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COMPARATIVE ANALYSIS OF PROFESSIONAL TEXTS ON COMPUTER SCIENCE

SROVNÁVACÍ ANALÝZA ODBORNÝCH TEXTŮ Z OBLASTI INFORMATIKY

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Abstract

The aim of this bachelor's thesis is to provide a comparative analysis of professional texts on computer science. VxLAN technology, which is most often used in data centers, was chosen as the topic for the materials. The first text chosen for the analysis is a web journal article, the second is the technical documentation Request for Comments (RFC), the third is a video lecture. The main goal of this work is to examine the selected materials from different perspectives and to determine the extent to which the texts, written and spoken, differ in their use of language and what common features they have. To achieve this goal, the materials are investigated in terms of several discourse features, including language functions, style and genre, cohesion and coherence, and deixis. The work also tries to define whether the analyzed materials are typical examples of their genres and styles.

Key words

Comparative analysis, functions of language, style, genre, cohesion, coherence, deixis, discourse features, computer network, RFC, VxLAN

Abstrakt

Cílem této bakalářské práce je srovnávací analýza odborných textů z oblasti informatiky. Jako téma pro materiály byla zvolena technologie VxLAN, která je nejčastěji používána v datových centrech. Prvním textem pro analýzu je článek z webového časopisu, druhým je technická dokumentace Request for Comments (RFC), třetím je video přednáška. Hlavním cílem této práce je prozkoumat vybrané materiály z různých pohledů a určit, do jaké míry se texty, psané a mluvené, liší v použití jazyka a jaké jsou jejich společné rysy. K dosažení tohoto cíle jsou materiály zkoumány z hlediska několika diskurzivních rysů, mezi které patří funkce jazyka, styl a žánr, koheze, koherence a deixe. Práce se také zaměřuje na zjištění, zda jsou analyzované materiály typickými představiteli svých žánrů a stylů.

Klíčová slova

Srovnávací analýza, funkce jazyka, styl, žánr, koheze, koherence, deixe, diskurzivní rysy, počítačová síť, RFC, VxLAN

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List of Abbreviations

ARP	Address Resolution Protocol
IP	Internet Protocol
ISP	Internet Service Provider
LAN	Local Area Network
MAC	Media Access Control
MTU	Maximum Transmission Units
RFC	Request for Comments
UDP	User Datagram Protocol
VEM	Virtual Ethernet Module
VLAN	Virtual LAN
VM	Virtual Machine
VNI	Virtual Network Identifier
VTEP	Virtual Tunnel End Point
VxLAN	Virtual Extensible LAN

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1 Introduction

1.1 Research aim and goals

The aim of this bachelor's thesis is to provide a comparative linguistic analysis of two professional texts on computer science. The original English texts of various genres with similar topics will be chosen and described from the point of view of several linguistic features. A YouTube video of the same topic will be selected as additional material for the analysis.

The first and main goal of the analysis is to examine the texts, written and spoken, from different perspectives and to determine the extent to which the selected texts differ in their use of language and what their common features are. To fulfil this goal, an appropriate analytical framework has to be chosen. The analytical framework for this work includes the investigation of several discourse features, among which are functions of language, style and genre, cohesion and coherence, and deixis.

As an additional goal of the project, I will analyze whether the texts are typical representatives of their style and genre, and what makes them different from conventional standards. Moreover, the spoken language used in the video will be commented on, as it can demonstrate some unique aspects of the discourse features, different from those in the written language.

Each chapter starts with a brief description of the theory on which my analysis will be based. They also include a short conclusion, which will be summarized at the end of the paper.

1.2 Materials under investigation

In accordance with the main objective of the thesis, the topic for the analysis was chosen from the field of computer science - VxLAN technology. VxLAN is a protocol most commonly used in data centers, allowing the virtualization of the networks and providing such an important feature for modern cloud technologies as scalability.

The first text (Wilson 2020) is taken from the web journal PCWDL.com (*PC&Network: Downloads*). PCWDL.com provides its readers with various review articles, tutorials, guidelines and software recommendations. Although the journal specializes in the technical topics, its content is addressed not only to professionals but to laypeople as well. The article chosen for the analysis describes the VxLAN technology in general and provides an overview of its main elements.

The second text is represented by an RFC - Request for Comments. The RFC is a document that provides a description or instruction to protocols, programs, technologies, and their technical principles and aspects. Even though many of them are not considered standards, it is highly recommended to follow the RFCs.

To investigate the difference between the use of the written and spoken languages in terms of the chosen discourse features, an additional material for the analysis was added – a video lecture. It is the YouTube video lecture about the VxLAN technology available on the channel of Kevin Wallace (2020). Kevin Wallace is a Cisco Certified Systems Instructor (CCSI) and his channel includes various video courses about networking.

1.3 Expected results

Although all the materials describe identical technical topic, they will most probably differ in the way how the authors use the language.

Texts from web journals often have one typical feature – they are written in a popular scientific style. The audience of such texts is not only those who have some professional expertise but also laypeople who do not necessarily have enough technical experience. It requires the author to use particular language tools and features and make the material unambiguous for a wide variety of readers. The same goal is shared by such videos as Kevin Wallace’s video training. Even though its genre can be defined as a lecture, it differs from the typical lecture given at school or university. Thus, it is expected that the first text taken from the journal and the YouTube video will have, in contrast to the RFC, several distinctive aspects typical of the popular-scientific style.

The RFC is a technical specification, recommendation, or documentation that engineers and technicians have to or should follow in order to obtain a fully operational and reliable network. RFCs contain a lot of different technical terms and definitions that might be difficult to understand by non-related readers. The professional style of these texts represents such frequently used features as impersonality, professional terms, the prevalence of the passive voice and others. RFC 7348 used as a second text for analysis will be probably notable for the mentioned characteristics.

The difference in style and genre of the materials will definitely affect other discourse features such as cohesion and deixis.

VxLAN technology, the technical topic of the texts, is not for beginners. Its understanding requires at least a basic set of knowledge and skills. It may affect the language

used, its style and genre and other linguistic features. Moreover, RFC 7348 is not considered a standard but a recommendation. This might cause the content to be less official and formal. The spoken language of the YouTube video, in turn, can be affected by the author's unique experience, pronunciation, or intonation. Hence, I expect that the materials will show both similarities and differences in their use of language and various linguistic tools.

2 Functions of Language

Language as a means of communication serves different purposes. The purpose of the communication itself is defined by the speaker or writer. It depends on the initial intention of the producer of a message. What the language is used for determines its functions. Undoubtedly, functions of the written and spoken language will differ in the extent to which they are used and prevalence of ones over others. However, it is worth noting that the interplay of the functions is the main attribute of communication. Some functions may dominate whereas others play just a secondary role giving additional meanings and tones to the process of communication. Moreover, in some cases, the function might replace its predecessor guiding the interaction in a new direction.

Perhaps the most known and recognizable taxonomy of functions was created by Roman Jakobson, a Russian-American linguist and literary theorist. Based on his model of 6 factors, or aspects, of communication, Jakobson defines 6 different functions of language, each serving a separate aspect: referential, expressive, conative, phatic, poetic and metalinguistic (1960, p.353). Each function fulfils its specific task: conveying information, expressing feelings, establishing a communication channel and others. It is worth mentioning that Jakobson also states that “diversity lies not in a monopoly of some one of these several functions but in a different hierarchical order of functions” (1960, p. 353), which confirms the idea about the functions’ interplay property.

Michael Halliday, an English linguist, had a slightly different approach to the language functions and understood them as meanings. Instead of answering the question *Why people use language*, Halliday tried to define *What the language is*. From that point of view, the language functions, or meanings, include four types: experiential, interpersonal, logical, and textual. Moreover, the meanings of language can be paralleled to the aspects of the register: field, tenor, and mode. (Halliday & Hasan 1995, pp. 25–26)

Later in this chapter, the texts and the YouTube video chosen for the analysis will be described and investigated from the point of view of these two main approaches to the functions of language.

2.1 Text 1 analysis

I would like to start the analysis with the Jakobson’s model of language functions. It includes six functions, and in most cases, there is one prevalent and one or two secondary functions. As it stems from the title of the article selected for the analysis, *VxLAN – What Is*

it & Quick Tutorial, the main aim of the author is to convey information, teach and instruct a reader. Obviously, the dominant function of this text is the referential function. It is, perhaps, the most typical function for the written language, as the main purpose of the written text is to transfer knowledge, news and ideas. Defining the secondary function might be problematic in some cases. However, I believe this VxLAN manual makes it evident - the subordinate function is phatic. When analyzing the article, it can be easily noticed that the personal contact the author tries to establish with the reader is one of the most notable characteristics of the text. The function is realized by a significant number of personal pronouns as in *it can help you* or *You'll also learn*, and personal address to the reader – *Let's dive in!* or *let's go through*. It is also worth noting that such addressing represents inclusive *we*, which combines the addressee with the addresser at the same time. The creation of the conversation with the audience helps to address as wide variety of manual users as possible and convey the knowledge to all of them.

From M. Halliday's model perspective, the article about the VxLAN technology corresponds with all four functions/meanings defined by the linguist. The textual function represents the text itself, its thematic and information structure, semantic, grammar and is definitely presented in the written language. Obviously, the article includes the experiential meaning, the main idea of which is to transfer experience and describe the objects from the real world. It is expressed by the topic, VxLAN technology, and the author intention itself – conveying the knowledge. As it was already mentioned above, the article is characterized by the author's intention to establish a dialogue with the reader, which fulfils another function of the language – interpersonal. It is usually demonstrated by social interaction and is more often observable in the spoken types of language. However, a written text can obtain interpersonal meaning as well. By using such personal pronouns as *you* or *we*, the author wants to demonstrate that the writer "...and their readers are at the same level" (Krhutová 2009, p.56). The logical function of the text appears in the relationships between the clauses and is expressed by the conjunctions. A distinctive feature of this text might be its informality affecting the sentences, making them shorter and less complex.

2.2 Text 2 analysis

RFC 7348 chosen as a second text for the analysis represents a set of instructions and recommendations regarding the VxLAN technology implementation and support. As the document itself states, it "...is published for informational purposes."

(M. Mahalingam et al., 2014). Thus, it can be concluded that the main purpose of the text is to transmit information and the main function is referential. Defining the subordinate function might be debatable in this case. On the one hand, it is recommended to follow the RFC's guidelines in order to implement the network and VxLAN technology properly. Hence, the conative function, the purpose of which is to persuade somebody to do something, can be considered as a subordinate function in this text. On the other hand, RFC 7348 is not a standard but a recommendation, and does not have to be mandatorily followed. Another option for the role of the secondary language function is metalinguistic. The original RFC 7348 contains a significant number of modal verbs that should be additionally explained from the RFC documents' perspective. However, such a metalinguistic function is realized by another RFC. One of the first sections of the document is 'Conventions Used in This Document', where the link to additional RFC 2119 is provided. The RFC 2119 describes and explains the meanings of such words as *should*, *must*, *may* and others, which provides us with the metalinguistic function missing in the RFC 7348.

Michael Halliday's model is represented in the RFC partially. The textual meaning of the language is obviously applicable for the document as it is a written text with a specific thematic and logical structure. The experiential function is expressed by the intention of the group of authors to convey their experience with the VxLAN technology and make its management and implementation more understandable for the Internet community. However, given the style and genre of the text, it does not imply familiarity or any dialogue with the reader. The interpersonal function of the language here is defined by the distant and formal communication between the producer of the text and the reader. The logical function for the RFC, as in Text 1, is defined by different conjunctions and connectors between the clauses. The formality and professional style of the RFC documents allow them to use compound sentences and more complex syntactic structures. This fact makes the reading and understanding of the RFC text more difficult and time-consuming.

2.3 Video analysis

The investigation of linguistic features and means of the spoken language represented in Kevin Wallace's video about the VxLAN technology gives us a chance to take a look at the topic from a different point of view.

The tutor explains the basics of the VxLANs and provides a general understanding of the technology. Thus, the main aim of the speaker is to convey information. Regardless

of the different, spoken type of the language used, the main function of the video is similar to the first text's function – referential. The subordinate function of the language in the video is also related to the secondary function of the first text. Kevin Wallace establishes a strong communication channel with his listeners, speaking with them as if they were sitting in front of him. He greets the auditory with a friendly *Hey* just at the beginning of the video. Moreover, he often uses inclusive *we* as in *we're going to take a look at* or *we're going to see that*. Personal pronouns and appeals also occur in the speech: *you'll see that you need, now you might be wondering, let's jump into this video, let's walk through an example* and others. The phatic function, which represents the secondary function in this case, is even more visible here than in the previous text. This can be explained by the fact that the spoken language allows and sometimes motivates to establish a dialogue with the audience, even in the situation when it is imaginary and represented only by a camera.

Four meanings of the language, described by Michael Halliday, are clearly visible in the video. However, as the video represents the spoken language, the meanings have some specific characteristics. The educational purpose of the video clearly defines the experiential meaning of the speaker's monologue. Logical and textual meanings, in turn, have their specifics because of the spoken nature of the discourse medium: sentences are shorter and simpler, thematic and information structure is less strict, and prevalent conjunction between the clauses is *and*, which separates the logical units of the text from each other and makes their weight equal in the sentence. Interpersonal meaning is expressed by the author's intention to establish a dialogue with a viewer, even though such a dialogue will be monodirectional.

2.4 Conclusion – functions of language

Despite the fact that several texts, written or spoken, may describe the same topic and cover similar material, the way they use language can differ.

The web journal article, the RFC 7348, and the video lecture of Kevin Wallace all have as their goal to convey the knowledge and teach. However, the article and the video try to establish contact with the audience, which makes their subordinate language functions similar. In contrast, the RFC has a higher level of formality and does not “speak” with the reader. It rather insists or strongly recommends its audience to follow the principle described in the RFC.

Following Michael Halliday's approach, we can see that all the materials show a relatively similar realization of the language functions, or meanings. The main difference is demonstrated by the interpersonal meaning of the RFC, characterized again by more distant and formal communication between the authors and the audience. Besides this, the logical and textual meanings of the video's language also show several specific features. For example, shorter and simpler sentences, or a less strict thematic structure of the text.

Thus, it can be concluded that from the language functions perspective, the texts, written and spoken, are analogous and different at the same time.

3 Style and Genre

From Widdowson's (2007) perspective, the genre is a specific kind of speech event which has a specific intended effect that a speaker/writer wants to achieve. Both turn-taking and single-turn genres have to follow conventions established by a discourse community (Widdowson 2007, pp. 39-40). The conventions may define the form, context, structure or linguistic features of the text. However, as Bhatia (2013) states in his 'Analysing Genre', "Although there are several other factors, like content, form, intended audience, medium or channel, that influence the nature and construction of a genre, it is primarily characterized by the communicative purpose(s) that it is intended to fulfil." Moreover, the genre is "highly structured and conventionalized", but might be altered or transformed with the specialists' features and innovations. Doing this the author can "achieve special effects or private intentions" and create a new or sub-genre (Bhatia 2013, pp. 49-54).

The general definition of a style may refer to various fields of life: music style, style of play, hairstyle, management style, lifestyle, and others. Linguistics, however, considers the style mainly as an author's approach to conveying their thoughts. As Leech and Short (2007, p. 9) state in 'Styles in Fiction' a style "...refers to the way in which language is used in a given context, by a given person, for a given purpose, and so on".

Depending on the needs, the style can be analyzed from different points of view. First, we can assess the extent to which a text corresponds with the norms of a given style or genre. Another possible way is to investigate a text's style taking into consideration its individual uniqueness. The uniqueness here may concern not only the style of a specific author but a single work as well. For the comparative linguistic analysis, I will use the first approach mentioned above because it corresponds with one of the goals of the project.

Determining the style requires the search and analysis of the style markers. The style markers represent linguistic features that are typical for a given style. To make the analysis of the texts consistent, I will use the style features classification suggested by G. N. Leech et al. (1982, pp. 158-166) in 'English Grammar for Today'. It divides the features into four groups: lexis, grammar, figures of speech, and cohesion and context. The cohesion will be analyzed in the separate chapter of this work.

Style and genre accompany each other and make it possible for a text to convey certain ideas within the conventional framework. The main aim of this chapter is to characterize the linguistic features of the texts and evaluate the extent to which they conform to the typical representatives of their style and genre. In this task, I will base on the

investigations of such linguists as Biber (2009), Krhutová (2009), Urbanová (2002), Galperin (1977), and Knitlová (1977).

3.1 Text 1 analysis

Referring to Bhatia's assumption about the primary role of the genre's communicative purpose, the analysis can be started with considering the aim of the chosen genre. As it was already mentioned in the previous chapter, the main goal of the first text is to convey information. Obviously, there are many genres the purpose of which is to inform or transmit the knowledge. The first text is represented by one of the most popular ways to share the information – an article in a journal. Such a genre allows not only to transfer the message but also make it available and understandable for the wide audience, which makes it an excellent tool for the mentioned purpose fulfilment.

The lexis, as one of the parts of the style analysis (G. N. Leech et al. 1982), represents vocabulary used in the text and its features. Before the text analysis, it might be useful to look at the title first. The title of the article, *VxLAN – What Is it & Quick Tutorial*, combines a difficult technical term with simple words and phrases. It attracts the reader's attention and makes him curious about the article's topic. Such an approach may help to avoid the situation when a potential reader would not even start to read the article.

Considering the text, it can be noticed from the very beginning that the author tries to make his explanations as clear as possible. However, such clarity is not created by the vocabulary. There are various technical terms in the text which are not explained, and it is assumed that the reader is aware of the basics of the topic. Among the definitions unaccompanied with any additional information are *hosts*, *Virtual Machines*, *VLANs*, *layer 2*, *virtualization*, *ISPs*, *Ethernet frames*, *encapsulation* and many others.

To make the article simple for the reader, the author uses other lexical features of the language. The introduction part is full of phrasal verbs such as *growing up*, *getting out*, *get into*, *runs out*, and *dive in*. Contractions are among other informal elements of the text: *we'll provide*, *you'll also learn*, *Let's say that*, and *doesn't need to be*. Perhaps the most noticeable grammatical component of the article, which makes it more objective and scientific, is passive voice: *switch is routed*, *which is commonly used*, *being affected by*, *is connected to*, *is usually configured on* and others.

Further analysis can show how the sentences are constructed. The complexity of the sentences is relatively stable throughout the whole article and is represented mostly by the

horizontal type, making the sentences more complex by increasing the number of their elements (G. N. Leech et al. 1982, p. 137). Subordination is also used in the text but not too often. Moreover, it is worth mentioning that the structure of the subordinate clauses tends to be simple, consisting of just several words. The more favored type of sentence construction used in the text is coordination, both linked and unlinked (G. N. Leech et al. 1982, pp. 107-109). The following sentence can be considered as a typical example of linked and at the same time unlinked coordination:

- *Layer 2 Simplification. Simplify the network and reduce the need for layer 2 Spanning Trees, Trunking, and VLAN stretching.*

The third group of features (G. N. Leech et al. 1982, pp. 158-166) is represented by the figures of speech. There are several cases of personification and metaphor in the text. These figures of speech help the reader to visualize the situation and technical aspects of the topic. Inanimate objects can be endowed with human properties as shown in the following examples of personification:

- *Your network is growing up and getting out of control.*
- *Host A wants to communicate with Host Z...*
- *Now, the in-between layer 3 infrastructure only sees IP traffic...*

The examples below demonstrate the use of metaphor:

- *Let's dive in!*
- *When you implement it, you are not locked by any vendor.*

Taking into consideration all the features mentioned above, it can be concluded that the first text has the features of both the popular scientific style and scientific prose. The latter is demonstrated by the frequent use of the discourse specific terms, which are sometimes not explained. This reduces the target audience, whereas the pure popular scientific style addresses the general public.

3.2 Text 2 analysis

The second text, as it is mentioned in the RFC 7348 itself, is represented by the memo, or memorandum, which can include an instruction or be a reference for future tasks (DuPuis 2021). Alternatively, the RFC 7348 can be considered a technical specification or documentation – another writing genre the main purpose of which is to convey information. Unlike the journal article, however, such a genre is not intended to be clear for everyone.

Technical documentation is used to communicate the information to the technical experts and professionals. To reach its main goal, the documentation follows the genre convention and uses a specific style, which is described in the following paragraphs.

As in the first text, the investigation of the style begins with the lexis. The title of the RFC, '*Virtual eXtensible Local Area Network (VXLAN): A Framework for Overlaying Virtualized Layer 2 Networks over Layer 3 Networks*', is relatively long and complex. It is full of professional technical terms. Such a title aims to get a complete overall understanding of the topic which will be discussed further.

Considering the content of the RFC, formal and complex vocabulary can be noticed. Many technical words are used and given without explanation: *virtualization*, *server*, *data center*, *traffic*, *domain*, *Spanning Tree Protocol*, *multipath scalability*, *broadcast isolation* and many others. Some general academic, polysyllabic words can be found as well: *inadequate*, *segregation*, or *interchangeably*. It makes the understanding of the text much more difficult and may require the reader to search for additional information before starting with the document investigation.

From the point of view of grammar, the most frequently used feature is passive voice. There is a significant number of such constructions as *is identified through*, *overlay is used to*, *a tenant could be identified by*, *multicast is used for* and others. As it was expected, there are no contractions in the text. However, although the tone of the document is formal and professional, it includes several phrasal verbs: *sketch out*, *strip out*, *come up*, *look up* and *send out*. However, when related to the size of the text, such a number of phrasal verbs is rather exceptional. One of the interesting properties of the document is the lack of personal pronouns, which makes the text objective and increases the distance between the author and the reader. The only example of the personal appeal is in the following sentence:

- *Thus, you could have overlapping MAC addresses across segments but never...*

The sentence constructions are noticeably complex in the RFC. As the following example shows, there is not only horizontal complexity but the vertical as well:

- *This is used to build efficient multicast forwarding trees so that multicast frames are only sent to those hosts that have requested to receive them.*

The frequency of the subordination and coordination in the text is roughly the same.

Unlike the journal article, the RFC 7348 does not contain any figures of speech, with the exception of two examples of personification in *this upper limit is seeing pressure* and *the VM never sees it*.

Considering the features used in the text and the genre, the style of the RFC can be described as a scientific prose style. Such an instance of technical writing, the main goal of which in this case is to inform the internet community about the VxLAN technology, “...tends to be objective, precise, unemotional, devoid of any individuality...” (Galperin 1977).

3.3 Video analysis

There are several main types of videos presented on such video platforms as YouTube: Educational, Promotional, Informational, Documentary, and Entertainment. (Karel, 2020) As was already discussed in the previous chapter, Kevin Wallace’s channel focuses on providing educational content, informing and transmitting the knowledge to a wide audience. Taking this into consideration, we can conclude that the video about VxLAN technology is an educational type of video. In more specific terms, the video can be classified as a video lecture or, as Mr. Wallace states in the name of his channel, a video training.

To specify the style of the language we need to refer to the lecturer’s speech. It includes a great number of network terms that are not explained, similarly to the article and RFC. Among such words are *ethernet switches*, *VLANs*, *virtualization*, *virtual machines*, *encapsulating*, *network identifier*, *spine-leaf design*, *port-channel* and others. It is expected that the audience of the video is aware of these basic terms or performed the initial investigation of the topic. It can cause a problem with understanding the video for some of the viewers who do not have the required basic knowledge. However, the author’s overall approach to the knowledge delivery and the language features he used serves one of the main functions – making the material as simple and understandable to a wide audience as possible. Among the language features used to reach this goal are phrasal verbs, personal appealing and contractions: *pick up*, *jump into*, *run out*, *making up*, *bring up*, *you*, *we’re*, *it’s*, *don’t*, *that’s*, etc.

The video lecture, in comparison with the web journal article, shows significantly more examples of personification. There are many examples of it represented by such verbs as *say*, *see*, *want*, or *know*:

- ...and leaf switch 3 *sees* that...
- ...server one...*knows* it *wants* to...
- ...server 2 *says* yep that's me and it *says* my MAC address is...

The spoken nature of the language makes the grammatical structure of the speech simpler. The clause structure complexity consists mostly of the horizontal complexity, reproduced by increasing the number of elements in the clause. Relation between the clauses is mostly represented by coordination. Very noticeable is the use of *and* conjunctions. Perhaps the most obvious difference between the spoken language in the video against the texts is the lack of clear sentence boundaries. Even though there was probably a script prepared for the video lesson, it can be seen that the speech is rather fluent and flexible than strictly divided into sentences.

The style of language used in the video training can be defined as a popular scientific style. Personal appeals, questions to the reader, and fractured and incomplete utterances are typical features of such spoken types of discourse (Biber 2009). This style, because of its informality and simplicity, is a perfect choice for a video lesson that should be understood by a vast audience. However, as in the web journal article, the unexplained discourse specific terminology can be found in the speech. This prevents the style of the video of being a pure popular scientific style.

3.4 Conclusion – style and genre

Analysis of the texts makes the authors' style and genre choice clear and reasonable. The texts, either written or spoken, are about the same topic. However, the authors used different approaches to the process of conveying the information, each of which represents a perfect tool for sharing and summarizing the knowledge.

The RFC 7348 is detailed technical documentation, written by experts for experts. It contains many features of formal writing as passive voice, impersonality, absence of contractions, no dialect or slang used and others. However, the phrasal verbs, which are more popular in informal types of texts, can be found in the documentation as well. It might be explained by the recommendation character of the documentation, unlike other RFCs that are considered network standards.

The most noticeable feature of the texts is probably the assumed awareness of the readers about the network basics. This equalizes the level of implicitness and makes the readers/hearers prepare before proceeding with the investigation of this topic (Krhutová 2009).

While the RFC represents rather purely scientific prose, the web journal article and the video training of Kevin Wallace are located between the academic scientific style and

the popular scientific style. The syntactic structure of the sentences, personal appeals, presence of figures of speech, and the sense of a dialogue with the reader/hearer distinguishes them from the academic scientific prose style.

Answering the question about the materials being typical representatives of their style and genre, we should say that the RFC 7348 demonstrates the purest style. The web journal article and the video lecture, in turn, have the features from the adjacent styles and do not represent only one of them. This can be explained, for example, by the difficulty of the topic or the author's unique approach.

4 Cohesion and Coherence

A text, written or spoken, should be clear and represent a complete message for a reader or hearer. The text is not just a sequence of words and sentences. It interconnects them into a whole unit, and the concept describing the idea of such connectedness is called texture. One of the aspects of texture is cohesion. It provides the links between sentences and makes the text consistent. Cohesion can be created by various linguistic means that are called cohesive devices. These devices generate cohesive ties, separate instances of cohesive relations, which, in turn, comprise cohesive chains (Halliday & Hasan 1976).

In the most general way, cohesive devices can be divided into two groups: structural and non-structural.

Michael Halliday and Ruqaiya Hasan in their 'Cohesion in English' state that "a text is best regarded as a semantic unit: a unit not of form but of meaning" and focus on the non-structural type of cohesive devices. These are represented by grammatical (reference, substitution, ellipsis, and conjunction) and lexical (reiteration, collocation) cohesion (Halliday & Hasan 1976).

Following Halliday and Hasan's approach, the analysis of cohesion can be represented by three parts: identifying the number of cohesive ties that are not presupposed within the same sentence, determining the type of cohesion and cohesive devices used in these ties and, finally, specification of the ties in terms of their length (Halliday & Hasan 1976, p. 332). This will help understand how long and complex the cohesive chains are and whether they differ depending on the style or genre.

Even though the taxonomy of cohesive devices provided in 'Cohesion in English' can seem to be the most comprehensive and straightforward, it can still be considered insufficient because it excludes the analysis of structural cohesion.

Professor Kim Sydow Campbell (1991), for example, criticizes Halliday and Hasan's approach. She claims that "cohesion is the result of repeating semantic and structural elements" and repetition provides "a uniform background against which semantic distinctions are foregrounded". She insists on the fact that the analysis of the texts, especially the technical ones, should be also supplemented by the analysis of structural cohesion. Based on professor Campbell's findings, I will analyze structural cohesion of the texts focusing on thematic progression, syntactic parallelism, and graphic devices (Campbell 1991, p. 222).

Thematic progression "refers to the progression from the topic of one sentence to the topic of another." Topics and comments, or themes T and rhemes R, are repeating elements

in thematic progression and represent old and new information. According to FSP (Functional Sentence Perspective) theory, the most natural position for the old information is at the beginning of the sentence and for the new information at the end of it (Campbell 1991, p. 225-226).

Syntactic Parallelism represents the repetition of syntactic structures. The cohesive ties created by this cohesive device can occur not only within adjacent sentences but in the different sections of the text as well (Campbell 1991, p. 228).

Graphic cohesive devices, as per Campbell, “help to limit the possible meanings of a text.” These devices are represented by typography, enumeration, and repetition of various graphic elements such as charts, graphs, figures, or tables (Campbell 1991, p. 230-233).

While cohesion, represented by concrete linguistic forms and means, can be easily retrieved and distinguished in the text, coherence represents a more intuitive concept. It describes the internal logic of the text, or, in other words, the possibility of the text to make sense for a reader or hearer. Despite the fact that most of this chapter concerns structural and non-structural cohesion, coherence, being inseparable from cohesion, will be commented on as well.

4.1 Text 1 analysis

The analysis of the journal article showed that the number of cohesive ties in each sentence fluctuates between one and two. Also, the ties are considered to be immediate or mediated, which means that presupposition created by cohesive devices is resolved in one or two preceding sentences (Halliday & Hasan 1976, p. 330).

Among non-structural cohesive devices, reference, specific type of grammatical cohesion, and lexical cohesion occur most often. Reference is represented both by exophora and endophora. Personal pronouns in *you might have*, *you might want*, *we'll provide*, or *you'll also learn* point outside the text and provide exophoric reference. Endophora expresses reference to the following or preceding discourse and can be illustrated by demonstrative and comparative references as in *with this technology*, *it was initially designed*, and *it is more common*.

There are only few examples of substitution and ellipsis in the text. The nominal substitution is demonstrated by the utterance *the most obvious one is its segmentation*, where *one* replaces the word *advantage*. Ellipsis is represented by two types: nominal and clausal. The examples below show the nominal ellipsis, where the word *methods* is removed from

the end of the sentence, and the clausal ellipsis, where the author asks a question and immediately answers it removing unnecessary words from the answer:

- *You can limit the deployment to one method or use a combination of both [methods].*

- *How does the overlay VxLAN avoid being affected by underlay changes? [It avoids being affected by] Using a switching fabric, referred to as the Spine-and-Leaf.*

Conjunctions in the text are represented by various types: additive (and), comparison (on the other hand), contrastive (but), causal (so), conditional (in some cases) and others. It should be mentioned, however, that conjunctions, even though being treated as cohesive devices, do not represent cohesive ties. They serve as connectors and “presuppose the presence of other components in the discourse” by themselves (Halliday & Hasan 1976, p. 226).

Lexical cohesion, along with reference, represents the most often used type of cohesion in the article. Lexical cohesion mainly occurs as repetitions, synonyms and generalizations. The following passages can demonstrate the repetition (leaf layer switches) and generalization (VxLAN host/VxLAN gateway -> method):

- *The Leaf layer of switches interconnect the spine and the end points. The leaf layer switches create the VxLAN tunnels... The leaf switches that perform VxLAN functions are known as VTEPs (VxLAN Tunnel Endpoints).*

- *You can deploy the technology through a VxLAN host or VxLAN gateway. You can limit the deployment to one method or use a combination of both.*

Following Campbell (1991), we can start analyzing structural cohesion with thematic progression. Even though different types of thematic progression can be combined to create more complex structures, the most basic types are simple progression ($T_1R_1 \rightarrow T_2(=R_1)R_2$), progression with a continuous theme ($T_1R_1 \rightarrow T_1R_2$), and progression with themes derived from a “hypertheme” (Daneš 1974).

Most of the themes and rhemes in the article are of the first two types described above. As an example, consider the following utterance representing thematic progression with a continuous theme and different rhemes:

- *This topology [Leaf-and-switch] makes every destination only two hops away. Leaf-and-switch may also use ECMP (Equal Cost Multi-Pathing) to recover when... The spine-and-leaf fabric topology is highly relevant to VxLAN because ...*

The following example demonstrates syntactic parallelism, another type of structural cohesion. The repetition of the same pattern at the beginning of each utterance (*X header: This header...*) creates cohesion among them and helps to highlight the contrast between various headers:

- *Outer MAC header: This is the header that...*
- *Outer IP header: This header allows transport across...*
- *Outer UDP header: This header identifies the packet as VxLAN.*
- *A VxLAN header. This header is also referred to as...*

Figures, as one of the types of graphic repetition, provide a good example of structural cohesion. However, an even better representation of it could be the typography and enumeration used in the article. The following utterance demonstrates both of them. The author, listing various benefits of VxLAN technology, highlights them not only by numbers but also in bold font:

1. **Scalability and flexibility:** *VxLAN improves...*
2. **Segmentation and Multi-tenancy:** *VxLAN provides...*
3. **Layer 2 Simplification.** *Simplify the network and...*

Finally, analyzing the article from the coherence perspective, we can notice that the author uses appropriate and relevant vocabulary, provides a clear and consistent logical structure of the article, and leads his audience from the very basics of VxLAN technology to the final section with the summary of the topic. This approach excludes ambiguity from the text and makes it coherent.

4.2 Text 2 analysis

Similar to the web journal article, RFC shows approximately the same number of cohesive ties in the sentences. Most of them contain one or two ties. Presupposition, created by these ties, is resolved also within one or two sentences in the following or preceding discourse.

Most of the cohesive devices are represented by reference and lexical cohesion. However, it should be mentioned that unlike in the first text, there are not many instances of exophora in the RFC. Three examples of it are shown in the following sentences:

- *To affect this, we need to have a mapping between...*
- *Thus, you could have overlapping MAC addresses across...*

- *In the case when the VMs in a data center are grouped according to their Virtual LAN (VLAN), one might need thousands...*

Demonstrative reference, represented by the demonstrative pronoun *this*, prevails in the text. Some of the examples demonstrate reference to the RFC itself, others point to an element in the previous discourse:

- *This document is not an Internet Standards Track specification...*

- *This document details a framework termed "Virtual eXtensible Local Area Network (VXLAN)"...*

- *...lead to a requirement for an overlay network. This overlay is used to...*

There are also several cases of using *such* as anaphora. The example below demonstrates the situation, where *such* refers back to the previously discussed discourse:

- *The current VLAN limit of 4094 is inadequate in such situations...*

- *it MAY choose to verify the checksum value. If it chooses to perform such verification...*

Lexical cohesion in the text is represented by reiteration. Consider the following utterance, illustrating the use of repetition (*cloud computing*) and near-synonyms (*elastic provisioning - elastic services*):

- *Cloud computing involves on-demand elastic provisioning of resources for multi-tenant environments. The most common example of cloud computing is the public cloud, where a cloud service provider offers these elastic services to multiple customers/tenants over the same physical infrastructure.*

Investigation of the text showed that there are no instances of substitution or ellipsis in the text. Perhaps, it can be explained by the genre of RFC, which excludes any ambiguous or incomplete thoughts from the text.

The use of conjunctions, as in the web article, demonstrates various types of them such as additive (*and, in addition, thus*), adversative (*however, but*), causal (*so, then, for, because*), and others.

The analysis of structural cohesion showed significantly more complex patterns of thematic progression in RFC than in the article discussed before. Even though the simple form of it can be found in the text as well, most of the paragraphs in the document represent combinations of different types of thematic progression, which makes it more difficult to identify a unified fixed pattern. Consider the utterance below:

- A key characteristic of Layer 2 data center networks is their use of Virtual LANs (VLANs) to provide broadcast isolation. A 12-bit VLAN ID is used in the Ethernet data frames to divide the larger Layer 2 network into multiple broadcast domains. This has served well for many data centers that require fewer than 4094 VLANs. With the growing adoption of virtualization, this upper limit is seeing pressure.

While the third and the fourth sentences demonstrate the typical pattern of thematic progression when a rheme becomes a theme in the next sentence (Daneš 1974, p. 118), the first two sentences do not have such a connection. Moreover, This in the third sentence refers back to the combination of the theme and rheme of the second sentence.

In contrast to the first text, syntactic parallelism does not occur very often in RFC. We can find it only in the table of contents. It demonstrates a similar pattern in the headings for the main chapters of the document:

3. VXLAN Problem Statement
4. VXLAN
5. VXLAN Frame Format
6. VXLAN Deployment Scenarios

One of the realizations of graphic cohesion in the text is typography. Modal verbs used in the document are written with capital letters, signaling a unique role, or property, of these words. It is mentioned at the beginning of the RFC that a specific interpretation of these verbs can be found in a separate RFC 2119:

- *The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119.*

The enumeration of the chapters and subchapters, along with the bold font of the headings, is another example of graphic cohesion. Also, various schemes and figures, representing VxLAN headers and frames, occur in the text.

The RFC can be definitely considered a coherent text. It explains the topic of VxLAN technology in even more detail than the article, which makes it easier for the reader to follow the main idea. Moreover, the division of the document into several chapters and subchapters logically separates the information and simplifies the process of reading and understanding.

4.3 Video analysis

In this section, I am going to analyze Kevin Wallace's speech in his video lecture. This means that by the word text, I will mean spoken language produced by the author of the video. Moreover, it should be mentioned that all examples cited here will keep the original grammar, punctuation and syntax.

Even though Halliday and Hasan claim that cohesive ties in the spoken language can be very long, these in the video lecture can be considered immediate and mediate (1976, p. 330-331). However, the cohesive chains are slightly longer than in the texts investigated before. Usually, the reason is the frequent use of anaphoric reference and lexical reiteration. As an example, consider the following utterance:

...the device that does our VxLAN encapsulation is called a virtual ethernet module or a VEM and each VEM has an IP address it could have more than one but it's got at least one IP address that we're going to use to communicate over this routed network and the IP address it's assigned to a special interface called a VTEP which stands for VxLAN tunnel endpoint and each VTEP is associated with one or more VNEs and VTEPs on different switches they can temporarily bring up a tunnel and pass traffic between themselves by...

There are several cohesive chains in the example above, consisting of anaphora (*it*) and repetition of such nouns as VEM, IP address and VTEP.

To proceed with the investigation of the rest of the cohesive devices, I should mention intonation. It has a specific effect on the cohesive devices in the spoken language. It helps to distinguish the meanings expressed by them and also emphasizes the cohesive relation where it is required.

Phonologically, conjunctive and cohesive elements can be either tonic or reduced. This can have a specific effect on some of the cohesive elements. For example, temporal conjunction now if it is tonic expresses rather deixis but not cohesion. Otherwise, if now is phonologically reduced, determines a "boundary" between two adjacent parts of the communication (Halliday & Hasan 1976, p. 268). Consider the following utterances where now illustrates such a boundary:

- ...now let's jump into this video on VxLANs...
- ...now you might be wondering do we have to have a multicast group for each VNI and...
- ...so now we have a VNI identifier not just a VLAN identifier...

The difference between the tonic and reduced cohesive items can also demonstrate the continuative *well*. When tonic, usually at the beginning of the response, expresses the process of thinking about the answer. When reduced, refers to something that has been just mentioned before. Moreover, when *well* is used by the same speaker, it introduces an explanatory comment (Halliday & Hasan 1976, p. 269). The examples below demonstrate the latter use of *well*:

- ...we could easily run out of VLANs *well* the great news is virtual extensible lands or VxLANs can come to the rescue...

- ...how do we do this *well* server one is gonna send out an ARP broadcast because...

Anaphoric cohesive elements in English are usually phonologically non-prominent, or reduced. However, if it is required to emphasize the cohesive relation itself, intonation patterns can be used: falling, rising, falling-rising, and rising-falling (Halliday & Hasan 1976, p. 271).

Consider the following example of the demonstrative pronoun *that*. Even though it is used as anaphora, the falling-rising tone highlights cohesion and makes the use of *that* tonic:

- ...and if you take a look at the encore blueprint you'll see that you need to be able to explain VxLANs no configuration necessary *and that's* what we're going to accomplish in this video...

Falling-rising intonation pattern often creates a contrast between what follows and what was said before. Demonstrative reference *here*, emphasized by that intonation pattern, shows a clear cohesive relation between the previous and following parts of the utterance (Halliday & Hasan 1976, p. 271):

- ...but we could create logical tunnels between specific switches to create an entirely different topology *here* we're using that same physical underlay network but...

It is more difficult to trace structural cohesion in the spoken language. First, there is a lack of clear sentence boundaries, which makes thematic progression dependent more on intonation rather than syntactic structure. The intonation of spoken English divides the speech into "...unbroken succession of intonation units, or TONE GROUPS..." (Halliday & Hasan 1976, p. 325), which include new and given information.

The problem is that even though tonicity in English is associated with new information (Halliday & Hasan 1976, p. 69), we can see that Kevin's voice pitch sometimes

increases not to introduce new information, but either to emphasize the cohesion, or to highlight the most important information in the current context.

Consider the following utterances. In the first two examples, the **intonation focus** highlights the cohesive *as compared to* and *today's*. The last utterance shows that the **intonation focus** is rather on given information than new and used rather for attracting the hearer's attention to it:

- ...we're going to see that we can have many more VxLANs **as compared to VLANs**...

- ...but in **today's networks** where we might have a data center with lots of virtualization and...

- ...that's what gives us those 16 million plus VxLAN network identifiers and those **VxLANs** can run over our existing physical network infrastructure **the existing physical network infrastructure** is referred to as an underlay network...

As a result, the division of the speech into distinctive semantic units does not follow some strict rules but depends on different factors such as the grammatical structure of the phrases and sentences used, the author's unique approach, his conversational habits and intention in each specific moment of time, and others.

There were no examples of parallelism in the text. In spoken language, it is more typical for the public speeches, where it highlights the ideas and creates an intentional effect for the reader (*Parallelism - Examples and Definition of Parallelism 2022*).

Graphic cohesion is expressed by the animation in the video. The animation provides the connection between the words of the lecturer and the idea behind them. Such a cohesive relation helps to distinguish similar ideas in the topic and makes the video lecture coherent. Kevin's monologue would be quite ambiguous and confusing without such an accompanying demonstration.

4.4 Conclusion - cohesion and coherence

In this chapter, I analyzed the materials from the point of view of cohesion and coherence. The analysis of cohesion, divided into non-structural and structural, showed that the number of ties and their length in the written and spoken texts is almost the same. However, cohesive chains in the video lecture are slightly longer, which can be explained by the frequent use of lexical reiteration in combination with anaphora.

Reference, as well as lexical cohesion, occurs in the texts more often than other types of cohesion. It should be mentioned, however, that the journal article and the video lecture, unlike the RFC, demonstrate significantly more frequent use of exophoric pronouns such as *we* or *you*, which can be explained by the author's intention to establish contact with the reader.

The analysis of structural cohesion showed that thematic progression patterns in the RFC are significantly more complex than in the article and consist of a combination of the basic ones. While graphic cohesion occurs in each investigated material, either as figures or animation, syntactic parallelism is mostly represented in the web journal article.

Intonation plays a specific role in cohesion. Different intonation patterns can not only help to modify the meaning of the cohesive elements but also highlight the most important information in the discourse. Moreover, they provide a basic division of the speech into separate semantic units, which makes it easier to understand the speaker.

Coherence is provided by the consistent narration of the author, clear structure of the information, and additional materials. The background technical knowledge the reader may need does not affect coherence and rather concerns informativity, another aspect of textuality, which is, however, outside the scope of this work.

5 Deixis

Deixis (Greek 'pointing') is the phenomenon that expresses the relationship between the language and the context of the situation in which the language was used. Deixis is represented by various linguistic forms that provide reference crucial for the understanding of a speech event. Reference typically defines the participants of the speech event, its place, and time (Levinson 1983).

The linguistic forms or means used for deixis are called deictic expressions, deictics, or indexicals. (Yule & Widdowson 1996). As Huang (2014) states in his 'Pragmatics', such "...linguistic expressions include (i) demonstratives (e.g. *this*), (ii) first and second-person pronouns (e.g. *you*), (iii) tense markers (e.g. *-ed*), (iv) adverbs of time and space (e.g. *now*, *there*), and (v) motion verbs (e.g. *go*)".

There are three main types of deixis - person, spatial and temporal. By person deixis, the roles of the participants of communication are encoded. It defines who is a speaker, an addressee, and who is outside of the speech event. The first-, second- and third-person pronouns are used to distinguish these roles (Yule & Widdowson 1996). Spatial deixis determines the relative location of each of the participants of the speech event. Time deixis points either to the moment of time when an utterance was produced (coding time) or to the moment when the utterance is supposed to be received (receiving time) (Fillmore 1971, pp.39-40).

Such words as *this*, *here*, and *now* are considered "near speaker" and called proximal terms. They correspond with a typical deictic center of communication. *That*, *there*, and *then* are called distal terms and considered "away from speaker" (Yule & Widdowson 1996). The shift from the deictic center, from the speaker, towards the addressee (from *this* to *that* or from *now* to *then*) is called a deictic projection (Lyons 1977) or deictic transposition (Hanks 2011).

All deictic expressions can be used in two ways – deictically and non-deictically. Deictic use corresponds with the main purpose of deixis – describing the relationship between the utterance and the context of the situation where the utterance was produced. Non-deictics do not use this approach. An example of the latter can be third-person pronouns (*he*, *she*, *it*) used anaphorically, or the pronoun *you* used impersonally (Huang 2014, p. 171).

Following Fillmore (1971), the deictic use of deictic expressions can be divided into gestural and symbolic. Gestural use implies the need for additional knowledge of the context that can't be retrieved from the utterance or previous discourse. In other words, some

physical demonstration has to be provided. For symbolic use, in turn, basic knowledge and understanding of the communication event are enough for the addressee to decode the message.

Besides the three main types of deixis mentioned above (person, spatial, and temporal), three other types can be defined: social, discourse, and emotional deixis. Social deixis operates with the social status of the participants of the communication (Yule & Widdowson 1996). Emotional deixis (Huang 2014), or psychological distance (Yule and Widdowson 1996), concerns the emotional relationship between the participants. It should be mentioned that none of the materials under investigation in this chapter includes social or emotional deixis. These types of deixis would be probably more expected in other written and spoken genres, such as, for example, fiction, conversation, or interview.

Discourse deixis is used to point to “the current, preceding, or following utterances in the same spoken or written discourse” (Huang 2014). Examples of it could be such words as *this*, *that*, *next*, *however*, or *anyway*.

Anaphora is considered a non-deictic use of some of the deictic expressions and is sometimes confused with discourse deixis. Levinson (1983, p. 86) defines the difference between them as follows: “...where a pronoun refers to a linguistic expression (or chunk of discourse) itself, it is discourse-deictic; where a pronoun refers to the same entity as a prior linguistic expression refers to, it is anaphoric”.

The goal of this chapter is to analyze the materials from the deixis perspective. I am going to investigate if there is any difference in the types of deixis used depending on the genre and what are their main features.

5.1 Text 1 analysis

Let me start the analysis with person deixis and the features that it has in the text. Personal pronouns, which often express person deixis, are mostly represented in the text by *you* and *your*. There are two types of use of these pronouns in the text: deictic and non-deictic. Deictic pronouns *you* are used in a symbolic way when no additional physical representation is required to understand the referent of the deixis expression. Consider the following utterances where *you* is a deictic expression that addresses a reader:

- *In this article, we'll provide an overview of VXLAN and you'll learn...*
- *You'll also learn about...*

However, in the next examples just from the beginning of the article *you/your* has more general reference and does not point to any specific participant of the speech event. Grundy (2000) called this an empathetic way of deictic form usage:

- *Your network is growing up and getting out of control.*
- *You might have physical hosts and Virtual Machines distributed across the entire network...*
- *Stretching your VLANs could be a solution, as it can help you span your layer 2 across the physical network.*

Besides *you*, we can also find two uses of the pronoun *we*, both exclusive (*we'll provide an overview of VXLAN and you'll learn*) and inclusive (*We know so far that VxLAN stretches the layer 2 subnets across*) (Yule 1996, p.11).

Although third-person pronouns can be used as person deixis, there are no examples of this use in the text. Third-person pronouns in the article often serve as anaphora. In other words, the pronouns and the linguistic expressions to which they point, refer to the same initial object or entity (Levinson 1983). This non-deictic use can be demonstrated with the example below. Here, *Spine-and-leaf* and the two first uses of *it* refer to the same entity. The same is valid for the word *VxLAN* and the last *it* in the sentence:

- *Spine-and-leaf is an independent architecture. It is not exclusive to VxLAN, but it is often associated with it.*

However, third-person pronouns can be used deictically as well. In this case, they are used as discourse deixis and refer "...to a linguistic expression (or chunk of discourse) itself..." (Levinson 1983). The following examples show how *it* can refer to the succeeding discourse in the same utterance, or even to the whole article preceding the utterance, as in the title of the last sixth chapter:

- *Although it is more common to run VxLAN in software...*
- *6. Putting it all Together*

The words *now* and *then* are typical representatives of temporal deixis. Consider, for example, the following utterances where *now*, and also *then*, were shifted from its default position in the deictic center and refers to a moment when the reader reaches this utterance:

- *...it encapsulates the frame with a VxLAN and UDP/IP headers. Then sends it over using the underlay IP network transport...*
- *3. Now, the in-between layer 3 infrastructure only sees IP traffic...*

There is also another instance of *now*, where it serves rather as a discourse marker. It does not point to the speaker's or reader's moment of time. It is used to define the boundary between different topics in the discourse:

- *Now that you know about Spine-and-leaf overlay topology...*

The analysis of spatial deixis showed that there are no instances of it in the text. There are only five cases of using the demonstrative pronoun *this* as deixis. However, it is discourse deixis in these cases as it refers not to some location of the author or reader, but to the previous part of the discourse or even to the whole article:

- *Two leaf VTEPs gateways can act as one through peer-link and keep-alive links. You can accomplish this with...*

- *In this article, we'll provide an overview of VXLAN and...*

Such typical for the spatial deixis distal terms as *that* and *there* are used non-deictically in the article. They either create a link between two clauses as in *The leaf switches that perform VxLAN functions* or show the general idea of the existence of something as in *There are many advantages to using an overlay network.*

5.2 Text 2 analysis

The analysis of person deixis of the second text, RFC 7348, showed that it differs from the first text deixis. The most significant difference is in the use of the personal pronoun *you* and possessive *your*. There are only two sentences in the text where *you* and *your* are used, whereas there are twenty-six cases of them in the first text. The first example, taken from the beginning of the RFC, demonstrates deictic use of *your*, where the authors address the reader:

- *Please review these documents carefully, as they describe your rights and restrictions with respect to this document.*

The second example shows a non-deictic, empathetic (Grundy 2000) form of the deictic expression *you*, referring not to the reader but rather to the general possibility of the situation:

- *The VNI identifies the scope of the inner MAC frame originated by the individual VM. Thus, you could have overlapping MAC addresses across segments but...*

The personal pronoun *we*, as another example of person deixis, occurs in the text only once. It is inclusive *we*, which includes both the author and the reader:

- *To affect this, we need to have a mapping between the VxLAN VNI and the IP multicast group that it will use.*

Anaphoric use of the third-person pronoun *it* in RFC prevails as well as in the first text. Most of the cases demonstrate its non-deictic use when the pronoun refers to the same entity as the previous linguistic expression before:

- *This document is not an Internet Standards Track specification; it is published for informational purposes.*

- *...remote VTEP learns the mapping from inner source MAC to outer source IP address. It stores this mapping in...*

There are significantly fewer examples of "it" being used as discourse deixis. Below are two examples of *it* referring to the previous, as in the first utterance, or to the following, as in the second utterance, discourse:

- *Data centers are often required to host multiple tenants, each with their own isolated network domain. Since it is not economical to realize this with...*

- *To ensure end-to-end traffic delivery without fragmentation, it is RECOMMENDED that the MTUs (Maximum Transmission Units) across the physical network infrastructure be set to...*

As for the first text, there is no use of third-person pronouns as personal deixis in the RFC.

Temporal deixis is represented by two instances of *now*. Both refer to the coding time, so to the moment of time when the utterance was produced:

- *A physical server now has multiple Virtual Machines (VMs) each with...*

- *Instead of just one MAC address per server link, the ToR now has to learn the MAC addresses...*

Both examples above demonstrate pointing to the real-world situation that concerns the modern, in terms of the authors' time, server and virtual machine requirements. The distal term *then* in the following example, in turn, is not related to the real world. It is used for educational purposes and expresses exophora describing the sequence of steps in an imaginary situation:

- Consider a VM within a VxLAN overlay network. [...] The VTEP on the physical host looks up the VNI to which this VM is associated. It then determines if the destination MAC is on the same segment and...

Although there are many instances of demonstrative pronouns this and that, as well as several examples of adverbs of place here and there, all of them represent either discourse deixis or anaphora. Two sentences below show the discourse-deictic use of this, referring either to the whole RFC or pointing to the term discussed previously in the discourse:

- This document describes Virtual eXtensible Local Area Network...

- With VXLAN, a header including the VXLAN VNI is inserted at the beginning of the packet... [...]. However, this broadcast packet is sent out to the IP multicast group on which that VXLAN overlay network is realized.

The proximal adverb here is used not as spatial deixis again but either as anaphora, referring to the same object as the expression control scheme refers to, or as cataphora, anticipating the upcoming information:

- ...one type of control scheme -- data plane learning. Here, the association of VM's MAC to VTEP's IP address is discovered via...

- A side note here is that since each VTEP can...

5.3 Video analysis

First, let me emphasize again that all examples cited in this chapter, will keep the original grammar, punctuation and syntax.

The analysis of person deixis in the video lecture of Kevin Wallace showed a significant difference from the texts that were investigated before. The first distinctive feature of it is the use of the personal pronoun I, which was not used in the texts.

What is more interesting, five out of seven instances of I demonstrate deictic projection. At the beginning of the video, author uses the pronoun I to refer to himself. However, later in the lecture, he provides an example of a network topology with several network devices that communicate with each other using the VxLAN technology. In this educational example Kevin Wallace plays the role of one of the network devices speaking on its behalf:

- ...it's going to see that oh yeah this is destined for a different VNI i don't send it out of this port...

- ...and leaf switch one is going to make an entry in its table it says if i want to get to the...

Such a use of the personal pronoun illustrates a shift from the deictic center, the speaker, towards another inanimate object. The direct speech in this case represents the network device but not Kevin Wallace.

The same deictic projection can be noticed with the use of the personal pronoun you. Even though in most of the cases this pronoun is used to address the hearer, by you in the following sentence the author “speaks” with one of the network devices in his example topology:

- ...so it's going to respond to the other VTEP and say hey if you want to get to the...

The personal pronoun we is used considerably more often in the video than in the written texts. Most of the cases demonstrate inclusive we as in but we're going to consider in this example or but an issue we have is. However, there are also several examples of the empathetic use of we, when it refers to the more general term we, including not only the speaker and his audience but every possible user of the VxLAN technology:

- ...in today's networks where we might have a data center with lots of virtualization [...] we could easily run out of VLANs...

- ...we typically see this in data centers where we use...

Temporal deixis is mostly expressed by several examples of the adverb of time now. Each of the adverbs represents the receiving time, the time when the hearer gets to the specific moment in the video:

- ... now you might be wondering do we have to have a multicast group for each VNI and...

Besides the adverb now, there are two more deictic expressions, which represent the coding time. The video lecture is accessible on YouTube where each video has the date when it was uploaded. Hence, we are able to recognize the day and week to which Kevin refers saying in this week's video. The second utterance represents rather contemporariness in general than a specific given date. However, it still refers to the coding period of time when the utterance was created:

- this is Kevin and in this week's video we're going to take a look at...

- ...it's going to give us just over 4 thousand VLANs but in today's networks where we might have a data center...

Unlike the texts analyzed before, this video lecture includes many examples of spatial deixis. There are also several instances of discourse deixis.

The first two utterances can demonstrate the use of this and that as spatial deixis. In the first sentence, Kevin Wallace introduces himself to the audience. In the second, he asks to click on the button to subscribe. In both examples, reference generated by these deictic expressions is very clear. Just from the context, we know that this refers to someone who is speaking at that moment and that means the button under the video on the current web page:

- *welcome back to the channel everybody this is Kevin and...*
- *...please do me a favor click that like button and subscribe...*

The following examples, however, demonstrate the discourse deixis, where the lecturer refers to the situation in the topology that he is describing:

- *...we just sent broadcast traffic into this leaf switch one...*
- *...to create a totally different topology and that's our overlay network...*

The most common adverbs of place here and there also occur in the video. Again, they refer to the situation in the network topology:

- *...here we see twelve different switches...*
- *...leaf switch three it's gonna send that traffic over there and...*

5.4 Conclusion – deixis

The main goal of this chapter was to investigate the deictic expressions used in the web article, RFC, and video lecture. The analysis helped to compare the number of cases when the deictic expressions are used deictically and when non-deictically.

The following table demonstrates this comparison.

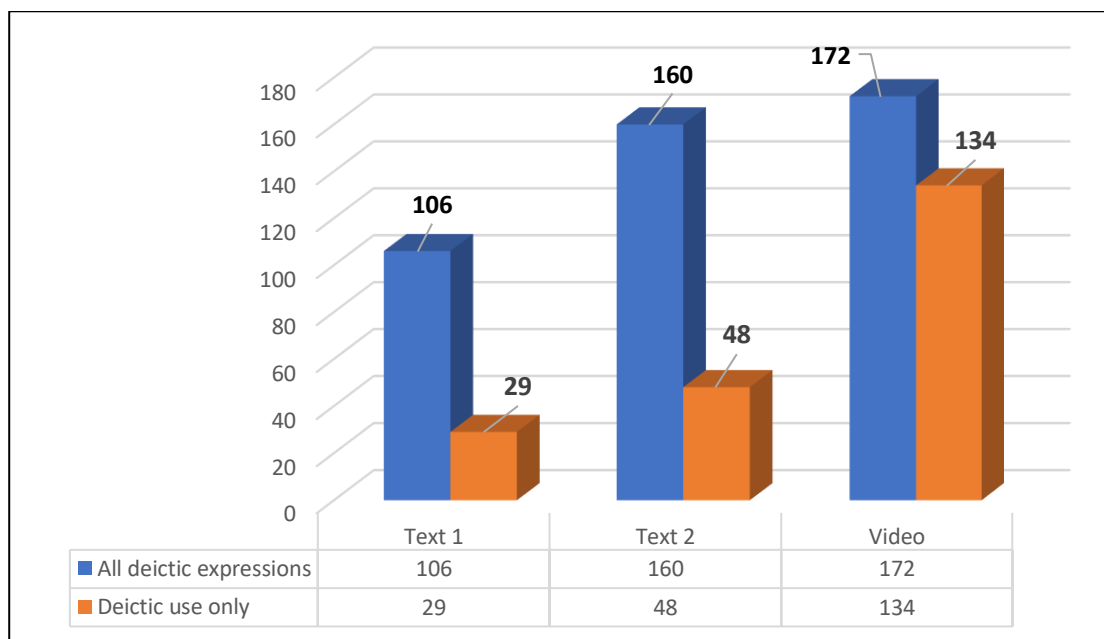


Figure 1. The amount of all deictic expressions in comparison with their deictic use

The chart above demonstrates that only about one-third of all deictic expressions found in the article and RFC are used deictically. The main reason for such a difference lies in the use of the spatial deictic forms *this* and *that*. Unlike in the video lecture, they mostly represent anaphora that points back to the same object as the previous linguistic expression. In Kevin Wallace’s video, in turn, the demonstratives *this* and *that* are often used as a “real” spatial or discourse deixis.

Depending on the genre or style of the materials, the use of types of deixis also differs. For example, the RFC does not have many instances of personal pronouns *we* and *you/your*. The web article and video, in turn, include many examples of these pronouns, which can be explained by the stylistic choice and functions of the languages. In terms of spatial deixis, the demonstrative *that* hardly ever occurs in the texts. For pointing, another demonstrative, *this*, is used more often. Temporal deixis shows the prevalent use of *now* as an identifier of the relevant time of the utterance, illustrating either coding or receiving time.

6 Conclusion

The aim of this work was to perform a comparative linguistic analysis of the web journal article, the Request for Comments (RFC) 7348, and the video lecture of Kevin Wallace. All the materials are about the VxLAN technology, a computer network topic, and include the basic description and explanation of the technology.

Following the main goal of the work, the analysis of similarities and differences of the materials, I investigated them from the point of view of several discourse features. The focus of the analysis was on the functions of language, style and genre, cohesion and coherence, and deixis.

The results of the analysis show that all the texts, written and spoken, have some common and distinct features.

The article, the RFC, and the video all transmit the knowledge. This defines their primary language function – referential. However, they differ in the secondary functions. While the article and the video lecture try to establish a dialogue with their audience and demonstrate phatic function, the RFC rather insists on the use of the instruction included in the document, which provides an example of the conative function. Such difference can be explained by the authors' way to convey the information. However, genre and style have probably greater influence in this situation.

The RFC is technical documentation and sets as its main goal to provide as much information as possible. What is important, it serves professionals, which makes the target audience smaller. This also affects the style of the RFC – scientific or academic scientific prose. Among its main features are impersonality, objectiveness, dense terminology, complex syntax and others.

An additional goal of the paper was to analyze whether the texts are typical representatives of their style and genre. It should be mentioned that RFC 7348 can be considered a typical example of the scientific style. The web journal article and the video lecture, in turn, have a combination of both the technical scientific style and the popular scientific style. They have a different approach to the audience as they try to establish a closer relationship with the reader/hearer and make the understanding of the material easier. There are examples of personal appeals and dialogue with the audience, phrasal verbs, rhetorical questions, simpler grammar, shorter sentences and other aspects typical of the popular scientific style. However, the most interesting feature of these materials is the lack of explanation for some of the discourse specific technical terms. Some background

knowledge is expected from the readers, which limits the target audience and focuses rather on professionals or someone who already has some insight into the topic. Thus, it can be concluded that the article and the video lecture cannot be considered typical examples of the popular scientific style.

Cohesion and coherence analysis also demonstrated the presence of common as well as distinct features of the materials. The most used cohesive devices are reference and lexical cohesion represented by reiteration. The cohesive ties and chains are almost of the same length regardless of the type of text. The exception is the video lecture, in which the cohesive chains are slightly longer. The article and the video lecture, as examples of the popular scientific style, showed frequent use of personal pronouns and questions to the audience. The RFC, in turn, is distinguishable in its thematic progression structure, where significantly more complex theme-rheme patterns are used. This can make the process of reading more difficult and time-consuming.

Speaking about cohesion, a specific role of intonation in the video lecture should be mentioned. The syntax structure in the spoken language is not strictly defined, which removes the boundaries between the sentences. Intonation helps to divide the speech into logical units and structure the conveyed information.

Coherence is an inseparable feature of all the materials, provided by the structure of the texts, their internal logic, graphical demonstration, intonation and other linguistic tools.

The analysis of deixis showed that most of the deictic expressions in Kevin Wallace's video are used in a deictic way. This is mostly achieved by the spatial deixis (demonstratives *this* and *that*) and can be explained by the necessity to point to specific objects in the animation that accompanies Kevin's explanation throughout the whole video. The article and the RFC, in turn, have only one-third of all deictic expressions used deictically.

Analogically, the popular scientific article and the video lecture have a similar rate of use of personal deixis (personal pronouns *you*), which indicated a desire to establish contact with the audience.

To summarize, it can be said that the aim and goals of the work were achieved, and the results correspond with the thesis's expectations. The analysis's outcome allows to describe the common and different aspects of the discourse features of the materials and to draw a conclusion about their potential to be the typical examples of their styles and genres.

Rozšířený Abstrakt

Tato bakalářská práce se zabývá srovnávací analýzou odborných textů z oblasti informatiky. Jako téma pro materiály byla zvolena technologie VxLAN. VxLAN je protokol nejčastěji používaný v datových centrech. Tento protokol umožňuje virtualizaci sítí a poskytuje velmi důležitou vlastnost pro moderní cloudové technologie - škálovatelnost.

První text byl nalezen ve webovém časopisu PCWDL.com, který poskytuje svým čtenářům různé články, návody, pokyny a doporučení k softwaru a IT technologiím. Článek, který byl zvolen pro analýzu popisuje základy technologie VxLAN a poskytuje přehled jejích hlavních prvků.

Druhým textem je RFC - Request for Comments, což je dokument, který poskytuje popis nebo instrukce k protokolům, programům, technologiím a jejich technickým principům a aspektům.

Jako další materiál pro analýzu bylo zvoleno video na YouTube, jelikož umožňuje porovnat rysy psaného a mluveného jazyka. Video přednáška z YouTube je dostupná na kanálu *Kevin Wallace Training, LLC*. Autorem kanálu je Kevin Wallace, certifikovaný Cisco instruktor, a jeho kanál zahrnuje nejrůznější videokurzy o networkingu.

Hlavním cílem této práce je prozkoumat texty, psané i mluvené, z různých pohledů a určit, do jaké míry se vybrané texty liší v použití jazyka a jaké jsou jejich společné rysy. K dosažení tohoto cíle jsou materiály zkoumány z hlediska několika diskurzivních rysů, mezi které patří funkce jazyka, styl a žánr, koheze, koherence a deixis. Druhým úkolem této práce je zjistit, zda jsou analyzované materiály typické pro své žánry a styly.

První kapitola je zaměřena na popis funkcí jazyka použitého v materiálech. Analýza je založena na dvou taxonomiích. První vytvořil rusko-americký lingvista Roman Jakobson (1960). Jeho model je založen na 6 různých aspektech komunikace a identifikuje 6 jazykových funkcí: referenční, expresivní, konativní, fatickou, poetickou a metalingvistickou. Druhý přístup definoval britský lingvista Michael Halliday (1995), který měl mírně odlišný pohled a chápal funkce jako významy (*meanings*). Z tohoto hlediska jazykové funkce neboli významy zahrnují čtyři typy: interpersonální, logickou, textovou a spojenou se zkušenostmi.

Z výsledků vyplývá, že všechny materiály mají z pohledu obou modelů jak společné, tak i odlišné vlastnosti. Například jednou z vlastností, která spojuje článek z časopisu, RFC a video přednášku, je jejich hlavní funkce - přenos informací. Sekundární funkcí článku a videa je přitom fatická, což se liší od sekundární funkce RFC, která je konativní. Je to dáno

snahou autorů vytvářet dialog se svým publikem a být na stejné úrovni se čtenářem či posluchačem. Tento přístup se projevuje používáním velkého množství osobních zájmen, řečnických otázek, frázových sloves a dalších jazykových prostředků.

Analýza stylů a žánrů textů a videa je založena na výzkumech takových autorů jako Biber (2009), Krhutová (2009), Urbanová (2002), Galperin (1977) či Knitlová (1977). Na základě získaných výsledků stojí za zmínku, že RFC je snad jediným příkladem čistého stylu, tedy takového, v němž se nevyskytují kombinace různých stylů. Tento text se vyznačuje velkým množstvím odborných termínů, složitější syntaktickou konstrukcí, absencí osobních zájmen a dalšími vlastnostmi, které jsou typické pro odborný styl. Už sám název dokumentu, který je dlouhou složitou větou s několika odbornými výrazy, nám signalizuje, že se jedná o odborný styl. Článek z webového časopisu a video přednáška jsou si naopak podobné v tom, že kombinují jak populárně naučný styl, tak i ten technicky odborný. Zřetelně v nich však převládají rysy populárně naučného stylu. Hlavní charakteristikou článku a videa jsou jednodušší syntaktické konstrukce, velké množství frázových sloves, zkratek a jiné. Rysem odborného stylu, vnořeném do stylu populárně naučného, je nedostatek vysvětlení základních pojmů. Autoři předpokládají, že jejich publikum má základní vědomosti o daném tématu. Toto zmenšuje počet potenciálních čtenářů/posluchačů a nutí je nejprve získat potřebné znalosti. V tomto ohledu lze konstatovat, že webový článek a video přednáška nejsou typickými představiteli jediného stylu.

Další analýza, která je uvedena ve čtvrté kapitole, popisuje shody a rozdíly zkoumaných materiálů z hlediska koheze a koherence. Podle výsledků je vidět, že koherence je nedílnou součástí textů i video přednášky. Toho je dosaženo nejen přístupem autorů k prezentaci informací a strukturou materiálů samotných, ale také kohezí. Kapitola obsahuje analýzu strukturální (Campbell 1991) a nestrukturální (Halliday & Hasan 1976) koheze. Druhá jmenovaná zahrnuje lexikální a gramatickou kohezi.

Výsledky analýzy ukazují, že nejčastěji používanou kategorií kohezních prostředků jsou reference, typ gramatické koheze, a reiterace, typ lexikální koheze. Znatelné je velké množství případů použití exofory v časopisovém článku a video přednášce, což je projevem stylu a žánru těchto materiálů. RFC má také svůj charakteristický rys – mnohem složitější posloupnosti tématické progrese. Svě zvláštní charakteristiky má i mluvený jazyk autora videa. Vzhledem k tomu, že hranice vět v řeči nejsou přesně stanoveny, intonace nabývá na významu. Intonace dokáže nejen rozdělit tok informací na logicky smysluplné části, ale také dát nové významy některým kohezním prvkům, jako například *now*. Slovo *now*, zdůrazněné

intonací, vymezuje hranice diskurzu. Naopak, v nepřízvučné pozici *now* označuje spíše časovou deixi.

Pátá kapitola popisuje čtyři typy deixe nalezené v materiálech: personální, prostorovou, časovou a kontextovou. Poměrně velké množství příkladů deiktických výrazů představuje kontextovou deixi, označující předchozí nebo následující část textu nebo řeči. Článek v časopise a video přednáška vykazují podobné rysy z hlediska použití personální deixe (pomocí zájmen *you* nebo *we*). RFC se od ostatních materiálů liší tím, že téměř neobsahuje personální deixi. Nejčastěji se v tomto textu používá kontextová deixe. Nejnápadnějším rysem odhaleným v průběhu analýzy je poměr všech deiktických výrazů a skutečné deixe. Téměř všechny deiktické výrazy ve video přednášce jsou používány jako deixe, avšak většina takových výrazů v článku z časopisu a RFC je buď anaforou, nebo odkazem na obecnou situaci. Grundy (2000) pojmenoval takovéto obecné situace „*empathetic use of deixis*“.

Bakalářská práce ukazuje, že i když účel a téma komunikace mohou být stejné, existují různé způsoby, jak předávat informace. Tato práce porovnává tyto způsoby a pomáhá pochopit, v čem se liší a jaké mají jedinečné vlastnosti. Snad nejsilnější vliv na proces předávání znalostí a zkušeností má volba stylu a žánru, které ovlivňují nejen obecnou a syntaktickou strukturu textu, psaného nebo mluveného, ale také volbu konkrétních lingvistických prostředků. Samozřejmě by se nemělo zapomínat na preference autora ohledně způsobu prezentace informací. Vliv mohou mít osobní zkušenosti a zvyky autora nebo některé vnější okolnosti.

Výsledky analýzy ukazují, že nejvíce podobností ve zkoumaných rysech vykazují článek z webového časopisu a video přednáška na YouTube. Materiály se podobají nejen svými hlavními funkcemi či stylem, ale také použitím koheze a deixe. Není je však možné považovat je za typické příklady jejich stylu. Demonstrují spíše kombinaci populárně naučného stylu a odborného stylu. Za nejtypičtější pro svůj styl lze považovat technickou dokumentaci RFC 7348, která má hlavní rysy odborného stylu.

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