The language of COVID-19 – comparison between collocations in popular and scientific articles

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Abstract: Language has been changing since its origin. This change has been influenced by many factors – the appearance of new technology, new inventions, as well as the appearance of new diseases. Such changes in register will be dealt with in this paper. The aim is to see whether there are any changes primarily in collocations that had been used previously in medical English and those used when reporting on the new disease COVID-19. First, two corpora were formed – one based on popular articles and another on scientific ones. Then, TextSTAT was used to find the most frequent nouns in each of the corpora. Afterwards, twenty most frequent nouns were chosen, and their collocations were sought. Finally, the results were analyzed and discussed.

Key words: language, changes, collocations, COVID-19, coronavirus

1. Introduction

Language has been changing constantly. According to Matthiessen (2004), there are two types of changes: a) cyclical and b) unidirectional. Cyclical are mostly connected with changes within historical linguistics – e.g. typology based on the nature of the word grammar of a language. For this research, changes of a unidirectional nature are more interesting as they include evolution of various registers – e.g. funeral ceremony, legal discourse, scientific discourse, media discourse (ibid.). As Matthiessen explains, together with socio-cultural changes, there is also evolution of registers. Thus, this paper aims to show some of the vocabulary changes that occurred with the occurrence of the new disease – coronavirus or COVID-19.

1.1. New vocabulary

There have been many theories why languages change, especially semantically. Some of these sociolinguistic theories will be mentioned. One of them is Meillet (1906) who distinguishes linguistic, historical, and social causes of the changes.

Sperber (1930) uses a psychoanalytical approach stating that the very essence of language change lies in emotional causes.

Ullman (1951, 1957) is most intriguing since he tries to systematize the causes of semantic changes, joining the ideas of the two abovementioned theoreticians: 1. Linguistic causes, 2. Historical causes (specialization), 3. Social causes (generalization), 4. Psychological causes (4.1. emotional factors, 4.2. taboo – euphemism), 5. Foreign influences, 6. Need of new names.

Other theoreticians disagree with so many categories and believe that they can be combined in a simpler scheme – e.g. linguistic, social, and psychological causes (Crespo, 2013).

When speaking about linguistic creativity, Ronald Carter (1999) emphasizes that "verbal play is often undertaken for humorous purposes, serving in part to bring people closer together", as well as challenging the "normal" view of things. He continues by saying that inventive language is not just ornamental, but practical.

History shows that different periods of serious social crises result in creation of new words or usage of old words with new meaning. For example, World War II gave us 'radar' (Radio Detection and Ranging), UK's leaving the EU introduced new terms like 'brexiteers', 'regrexit'.

However, previous pandemics did not have such an influence on language except for the name itself – like Human Immunodeficiency Virus (HIV), Acquire Immune Deficiency Syndrome (AIDS), Spanish Flu, Swine Flu, and others.

Lawson (2020) thinks that since coronavirus has completely changed our ways of living, it was quite expected that new vocabulary will appear as an aid in talking about coronavirus-related issues. As there was no social contact, people needed something to bring them together, and to feel connected to each other. One of the factors that contributed to the emergence of new vocabulary and terminology is digital connection and instant access to social media which was not present in previous pandemics. Online connections were a vast source of new terminology and creativity (Lawson, 2020).

This paper aims to see whether new words are used with the occurrence of COVID-19 and particularly different collocations in comparison to previous medical vocabulary.

The next sub-chapter will deal with new expressions that can be found in everyday language, primarily newspapers.

1.1.1. Some examples of new vocabulary

In Tribune News Service dated March 27, 2020, McFeatters has even coined a new term: lingua corona. Her article is also full of new abbreviations - B.C. (meaning Before COVID-19), PPEs (personal protective equipment), SIP (sheltering in place), SD (social distancing), SQ

(self-quarantine), SI (self-isolate), SDS (sports deficiency syndrome), SHSH (stay home, stay healthy). Such word formation is called initialism or acronym.

She also mentions some new phrases – 'Pulling a Rand Paul' means endangering your co-workers in the Senate before you get the results of your test. 'Going all Donald Trump' refers to denying a problem and claiming everything will be over by Easter.

The word COVID-19 (or somewhere spelled as Covid-19), an abbreviated version of 'coronavirus disease 2019' has penetrated our vocabulary in a very short period of time. It appears not only in the fields of epidemiology and medicine, but in everyday usage as well. There are some other terms which appear together with it like 'social distancing', 'flatten the curve' and some distinctions between terms such as 'epidemic' and 'pandemic', 'quarantine' and 'isolation', 'respirator' and 'ventilators' have become known to us.

Such terms are also entering dictionaries (for example, Oxford English Dictionary) though they have existed before. Thus, WFH or working from home was first attested as a noun in 1995, and as a verb in 2001 (Paton, 2020). Also, a word like 'self-isolation' was already used in 1834 when it mostly referred to countries which detached themselves politically and economically from the rest of the world while today it describes self-imposed isolation to prevent catching or transmitting an infectious disease (Paton, 2020).

Some old coined words also appeared as a result of the present crisis. 'Infodemic' is a coined word from 'information' and 'epidemic' and refers to abundant and frequently unsubstantiated media and online information relating to a crisis. It was used for the first time in 2003 for the SARS epidemic (Paton, 2020).

The phrase 'shelter-in-place' which refers to the instruction for people to find a place of safety, was used primarily in 1976 referring to a nuclear or terrorist attack but now also refers to staying indoors to be protected from coronavirus.

Paton (2020) also mentions some other phrases, like 'social distancing' (first used in 1957 when speaking about an attempt to distance oneself from others socially and now as a physical distance between ourselves and others); 'elbow bump' which is today used instead of a handshake and in 1981 was used to convey celebratory pleasure to a teammate.

Apart from already mentioned abbreviation WFH, PPE (personal protective equipment) has also been used. Its origin is from 1977 but the full phrase dates from 1934.

The word 'coronavirus' dates from 1968 in a paper in *Nature* describing a virus which resembles the solar corona.

On the other hand, dictionary.com (2020) mentions the importance of introducing humorous words during such scary times. That is why some wordplay has been introduced to help us deal with this disease and quarantines.

Some of such humorous words are formed by blending – like 'coronapocalypse' (derived from 'corona' and 'apocalypse') and 'coronageddon' (derived from 'corona' and 'armageddon'). 'Coronacation' refers to staycations compelled by coronavirus and is usually used in an ironic sense. Another example of blending is 'covidiot' – coming from 'COVID-19' and 'idiot' – an insult for a person who disregards healthy and safety guidelines about the coronavirus. Its synonym is 'moronavirus' which centers on the word 'moron'. 'Covexit' is a term coined to denote the strategy for exiting lockdown.

Some words are shortened variants – like 'corona' which is a shortened version of 'coronavirus' but is further clipped to 'rona'. Such word formation is called clipping.

Another word formation is compounding – for example – 'doom-scrolling' which refers to constant refreshing our feeds to get the latest news about the pandemic.

There are words which are changed to get a humorous effect. Such word formation is called creative respelling. The examples are 'quarantini' – which refers to a cocktail people drink at home under quarantine.

There is even a funny example which belongs to a rhyming slang, and that is 'Miley Cyrus' for coronavirus.

Canadian Government even published the glossary on the COVID-19 pandemic, both in English and French, which can be found here: https://www.btb.termiumplus.gc.ca/publications/covid19-eng.html.

There are more examples which all fall into one of the abovementioned categories but since the topic of the paper are collocations, the next chapter will deal with them.

1.2. Collocations

The study of collocations started in the 1950-ies and the term is derived from the Latin for 'place together'. In the linguistic sense the term was first used by Firth. To him, collocation is a mode of meaning. He thinks that lexical meaning of a word is realized through multiple meanings on various levels (Firth, 1957). He also thinks that the meaning of a collocation is determined by its lexical meaning on the syntagmatic level. Syntagmatic and paradigmatic relation between lexical units can be shown schematically by two axes – a horizontal and vertical. The paradigmatic axis is vertical and includes all the words that belong to the same class and are interchangeable in a certain grammatical and lexical context. The horizontal axis is syntagmatic and refers to the ability of a word to connect with the others. For example, in a sentence *Mary drank beer, beer* is in a paradigmatic relation to *wine, juice, Coke* while in syntagmatic with *drank* and *Mary*. Therefore, a collocation is a result of lexical relations along the syntagmatic axis.

In order to understand collocations, some terms have to be explained, and they are 'collocate', 'node' and 'span'. 'Node' refers to a lexical unit which is investigated. 'Span' refers to a number of lexical units from any side of a node, which is relevant in collocating units, and a 'collocate' is a unit which determines a span. For example, if a node is 'car', and a span three, it means that we are considering three lexical units before and after 'car'. All lexical units within a span of the word 'car' are its collocates.

There are many types of collocations but here we will mention only the classification introduced by Sinclair (1991) who distinguishes downward collocations in which *a* is a node and *b* a collocate, and upward collocations in which *a* is a collocate and *b* is a node. Sinclair's examples for a downward collocation is 'bring back' where 'back' is a node and 'bring' is a collocate and for an upward collocation 'back from' where 'back' is again a node and 'from' is a collocate.

Previous research was mostly focused on collocations in general English (cf. Channel 1981, Elkhatib 1984, Ghadessy 1989, Aghbar 1990, Aghbar & Tang 1991, Fayez-Hussein 1990, Bahns & Eldaw 1993, Zhang 1993, Arnaud & Savignon 1994, Gitsaki 1999). In the scientific English collocations were addressed by Gledhill (2000) and in Croatia Špiranec (2005 – technical English), Štefić (2010 – dental medical English) and Miščin (2012 – medical English), as well as Miščin & Pavičić (2013 – medical English).

This paper will deal with mostly downward collocations with a noun as a node.

2. Material and methods

Two corpora were formed – one from scientific articles dealing with COVID-19 and another from popular internet articles on the same subject. Each corpus was analyzed by TextSTAT in order to get the most frequent nouns. Twenty most frequent nouns were chosen (personal names were exempted) and their collocations were sought. The collocations were divided into groups – verb + noun, noun+ noun and adjective+ noun, and in a popular corpus, other + noun. In the end, the conclusion was brought.

The following research questions were asked:

1. What are the most frequent nouns and are their differences between corpora?
2. What are the most frequent collocations occurring with these nouns?
3. Are these collocations different than the ones in general medical corpus?

3. Discussion and results

3.1. Scientific corpus

The scientific corpus was made of articles found on Google Scholar and a Handbook of COVID-19 prevention. It contained 32,149 word units. After being processed by TextSTAT, twenty most frequent nouns were selected for collocations. These nouns can be seen in Table 1.

Table 1. Twenty most frequent nouns in the scientific corpus

NOUN	NUMBER OF OCCURRENCES
patient	336
COVID-19	276
transmission	199
case	131
respirator	95
treatment	87
disease	78
infection	68
blood	62
health	58
symptom	58
lung	54
measure	49
SARS-CoV	49
year	49
risk	43
coronavirus	42
therapy	42
prevention	41
oxygen	40

Table 1 shows most frequent nouns and the number of their occurrences. The

lemmatization principle was used, which means that the words of the same lemma (a base form of a word) were analyzed as a single item (e.g. ‘patients’ is analyzed under ‘patient’). The most frequent word is ‘patient’ followed by ‘COVID-19’ which is a more formal word for the disease. Though most of the words are medical ones, some of them could be used in a general sense – like ‘case’, ‘treatment’, ‘year’, ‘risk’.

After that, concordances of the words were analyzed to find collocations. As mentioned before, downward collocations were looked for, though some upward ones will also be mentioned.

Figure 1 shows the example of concordance for a noun ‘patient’

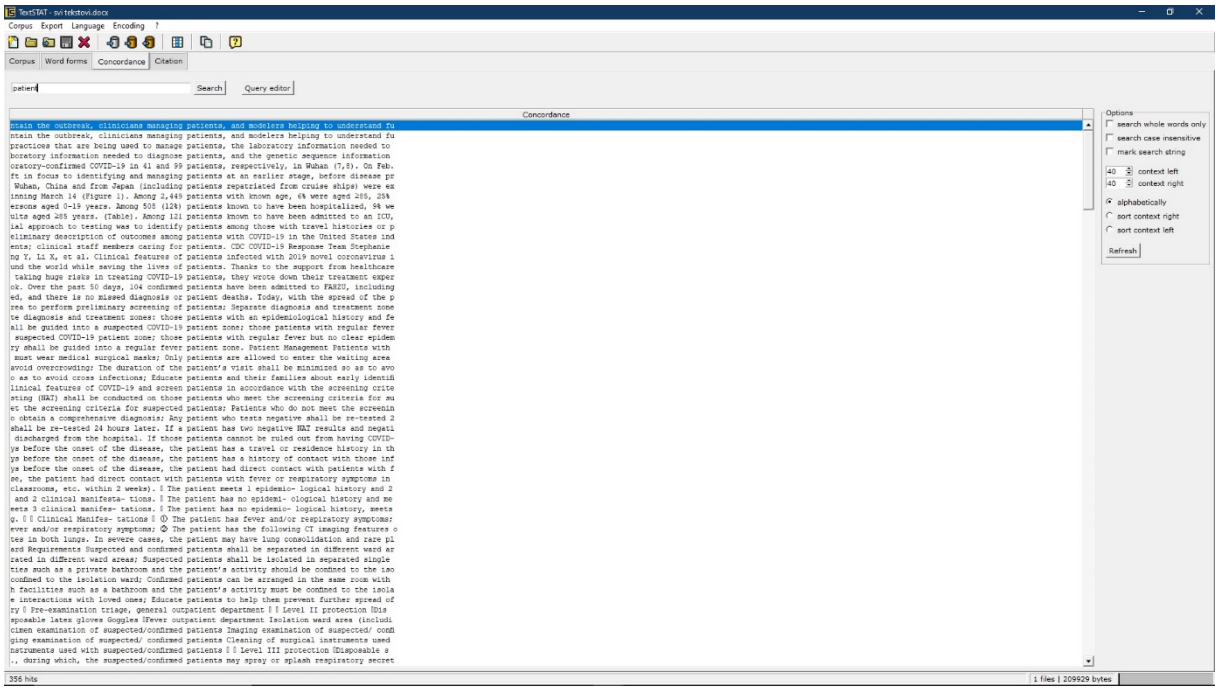

Figure 1. Concordance for a noun ‘patient

Such concordances help in determining collocations and in distinguishing a part of speech (for example, ‘patient’ can also be an adjective, and in this way such mistakes can be avoided). Also, collocates do not always necessarily occur immediately before the node, but two-three or even more words before it.

The list of nouns with collocates was made and it can be seen in Table 2.

Table 2. the list of upward collocations with twenty most frequent nouns

COLLOCATION			**NODE**
ADJECTIVE	*NOUN*	*VERB*	
Confirmed, suspected, critically ill, mild, ordinary, applied to, severe, elderly, discharged, hospitalized, recovered, infected	COVID-19, screening of, identification of, hyperglycemia, ECMO	Manage, diagnose, identify, care for, educate, screen, encourage	**patient**

Confirmed, reported, severe, mild, suspected, critical	Exposure to, spread of, treatment of, diagnosis of, control of, investigation of, transmission of, test of, report of, isolation for	Describe, treat, have, manage, diagnose with, cause	**COVID-19**
Early, local, interrupted, epidemiological	Human-to-human, cluster, aerosol, person-to person, COVID-19, risk community, levels of, type of, risk of	Reduce, prevent	**transmission**
Confirmed, locally transmitted, reported, multiple, laboratory-confirmed, active, severe, suspected, highly-suspected, critical, imported, domestic, repatriated, asymptomatic	COVID-19	Identify, isolate, manage	**case**
Air-purifying	----------	----------	**respirator**
Initial, personalized, supportive, preferred, effective, clinic, antibacterial, antiviral, planned, continuous	Chronic diseases, corticosteroids, oxygen supplementation, oxygen, HFNC, COVID-19, convalescent plasma, heat, in-patient, ALSS, patient	Arrange, achieve, monitor, fail	**treatment**
Serious, severe, brand-new, infectious, chronic, underlying, pulmonary, cerebrovascular, original, neuromuscular, blood-borne, retinal, physical, pancreatic	Coronavirus, onset of, bleeding, chronic airway, autoimmune system, development of, spread of, respiratory, spectrum of	Stop, prevent	**disease**
Cross, possible, fungal, severe, viral, bacterial, gut-derived, nosocomial	Coronavirus, COVID-19, risk of, lung, onset of, post-procedure, urinary tract, bloodstream, SARS-CoV-2, source of, human	Prevent, reduce, avoid, define	**infection**
----------	----------	----------	**blood**
----------	----------	----------	**health**
Severe, respiratory, relevant, clinical, obvious, gastrointestinal, cold-heat, psychotic, cardiovascular, systemic	Identification, respiratory tract, respiratory distress, onset of, severity of	Monitor, have, worsen, relieve, observe	**symptom**
wet	----------	expand	**lung**
Protective, social, environmental, appropriate	Community based mitigation, isolation, response, social distancing, public health, travel, physical distancing, international travel, staying-at-home		**measure**

Termed, induced by, caused by, recovered from, infected with	Outbreak of, case of	Diagnose, test for	**SARS-CoV**
----------	----------	----------	**year**
Higher, high, huge, potential, nutritional, critical	Exposure, mortality, aspiration, nutrition, infection	Increase, reduce, prevent, assess, estimate, determine, take, be at	**risk**
Novel, respiratory syndrome-related, new, suspected	Outbreak of, infection with	----------	**coronavirus**
Controlled, anti-fungal, cold-heat, physical	Oxygen, corticosteroid, HFNC, plasma, convalescent plasma, continuous renal replacement, rehabilitation, ribavirin, antihypertension	----------	**therapy**
	Infection, delirium, aspiration	----------	**prevention**
inspired	blood	----------	**oxygen**

Table 2 shows that some nouns have quite a lot of upward collocations while some have very few or none at all. The examples of nouns without upward collocations are: blood – but it appears with downward collocations - blood gas analysis, blood-borne disease, blood clotting, blood type; health which also occurs with downward collocations: health professionals, health emergencies, health conditions, health care providers. 'Lung' occurs with only few upward collocations but its downward collocations are: lung function, lung transplantation, lung lesions. 'Years' occurs mostly in the phrase 'over the years' and oxygen also occurs in quite a few downward collocations: oxygen inhalation, oxygen therapy, oxygen concentration, oxygen saturation.

Collocates were classified into three groups: adjectives, nouns (which have an adjectival function) and verbs. The most frequent noun 'patient' also has the most collocations – twenty-five. The noun 'year' does not have any collocates, and the noun 'oxygen' has only two collocates. The most frequent combinations are adjective + noun. Although there are other programs, like Collocation Extract, which can automatically extract collocations, such a method has limitations. For example, some collocations involve words that may be separated by other words and that may not be directly related, or a node can be a part of another word combination, e.g. 'health' can be a part of 'health hazard', and therefore, cannot be included in the list of collocations occurring with 'health'.

Regarding the most frequent nouns and comparison with general medical corpus (see Miščin, 2012), the only new nouns which appear are the names of the new disease: COVID-19, coronavirus, and SARS-CoV.

3.2. Popular corpus

The popular corpus was composed of various articles from British and American popular papers found on the Internet. It consisted of 23,459 word units. Most frequent nouns can be seen in Table 3.

Table 3. Twenty most frequent nouns in the popular corpus

NOUN	NUMBER OF OCCURRENCES
coronavirus	137
case	132
COVID-19	108
people	106
virus	69
pandemic	48
health	46
lockdown	46
home	44
symptom	39
week	38
public	35
number	33
testing	33
state	32
outbreak	30
country	29
church	27
data	25
distancing	25

As it can be seen in Table 3, the most frequent noun in the popular corpus is ‘coronavirus’ which is higher on the list and precedes ‘COVID-19’ which had a higher frequency in the scientific corpus. ‘COVID-19’ is third on the list. This list has some words which do not appear

in the scientific list, which is understandable, since they belong to different registers.

The list of nouns with collocates can be seen in Table 4.

Table 4. the list of upward collocations with twenty most frequent nouns

COLLOCATION				**NODE**
ADJECTIVE	*NOUN*	*VERB*	*OTHER*	
Novel, human, canine, feline, new, milder, positive for	Cases of, origin of, Wuhan, MERS, SARS, spread of	Die of, infect with, eliminate, catch, contract, bench by	----------	**coronavirus**
New, positive, imported, known, confirmed, recorded, recent, recovered, Victorian, strong, single, rare, milder, linked to, unreported, diagnosed	Coronavirus, increase in, spike in, number of, COVID-19, growth in, rise in, surge of, amount of	Confirm, track, assign	----------	**case**
Positive for, effective against	Prevention of, support for, death from, fear of, risk from, transmission of	Have, treat, get, ride out, recover from, relate to, diagnose with, die of, die from	Due to	**COVID-19**
Young, influential, well-intentioned, older, Asian, black, white, infected	dozen	Remind, call for, apply to, avoid, detect, round up, endanger, include	----------	**people**
Vulnerable to, positive for	Transmission of	Strike down to, contract,	----------	**virus**
Current, caused by, global	Coronavirus, COVID-19, trajectory of, stages of, Spanish flu	----------	----------	**pandemic**
Physical, public, spiritual, mental, global	----------	----------	----------	**health**
Localized, local, current, dramatic, placed in, toughest, Wuhan's, nationwide, New Zealand's	Leicester, COVID, stages of, value of, coronavirus	Go back into, return to, enforce, move out of, extend, crawl out of, bought by, stay in	----------	**lockdown**
Parents'	Family	Stay at, work from, come, fly, shift to, stay, arrive	back	**home**
Mild, milder, common, severe	Onset of, coronavirus, flu-like, COVID-19	Show, have, develop, relieve	----------	**symptoms**
Last, several, past, recent	Couple of	----------	Two, six	**weeks**
----------	----------	Go out in, disempower, prepare	----------	**public**
Large, total, actual, highest, official	Phone, case	increase	per	**number**

Effective, accurate, drive-thru, less-targeted, adequate, daily, extensive, proper	----------	Have, increase	----------	**testing**
Badly-hit	----------	Travel from	----------	**state**
Growing, largest, Australian, recent, current, latest, past, nations'	COVID-19, coronavirus, SARS, Zika	----------	----------	**outbreak**
Remote, worst-affected	----------	enter	across	**country**
Pentecostal, South Korean	----------	Surge through, strike, reopen, trace to, accuse, shut down	----------	**church**
Live, Australian, extended, deidentified, large	Paucity of, backlog of	Collate, disclose, publish	----------	**data**
Social, physical, mandatory*, necessary*, effective **	----------	Promote*, practice*, maintain*, take to*, stick to*, reintroduce**	----------	**distancing**

* refers to 'social distancing' collocation

** refers to 'physical distancing' collocation

As it can be seen in Table 4, the most frequent collocates are again adjectives. There are also quite a lot of trigrams (three-word collocations), mostly consisting of either a verb, noun or adjective plus a preposition. Though this paper is mostly concentrated on bigrams (two-word collocations), trigrams were quite interesting, and considered of a linguistic value, and that is why they were also included. A noun 'distancing' rarely appeared alone in the corpus. It was mostly used in a collocation either 'social distancing' or 'physical distancing' or even in phrases like 'social distancing restrictions', 'social distancing rules', 'social distancing requirements'. With collocations they created n-grams: 'compliance with social distancing restrictions', 'observe social distancing rules', 'adhere to social distancing requirements'.

This corpus included some other collocations apart from verb, noun, and adjective ones. They were classified in the category 'others' and include prepositions (due to) and numbers (two).

The noun with the highest number of collocates is 'case' (twenty-eight). 'Public' and 'state' have the lowest number – only two collocates.

Again, only two new words occurred in the corpus – 'coronavirus' and 'COVID-19'. But unlike in the scientific corpus, 'coronavirus' was more common than its more formal synonym 'COVID-19' which could be attributed to a different register.

There were no other studies on the similar topic but if these collocations are compared with the research carried out by Miščin (2012) on verb collocations of the most frequent medical

nouns, some similarities can be found. They can mostly be found in the scientific corpus since the 2012 study belongs to the same register. All the verbs that appear in the scientific corpus were found in the 2012 general medical corpus. The exceptions are: 'care for', 'educate', 'diagnose with', 'arrange', and 'test for'. However, only few verbs from the popular corpus can be found also in the 2012 general medical corpus. They are: 'have', 'develop', 'get', 'show', 'relieve', 'treat'.

Regarding the nouns, the situation is similar. The nouns from the scientific corpus that cannot be found in the 2012 general medical corpus are: 'COVID-19', 'respirator', 'SARS-CoV', 'year', and 'coronavirus', while from the popular corpus the following cannot be found: 'coronavirus', 'COVID-19', 'people', 'pandemic', 'lockdown', 'home', 'week', 'number', 'outbreak', 'country', 'church', 'data', 'distancing'. Those are all nouns related to the present disease or to more general vocabulary.

4. Conclusion and further recommendations

This paper dealt with the analysis of two corpora – a scientific and a popular one – created for the purpose of analyzing the most frequent nouns and collocations on the topic of a recent disease – coronavirus or COVID-19.

Three research questions were formulated. The answer to the first is that the most frequent noun in the scientific corpus is 'patient', while in the popular 'coronavirus'. There are differences in the most frequent nouns and their collocates, which is understandable as they belong to different registers.

The answer to the second question is given in Tables 2 and 4. The noun with most collocates in the scientific corpus is 'patient' with twenty-five collocates and 'case' in the scientific corpus with twenty-eight collocates. Some collocations are trigrams but also the examples of n-grams were given.

The answer to the third question is that collocations are different than the ones in general medical corpus since they refer to a specific disease non-existent at the time when the general medical corpus was created, and also because of different registers.

It would be interesting to extract also downward collocations and to do the research on the more extensive corpus. However, these collocations could prove useful both for scientists when writing about this disease, and for lay people when speaking about everyday problems caused by this virus.

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