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Writing science in urgent times: CoViD-19 and its impact on scientific writing

Research article

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Abstract: The urgent need for new knowledge as a result of the CoViD-19 pandemic has led to a significant increase in the amount of scientific writing on the topic. Various analyses of this phenomenon from different approaches have appeared thus far (Horbach 2020; Torres-Salinas 2020). However, less attention has been paid to the impact of this situation on the language of these studies, looking into whether the continued emergency affects authors' conscious or unconscious linguistic choices, and if so, how. This article compares texts on CoViD with texts written during the previous MERS emergency and its aftermath, trying to find if texts on CoViD present particular linguistic features reflective of this situation of urgency. Results suggest that texts on CoViD do indeed exhibit particular linguistic features, and that these point to a preference for conveying immediate knowledge and a departure from rhetorical practices common in scientific writing.

Keywords: *discourse analysis • scientific writing • academic discourse • editorial pressure*

1 Introduction

The situation that the whole planet is living with the CoViD-19[1] pandemic at the time of writing this paper is different from anything previously experienced. And this is not because humankind has not suffered pandemics before (from the Antonine Plague during the Roman Empire to the ongoing HIV/AIDS pandemic, through the Black Death in Medieval times to so-called Spanish flu in the early-twentieth century), but because of the sheer amount of scientific knowledge that has been produced during the current emergency, and the speed with which it has been generated. This is a result both of the urgency of the situation and of the way information has come to be transmitted over recent years via the internet.

This urgency, and its effects on both publication processes and the quality of science itself, has already been the object of analysis (Horbach 2020; Torres-Salinas 2020), but less attention has been paid to the impact of this situation on the language of research articles themselves, and, more particularly, on whether and how the current public health emergency has affected authors' conscious or unconscious linguistic choices.[2] By analysing how scientific information is conveyed in these times of urgency, we might better identify whether the use of certain linguistic features might be indicators of urgent writing. A useful point of departure to this end is to compare the linguistic characteristics of CoVID articles,

1 The commonly used acronym for the Coronavirus Disease.

2 In fact, initial research on the language of CoViD-19 has mainly focused on the challenges of communicating rules and restrictions to a global audience in multiple languages (Khan et al. 2020; Piller et al. 2020), rather than on the language of scholarly articles on CoViD-19.

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published under pressure and in a situation of emergency, with others written about almost identical topics, but at a time when pressure was not so intense or had reduced in some way.

The paper is structured as follows: Section 2 will present the background to, and circumstances in which, this study has been conducted. Section 3 will then present the material which constitutes our data as well as the method followed to carry out the study. Following, Section 4 will set out and analyse our findings, which will be discussed in Section 5, whereas we will try to provide some concluding remarks in Section 6.

2 Background and initial hypothesis

A brief review of what coronavirus is and how its behaviour affected editorial cycles seems in order prior to our linguistic analysis. Coronaviruses are a large family of viruses that can affect both animals and humans in different degrees "from common cold to Severe Acute Respiratory Syndrome (SARS)" (WHO 2013).

From the beginning of the twenty-first century, three novel coronaviruses causing disease in humans have been discovered. The SARS-CoV virus caused the 2002–2004 SARS epidemic, affecting twenty-nine countries, mainly in East Asia (WHO 2004). In April 2012, a new coronavirus was first reported in Saudi Arabia, spreading to other countries in the area. The International Committee on Taxonomy of Viruses named it MERS-CoV, and the disease it produced MERS (Middle East Respiratory Syndrome). In July 2013 the World Health Organisation (WHO[3]) convened an Emergency Committee to decide whether they should declare MERS a Public Health Emergency of International Concern, deciding against doing so (Canadian Press 2014). The disease was considered to have passed its peak in April 2014 and, after South Korea's May 2015 outbreak, no further surveillance timelines have been recorded (MedlinePlus 2020). This seems to indicate that less attention has been paid to it.

The third such coronavirus, said to have appeared on the 31st of December 2019, is SARS-CoV2, the coronavirus causing CoViD-19. This new coronavirus was identified after Wuhan Municipal Health Commission, China, reported some cases of pneumonia. The new coronavirus identified was provisionally labelled 2019-nCoV by the WHO and later renamed SARS-CoV-2 by the International Committee on Taxonomy of Viruses. As with MERS, timelines have been developed by the WHO (2020a) and are continually updated (WHO 2020b) to follow the evolution of CoViD-19 which, contrary to what had happened with MERS, was declared a pandemic on the 11th of March 2020 (WHO 2020c).

Due to strong demand from social and healthcare-related sectors, the amount of scientific studies on coronaviruses and CoViD-19 has increased dramatically. According to Salas (2020), around 3,000 articles on coronaviruses were published each year between 2004 and 2019, whereas after the declaration of the pandemic in March 2020, 700 have appeared every day. Concurrently, Torres-Salinas (2020) notes that by mid-May 2020 "the daily global growth rate is 500 publications and the production doubles every 15 days". This has resulted in notable pressures on academic publishers and has severely tested their ability to cope with the higher flux of work for publication (Horbach 2020; Torres-Salinas 2020).

The effect of the CoViD-19 pandemic in scholarly publishing is not only a question of the number of works and the subsequent pressures on publishers, but also a matter of the time it takes and the processes required for individual authors or groups of authors to produce an article that meets customary quality requirements. It has been argued that scientific writing needs its own timing, including time for reflection as well as revision by peers, in order to attain the expected level of quality (Salas 2020). However, the current situation of emergency has put pressure on these processes, and even though the speed at which medical papers are reviewed has increased drastically for all work relating to CoViD-19 (Horbach 2020), a dilemma has also emerged regarding the trade-off between sacrificing some quality in the information conveyed for the sake of immediacy and delaying publication until high-quality information has been fully reviewed and processed in the normal way.

[3] The World Health Organisation (WHO) was established in April 1948 to monitor public health risks and coordinate responses to health emergencies, among other things.

Taking all these factors into consideration, then, our initial hypothesis is that emergency situations (both in medical and editorial terms) such as the one arising because of this pandemic, inevitably have an influence on the use of scientific language. In this scenario, our interest is in finding out in which direction language is modified by the medical and social demand for studies, and, concurrently, by ensuing editorial pressures. More specifically, we shall explore a) whether texts on CoViD-19 present a particular linguistic profile as a result of the emergency situation, b) which linguistic elements among those selected for analysis are characteristic of this profile, and c) whether these linguistic elements are related to the creation of a feeling of urgency.

3 Corpus material and methodology

The data for this study comprises three groups of articles, all taken from *The Lancet*, a British journal (https://www.thelancet.com/), first published in 1823, which is known to require peer reviews, and whose high standards are widely respected. By selecting texts from this single journal we have disregarded the enormous body of scientific work now available in preprints and in all manner of repositories and open-access sites such as the *Royal Society Open* Publishing.[4]

The Lancet comes out weekly, which implies a quick revision process. Its motto is "The best science for better lives" and a manifesto on the journal's web page includes three main items. The first of these, "Highest standards for medical science", claims that "We select only the best research papers for their quality of work and the progression they bring". The other two, "Improving lives is the only end goal" and "Increasing the social impact of science", are of a clearly applied nature. The content of this third item is most relevant to the purposes of the present study:

> We recognise that a great research paper is not enough and that it requires development, mobilisation, and exposure. So we promise to set agendas, create context, inform leaders, start debates, and advocate for the idea that research can and will make a difference. (*The Lancet* 2020)

Throughout 2019, *The Lancet*, as well as other medical journals such as *The New England Journal of Medicine*, occupied a prominent position in the bibliographical indexes (Q1 in Elsevier-SCOPUS according to https://www.scopus.com/sources.uri). In fact, this journal was chosen as a source of data because of its peer-review system, which in principle guarantees better quality standards. These should be reflected not only in the validity of the scientific method but also in writing style.

Since we intend to compare texts written in a situation of emergency with those written after such a situation had subsided, the three groups of articles selected correspond to three different moments in time (in accordance with the reporting and development of Public Health emergencies). Thus, we have selected eight articles published by the journal between the 29th of May and the 17th of December 2013, coinciding with the MERS emergency,[5] and which we have labelled 'MERS Peak'; five articles published after that emergency (between the 9th of April 2015 and the 13th of December 2019), these corresponding to the group 'MERS Valley'; and another thirteen articles published during the CoViD-19 emergency, that is, between the 24th of February and the 8th of April 2020, referred to as 'CoViD Peak'. These dates are not arbitrary, but reflect moments at which the World Health Organisation made specific announcements relating to the respective situations.

To ensure that other factors, such as subject matter, do not exert any influence on linguistic choice,[6] all the articles address the same topic, respiratory syndromes caused by coronaviruses, and all have

4 The Royal Society has established a group of 700 reviewers to carry out paper reviews in 24 to 48 hours (Brock 2020).

5 Articles on MERS have been preferred over articles on SARS for comparison with CoViD-19 texts due to their proximity in time and despite the diverging geographical areas affected.

6 As part of our methodology, we did not consider whether authors were native speakers of English or not. This would have been problematical from a practical point of view, and we also assumed that the journal would have revised texts for linguistic correctness, thus rendering the status of particular authors of less import.

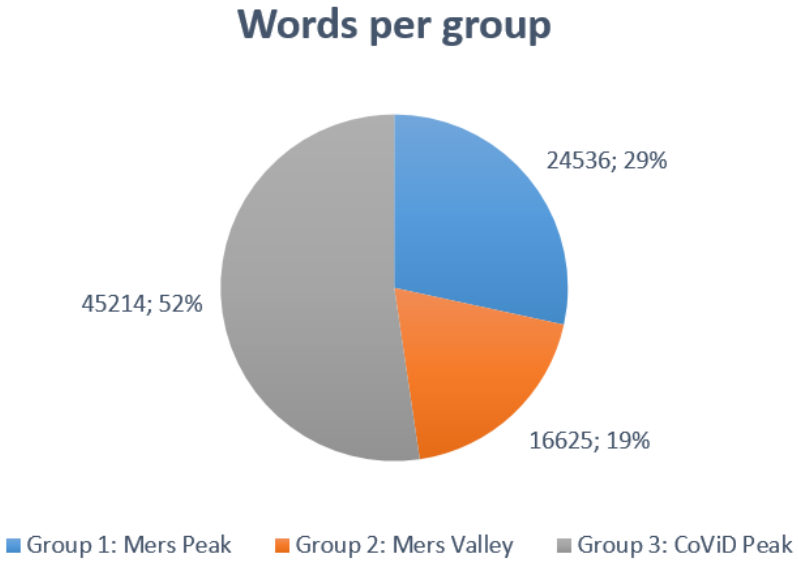

Figure 1. Distribution of words per group.

been selected from the same section of the journal, thus ensuring that they share the same structure and format. Also, we have divided all articles into their four sections (Introduction, Methods, Results, and Discussion) to ensure homogeneity, since different sections have been shown to behave as different genres with their own characteristics (Lin and Evans 2012). Our initial expectation was that few or no differences would be found in the three first sections (Introduction, Methods, and Results), whereas Discussion would probably yield more differences.

Our dataset numbers some 104 section-length samples (32 for MERS Peak, 20 for MERS Valley, and 52 for CoViD Peak), containing a total of 86,375 words. Their distribution is shown in Figure 1.

The articles in MERS Peak, with 24,536 words, were written during the MERS crisis, and therefore presumably subject to urgent writing and revision processes. The samples in MERS Valley, containing 16,625 words, include articles written after the peak of the MERS emergency and which therefore, in accordance with the journal's aims and scope mentioned above, should have followed strict scientific methodologies and should also have been revised by peers free of the urgency of a situation of emergency. Finally, under CoViD Peak we have placed those articles (45,214 words) written during the Coronavirus Emergency, under the pressures of a medical emergency when the methods and practices of publishing houses were being severely tested.

Articles were available on the journal's website (www.thelancet.com) in PDF format. In order to process them, they were converted to .txt format and one independent file was created for each of the four sections which typically appear in research papers. Summaries, references, footnotes, captions, and some other components such as the 'Research in Context' panels were discarded.

Once processed this way, the total number of words for each section is as given in Table 1.

As is customary with medical articles, the word count in our samples increases in the consecutive sections, with introductions being the shortest and discussions the longest. Given the differences between the sizes of sections, all word frequencies have been normalized in the analysis.

We searched the resulting corpus for a series of linguistic features that we identified as those most likely to encode urgency. The selection of these is influenced by Biber's (1988)[7] pioneering work that

[7] The communication of science has been studied quite intensively over recent decades and, apart from Biber (2006), this is thanks to contributions by authors such as Swales (1990), Fairclough (1993), Biber, Conrad and Reppen (1998), Cargill and O'Connor (2006), Hyland (2012), and Biber and Conrad (2019).

Table 1. Distribution of words in sections.

Section	Words
Introduction	9408
Methods	22556
Results	25030
Discussion	29381

Table 2. Verbal features selected.

	Lexical features	Grammatical features
Dimension 2	Public verbs	Past tense Perfect aspect *Present tense* (negative feature)
Dimension 4	Suasive verbs Necessity modals Prediction modals Possibility modals	Infinitives

applies multifactorial analysis to academic language in an attempt to discover underlying tendencies in the way in which particular disciplinary discourses developed. In this work, he identified a series of dimensions, or groups of features, which presented common variation and encoded particular meanings, which helped characterize different registers. Among these, three helped distinguish scientific writing from other registers, while two had the potential to show variation among different scientific texts: these are Factor 2, "Narrative vs. Non-narrative concerns" (Biber 1988: 108–109); and Factor 4, "Overt expression of persuasion" (Biber 1988: 111).

As noted above, each of these factors is characterized by a tendency for certain linguistic features to co-occur, features that readers may recognize as typical of particular registers and styles. Thus, the use of the perfect aspect and public verbs (such as *admit* or *explain*) is typical of Factor 2 (narrative vs non-narrative) whereas modals and suasive verbs (such as *grant* or *decide*) occur more frequently in texts with a high persuasive load (Dimension 4). We have selected the verbal linguistic features in these two dimensions for our analysis, distinguishing between lexical and grammatical features, as set out in Table 2.

In turn, the inventory of lexical elements searched for in the data is set out in Table 3.

For lexical items, all possible forms of these verbs (base form, 3rd person singular, *-ing* and *-ed*) were searched. Following all searches, carried out automatically with AntConc 2019 (Laurence 2019), manual disambiguation was needed for those cases in which a particular form could belong to two or more different types. This was done through a close reading of concordance lines, in order to eliminate all those tokens that were not verbal forms, such as *demand* in (1) or *request* in (2):

(1) In the Middle East, huge numbers of camels are imported from Africa to meet the **demand** for meat (1054)[8]

(2) From the time of laboratory diagnosis, respiratory, faecal, and urine samples were obtained. We designed two different sets of primers generating overlapping amplicons (available on **request**) (1022).

[8] Sources for examples have been encoded as a 4-digit number. The first digit indicates the period (1 MERS Peak, 2 MERS Valley, 3 CoViD Peak), the second and third digits identify particular samples within the period, and the final digit indicates the section in the text (1 Introduction, 2 Methods, 3 Results, 4 Discussion).

Table 3. Verbs (lexemes) selected.*

Suasive verbs	*agree, arrange, ask, beg, command, decide, demand, grant, insist, instruct, ordain, pledge, pronounce, propose, recommend, request, stipulate, suggest, urge* (Quirk et al. 1985: 1182–1183; Biber 1988: 242)
Public verbs	*acknowledge, admit, agree, assert, claim, complain, declare, deny, explain, hint, insist, mention, proclaim, promise, protest, remark, reply, report, say, suggest, swear, write* (Quirk et al. 1985: 1180–1181; Biber 1988: 242)
Possibility modals	*can, could, may, might* (Biber 1988: 241)
Necessity modals	*must, ought (to), should* (Biber 1988: 242)
Predictive modals	*will, would, shall* (Biber 1988: 242)

* Modals have been classified in a single category, despite modal polysemy, following Biber's taxonomy (1988: 241–242).

Similarly, verb lexemes appearing in more than one category were classified by means of close reading. This is the case with *suggest*, which can fall within the category of suasive verbs, as in (3), or public verbs, as in (4).

(3) The risk that on acquisition of mutations MERS-CoV might become increasingly transmissible between human beings must also be kept in mind and continuously assessed as **suggested**. (1014)

(4) These findings indicated the appearance of interstitial changes, **suggesting** the development of fibrosis. (3084)

Results on the use of grammatical features were obtained by means of close reading of all the texts. This combination of corpus-based methods and close reading is well attested in the field (see Atkinson 1996, for instance), and allows for insights into uses which might otherwise be disregarded, whilst at the same time helping to overcome some of the pitfalls of a corpus-based-only approach. In this case, it was indeed a necessary approach, since there were a number of false identifications in POS-tagged texts, particularly with bare infinitives identified as simple present verbs and isolated past participles identified as uses of the simple past.

The following section presents our findings and the analysis of data.

4 Analysis of data

The analysis of our results shows the anticipated differences between the sections of the articles under study. In the 86,375 words of the corpus, there were 3,507 uses of verbs in the simple past, 1,298 in the simple present, 569 infinitives, and 330 perfects. Also, we found 299 public verbs, 100 suasive verbs, 355 possibility modals, 96 predictive modals, and 55 necessity modals.[9]

As shown in Figure 2, the sections on Methods[10] and Results show a higher prevalence in the use of verbs in the past, with 53.87 and 53.86 uses per thousand words, respectively, accounting for almost three quarters of all verbs. By contrast, Introductions show a higher prevalence of verbs in the present, at 24.45 uses per thousand (31.86% of all verbs studied here). Discussions show a more balanced

[9] It should be noted that some categories are grammatical and some are lexical. This means that, for instance, a private verb in the past has been counted twice, once as a private verb and once as a verb in the past. This is in keeping with Biber's practice.

[10] Most texts include a small subsection with the title "Role of the funding source" in the Methods section, which often includes a semi-formulaic statement reading "The sponsors of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding authors had full access to all the data in the study and final responsibility to submit for publication." This includes two uses of simple past and one of an infinitive. They have been included in the counts as not all texts show exactly the same statement and may, therefore, reveal some variation.

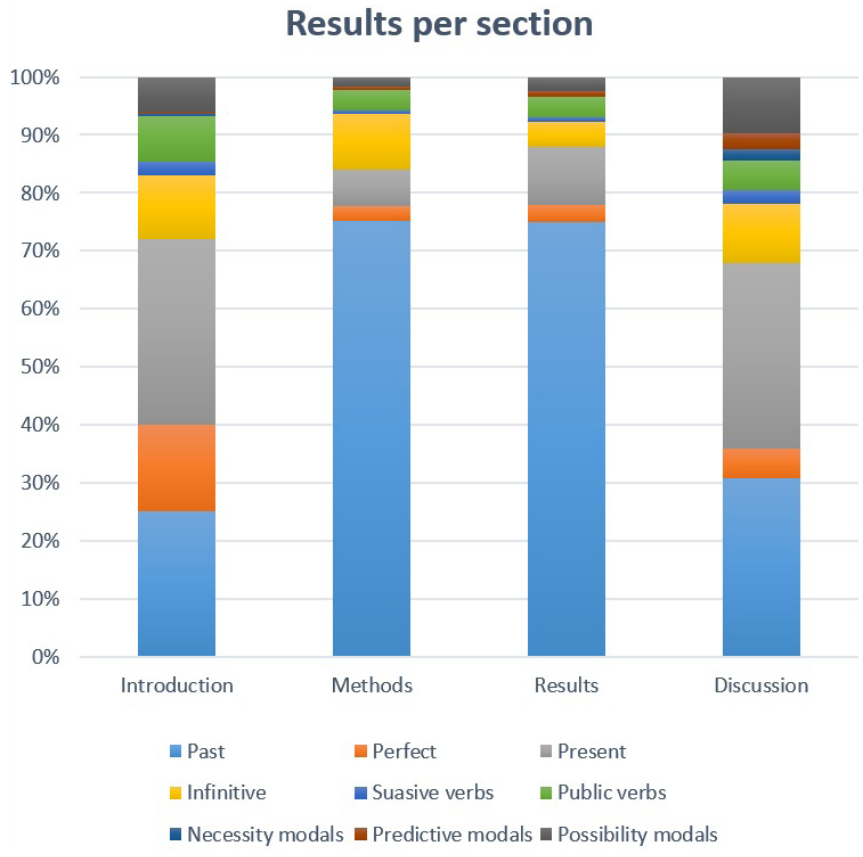

Figure 2. Overall distribution of verbal features per section.

distribution, with 26.82 uses of verbs in the present per thousand words (31.82%), whilst verbs in the past are used 25.97 times every thousand words (30.97%).

The difference in the use of modals is also notable, in that they appear to be much more common in Introductions and Discussions, particularly the latter, than they are in Methods and Results sections. This is especially the case with possibility modals, which represent 6.10 per cent of all uses in Introductions and 9.77 per cent in Discussions, compared to only 1.61 per cent in Methods and 2.39 per cent in Results; see Figure 2.

As noted above, these results are more or less as expected, in that each section shows a different rhetorical profile since they serve different purposes in the text, which correspond with particular verbal tenses (Swales 1990: 133–137; Ozturk 2007). Introductions connect the question of study, in the present time, to the existing body of knowledge about it, thus explaining the higher use of verbs in the present tense. Both Methods and Results show a more narrative nature, as they report on finished procedures and how they have occurred. Thus, the absolute prevalence of verbs in the past in these sections is not surprising. Finally, Discussions reconnect the results of these procedures with the present situation and project the new knowledge acquired into the future, thus explaining the distribution of the uses shown here, with a higher use of modals than in the other sections.

However, analysis of the results comparing the different periods of study, that is, MERS Peak, MERS Valley, and CoViD Peak, has uncovered differences in the distribution of features in each of these sections across the three periods, as shown in Figure 3.

In what follows, these overall differences in the data are examined in some detail, starting with lexical features, and then turning to the distribution of the different grammatical features.

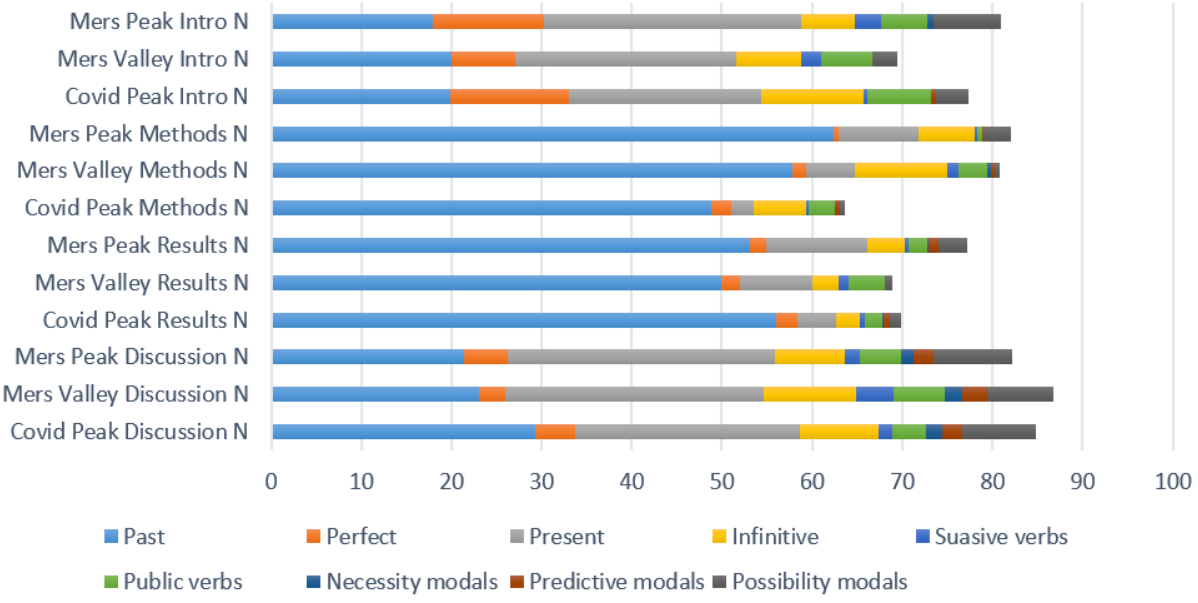

Figure 3. Distribution of verbal features across periods and sections.

4.1 Lexical features

Introductions show notably lower use of both possibility modals and suasive verbs in CoViD texts compared with texts on MERS. Possibility modals occur 3.67 times per thousand words in CoViD texts, down from 7.47 during the MERS emergency, and suasive verbs appear only 0.49 times per thousand words, compared to 2.92 and 2.22 times for the MERS emergency and the period immediately after it. This contrasts with public verbs, whose use increases in CoViD texts (7.10 uses per thousand) compared with the MERS emergency (5.20) and its aftermath (5.78).

As regards the Methods sections, we see that possibility modals account for 2.64 uses per thousand words in texts during the MERS emergency, but only 0.60 and 0.64 during its aftermath and in the succeeding CoViD emergency, respectively. However, perhaps the most relevant divergence across the different periods in Methods sections is the lower total of all categories under study (both grammatical and lexical features) in texts on CoViD (63.65 uses per thousand) compared with texts on MERS (82.01 in MERS Peak and MERS Valley).

For the Results sections, once again the most notable difference is the lower use of possibility modals in CoViD texts, only 1.20 uses per thousand words, down from 3.16 in texts written during the MERS Peak.

However, differences in the use of possibility modals in Discussions are less striking, with 8.81 uses per million during the MERS emergency and only a slight decrease to 8.14 in texts on CoViD.

Thus, it seems the main difference regarding the use of lexical features in the three sets of sections is the lower use of possibility modals in the Introduction, Methods, and Results sections of CoViD texts compared with texts written during the MERS emergency.

Notwithstanding this, with regard to lexical features it is interesting to note the occurrence of certain specific verbs. Both public verbs and suasive verbs concentrate the vast majority of all their uses in just two lexical forms, as shown in Tables 4 and 5. In the case of public verbs, these two verb types are *report* and *suggest*, which account for 53.84 per cent and 36.45 per cent of all uses of public verbs, respectively:

The use of *report* and *suggest* is not uniformly distributed across the different periods, however. 120 of the 161 uses of *report* are found in articles on CoViD, whereas 62 out of the 109 uses of *suggest*

Table 4. Public verbs in our corpus.

Public verb	Number of tokens
report	161
suggest	109
explain	8
write	4
admit	3
agree	3
say	3
complain	2
declare	2
deny	2
hint	1
mention	1
acknowledge, *assert*, *claim*, *insist*, *proclaim*, *promise*, *protest*, *remark*, *reply*	0

Table 5. Suasive verbs in our corpus.

Suasive verbs	Number of tokens
suggest	79
recommend	10
agree	3
ask	3
pronounce	2
grant	1
instruct	1
request	1
arrange, *beg*, *command*, *decide*, *demand*, *insist*, *ordain*, *pledge*, *propose*, *stipulate*, *urge*	0

appear in texts written during the MERS Peak. All other public verbs show a much lower proportion of use.[11]

Similarly, the vast majority of uses of suasive verbs correspond to the verbs *suggest*, which accounts for 79 per cent of all uses, and *recommend*, which accounts for 10 per cent; see Table 5.

The grammatical features of verbs we have selected for study will be dealt with in the following subsection.

4.2 Grammatical features

As explained above, the use of past and simple present tenses across the different sections of articles seems to conform to the distribution of the different rhetorical actions characteristic of such sections in scientific writing, with Introductions and Discussions showing a higher frequency of simple present and sections on Methods and Results preferring the simple past. However, there are interesting differences across the three periods, particularly in those samples corresponding to Discussions.

Introductions show a preference for the simple present in all periods, although, as shown in Figure 3 above, its use is reduced for articles on CoViD, at 21.31 uses per thousand compared with the MERS emergency (28.60) and its aftermath (24.47).

[11] The finding that particular lexical items are preferred over different periods has been unexpected and deserves further study in the future.

Regarding Methods, verbs in the simple past are more frequent than those in the simple present in all three periods under study, although their proportion of use once again decreases in texts on CoViD (48.80 uses per thousand, down from 62.39 and 57.80 for the MERS Peak and MERS Valley, respectively). However, we might also mention the higher frequency of verbs expressing a perfect aspect in CoViD texts (2.21 uses per million, compared with 0.59 and 1.60, respectively), this perhaps reflecting the ongoing situation in that experiments and analyses were still being carried out whilst publications were being written.

Sections on Results also unanimously prefer the use of simple past forms over simple present ones. However, there are also some differences, such as the lower use of verbs in the simple present in articles written during the CoViD emergency, at 4.33 times per thousand words, this compared to 11.13 during the MERS emergency and 8.12 during its immediate aftermath.

Finally, it is in Discussions that any such homogeneity disappears. Both those texts written during the MERS emergency and those written during its aftermath use verbs in the simple present more often than verbs in the simple past, whilst the opposite is true of texts on CoViD. This corresponds with a notable leap in the use of simple past forms in articles written during the CoViD pandemic, at 29.30 per thousand words, compared to MERS and post-MERS (21.35 and 23.02, respectively). Conversely, the use of verbs in the present diminishes, from 29.50 and 28.86 during MERS and its aftermath to 24.86 during CoViD.

This is perhaps the most notable difference, as all Methods and Results sections in the three periods show a preference for verbs in the past, and all Introductions show a preference for verbs in the present. But as observed in regard to Discussions, those texts published during the MERS peak and its aftermath prefer present forms, and those published during the CoViD emergency prefer verbs in the past. This will be the main object of the next section.

5 Discussion

The difference between the prevalence of past and present verbs in the samples from Discussion sections is perhaps the most striking divergence in our results across the different periods studied, and one which merits further examination.

A possible explanation as to why texts on CoViD use more verbal forms in the past than in the present is that, as a new, unknown, and potentially dangerous disease, scholars focused on the dissemination of factual information about *the disease*, which is typically expressed as confirmed data obtained from finished procedures, and consequently in the simple past, as shown in (5) below.

(5) The symptoms of this novel pneumonia **were** also non-specific. The three oldest patients in this family with comorbidities **had** more severe systemic symptoms of generalised weakness and dry cough. (3014)

This contrasts with the more common preference for the use of the simple present in Discussions, which seems to be the tense chosen in explanations in which the topic is *the study* or *the publication* itself, rather than the disease, as shown in (6):

(6) The most important findings from this study **are** that at least two distinct lineages were circulating in Riyadh in October, 2012, and transmission patterns in the epidemic **are** consistent with both human-to-human transmission and sporadic zoonotic events. (1064).

Thus, this more frequent use of verbs in the simple past, and the concurrent focus on the disease rather than on the published scholarly text as the topic about which information is conveyed, may be indicative of a greater urgency, as normal rhetorical uses which situate research or the text itself as the focus of the scientific narration[12] are disregarded, and the swift transmission of potentially life-saving information

[12] It is interesting to recall how, according to Bazerman (1994: 104), written scholarly texts are “the primary product of most disciplines, and a secondary product of all…”, and they are even “taken to constitute the knowledge of the disciplines”.

Table 6. Use of locutions expressing necessity.

Verb	MERS Peak	MERS Valley	CoViD Peak
be necessary	1	1	2
be needed	15	1	11
be recommended	1	1	3
be warranted	0	1	7
Total	17	4	23
Total (NF)	1.87	0.98	1.42

is prioritized. This focus during urgent times on facts and data rather than on speculation may also help to explain the lower use of possibility modals in the Introduction, Methods, and Results sections of texts on CoViD compared with those on MERS.

Conversely, this urgent 'mode' of scientific writing may be suspended in the event of a disease being found to be not as damaging as initially suspected. Our data seems to corroborate this interpretation, as the two first texts on MERS, written at an early stage in the development of knowledge about the disease (when its potential to become an epidemic was still unknown) show a higher use of verbs in the simple past than verbs in the simple present. A third text then appeared (on the 5th of July, 2013) in which MERS was found to have less potential to develop as a pandemic than was initially feared, and from this text onwards the use of verbs in the simple present (and logocentrism) becomes the norm in texts about MERS, as shown in (7).

(7) **Our analysis suggests** that MERS-CoV has not reached epidemic potential —ie, R0 was less than 1. (1034).

As is well known, the expression of necessity cannot be ascertained satisfactorily with the mere examination of necessity modals. During our search for grammatical features in these texts (which, as explained above, was conducted by means of a close reading of the materials), we noticed that several texts expressed necessity by means of complex locutions such as "is necessary", "is needed", or the very characteristic "is warranted". These expressions are common in texts, and particularly in Discussions, highlighting necessary procedures or actions for the fight against the given disease, normally regarding further information or technological developments, as shown in examples (8) and (9) below, respectively.

(8) Further case-control **studies are needed** to define the effect of comorbidities on susceptibility to, and associated mortality from, MERS-CoV infection. (1044)

(9) At the moment, no tests are available to rule out MERS among patients with febrile respiratory illnesses, and development of a range of rapid and accurate diagnostic tests **is needed** urgently. (1044)

It is also common for these structures to appear as part of a combination of verb tenses through a paragraph, as shown in example (10) below. In it, an ascertained fact is presented in the simple past, followed by a hypothetical outcome whose factuality is unknown, mitigated with the use of the modal *might*, and finally these structures expressing a necessary procedure which may confirm or discredit the explanation attempted:

(10) Notably, patients 3 and 4 **were** afebrile at presentation to our hospital. These cryptic cases of walking pneumonia **might serve** as a possible source to propagate the outbreak. Further studies on the epidemiological significance of these asymptomatic cases **are warranted**. (3014)

Results for the frequency of uses of these locutions in Discussions are shown in Table 6.

As can be seen, texts during the emergency periods of both MERS and CoViD show a higher use of these expressions of necessity (1.87 and 1.42 uses per thousand, respectively) than texts written during the aftermath of MERS (0.98 uses per thousand). This contrasts with the results for necessity modals,

which show the highest proportion of use in texts from the MERS Valley group (1.96 uses per thousand words), followed by the CoViD Peak (1.79) and the MERS Peak (1.32).

These differences highlight once again the potential problems which may appear when using Biber's set of features as a starting point for the microscopic analysis of instances of a register. Apart from the need for disambiguation described above, which is well noted in the literature (Biber 1988: 211–220; Monaco 2017), Biber's lists of features are designed for an approach in which "[t]he notion of linguistic co-occurrence is central […] different co-occurrence patterns are analyzed as underlying dimensions of variation" (Biber and Conrad 2009: 215), and thus provide a degree of broadness in the definition of particular features, as this is diluted when the features are subsumed in the dimensions. However, this is not the case when such features are selected for a microscopic analysis, in which a higher degree of thoroughness is needed, and where the use of Biber's lists might lead to equivalent expressions which do not conform to his predefined closed classes being overlooked in the analyses, as was the case in the present study.

6 Concluding remarks

Our initial hypothesis – that the situation of emergency that developed during the ongoing CoViD crisis influenced scientific writing at multiple levels, from the constraints suffered by editorial processes to the very choice of words by authors, through the type of information selected and the rhetorical uses dispensed with – seems to have been confirmed. We also wanted to answer three research questions, relating to: a) whether texts on CoViD-19 present a particular linguistic profile as a result of the emergency of the situation, b) which linguistic elements among those selected for study are characteristic of this profile, and c) whether these linguistic elements are related to the creation of a feeling of urgency.

For our study, we have shown how certain verbs and certain verb forms may reveal the urgency underlying the writing process. Since we wanted to study those verbal features denoting urgency during the CoViD-19 crisis, we chose some papers written under similar circumstances (those we call the MERS Peak) and another group of articles written in the aftermath of this emergency (MERS Valley). Since research articles are highly standardized, we decided to deal with each of their sections as belonging to the same taxonomy. In fact, our study also revealed that fragments belonging to the same section in different articles share more linguistic characteristics than with other sections of their own article.

The data presented here shows that, given an ongoing medical emergency, authors of scientific articles concentrate on the transmission of factual information and data rather than on their interpretation or speculation. This is translated into a more frequent use of simple past forms, particularly in Discussion sections, and a lower use of possibility modals. Our data also shows that this seems to correspond to the selection of the disease (rather than the scientific process or product, as might be expected in terms of rhetorical practices) as the focus of the information transmitted.[13]

Although certain verbal features had been selected before starting the analysis, our combination of automatized corpus-linguistics methods and close reading provided us with some elements that may be of relevance for the study of the rhetoric of urgency. Despite the fact that we have not quantified or classified them systematically in the present paper, we have seen that expressions of necessity (other than necessity modals) appear more frequently during emergency periods. This also illustrates how studying only necessity modals leads to an incomplete examination of this lexical field.

Science is the interpretation of the world of a particular individual (the scientist) and not an independent entity or an absolute truth. That being so, language is a central element both for the interpretation of facts and for their transmission (Moskowich 2012: 48). In this article we have tried to interpret how scientists studying a new, threatening reality consciously prioritized the transmission of information over rhetorical disciplinary practices, and in doing so also modified their language.

[13] This shift of focus will be the object of special attention in further research, in relation to the tradition of studies on the 'centre' of scientific writing (Atkinson 1996; Taavitsainen and Pahta 1998).

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