BRNO UNIVERSITY OF TECHNOLOGY

FACULTY OF ELECTRICAL ENGINEERING AND COMMUNICATION

DEPARTMENT OF FOREIGN LANGUAGES

AMBIGUITY, VAGUENESS, FUZZINESS IN TECHNICAL/SCIENTIFIC TEXTS

DVOJZNAČNOST, VÁGNOST, NEURČITOST V TECHNICKÝCH/VĚDECKÝCH TEXTECH

BACHELOR'S THESIS
BAKALÁŘSKÁ PRÁCE

AUTHOR **Dominik Šafránek**
AUTOR PRÁCE

SUPERVISOR **Mgr. Agata Walek**
VEDOUCÍ PRÁCE

BRNO 2021

Bakalářská práce

bakalářský studijní obor **Angličtina v elektrotechnice a informatice**

Ústav jazyků

Student: Dominik Šafránek   **ID:** 203162
Ročník: 3   **Akademický rok:** 2020/21

NÁZEV TÉMATU:

Dvojznačnost, vágnost, neurčitost v technických/vědeckých textech

POKYNY PRO VYPRACOVÁNÍ:

- Jaká je definice všech termínů a jaký je mezi nimi rozdíl? Uveďte příklady.

- Jaké jsou typy dvojznačnosti? Jak je překládat?

- Co napomáhá k eliminaci daných jevů? Je to vždy kontext?

- Jsou v technických/vědeckých textech tyto jevy nežádoucí?

- Jak často se tyto jevy v daných textech vyskytují a proč byly použity?

DOPORUČENÁ LITERATURA:

Cruse, Alan. 2011. Meaning in Language. Oxford: Oxford UP.

Krifka, M. 2002. "Be brief and vague! And how bidirectional optimality theory allows for Verbosity and Precision." In Sounds and Systems. Studies in Structure and Change. A Festschrift for Theo Vennemann, ed. David Restle and Dietmar Zaefferer, 439-58. Berlin: Nounton de Gruyter.

Malková, Eva. 2011. Ambiguity in Translation. MA Diss, Palacký University.

Zhang, Qiao. 1998. "Fuzziness – Vagueness – Generality – Ambiguity." Journal of Pragmatics 29: 13-31.

Termín zadání: 31.1.2021   **Termín odevzdání:** 31.5.2021

Vedoucí práce: Mgr. Agata Walek

doc. PhDr. Milena Krhutová, Ph.D.
předseda oborové rady

Prohlášení

Prohlašuji, že svoji bakalářskou práci na téma *Ambiguity, Vagueness, Fuzziness in Technical/Scientific Texts* jsem vypracoval samostatně pod vedením vedoucího bakalářské práce a s použitím odborné literatury a dalších informačních zdrojů, které jsou všechny citovány v práci a uvedeny v seznamu literatury na konci práce.

Jako autor uvedené bakalářské práce dále prohlašuji, že v souvislosti s vytvořením této práce jsem neporušil autorská práva třetích osob, zejména jsem nezasáhl nedovoleným způsobem do cizích autorských práv osobnostních a/nebo majetkových a jsem si plně vědom následků porušení ustanovení § 11 a následujících zákona č. 121/2000 Sb., o právu autorském, o právech souvisejících s právem autorským a o změně některých zákonů (autorský zákon), ve znění pozdějších předpisů, včetně možných trestněprávních důsledků vyplývajících z ustanovení části druhé, hlavy VI. díl 4 Trestního zákoníku č. 40/2009 Sb.

V Brně dne ....

Dominik Šafránek

Abstract

Ambiguity, vagueness, and fuzziness are essential tools of our language. Many papers have been published on this topic, but there still are difficulties with distinction between these cases. In this paper, I will give you definitions of these terms, and demonstrate them on examples, as well as provide syntactic tests to distinguish them. Fuzziness differs from ambiguity and vagueness, as it does not imply two or more meanings, but it has no clear-cut referential boundary, and cannot be resolved by giving a context, i.e., by clarifying the intended meaning. On the other hand, ambiguous expressions differ from vague expressions in that, they have two or more meanings that are not semantically related, but the vague expressions imply two or more meanings whose senses are closely – semantically – related. Ambiguity and vagueness both can be contextually resolved, i.e., unintended meanings can be eliminated. Although ambiguity, vagueness, and fuzziness imply uncertainty in our language, they are used in scientific and technical texts. I will show you a part of a scientific research on *'Inhibitory effects of different hand sanitizers against the resident microflora of skin'* and analyse the text, looking for ambiguous, vague or fuzzy expressions and their interference in the context and I will suggest solutions to reduce or avoid uncertainty in the text.

Klíčová slova: dvojznačnost, vágnost, neurčitost, nejistota

Abstrakt

Dvojznačnost, vágnost a neurčitost jsou základními nástroji našeho jazyka. Mnoho prací bylo publikováno na toto téma, ale stále se setkáváme s problémy s rozlišováním mezi těmito případy. V této práci Vám poskytnu definice těchto termínů a ukážu je na příkladech, stejně tak na syntaktických testech sloužících k jejich rozlišení. Neurčitost se odlišuje od dvojznačnosti a vágnosti tím, že neimplikuje dva nebo více významů, ale neobsahuje žádnou jednoznačnou referenční hranici a nemůže být vyjasněna dáním kontextu, tj. vyjasněním zamýšleného významu. Na druhou stranu dvojznačné výrazy se liší od těch vágních tím, že obsahují dva nebo více významů, které spolu nesouvisejí sémanticky, ale vágní výrazy implikují dva nebo více významů, jejichž smysly spolu úzce – sémanticky – souvisejí. Dvojznačnost a vágnost mohou být vyjasněny dáním kontextu, tj. nezamýšlené významy mohou být eliminovány. Ačkoli dvojznačnost, vágnost a neurčitost v našem jazyce implikují nejistotu, ve vědeckých a technických textech jsou využívány. Ukážu Vám úryvek z vědeckého výzkumu s názvem *'Inhibitory effects of different hand sanitizers against the resident microflora of skin'* a daný text zanalyzuji a budu hledat dvojznačné, vágní nebo neurčité výrazy a jejich zásah do kontextu a navrhnu řešení, jak nejistotu v textu snížit nebo se ji vyhnout.

Key words: ambiguity, vagueness, fuzziness, uncertainty

Table of content

1. Introduction

Ambiguity, vagueness, and fuzziness are essential in our language, although many people can have difficulties to distinguish them. We encounter these tools of language every day in regular speech, but very little attention is paid towards them, moreover they are usually not even registered. After first look at these terms, one could think of them as a manipulative language, but they also could be used for grasping attention or encouraging thinking. In literature it is used to evoke mystery or apply humour, as well as in politics or mass media to mislead or provoke. Among young people it is vastly used as a type of humour, called *'pun'*, which uses words that have two or more similar meanings or exploit similar sounding words that have different meanings, e.g., "*It takes a big man to admit when they are wrong, but it takes an even bigger man to give a giraffe a haircut*" (Ryan Knox, twitter.com, @RyannKnox).

In this paper, we will look into these terms being used in technical and scientific texts. Generally speaking, the more of these terms are used, the less formal text becomes, but formality is one of the main aspects of technical and scientific texts. On top of that, technical and scientific texts are based on precise facts. However, ambiguity, vagueness, and fuzziness still occur in these texts and the level of uncertainty is dependent on the author and his use of these cases.

It is essential to understand the distinction between ambiguity, vagueness, and fuzziness to be able to point them out in the text. Although a lot of papers have been published on this topic, it can be very difficult. I find it crucial to obtain a lot of examples for every case and compare them within the category, as well as with examples of other cases, to fully understand the aspects, which distinguish the particular cases. Many methods for distinction for every case can be found and applied. Simply put, ambiguity is a play of words, in which a particular word or words can have two or more meanings, that are semantically unrelated; vagueness has a feature called 'a borderline case' and is characterized by having two or more meanings, that are closely – semantically – related; and fuzziness lacks a clear-cut referential boundary and can be derived from 'Fuzzy logic' by L. A. Zadeh, dealing with partial truth, that has no logical principle. But to be able to really define all the aspects, in-depth definitions are necessary.

2. Definitions

Ambiguity, vagueness, and fuzziness can be defined as follows.

2.1. Ambiguity

Ambiguous expressions are expressions that have more than one semantically unrelated meanings. From ambiguity arises uncertainty. According to Cambridge Dictionary, ambiguity is *"a situation in which something has more than one possible meaning and may therefore cause confusion."* Such situation occurs in often used statement: *"Flying planes can be dangerous."*

The statement is ambiguous, because the expression 'flying planes' has two unrelated meanings: *'planes that fly'* and *'piloting planes'*. However, ambiguity is not merely the absence of certainty, but two or more possible meanings can be presented. A good example is a joke made by English comedian Tim Vine: *"You know, somebody actually complimented me on my driving today. They left a note on the windscreen; it said, 'Parking Fine.' So that was nice."* In literature ambiguity is used on purpose for readers to experience mystery or feelings, but also to lighten the atmosphere with humour. Ambiguity has two elemental linguistic forms:

> 1. Lexical ambiguity
> 2. Syntactic ambiguity

1. Lexical ambiguity presents two or more possible meanings within a single word. For example: *"He showed me the crown."* The word 'crown' has multiple meanings: *'crown that belongs to a king'*; *'a Czech coin'*; *'a treetop'*. These meanings are semantically unrelated and are dependent on the context.

Other examples of lexical ambiguity:

- *The fisherman went to a bank.*

By 'bank' we could mean *'a financial institution'* or *'edge of a river'*.

- *"I have a really nice stepladder. Sadly, I never knew my real ladder." (English comedian Harry Hill)*

This joke is based on the word *'step'*, that is used in compound with ladder, but we can also use this word in compound with father or mother, implying that they are not your real parent.

- *I bought herbs from the apothecary.*

In this sentence, we do not know if one spoke to the pharmacist or went to the pharmacy.

Another example would be applying various prefixes and suffixes to create ambiguous expressions. For instance, the word 'unlockable' could mean *'capable of being unlocked'* or *'impossible to lock'*.

2. Syntactic ambiguity presents two or more possible meanings within a sentence or phrase. For example: *"She saw him with a telescope."* In this case we cannot be certain if she used the telescope to see him, or he was holding a telescope. Again, the meaning is dependent on the context.

Other examples of syntactic ambiguity:

- *I saw her duck.*

This sentence could be understood as *'she owns a duck'* (the noun *'duck'* is modified by the possessive pronoun *'her'*) or *'she lowered her body'* (the verb *'duck'* and the subject *'her'*).

- *He ate the cookies on the couch.*

In this sentence, we do not know if *'the cookies were on the couch'*, as opposed to those that were on the table, or *'he was sitting on the couch while eating them'*.

- *Look at that dog with one eye.*

This sentence could be understood as *'the dog has only one eye'* or *'I am supposed to close one eye and look at that dog'*.

- *That girl is smokin'.*

This expression is an example of a slang. It can have two meanings, *'she is very attractive'* or *'she is smoking a cigarette'*.

When dealing with ambiguity, a context is very important. To give context in texts and speeches, 'context clues' can be used. Context clues are a set of words or even the whole sentence that provides further information about a word or phrase and help us to understand the meaning better. When we look back at the example *"that girl is smoking"* and add *"that is not good for her health"*, we can easily clarify the intended meaning.

2.2. Vagueness

It is widely agreed that an expression is vague if it has 'borderline cases'. Francis Jeffry Pelletier and István Berkeley (1999) of University of Alberta stated in their Cambridge Dictionary of Philosophy , that 'borderline cases' are completely determinate situations in which we cannot clarify whether the vague term applies to a certain object or not. In the vast majority of cases,

we can talk about the unknowability of a borderline statement, for it is only connected to certain means of solving the problem (Sorensen 2001, chapter 1). According to Stanford Encyclopaedia of Philosophy, when you meet a person and you cannot tell if he is obese or not by just looking at him, he may count as a borderline case of 'obese'. But you can calculate his body mass index by dividing his weight (in kilograms) by the square of his height (in meters). If the value is bigger than 30, he is count as obese. But this calculation does not take the fat to muscle ratio into account, therefore leaving us with another borderline cases of 'obese'. There are many other formulas, charts and ways of physical examinations to determine whether you are obese, or not. We can only talk about an absolute borderline case of 'obese' if there is no way of solving the problem.

On the other hand, Zhang (1998) defines vagueness in her paper 'Fuzziness --- Vagueness --- Generality --- Ambiguity' as an expression, that has two or more meanings, whose interpretations express closely related concepts. For example, 'good' can have various meanings whose senses are closely related. ''That is a good hammer'' means 'useful' or 'functional', ''She is a good student'' means 'exemplary', ''This is a good soup'' means 'tasteful', ''He is a good person'' means 'moral' or 'righteous', thus a sentence ''I have a good daughter'' does not clarify in what sense the word 'good' is used.

Vagueness can also be defined as being imprecise or unclear. Although it often occurs unintentionally, it can also be a part of a rhetorical strategy to avoid providing with exact information or dealing with an issue. For example: *''We should raise taxes on the wealthy''* could be considered vague, because we do not know, if wealthy means those who earn a certain amount a month and what the amount is, or those who already own a certain amount and what the amount is. Another example would be: *''We promise to take all appropriate steps and find a fair solution.''* In this sentence, we do not know what the appropriate steps are or how many steps there are, meaning, that even though it is stated *''we promise''*, we do not know what we are promised. The same applies to the *''fair solution''*. We do not know what the fair solution would be and for whom.

As well as ambiguity, vagueness also carries more meanings, thus can leave one with confusion. The difference between ambiguity and vagueness is a matter of whether two or more meanings of the given expression are distinct – semantically unrelated (ambiguous), or united as related subcases of a common, more general meaning (vague). As an example of ambiguity, we can use the word 'bank', that could mean *'financial institution'* or *'edge of a river'*, where these two meanings are intuitively distinct. As an example of vagueness, we can use the word *'aunt'*,

that could be *'a father's sister'* or *'a mother's sister'*, but these two meanings are intuitively united into one meaning *'a parent's sister'*.

Another example of vagueness:

- *I have read his book.*

This sentence is vague, because it has at least two semantically related meanings: *'a book he owns'* or *'a book he has written'*.

From vagueness, the 'sorites paradox' is derived, also known as the paradox of the heap ('sorites' derives from the Greek word for 'heap'). We have a heap of sand. If we remove one grain, we still have a heap of sand, meaning removing a single grain does not turn a heap into a non-heap. If we repeat it enough times until one grain of sand is left, we still have a heap, because we cannot determine when it turns from a heap into a non-heap. We can also describe it using premises:

> Premise 1: *1,000,000 grains is a heap*
>
> Premise 2: *a heap of sand minus one grain is still a heap*

We repeat the application of Premise 2, each time with one fewer grain, until we are left with the conclusion that one grain is still a heap.

> *1,000,000 grains is a heap.*
>
> *A heap of sand minus one grain is still a heap. So, 999,999 grains is still a heap.*
> *999,999 grains is a heap.*
>
> *A heap of sand minus one grain is still a heap. So, 999,998 grains is still a heap.*
> *...*
> *So, 1 grain is still a heap.*

In language, vagueness could be avoided the same way as ambiguity - by clarifying the intended meaning, i.e., referring to a context.

2.3. Fuzziness

The word 'fuzzy' is derived from mathematics and used by linguists to describe uncertainty and inaccuracy in language. In 1965 Lotfi Asker Zadeh published his work 'Fuzzy sets'. It is based on generalization of mathematical concepts. Along with this theory, Zadeh also introduced 'Fuzzy logic', that focuses on the concept of partial truth. In comparison, Boolean logic operates only with two truth values 0 or 1, but Fuzzy logic operates with the true values of variables that can be any real number between 0 and 1, but there is not any logic for absolute true or false.

For example, someone asks a question: *"Is it cold outside?"* In Boolean logic, we have only two answers: *"Yes" (1)* or *"No" (0)*, but in Fuzzy logic we have a theoretically infinite number of answers: *"Very much" (0.9)*; *"Quite" (0.7)*; *"Little" (0.25)*. This raises a question whether an answer *"Not that much"* is between *"Very much"* and *"Quite"* or below *"Quite"*.

According to Zhang (1998), fuzzy expression is defined as an expression that has no clear-cut referential boundary, meaning we cannot determine a degree of truth of the expression. Using the same example as Zhang, when we say *"around two o'clock"*, the applicability of the word 'around' cannot be determined exactly. We can then ask how close to two o'clock 'around' is and get different answers, for example 2:05 or 2:15, where 2:05 is more 'of *around two o'clock*' than 2:15, i.e., 2:05 has a higher degree of truth.

Fuzziness of an expression depends on context and individuals, that give you imprecise and non-numerical answers based on their own decision. Such decision is based on a common knowledge, as well as individual's own experience, and, to some extent, feelings. For instance, a 45-year-old man can be viewed as old by a 20-year-old girl, however in the eye of 80 years old man, he can be considered young (decision of individuals). That same 45 years old man can be considered old for cross-country skiing (as the peak performance is around the age of 30), but in an academic field this age is still young (based on context). Therefore, we simply cannot do with only two absolute answers *"old" (1)* and *"young" (0)* for the question *"Is 45 old age?"* It moves us to tools which give 'fuzziness' to language: *'somewhat', 'rather', 'quite', 'about', etc.* For example, *'about 20 students'* again depends on individuals. For some people, the range of *'about 20'* could be between 15 to 25, but other people might disagree that 15 students is not *'about 20'*. When you are asked to buy *'about 10 baked rolls'*, most people would buy exactly 10 baked rolls, but we cannot logically conclude whether we satisfy the requirement more, than when we would buy 8 or 12 baked rolls.

Another examples of fuzziness:

- *It is quite cold outside.*

In this sentence, fuzziness is expressed through the word 'quite'. When we ask someone *"what is the weather like outside?"* and we are given such imprecise answer, we actually learnt nothing about the weather. In such situation it depends what season of the year it is. If it is winter, then *quite cold* could be a pleasing answer, but if it is summer, then we would most probably be disappointed. On top of that, it also depends on who the answer comes from. For some people 'quite cold' could mean, that they have to wear a jacket, but other people would

be satisfied by a sweatshirt.

- *She is rather happy.*

In this sentence, fuzziness is expressed through the word 'rather'. In this case we can say that the producer of the statement is uncertain, if she is happy or not, but he thinks she is more happy than unhappy. But it leaves us with uncertainty if the producer really guessed it based on his own intuition, or actually knows it. We can then ask ourselves *"How much is 'rather'?"*; we cannot get an exact answer.

- *My tea is still hot.*

This sentence is fuzzy, because we do not know, what temperature the tea has. Also, we cannot determine how hot is hot. The tea could be around 90 degrees of Celsius, thus we could scald our mouth when we drink it, but also it could mean it has around 40 degrees of Celsius and we are able to drink it without scalding our mouth, but we simply prefer not to, because we prefer a room temperature of a tea to drink it. However, in both cases we can speak of indeterminate referential boundary of 'hot'.

Fuzziness, as opposed to ambiguity and vagueness, cannot be avoided by giving a context alone, as it is more connected to our own judgement. And as Zhang stated: *"The reason is that it is difficult for human beings to reach an agreement on the referential applicability of fuzzy expressions."* (1998: 16)

3. Distinction

As I stated above, it can be very difficult to completely grasp the difference between ambiguity, vagueness, and fuzziness. Although many examples for each of the cases were presented, uncertainty in distinction could still be prevalent among many people. To be able to fully distinguish ambiguity, vagueness, and fuzziness from one another, there are several semantic, syntactic, and pragmatic tests proposed by Zhang (1998).

3.1. Semantic tests

In this section, we will focus on meaning of phrases and its relations.

3.1.1. One or more than one meaning

Ambiguous expressions have two or more semantically unrelated meanings. As a result, we can find more than one translation in a dictionary. For example, the Czech word 'kolo' could be translated as 'wheel', 'lap', or 'bike'. Thus, according to the Czech Language Institute of the Czech Academy of Science, we can find more than one definition of the Czech word 'kolo' that are semantically unrelated.

Contrariwise, vague expressions have two or more meanings, whose interpretations express closely related concepts. For instance, the English word 'walk' can be translated into Czech differently, depending on the context. *'Walk a dog'* could be translated as *'vyvenčit psa'*; *'walk a friend out'* could be translated as *'vyprovodit kamaráda'*; *'take a walk'* could be translated as *'projít se'*; etc. Although the word 'walk' is translated differently in these sentences, it still refers to an activity that involves walking.

Finally, fuzzy expressions have only one meaning. For example, the Czech word 'horký' can be translated as 'hot' and have only one interpretation: 'having a high temperature'.

3.1.2. Referential or non-referential

As Zhang stated, fuzziness has a distinctive feature, that distinguishes it from ambiguity and vagueness, and that is the lack of a clear-cut referential boundary. For example, 'hot' is defined by Cambridge Dictionary as 'having a high temperature'. Fuzziness arises, as we start looking for its reference. There are many non-linguistic factors, that we must follow in order to determine whether a certain entity belongs to a semantic domain denoted by 'hot'. We can ask a question "Is 40 degrees of Celsius hot?" but we cannot simply determine if the answer is "yes" or "no". The answer depends on various circumstances, e.g., are we talking about a weather or baking. When talking about the weather, 40 degrees of Celsius is definitely considered hot,

even during the summer, while in baking, 40 degrees is not considered hot, as most of the recipes state temperatures around 180 degrees of Celsius.

In contrast, ambiguous and vague expressions do not raise uncertainty, while talking about semantic reference, as opposed to relations between various interpretations of such expressions. An ambiguous word 'bank' refers to two interpretations that are semantically unrelated, 'a financial institution', or 'an edge of a river', but we do not focus on referential boundary, that would define if a bank were a bank. A vague expression 'John's book' refers to two possible, closely related interpretations: 'a book John owns' or 'a book John has written'. When vagueness is concerned, clear-cut referential boundary is negligible. However, if we talk about fuzziness, we will have to determine a clear-cut referential boundary of the expression 'John's book'. In the case of 'a book John owns', we would have to find out, if he bought it by himself, or he put money together with his friends and they bought the book together. Thus, we would not know how much of the book John really owns.

3.2. Syntactic tests

In this section, we will focus on language properties of ambiguity, vagueness, and fuzziness.

3.2.1. The identity test

This test observes, if two conjuncts contain identical sense, i.e., are compatible in a sentence.

(1) I went to a bank; so did Mary.
(2) I have eaten; so did Mary.
(3) I am tall; so is Mary.

The sentence (1) means: *'I went to a riverside; Mary went to a riverside, too'* or *'I went to a financial institution; Mary went to a financial institution, too'*, but it certainly does not mean *'I went to a riverside; Mary went to a financial institution'*. The reason is that these two senses of the ambiguous word 'bank' are not semantically related, i.e., they are incompatible, thus they cannot be used in the same sentence.

The sentence (2) is vague, because it could mean *'I have eaten some chicken; Mary has eaten some pork'*, where both *eaten some chicken* and *eaten some pork* are both semantically related, i.e., they are compatible.

The sentence (3) could mean *'I am 1.9 meters in height; Mary is 1.8 meters in height'* where both parameters are implied by the fuzzy word 'tall', thus they are compatible.

In this test, we can see that ambiguity differs from vagueness and fuzziness, as the ambiguous

word 'bank' have two separate meanings, that contradict each other, but the vague and fuzzy expressions can interpret or refer to an identical sense.

3.2.2. The contradiction test

This test is based on contradicting a conjunct with the opposite conjunct.

(1) It is a bank, but it isn't a bank.

(2) It is John's book, but it isn't John's book.

(3) It is around two o'clock, but it isn't around two o'clock.

The sentence (1) means *'It is a riverside, but it isn't a financial institution'.* because the two semantically unrelated meanings of the word 'bank', the sentence makes sense as a contradiction.

In the sentence (2) the vague expression *John's book* could mean *a book John owns* or *a book John has written,* but these two meanings both describe a possessive relation between 'John' and 'the book', thus these two meanings are semantically compatible and cannot totally contradict each other.

In the sentence (3), the fuzzy expression *around* may imply 2:05 or 1:55, but both implications would be true, thus they cannot contradict each other.

This test shows us that the ambiguous words can contradict each other, because of their semantically unrelated meanings. In contrast, the vague or fuzzy expressions imply semantically or referentially close senses, thus they cannot contradict each other.

3.2.3. The 'how' test

This test is proposed to identify fuzziness in an expression. As stated in definitions, fuzziness is a matter of degree of truth. For instance, *almost 20* can be 18 as well as 19, but 19 is more of *around 20.*

That is why fuzziness can be tested by a 'how' question, for example *'how tall is tall?'*; *'how many is many?'*; *'how hot is hot?'* This type of question is aimed to find a referential boundary for a fuzzy expression. In the example *about* 20, we can ask *'How much is almost?'* and we can answer such question with *'It depends…'* or *'It's about…',* etc. but none of these answers would be definite.

In the contrary, when talking about ambiguity and vagueness we would not normally ask a 'how' question. For instance, a statement *'I went to a bank'* would not be followed by a 'how'

question, as it would not make any sense, but rather by a question *'what do you mean by 'bank'?'*

3.2.4. The hedge test

This test assumes, that every expression that is modified by a certain hedge word, e.g., *about, sort of, almost*, becomes fuzzy. Again, let us examine on the Zhang's examples:

(1) It is sort of a bank.

(2) It is sort of a John's book.

(3) It is sort of a city.

In the sentence (1), the expression *'it is a bank'* is ambiguous, while *'it is a sort of a bank'* is both ambiguous and fuzzy, because of the word 'sort of'. If 'bank' means *financial institution*, then 'sort of' indicates, that for some reason – its size or location – it is not a financial institution in every sense.

Similarly, the sentence (2) is both vague and fuzzy - vague because of the *'John's book'* can mean *'a book owned by John'* or *'a book written by John'*, and fuzzy because of the 'sort of', that implies a referential boundary of 'how much of a John's book it is'.

In the sentence (3), the expression *it is a city* was originally fuzzy, as we cannot determine its referential boundary of the word 'city'. The addition of 'sort of' could either point out the fuzziness in the expression or escalate the fuzziness.

The test indicates that hedge words can bring fuzziness into any expression or escalate the fuzziness, as seen in the example (3).

3.2.5. The yes/no test

In previous section, we can see that a statement can be both fuzzy and ambiguous/vague. This test can be useful in determining what meaning we focus on. Let us examine these two statements.

(1) It is a new bank.

(2) It is John's new book.

The statement (1) is ambiguous, as it contains the word 'bank', that can mean *'a financial institution'*, or *'an edge of a river'*. However, it is also fuzzy, because of the word 'new', that has no clear-cut referential boundary. If we ask a question *'Is it a new bank?'* and we answer simply *'Yes'* or *'No'*, we imply that only the ambiguous meaning is in our focus. For instance,

11

if we talk about a new building and we know that it is supposed to be a new bank, we will get the answer *'Yes'*. However, if we want to emphasize fuzziness of the statement, we will answer depending on our intuition, opinion, or experience, for instance *'Kind of, it has been here for a few years.'* In this case, we may assume that we would get many different answers. In contrast, when only ambiguity is considered, the answer would be unified.

Similarly, the statement (2) is both vague, because of the 'John's book', and fuzzy, because of the word 'new'. The same applies for this case. If we focus merely on vagueness, we will answer a question *'Is it John's new book?'* with simply *'Yes'* or *'No'*. For instance, if we talk about a book that we saw John buying, we will get the answer *'Yes'*. And again, if we want to emphasise fuzziness, we will answer with 'kind of'; 'sort of'; etc.

This test indicates, that answering a yes/no question with fuzzy expressions (i.e., kind of) we imply that we focus on the fuzziness of the expression, rather than the ambiguity/vagueness.

3.3. Pragmatic tests

In this section, we will focus on context and how it acts on ambiguity, vagueness, and fuzziness.

3.3.1. Language user's judgment

As I stated in definitions, fuzziness of an expression is dependent on individual's own judgment. Such judgment is based on an experience, as well as feelings. For example, 130km/h could be considered 'fast' for a common driver, as it is a maximum speed limit on a highway in the Czech Republic. However, for the professional racing driver it would be considered rather 'slow', as he or she would probably only change to the second gear in such speed. Thus, fuzziness is dependent on the language user's judgment.

Contrariwise, as Zhang suggests, ambiguity and vagueness are not dependent on individual's own judgment in finding out the truth value of a statement, at least not to the same extent as fuzziness. For example, when we examine the following ambiguous statement: *"he went to a bank"*, we will primarily focus on whether or not he went to a bank ('a riverside' or 'a financial institution' – based on the context), rather than on individual's own judgment in whether it is a bank or not. Similarly, in the vague statement *"he is a good person"*, we focus on whether or not he is a good person, rather than on in what sense the word 'good' we mean ('righteous', 'loyal', 'kind', etc.)

In conclusion, fuzziness is closely related to the language user's judgment, as the fuzzy expressions have no clear-cut referential boundary and are indeterminate in the degree of truth

they denote. On the other hand, ambiguous and vague expressions denote two different senses (either semantically unrelated or related), and language user's judgment does not interfere in those senses.

3.3.2. Context

As we take a look again in definitions, fuzziness of an expression is, besides of on individual's own judgment, to some extent, dependent on the context, but cannot be resolved by giving the context alone. This is because of individual's own judgment will always play its role in determining what the fuzzy expression denotes. If we consider the example *'he is old for the competitive cross-country skiing'* when talking about a 45-year-old man. Even when the estimated peak performance for cross-country skiing is around the age of 30, we would still encounter many arguments against our statement, e.g., *"but he is still in a good shape", "he still finishes in good positions"*.

In the contrary, ambiguity can be contextually resolved. For example, the word 'bank' alone is ambiguous, but when we put it in a sentence: *"I went to a bank and took a loan",* we contextually clarified our intended meaning of the word 'bank' and we can assume, that the receiver of the statement understood without any uncertainty. Moreover, the receiver may not even realize that there might be another meaning to the word 'bank'.

Similarly, the expression 'John's book' alone is vague, but when we put it in a sentence: *"I read John's book, he is an excellent writer"*, we contextually clarified that we mean a book that John has written. Although there might be some uncertainty remaining, as someone could argue that there is no connection between the relation of John to a book and the fact that he is an excellent writer, for majority of the receivers of the statement the intended meaning would be prevalent.

3.3.3. Grice's co-operative maxims

According to SIL (2003), Grice's co-operative, or conversational maxims are 4 rules proposed by Grice, P. H. (1975). The four maxims are as follows:

(1) Maxim of quantity (be as informative as possible but not overly informative)

(2) Maxim of quality (do not provide with false information or information you have not enough evidence for)

(3) Maxim of relevance (be relevant to the topic)

(4) Maxim of manner (be as brief, clear, orderly and unambiguous as possible)

As Zhang (1998) stated, while vagueness and fuzziness are in accordance with Grice's co-operative Maxims, ambiguity violates them. For example, fuzzy expression *'he is tall'* do not violate any of the four maxims in everyday communication. In the statement *'he is tall'*, we are being truthful, as we do not know his exact height, but we may know that he is at least of some height. We may also do not want to be overly informative, as the exact height is not needed in everyday communication. We may as well stay relevant, as the exact height of a person is not relevant in certain situations. And finally, we want to be brief by not stating the exact height of a person.

However, one may object that if we know his exact height, but do not provide the information, we are violating the maxim of quality or manner by being untruthful or unclear. According to Boston University, Grice also introduced a theory of implicature, where something *we meant* goes beyond what *we said*. In the statement *'he is tall'*, the intended implicature may be that 'we know his exact height, but it does not need to be specified; more importantly, he is tall in our own judgment.'

Similarly, vague expression *'John's book'* does not violate any of the four maxims. In the statement *"It is John's book"*, we stay truthful, as we know there is a possessive relation between 'John' and 'book'. We may also do not want to be overly informative by stating the specific possessive relation, because it is not required in the everyday communication. We may as well stay relevant, for the possessive relation is not relevant to the situation. And finally, we want to be brief by not stating the specific possessive relation.

Contrariwise, ambiguity violates Grice's co-operative principle, as it is directly stated in a definition of fourth Grice's maxim of manner – stay unambiguous. As Zhang suggests, ambiguity creates confusion in everyday communication. In the statement *'he went to a bank'*, without giving a context, one is being unclear, as we cannot conclude what the intended meaning is. According to Grice, this is 'flouting' of the maxim of manner, as the author of such sentence does know the intended meaning but stays unclear; thus, we cannot determine, what he implies.

In conclusion, vagueness and fuzziness comply with Grice's co-operative maxims and they are appropriate in everyday communication, for they typically do not confuse receivers of vague or fuzzy utterances. On the other hand, ambiguity does not comply with Grice's co-operative maxims, and as Zhang implies, we should not use ambiguous expressions in everyday communication to avoid confusion among the hearers.

4. Text analysis

In the following step, a scientific text will be analysed. It is a research paper on *'Inhibitory effects of different hand sanitizers against the resident microflora of skin'*. We will be looking for ambiguous, vague, and fuzzy terms or expressions and analyse their interference in the meaning. I will then propose possible suggestions in text editing in order to circumvent any uncertainty encountered in the text.

4.1. Text

INTRODUCTION

Most of the germs that cause (1) serious infections in healthcare are spread by people's actions. Hand hygiene is a (2) great way to reduce the transmission of infectious disease particularly in hospital. There are (3) several methods of hand hygiene such as hand washing or sanitizer to kill or eliminate the pathogenic microorganisms present on hands. However, various organizations such as Centers for Disease Control and Prevention (CDC) and WHO have been published guidelines on (4) appropriate hand hygiene. Currently, the concept of hand sanitization has been in place right from the start of the hand hygiene campaign by (5) many governmental and non-governmental organization. Previous researchers have been focused on the importance of hand sanitizer as an infection control means particularly against the (6) communicable diseases. However, in the (7) early 2000s the CDC has been issued a proper guideline which recommended that alcohol-based hand rub (ABHR) should be routinely used for decontaminating hands. In (8) recent years, the most commonly used hand sanitizers are ABHR which are (9) often composed of alcohol, ethanol, isopropanol or propanol. The recommended concentration range of these sanitizers are 60 to 95%. For the time being, hand sanitizers not only (10) very effective to minimize the infection rates but also these are (11) very useful alternative source of water where access to water is (12) so limited for hand cleaning. Beside the antibacterial activity, alcohol-based hand sanitizers have been reported as one of the commonly recommended hand hygiene against the diseases outbreaks causes by Ebola-Virus. As described by previous researchers that hand sanitizers have been found as (13) very effective agent in order to eradicate the gastrointestinal infection as well as hospital acquired infection. Eventually, people are now more interested to use hand sanitizer instead of only hand washing due to its better (14) performance against the resident skin flora such as Staphylococcus aureus, Staphylococcus epidermidis and Enterococcus faecalis. As a result, (15) many companies have now launched verities of hand sanitizer in the market without

verifying the proper concentration and activity of the products which making (16) huge dissatisfaction among the customers. To confirm the efficacy of the hand sanitizer, present study attempted to isolate (17) several inherent microflora from the hand of laboratory stuffs and introduce the effectivity of the three (18) common hand sanitizers (Dettol, Savlon and Purell) against the growth of the microbes.

...

DISCUSSION

As reported in (19) many studies that the upper layer of the skin serve (20) huge amount of nutrient for the (21) propagation of different bacteria especially Staphylococcus aureus, Staphylococcus epidermidis, Cornnebacterium, Streptococcus pyogenes etc., those are responsible for transmitting (22) several communicable diseases as well as hospital acquired infection. Beside such diseases outbreaks these bacteria can also be transmitted as contamination during the laboratory experiment. In order to eliminate the proliferation of such bacteria, use of hand sanitizer or disinfectant is (23) very significant before starting any experiment and taking any food as well. In (24) recent years, the rate of communicable diseases and hospital acquired infection have increased (25) alarmingly which has become a (26) serious public health problem through worldwide. The most (27) common route for transmission of infection or communicable diseases are hands and skin. Thus hand hygiene has become (28) essential to prevent communicable disease and diseases that acquired from health care centre including nosocomial infection. Although, human skin contain two different types of normal flora, one that always presence on skin known as resident flora e.g., Staphylococcus aureus, Staphylococcus epidermidis, Enterococcus faecalis and other that are introduced on skin from external environment, which called transient flora consists S. aureus, Escherichia coli, and Pseudomonas aeruginosa. Analysis of (29) several scientific studies explained that hand washing without sanitizers, does not remove pathogenic microorganisms from hands. Even most of the pathogenic organisms about 80% remain on skin, therefore scientists have introduced different hand sanitizers to improve (30) skin condition as well as to reduce" will be added after different and pathogenic microorganisms such as bacteria, virus, fungi from hand and skin surfaces and in improving skin condition. Moreover, using hand sanitizers decreased the risk of spreading gastrointestinal and respiratory infection can minimize skin dryness and (31) irritation also in reducing the rate of absentee in schools and college. Direct use of alcohol can cause skin dryness but alcohol based sanitizers are effective to prevent infection in hospitals and also in reducing the load of pathogenic microorganisms from hand.

- Ishma, Touhida & Uddin, H. & Paul, Anik & Feroz, Farahnaaz & Acharjee, Mrityunjoy. (2019). Inhibitory effects of different hand sanitizers against the resident microflora of skin. International Journal of Scientific Reports. 5. 355. 10.18203/issn.2454-2156.IntJSciRep20195300.

4.2. Analysis

(1) An expression *'serious infections'* could be considered vague, as it has a borderline case of 'serious'. From the text we cannot determine what makes an infection serious, if it is its aggressivity or ability to kill or spread from one human to another. Although there are statistics about particular infections and their seriousness is based on those statistics, there are no further calculations or other means to determine what properties exactly has a serious infection. In this context vagueness could be reduced by naming the properties of such infections.

(2) An expression *'great way'* could be considered vague, as the word 'great' can express two or more closely related concepts. It could be understood as *'effective way*; *important way*; *fantastic way'*. Based on the context uncertainty does not arise, as we speak about effective ways to kill or eliminate germs on hands. In this case, the word *'effective'* could be a good substitute for the word *'great'*.

(3) An expression *'several methods'* could be considered fuzzy, as the word 'several' has no clear-cut referential boundary. According to Cambridge Dictionary, 'several' means *'an amount, that is not exact but is fewer than many'*, thus leaving us with more uncertainty. In this context, we cannot determine how many is several. As I stated in definitions, fuzziness is related to one's personal opinion, experience or feelings. In this context, we cannot determine if the authors mean, that there are *'only a few methods'*, or it means *'enough methods'*; or if this is satisfactory to his assumptions or not. The fuzziness in this case could be avoided by stating number of methods that are commonly known or used.

(4) An expression *'appropriate hand hygiene'* could be considered vague because we do not know what measures we have to take to accomplish such hand hygiene and for what occasion it would be considered appropriate. In this context, vagueness could be reduced by using the word *'correct'*.

(5) An expression *'many governmental and non-governmental organizations'* could be considered fuzzy, as the word *'many'* has no clear-cut referential boundary. We do not

know how much is many and we cannot determine its applicability. In this context it is understood that we talk about some number of organizations in the world, but we do not know if *'many'* means majority, vast amount or simply more than for example five organizations. The fuzziness in this case could be reduced by giving some numbers or percentage of organizations.

(6) An expression *'communicable diseases'* could be considered a lexical ambiguity of the word *'communicable'*. Although it is a common collocation, that is used when talking about diseases that can transmit from one human being to another, the word *'communicable'* can cause uncertainty among non-native English speakers, as it has another meaning, that can be translated the same way as *'communicative'* or *'talkative'*.

(7) An expression *'early 2000s'* could be considered fuzzy, because some may assume that we talk about years 2000 through to 2004, but other may refer to the year 2004 as *'mid-2000s'*. We can ask *'How close to 2000 'early' is'*, but we would not get an exact answer, thus leaving us with fuzziness of *'early'*. In utterance, it is based on individual producers what years are concluded in this expression, and without further specifications, uncertainty can arise among the receivers. In this sentence, we can avoid fuzziness by stating the exact years.

(8) An expression *'recent years'* could be considered fuzzy because one cannot determine what years can be included in the statement. It is similar to the expression (7). To avoid fuzziness in this case, we can again state the exact years.

(9) An expression *'often composed'* could be considered fuzzy, as we cannot determine how often is often, as it has no clear-cut referential boundary. The fuzziness could be avoided by stating a percentage or some data of usage.

(10) An expression *'very effective'* could be considered fuzzy, as the word *'very'* is one of the tools in language that emphasize fuzziness. Using Fuzzy logic, for a question *'Is it effective?'* we cannot logically determine where the answer *'Very'* within the interval of the true values between 0 and 1 is located, as well as we cannot determine how far from the absolute truth 1 it is. But based on the context the intended meaning can be understood. To avoid fuzziness, we could use for example percentage of effectiveness of such hand sanitizers.

(11) An expression *'very useful'* is a similar case to the previous one. Again, the intended meaning in the context can be understood. To avoid fuzziness in this case, we could simply omit the word *'very'*, without changing the context significantly.

(12) An expression *'so limited'* could be considered fuzzy because the word *'so'* is another

example of tools in language that raise fuzziness. We cannot determine how much *'so'* is and it could be understood differently by individual people or in individual contexts. However, in this context the implied meaning can be understood. To avoid fuzziness in this case, we could omit the word *'so'*, without changing the context significantly.

(13) It is the same expression as the expression (10). To avoid fuzziness in this case, we can use the same solution.

(14) A word *'performance'* is another example of lexical ambiguity. It can be understood as *'performance executed by actors (a show)'* or *'performance of a vehicle (e.g., horsepower)'*. In this case the meaning is apparent, as we speak about effectiveness of hand sanitizers, but we could use the word *'effectiveness'* to reduce the uncertainty.

(15) An expression *'many companies'* could be considered fuzzy, as the word *'many'* has no clear-cut referential boundary. It is the same expression as the expression (5). The fuzziness in this case could be reduced the same way as before, by giving number of companies or percentage.

(16) An expression *'huge dissatisfaction'* could be considered fuzzy, because we cannot determine how big something has to be to become huge. We can then speak of indefinable applicability of the word *'huge'*. In this context, we can understand that we talk about a majority of customers, however, to avoid fuzziness we could use a percentage of customers.

(17) An expression *'several inherent microflora'* could be considered fuzzy, as the word 'several' has no clear-cut referential boundary. It is a similar case to the expression (3). In the context, we can conclude that we talk about a certain number of inherent microflora, but we cannot determine what the number is. To avoid fuzziness in this case, we could state a number of different kinds of microflora we attempted to isolate.

(18) A word *'common'* is an example of lexical ambiguity. Although it can be understood as *'same for more people'* or *'ordinary'*, in this context uncertainty does not arise, because we can understand that we talk about ordinary hand sanitizers. In this case we could use a word *'ordinary'* as a good substitute for the word *'common'*.

(19) An expression *'many studies'* could be considered fuzzy, as the word 'many' has no clear-cut referential boundary. It is the same case as the expressions (5) and (15). We could reduce the fuzziness similarly to previous examples, by stating a number of studies that focus on the subject.

(20) An expression *'huge amount'* could be considered fuzzy. It is a similar case to the expression (15). In this context, we cannot conclude what amount is 'huge' when talking about nutrients for bacteria, thus leaving us with indeterminate applicability of the word

'huge'. However, from the context we can understand, that we talk about bacteria and that they can easily proliferate on skin. The fuzziness in this case could be reduced by stating a number of nutrients in the skin as well as stating what amount of nutrients bacteria need to proliferate.

(21) A word *'propagation'* is another example of lexical ambiguity. According to Cambridge Dictionary, it has two different meanings: 'growing' as in *'the act of producing a new plant from a parent plant'*, or 'spreading' as in *'the act or process of spreading something'*. In the context, we can conclude that we talk about growing new bacteria on one's skin, as it is mentioned that skin serve huge amount of nutrients that bacteria need to propagate. In this case, we could use the word 'proliferation' as a good substitute for the word 'propagation'.

(22) An expression *'several communicable diseases'* could be considered fuzzy, as the word 'several' has no clear-cut referential boundary. It is the same case as the expressions (3) and (17). We could avoid fuzziness the same way, by giving a number or percentage of communicable diseases transmitted by the listed bacteria.

(23) An expression *'very significant'* could be considered fuzzy because of the word 'very' that is one of the tools in language that emphasize fuzziness. It is similar case as the expressions (10) and (11). To avoid fuzziness in this case, we could simply omit the word 'very' without changing the context significantly.

(24) It is the same expression as expression (8). To avoid fuzziness in this case, we can use the same solution.

(25) An expression *'alarmingly'* could be considered vague because we do not know what makes a situation alarming and in what way. We can talk about a borderline case of 'alarming', as we cannot determine what aspects an alarming situation must have in order to become alarming. However, uncertainty does not arise in this case, as in this context we can understand that we talk about a large increase of the rate of communicable diseases and hospital acquired infections. To reduce vagueness in this sentence, we could state a percentage of the rate increase or clarify why the increase is alarming.

(26) An expression *'serious public health problem'* could be considered vague because of the borderline case of the word 'serious'. We cannot determine what makes a public health problem serious, if it is a number of cases, that would make the public health problem serious, or seriousness of the cases. Thus, leaving us with another borderline case of 'serious' for what makes a serious case serious. In this case, vagueness has been contextually resolved, as we speak about increase of the rate of communicable diseases and

hospital acquired infection that makes the public health problem serious, and uncertainty does not arise.

(27) A word *'common'* is an example of lexical ambiguity. In this context, it can mean 'ordinary, usual' or 'shared'. However, in this sentence, it is in a commonly used collocation 'the most common'. Thus, the uncertainty does not arise, as we can easily understand the intended meaning, which is 'prevailing'.

(28) A word *'essential'* is another example of lexical ambiguity. According to Collins Dictionary, in British English the word 'essential' means *'vitally important; absolutely necessary'* or *'basic; fundamental'*. Thus, a non-native English speaker could understand this sentence as *'hand hygiene is one of the basic procedures to prevent communicable disease and hospital acquired infections'* or *'hand hygiene is absolutely necessary to prevent communicable disease and hospital acquired infections.'* However, regarding the previous sentence in the text, uncertainty does not arise in this context, as we speak about diseases and infections whose most common way of transmission are hands and skin.

(29) An expression *'several scientific studies'* could be considered fuzzy, as we cannot determine the applicability of the word 'several'. It is the same case as the expression (3), (17), and (22). Again, we could avoid fuzziness by giving a number of studies.

(30) An expression *'skin condition'* could be considered ambiguous, as in this context we cannot determine if we talk about 'a skin disease or infection' or 'a state of the skin'. From the text, it is not apparent if the authors talk about improving conditions (as in 'requirements') under which it would be less likely to develop a skin infection; or the authors talk about improving a state of the skin, i.e., dryness, cleanness. That is mainly because of the grammatical mistakes in the text, as well as incomplete sentences. However, I would incline to the second meaning, as it suits the overall text better. To avoid ambiguity in this case, 'a state of the skin' could be a good substitute for the expression 'skin condition'.

4.3. Result of analysis

In the text we could observe several instances of ambiguity, vagueness, and fuzziness. In most cases, it could be avoided by stating more precise data or choosing a better word, but there were no serious problems which would require immediate correction.

Fuzzy expressions in the text seem to be unnecessary and the fuzziness could be avoided simply by omitting the words, that give fuzziness to language, or stating more precise data. Moreover, fuzzy expressions are connected to individual's decisions, based on their own knowledge, as

well as feelings, which is considered unprofessional to include in such texts. But these expressions were not the case and had no influence on the context.

Vague expressions were not that frequent in the text. However, they seem to raise more uncertainty. That could be avoided by choosing a better word or by clarifying the intended meaning.

Finally, ambiguous expressions in the text are negligible. From the context, we could determine the intended meaning without any difficulties. The exception is the expression (30), which could raise uncertainty among the readers, especially readers whose level of English is at lower rates. However, this is partly because of incompleteness of the text and several grammatical mistakes in the paper, which makes the text analysis more inconvenient, hence it raises uncertainty within determining if certain expression is one of the phenomena or not.

In conclusion, the context of the text was not disrupted, and level of uncertainty was at minimum. But even if we wanted to deal with these expressions, simple, and yet effective solutions were proposed.

5. Conclusions

The discussion in this paper shows that ambiguity is characterized by raising the uncertainty with having two or more possible meanings that are not semantically related to each other. Without further information – context clues, confusion between those meanings could appear. On the other hand, vagueness represents expressions that have semantically related meanings. It is also characterized by having a borderline case, that we are unable to determine, thus leaving us with uncertainty. That could be easily avoided by stating more precise information or clarifying the intended meaning. Fuzziness is characterized by stating expressions that have no clear-cut referential boundaries. Its definition can be also derived from Zadeh's 'Fuzzy logic', that operates with the truth values of variables, that can be any real number from 0 to 1. They represent 'a partial truth' that give us imprecise and non-numerical decision of an individual, but we cannot logically determine, how close to the truth it is. I also demonstrated these phenomena on various examples and described the reason for uncertainty and how it could be avoided.

I also conclude that fuzziness vastly differs from ambiguity and vagueness, as fuzzy expressions depend on a context, but cannot be resolved by giving a context – by clarifying the intended meaning; they refer to the indeterminacy of a referential boundary. In contrast, ambiguity and vagueness can be contextually resolved, i.e., unintended meanings can be eliminated.

During my research, I found various definitions of ambiguity, vagueness, and fuzziness. In most cases, the sources agree with themselves or complete each other, but in some instances they diverge. In some cases, they simply disagree with each other and we cannot conclude which source is right, but in other cases they examine particular expression only from one point of view. I find it a huge problem that made my research more complicated, but it made me realise that one expression can be for example vague and fuzzy simultaneously. It is crucial to realize in what context observed expression is and what sense of the expression are we focused on. To better understand, several syntactic, semantic, and pragmatic tests proposed by Zhang (1998) were include in this paper.

In most technical and scientific texts, ambiguity, vagueness, and fuzziness appear rarely, for the intention of such texts to be as clear and precise as possible. Despite that, it is used in such texts. As I stated above, ambiguity, vagueness, and fuzziness are essential tools of our language and in some situations, we cannot express our intention without being for example vague, even though it raises uncertainty. During my research for such observations in technical and scientific

texts, I stumbled across many published papers on scientific web pages. Vast majority of technical and scientific texts are unproblematic, with several instances of ambiguous, vague, and fuzzy expressions that do not raise uncertainty. In contrast, the analysed text in my paper contains a higher amount of these expressions, and the level of uncertainty rises slightly. The amount and seriousness of these phenomena in technical and scientific texts is usually indirectly proportional to the quality of the research, but they are impossible to avoid completely, and sometimes they are used on purpose, e.g., fuzziness could be used for simplifying unimportant or unrelated information to stay relevant to the topic.

Rozšířený český abstrakt

Dvojznačnost, vágnost a neurčitost jsou základními nástroji našeho jazyka. Mnoho prací bylo publikováno na toto téma, ale stále se setkáváme s problémy s rozlišováním mezi těmito případy. V této práci Vám poskytnu definice těchto termínů, jednotlivé syntaktické, sémantické a pragmatické testy, které nám pomohou v jejich odlišení, a ukážu Vám je na příkladech. Na první pohled by se mohlo zdát, že jde pouze o nástroje k manipulaci, kdy řečník úmyslně plete své publikum. Ovšem dvojznačnost, vágnost a neurčitost slouží nejen v politice, kde je lze využít k provokaci či k poskytnutí zavádějících informací. Můžeme se s nimi setkat i v literatuře, kde slouží k vyvolání humorné nebo tajemné atmosféry. V jiných textech mohou tyto výrazy sloužit k získání pozornosti nebo donutit k zamyšlení. V této práci se zaměřím na výskyt dvojznačnosti, vágnosti a neurčitosti ve vědeckých a technických textech. Konkrétně jde o úryvek z vědecké práce s názvem 'Inhibitory effects of different hand sanitizers against the resident microflora of skin', ve kterém si ukážeme tyto výrazy a jakým způsobem ovlivňují text. K tomu, abych byl schopný tyto výrazy najít, správně identifikovat a navrhnout úpravu, potřebuji prvně znát definice těchto výrazů. Při vyhledávání definic můžeme narazit na spoustu různých zdrojů, které se většinou shodují či doplňují, ovšem také se mohou navzájem vyvracet. V několika případech jde o neshodu v definicích, kdy zkrátka se nelze shodnout na tom, který zdroj má pravdu. V jiných případech lze jasně vidět, že každý autor se dívá na daný výraz pouze z jednoho směru. Při sepisování této práce jsem tohle považoval za největší problém, kdy je potřeba si uvědomit, že daný výraz nemusí být pouze například vágní, ale také neurčitý. Rozhodujícím faktorem je to, v jakém smyslu se na daný výraz právě díváme a v jakém kontextu se nachází. K lepšímu porozumění nám právě pomohou syntaktické, sémantické a pragmatické testy, které nám lépe nastíní rozdíly mezi dvojznačností, vágností a neurčitostí, ale také o jaký lingvistický jev se u daného výrazu právě zajímáme.

Ve své práci jsem dvojznačnost definoval jako výraz, který má dva a více významů, které spolu sémanticky nesouvisí. Dvojznačnost se dělí na lexikální dvojznačnost, kdy se dvouznačným stává pouze jedno slovo, např. „*Fisherman went to a bank*", kde slovo ‚bank' může znamenat finanční instituci anebo okraj řeky; a syntaktickou dvojznačnost, kdy je dvojznačná fráze nebo celá věta, např. „*I saw her duck*", což může znamenat, že jsem ji viděl dřepnout si anebo jsem viděl kachnu, která ji patří. Oproti tomu vágnost je podle Grace Qiao Zhangové definována jako výraz, který má dva a více významů, které jsou si velmi blízké – sémanticky související, např. „*It is John's book*", čímž můžeme myslet knihu, kterou John vlastní anebo knihu, kterou John napsal, ovšem v obou případech lze mluvit o určitém vlastnictví knihy Johnem. Z jiných zdrojů

lze zase vyvodit, že vágní výrazy jsou ty, které jsou tzv. ‚hraniční případy‘, kdy u daného jevu nemůžeme jasně určit, zda výraz je v té situaci platný či nikoliv. Tímto se zabývá především Francis Jeffry Pelletier a István Berkeley. Příkladem je slovo ‚obézní‘, kdy nemůžeme u dané osoby jednoznačně určit, zda je obézní, když se na ni podíváme. Existuje mnoho výpočtů a lékařských posudků, která jasně určují, kdy je osoba obézní. Proto můžeme mluvit o vágnosti slova ‚obézní‘ jen do doby, než známe všechny potřebné výsledky. Tato definice vychází ze Soritova paradoxu, také známý jako paradox hromady. Ten se zabývá hromadou určitého množství zrn rýže, kdy postupně odebíráme jedno zrno rýže a nedokážeme jednoznačně určit, kdy jde o hromadu a kdy hromada zaniká. Vágnost, stejně jak dvojznačnost, může být vyjasněna dáním kontextu, tj. nezamýšlené významy mohou být eliminovány. Neurčitost se výrazně liší od dvojznačnosti a vágnosti tím, že neimplikuje dva a více významů. Definice neurčitosti vychází z Fuzzy logiky, také známé jako mlhavé logiky, kterou napsal Lotfi Asker Zadeh v roce 1965. Ta je založena na ohodnocování logických výroků mírou pravdivosti. Jejím opakem je klasická výroková logika, která udává pouze dva výsledky – pravda a nepravda, které jsou zpravidla zapisovány jako 1 a 0. Fuzzy logika pracuje s výroky, které mohou být jakékoliv reálné číslo od 0 do 1, ale nemůžeme logicky odvodit absolutní pravdu či nepravdu. Příkladem je otázka „*Je venku zima?*“ Výroková logika by měla pouze dvě odpovědi: „*ano*“ (1) a „*ne*“ (0), zatímco fuzzy logika nabízí nekonečně mnoho odpovědí: „*velmi*“ (0,9); „*docela*“ (0,7); „*trochu*“ (0,25); atd. Z fuzzy logiky můžeme vyvodit, že hlavní vlastností neurčitosti je, že jí chybí jednoznačná referenční hodnota, díky čemuž nemůžeme určit míru pravdy výrazu. Neurčitost je závislá na kontextu, stejně tak na jednotlivci, který vám dá svoji nepřesnou odpověď, která závisí na jeho názoru, zkušenostech a pocitech. Ovšem neurčitost se nedá vyjasnit pouze dáním kontextu, jak je tomu u dvojznačnosti či vágnosti. Jak Zhangová uvedla ve své práci ‚Fuzziness --- Vagueness --- Generality --- Ambiguity‘: „*Důvodem je to, že pro lidi je obtížné shodnout se na referenční použitelnosti neurčitých výrazů.*“ (1998: 16)

Při analýze textu jsem nenarazil na žádné větší problémy při určování dvojznačnosti, vágnosti a neurčitosti. V pár případech sem narazil na gramatické chyby či na nedokončenou větu, která může čtenáře zmást. Ačkoliv jsem se těmto chybám nevěnoval, v jednom případě by zvláště pro ty, jejichž angličtina není na vysoké úrovni, mohla značně narušit význam věty. Jde o poslední zkoumaný výraz ‚*skin condition*‘, což může znamenat ‚stav kůže‘ (čistota, vlhkost) anebo ‚kožní onemocnění‘, jde tedy o dvojznačnost, kdy kvůli právě nedokončené větě a na základě toho, že se autor už dříve v textu dopustil několika gramatických chyb, nemusí na první pohled být jasné, co autor má na mysli. Mimo to se v textu nachází několik příkladů

dvojznačnosti, vágnosti a neurčitosti, kterých by se dalo vyvarovat uvedením přesnějších dat anebo zvolením vhodnějšího slova. Neurčité výrazy v textu se mi zdály spíše zbytečné a mohly být buď vynechané anebo autor mohl uvést procenta či přesnější čísla. Podle mých definic neurčitost závisí na názoru či pocitech jednotlivce, což by se ve vědeckých a technických textech nemělo vyskytovat. Ovšem neurčitostí se dá také úmyslně vynechat nedůležité informace, které nesouvisejí s probíranou problematikou, což je právě případ tohoto textu. Vágní výrazy nebyly zas tak časté, ovšem mohou vyvolávat větší nejasnost pro čtenáře. Vágnost v textu mohla být eliminována buď zvolením lepšího slova anebo vysvětlením zamýšleného významu. A nakonec dvojznačnost v textu se dá snadno přehlédnout (s výjimkou již zmíněného výrazu) s ohledem na kontext.

Závěrem můžu říct, že dvojznačnost, vágnost a neurčitost se ve vědeckých textech zcela běžně objevuje, ovšem v daleko menší míře. Je to především proto, že jde o základní nástroje našeho jazyka, a i ve vědeckých či technických textech se nelze úplně vyvarovat těmto výrazům a někdy jsou dokonce použity úmyslně, například ke zjednodušení nepodstatné nebo nesouvisející informace. Během mého vyhledávání různých vědeckých či technických textů bylo obtížné najít text, který by byl skutečně problematický, co se týká dvojznačnosti, vágnosti a neurčitosti a mnou analyzovaný text je jediný z těch, co jsem našel, který obsahuje tyto jevy ve vyšší míře. Dá se předpokládat, že množství a závažnost těchto jevů ve vědeckých či technických textech jsou nepřímo úměrné ke kvalitě práce.

References

Ambiguity (2019), retrieved from https://literarydevices.net/ambiguity/

Conversational Implicatures, Boston University (2008), retrieved from https://www.bu.edu/linguistics/UG/course/lx502/_docs/lx502-implicatures.pdf

Conversational Maxim, Glossary Terms, SIL (2003), retrieved from https://glossary.sil.org/term/conversational-maxim

Cruse, Alan. 2011. Meaning in Language. Oxford: Oxford UP.

Definitions and Examples of Vagueness in Language (2018), retrieved from https://www.thoughtco.com/vagueness-language-1692483

Definition of 'ambiguity', Cambridge Dictionary (2019), retrieved from https://dictionary.cambridge.org/dictionary/english/ambiguity

Definition of 'essential', Collins Online English Dictionary (2021), retrieved from https://www.collinsdictionary.com/dictionary/english/essential

Definition of 'hot', Cambridge Dictionary (2021), retrieved from https://dictionary.cambridge.org/dictionary/english/hot

Definition of 'propagation', Cambridge Dictionary (2021), retrieved from https://dictionary.cambridge.org/dictionary/english/propagation

Definition of 'several', Cambridge Dictionary (2021), retrieved from https://dictionary.cambridge.org/dictionary/english/several?q=Several

Fuzziness (2017), retrieved from https://www.sciencedirect.com/topics/engineering/fuzziness

Fuzzy logic (2016), retrieved from https://searchenterpriseai.techtarget.com/definition/fuzzy-logic

Fuzzy Logic | Introduction (2019), retrieved from https://www.geeksforgeeks.org/fuzzy-logic-introduction/

Grice's Maxims, Penn Arts & Science, University of Pennsylvania (2021), retrieved from https://www.sas.upenn.edu/~haroldfs/dravling/grice.html

Ishma, Touhida & Uddin, H. & Paul, Anik & Feroz, Farahnaaz & Acharjee, Mrityunjoy. (2019). Inhibitory effects of different hand sanitizers against the resident microflora of skin. International Journal of Scientific Reports. 5. 355. 10.18203/issn.2454-2156.IntJSciRep20195300. retrieved from https://www.researchgate.net/publication/337555382_Inhibitory_effects_of_different_hand_sanitizers_against_the_resident_microflora_of_skin

Lexical Ambiguity Definition and Examples (2019), retrieved from https://www.thoughtco.com/what-is-lexical-ambiguity-1691226

Lucid Philosophy, Chapter 9: Vagueness, Ambiguity, and Philosophy (2019), retrieved from https://lucidphilosophy.com/chapter-9-vagueness-ambiguity-and-philosophy/

Peirce, C.S., 1902, "Vague", in *Dictionary of Philosophy and Psychology*, J.M. Baldwin (ed.), New York: MacMillan, 748.

Pelletier, F.J. & Berkeley, I., Vagueness (1999), retrieved from http://www.sfu.ca/~jeffpell/papers/VagueDictionary.pdf

Pun (2019), retrieved from https://literarydevices.net/pun/

Sorensen, Roy, 2001, *Vagueness and Contradiction*, Oxford: Oxford University Press

Vagueness in Stanford Encyclopedia of Philosophy (2018), retrieved from https://plato.stanford.edu/entries/vagueness/