5).

(5) a. [ɪ] xN{I} b. [ʊ] xN{U} c. [j] xO{I} d. [w] xO{U}

Any reduction processes that all of the above structures (2–5) are concerned with potentially involve a loss of terminal nodes (x-positions) and/or melodic annotation. In the following sections, I will delve into the previous proposals and investigate whether the pruning of terminal nodes proceeds in any particular fashion and what the role of melody in these processes is. Additionally, I will look into how the distance from the head of the expression affects the position's vulnerability to being deleted and whether licensing (e.g. in a form of m-command) plays any particular role in preventing tree pruning.

3. Tree pruning in language acquisition

An interesting argument for the directionality of tree pruning comes from Úlfsbjörninn (2008), who takes into account processes occurring at the early stages of first language acquisition. Looking at data from various empirical studies, it appears that stops are acquired before fricatives. However, in the structural approach, fricatives are structurally simpler (notice that in the standard GP they are melodically simpler as well), therefore the logical path would be for children to acquire and produce fricatives sooner. Yet, the evidence shows that they tend to be dropped or realised as stops, as in the following examples (Bernhardt and Stemberger 1998, as cited in Úlfsbjörninn 2008: 134):

(6) German one-year-old obstruent production

a. Dropped fricatives

[at]	for	[zat]	'satisfied'
[aka]	for	[vagn]	'car'

b. Fricatives realised as stops

[dat]	for	[zat]	'satisfied'
[gaga]	for	[vagn]	'car'
[nana]	for	[na:za]	'nose'

Contrary to what the theory predicts, the child does not utter a fricative but a plosive or drops the consonant altogether. Additionally, Úlfsbjörninn's (2008) inquiry into the occurrence of plosives and fricatives in the world's languages reveals that there are no natural languages with fricatives but no plosives. Consequently, plosives have to be regarded as "more primitive" than fricatives and, as more complex structures (two layers), they are constructed first as "'default' onset structures" (Úlfsbjörninn 2008: 134–135). In the process of speech development, fricatives emerge when one of the complements is removed. The tree pruning is argued to dispose of the lowest complement, which, as a result, rules out control in fricatives. What is targeted in language acquisition is the position closest to the constituent head, i.e. its sister complement position x_2 as in (2d), at the bottom of the structure.

It can be concluded that non-head positions that are within the lowest projections of consonants (sisters of heads) are prone to be pruned. As lenition is considered a mostly diachronic phenomenon creating synchronic patterns (cf. Bauer 1988; Millar and Trask 2015; Scheer and Ségéral 2008), the prediction could be that the same principle – i.e. the bottom-up directionality – applies to vowel reduction and lenition phenomena. In the following sections, I will try to verify whether this prediction is indeed correct.

4. Vowel reduction

An instance of vowel reduction that has already been tackled within GP 2.0 is that of vowel neutralisation in unstressed positions in Brazilian Portuguese and Eastern Catalan (see Pöchtrager 2016ab, 2018). The vocalic inventory of Brazilian Portuguese comprises seven vowels in stressed positions [i], [e], [ɛ], [a], [ɔ], [o] and [u], with the number diminished to five [i], [e], [a], [o] and [u] in pretonic positions and to three [i], [a], [u] in posttonic positions. The vowels that undergo reduction are the mid ones, as the mid-open/mid-close contrast is neutralised to mid-close and high vowels, as in (7).

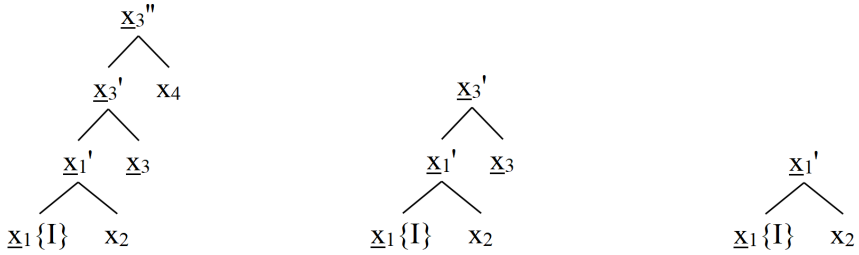
(7) Brazilian Portuguese (Cristófaro Silva 1992)

tonic	**pretonic**	**posttonic**
i	i	i
e	e	
ɛ		
a	a	ə
ɔ	o	u
o		
u	u	

While the standard GP account of the merger of [e] and [i] to [i] is that of the loss of the operator A (A.I > I), the merger of [e] and [ɛ] to [e] requires a status switch of I from the operator to the head (I.A > I.A). In the former, the output seems weaker since the elemental makeup is depleted. The latter appears to be stronger as the expression becomes headed. Such an interpretation seems inconsistent as not only does it put forward two different phonological operations in order to account for the same phenomenon, but also uses a strengthening mechanism for one of them. Additionally, even if we assume that the representation of [ɛ] contains headed A, i.e. (I.A), the motivation for the exchange of status between the elements is questionable and does not reflect any reduction or weakening. Contrary to the inconsistent treatment by the standard model, in GP 2.0 the reduction trajectory is a logical sequence of representations involving a gradual loss of terminal nodes with the subsequent removal of upmost projections, as in (8).

(8) Reduction trajectory in Brazilian Portuguese (adapted from Pöchtrager 2018: 57)[3]

[ɛ] > [e] > [i]



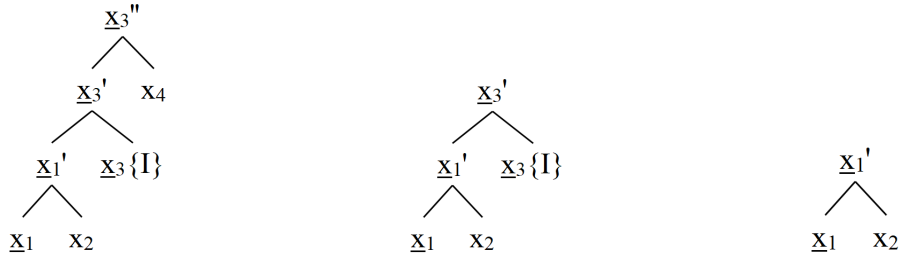
As can be noticed in (8), the positions targeted in the vowel reduction are the ones situated further from the head. In pretonic context, it is the position x_4 that becomes deleted and the vowel is therefore reduced to a double-layered projection, i.e. [e]. In posttonic context, two positions, namely all projections of x_3, including position x_4, are removed, yielding the high vowel [i]. The annotation of I to x_1 is not affected by the process at all. The stipulation here is that melodic annotation is allowed without any form of additional support exclusively in head positions. Such a stance is sound on both theoretical and empirical grounds, as it constitutes a necessary restriction and, as shown by Drabikowska (2019), annotation to non-head positions is sustained under strict conditions, i.e. it must be supplied with some form of licensing, and can have phonetic consequences (cf. Živanović and Pöchtrager 2010).

As melodic annotation of heads is not further restricted, an alternative solution, i.e., to annotate x_3 with the I prime, allows an account of Eastern Catalan lenition, which proceeds from [ɛ] and [e] directly to [ə], as in (9).

[3] Following Pöchtrager's (2018) convention, in (8) and (9), the heads are underlined. The marking of adjunction and assigning headedness here is more vague than in the representations of consonants above or vowels below, but for the sake of the present considerations, it is sufficient to assume that open vowels have more structure. In these representations, I decided to place some of the heads on the right (contrary to established convention for vocalic constituents), since the alternation does not seem to affect the phonetic interpretation of the structures and allows me to notate positions with consecutive numbers, which facilitates the references in the following discussion. For some arguments that a change in positioning (left vs. right) might indeed affect phonetic interpretation in some languages, see Drabikowska (2019).

(9) Reduction trajectory in Eastern Catalan (adapted from Pöchtrager 2018: 57)

[ɛ] / [e] > [ə]

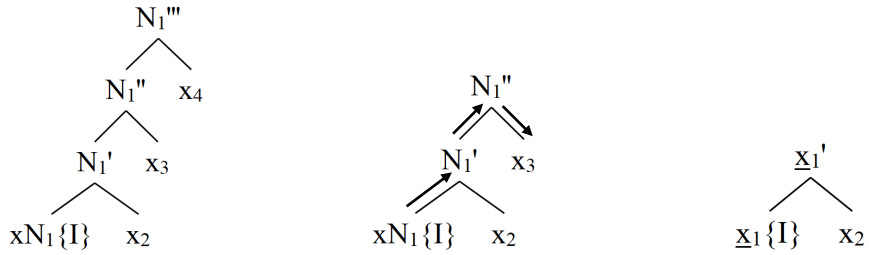


In (9), the reduction proceeds top-down as in Brazilian Portuguese, with the exception of the side effect in the form of melody loss since it is a property of position x_3.[4] In both languages the reduction proceeds downwards, that is, the most vulnerable positions are the top ones. In other words, the closer the complement is to the head, the more likely it is to be preserved in the structure.

A slightly different picture emerges in some of the Northern varieties of Italian, namely, the ones found in the area of Martignana di Po and San Benedetto Po in Lombardia. These varieties demonstrate the neutralisation of vowels in pretonic positions. While tonic positions allow fifteen vowels [i:, y:, e:, u:, ø(:), ɛ(:), a(:), ɔ(:), ɪ, ʊ, ɐ] in Martignana di Po and fourteen [i:, y:, e:, u:, ø(:), ɛ(:), a(:), ɔ(:), ʊ, ə] in San Benedetto Po, pretonic positions allow only four [i, y, a, u] in both varieties (see Savoia 2015: 128–130, 277–278). The processes involved testify not only to the reduction of tree structure but also to the role of m-command.

The neutralisation of mid front vowels closely resembles the process occurring in Brazilian Portuguese in that they are reduced to [i] in pretonic positions. Moreover, the result of reduction does not differ when long vowels are concerned. Namely, in both varieties long and short mid vowels are reduced to [i], as in [a ˈbe:vi] 'drink.1sg.pres' vs. [a biˈvʊm] 'drink.1pl.pres', [a ˈɛpɛti] 'wait.1sg.pres' vs. [a ɛpiˈtʊm] 'wait.1pl.pres'. This reduction can be represented as follows:

(10) [ɛ] / [e:] > [i]



The procedure presented in (10) shows an important aspect of tree pruning. In particular, the m-command that holds between the head xN_1 and the complement x3 in the representation of the long vowel [e:] does not prevent tree pruning, since the resulting vowel is short. The reduction, which proceeds from the top, prunes upmost nodes yielding a short vowel represented by a single projection with the head no longer m-commanding its complement.

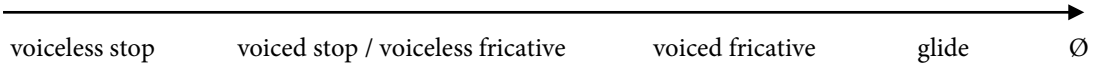
[4] Apart from accounting for reduction, different placement of the element I in Brazilian Portuguese and Eastern Catalan explains different outcomes of palatalisation in those languages (see Pöchtrager 2018: 58–60).

The element placement, in turn, assures its quality as the high front vowel [i]. As it is the head that is annotated with a melody (the element I), the prime is not affected by the reduction and is retained in the structure.[5] Additionally, the difference in the number of nodes representing these vowels (four vs. three) and the irrelevance of m-command in this context is further supported by the fact that in some cases the vowel [e:] is deleted altogether, as in [a ˈle:vi] 'lift.1sg.pres' vs. [a lˈva] 'lift.past.pc' in Martignana di Po and [a ˈbe:vi] 'drink.1sg.pres' vs. [a vˈbøm] 'drink.1pl.pres' in San Benedetto Po (cf. Savoia 2015: 277–278).

5. Lenition

As vowels in weak positions are characterised by a smaller number of projection layers than vowels in stressed positions, what seems primarily indicative of strength in GP 2.0 is the complexity of structures. The same applies to consonants. A clear example of the structurally-encoded strength is a set of representations of consonants in English with reference to strength scale as can be inferred from the discussion presented in Cyran (2010: 13–19). Here the stronger segments have greater distributional freedom. They can occur in the prosodic positions that are endowed with greater licensing potential and as such can be governors, hence the following scale:

(11) Strength scale in English



As proposed by Harris (1990), strength is correlated with the number of elements. Therefore, the above scale can be exemplified by the following labial representatives (12):

(12) GP representations

a. [p]	b. [b] / [f]	c. [v]	d. [w]
O	O O	O	O
|	| |	|	|
x	x x	x	x
|	| |	|	|
U	U U	U	U
h	h h	h	
ʔ	ʔ H		
H			

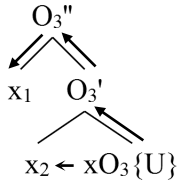
These representations demonstrate how the decreasing number of elements – from four elements for the voiceless plosive [p], through three for the voiced plosive [b] and the voiceless fricative [f] and two for the voiced fricative [v] to one element for the glide [w] – is reflective of

[5] Interestingly in Martignana and San Benedetto, [ɛ], when followed by [r] is neutralised to [a], as in [' pɛ:rdi] 'lose.1SG.PRES' vs. [par'dum] 'lose.1PL.PRES' (Savoia 2015: 277). It might be stipulated that here the melody loss is connected with the presence of adjunction in two adjacent constituents and the resulting relationship between them in a closed syllable. This issue, however, is beyond the scope of this paper.

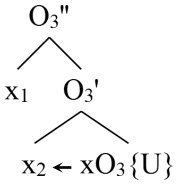
the decline in segmental strength. Let us now compare how the scale maps onto the GP 2.0 structures.

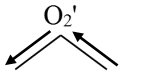
(13) GP 2.0 representations

a. [p]

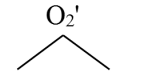


b. [b] / [f]





c. [v]



d. [w]

xO{U}

As can be noticed in (13), the decrease of strength is encoded in the structural complexity. However, what is significant is not only the number of nodes or layers but also the licensing relations between the head and its complements. Counting only projections, voiced and voiceless plosives (13a) and (13b) are equally complex with three terminal nodes. What sets them apart is the m-command between the head xO_3 and the complement x_1 in (13a), which stands for the voicelessness of [p]. Similarly, the voiced plosive and the voiceless fricative (13b) are of comparable strength (as also supported by Escure 1977 and Ewen and van der Hulst 2001, where they are considered alternative routes of lenition trajectories across the world's languages). It can be concluded that m-command also adds to the complexity and its contribution is roughly equivalent to one layer of projection. The voiced fricative (13c) lacks m-command and is considered weaker on the scale, but it is stronger than the glide [w] (13d), which is a non-projecting head. What seems striking here is that the licensing in the form of m-command might have a more prominent role in consonantal representations. Let us consider the picture that is revealed when we consider lenition of [t] in some English varieties, i.e. glottalisation foot-internally and word-finally (14a), most notably occurring in England and Scotland, and tapping in foot internal and word-final positions before a vowel, a consonant or a pause (14b), which is characteristic of North America, Australia, Ireland and parts of England,[6] as in the following examples (cf. Harris 1994; Bloch-Rozmej 2011):

(14) Lenition of [t] (Harris 1994: 121)

a. glottalisation

bi[t] > *bi*[ʔ]

pi[t]*y* > *pi*[ʔ]*y*

wa[t]*er* > *wa*[ʔ]*er*

b. tapping

fi[t] > *fi*[ɾ] *us* / *fi*[ɾ] *me*

pi[t]*y* > *pi*[ɾ]*y*

wa[t]*er* > *wa*[ɾ]*er*

[6] Lenition is by no means restricted to English and has been extensively discussed for years. Various accounts and analyses have been provided concerning numerous languages, including Romance, Celtic, Germanic and Slavic families to name a few, and using many theoretical frameworks, for example, Martinet (1952), Oftedal (1985), McCone (1996), Bloch-Rozmej (1998), Jaskula (2006), Giannelli and Savoia (1979), a collection of papers in de Carvalho, Scheer and Ségéral (2008) and numerous references therein. Whether optional or obligatory, the expectation is that the phenomena are inherently the same with respect to the processes affecting structural representations.

The standard Government Phonology approach to both these types is to consider them a loss or suppression of elements. Tapping is thus the loss of the noise element h, while glottalisation involves delinking of A and h. In both processes, the laryngeal prime H is suppressed as well, as below in (15).

(15)

[t]	>	[ɾ]	/	[ʔ]
O		O		O
|		|		|
x		x		x
|		|		|
A		A		|
ʔ		ʔ		ʔ
h				
H				

Interestingly, in Ireland and Meyerside area of England, lenition might result in spirantisation of [t] to [s] in intervocalic and word-final positions (16a) and might proceed even further to debuccalisation to [h] in weakly stressed function words (16b).

(16) Lenition of [t] (Harris 1994: 121)

a. spiratisation

ge[t] > *ge*[s]

le[t]*er* > *le*[s]*er*

b. debuccalisation

a[t] > *a*[h]

no[t] > *no*[h]

The standard representation of the trajectory is as follows:

(17)

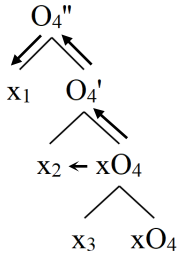
[t]	>	[s]	>	[h]
O		O		O
|		|		|
x		x		x
|		|		|
A		A		|
ʔ				
h		h		h
H		H		

The standard GP treatment of these reduction phenomena seems appealing in that there is a straightforward correspondence between the number of primes and the licensing potential of positions. Nevertheless, the approach is not without a flaw, as a reservation concerning the targeting of primes can be raised against the above treatment. In particular, the reduction processes are not consistent in the way they target the primes with relation to their status. While tapping disposes of h and H – both non-head elements – and preserves the head A, glottalisation reduces the melody to a single non-head prime, i.e. ʔ. Moreover, the targeting of non-head primes in various dialects has to be attributed to chance, since no explanation can be provided as to why the end product in one dialect is a single non-head ʔ, while it is h in another, given that both primes are of equal status. In other words, from a theoretical standpoint, there is no

means of differentiating the licensing potential of positions in relation to their ability to sustain two different primes of the same status.

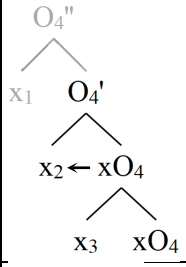
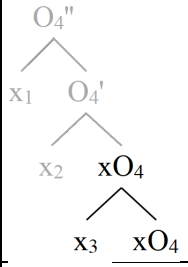
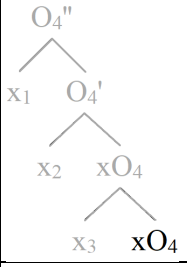
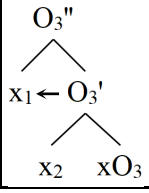
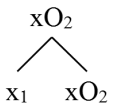
With the structural representations of GP 2.0, the matter is still complex but an explanation of why specific positions are targeted is less coincidental. Consider the following GP 2.0 structure for [t].

(18) [t]



The prediction for lenition is three-fold. It may proceed from the top down eliminating the top-most position x_1 alone or together with x_2. Conversely, it might target the lowest positions first, i.e., beginning with x_3 within the adjunction. Depending on the dialect, different approaches might be employed. The three possible trajectories with nodes being progressively eliminated (marked in grey) are presented below.

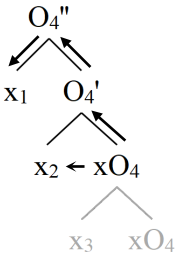
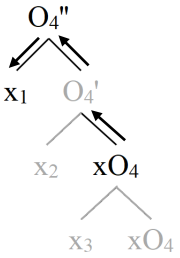
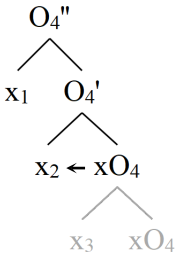
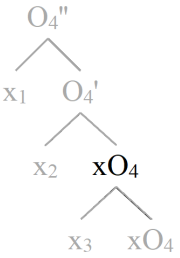
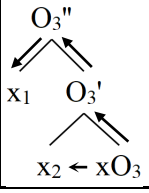
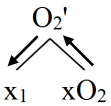
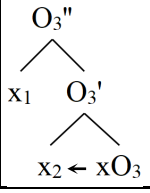
(19) Top-down trajectory

	Step 1	**Step 2**	**Step 3**
Types of structure	a single-layered projection (adjunction)	a non-projecting adjunction	a non-projecting head (no adjunction)
Possible realisations	an unaspirated coronal fricative	a coronal tap	[h]
Targetted positions visible			
Resulting structures			xO4

The trajectory in (19) is fairly simple in that the truncation of x_1 must eliminate the m-command between xO_4 and x_1 in its first step. Step 2 potentially takes us to the tap [ɾ], which is represented by a non-projecting adjunction. The final step reduces the adjunction to a non-projecting head.

The first step in the bottom-up trajectory (as in 20) is to eliminate adjunction, which would result in the reduction of [t] to a plosive unspecified for place.[7] Nevertheless, the potential of the head being diminished in weak contexts, further steps might produce either a fricative or a glottal stop.

(20) Bottom-up trajectory

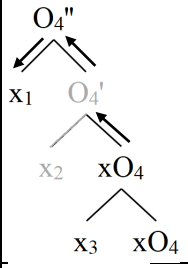
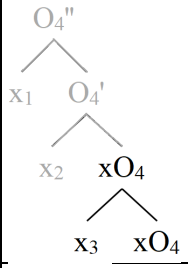
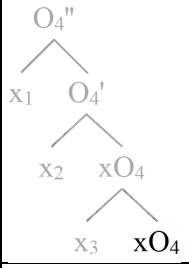
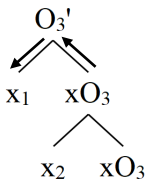
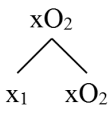
	Step 1	**Step 2a**	**Step 2b**	**Step 3**
Types of structure	a double-layered projection (no adjunction)	a single-layered projection (no adjunction)	A double-layered projection (no adjunction, no m-command)	a non-projecting head (no adjunction)
Possible realisations	an aspirated plosive	an aspirated fricative	[ʔ]	[h]
Targetted positions visible				
Resulting structures				xO1

None of these two trajectories, however, allow us to ensure a principled account of the reduction of [t] to [s] (and eventually to [h]), since either m-command or adjunction is disposed of in the first step. In fact, both of them would have to be retained in order for the process to be accounted for. At a closer inspection at the status of the positions and the strength of different forms of licensing in the phonological structures further explored in Drabikowska (2019), the strongest position in every projection is its head and the greater the distance from the head the weaker the position becomes. However, the employed types of licensing are not of equal strength and prevent positions from being affected by various processes to different degrees. As argued by Pöchtrager (2006: 250), adjunction can be a source of strong licensing (the so-called A-command) that holds between two onset projections that form a cluster. It allows certain positions to be sanctioned, although they are not licensed directly by the head. In other words, adjunction is more powerful with respect to its licensing capabilities. Thus, we can predict that the position x_3, i.e. the position dominated by the head-type node in (18), is the least susceptible. When m-command is compared to control, the former is stronger, making position x_1 the third strongest. The most vulnerable position in the structure in (18) is x_2, as it is sanctioned by the weakest form of licensing (control). Therefore, lenition might also target the positions in the

[7] The resulting plosive could be velar, but there is no consensus whether velar consonants in English should be marked by the presence of U in their representations. Backley and Nasukawa (2009) and Backley (2011, 2017) argue for a non-head U in velars.

order from the weakest to the strongest. Based on strength, the following trajectory can be derived:

(21) Strength trajectory (the weakest positions eliminated first, the strongest last)

	Step 1	**Step 2**	**Step 3**
Types of structure	a single-layered projection (adjunction)	a non-projecting adjunction	a non-projecting head (no adjunction)
Possible realisations	an aspirated coronal fricative	a coronal tap	[h]
Targetted positions visible			
Resulting structures			xO1

The projections in (21) are trimmed from the bottom as in (19), but due to strength of adjunction the position x_3 is spared and retained in the first step yielding an adjunction projecting once and m-commanding the complement under the maximal projection, which is exactly what the spirantisation is, as in (17). Debuccalisation to [h] is the result of two further steps eliminating all of the branches. Taking another look at the data from language acquisition presented by Úlfsbjörninn (2008) and the example where [z] is realised as [n], it might be argued that it is not the lowest position within adjunction that is targeted first but the weakest one – the complement controlled by the head. This further confirms that the strength trajectory might be one of the viable options.

Despite its complexity, the advantage of this approach over the standard GP model is that the varying status of positions is inherently encoded in the representations, while elements are equal by principle with no exceptions. They are position properties and their preservation or loss is dependent solely on whether their host position is targeted by lenition. Different dialects may employ different trajectories, but all of them can be defended also on theoretical grounds since the structural and strength hierarchies of positions are inherently encoded in the model.

6. Conclusions

The aim of the paper was to explore the process of tree pruning in the structural approach to phonological representations. In particular, some vowel reduction and consonant lenition procedures were looked into. A closer inspection of these phenomena revealed that the hierarchical structure characteristic of the GP 2.0 representations allows a more principled account. The data from language acquisition and consonant reduction show that top-down and

bottom-up directions might not be the prevalent ones. What seems to play a more significant role is the strength trajectory in which the weakest position is truncated first. Vowel reduction, on the other hand, appears to favour top-down trajectory, which is also connected with the hierarchical organisation of vocalic constituents whereby the positions further from the head are weaker and hence prone to deletion. The role of m-command is not fully uniform across the processes and, as it seems to perform different functions in vocalic and consonantal constituents, its role requires further examination. Future studies could also reveal how common the bottom-up trajectory potentially is across languages.

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LingBaW

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Abandoning the EPP-feature in Polish dual copula clauses by redefining the predication relation

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Abstract
This paper questions the logic behind the presence and the working of the EPP-feature in Polish dual copula clauses (henceforth, DCCs) with the pronominal copula *to*, the verbal copula *być* 'to be', and two nominative 3rd person DPs, as represented in Bondaruk (2019). The criticism follows from: (i) – Chomsky's (2000, 2001) downward Agree operation; (ii) – the view that the predicator encodes the predication relation between the pre-copular subject and the post-copular predicate; (iii) – selective multiple Agree, whereby the satisfaction of the EPP- and uφ-features is divorced. Adopting (i)–(iii), Bondaruk's scrutiny allows either the pre- or the post-copular DP to occupy SpecTP, thereby accounting for DCCs' agreement and configurational patterns, but, simultaneously, suffering from theoretical shortcomings it creates. We argue for a simpler satisfaction of the subject requirement which does not rely on the troublesome EPP-feature, but is motivated formally by the relation between T and the higher DP. We derive this requirement by following Zeiljstra's (2012) upward Agree which only takes place once interpretable features c-command uninterpretable features, and Rothstein's (2004) approach which is based on a neo-Davidsonian event semantics and which argues that *be* and its complement form a complex predicate, separated from the pre-copular DP both semantically and syntactically.

Keywords: EPP, predication, proposition, dual copula clauses (DCCs), Agree

1. Introduction[1] [2]

Originating in early 1980's (Chomsky 1981, 1982), the Extended Projection Principle (henceforth, EPP) requires each clause to have a subject (Svenonius 2002: 9).[3] Initially

[1] This paper focusses only on bi-nominative *to być* copular sentences with the obligatory pronominal copula *to* that invariably requires DP_2 in the nominative, and the verbal copula *być* 'to be' that can be dropped in the present tense. See section 2.2.2 for discussion.

[2] Abbreviations used in the paper: DCC – a dual copula clause, NOM – nominative, GEN – genitive, DAT – dative, INSTR – instrumental, SG – singular, PL – plural, MASC – masculine, FEM – feminine, NEUT – neuter, N-VIR – non-virile, COP – nominal copula *to*, IMPERF – imperfective, 1 – first person, 2 – second person, 3 – third person, u – unvalued, i – interpretable

[3] There are various approaches to the EPP. For Rizzi (1982), EPP is exclusively subject-oriented, necessitating either lexical or null subjects, depending on the richness of verbal agreement (cf. Biberauer and Roberts 2010;

considered from various standpoints (morphophonological – Holmberg 2000; semantic – Rothstein 1983; Williams 1980), it is now usually conflated with syntactic attributes (but see Kiss 2002; Roberts and Roussou 2002). Early Minimalism (Chomsky 1995) formalised the EPP as an independent D-feature on T and DPs, the one on T [-interpretable; +strong] and requiring checking. This checking, although involving lexical items, motivated SpecTP and movement therein structurally (Chomsky 1995: 341), for besides lexical subjects, SpecTP can also host semantically empty expletives. Later Minimalism (e.g. Chomsky 2001) strengthened the EPP's syntactic status, making it an uninterpretable selectional feature (Chomsky 2001: 9) and the EPP-requirement purely configurational. Al-Horais (2013) and Lasnik (2001) observe, for instance, that DP-movement to SpecTP does not value T's EPP-feature because DP lacks this feature.[4] Contrastively, other formal features on T and DP (e.g. φ-features) require no movement, being valued at a distance by Chomsky's (2000, 2001) Agree relation.[5]

Such a configurational guise of the EPP-feature is found in Polish DCCs. An example of a DCC is (1), featuring two nominative 3rd person DPs and two copulas (pronominal *to* and verbal *być* 'to be'), the latter agreeing in φ-features with the post-verbal DP.[6] [7]

Holmberg 2010). Alboiou (2000) parameterises the EPP-feature itself, manifestable as D-feature (requiring DP in SpecTP), V-feature (requiring V-movement to T), or T-feature (requiring a predicate XP in SpecTP). For Sigurðsson (2003), the nominative is checked already within *v*P and DP-movement to SpecTP is due to Person Prominence Principle, i.e., the requirement that the person feature be visualised at the leftmost edge of TP (Sigurðsson's IP/PersP). To substantiate this claim, he considers the so-called quirky subject constructions (i)–(ii), whereby the verb shows 3rd person 'defective agreement' with the initial dative argument, and only number agreement with the post-verbal nominative argument (in this respect, cf. also section 2.2.3 and the feature mismatch in DCCs with initial 3rd person DPs, as opposed to DCCs with initial 1st and 2nd person DPs).

(i) **Mér höfð**ud**leiðst Þið*
me-DAT had-2-**PL** bored you-NOM
'I had found you boring'

(ii) *Mér höfð**u** leiðst Þeir*
me-DAT had-3-**PL** bored they-NOM
'I had found them boring.'

For Haeberli (2003), DP-movement to SpecTP is a formal requirement because T's [T+, V+, D-, N-] and D's [D+, N+, T-, V-] feature matrices must become valued/positive by the end of the derivation. The movement of a D-category thus follows from T's negatively specified categorial feature [D-]. This approach resembles the one advanced here which takes the DP-movement to SpecTP to be due to T's lack of the inherent nominal property (cf. section 2.2.1) (we thank Reviewer 2 for bringing this similarity to our attention).

[4] We disregard here the Edge Feature, EPP's incarnation in the 'phase theory era' (e.g. Chomsky 2001). It attracts lexical items to the phasal edge so they can participate in further syntactic operations.

[5] Following Chomsky (2000: 101, 121–123) and Chomsky (2001: 3–6), the Agree relation can be taken to hold between α (Probe) and β (Goal) if: (i) – α carries unvalued φ-features; (ii) – β carries valued φ-features and an unvalued case feature; (iii) – α c-commands β; (iv) – α and β are active i.e., possess unvalued features; (v) – there is no γ closer to α than β, even if γ is inactive (cannot agree with α).

[6] Despite numerous analyses, the status of the Polish particle *to* remains unresolved. See section 2.2.2 for a more detailed discussion.

[7] Bondaruk (2019) and Citko (2008) offer most comprehensive accounts on Polish DCCs, though the former is more detailed and handles phenomena (e.g. agreement with DP_2) the latter cannot (see Bondaruk 2013 for details). Given that, and the fact that problematic issues we address are largely shared (although with some

(1) *Ta okolica to *była / były*
this neighbourhood-NOM-3-SG-FEM COP *was-3-SG-FEM / were-3-PL-N-VIR
obrzeża miasta
outskirts-NOM-3-PL-NEUT of-city
'This neighbourhood was the outskirts of the city'

This φ-agreement pattern compels Bondaruk (2019) to dissociate the satisfaction of the EPP-feature from the valuation of T's φ-features (contra Chomsky 2008, 2001). T probes the pre- and the post-copular DP (henceforth, DP_1 and DP_2, respectively) for different features (contra Hiraiwa 2005, where a single Probe and multiple Goals share their features), an instance of selective multiple Agree which she adopts to account for two DCC types. These are predicational (1) and specificational (2) DCCs, their simplified derivations shown in (3)–(4), respectively (numeral indexes show feature valuation scenarios).

(2) Obrzeża miasta to była / *były
outskirts-NOM-3-PL-NEUT of-city COP was-3-SG-FEM / *were-3-PL-N-VIR
ta okolica
this neighbourhood-NOM-3-SG-FEM
'The outskirts of the city were this neighbourhood'

(3) $[_{TP}\ DP_{[1]}\ [T_{[EPP1;\ u\varphi2]}\ to\ [_{VP}\ V_{[2]}\ t_{DP[1]}\ DP_{[2]}]]]$

(4) $[_{TP}\ DP_{[2]}\ [T_{[EPP2;\ u\varphi1]}\ to\ [_{VP}\ V_{[1]}\ DP_{[1]}\ t_{DP[2]}]]]$

T probes both DPs simultaneously and being finite (φ-complete) it values their case-features as nominative (Bondaruk 2019: 127).[8] In return, selective multiple Agree allows each DP to satisfy one of T's features (EPP or φ). This picture is, however, problematic.

First, multiple valuation of u-case features as nominative by T is dubious. In (4), for instance, T probes DP_1 for φ-features (valuing in return its u-case feature) and DP_2 for EPP reasons. Given that, the valuation of DP_2's u-case feature becomes murky, for T's uφ-features have already been valued by DP_1. No property inherent in T seems to motivate multiple Agree, even if T probes both DPs simultaneously, escaping the Defective Intervention Constraint (henceforth, DIC) effects.[9] Whilst T's uφ-features necessitate agreement with an appropriate Goal, this in no way implies *multiple* Agree. A single Goal (DP_1) suffices to value T's features, which completes the Agree relation between the two, manifested by the verb's φ-agreement with DP_1 only.

Second, the movement of the farther DP_2 in specificational DCCs violates relativised minimality effects (Rizzi 1990; Zeiljstra 2012), whereby a syntactic operation between A and C is blocked if another constituent B, capable of satisfying it, intervenes between the two. To circumvent the problem of DP_2 movement to SpecTP, Bondaruk (2019) follows Mikkelsen's

alterations, highlighted whenever necessary) by both approaches, we focus here on the critical analysis of Bondaruk's approach.

[8] This operation is Chomsky's (2001) approach to case checking as a reflex of valuing T's uφ-features, for T's formal content is [uφ; EPP] and DP_1 and DP_2 are [iφ; u-case].

[9] According to DIC, Agree cannot involve Probe α (T) and Goal γ (DP_2) in α > β > γ, β (DP_1) being inactive, having already agreed with α (Chomsky 2000: 123).

(2005) idea and adopts a topic-feature-based dependency holding exclusively between T and DP_2, the feature which DP_1 lacks and, consequently, does not intervene between them. The postulation of this topic-feature is due to the fact that DP_2 in specificational DCCs represents discourse-old information (Bondaruk 2013: 278–279, 2019: 123–124; Mikkelsen 2005: 163). Nevertheless, the very necessity of circumventing both the DIC effects (by means of multiple Agree) and the relativised minimality effects (by means of additional features) in itself suggests that Agree and movement phenomena should both be confined to locality conditions.

Third, as Haider (2016: 25) observes with respect to the EPP: "[i]t does not refer to a property of linguistic signs but to the result of a derivation". The EPP is thus not a feature, for it presupposes no valuation between the Probe and the Goal. But then, what drives SpecTP movement of DPs in DCCs if the EPP-satisfaction lacks formal motivation? Furthermore, since in Bondaruk (2019: 120) the EPP-requirement simply states that SpecTP be occupied i.e., it allows for SpecTP-movement of DP which does not necessarily value T's uφ-features, what (and why) determines whether the EPP is satisfied by DP_1 or by DP_2? If, as Bondaruk (2019: 123) herself notes, SpecTP-movement may also be determined by the topic feature (the proposal in itself devised just to bypass the relativised minimality effects) of DP_2 in specificational DCCs, then the claim that the EPP requirement only requires a lexically occupied SpecTP is simply false. Essentially, the proposal that different DPs may satisfy the EPP requirement merely restates the observation in formal terms, but does not explain why DP-movement patterns in DCCs are the way they are.

These issues will receive a principled explanation once the subject requirement operates exclusively within the reformulated Chomsky's (2001) Agree relation (holding only if i-features c-command u-features) coupled with the reformulated predication relation (holding between DP_1 and *być* + DP_2 complement).

The paper is organised as follows. Section 2.1 briefly reviews Polish DCCs. Section 2.2 covers the analysis. Section 2.2.1 highlights the problematic status of the EPP in Chomsky's (2000, 2001) Agree operation. Next, it offers an alternative take on the EPP which is based on Zeiljstra's (2012) upward Agree and motivated by formal-semantic relations involving the finite T, DP_1, and *v*P/VP in contexts with lexical verbs. The subject requirement thus obtained is invariably satisfied by DP_1 separated syntactically and semantically from the predicate and asserted its semantic property. Section 2.2.2 extends the subject requirement as defined in section 2.2.1, to hold also of DCCs. It does so by additionally drawing from Rothstein's (2004) approach to predication built on a neo-Davidsonian event semantics. Some space is also devoted to determining the status and the role of the nominal copula *to*. Section 2.2.3 briefly outlines the derivation of Polish DCCs within the confines of the approach advanced in sections 2.2.1 and 2.2.2. Section 3 concludes the discussion.

2. Eliminating the EPP-feature from Polish dual copula clauses

2.1. General remarks on dual copula clauses[10]

Polish DCCs are clauses with the pronominal copula *to* and the verbal copula *być* 'to be', surrounded by two nominative DPs. The different configuration of these DPs with respect to *być* produces two types of DCCs, predicational (1) and specificational (2).[11] In (1), the initial DP *ta okolica* 'this neighbourhood' is ascribed the property of being the outskirts of the city by DP_2 predicate *obrzeża miasta* 'outskirts of the city'. In (2), the order is reversed, with the initial DP_2 predicate *obrzeża miasta* specified by DP_1 *ta okolica*. The agreement in DCCs is always the same; the verbal copula agrees with a post-copular DP. This pattern is characteristic of DCCs only, for dropping *to* yields φ-agreement between DP_1 and the copula (5)–(6).[12] [13]

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[10] This section only highlights key aspects for our scrutiny. For a comprehensive, multi-faceted survey of copular clauses in Polish (and English), see Bondaruk (2013).

[11] For Błaszczak and Geist (2000: 118, 124, 2001: 247, 251) (but see also Geist 2007 for similar remarks on Russian), Polish predicational copular clauses lack *to*, featuring only the verbal copula *być* 'to be' and the instrumental case-marked DP (e.g. *Piotr jest moim nauczycielem*, lit. 'Peter is my$_{INSTR}$ teacher$_{INSTR}$'). Błaszczak and Geist argue that *to* behaves similarly to coordinating conjunctions, namely, it functions as a linking device establishing the relation between two constituents. Consequently, they classify DCCs not as predicational, but specificational or equative (Błaszczak and Geist 2000: 124). For details on what determines the specificational and equative interpretation, see Geist (2007).

[12] Unlike English, Polish does not use articles so its bare DPs_2 in (5)–(6) are predicate-denoting despite being translated by definite DPs. See Geist (2007) for similar considerations on Russian, another article-less language, and English. Consult Bondaruk (2019) and, especially, Bondaruk (2013) for an overview of tests/analyses to distinguish predicational from specificational copular clauses.

[13] The interpretation of clause (5) somewhat differs from that of clause (6). For example, while *to być* + DP_{NOM} clauses are more expressive, *być* + DP_{INSTR} clauses are more neutral. Hence, although (i) and (ii) can be uttered to emphasize that 'this neighbourhood' is part of the city, (ii) is more suggestive, implying anger or frustration. Furthermore, *być* + DP_{INSTR} clauses may show aspectual marking (iii) unavailable in *to być* + DP_{NOM} clauses (iv). See Bondaruk (2014, 2013: 152–155, 214–216) for more detailed remarks on the interpretational differences between different types of Polish copular clauses.

(i) *Ta okolica była obrzeżami miasta, a nie jakąś tam wioską*
this neighbourhood-NOM was outskirts-INSTR of-city, and not some-INSTR any village-INSTR
'This neighbourhood was the outskirts of the city, and not just any village'

(ii) *Ta okolica to były obrzeża miasta, a nie jakaś tam wioska*
this neighbourhood-NOM COP were outskirts-NOM of-city, and not some-NOM any village-NOM
'This neighbourhood was the outskirts of the city, and not just any village'

(iii) *Ta okolica bywała obrzeżami miasta, ale to dawne czasy*
this neighbourhood-NOM was-IMPERF outskirts-INSTR of-city, but it old-NOM times-NOM
'This neighbourhood was the outskirts of the city, but that was a long time ago.'

(iv) **Ta okolica to bywały obrzeża miasta, ale to dawne czasy*
this neighbourhood-NOM COP was-IMPERF outskirts-NOM of-city, but it old-NOM times-NOM
'This neighbourhood was the outskirts of the city, but that was a long time ago.'

(5) *Ta okolica była / *były*
This neighbourhood-NOM-3-SG-FEM was-3-SG-FEM / *were-3-PL-N-VIR
obrzeżami miasta
outskirts-INSTR-3-PL-NEUT of-city
'This neighbourhood was the outskirts of the city'

(6) *Ta okolica to *była / były*
This neighbourhood-NOM-3-SG-FEM COP *was-3-SG-FEM / were-3-PL-N-VIR
obrzeża miasta
outskirts-NOM-3-PL-NEUT of-city
'This neighbourhood was the outskirts of the city'

Citko (2008) offers some remarks on the syntax and semantics of DCCs (e.g. their typological status or extraction/movement phenomena), but provides little as regards their agreement patterns. In fact, she only discusses contexts where T and two DPs agree in φ-features (7).[14]

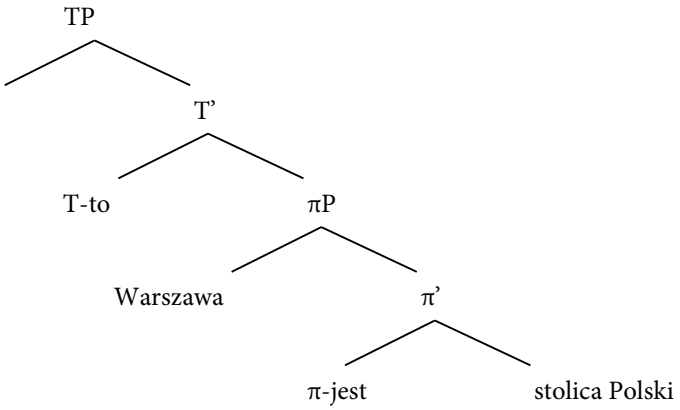
(7) *Warszawa to jest stolica Polski*
Warsaw-NOM-3-SG COP is-3-SG capital-NOM-3-SG of Poland-GEN-3-SG
'Warsaw is the capital of Poland'

For her, T has a complete set of uφ-features and undergoes multiple Agree with both DPs, valuing their u-case features as nominative (cf. Hiraiwa 2002). T, in return, has its uφ-features valued as 3rd person-SG. T also carries the EPP-feature which triggers the movement of the closer DP to SpecTP. In contrast to Bondaruk (2019), Citko's multiple Agree is thus non-selective, for T probes both DPs for the same features. This obviously blurs the picture of verbal agreement whenever two DPs show φ-features mismatch, although Citko does not address this issue. Bondaruk's (2019) perspective partly overlaps with Citko (2008) (e.g. the finite T also values the u-case features of two DPs as nominative), but given the problem that Citko's (2008) approach faces, Bondaruk formulates a more advantageous proposal. Based on selective multiple Agree, it allows to account for the valuation of T's uφ-features and the EPP-feature by two different DPs ((3)–(4)). These different feature valuation scenarios allow her to account for φ-agreement patterns between DPs and *być*, even if DPs show φ-features mismatch.

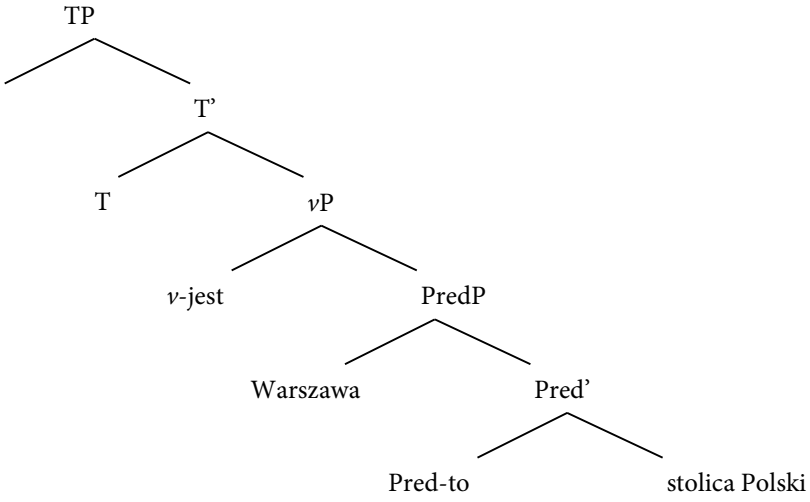
As for the structure of DCCs, they are frequently taken to feature syntactically manifested predication (but cf. Rutkowski 2006, who places *to* in T and base-generates the subject DP in Topic Phrase in the left periphery of the clause). Hence, despite certain differences, Bondaruk (2019) and Citko (2008) come up with partly overlapping cartographies (8)–(9). For convenience's sake, Citko's example (8) is imposed on Bondaruk's syntactic template in (9).

[14] DCCs like (6) or (7) may, of course, be turned into *być* + DP_{INSTR} clauses by dropping *to* and having the post-copular DP in instrumental.

(8)



(9)



Citko's (2008) πP-projection corresponds to Bondaruk's PredP, both authors following Bowers's (1993) idea that predication requires syntactic manifestation of the form [$_{PredP}$ subject [$_{Pred'}$ Pred predicate]].[15] Its structure is ternary, centred around the predicator which expresses the relation between the subject (in SpecPredP) and the predicate (Pred's complement) of which neither is more prominent than the other. Citko correlates *to* and *być* with T and Pred, the latter LF-raising to T to provide *to* with the temporal property (since tense marking is manifested on the verb and not *to*). She takes the π Pred head (the verbal copula) to be a coordination conjunction linking the same lexical categories (cf. also discussion in section 2.2.2). Bondaruk finds the temporal specification of *to* unappealing and relocates it to Pred, whilst defining *być* as a type of an unaccusative verb occupying *v*. Citko (2008) and Bondaruk (2019) both distinguish between defective and non-defective Pred. A non-defective Pred has uφ-features and is capable of valuing the instrumental case on DPs. A non-defective Pred can be found in

[15] An alternative approach to predication is offered by den Dikken (2006). For him, the predication relation between the subject and the predicate is encoded by the Relator Phrase (RP) with an abstract Relator head as shown in (i) (representation based on den Dikken 2006: 2–3, 11–13). In predicate inversion contexts, he takes the raised predicate to be connected, via the Linker, to a small clause containing the subject (ii) (representation based on den Dikken 2006: 113, 115). Though mediating the predication relation, Relators and Linkers are semantically empty functional heads. See den Dikken (2006) for motivations behind representations (i)–(ii).

(i) [$_{RP}$ [$_{XP}$ SUBJECT [$_{R'}$ RELATOR [$_{YP}$ PREDICATE]]]]

(ii) [$_{LP}$ [$_{YP}$ PREDICATE$_i$ [$_{L'}$ LINKER + RELATOR$_j$ [$_{RP}$ [$_{XP}$ SUBJECT [$_{R'}$ t$_j$ t$_i$]]]]]]

sentences with just a verbal copula as (5). A defective Pred lacks uφ-features and is unable to value DP's case. An example of a defective Pred can be found in DCCs as (1)–(2). That being said, the only probe in DCCs is the finite T whose uφ-features and the [+multiple] property allow it to value the u-case features of two DPs as nominative.

2.2. Reconsidering formal and semantic relations in DCCs

2.2.1. The EPP-requirement in general: Problems and solutions

The downward Agree relation involves a Probe (α) with uφ-features and a Goal (β) with iφ-features and a u-case feature. In Chomsky (2000, 2001), Agree is initiated by a Probe, a functional category (e.g. T), following linearly rightwards (downwards on a derivational tree) in accordance with the c-command condition. It is represented schematically in (10)–(11), example (11) translating to 'Tomek listens to Metallica'.

(10) $[\ldots\ \alpha_{[u\varphi]} \ldots \text{PROBING} \ldots\ \beta_{[i\varphi]}\ \ldots]$

(11) $[_{TP}\ T_{[u\varphi]}\ [_{vP}\ \text{Tomek}_{[i\varphi,\ u\text{-case}]}\ \text{słucha Metalliki}]]$

In (11), T carries uφ-features and probes down for the Goal (*Tomek*) with matching valued iφ-features. The Goal's valued φ-features assign the value to T's and, as a reflex of this agreement, *Tomek* has its u-case feature valued as nominative. This step completes the Probe-Goal Agree relation, which is why the subsequent movement of *Tomek* to SpecTP is triggered by T's EPP-feature. Intrinsically, the EPP's source is T's finite property i.e., φ-completeness (Chomsky 2001: 8–9) sanctioning T's Agree with the Goal in Spec*v*P and making the latter an appropriate candidate to occupy SpecTP (Chomsky 2001: 4, 6). Notwithstanding, despite licensing nominative agreement and contributing to *v*P's temporal reference, TP's role in Chomsky's works is marginalised.[16] First, Agree between T and the subject does not contribute to semantics, T's uφ-features being uninterpretable. Second, the fact that Agree is the (only) mechanism of feature valuation allows the subject, whose case feature have been valued at a distance, to receive Full Interpretation in Spec*v*P.[17] Hence, no further operation is necessitated by T's requirements in (12) (simplified, strikethrough represents feature valuation).

(12) $[_{T'}\ T_{[iT;\ \sout{u\varphi}]}\ [_{vP}\ \text{Tomek}_{[i\varphi;\ \sout{\text{case:nom}}]}\ [_{VP}\ \text{słucha}_{[+\text{finite}]}\ \text{Metalliki}]]]$

The role of the EPP-feature is thus twofold; causing the movement of the subject to SpecTP it also remedies the minor role that TP/T plays in the derivation. This remedy is, however, illusive and leads to circularity. As Haider (2016: 25) observes, the subject moves because of the EPP-

[16] In Chomsky (2000, 2001) the finite T no longer has the categorial +V-feature (the formal T-V dependency advocated earlier in Chomsky (1995) is abandoned). In Chomsky (2008), temporal properties of T are further reduced and T only receives its Tense and φ-features from C, a phase head.

[17] Full Interpretation dictates that all features receive interpretation by the time they reach the PF and LF interfaces (Chomsky 1995: 130).

feature whose presence, in turn, follows from the presence of the subject. Here, we will adopt an alternative view on the subject-requirement as operating within the tenets of Zeiljstra's (2012: 17) upward Agree which complies with the requirement that under Agree i-features c-command u-features.[18]

(13) Agree: α can Agree with β iff:
  a. α carries at least one uninterpretable feature and β carries a matching interpretable feature.
  b. β c-commands α.
  c. β is the closest goal to α.

Given that the subject requirement is satisfied by the nominative DP i.e., DP with a specific [iφ, uT] featural matrix, we propose that all instances of Agree (in φ- and case-features) between T and this DP are constrained by (13a-b) (for now, we disregard (13c)). As regards the nominative case-feature, we assume (contra Bondaruk 2019) that it does not crop up as a reflex of DP's φ-agreement with T, but is simply the uT-feature (see Pesetsky and Torrego 2004).[19] The way the subject requirement now operates is as follows. The nominative DP carries the uT-feature and by virtue of (13a) it functions as a Probe (Goal in Chomsky's Agree) that looks upwards for the interpretable counterpart which it finds on T. Since in this instance of Agree the i-feature c-commands the u-feature, it satisfies (13b) and SpecTP-movement is unnecessary. The next instance of Agree involves T's uφ-features. By virtue of (13a), T is a Probe and looks downwards for the iφ-features which it locates on the nominative DP. Because in this case i-features do not c-command u-features, Agree cannot take place and, hence, to satisfy (13b) SpecTP-movement of DP is necessary. The EPP-requirement thus becomes formal for the sake of checking T's uφ-features.

One could ask, however, why it is T's uφ-features that determine the subject requirement. Put differently, why does Agree operate the way as captured in (13)? We believe this is due to T's properties. T is often labelled as 'extensional' with respect to the thematic *v*P-/VP-domain (e.g. Boeckx 2008: 152–155; Vangsnes 2002), providing the verb's event denotation with temporal interpretation and allowing *v*P/VP to 'expand' and connect to the CP-domain expressing force and/or mood (cf. Roberts and Roussou 2002). Biberauer and Roberts (2010:

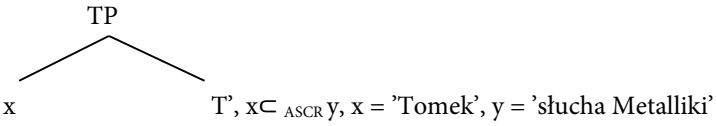
[18] In (13), the driving force of Agree is the uninterpretable and not the unvalued status of the Probe's feature. In Chomsky (2001, 2000), valuation does not seem to be a sufficient trigger for Agree, for it is still possible for multiple DPs with inherently/lexically valued φ-features to participate in a single Agree relation (e.g. in Japanese multiple nominative constructions – see Hiraiwa 2005, Ura 2000). An alternative to Zeiljstra's approach is offered by Bošković (2002). He rejects the EPP arguing that SpecTP must be occupied due to the Inverse Case Filter (cf. Bošković 1997), namely, the requirement that traditional Case assigners assign case features (nominative for T). This requires that case features be under c-command, for they are uninterpretable on both Case assigner and assignee. Hence, the overt movement of the latter to SpecTP (Bošković 2002: 172). Elsewhere, Alexiadou and Agnostopoulou (2001, 2007) offer a principled version of the EPP based on The Subject in-situ Generalisation which says that by Spell-out, *v*P can only contain one argument with an unchecked case feature. That SpecTP must be filled is thus constrained by case checking.

[19] For brevity, we disregard problems with reflex (nominative) case checking in Chomsky (2001). Let us only remark that the transformation from what Chomsky (2001: 4, 6) calls an 'uninterpretable structural Case' to 'nominative' i.e., from 'u-Case' to '$Case_{nom}$'/'NOM' violates the *Inclusiveness Principle* which, as he himself observes: "bars introduction of new elements (features) in the course of a derivation". (Chomsky 2001: 2).

265) argue, for instance, that T and the verb carry both T- and V-features and enter into Agree due to their mutually interrelated properties. Verbs carry the uT-feature since they manifest tense morphology, but lack temporal content on their own. T carries the uV-feature because it lacks the semantics/argument structure of verbs, but is the position where lexical/auxiliary verbs move/are merged. Assuming the above view on the nominative case-feature, T is also extensional with respect to the nominative DP, allowing it to be interpreted in the TP-domain. It is thus reasonable to assume that T's iT-feature reflects T's inherent Tense-related property and that because of this property, the movement of a uT-feature-bearing category to T or SpecTP is not mandatory. On the contrary, it is doubtful that T is inherently nominal. V-to-T movement is irrelevant to subject licensing (Biberauer and Roberts 2010: 267; Roberts 2010; Vangsnes 2002), which necessitates an overt D-/φ-features-bearing category in SpecTP (unless, perhaps, in null-subject languages whose verbs may carry D-features). We take this necessity of the movement of an iφ-feature-bearing item to SpecTP to be due to T's lack of the inherent nominal property manifested formally as uφ-features.[20] Semantically-wise, we follow Vangsnes (2002) and claim that nominal properties must be manifested lexically in SpecTP so that the denotations of the subject and the event expressed by the verb both be anchored to the same state of-affairs.[21] Essentially, the presence of the subject in SpecTP: (i) – allows the event denotation to be anchored with respect to the verb's thematically most prominent argument (Vangsnes 2002: 60–61); (ii) – allows the subject to be identified as a part of this event denotation/state-of-affairs i.e., ascribed the semantic property of (the temporally modified) VP.

Syntactically then, TP represents an Aristotelian bipartite proposition, a point in the derivation where the subject (DP), rendered as SpecTP, is asserted/denied, with the help of tense, some property by the predicate (VP), rendered as T'. This proposition is schematised in a simplified form in (14) on the basis of example (11) ('ASCR' = 'is ascribed the property of').

(14)



In section 2.2.2 we show that this bipartite structure of proposition also holds of DCCs. Following Rothstein's (2004) approach to predication, we argue against the semantically void verbal copula and motivate this premise by considering the semantic details of predicate

[20] Polish DCCs may of course have null subjects. In (i) below, the neighbourhood has already been mentioned in A, so it is salient enough to be left out in B. We disregard such contexts here.

(i) A: *Wiesz coś więcej o tej okolicy?*
'Do you know more about this neighbourhood?'
B: *To były obrzeża miasta.*
'(This neighbourhood) was the outskirts of the city.'

[21] Vangsnes actually refers to SpecAgrSP due to investigating the distribution of different subject types in Icelandic Transitive Expletive Constructions (TECs). In TECs, SpecAgrSP is where expletives sit, with their nominal associates (subjects) located in SpecTP (e.g. ***Það*** *hefur verið* ***einhver köttur*** *í eldhúsinu* '**There** has been **some cat** in the kitchen'). We follow Vangsnes's (2002) semantic motivation for the subject requirement, but proceed without assuming AgrSP. Nothing hinges on that.

formation, the corresponding syntactic form it takes, and how these two aspects underlyingly separate DP_1 from the verbal copula and its DP_2 complement. This will allow us to: (i) – dispense with the predicate raising hypothesis and its predictions with respect to semantics of predicational and specificational DCCs; (ii) – maintain the syntax-semantic primacy of one of the nominative arguments; (iii) – show that the subject requirement as outlined above is uniformly satisfied by the higher nominative DP.[22]

2.2.2. The EPP-requirement in DCCs: Deriving the bipartite structure of predication

Consider first the issue of whether *być* 'to be' contributes semantically to the interpretation of (copular) sentences. Neither Bondaruk (2019, 2013) nor Citko (2008) address this issue directly, but syntactic and semantic considerations they offer suggest that they discard such a possibility.[23] For Benveniste, however, (1966: 159, 162), who examines Latin and Ancient Greek verb-less and verbal copular clauses, the difference between the two exists. The former, like Latin *omnia praeclara rara*, lit. 'all excellent things [are] rare', lack the 'narrative content' since the nominal predicate introduces no event (cf. Citko 2008, for whom the defective π lacks the eventuality variable). It only asserts the very semantic content about the subject, i.e., expresses general statements/states and universal truths which lack temporal determination (cf. Meillet 1906).[24] This temporal determination crops up in the latter, like Latin *omnia praeclara rara sunt*, 'all excellent things are rare', where *be* relates the event time to the speech time, thereby yielding the narration of a situation (Benveniste 1966: 159, 162–163). The same difference also characterises the Polish copular clauses.

(15) *Marek* *to* *lekarz*
Marek-NOM COP doctor-NOM
'Marek is a doctor'

(16) *Marek* *to* *jest* *lekarz*
Marek-NOM COP is-3-SG doctor-NOM
'Marek is a doctor'

The verb-less one in (15) only informs that there is a property of 'doctorhood' ascribed to *Marek* by the predicative DP alone. A naïve interpretation of (15) would be that 'Marek *has* the

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[22] The predicate raising hypothesis is defined in (i) and yields the semantics of predicational and specificational DCCs as captured in (ii). This hypothesis has been widely advocated by Moro (1997), Zamparelli (2000), Adger and Ramchand (2003), Bondaruk (2012, 2019), amongst others.

(i) specificational DCCs are derived from predicational DCCs by virtue of predicate raising
(ii) specificational DCCs have predicative subjects and referential post-copular DPs; predicational DCCs have referential subjects and predicative post-copular DPs

Syntactic/empirical arguments for predicate raising hypothesis are numerous, but will not be discussed, both for space reasons, and because they do not directly relate to the scrutiny of this paper. See Bondaruk (2013) and Mikkelsen (2005) for details.

[23] This stance is dominant amongst scholars (e.g. Déchaine 1993; den Dikken 2006; Heycock 2013).

[24] We discuss temporal properties of verb-less copular clauses later in this section while scrutinising the status of the word *to*.

property of a doctor'. Contrastively, the presence of *być* in (16), a DCC, locates the semantic content of the predicative DP in a temporally determined eventuality, which yields a proposition asserting that '*there is an event* in which it holds (at some time t) that Marek has the property of doctorhood'. The interpretational disparity between (15) and (16), however subtle it is, suggests that we should not treat *być* 'to be' as completely semantically void (in this respect, cf. also Partee 1987: 375, 2000, 2010). But even if it is even minimally semantically substantive, Benveniste's remarks do not say why *be* would form a predicate together with its post-verbal complement. A plausible reason is, however, offered by Rothstein (2004) who, like Benveniste, takes *be* to introduce a temporally determined eventuality.[25, 26] Unlike him, however, she claims that whilst lexical verbs introduce both the eventuality and its property (e.g. the verb *read* introduces the event whose property is 'reading'), the verbal copula does not specify the property it introduces. It is only after *be* combines with its complement like a referential DP (Rothstein 2004: 243–246) or an adjective (ibid. 289–297, 318–326) that we can determine what kind of eventuality it is. To capture Rothstein's idea we may use the fairly simplified logical notations in (17)–(18) ('$P_{(e)}$' = 'property of eventuality'). Expressed in such terms, the complex predicate [*być* + post-copular complement] in (18) follows from syntax-semantic considerations, for only a syntactically complex form can denote a fully semantically specified eventuality. Hence, the infelicitous status of examples like (19), where the DP_1 subject accompanied only by the verbal copula is not ascribed any property.[27]

(17) [lexical $verb_{(e\ \&\ P(e))}$]

(18) [verbal $copula_{(e)}$ [$complement_{(P(e))}$]]

(19) *Marek jest
Marek is-3-SG
'Marek is'

---

[25] She follows a neo-Davidsonian semantics theory (see Parsons 1990), whereby verbs denote event arguments '*e*' and introduce a set of thematic roles (e.g. Agent, Goal) which denote functions from events into individuals. A neo-Davidsonian semantics of *Marek napisał artykuł* 'Marek wrote an article' is given in (i). The existentially-bound event variable (∃*e*) represents an expression which denotes the truth value '1' i.e., 'true' if it holds that y $\subset_{ASCR}$ to x, where x = subject and y = predicate.

(i) ∃e (WRITE(*e*) & AGENT(*e*, Marek) & GOAL(*e*, artykuł) & PAST(*e*))

[26] Examining the behaviour of state expressions, Maienborn (2005, 2007, 2011, 2019) shows that sentences with the copula *be* behave like stative verbs (e.g. *know*, *weigh*, *cost*, *own*, *resemble*, etc.) and, hence, unlike state verbs (e.g. *sit*, *stand*, *lie*, *wait*, *gleam*, *sleep*), do not meet the criteria for Davidsonian eventualities. Thus, they cannot serve as infinitival complements of perception verbs, cannot combine with locative modifiers and manner adverbials (Maienborn 2019: 41–43). Instead, they are shown to instantiate *Kimian states* (Kim 1969, 1976) in that: (i) they are not accessible to direct perception, (ii) have no location in space, (iii) no unique manner of realisation, (iv) can be located in time, (v) are reified entities of thought/discourse, (vi) are closed under complementation (2019: 47–52). See Maienborn (2011, 2019) for detailed remarks.

[27] Such examples are grammatical but in contexts with ellipted post-copular complements.

(i) *Tomek to nie jest lekarz, ale Marek jest.*
Tomek COP not is-3-SG doctor, but Marek is-3-SG
'Tomek is not a doctor, but Marek is.'

Assuming this standpoint, the derivational step marking the establishment of a complex predicate in DCCs will be [Pred'] instantiating the merger of *być* and its complement. In this respect, consider now the semantics of the predicational DCC from (16)=(20) up to the point where [Pred'] is formed. We use lambda (λ) abstraction to account for how the structure is combined and interpreted in the semantics. Since *be* assigns no thematic roles, we use 'Arg_1' and 'Arg_2' rather than 'Agent' and 'Patient' to annotate external and internal arguments, respectively.

(20) *Marek to jest lekarz*
Marek COP is-3-SG doctor
'Marek is a doctor'

(21) [Pred]: λy λx λe [P(*e*) & Arg_1(*e*) = x & Arg_2(*e*) = $y_{(P(e))}$ & y = x][28]

(22) [Pred']: λy λe [P(*e*) & Arg_1(*e*) = x & Arg_2(*e*) = $y_{(P(e))}$ & y = x] (lekarz) =
λe [being-a-doctor(*s*) & Arg_1(*s*) = x & Arg_2(*s*) = $lekarz_{(P(s))}$ & lekarz = x]

In (21), the proposition from (20) is turned by a λ-operator into a function represented by the verbal copula *być* ([Pred]). This function selects the arguments of the proposition and replaces (λ-abstracts) them by variables 'x', 'y', the latter specifying the property $P_{(e)}$ of the eventuality introduced by *być*. At this point, we take the fact that DCCs denote non-eventive assertions in which, at some time t, something holds rather than begins/is in progress/culminates, to indicate that both predicative and referential post-copular DPs introduce a state *s* rather than an event *e* argument (see Parsons 1990 for discussion; cf. also Bondaruk 2013: 217). For example, in (22), *być* merges with *lekarz* 'a doctor', which is interpreted in the semantics as the application of the function to the predicative Arg_2. This results in the formation of the predicate [Pred'] whose paraphrase could be: 'an eventuality which instantiates the state of doctorhood'. Predicate formation is defined by Rothstein (2004: 138) as follows.

(23) If κ is the translation of a syntactic predicate then κ → λx.κ[29]

In the semantics, κ is prefixed by λx (24) which means that the semantic content of κ will be applied to the denotation of the referential Arg_1.

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[28] To account for the predicative use of DPs, Partee (1987) uses the *ident* operator '*ident*: λy λx [y = x]'. It maps any 'y' to the property identical to 'y'. When applied to the predicative DP *lekarz* 'a doctor', it yields λx [λy [lekarz(y)] = x so DP thus mapped denotes the property identical to that of a doctor. The notation 'y = x' is simplified for expository reasons.

[29] We use κ instead of Rothstein's α since here α = Probe. The term 'syntactic' follows from Chierchia (2004) and Rothstein's (1995) considerations, whereby the sentence has a bipartite structure – a function (predicate) and an argument (subject). The function is structurally incomplete and must apply to a complete constituent (argument) to be closed. This idea reverberates Frege (1891/1960), where the 'saturated'/'unsaturated' status is determined by constituents' combinatorial properties (Rothstein 2004: 44). DPs are inherently saturated, for they can stand on their own. VPs are inherently incomplete, as they require DPs to form a sentence (cf. Frege 1891/1960: 31). This requirement is syntactic because it holds regardless of verbs' thematic properties (Rothstein 2004: 44–49). It characterises predicates with lexical verbs (e.g. *visited John*), the copula *be*, or raising verbs like *seem* (e.g. *is a tall man* and *seems that John is late*).

(24) [Pred']: λx λe [being-a-doctor(s) & Arg_1(s) = x & Arg_2(s) = $lekarz_{(P(s))}$ & lekarz = x]

Assuming, as commonly done, that the basic DP order in DCCs is $DP_{referential}$ > *być* > $DP_{predicative}$, the fact that κ translates to a syntactic and semantic predicate (to which the predicative Arg_2 contributes semantically) implies that $Arg_2 \in$ κ. In this respect, consider now the semantics of [Pred'] in specificational DCCs like (25).

(25) *Lekarz to jest Marek*
doctor COP is-3-SG Marek
'A doctor is Marek'

(26) [Pred]: λy λx λe [P(e) & Arg_1(e) = x & Arg_2(e) = $y_{(P(e))}$ & x = y]

(27) [Pred']: λy λe [P(e) & Arg_1(e) = x & Arg_2(e) = $y_{(P(e))}$] (marek) =
λe [existence-of-marek(s) & Arg_1(s) = x & Arg_2(s) = $Marek_{(P(s))}$ & x = Marek]

(28) [Pred']: λx λe [existence-of-marek(s) & Arg_1(s) = x & Arg_2(s) = $Marek_{(P(s))}$ & x = Marek]

In (27), *być* merges with *Marek*, so the function first applies to the referential Arg_2 which specifies the property $P_{(e)}$ of the eventuality introduced by *być*.[30] This step results in the formation of [Pred']. Since Arg_2 is not used predicatively but refers to an individual, we assume that the denotation of [Pred'] *jest Marek* 'is Mark' is simply 'an eventuality instantiating the state of existence for Marek'. As in (24), κ translates to a syntactic and semantic predicate of which Arg_2 is part. In (28), the denotation of κ is prefixed by λx and will apply to the denotation of the predicative Arg_1.

Considering this semantics-based scrutiny we observe that κ in (24) and (28) is not the same. The 'predicational κ' (which we label ε) predicates of the referential DP_1, and the 'specificational κ' (which we label ρ) specifies the value for the variable set up by the predicative DP_1. This means that the predicative DPs in (24) and (28) are not the same either, for the one in the predicative DCC is syntactically and semantically part of ε which *predicates* of the referential DP, and the one in the specificational DCC is *specified* by ρ of which the referential DP is now part. This difference cannot come from predicate raising, for given the underlying word order $DP_{referential}$ > *być* > $DP_{predicative}$, $DP_{predicative}$ cannot be specified by ρ, where ρ = *być* + $DP_{referential}$ if $DP_{predicative} \in$ ε, ε = *być* + $DP_{predicative}$ and the formation of ε is the initial derivational step of a DCC. The difference must thus arise from the order at which the function applies to arguments, which, in turn, suggests that the predicative DP in (25) is base-generated in SpecPredP just as the referential DP in (20). This is summarised in (29)–(30). We conclude that the formation of ε and ρ does not take place within the same derivation, but implicates two different derivations.

(29) $DP_{referential}$ is in SpecPredP: 'predicated of' (by ε, ε = *być* + $DP_{predicative}$)

(30) $DP_{predicative}$ is in SpecPredP: 'specified' (by ρ, ρ = *być* + $DP_{referential}$)

[30] In compliance with (20), '$P_{(e)}$' always comes from the DP_2 complement, regardless of whether it is used predicatively or referentially.

Taking these considerations into account, we claim, contra Bondaruk (2019, 2013), that the subject requirement in Polish DCCs only holds of the nominative DP_1.We now move on to determine the status/role of the word *to* and the derivational step at which κ applies to x. We discuss these issues in the respective order.

As already indicated (section 1, fn.6), the status of the particle *to* is vague and different scholars consider it from various standpoints. For example, Rutkowski (2006) (but cf. also Hentschel 2001) defines *to* as a demonstrative pronoun located in SpecTP, with DP_1 base-generated in the left periphery (SpecTopP) and DP_2 functioning as a VP-internal subject. For Tajsner (2015a, 2015b), *to* functions as a focus marker, heading the Specification Predication Phrase (S-PredP). As noted earlier (fn.1), Błaszczak and Geist (2001) consider *to* a conjunction-like particle. They also take it to project its own ėtoP projection (they examine both Polish and Russian), thereby linking two elements (one in SpecėtoP and the other as the complement of *to*). Here, we basically follow Bondaruk (2019, 2013) in that *to* represents a pronominal copula with clitic-like properties owing to which it shows distributional patterns as in (31)–(32), these being, perhaps, subject to some PF-movement constraints (cf. Bondaruk 2013: 234–240).

(31) *Warszawa* *to* *jest* *stolica* *Polski*
Warsaw-NOM-3-SG COP is-3-SG capital-NOM-3-SG of Poland-GEN-3-SG
'Warsaw is the capital of Poland'

(32) *Warszawa* *jest* *to* *stolica* *Polski*
Warsaw-NOM-3-SG is-3-SG COP capital-NOM-3-SG of Poland-GEN-3-SG
'Warsaw is the capital of Poland'

Contra Bondaruk, however, we do not place it in Pred, but base-generate in T, the choice following from the distribution of *to* and *być* 'to be' in DCCs. As (33)–(34) show, *to* is obligatory in past, present, and future tense DCCs, whereas *być* can be dropped in the present tense DCCs, the fact annotated by placing it in brackets in (33).

(33) *Marek* *to* *(jest)* *lekarz*
Marek-NOM COP is doctor-NOM
'Marek is a doctor'

(34) Marek to był / będzie lekarz
Marek-NOM COP was / will-be doctor-NOM
'Marek was/will be a doctor'

Suppose then, that past and future tense DCCs carry the past and the future tense specified for the categorial verbal [+V] and nominal [+D] features and, hence, the obligatory presence of both copulas in (34). Contrastively, present tense DCCs carry the present tense feature which does not require the [+V] feature and may be satisfied by the nominal item alone. This allows for copular clauses with only the pronominal copula like in (15) above. Similar considerations have been followed (e.g. Alharbi 2017; Benmamoun 2000, 2008; Doron 1986) to account for Hebrew and Arabic present tense copular clauses. Benmamoun (2008: 125), for example, takes the Hebrew pronominal copula (which agrees with the subject in number and gender but lacks any tense marking) to be the manifestation of the present tense's nominal feature whose

specification is, accordingly, [+D, number, gender].[31] We argue that *to* plays the same role in Polish copular clauses. It manifests the present tense's nominal feature whose formal guise is simply [+D] because *to* lacks any kind of agreement morphology.[32] The proposal that *to* is implicated in feature valuation with T has three major benefits. First, since *to* remains a nominal item, we can still account for its clitic-like properties and distribution in examples like (33)–(34). Second, the location of *to* is no longer problematic, even considering its lack of tense morphology, an issue raised by Bondaruk (2019: 117). Third, the temporal property of verb-less copular clauses like (15) receives a straightforward explanation. The present tense has only the nominal feature to value (but cf. fn.32), so it requires no verbal item/morphology to convey the present tense interpretation.[33] But because T does not have to be paired with a verbal head or other temporal markers, examples like (15) lack an unambiguously located temporal reference.

Finally, let us account for the ascription of κ's denotation to the subject. We have already suggested (section 2.2.1), that TP is where the proposition is encoded configurationally between the subject (in SpecTP) and the predicate (T'). Assume then, that after DP_1 merges with [Pred'] it yields [PredP] which is too small a domain for establishing proposition.[34] It is only when [PredP] merges with T that κ is temporally modified and can be applied to the denotation of the subject. We take this temporal modification to have a syntax-semantic guise. In the semantics, T, a modifier of type <κ,κ>, takes as its complement the predicate [Pred'] and returns the same predicate [Pred'], but whose eventuality is now modified by tense. Adopting Biberauer and Roberts's (2010) T-verb Agree relation, we take the syntactic reflex of this modification to be the valuation of the verb's uT-feature by T's iT-feature, which provides the verb with temporal content. The denotation of this temporally modified κ is ascribed/applied to DP_1 once it occupies SpecTP. Examples (35)–(37) show, in the respective order, the formation of κ, its temporal modification by T, and the ascription of its denotation to DP_1 which has moved to SpecTP in the predicational DCC. Examples (38)–(40) show the same for the specificational DCC.

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[31] Similarly to Polish, Hebrew (i) and Arabic (ii) present tense copular clauses may do without the verbal copula. Interestingly, they may also do without the pronominal copula (indicated by brackets). In such cases, Benmamoun takes the nominal feature of the present tense to be valued by the subject.

(i) *dani (hu) rofe*
Dani SG-MASC doctor
'Dani is a doctor'

(ii) *Zayd-un (huwa) l-malik-u*
Zayd-NOM he the-king-NOM
'Zayd is the king'

[32] More adequately, given the optionality of *być*, the present tense feature in DCCs is [+D, (+V)]. The [+D] feature is adopted for simplicity given the troublesome categorial status of the word *to*.

[33] Bondaruk (2019: 111) acknowledges that dropping the past/future verbal copula in DCCs like (34) triggers the present tense interpretation, but she does not correlate this fact with the presence/properties of *to*.

[34] In Aristotelian terms, a sentence affirms/denies the subject's predicate once it features the subject, the predicate, and tense, the three resulting in a proposition (Woodard 2018: 43).

(35) [PredP]: λx λe [being-a-doctor(*s*) & Arg_1(*s*) = x & Arg_2(*s*) = $lekarz_{(P(s))}$ & lekarz = x] (x) =
λe [being-a-doctor(*s*) & Arg_1(*s*) = x & Arg_2(*s*) = $lekarz_{(P(s))}$ & lekarz = x] [35]

(36) [$_{T'}$ T PredP]: λx λe [being-a-doctor(*s*) & Arg_1(*s*) = x & Arg_2(*s*) = $lekarz_{(P(s))}$ & lekarz = x & Present(*s*)]

(37) [$_{TP}$ x [$_{T'}$ T PredP]: λx λe [being-a-doctor(*s*) & Arg_1(*s*) = x & Arg_2(*s*) = $lekarz_{(P(s))}$ &lekarz = x & Present(*s*)] (marek) =
∃e [being-a-doctor(*s*) & Arg_1(*s*) = Marek & Arg_2(*s*) = $lekarz_{(P(s))}$ & lekarz = Marek & Present(*s*)]

(38) [PredP]: λx λe [existence-of-marek(*s*) & Arg_1(*s*) = x & Arg_2(*s*) = $Marek_{(P(s))}$ & x = Marek] (x) =
λe [existence-of-marek(*s*) & Arg_1(*s*) = x & Arg_2(*s*) = $Marek_{(P(s))}$ & x = Marek]

(39) [$_{T'}$ T PredP]: λx λe [existence-of-marek(*s*) & Arg_1(*s*) = x & Arg_2(*s*) = $Marek_{(P(s))}$ & x = Marek & Present(*s*)]

(40) [$_{TP}$ x [$_{T'}$ T PredP]: λx λe [existence-of-marek(*s*) & Arg_1(*s*) = x & Arg_2(*s*) = $Marek_{(P(s))}$ & x = Marek & Pres(*s*)] (lekarz) =
∃e [existence-of-marek(*s*) & Arg_1(*s*) = lekarz & Arg_2(*s*) = $Marek_{(P(s))}$ & lekarz = Marek & Present(*s*)]

The movement of the higher nominative DPs to SpecTP makes it ascribed the semantic content of T' i.e., the temporally modified κ. This, as shown in section 2.2.1, is a configuration which produces the proposition whereby the denotations of the DP subject and T' are anchored to the same state-of-affairs. This is manifested semantically by the existential binding of eventuality variables (∃*e*) of expressions denoted in (37) and (40) owing to which they receive the value 'true', namely, they are asserted the property denoted by T'.

Section 2.2.3 below briefly outlines the derivation of Polish predicational and specificational DCCs on the basis of the considerations from sections 2.2.1 and 2.2.2.

2.2.3. The EPP in DCCs: A revised formal account

For the sake of examination, we use examples (1)–(2) which Bondaruk (2019) uses in her own analysis of DCCs. The two examples are repeated below in (41)–(42). For convenience, we also repeat Zeiljstra's (2012) upward Agree (43).

(41) *Ta okolica to były obrzeża miasta*
this neighbourhood-NOM-3-SG-FEM COP were-3-PL-N-VIR outskirts-NOM-3-PL-NEUT of-city
'This neighbourhood was the outskirts of the city'

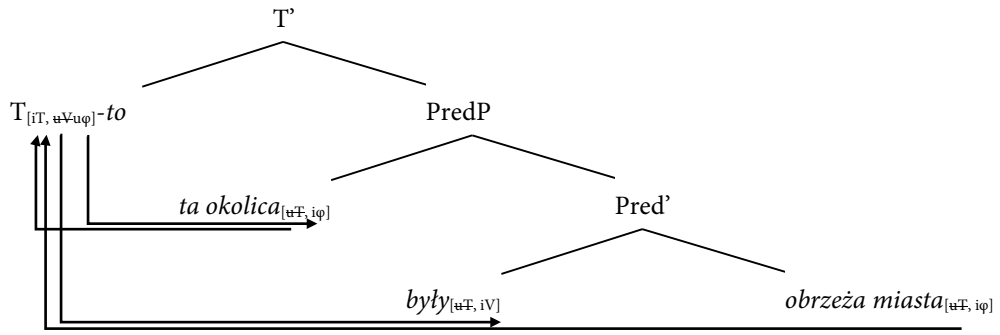
(42) *Obrzeża miasta to była ta okolica*
outskirts-NOM-3-PL-NEUT of-city COP was-3-SG-FEM this neighbourhood-NOM-3-SG-FEM
'The outskirts of the city were this neighbourhood'

(43) Agree: α can Agree with β iff:
a. α carries at least one uninterpretable feature and β carries a matching interpretable feature.
b. β c-commands α.
c. β is the closest goal to α.

[35] The arguments *Marek* and *lekarz* are interpreted in SpecTP, so the function in (35) and (38) applies to the variables they leave behind in SpecPredP. Once the two arguments are identified in SpecTP (examples (37) and (40), respectively), the variables are replaced by the denotations of *Marek* and *lekarz*.

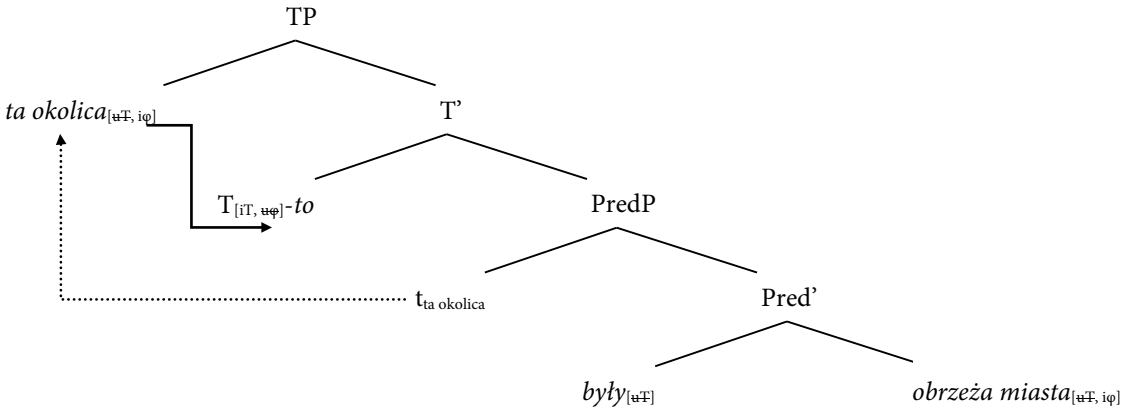
Let us now examine the derivation of the predicational DCC (41) at the moment when PredP merges with T, producing T'.

(44)

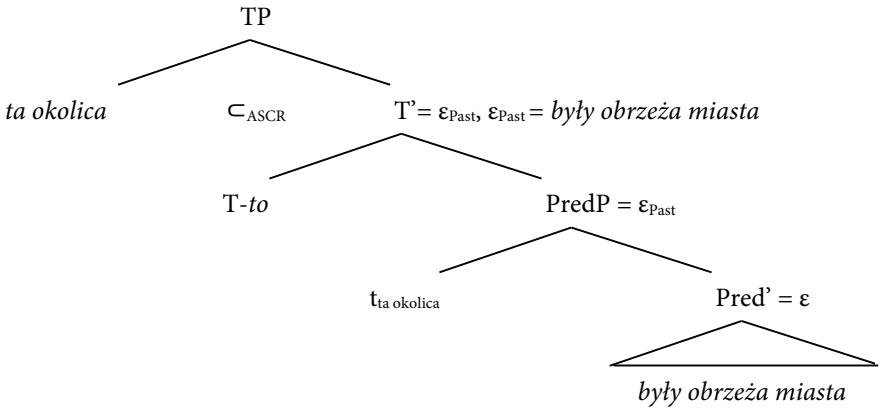


As shown in (44), the Agree relation between T and the verbal copula *były* 'were' follows in a 'classic' manner. This is because it does not involve DP with iφ-features and the uT-feature, and so it does not satisfy the subject requirement. Consequently, T probes down to have its uV-feature valued by the iV-feature which it locates on the copula (Goal). As a result of this Agree relation, the copula's uT-feature is also valued by T's iT-feature (Biberauer and Roberts 2010: 265, 270), which makes [Pred'] temporally modified. On the other hand, the Agree relation between T and DPs *ta okolica* 'this neighbourhood' and *obrzeża miasta* 'the outskirts of the city' follows in an upward manner. This is because it is expected to satisfy the subject requirement, for it takes place between T and DP with the [iφ, uT] featural matrix. Since in (44) two DPs carry the uT-feature, by virtue of (43a) both function as Probes and probe upwards to have their features valued by the iT-feature which they locate on T (Goal). Since at this step in all Agree instances between T and the two DPs the iT-feature c-commands the uT-features, no movement of a uT-feature bearing item to SpecTP is required for Agree to take place. This follows from the inherent Tense-related property of T (see section 2.2.1). As for the multiple valuation of DPs' uT-features, it yields no relativised minimality effects (contra Bondaruk 2019), for being initiated by DPs and not by T, no alternative Goal intervenes between multiple Probes. Multiple Agree thus proceeds with no additional assumptions. The next step involves the valuation of T's uφ-features. By virtue of (43a), this valuation is initiated by T and since T's property is not inherently nominal (see section 2.2.1), it necessitates the movement of the iφ-features-bearing item to SpecTP. Notice that despite the fact that both Bondaruk (2019) and the present approach take DP_1 to move to SpecTP in predicational DCCs, only in (44) does the movement of DP_1 receive a principled explanation. First, it moves because it is the only legitimate DP to move (DP_2 is syntactically and semantically part of the complex predicate [Pred']). Second, it moves so that Agree between it and T may take place and this is only possible when DP's iφ-features c-command T's uφ-features. The movement thus satisfies (43c). It is shown by dotted lines in (45). Having moved there, the subject DP is lexically identified in TP, which makes its denotation and the denotation of the predicate anchored to the same state-of-affairs. This is schematised in (46), where the subject is ascribed the semantic content of the temporally modified [Pred'] (ε). This step results in the formation of the proposition that asserts that there is an eventuality in which the state of being city outskirts holds of the specific neighbourhood.

(45)



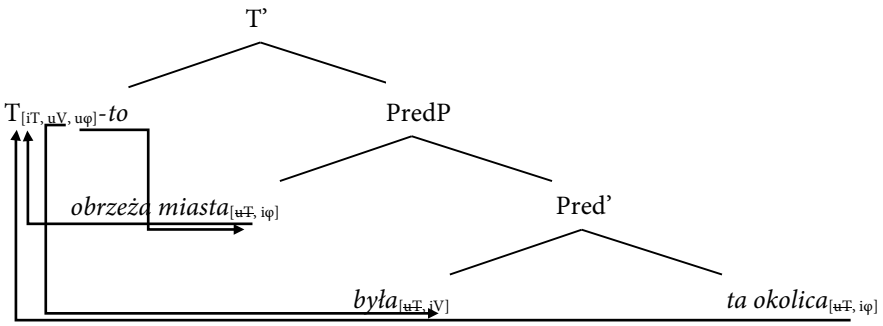
(46)



The same constraints apply to specificational DCCs like (42). The Agree relation between T and the verbal copula follows downwards for it does not satisfy the subject requirement. T thus probes down to have its uV-feature valued by the iV-feature of *była*'was'. As a result of this Agree, *była* 'was' also has its uT-feature valued by T's iT-feature. The Agree between T and the two DPs follows upwards, for it involves DPs with the [iφ, uT] featural matrix and, hence, is expected to satisfy the subject requirement. By virtue of (43a), the two DPs which carry the uT-features probe upwards to have them valued against T's iT-feature. As in (44), the iT-feature c-commands uT-features so Agree is satisfied without resorting to movement. No relativised minimality effects follow either since no alternative Goal intervenes between the two DP Probes. This multiple Agree procedure is shown in (47). The next instance of Agree involves the valuation of T's uφ-features which, by virtue of (43a), is initiated by T. Since T's property is not inherently nominal, it necessitates the movement of DP to SpecTP. As in (44), and in contradistinction to Bondaruk (2019), only DP_1 is legitimate to move, for DP_2 is syntactically and semantically part of [Pred'].[36]

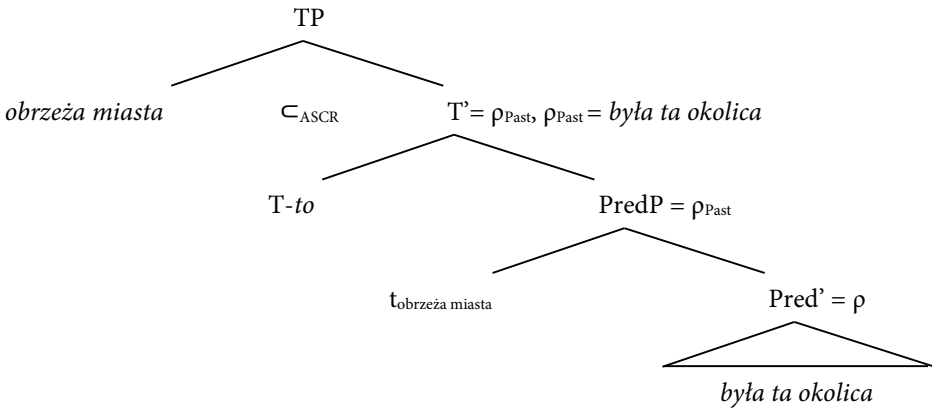
[36] Notice that the valuation of the uTopic-feature carried by the predicative DP_1 is now also unproblematic, for not only is there no relativised minimality effects, but also no feature-tandem phenomenon is necessary to move the predicative DP_1 to SpecTP. Its movement now stems directly from (43a-c).

(47)



Having moved to SpecTP, the DP *obrzeża miasta* is lexically identified in TP and the denotations of this DP and that of the predicate are anchored to the same state-of-affairs. This is shown in (48), where the subject is ascribed the semantic content of the temporally modified [Pred'] (ρ). This step, as in the case of the predicational DCC, results in the formation of the proposition which asserts that there is an eventuality in which the existence of the specific neighbourhood determines of whom the property of city outskirts holds.

(48)



Given the above considerations, the troublesome EPP-feature becomes redundant, for the requirement that SpecTP be lexically occupied is now formally motivated. It holds to compensate for T's lack of the inherent nominal property rendered formally as uφ-features. T must then probe for the iφ-features of DP, which necessitates the movement of DP to SpecTP. This creates the configuration where DP's iφ-features c-command T's uφ-features so that: (i) – Agree between the two may take place; (ii) – the denotation of the temporally modified [Pred'] can be ascribed to DP in SpecTP. Furthermore, the subject requirement is now constrained. It can only probe for the iφ-features of the closer DP (DP_1) because DP_2 (in both predicational and specificational DCCs) is syntactically and semantically part of the complex predicate [Pred'] whose semantic content is ascribed to the denotation of DP_1 once the latter lands in SpecTP. The derivation outlined here also holds of predicational (49) and specificational (50) DCCs featuring 1st and 2nd person pronouns in which φ-agreement is determined by the person hierarchy (51)–(52) (Bondaruk 2019: 126).[37]

[37] The issue of what motivates the person hierarchy in DCCs is not relevant for this scrutiny and will be omitted.

(49) *My to jesteśmy złodzieje*
We-1PL-NOM COP are-1PL thieves-3PL
'We are thieves.'

(50) *Szczęściarz to jesteś ty*
lucky man-3SG-NOM COP are-2SG you-2SG-NOM
'A lucky man is you.'

(51) If NP_1 is 1st or 2nd person, then it can and will agree thereby blocking NP_2 agreement.

(52) Only if NP_1 is 3rd person, will NP_2 agreement be possible.

In (49)–(50) nothing changes as regards the binary structure of proposition. DP_1 is invariably expected to move to SpecTP because DP_2 is semantically and syntactically part of [Pred']. What changes only is the way φ-features valuation operates (see immediately below).[38] With respect to the above, Bondaruk's (2019) approach to the derivation of Polish DCCs not only fails to provide a coherent syntax-semantic rendition of the subject requirement, but also leaves the reason for the satisfaction of the subject requirement by two different DPs unaccounted for. On the basis of considerations from sections 2.2.2 and 2.2.3, we conclude that it should, therefore, be rejected on both formal and semantic grounds. Before we conclude our examination, let us briefly discuss two issues which require additional comments in terms of the approach adopted here.

The first issue concerns agreement in DCCs with two nominative 3rd person DPs which is always controlled by DP_2. In our approach, such an agreement cannot come from Agree in φ-features between T and DP_2, for it is DP_1 which moves to SpecTP and values T's uφ-features. But dispensing, as we have done, with Chomsky's (2001) case checking as a reflex of φ-features valuation, allows for an alternative. Since the nominative case feature is the uT-feature, the verbal copula need not be defective and can have a full set of uφ-features. We propose that having them, it acts as a Probe and values them against DP_2's iφ-features, which yields φ-agreement controlled by DP_2 in (41)–(42). We thus end up with two φ-features Agree relations (between T-DP_1 and Pred-DP_2) which serve different formal needs. We surmise that these two relations are necessitated formally because DCCs feature two nominative 3rd person DPs which are both potential subjects expected to engage in operations that yield 'subject effects' i.e., SpecTP-movement and subject-verb agreement. The latter is thus 'taken care of' by φ-agreement between the copula and DP_2 and the former emerges due to φ-agreement between T and DP_1. This scenario also holds of DCCs with 3rd person DP_1 (e.g. (50)), although here it results from the person hierarchy (cf. (51)–(52)). In DCCs with 1st or 2nd person DP_1 (e.g. (49)) the person hierarchy predicts that the two subject effects will crop up due to φ-agreement between T and DP_1 only. In such cases, we follow Bondaruk (2019) and Citko, claiming that *być* 'to be' is defective, thereby lacking φ-features.

[38] For Bondaruk (2019), in (49) the satisfaction of the EPP-requirement and T's φ-features valuation are performed by DP_1 and in (50) they are divorced, DP_2 satisfying the former and DP_1 the latter. Her account thus continues with formal shortcomings from the analysis of DCCs with two nominative 3rd person DPs (section 1).

The second issue concerns the very legitimacy of postulating upwards Agree, an odd man out which holds exclusively of the finite T and the nominative TP, just to account for the fact that SpecTP must be occupied. Nevertheless, such a postulation is nothing else than the EPP-requirement, only motivated and constrained by syntax-semantic considerations. In Chomsky (2001: 4), for instance, it is T's EPP-feature that allows DP to move to Spec of T. The satisfaction of the EPP-feature is thus dependent on the spec-head relation obtained by moving the nominative DP to SpecTP (cf. also Lasnik 2001: 357). In the present approach, the same spec-head relation has to be maintained so that Agree between T and the nominative DP takes place. Here, however, it is not T's EPP-feature, but its uφ-features that necessitate the movement of the iφ-features-bearing item. Making the subject requirement dependent on the valuation of φ-features, apart from motivating it formally, also has another advantage. It allows us to correlate it with the very syntax-semantic prominence of the nominative argument which, as Haider (2016: 26) observes, is the defining property of SVO languages. Because the nominative argument in languages like Polish or English must be confined to a functional position in a functional projection above *v*P, Agree between T and the nominative DP operates upwards, thereby receiving a natural and principled explanation.[39]

3. Concluding remarks

This paper shows that the satisfaction of the EPP/subject requirement in Polish DCCs as based on downward and selective multiple Agree, the relational notion of predication and the EPP-feature is formally and semantically untenable. It results in a number of problematic phenomena (e.g. the satisfaction of T's EPP- and uφ-features by two different DPs or multiple valuation of DPs' u-case features as nominative by T) which conspire to a purely configurational rendition of the EPP requirement. Its satisfaction not only lacks formal motivation and requires additional assumptions to bypass locality conditions such as Defective Intervention Constraint and Relativised Minimality, but also leaves the distribution of two nominative DPs unaccounted for.

The novel proposal advanced here argues for a simpler and more straightforward rendition of the subject requirement in Polish DCCs which is satisfied not by the EPP-feature, but by upward Agree between T and the pre-copular nominative DP. This Agree operation only takes place once DP's iφ-features c-command T's uφ-features, the proposal motivated by semantic properties of and relations between the finite T, the subject DP and the *v*P/VP predicate. As a follow-up to this, the post-copular nominative DP is taken to form, together with the verbal copula *być* 'to be', a complex predicate separated syntactically and semantically from the pre-copular nominative DP. The validity of this idea is substantiated by a detail-oriented semantics-based examination of the derivation of DCCs.

We thus end up with a bipartite structure of proposition, whereby the subject (pre-copular nominative DP) in SpecTP is necessarily ascribed the semantic property of T', the tensed

[39] In SOV/VSO languages where the obligatory pre-verbal subject position appears to be missing (e.g. Haider 2015; McCloskey 1996), Agree between T and the nominative DP would proceed in a downward fashion or, in the absence of the subject (e.g. in Irish subject-less clauses – see McCloskey 1996), would not take place at all.

predicate (*być* + post-copular nominative DP). SpecTP-movement and the subject requirement are thus rendered as two sides of the same coin and both receive formal and semantic motivation. Also, the subject requirement is now constrained, being invariably satisfied by the higher (pre-copular) nominative DP. This is due to the fact that the post-copular nominative DP is syntactically and semantically part of the complex predicate and, hence, illegitimate to occupy the subject position in SpecTP. As a result, locality conditions on movement are satisfied without recourse to additional assumptions.

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A study on the relationship between musical ability and EFL pronunciation proficiency

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Abstract
This study investigates the relationship between musical ability and pronunciation proficiency of English as a foreign language [EFL] of university students of English philology. English pronunciation of the participants is evaluated by academic teachers of English in three categories: the general impression of the foreign or native accent, the accuracy of production of English sounds and the use of word stress and intonation. This experiment was conducted entirely online. Participants' musical ability was tested using Gordon's Advanced Measure of Music Audiation [AMMA]. The results of this study demonstrate a moderately positive **correlation** between musicality and FL pronunciation proficiency. The more musical students, the higher marks from the judges. The present findings seem to be consistent with other studies which suggest that musical skills may positively affect the acquisition of foreign language pronunciation.

Keywords: musical ability, musicality, FL pronunciation, AMMA, pronunciation proficiency

1. Introduction

Foreign learners of English have numerous pronunciation difficulties which often make them unintelligible to native English speakers and cause serious communication problems (Szpyra-Kozłowska 2012). A considerable number of studies tend to suggest that foreign learners of English, including Polish ones, tend to make different kinds of pronunciation errors. The main source of these errors is a negative transfer from first language [L1] to the second language [L2] due to the differences between L1 and L2 sounds systems. According to Rojczyk (2015), the notion of transfer in foreign language accent imitation is the most crucial. As explained by Balas (2018: 16), "non-native speech sounds are incorrectly interpreted, because they pass through the filter of native phonology" which means that, without specific knowledge, an L2 learner does not distinguish some similar L2 and L1 sounds and categorises them as identical instead.

The pronunciation difficulties concern both segmental and supra-segmental features. In fact, EFL proficiency is affected by several factors, such as the age of the onset of L2 learning, personality, learning strategies, memory, prior experience, the similarity of the phonemic

systems between the mother tongue and the target language and motivation (Milovanov et al. 2010: 56).

The role of musicality in foreign language acquisition and proficiency has always been noted as worth-investigating and it has recently been gaining greater attention. Throughout this paper, the term musicality will refer to musical ability in a broad sense, including an ear for music, musical talent or musical expertise and all these terms will be used interchangeably. Music and language share a considerable number of characteristics. Firstly, music and language are both perceived through the auditory system. Both music and language can be correlated on the basis of the same acoustic parameters, such as intensity, duration, frequency or timbre (Chobert and Besson 2013: 924). Secondly, in both cases sound production is involved. According to Patel (2012: 8), several studies showed a strong link between musical ability and 'linguistic phonemic abilities'. The acquisition of both music and language requires several other cognitive capacities, such as memory ability to store words in language and, analogously, melodies in music. Unlike any other human domain, both music and language call for vocal production, imitation, as well as control of sound expression. Music and language are also relatively important in the social context. It is necessary to emphasise that this area of research is being in constant development and a number of studies investigating the relationship between music and language is ever increasing. According to a number of parallels between music and language, in recent years, many researchers have started to investigate the influence of musical ability on foreign language pronunciation proficiency. Several studies (Bailles et al. 2021; Pai et al. 2016; Christiner and Reteirer. 2013; Christiner and Reteirer 2015; Milovanov et al. 2010; Schön et al. 2004; Besson et al. 2006; Slevc and Miyake 2006; Gralińska-Brawata and Rybińska 2017; Połać 2014; Pastuszek-Lipińska 2008, Chang 2015) confirmed some positive effect of musical ability on FL pronunciation expertise. The present study was a preliminary investigation of examining the role of musical capacity in EFL pronunciation proficiency in first-year English philology majors. The results show to what extent musicality may influence FL pronunciation proficiency and which areas of pronunciation are the most correlated with musicality.

2. EFL pronunciation

One of the reasons why English pronunciation causes so many problems to the learners, including Polish learners is that very little attention tends to be paid to teaching pronunciation in English classroom. Teachers concentrate on drilling vocabulary and grammar, focusing on fluency rather than accuracy (Waniek-Klimczak 2015: 76), whereas foreign language pronunciation is one of the most difficult aspects to acquire (Fraser 2000: 7–8). Trask (1996: 291) defines pronunciation as "the manner in which speech sounds, especially connected sequences are articulated by individual speakers or by speakers generally." Speaking involves many sub-skills, out of which pronunciation is the most important one because "with good pronunciation, a speaker is intelligible despite other errors; with poor pronunciation, a speaker can be very difficult to understand, despite accuracy in other areas. Pronunciation is the aspect that most affects how the speaker is judged by others, and how they are formally assessed in

other skills" (Fraser 2000: 7). Although pronunciation is so important, it is still an aspect on which least time is spent in EFL courses (Waniek-Klimczak 2015).

Szpyra-Kozłowska (2012: 243) makes an extensive list of errors in foreign-accented English, including Polish English. These errors "significantly decrease Polish learners' comprehensibility and intelligibility, create the impression of a heavy foreign accent and are irritating for native English listeners." However, correct pronunciation is a real challenge in L2 learning. Acquiring native-like pronunciation is virtually impossible and there are certain aspects that learners follow in order to achieve a near-native proficiency in FL pronunciation. Sobkowiak (2008) provides a list of common pronunciation errors made by Polish learners of English. These include final devoicing, vowel length, place and manner of articulation, connected speech, word-stress and intonation. Interestingly, these errors are observed at all levels of proficiency. Even advanced English majors encounter some difficulties speaking English and, as a result, they often speak with a heavy foreign accent. Veenendaal et al. (2016: 2–3) state that phonological awareness is the ability to separate sound units in speech and this ability refers to supra-segmental phonology. This includes "awareness of speech rhythm, and perception and production of stress placement and word boundaries." Poorly developed phonological awareness may result in difficulties in foreign language pronunciation because if a learner is not able to perceive the sound correctly, he or she may not be able to produce it accurately or correct himself. As suggested by Peynircioglu (2002: 69), this phonological awareness may be "a general ability for auditory pattern recognition" similar to that which is responsible for discriminating components of music.

3. Music and language

Music and language are two main channels of communication, both perceived through the auditory system (Jackendoff 2009: 195–197). Both music and language can be correlated on the basis of the same acoustic parameters, such as intensity, duration, frequency or timbre (Chobert and Besson 2013: 924). In both cases sound production is involved. According to Patel (2012: 8), several studies showed a strong link between musical ability and phonemic abilities (phonological awareness). Moreover, the acquisition of both music and language requires several other cognitive capacities, such as memory ability to store words in language and, analogously, melodies in music. Interestingly, unlike any other human domain, both music and language call for vocal production, imitation and control of sound expression. From the more generative perspective, similarly to language, music "uses rule-governed combinations of a limited number of elements to generate an unlimited number of hierarchically structured signals" (Fenk-Oczlon and Fenk 2009: 2).

According to all those parallels between music and language, in recent years, many researchers started to investigate the relationship between these two domains in several different aspects, including the impact of musicality on FL pronunciation proficiency. A considerable number of studies confirmed certain positive effects of musical ability on speech perception. The ability to perceive speech and correctly discriminate its prosodic changes can significantly enhance further FL proficiency. One of the possible effects is pitch processing, as observed in Schön et al. (2004) and Besson et al. (2007). The positive influence of musical

experience on speech perception is also seen in studies conducted by Chang et al. (2015), in which musicians outperformed non-musicians on tonal discrimination of speech. Several studies concentrated on determining to what extent musical capacity facilitates phonological awareness. An experiment conducted by Degé et al. (2015) proved that skills not achieved through an intentionally arranged musical training, but rather musical potentials, can notably influence phonological awareness abilities. A number of researchers, including Polish, (Pai et al. 2016; Christiner and Reteirer 2013; Christiner and Reteirer 2015, Milovanov et al. 2010; Slevc and Miyake 2006; Gralińska-Brawata and Rybińska 2017; Połać 2014; Pastuszek-Lipińska 2008) decided to investigate whether musical ability can improve FL pronunciation. The results showed that participants with high musical aptitude outperformed those of low musicality in such tasks as speech and accent imitation, word stress or intonation. Arjomad (2015), Moreno and Besson (2006), François and Schön (2011) or Chobert et al. (2012), investigated the role of musical training in FL speech production. On the basis of the results, it seems that musical ability, in a broad sense, may have positive influence in acquiring correct and native-like FL pronunciation. Overall, these studies highlight the need for examining the relationship between musicality and FL pronunciation.

In the view of the above, the present study aims at investigating the correlation between musical ability and EFL pronunciation proficiency. This study therefore seeks to examine to what extent musical ability may affect FL pronunciation and which aspect of pronunciation is mostly correlated with musicality. According to the findings of the previous studies, the key research question of this paper is whether or not FL pronunciation proficiency is correlated with musical ability. Another question is whether the influence of musical ability on FL pronunciation proficiency is different for segmental and supra-segmental features.

4. Methodology

The study was conducted entirely in an online form. In most recent production-based studies, such as Coumel et al. (2019), Slevc and Milyake (2006), Połać (2014) or Arjomad (2006), the relationship between musicality and FL pronunciation was usually investigated by recording students talking or reading the stimuli and subsequently, evaluating their performances by native speakers of the target language. In the present study, native English speakers were not used as raters. Instead, a group of Polish academic teachers of English, including English pronunciation teachers, were asked to evaluate student's pronunciation.

4.1. Participants

Nineteen participants (11 females, 8 males) of age between 19 and 23 *(Mean (M) = 20.3, Standard Deviation (SD) = 1.20)* were recruited from the first and second year of English philology course at the John Paul II Catholic University of Lublin. They were not paid for the participation. All of them were native speakers of Polish apart from one girl who was a native speaker of Ukrainian. The first year students had undergone one and half a semester of an advanced English course (including an intensive phonetic training) and the second year students had undergone more than three semesters of the advanced English course.

4.2. Stimuli

The stimuli comprised a short dialogue 'Will you watch Sheila for me' taken from Mortimer (1975: 48). The form of a dialogue read by one person was chosen in order to obtain as much natural performances as possible, yet still in a controlled environment. This form involved participants in a kind of acting, which also required some use of melody (word stress and intonation), besides focusing on segmental features.

4.3. Procedure

4.3.1. Dialogue recordings and pronunciation assessment

Although the students were not allowed to practise the dialogue before recording it, they were asked to read it once or twice in order to get familiar with it. Subsequently, they were instructed how to record themselves using their mobile phones or computers. The recordings were sent as m4a files via e-mails.

Each recording was then uploaded to questionpro.com, a website where an online questionnaire was created. Three questions were attached to each recording: The first question, 'What is your general impression on this student's pronunciation?' intended to determine to what extent a student speaks with a heavy foreign accent in general. In the second question, 'How do you evaluate this student's pronunciation of English sounds?' the raters were asked to judge whether a participant pronounces English sounds correctly or rather mistakes them for L1 or other sounds. The last question, 'How do you evaluate student's melody?' intended to assess student's use of word stress and intonation. All three questions were to be answered using a five point Likert scale, where 1 was 'a strong foreign accent' and 5 was 'near-native production'. The raters were given a written instruction what exactly they were supposed to judge.

A jury of twelve Polish university teachers of English at The John Paul II Catholic University of Lublin were sent links to the online questionnaire. All raters were native speakers of Polish and they teach English pronunciation to English philology majors. Their teaching experienced ranged between 8 and 22 years.

4.3.2. Musicality assessment and surveys

Participant's musicality was tested using an online musicality tests – Gordon's Advanced measure of Music Audiation [AMMA]. Students were sent links and short instructions to the test. This perception-based task consists of 30 pairs of melodies (musical statement followed by a musical answer). Students 'role was to listen to each pair of melodies and decide whether they sound the same or different. If students decided that the musical statement is different than the musical answer, they had to decide whether they are different rhythmically or tonally. The participants could also answer 'I don't know'. On average the AMMA test lasted 15–20 minutes.

At the end, the participants were sent short surveys in which they answered questions about their age, sex, year of studies, musical education, musical abilities and the amount of English input and their exposure to English. The surveys were sent via email to the participants in .docx format. On average filling the survey lasted up to five minutes.

4.4. Results

4.4.1. Musicality

The results of AMMA are compared using a percentile marking for tonal scores, rhythm scores and both combined together. In the present study no distinction between tonal and rhythm scores was taken into consideration. Instead, the participants' musicality was determined by comparing tonal and rhythm scores combined together. The participants' combined percentile scores were the average (M=55.73, SD=23.49).

4.4.2. Musicality and general impression

The mean score for general impression of students' pronunciation on the five-point scale was M=2.60, SD=0.62. These points were compared to the percentile score they obtained in the musicality test. Pearson's correlation coefficient was used to measure the relationship between the variables. A moderately positive correlation (Correlation coefficient (R)= 0.53, Correlation of determination (R2) = 0.28) was found between musical ability and general impression scores.

4.4.3. Musicality and English sounds

The mean score for English sounds evaluation on the five-point scale was M=2.51, SD=0.56. Musical ability and English sounds production were found to be moderately positively correlated (R=0.51, R2=0.26).

4.4.4. Musicality and melody

The mean for the melody assessment on the five-point scale was M=2.41, SD=0.68. A moderately positive correlation (R=0.63, R2=0.40) was found between musical ability and general impression scores.

4.4.5. Musicality and total pronunciation score

The mean score for the three aspects (general impression, English sounds and melody) altogether on Likert scale was M=2.51, SD=0.58. Musical ability and total pronunciation scores were found to be moderately positively correlated (R=0.59, R2=0.35), as can be seen in Figure 1:

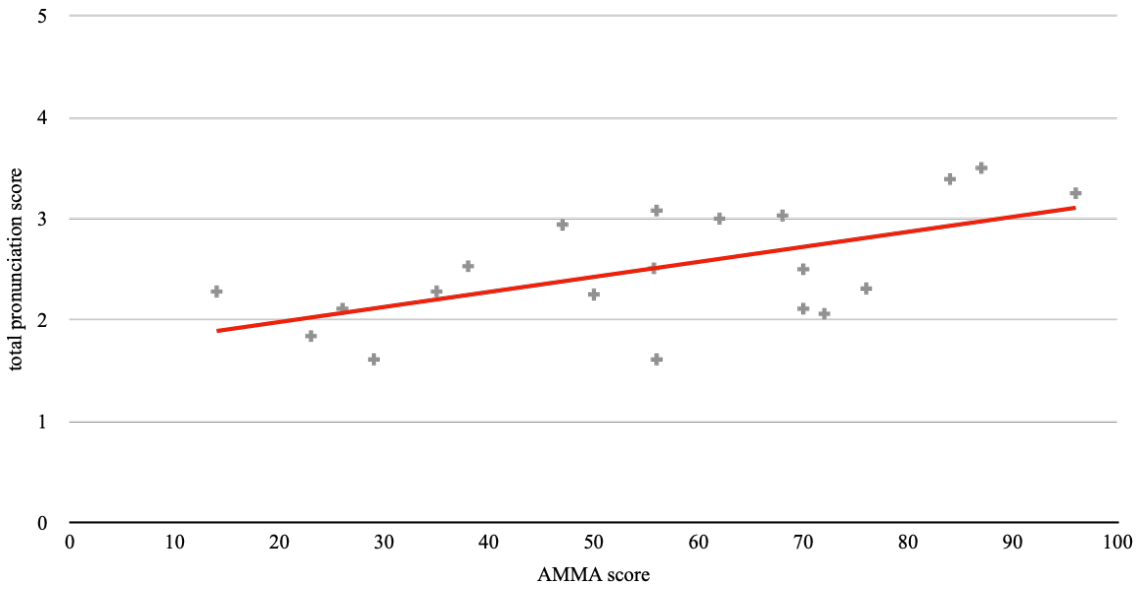

Figure 1: *Musicality and total pronunciation score*

4.4.6. Surveys

Of the study population, sixteen subjects completed and returned the surveys, eight of whom declared having some musical education or musical abilities. When the participants were asked to respond to a statement 'I have an ear for music' using a five-point scale (where 1 was 'I strongly disagree' and 5 was 'I strongly agree'), most of them (M=3.12, SD=0.93) assessed their musical perception skills as rather good. On the same scale, subjects were asked to agree or disagree with a statement that their English pronunciation is very good. Most of them (M=3.38, SD=0.93) agreed with the statement. The last statement of the survey was 'I think musical ability is correlated and positively influences FL pronunciation'. Interestingly, most of the students (M= 3.48, SD=1.17) also agreed with this statement. As not all of the students completed the surveys, this information was not correlated to their rating.

5. Discussion

The aim of this study was to investigate the correlation between musical ability and FL pronunciation proficiency. The findings of the present research clearly support the results of a number of previous studies (Pai et al. 2016; Christiner and Reteirer 2013; Christiner and Reteirer 2015; Milovanov et al. 2010; Slevc and Miyake 2006; Gralińska-Brawata and Rybińska 2017; Połać 2014; Pastuszek-Lipińska 2008) which showed that participants with higher musical aptitude usually outperformed those of lower musicality. As melody scored the lowest in the ranking, the most positive correlation was found between musicality and melody (R=0.63, R2=0.40) which can be explained by a number of prosodic features of language such as intonation, rhythm, tone and timbre. The ability to perceive speech and correctly discriminate its prosodic changes can significantly enhance further FL proficiency. One of the possible effects is pitch processing, as observed in Schön et al. (2004) and Besson et al. (2006). The positive influence of musical experience on speech perception is also seen in studies conducted by

Chang et al. (2015), in which musicians outperformed non-musicians on tonal discrimination of speech. A similar result was found in a study conducted by Akiyoshi (2013), where students with higher musicality also outperformed students with lower musicality in intonation perception and production tasks.

All three aspects of English pronunciation were rated as mid values on the scale even though the participants were English philology students of the first and second year, who had already undergone at least one and half a semester of an advanced pronunciation course. Overall, their pronunciation was assessed as average (M=2.51, SD=0.58). These findings seem to confirm the claim that even advanced EFL learners have many difficulties with English pronunciation (Sobkowiak 2008, Szpyra-Kozłowska 2011). Interestingly, in the surveys, the majority of the students assessed their English pronunciation as rather good (M=3.38, SD=0.93). From this data, it can be also seen that among these three aspects, participants got the lowest marks for their use of melody. This seems to confirm an observation that intonation and other aspects of melody are very often ignored in teaching FL pronunciation (Gilakjani and Sabouri 2016; Lantolf 1976).

6. Conclusions and further implications

Returning to the hypothesis posed at the beginning of this paper, the results demonstrate a rather visible relationship between musical ability and FL pronunciation proficiency can be observed. Production scores compared in the general analysis evidenced that students who scored higher in the musicality test performed better in the whole experiment than those students of a lower musicality scores. The findings of this study have also some implications on pronunciation teaching and learning. It seems that musical ability or having an ear for music may enhance, to some extent, FL acquisition, including speech perception and production.

7. Limitations

The most important limitation lies in the fact that the COVID-19 pandemic surprisingly occurred which had changed the original design of the study into an entirely online experiment. In order to obtain more statistically reliable results, the investigation should involve greater number of participants. Students' musicality could be assessed not only using a perception-based test, but also a production task, such as imitation task. This was, however, not possible due to the lockdown. The quality of the dialogue recordings varied, nevertheless, obtaining recordings in .wav format ensured a rather high quality of the sound regarding the circumstances the recordings were made.

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LingBaW

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A time for consolidation: A bibliometric analysis of L2 vocabulary research 1985–1989

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Abstract
This paper uses a co-citation analysis to examine the research on L2 vocabulary acquisition that was published in 1989. Two analyses are presented. The first is a detailed account of the 1989 research on its own terms. The second analysis places this work in a larger context by looking at research published in a five-year window covering 1985–89. The analyses identify important themes in the research and significant sources who are influencing the way the research is developing at this time. The main features of this work are the substantial growth in dictionary and corpus research, and the emergence of Paul Nation as the Most Significant Source in 1989.

Keywords: L2 vocabulary acquisition, vocabulary research, bibliometric analysis

1. Introduction

This paper is the ninth in a series of studies in which I have been mapping out the way L2 vocabulary research has developed over the last 50 years. Beginning with the 1982 research, these papers have presented bibliometric maps for each year between 1982 and 1988 (Meara 2014, 2015, 2016, 2017, 2018, 2019, and 2020), with an exploratory foray into some more recent data from 2006 (Meara: 2012). This paper is a sequel to my earlier LingBaW papers, in that it covers the research output for 1989.

The paper falls into two parts. Part 1 reviews the 1989 research in its own terms. Part 2 puts this research into a wider context by summarising the main trends that appear in a five-year window covering 1985–89. Both parts use the author co-citation method, developed by Small (1973). Small's method is described in detail in Appendix 1 for readers who are not yet familiar with the approach used in these papers.

2. Part 1. The new research published in 1989

1989 seems to have been a good year for L2 vocabulary research. The previous year, 1988, saw a decline in the number of outputs, following a sustained rise from 1984. In 1989, the number of outputs is back to 1987 levels, and the VARGA data base (Meara n.d.) identifies 142 sources published in 1989. More importantly, the type of publication appearing in this year seems to be shifting, as the vocabulary research becomes more focussed and less haphazard. Notably, in 1989, we have several collections of papers and special issues of journals that deal with vocabulary issues. These include a special issue of the influential Dutch Journal *Toegepaste Taalwetenschap in Artikelen,* a special issue of the French Journal *Le français dans le monde,* and a special issue of the *AILA Review* edited by Ron Carter.

Several collections of edited papers also appeared in 1989: Tickoo edited a State of the Art collection on L2 dictionary use (Tickoo: 1989) and James edited a collection of papers on lexicography (James: 1989), a theme which is also taken up in volumes edited by Zagrebelsky (1989) and by Marello (1989). These last two sources are important, because they hint at a seam of vocabulary research in Italian, which has not previously appeared in our analyses. This year also saw the publication of a number of monographs dealing with L2 vocabulary issues. The most important of these are Francine Melka Teichroew's volume on receptive and productive vocabulary (Melka Teichroew: 1989) and a monograph by Elisabet Service which dealt with phonological coding and working memory as they relate to L2 vocabulary learning (Service: 1989). Another notable publication this year is Kirsten Haastrup's thesis (Haastrup: 1989), which deals with lexical inferencing by L2 readers. Other book length volumes also appeared in this year's outputs: Hammer and Giauque (1989) is a series of short chapters on cognates in L2. Helliwell (1989) appears to be mainly interested in lexical errors. The fourth edition of Hornby's *Oxford Advanced Learner's Dictionary of Current English* also appeared in 1989. Table 1 lists these works in more detail.

Table 1: *Work published in 1989, but excluded from the analysis in this paper. For the reasons explained in my earlier papers, these items are not included in the main analysis in this section. Book length treatments tend to have citation patterns which differ from the patterns we find with the shorter research papers and chapters which form the bulk of the 1989 data set.*

BOOKS and MONOGRAPHS

Hammer, P. and G. S. Giauque. 1989. *The role of cognates in the teaching of French*. New York.

Helliwell, M. 1989. *Can I become a beefsteak? Trügerische Wörter zum Nachschlagen und Üben*. Berlin.

Hornby, A. S. (ed.) 1989. *Oxford Advanced Learner's Dictionary of Current English*. Oxford. 4th edition.

Marello, C. 1989. *Dizionari bilingui.* Bologna.

Meara, P. M. 1989. *Beyond Words*. London.

Melka Teichroew, F. J. 1989. *Les notions de réception et de production dans le domaine lexicale et sémantique*. Berne.

Service, E. 1989. *Phonological coding in working memory and foreign language learning.* University of Helsinki: General Psychology Monographs, B9.

Sim, DD and B Laufer-Dvorkin. 1989. *Vocabulary development.* Glasgow.

THESES and DISSERTATIONS

Haastrup, K. 1989. *Lexical inferencing procedures or talking about words.* PhD thesis: University of Copenhagen.

Li Lan. 1989. *Extending vocabulary in English for specific purposes – with special reference to Chinese University students*. MPhil thesis, Exeter University,

2.1. The data sources

A total of 122 ordinary papers were identified as published in 1989. Most of these papers were regular journal articles, but a new feature of the field seems to be the large number of papers which appeared as book chapters. There were 35 publications of this type – more than a quarter of the total output for this year. Fifteen of these items appeared in the thematic collection of papers edited by Tickoo, two items appear in Zagrebelsky, and a further two items in the thematic volume edited by James. All three of these volumes deal with dictionaries. The other items of this type appear in edited volumes which do not have a thematic focus on vocabulary matters.

As usual, a small number of eligible papers turned out to be unobtainable. These items are listed in Table 2, and they are not included in the analyses reported later in this report. It is unlikely that the absence of these items would make a significant difference to the analysis reported later. However, it is worthwhile pointing out that two of these sources are in German, and the other two sources are in Japanese, and Dutch respectively. Publication of German language resources in 1989 seems to have been seriously disrupted by the political events surrounding the fall of the Berlin wall, and the subsequent regime change in East Germany. However, Scherfer does appear as an author of other papers in the data set. Vermeer, too, has other outputs in the 1989 data set.

Table 2: *Items that appeared in 1989 but were untraceable.*

Harado, H. 1989. Kanji no shidōhō: kanji-kei. In: Katō, A (ed.) *Kōza nihongo kyōiku 9, nihongo no moji to hyōki*. Meiji Shoin: 1989. 265–289.

Mrazovic, P. and W. Stöting-Richert. 1989. Die Wortschatzbeherrschung zweisprachiger jugoslawischer Schüler in Niedersachsen. *Deutsch Lernen* 4: 28–55.

Scherfer, P. 1989. Vokabellernen. *Der Fremdsprachen Unterricht* 98: 4–10.

Vermeer, A. 1989. Woordenschat en Nederlands als tweede taal: een experiment. *Maggezien* 14,3: 16–21.

This leaves us with a set of 118 papers that make up the data set to be analysed here. This is a significant uplift on the 1988 data set, which included only 81 papers. For reasons of space, the items included in the data set are not listed here, but interested readers can identify them in the Vocabulary Acquisition Research Group Archive **https://www.lognostics.co.uk/varga/**

Typing **## 1989** into the search box, will return a complete list of these papers.

As usual, we begin with a superficial analysis of the data set. 134 authors contribute to the 1989 data set, and once again the vast majority of these authors contribute only one paper: 109 of the 134 authors fall into this category – a considerable increase on the 1988 figure of 83. Proportionately, however, the number of single paper authors has decreased from 90% in 1988 to 81% in 1989.

There is a considerable turnover in the list of authors who contribute to more than one paper. Several of last year's prolific authors no longer maintain their position in 1989, notably McCarthy, Johns, Tono, and Summers. Almost all of the authors of multiple papers are new in 1989: only Carter, Meara, Nation and Robinson appeared in both the 1988 prolific author list and in this year's list. Overall, the number of authors contributing a large number of outputs in 1989 is down. The outstanding contributor in 1989 is Zimmerman with four outputs. Four

authors (Feldman, Katz, Meara and Robinson) contribute three papers each – a small increase on the 1988 figure. The main growth appears to come from authors who contribute to two outputs in 1989. Eighteen authors fall into this group (Lukatela, Turvey and Carello, Hafiz and Tudor, Carter, HC Chen, Harley, Hartmann, Hulstijn, Krashen, Laufer, Mondria, Nation, Scherfer, Stein, Tickoo and Weltens) – almost five times as many sources contributed to two outputs in 1989 as was the case in 1988. (See Table 3).

The overall result of these shifts is that the distribution of authors in the 1989 data set is much more normal than it was in previous years. "Normal" here means that the pattern of authorship conforms to a logarithmic distribution described by Lotka (1926), and commonly known as Lotka's Law. (cf. Appendix 2). Lotka's model estimates the number of authors we might expect to be making

***Table 3**: The number of authors contributing to N outputs in the 1989 data set.*

Contributions	**6**	**5**	**4**	**3**	**2**	**1**
1989 data			1	4	18	109
Lotka's model	3	4	7	12	27	109

multiple contributions to the data set given that we have 109 authors who contribute to only one paper. The relevant figures, shown in the bottom line of Table 3, suggest that we might expect a sizeable number of authors to be contributing to five or more papers in this data set. This does not appear to be the case in 1989, but the 1989 data is nonetheless a much closer match to Lotka's model than was the case in 1988. The best-fitting exponent for the 1989 dataset is 2.73 whereas the equivalent figure for 1988 was 5.1. (Lotka suggests that this figure is normally close to 2).

The data summarised so far provides a fairly superficial summary of what was happening in L2 vocabulary research in 1989. Of course, the mere fact that a paper was published does not necessarily mean that it had any influence on the way researchers were thinking about vocabulary at the time. Indeed, many of the papers in the 1989 data set appear to have disappeared without trace, as they have no recorded citations in Google Scholar. An extreme example of this can be seen in Tickoo's edited collection of papers: this volume accounts for nearly a tenth of the publications that appeared in 1989, but its long-term influence is relatively slight, and does not reflect its prominence in the 1989 data set.

2.2. The analysis

In order to get beyond these superficial characteristics of the 1989 data set, we need to look in more detail at the ideas that are influencing the published research. Our first step in this analysis is to identify the important sources whose work is being cited in the 1989 data set. To do this, the citation data for 1989 was extracted following the procedure described in my earlier papers, and summarised in Appendix 1. This analysis identified a total of 1911 sources – a considerable increase on the figure of the 1391 sources that we identified in the 1988 data. As usual, most of these sources are cited only once, but a small number of sources are cited much more than this. The data is summarised in Table 4.

Table 4: *The number of times sources are cited in the 1989 data set.*

frequency	**24**	**23**	**22**	**21**	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**
cases				1							4	3
frequency	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
cases	2	1	2	10	5	13	14	25	54	117	254	1406

The most cited sources in this data set are Nation (21 citations), Faerch, Ilson, Kasper and Sinclair (14), Carter, Hornby and Meara (13), and Laufer and Levenston (12). The main point to note here is the emergence of Nation as by far and away the most cited source. His 21 citations mean that his work is cited in 18% of the studies included in the data set. The next most cited sources manage to be cited in only a much smaller percentage of the data set (11%). It is worth pointing out here that only two *outputs* are recorded for Nation in the 1989 data set – another example of influence not being well reflected by output volume.

Once again, we have a lot of change in the list of most-cited sources. There are six new entrants in the 1989 Most Cited Sources List (Faerch, Ilson, Kasper, Hornby, Laufer and Levenston). These sources replace Channell, Krashen, Renouf, McCarthy and Richards – all major figures in the 1988 data set. Only four sources appear in both the 1988 and the 1989 lists: Carter, Meara, Nation and Sinclair.

The next step in our analysis of the 1989 data set is to produce a co-citation map of the data set. To do this, we identify a large set of sources – conventionally about 100 – and compute the number of times these sources are cited together in the papers that make up the data set. Some arbitrary judgements are sometimes necessary here: in the 1989 data set, 134 sources are cited at least four times, but this figure is rather higher than we would like as it is a lot higher than the conventional figure of 100 sources. Only 80 sources are cited five times or more in the 1989 data set, somewhat fewer than we would like. However, given that the maps in last year's paper were based on the 82 most cited sources with an inclusion threshold of four citations, the best choice here seems to be to adopt an inclusion threshold of five citations. With this threshold, a total of 80 cases qualify for inclusion – a figure which is very close to number of sources that appeared in our map of the 1988 research. In percentage terms, the inclusion threshold of 5 citations is almost exactly the same as last year's inclusion threshold of four citations: in both cases, sources are included in the analysis if they are cited in just over 4% of all the papers included in the data set.

The co-citation data for the 80 most cited sources in the 1989 data set were extracted from the complete data set (all 1911 sources cited in 1989), and the results analysed using the Gephi software package (Bastian, Heymann and Jacomy: 2009). The results of this analysis are reported in Figure 1. Figure 1 looks a little different from the maps I presented in my earlier papers, as I have slightly changed my way of working in order to simplify the additional complexity that arises as the maps get bigger. The clustering in Figure 1 is based on all the co-citation links between the 80 nodes that appear at least twice in the data set. All this data is used to identify the co-citation clusters between the sources. When it comes to drawing the maps, however, I have ignored all the co-citation links which appear fewer than four times in the data set in the interests of clarity. Each co-citation link in the map thus occurs at least four times in the data set. This process loses some data (weak co-citation links that appear only rarely in the

data set), but it results in a clear set of clusters, with only a small number of detached nodes, and each of these detached nodes can be associated with a specific cluster in the map.

The 1989 map is a fairly easy to interpret.

The largest cluster, **Cluster I,** at the top of the map, is mainly composed of British linguists who work on dictionaries, corpora, word lists, and similar tools which inform the research on vocabulary. The outstanding source here is Sinclair, already identified as a significant source in the 1988 map, but here consolidating his position. The co-citation links in this cluster are surprisingly dense, but the cluster is only weakly linked to the rest of the map, mainly through Cluster II. Most of the sources in this cluster are descriptive linguists, but the cluster also incudes a group of sources whose main interest is how L2 learners use dictionaries.

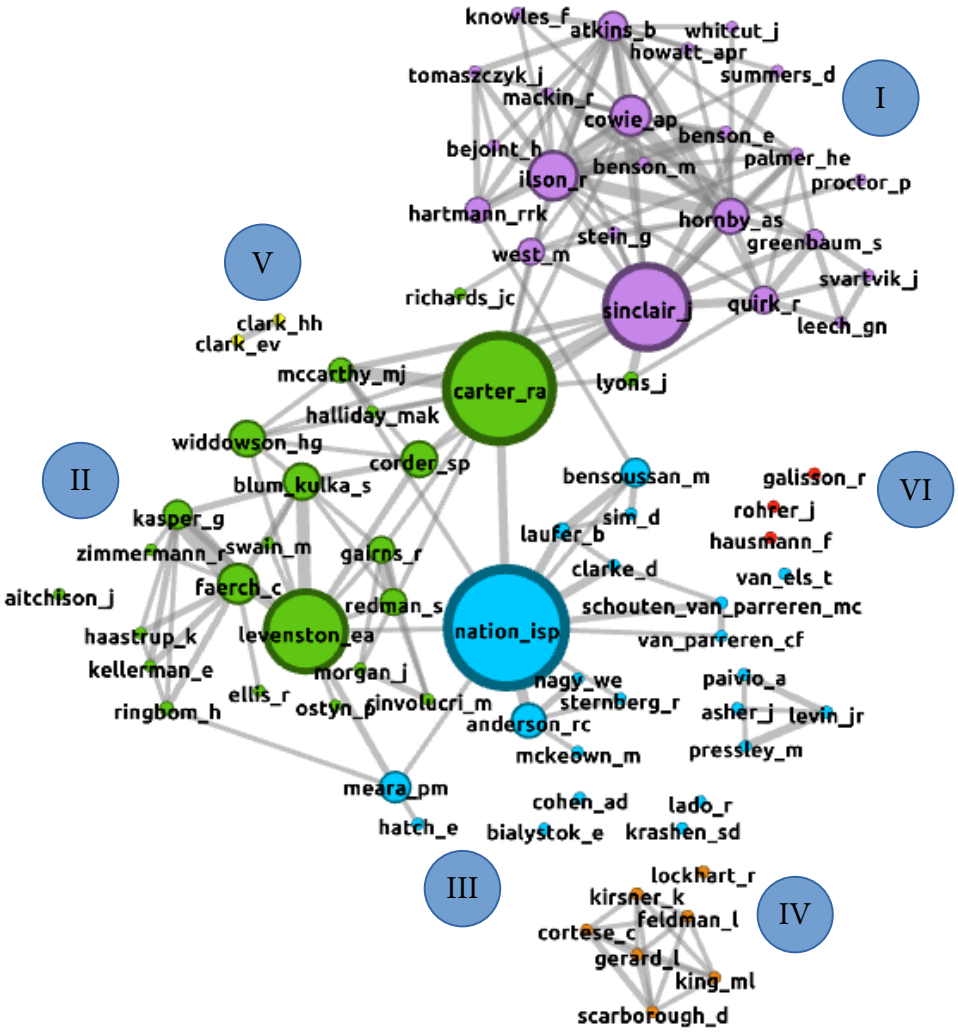

Figure 1: *A co-citation analysis of the 1989 data set. There are 80 nodes in this map; links appearing fewer than 4 times in the data set have been eliminated. Nodes are sized according to their betweenness centrality. See the discussion in the text.*

Cluster II, on the western edge of the map, is rather more difficult to describe succinctly. It consists of several sub-clusters. Carter and McCarthy need to be considered in conjunction with the corpus and dictionary sources we found in Cluster I. Halliday, Widdowson and Corder are a group of influential British applied linguists, who also have close co-citation links with the

sources in Cluster I, but are not themselves L2 vocabulary researchers. Gairns and Redman, Morgan and Rinvolucri and Ostyn are all authors of vocabulary teaching materials. Ellis and Aitchison are textbook sources: Ellis is the author of the main textbook on Second Language Acquisition at this time (Ellis 1985), while Aitchison (1987) was influential in popularising some psychological ideas. Swain is mainly cited by North American researchers in connection with an important paper on communicative competence (Canale and Swain: 1980). The remaining sources in this cluster are representative of an important strand of empirical research in L2 vocabulary acquisition, as opposed to the corpus based approaches that we identified in Cluster I.

Cluster III, at the centre of the map is also difficult to describe succinctly. The key source in this cluster is Nation: the map identifies him as the most central node in this year's data set. Most of the sources in this cluster are concerned with reading in an L2 and the acquisition of L2 words through reading. Sternberg, Nagy, McKeown and Anderson are L1 reading researchers. The cluster also contains a detached sub-cluster consisting of four sources: Asher, Paivio, Pressley and Levin. Asher is best known for his work on the Total Physical Response approach to vocabulary learning. This work appeared in the 1960s (e.g. Asher: 1969), and it is surprising to find it resurfacing here. Pressley and Levin are the main researchers behind the keyword mnemonic method. This work too appeared much earlier than 1989 (e.g. Pressley: 1977), so it is possible that this sub-cluster is mainly a historical one. Paivio's work on memory, dual-coding and L2 vocabulary acquisition is current at this time, however. (e.g. Paivio, Clark and Lambert: 1988).

These three clusters make up the main core of the 1989 map, but the analysis also identifies three small, detached clusters.

Cluster IV, at the bottom of the map, is a group of psychologists who mainly work on word recognition in bilinguals. This cluster seems to be remains of the very large psycholinguistics clusters that we identified in earlier maps.

The small **Cluster V**, on the western edge of the map, contains only two sources, Eve Clark and Herb Clark, both child language development researchers. These two sources will be familiar from our earlier maps.

The three sources who make up **Cluster VI** seem to be linked primarily because all three are cited frequently in the special issue of the French language journal *Le français dans le monde.*

The central sources in this map are Nation, Carter and Sinclair and Levenston. Sinclair and Nation were both identified as Significant Influences in 1988, but they have consolidated their position here, clearly dominating the 1989 map. Carter and Levenston had both appeared in the 1988 map, but here they play much more important roles. Two Significant Influences from 1988 no longer have a central role in 1989: Renouf does not figure at all in the 1989 map, while Meara plays a much reduced role in Cluster III.

As usual, there is quite a lot of turn-over in the sources, and this feature is summarised in Figure 2 and Figure 3, which show the "survivor" sources from 1988 and the new sources in 1989 respectively.

Figure 2 shows that fewer than half of the 80 sources in the 1989 data set also appeared in the 1988 data set. The main outline of the 1988 map is clearly still visible in the 1989 data, but some consolidation seems to be taking place.

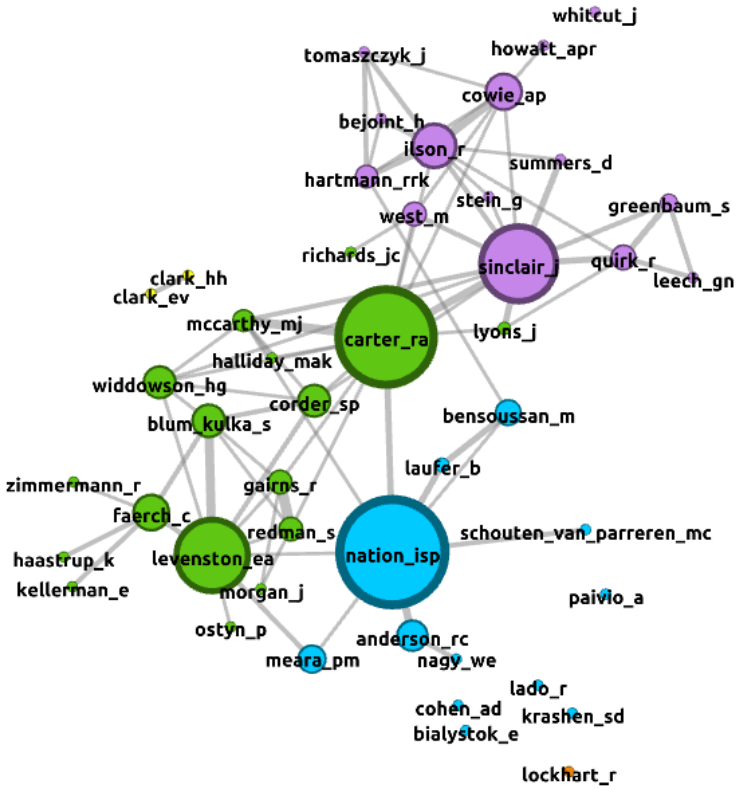

Figure 2: *The "survivors": sources who appear in both the 1988 and 1989 maps. Links which occur fewer than 4 times have been removed in the interests of simplification.*

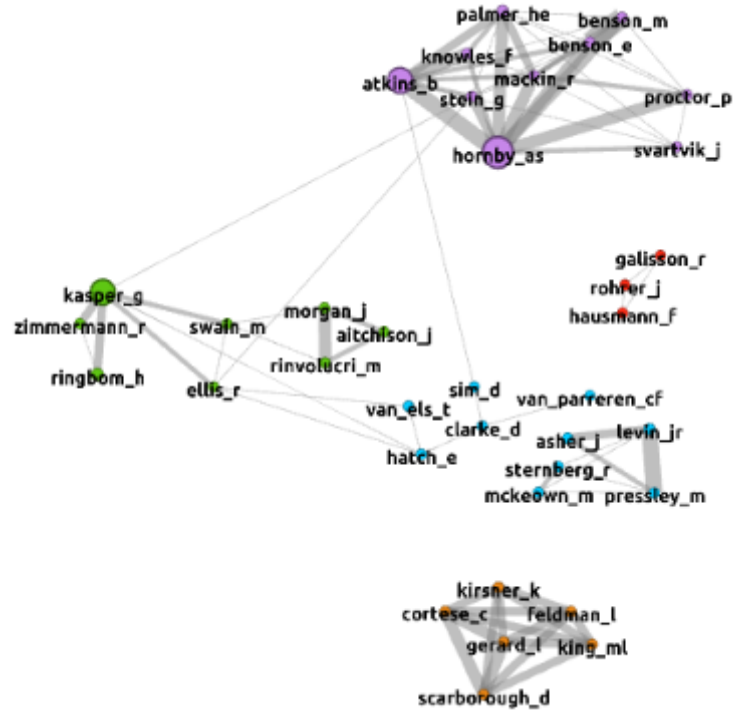

Figure 3: *The new entrants in the 1989 map.*

Figure 3, which identifies the new entrants in the 1989 map, shows that consolidation is not the only thing that is going on: the changes noted in 1989 are not evenly distributed. There are 38 new sources, slightly fewer than the new sources in 1988. A small handful of these sources

have appeared in earlier analyses, but most of them are genuinely new. The figure suggests that new sources are appearing in all of the clusters. However, most of the consolidation is taking place in Cluster I, the dictionaries and corpus linguistics cluster, where there has been a very large increase in the number of new sources being co-cited, and a significant strengthening of the existing co-citation links. The new entrants in the other clusters may be an indication that their research focuses are shifting a little. The new entries in Cluster III – Clark, Sternberg, McKeown and van Parreren – focus this cluster more obviously on L2 reading and inferencing behaviour. Cluster IV, which also formed part of the main L2 cluster in 1989, now appears as a group of sources who are mainly concerned with vocabulary theory and empirical studies of L2 acquisition. The Scandinavian research group that we have identified in our previous maps – Faerch, Kasper, Haastrup, Ringbom – form an important sub-cluster here. However, more than half of the sources in this cluster are new, making it the most volatile of the larger clusters in the 1989 map. Cluster V and Cluster VI are almost entirely made up of new entries.

3. Part 2. A wider perspective 1985–89

In this section, we will place the 1989 data into a larger context by looking at a five-year window covering all the research published between 1985 and 1989. This larger window smooths out some of the ad hoc fluctuations in the annual data, and it allows us to identify important sources whose influence is more than just a transitory one.

Table 5 summarises the main characteristics of the 1984–1988 window that we analysed in Meara (2020a). Table 6 summarises the new window covering 1985–89. Obviously, there is a lot of overlap between the two data sets, since both data sets include works published between 1985 and 1988.

Table 5: *The main characteristics of the 1984–88 data set.*

Number of papers in the data set:	403
Number of authors contributing to the data set:	375
Number of sources cited in the data set:	4080
Inclusion threshold for this data set	12 citations
Number of cited sources meeting the inclusion threshold	100
Identifiable co-citation clusters	7+3 detached singletons
I: vocabulary acquisition (31)	
II: word recognition in an L2, performance of bilingual speakers (26)	
III: meaning, corpus analysis (22)	
IV: word frequency counts (5)	
V: Français Fondamental (5)	
VI: Dictionary research (5)	
VII: Dutch research (3)	

In Table 6, however, the 1984 data has dropped out of our five year window, while the newer 1989 data has been added to the window, and because 1984 was a fairly lean year for vocabulary research while 1989 was a very productive year, the figures in Table 6 are quite different from those in Table reported in Table 5.

The number of papers in the data set has increased by about 18%. The number of authors contributing to the data set has increased by 27%. The number of cited sources in the data set has increased by 13%. These figures all signal a substantial and steady increase in the amount of research available. This increase is also reflected in the increased threshold that we are using to identify the most significant sources in the data set. This figure too is steadily creeping upwards.

Table 6: *The main characteristics of the 1985–89 data set.*

Number of papers in the data set:	477
Number of authors contributing to the data set:	475
Number of sources cited in the data set:	4616
Inclusion threshold for this data set	14 citations
Number of cited sources meeting the inclusion threshold	103
Identifiable co-citation clusters	6+1 detached singleton
I: vocabulary acquisition (26)	
II: dictionaries and corpus analysis (25)	
III: reading, meaning and inferencing (23)	
IV: word recognition in an L2, performance of bilingual speakers (19)	
V: mental imagery (5)	
VI: Français Fondamental (5)	

The main driver here is the number of papers being published: in both Tables, the threshold for inclusion is just under 3% of all the papers published in their respective windows.

Table 7: *The number of authors contributing to N papers in the 1985–89 data set, and the expected number of authors basesd on Lotka's Law.*

Papers	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
Authors	1					1	1	1	2	2	1	5	11	21	55	314
Lotka:	1	1	1	2	2	3	3	4	5	6	7	13	20	34	72	314

Table 7 shows the distribution of authors contributions to this new data set. The number of authors contributing five or more papers to the data set (i.e. at least one paper per year) has increased slightly, moving from 10 in 1984–88 to 13 in the 1985–89 data set. However, the list of prolific authors has not changed substantially. Meara (16 papers), Zimmerman (11), Palmberg (10), Carter (9), Broeder and Laufer (8), Extra and van Hout (7), and Beheydt (5) all appeared in the 1984–88 prolific authors list. Nation (6 papers), Alfes, Cohen, McCarthy and Robinson (5 papers each) are all new entrants to this list. Arnaud (with 4 relevant papers) drops out of the list – though it is worth noting that a contribution of four papers in a five year window would have counted as a major achievement only a few years earlier.

The overall increase in outputs is reflected in the number of authors who contribute to just a single paper. In the 1985–89 window, 314 authors fell into this category, an increase of 9%. We have noted

in our earlier analyses that the field as a whole is characterised by an unusually large number of authors who make just one contribution to the data set, and this continues to be the case in 1985–89. The bottom line of Table 7 shows how far the data remains abnormally

skeweds. This data line shows the number of authors we might expect to be making N contributions to the data set given that the number of authors making a single contribution is 314. The model developed by Lotka (1926) suggests that we would expect to get substantially more authors making two, three, four and more contributions to the data set – so for example, Lotka's model suggests that we could expect to find 20 authors contributing 4 papers, whereas in fact we have only 11 in this data set.

As always, we need to note that publishing a paper is not a sufficient condition for its author to become a significant source in the data set. The real test of this comes from the extent to which papers are actually cited, and we turn to this feature in Table 8. This table summarises the number of times each source is cited in the 1985–89 data set. As usual, most sources are cited only once in the complete set of 477 papers – 2957 sources fall into this category, 64% of the total. But a number of sources are cited much more frequently than this. The most frequently cited sources in the 1985–89 data set are Meara (cited in 61 papers), Nation (55), Krashen (49), Levenston (47), JC Richards

Table 8: *The number of times sources are cited in the 1989 data set.*

FREQUENCY	**60+**	**59**	**58**	**57**	**56**	**55**	**54**	**53**	**52**	**51**	**50**	**49**	**48**	**47**	**46**
CASES	**1**					**1**						**1**		**1**	**1**
FREQUENCY	**45**	**44**	**43**	**42**	**41**	**40**	**39**	**38**	**37**	**36**	**35**	**34**	**33**	**32**	**31**
CASES	**1**											**4**	**1**		**3**
FREQUENCY	**30**	**29**	**28**	**27**	**26**	**25**	**24**	**23**	**22**	**21**	**20**	**19**	**18**	**17**	**16**
CASES		3	2	2	3	3	4	2	4	2	4	5	8	13	8
FREQUENCY	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
CASES	12	14	12	15	28	27	33	31	62	73	112	186	321	656	2957

(46), Faerch (45), AD Cohen and Kellerman (both with 34 citations), West (33), Blum-Kulka, Corder and Schouten-van Parreren (each cited in 31 papers). Again, this list is almost identical to the equivalent 1984–88 list: West, Schouten-van Parreren and Blum-Kulka are new entries. Nation, Levenston and Faerch have all substantially increased their citation counts.

This distribution suggests that the 1985–89 maps should be based on the 103 sources who are cited fourteen times or more. This figure is very close to last year's figure of 100 sources cited at least 12 times. Accordingly, we can set a threshold of 14 citations for a source to be included in the analysis that follows.

Figure 4 shows the basic map for the 1985–89 data set. Gephi identifies six clusters in this data set, and one detached singleton (Galisson).

Cluster I, in the centre of the map, is dominated by Meara, Nation and Richards, and is clearly identifiable as the mainstream vocabulary research cluster. Sources in this cluster are strongly co-cited with sources in Cluster II and Cluster III. Cluster I seems to have absorbed a small Dutch research cluster that we identified in 1984–88, suggesting that the Dutch research is becoming better integrated into a wider research program than it had been.

Cluster II at the Southeast corner of the map is a dictionaries and corpora cluster. This cluster was also present in the 1984–88 map, but here it has quadrupled in size. The cluster has a dense internal structure, but only a small number of its members are co-cited outside of the cluster.

Cluster III lies at the Southwest corner of the map. I think the defining characteristic of this cluster is a concern with the way L2 speakers acquire the meaning of new words (mainly through reading). The cluster is dominated by Krashen, but it also contains a large sub-cluster of Scandinavian vocabulary researchers whose main focus is inferencing. Transfer between L1 and L2 is also a theme here.

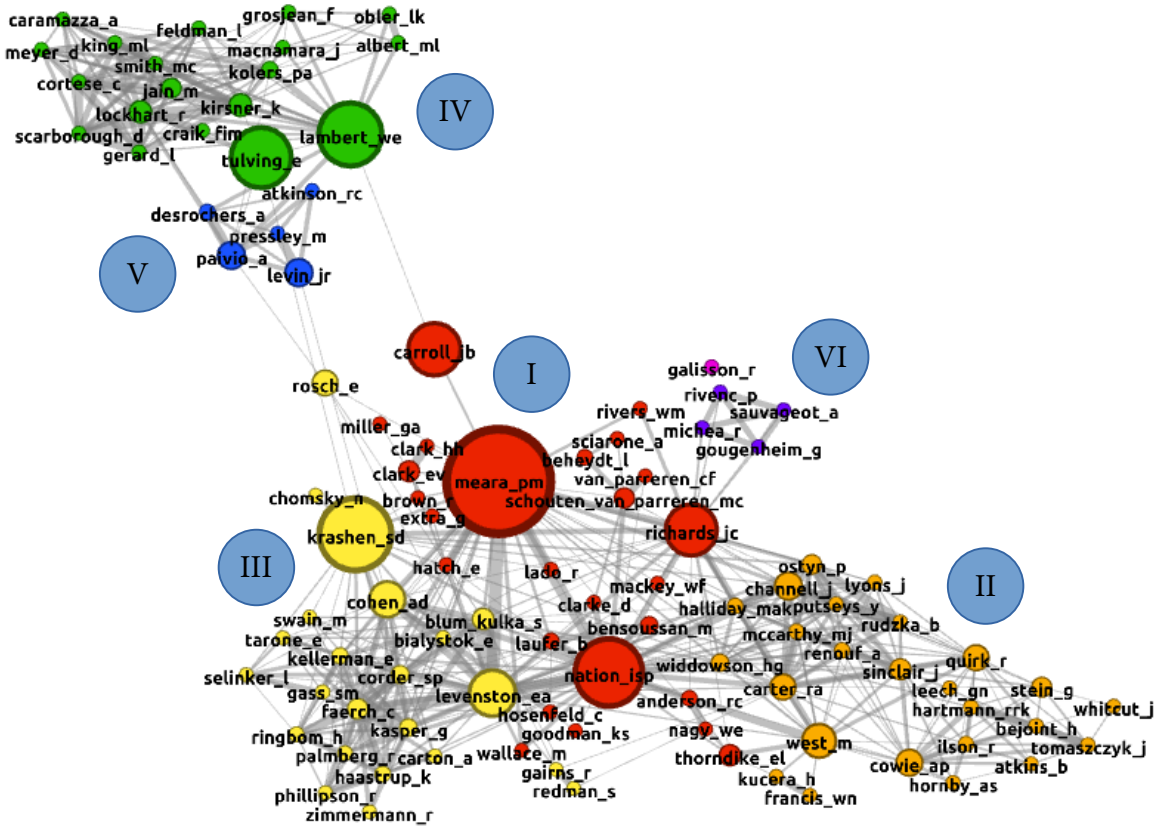

Figure 4: *Co-citation analysis of the 1985–89 data set. Nodes are cited at least fourteen times in the data set. Links that appear fewer than 6 times have been eliminated in the interests of simplicity.*

Cluster IV, at the Northwest corner of the map is clearly a psycholinguistics cluster, with a focus on word handling by bilinguals. This cluster has few co-citation links with the other clusters in the map. The weak links between Lambert and Carroll, and Tulving and Krashen contribute strongly to the high betweenness centrality scores recorded for these sources. This cluster also had a presence in the 1984–88 map, but here it appears to have shrunk considerably. Whether this indicates a general decline in psycholinguistic studies of L2 word handling is unclear. It may be an artefact of the unexpectedly large growth in dictionary research (Cluster II), which typically does not cite much psychological research. The dense co-citation links in Cluster IV are largely a function of authoring practice in psychology papers: these tend to have multiple authors who contribute to two or three papers in the period under analysis. This practice is rather different from what happens in the applied linguistics tradition, and may cause the real importance of these sources to be overstated.

Cluster V, just below cluster IV, is another psycholinguistics cluster. This one is focusses on mental imagery and mnemonic approaches to vocabulary acquisition, and is generally more

concerned with practical applications of the research for vocabulary instruction. The striking thing here is that this cluster has a few co-citation links with Cluster IV, but only very tenuous links with Cluster III, and no links at all with Cluster I or Cluster II. Mental imagery did appear in the 1984–88 map, but there it was rather more closely integrated with the mainstream L2 vocabulary research. Here, it looks to be in the process of becoming more detached from the L2 vocabulary sources: basically, L2 vocabulary research by applied linguistics obstinately refuses to pay any attention to the interesting work that psychologists are doing in this area.

Cluster VI is the familiar *Français Fondamental* cluster that we have identified in our earlier maps, with Galisson as a detached source. Like Cluster V, this work is only rarely co-cited along-side other sources in the map. The co-citation links with Richards prevent this group of sources from becoming a detached cluster, and it is clear that this work is not well integrated into the rest of the network.

Overall, this map shows that the main changes in this new five-year window are changes in emphasis, rather than changes of direction. Of the 103 sources in this map, 85% were also identified as important sources in the 1984–88 map. There are only 19 new sources. Six new sources are found in cluster I (Clarke, Goodman, Hatch, Nagy, van Parreren and Wallace), Goodman and Nagy are important L1 reading sources. Cluster II merges two separate cluster identified in the 1984–88 map, and also contains six new entrants (Atkins, Cowie, Hornby, Leech, Stein and Whitcut), indicating that the dictionary research that we noted last year is becoming significantly more important. Cluster III hosts four new entrants: Gairns and Redman authored a series of vocabulary textbooks; Swain is mainly cited for her early work on *communicative competence.* Zimmerman, one of this year's prolific authors, is the first German source to appear in our five-year window maps, and this may indicate that Cluster III reflects an upsurge in European vocabulary research. Cluster IV has one new source, King, a co-author of Kirsner's. RC Atkinson and JR Levin both strengthen the mnemonics and image cluster, cluster V. Cluster VI has no new members.

4. Discussion

Four themes seem to emerge from this year's maps.

The first theme is that 1989 is mainly about consolidation. There are some changes from the 1988 maps, but most of these changes are marginal – a few new additions to the list of significant sources, and some changes in the relative importance of individual sources. On the whole, however, we have a remarkably stable structure in the pattern of co-citations, and this is all the more striking when we consider how volatile the maps were only few years previously. Of course, we are still a long way away from the *first paradigm* scenario described in Meara (2020b), but many of the components of this first paradigm are already in place in the 1989 maps.

The second theme that characterises the 1989 data is the emergence of Nation as Most Significant Source in the 1989 map. Conventional wisdom has it that "modern" L2 vocabulary research really takes off around 1992, shortly after the first publication in 1990 Nation's seminal textbook *Teaching and Learning Vocabulary* (Nation: 1990). Early drafts of Nation's book had

already been circulating among researchers for some time (cf. Nation: 1983), but were not really well-known, and they are only rarely cited in the research literature. However, Nation's prominence in the 1989 map suggests that his influence on vocabulary research has already become pervasive before the publication of the 1990 volume. So far, however, citations of Nation's work are selective: he has extensive co-citations within Cluster I, Cluster II and Cluster III, but he is only rarely co-cited with sources in the dictionary research cluster, and never co-cited with sources in the psycholinguistics cluster.

At first glance, the 1985–1989 map suggests that Meara is the Most Significant Source in the 1984–1989 window, but I think that this is a misleading conclusion. Meara *was* important in the 1988 data set, but by 1989 he plays only a minor role in Cluster III. The reason he appears to be important in the 1985–89 map is that he is one of the few vocabulary researchers who is co-cited along with the sources in psycholinguistics cluster, Cluster IV. Meara is co-cited with psycholinguists because he had been arguing for a long time that applied linguists researching vocabulary seemed to be unaware of the importance of this research strand for their own research. For example, he frequently cites the keyword mnemonic research of Pressley and Levin as research that applied linguists ought to pay attention to, and this generates many co-citation links between Pressley, Levin and their co-workers and his own work. However, this is not a reciprocal relationship: Meara cites Pressley and Levin alongside his own work, but Pressley and Levin don't cite him at all. The maps don't show this bias in the co-citations. Clearly, Meara is not as central a source as the map suggests.

So far in these maps, I have been using betweenness centrality as way of teasing out the importance of individual sources. However, a number of correspondents have pointed out to me that it might not be appropriate to use this measure in the context of vocabulary research. The argument seems to be that betweenness centrality is an important feature of networks in which things actually move between nodes, but it is not obvious that this metaphor works where there is no flow involved. For example, in a network that describes traffic flow, a node which has a high betweenness centrality value is critical to the way the network functions: we are talking real physical properties here. But when, in Figure 8, we identify JB Carroll as the only node that connects Cluster IV to the rest of the network, it is not at all clear what this actually means. A co-citation network is more of an abstract metaphor than a physical description. The individual sources do not depend on each other in quite the same way as intersections in a road network do. The betweenness centrality measure captures the fact that dictionary researchers do not routinely cite psycholinguists and vice-versa, but we could argue that this does not assign any real significance to JB Carroll. The important point here is that dictionary writers only rarely see the need for psycholinguistics, not that JB Carroll provides a link when they do. Clearly, this use of the betweenness centrality feature needs some further thought, and I will be reviewing this practice in future analyses.

The final feature worth commenting on is the role of regional research networks in the 1989 vocabulary research. In 1988, I noted the increased importance of dictionaries and corpora in the vocabulary research, and I drew attention to the fact that this was largely a British initiative. Dictionary research continues to be important into 1989, and it continues to be largely a British interest. Cluster I in Figure 1 has doubled in size from 1988. However, all but one of the new entries in this cluster are British researchers – and the exception, Jan Svartvik,

professor of English at Lund University in Sweden – is closely associated with Quirk's research group at University College, London. In contrast, about half of the sources in Cluster II are British researchers, but most of the empirical work here is done by a group of northern European researchers. Cluster III contains a single British researcher. The remaining clusters are mainly focussed on North America. However, change is looming on the horizon. By 1989 researchers were beginning to have access to early versions of the Word Wide Web, and we can expect these technological developments to have a marked impact on L2 vocabulary research in the years to come.

5. Conclusion

The analyses in this paper have suggested that the L2 vocabulary research that appeared between 1985 and 1989 continues to show a fairly stable structure, but there are signs that some large-scale changes may be in the offing. In particular, the emergence of Paul Nation as the central source in the 1989 map marks the beginning of an important shift in L2 vocabulary research, and we can expect Nation's influence to grow in the immediate future. Some historically important figures still appear as influences in the five-year window map, but their influence in the 1989 map is greatly reduced, hinting that the vocabulary research is perhaps becoming more independent, and more self-sufficient in its use of sources. The next paper in this series will examine the research published in 1990 in the context of a five-year window covering 1986–90. 1990 is an important year for L2 vocabulary research in that it sees the publication of Nation's seminal book (1990) a critical milestone in L2 vocabulary research. It will probably be too soon for the influence of this work to make its presence felt in the bibliometric maps, but it is difficult to avoid the feeling that in 1990 some major new developments lie just around the corner.

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Appendix 1: Co-citation analysis: The methodology

The co-citation method used in this paper was developed by Small in a number of papers published in the 1970s (e.g. Small: 1973). This approach, which was actually built on earlier bibliometric work by da Solla Price (1965), has been extensively used to analyse research in the

natural sciences (e.g. White and Griffith 1981) but does not seem to have been adopted as a standard tool by researchers in the Humanities.

The raw data for a co-citation analysis consists of a list of all the authors cited in the set of papers to be analysed. For each paper in the data set, we make a list of every author that the paper cites; for each paper, each cited author counts only once, regardless of how many times they are cited in the paper; and for a cited paper with multiple authors, each of the contributors is added to the author list. Self-citations, where an author cites their own work, are treated in the same way as any other citation, on the grounds that authors only rarely fail to cite their own work. This raw data is then used to construct a large matrix showing which authors are cited together in each of the papers in the data set. The matrix can then be analysed using a program such as Gephi (Bastian, Heymann and Jacomy 2009). Gephi performs a cluster analysis on the data, groups together authors who tend to be cited alongside each other in a number of papers, and outputs a map which shows the composition of the clusters and the relationship between them. The clusters are generally taken to represent "invisible colleges" in the data – i.e. groups of researchers who share similar reference points and a common research focus.

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 make a single contribution to a data set, then it would be unusual to find only a single author making two contributions, and it would likewise be very unusual to find that a single author 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 of 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.

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 data when x= 2.73, though this figure needs to be treated with some caution because the data set is 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. I do not yet fully understand the implications of this.

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Identifying humor in stand-up comedy: A preliminary study

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Abstract
This paper describes a preliminary study examining how the audience of stand-up comedy approach humor analysis. By expanding the scope of the General Theory of Verbal Humor (Attardo 2001), it was possible to use the framework to aid and systematize the interpretation process, resulting in shifting the theory's focus from humor production to humor perception.

The first part of the paper introduces the main premise of stand-up comedy. The second part is devoted to the theoretical aspects, namely the theory of humor. The third part discusses the methodology of the preliminary study: a two-step interpretation task done by four audience members. The fourth and the fifth sections present the results of the study and discuss the implications. The outcome of the analysis gives an understanding as to what the audience may focus on during the interpretation process, which allows for identification of differences in humor perception.

Keywords: humor, stand-up comedy, General Theory of Verbal Humor

1. Introduction

Stand-up comedy is a much more complex phenomenon than the name would suggest; it has evolved into an international phenomenon with ever-growing popularity and an ever-growing audience. Bars and pubs became theatres and large venues, and radio programs changed into widely broadcasted comedy specials. The popularity of stand-up comedy is still increasing, despite its over 80-year tradition.

Today, stand-up comedy is much more than 'canned' jokes. Nowadays, the jokes take the form of a seemingly improvised (yet highly scripted) humorous narrative in which the comedian tells stories or talks about issues important to them. They expect the audience to engage with what they say, and in turn, the audience expects the comedians to be funny (Brodie 2014).

The attempts to define stand-up comedy have yielded different results based on the discipline. Nevertheless, there are certain aspects noted by every scholar researching the matter. Stand-up comedy is a form of talk, where an individual, the comedian, tells stories or jokes in

order to be funny. Some note the lack of characterization (Mintz 1998), others notice the ridicule of social issues (Bingham and Hernandez 2009, Rahman 2004). In turn, Brodie (2014) takes yet another approach to stand-up comedy and argues its certain similarity to folk tales. In a sense, there are two sides of the performance: the comedian, a storyteller, and the audience, a group of people with common characteristics or shared culture. This collective worldview, which is something that a comedian refers to or contests in their routine, becomes the central part of the story and, at the same time, the source of humor. Furthermore, the narratives are most often told from the comedian's perspective but do not necessarily have to be their own. A lot of the stories come from the comic's observations and may discuss recent political or social issues (Bingham and Hernandez 2009, Brodie 2014).

As stated before, the first and foremost aim of stand-up comedy has always been to entertain. Stand-up comedy is often described as monological, but the routines are heavily based on the audience's response to the comic's words, therefore highlighting a rather dialogic character of the show (Brodie 2014). The audience, while on the receiving end of the performances, is what distinguishes stand-up comedy from, say, stage plays or concerts. After all, comedians tell their stories to get the reaction. If the reaction is missing, then the whole premise of stand-up comedy is gone (TEDxTalk 2012, Brodie 2014). The audience's engagement and, ideally, laughter to what is said is the essence of the routine. Stand-up comedy evokes laughter by being relatable to the audience with its autobiographical and observational humor. While language and cultural context play a crucial role in interpreting jokes, the overall sense of humor is still a subjective matter. It differs from person to person regardless of their knowledge or cultural background.

When considering language, stand-up comedy is often associated with vulgarity and obscenity. While it is characteristic of many performances, it is not their key feature. One of the comics who was known for their inappropriate language was Lenny Bruce (Zoglin 2017). In his provocative narratives, he tackled some pressing issues and taboos that the United States was and is still dealing with today. What is more, his routines resulted in numerous arrests over the years, although ultimately, it was Bruce who contributed to the freedom of speech in stand-up comedy (Melton 2016). It did not come without a price, though, because nowadays stand-up comics are often associated with 'offensive' or 'shock' comedy (TEDx Talks 2012). Although stand-up comedy has eventually found its way into popular culture, the comedians' approach to social and political issues created an impression that stand-up comedy is a countercultural phenomenon (Brodie 2014); comics are dubbed the social commentators, sociologists, anthropologists, or even magicians (Bingham and Hernandez 2009; Brodie 2014; Gilbert 2004; Koziski 1984)

Given the complexity of stand-up comedy, scholars across disciplines have tried to decipher what exactly makes people laugh. The General Theory of Verbal Humor (GTVH; Attardo and Raskin 1991, Attardo 2001, 2017) offers a coherent framework for analyzing jokes by listing a set of factors (knowledge resources) that contribute to the humorous narratives. Although the GTVH does not account for the reaction to a joke, it can give an excellent insight into where humor can be found. Arguably, with specific alterations, the theory can be used by the audience as well (Tsakona 2013).

This study follows Tsakona's (2013) argumentation and shifts the focus of the GTVH from humor production to humor reception. Enlarging the scope of the GTVH allows it to use the knowledge resources as a tool for systematizing humor analysis on a larger scale (involving, for example, audience members). The main aim of this paper is to discuss the application of the GTVH to the interpretation process of stand-up comedy narratives. Moreover, it is assumed that the components of the joke are interpreted in a specific way, which could indicate a certain order possibly aiding the humor analysis.

This paper is divided into three parts. The first one discusses the General Theory of Verbal Humor which serves as a base for this study. The second section is devoted to the methodology behind the preliminary study which includes two interpretation tasks. The final part discusses the results and limitations of the conducted research.

2. The General Theory of Verbal Humor

Most humor theories have their roots in psychology, philosophy, or neurosciences. However, there is one approach that originated in linguistics, although it also encapsulates other accounts on funniness. The General Theory of Verbal Humor (GTVH; Attardo and Raskin 1991, Attardo 2001, 2017), and its predecessor Semantic Script Theory of Humor (SSTH; Raskin 1979) state that humor cannot occur without what the authors call a 'script opposition.' This study follows the definition of scripts provided by Attardo (2001), which describes scripts as containers connected to the lexical meaning of the word, having all prototypical information about an entity or action. (Attardo 2001: 2–3). With that being said, the essence of a joke lies within the incompatibility of the provided information, and humor cannot exist without it; in other words, no incongruity means no amusement. Still, the GTVH goes even further and states that the discrepancy between the scripts is not the only element responsible for the funniness, since the way the scripts are opposed is as crucial as the incongruity itself. Attardo and Raskin (1991) call it a logical mechanism. Interestingly, this central premise is in line with the incongruity-resolution theories prevalent in humor research (Larkin-Galiñanes 2017).

Apart from Script Opposition and Logical Mechanism, the authors of the GTVH name other factors that contribute to humor called Knowledge Resources: situation, target, narrative strategy, and language (Attardo and Raskin 1991, Attardo 2001). Although the remaining components are not the direct conveyors of humor, they are responsible for the set-up, phrasing, and even positioning of the punchline in the joke. Knowledge resources are explained below and based on Attardo and Raskin (1991) and Attardo (2001).

Let us consider the following joke to illustrate better the humor analysis based on the GTVH:

(1) My grandfather has the heart of a lion and a lifetime ban at the zoo (Korolkovaite 2017).

As the incongruity and its resolution are essential elements of a humorous narrative, it only makes sense to start the analysis with script opposition and logical mechanism. At first, the beginning of the joke, 'my grandfather has the heart of a lion,' does not seem funny or extraordinary. Having 'the heart of a lion' evokes the notion of bravery and courage. The

opposition of the provided information becomes apparent only with the lifetime ban at the zoo, which makes it clear that the first part of the joke is not an idiomatic expression, but a literal description of someone's possession. Therefore, the opposed script could be defined as being brave vs. killing an animal, or legal vs. illegal. It is necessary to mention that the incongruity need not be antonymic; the scripts must be merely distinguishable from each other.

The second part of the joke not only denotes the opposing script but also resolves the incongruity. The logical mechanism for this narrative becomes a garden-path situation, as it becomes obvious that the grandfather literally took out a lion's heart thus committed a crime – and now is banned from entering the zoo. In brief, logical mechanism describes the way the scripts are opposed, which may not be reasonable or logical in the usual sense, but still be "logical" in terms of the joke (Attardo 2001: 26). Or, in other words, logical mechanisms explain the joke altogether. See Attardo (2001: 27) for the list of known logical mechanisms.

While the incongruity and its resolution are vital parts of humorous narratives, other factors may significantly contribute to the interpretation as well. The situation resource provides us with additional background information. In (1) the situation resource explains that there is an older person who possesses a lion's heart, and therefore is not allowed to enter the zoo where said lion presumably lived. With the situation resource, the spectrum of the background information can be much broader, depending on the narrative.

In turn, the target resource tells us who or what is the subject of the ridicule. Interestingly, this resource relates to the superiority theory of humor, which states that a joker mocks someone or something because they feel superior to them (Larkin-Galiñanes 2017). This factor is especially apparent in stereotypical jokes that involve laughing at a group of people with shared characteristics. As opposed to the previously described resources, not every joke has to have a target. In (1), the target is the grandfather as the performer of the incongruous action.

As for the narrative strategy, (1) is a perfect example of a 'one-liner.' These narratives (if their length allows for describing them as such) begin and end within one sentence. In general, narrative strategy refers to the organization of the discourse. It could be a conversation, a riddle, a monolog, and many more. Stand-up comedy, as discussed in the introduction, takes the form of a talk: the audience takes part in this heavily one-sided conversation by reacting to the comedian's words. Therefore, based on the interactional aspect, it can be concluded that dialog is the dominant form in stand-up comedy (Brodie 2014), although a story or a monologue would be accurate as well.

The last knowledge resource discussed by Attardo and Raskin (1991) is language. As opposed to the narrative strategy, which manages the general structure of a joke, the language resource regulates how the narrative is told from the linguistic perspective. For example, any changes or peculiarities on the morphosyntactic or phonological level fall into the category of language. This knowledge resource also governs the punchline placement; if there is a punchline to a given joke, it will always occur at the end of the narrative. Punchlines are reflected in the joke phrasing; therefore, unskilled storytelling may result in a poorly worded ending and the lack of at least partial resolution of the incongruity. In (1) the language resource is apparent due to the ambiguity of the phrase 'heart of a lion'. Any other expression denoting one's bravery would not have had the same humorous effect in this situation.

The GTVH explains the mechanisms underlying possible humor in a narrative. However, these mechanisms stem from humor production, and not interpretation; in other words, the GTVH will not account for the variances in reaction to the same narrative (Attardo 2001).

3. Methods

This paper aims to shift the focus of the GTVH analysis from humor production to perception. The goal is to expand the scope of the theory by using the GVTH as means to systematize humor interpretation as done by members of a stand-up comedy show audience. To achieve that, I propose a two-step method which was preliminary tested and is described below.

The first step involved the preparation of the narratives for the analysis. For this stage, seven fragments from four different stand-up comedy specials have been chosen. Two narratives per show came from *Elder Millennial* by Iliza Shlesinger (2018), *Homecoming King* by Hasan Minhaj (2017), and *Afraid of the Dark* by Trevor Noah (2017). Additionally, one narrative from Jack Whitehall's *At Large* (2017) served as a control sample. The length of all fragments varied, but they did not exceed 90 seconds. Moreover, the narratives did not refer to any prior or subsequent elements from the shows; therefore, they were understandable in isolation. They also did not contain culture-specific elements that would interfere with the joke interpretation. It was essential to choose such samples in order to ensure the undisturbed comprehension of the narratives in question.

The four respondents were chosen from the author's acquaintances who had volunteered to take part in this stage of the study. They met the requirement of a level of proficiency in English which allowed them to view the material without any disturbance. All were native speakers of Polish. The gender make-up included three females and one male. None of the respondents had had any prior experience with humor research.

The aim of the first part was to elicit interpretation without any further instructions from the researchers conducting the study. The respondents watched the narratives individually and, after each video clip, they were asked to talk about the narratives. At that point, no additional questions were asked to avoid any interference or hints. Respondents' answers were noted for further analysis, including keywords and phrases (for example, an utterance "He tells a story about his parents' first encounter" would be noted as "story, his parent's first encounter"). A critical aspect of this methodology was not to audio record the interviewees to ensure the spontaneity of the answers. The awareness of being recorded might have impeded the interpretation, as it was the case with the first respondent, who started to think about their answer before saying it out loud, thus possibly making changes to the initial recall of the joke.

Once a respondent had watched and discussed freely all six narratives, they proceeded to the second part of the study, which was a guided analysis that utilized the elements from the General Theory of Verbal Humor (GTVH).

In this part, the respondents were instructed on the GTVH's knowledge resources and then asked to analyze a control sample from Jack Whitehall's *At Large* using said theory. First, the GTVH was presented by the researcher in a form of a talk. Next, each interviewee received a form with listed knowledge resources and their task was to note their answers on the forms. The

control sample was analyzed together with the researcher to clear any doubts that the respondents might have had during the introduction stage. The assistance included clarifying and confirming solely the definitions of knowledge resources, not the correctness of the provided analysis. When the respondents were confident that they were able to continue with the analysis, they were asked to re-watch the six fragments from the first interpretation and examine them from the GTVH perspective. Again, the respondents noted their analysis on the answer sheets which had had listed all knowledge resources. Each video clip had a separate form to fill, and the interviewees could give their answers either in Polish or in English.

The final stage involved comparing the collected answers from the notes from the first interpretation and the answer sheets from the second one. Initially, the respondents' individual contributions were juxtaposed to see if they had focused on the same aspects both times. Only then the respondents' answers were contrasted collectively against each other to see if there were any similarities between the interpretations. For each narrative, a chart combining all the answers was created, which made it easier to notice the discrepancies.

4. Results

This section examines the results of the analysis. Due to space limitations, only two out of six examples will be discussed here.

Let us consider Table 1 below. In one of the *Afraid of the Dark* narratives, Trevor Noah (2017) talks about his impressions on the Russian language. He says how he is not afraid of the language itself but rather someone that speaks English with a Russian accent. Noah jokingly claims that this combination makes a person sound like a criminal until they switch to proper Russian; then, this person automatically becomes a regular immigrant in his mind. He also compares the sound of the Russian language to a sound that a DJ-ing console makes when scratching a vinyl:

> 'All you need is that Russian accent. The most dangerous accent in the world. And yet… yet… strangely enough… I found the Russian language does not make me fear at all. Strangest discovery I made. The Russian accent… makes me fear. The Russian language does not. Because a language is something someone else speaks. An accent is me interpreting how they're using mine. It's a completely different thing. I was walking through the streets. There was a man on the phone, Russian guy, speaking to someone in English. Sounded like he was setting up a drug deal. Then he switched into Russian. The strangest thing happened in my brain. And he was like, "Vlad. The guys got to be there at three o'clock. Tell me when you get the package. Afterwards, I got to let you know– No, Vlad. No, listen. Vlad, Vlad. Vlad, nyet, nyet, Vlad." [speaking mock Russian] That was the weirdest thing in my head. In my head, he instantly went from international criminal to immigrant instantly. I wasn't afraid anymore. It was the strangest thing. He was just a normal person in my mind because Russian doesn't frighten me. If anything, Russian just sounds like a DJ is scratching on a turntable. That's all I hear when I hear Russian, like a DJ took a turntable. They're scratching English like, "Vlad, the guys got to be there at three o'clock. You got to let me know when you get the package. Afterwards, the guy's got to call me. Don't worry about that. I'll let you know. No, Vlad. Listen, Vlad.
> [imitating record playing backwards as mock Russian]
> [imitates record scratching]'
>
> Noah (2017)

Table 1 below presents the juxtaposed answer sheets of all respondents. The first column enumerates knowledge resources (see section 2): script opposition (SO), logical mechanism (LM), situation (SI), target (TA), narrative strategy (NS), and language (LA). The remaining four columns contain the respondent's answers as copied from the answer sheets. If the answer was given in Polish, it was later translated into English by the researcher. English answers were left intact, with no changes made to spelling or grammar. The underlined parts (e.g., 'the Russian accent vs. Russian language') indicate the repetition of answers. Italicized parts in the chart signal similarities between the free and the GTVH-based interpretations, meaning that the same respondent mentioned those aspects during both parts of the study. Letters Y/N, standing for 'yes' or 'no,' marked the interviewees' answers to the question that was asked right after they have seen the narrative: "Did you find it funny?"

Table 1: *Answer chart for Afraid of the Dark by Trevor Noah (2017) narrative*

	1 Y	**2 Y**	**3 Y**	**4 Y**
SO	Russian accent vs Russian language	*Russian language vs Russian accent*; Stereotype vs the truth *Immigrant* vs citizen	The Russian accent vs the Russian language	Russian: language vs accent Speaking a language vs DJ-ing (?) *Immigrant* vs criminal
LM	analogy	faulty reasoning	analogy	analogy
SI	A description of *an overheard phone conversation*; a man speaking first in English with a Russian accent, then in English	Trevor explains how he's not afraid of the language but the accent. He *overhears a phone conversation.*	He tells a story about an *overheard conversation of a Russian person with someone*	*An overheard conversation* of a Russian man with someone (Vlad?)
TA	The (Russian) man	Russian people	Trevor (the speaker)	Russian language / Russian people
NS	A story	Monologue	A story	A story
LA	Onomatopoeia: Russian accent, an imitation of the Russian language	Imitating a Russian person (sounds)	An imitation of Russian language sounds	Sounds which are similar to Russian

As it was mentioned in Section 3, the discussion of the results is based on juxtaposition of all notes (first interpretation) and answer sheets (the GTVH analysis), which were turned into separate charts for each individual narrative (see Tables 1 and 2), making it six charts in total. The analysis of the collected answers yielded some interesting tendencies when it comes to the interpretation of humorous narratives. It is important to note that any mention of an agreement or consensus in the analyses refers to the similarities in answers, and not any form of discussion between the respondents.

The second example in this paper concerns the first narrative from *Homecoming King* which depicts Hasan Minhaj talking about his parents and how they met in India in the 1980s. He tells the story of his parent's arranged marriage and compares it to online dating, especially using phone applications like *Tinder* before meeting someone in person. When talking about

his mother, Minhaj jokingly compared her to a smartphone because she owned a camera, which was something unusual back then:

> 'You realize my parents physically never saw each other? Thirty years ago, in a town in India, population 990,000 — that's a small town — my dad heard a buzz in the streets about this woman named Seema, my mom. And, like, Seema was that chick, you guys. In '82, Seema could get… [a picture appears on the screen behind Minhaj] Look at that red langa. Killing it! She was like the iPhone 8. "Have you heard of Seema? She's slim. Her family owns a camera." My dad was like, "A camera?" So, he runs to my grandfather's house and lays it on the line. "I'm going to America. I want to marry Seema. YOLO." In ten minutes, the man married a woman he had never laid eyes on. You understand? That's Tinder with no photos.'
>
> Minhaj (2017)

Table 2: *Answer chart for Homecoming King by Hasan Minhaj (2017) narrative*

	1 N / ?	**2 Y**	**3 N**	**4 Y**
SO	*Tinder vs. arranged marriage*	India in the 80s vs. Technology Mother vs. iPhone *Dating back in India vs. Tinder*	Dating today vs dating in the past *Scrolling through pictures (Tinder)* vs blind date	*Arranged marriages in India and Tinder*
LM	juxtaposition	juxtaposition/analogy	juxtaposition	analogy
SI	*A story about his parents' marriage*	*Hasan describes how his father married his mother without physically seeing her.*	He compared dating (arranged marriages) in India to dating using apps.	Hasan talked about his parents and their first meeting
TA	People using Tinder	Minhaj's parents	Modern people	*People using Tinder*
NS	A monologue, a story	a monologue, a story	A story	A story
LA	n/d	*Slang: the chick, YOLO*	n/d	*Slang: YOLO*

First, it is essential to mention that not every respondent found this narrative funny. The first respondent mentioned that they found it rather compelling than humorous (hence the question mark next to the number in Table 2). However, this fact did not make it impossible to detect the elements of the joke. Notably, both first and third respondents commented that they understood why some people might have found the narrative humorous, but they pointed out that it was not funny to them. These comments further prove that the GTVH is a valid tool to depict differences in perceiving humor but does not (nor it intends to) account for the origins of these discrepancies. As for the GTVH analysis, all respondents identified the opposed scripts, with two people giving more than one answer. At least two out of four interviewees agreed about the logical mechanism. The results of the analysis are discussed in the section below.

5. Discussion

The first interpretation, namely the one where the respondents talked freely about the narratives they had seen, became a crucial part in understanding how the interviewees interpreted the jokes and elements that they focused on when doing so when unprompted. It allowed for an insight into the joke comprehension and its general perception. At this point in the study, the recollection of the narratives varied from person to person; although general sentiments stayed

the same, the specific phrasing was different. An agreement across all respondents throughout the two tasks was a rare occurrence. For example, it can be observed in SO from Table 1 where only one person mentioned "Russian language vs Russian accent" during both tasks, although it was stated by all respondents during the GTVH analysis. Compare that with SO from Table 2, where SO appeared, at least partially, in both tasks, even though the phrasing differed across the analyses.

As it appeared, not every knowledge resource was brought up during the interview. For example, when interpreting the narrative from Table 1, no respondent mentioned anything or anyone that, in their opinion, may have been the subject of the ridicule, and they only paid attention to the target resource once it was mentioned during the GTVH-based interpretation. This tendency occurred in most of the interpretations, therefore indicating that the respondents did not perceive the jokes as being targeted at someone. Types of logical mechanisms were not directly mentioned as well, as they are specific terms used in linguistic contexts. However, the respondents referred to them indirectly when explaining the narratives. For example, a joke based on stereotypes is akin to the logical mechanism categorized as 'reasoning from false premises'.

The respondents' answers to the first task were analyzed according to the GTVH, in a sense that any element of the narrative was attributed to one of the knowledge resources, if applicable. Interestingly, the way the respondents were talking about the jokes aided the analysis. Namely, they used phrases that could be potentially marked as knowledge resource signals:

(2) S/he compared X to Y by saying…

(3) His voice went up/down.

(4) The joke was about…

(5) It was a story about…

Example (2) could be attributed to script opposition and logical mechanism. The comparison of one thing to another may contrast two entities based on a particular characteristic, and the explanation of how they are compared can be equal to the explanation of the joke.

On the other hand, (4) and (5) can indicate the situation resource, because in majority of the cases, respondents continued by explaining the background information given by a comedian. Additionally, in (5), the respondents immediately signaled the narrative strategy behind the joke. (3) connects the phrase to the language resource which describes any linguistic, so morphosyntactic and phonological, abnormalities in the utterance. Other similar signals involved the other changes in the intonation, as well as onomatopoeias and puns. It is crucial to say that the sole use of such phrases does not automatically assign them to particular resources, though could be perceived as corresponding to them; the ultimate decision is still up to the analyst.

Interestingly, the way the respondents interpreted the jokes showed certain patterns in recalling the narratives. The interviewees usually started with situation (preceded by the narrative strategy resource), continued onto script opposition and logical mechanism, and then added any relevant information about the language. If any target was mentioned, it appeared

either with the situation resource or the script opposition, provided that it was a part of any of the scripts. This order was prevalent in majority of answers, which in turn can indicate a possible approach to a systematized humor interpretation.

Let us turn to the second task, which was the GTVH analysis. Above all, every respondent was able to name different elements of the narratives, which indicates no issues with understanding the stories in question. While these elements may not have been alike in all cases, the discrepancies in the analyses suggest different interpretations brought to light and presented in the GTVH terms. For example, all respondents interpreted the script opposition from Table 1 as 'the Russian language vs. the Russian accent,' but there was a discrepancy between the 'immigrant vs. X' opposition provided by two respondents: one mentioned citizens, the other criminals. As for this part of the interpretation, the respondents agreed on most of the resources (the similarities are marked as the underlined text in Tables 1 and 2), although all analyses were done individually.

There was not only a consensus about the script opposition but also about the rest of the knowledge resources. In turn, the agreement indicates a proper understanding of the definition of each knowledge resource and the jokes in the narratives. For instance, all respondents provided 'an overheard phone conversation' as the situation resource for the narrative from Table 2, and all attributed the sounds Noah made in the narrative to the language aspect of the joke. As mentioned earlier, it was not a perfect agreement, with some of the features varying. However, the disparate elements were, in most cases, rightfully assigned to a particular knowledge resource. This can be seen based on how the respondents were able to classify the elements of a narrative even if they did not find it funny. For example, in Table 1 there was a consensus reached among the respondents, versus Table 2, where the opinions were divided.

All in all, when all charts are considered, the GTVH analysis did not pose significant problems. The respondents focused mostly on script opposition, logical mechanism, situation, and language during this interpretation task. Narrative strategy, due to the character of stand-up comedy, varied between a story or a monologue (the respondents did not take the audience factor into account). Additionally, the target resource seemed to confuse the interviewees, who noticed that sometimes the narratives were rather general. Therefore, it was hard to name one specific subject of the ridicule. Irrespective of the reaction to the narrative, the respondents were able to name the elements of the joke. What is more, most of the time, their answers were similar to at least one other interviewee. This proves that the GTVH framework has the potential to be used as a humor analysis tool in order to organize interpretation process on a larger scale.

5.1. Limitations

This paper discusses a study done in its preliminary stage. Therefore, it is vital to recognize its constraints. These limitations should be treated as implications for further research.

The first issue involves the native language of the participants. All respondents were native speakers of Polish but were asked to interpret narratives in American English. Although the participants had sufficient knowledge of the language and did not have any problems with understanding the routines, it poses a question of whether the results would be different if the respondents were native speakers of English. The narratives chosen for this stage of the study

did not contain any elements which would be unfamiliar to the international audience or would interfere with the interpretation. Nevertheless, as American stand-up comedy is recorded and by and large catered to the American audience, intercultural competence and general understanding of the American culture may significantly improve humor appreciation.

The other issue, perhaps far more important, is the sample size. The number of participants should be much higher in the subsequent studies to reach far more valid conclusions and discuss more global tendencies regarding humor identification. However, as stated, this paper discusses a preliminary stage of this study. A small number of respondents allowed for observing the usefulness of the proposed methodology, which in turn will help to adjust the method for the subsequent stages of research.

Another limitation, or rather question for future consideration, is the choice of narratives for the analysis. This study involved seven isolated narratives from four different comedy specials; the video clips were separated from the rest of the shows, which made them partially out of context. Although all the necessary information for a given instance was provided, the examination of the same joke in the context of the entire routine could result in different analyses. However, analyzing certain narratives in the context of a whole show may cause confusion, or rather information overload, where certain aspects of the examined narrative may be missed from the interpretation altogether.

Even with the aforementioned limitations, this preliminary study has shown that while there can be numerous ways to interpret a narrative, the tools with which we have been equipped so far can be used to systematize the interpretation process.

5.2. Conclusion

In summary, this preliminary study showed the possibility of expanding the GTVH's scope and shift its focus from the humor production to humor interpretation. This echoes Tsakona's (2013) conclusions that, with certain adjustments, the GTVH can become not only a theory of the joker, but also one of the audiences', too.

Even though the study is still in its early stages, it has shown that individual members of a stand-up comedy audience tend to interpret narratives in a similar way. However, more discrepancies occurred when they were able to talk freely, as opposed to the interpretation based on the General Theory of Verbal Humor. When they used knowledge resources for their analyses, they were able to distinguish and classify elements belonging to the joke in question without any issues. Moreover, when the initial interpretation task is considered, the respondents used certain phrases which could be attributed to the knowledge resources. Not only was there a similarity in answers during both tasks but also a certain tendency in approaching the interpretation of the narrative. The GTVH framework proves to be a useful tool for humor analysis systematization and could aid humor interpretation on a larger scale.

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