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The COVID-19 Crisis and Its Challenges on Social Issues

COVID-19: crisi e sfide nella società

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Boosting Booster Trust: Negotiating a Jungle of Misinformation

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ABSTRACT

Misinformation, disinformation, and fake news are available across diverse media, causing distrust in governmental and health institutions. In this context, the use of language has been of great interest in research, specifically in health communication, on social media, and in traditional news media. Our aim is to analyse and compare how the successive doses of the COVID-19 vaccine have been presented in different forms of knowledge communication, namely scientific research papers and the media, including online magazines and newspaper articles. By focusing on frequency, collocates, and phraseology of *booster* and *dose*, we trace differences in how boosters are presented in both lay and professional contexts of communication. Scientific discourse shows a marked preference for the more neutral and cautious term *dose*, which is also associated with the description of administration procedures. News discourse is characterised both by a higher incidence of the word *booster* (implying a reinforcement of an already existing immunity) and by the choice of referring to the institutional voices recommending vaccines. Results shed light on how different discourses manifest their perceived functions through lexical choice, as well as how news discourse uses and reinterprets scientific discourse in the light of what is relevant to the audience.

Keywords: collocation analysis; knowledge dissemination; professional communication; textual voices; vaccine communication.

1. INTRODUCTION

Effective health communication plays a crucial role in times of crisis. Clear, accurate, and accessible communication about health-related information serves as a vital tool for fostering trust in public health institutions, disseminating reliable information, debunking misinformation, and addressing public concerns. The COVID-19 pandemic has not only presented significant challenges to global health systems but has also highlighted the pervasive issues of misinformation and disinformation, which are both defined by the European Commission as false or misleading content. However, while misinformation is intentionally used “to deceive or secure economic or political gain”, disinformation is unintentional but may still be harmful¹. Both misinformation and disinformation have had far-reaching consequences, impacting public health, social dynamics, and public trust in governmental and health institutions. In particular, fear and distrust in governmental and health institutions have played a central role in shaping public perceptions and attitudes. As a response to the rampant spread of misinformation, the European Commission, for example, has recognised the urgency of tackling fake news related to COVID-19. In their “Code of Practice on Disinformation”, the Commission has outlined regulations specifically targeting the dissemination of false information concerning the pandemic. In the context of the COVID-19 pandemic, the importance of health communication has emerged as a crucial element in maintaining information exchange and forming the foundation for collective action (de Las Heras-Pedrosa, Sánchez-Núñez, and Peláez 2020, 2). Governments, health organizations, non-governmental organizations (NGOs), mass media, and stakeholders have all been compelled to manage communication about the impact of the pandemic and appropriate responses to the critical moments (Zhang, Huijie, and Chen 2020) in the rapid evolving of the pandemic.

In this setting, media discourse and scientific discourse have played an important role. The urgent need for diagnostic and therapeutic solutions has led to a dramatic surge in scientific publishing (Hyland and Jiang 2021), with research discourse gaining significant prominence: in what the World Health Organization (WHO) labelled as an ‘infodemic’ of published output, researchers exploited hyperbolic and promotional

¹ <https://digital-strategy.ec.europa.eu/en/policies/online-disinformation#:~:text=Disinformation%20is%20false%20or%20misleading,which%20may%20cause%20public%20harm> [14/11/2023].

language to get their research noticed by boosting aspects of their work, such as certainty, contribution, novelty, and potential. At the same time, the world followed scientific discoveries and results mostly through the words of the media, which played a pivotal role in shaping public perceptions, attitudes, and behaviours during the COVID-19 pandemic. As a primary source of information for many individuals, the media holds the power to influence public opinion and impact collective responses to the health crisis. News outlets, social media platforms, and other media channels have served as conduits for disseminating updates, sharing expert insights, and reporting on the evolving nature of the pandemic. Understanding the role of scientific and media discourse in the pandemic from an applied linguistics perspective allows us to examine the language choices, framing techniques, and discursive practices employed, evaluate their impact on public perception, and contribute to understanding effective strategies for responsible and accurate health communication.

While numerous studies have explored the role of health communication in the media, social media, and government releases during the COVID-19 pandemic (Dyer and Kolic 2020; Bernard *et al.* 2021; Depaula *et al.* 2022), most have focused on one specific medium. Müller, Bartsch, and Zinn (2021), for example, provide a comprehensive overview of expressions of uncertainty in British and German press discourse, revealing distinct trends in the two contexts: while markers of possibility and probability are similarly frequent, uncertainty is more commonly expressed through references to anxiety in the British context and disagreement in the German context. Similarly, Liu and Liu (2021) have also looked at traditional news media while other scholars have concentrated on public attitudes towards vaccines in social media (Atehortua and Patino 2021; Thelwall, Kousha, and Thelwall 2022) or blogs (Curry and Pérez-Paredes 2021).

Many have investigated the metaphoric dimension of public health communication. Semino (2021), for example, has examined various metaphors used in pandemic communication, with a particular close-up on the fire metaphor: the metaphor conveys notions of danger, urgency, the risk of contagion, the role of healthcare workers, and the connection to health inequalities. Another metaphorical field that has been explored extensively has been the construction of the war frame, whether in political speeches (e.g., Olimat 2020 on Trump) or in social media (e.g., Wicke and Bolognesi 2021 on Twitter).

Others have studied the evolving of the pandemic through its different phases and the various functions of the media. Abdulhadi and Abbas

(2021), for example, have paid attention to how the media exercise their power to deliver ideological and political perspectives through the coverage of the first case of COVID-19 in Jordan in local and nonlocal Arabic news. The analysis shows how nonlocal news stories included words with negative connotations that could contribute to resentment and panic, while the local news used more reassuring phrases. Jiang and Hyland (2022) have looked at news coverage through the year 2020, showing that news in the early months was dominated by the symptoms of the virus, with items relating to controlling the disease such as *guidelines*, *protocols* and, eventually, *vaccine*, becoming increasingly prominent, thus helping us see the changing public interest in the pandemic.

However, there is still a noticeable scarcity in research examining convergences and divergences between the discourse of experts and the discourse of the media. Bondi and Cavalieri (2022) have analysed and compared communicative functions of risk-related terms during the pandemic in scientific and diplomatic discourse, while Corrizzato and Cavalieri (2022) have explored the use of hypothetical questions in media interviews about the pandemic to diplomats and experts. Thus, the present study aims to address this gap by investigating lexical choices in scientific and journalistic discourse from a discourse-analytical perspective. We also focus on later stages of the pandemic, while still encompassing a larger time-frame. The initial phase of the pandemic was filled with anxiety and uncertainty as the world was grappling with the novel virus. In the second half of 2020 the race against time to develop a vaccine brought a renewed sense of optimism. Moreover, as time passed, new variants of the virus emerged in 2021, characterised by the potential to partially evade the immunity provided by the initial vaccine doses. This involved the administration of the third and fourth doses, especially recommended for the elderly, healthcare workers, and immunocompromised individuals. Our work centres on the use of near-synonyms *booster* and *dose* in this later phase of the pandemic. The two terms are often used interchangeably. Their meaning and the sense they acquire in context is, nonetheless, worth exploring. We do this through a comparative analysis of online press and scientific publications. By delving into these two distinct sources, we aim not only to highlight the different ways in which the two forms of knowledge communication portray vaccine boosters, but also to provide insights into how information is communicated to the public.

This study addresses two simple research questions: How do scientific and journalistic discourses reflect attitudes towards the third and

fourth dose of the vaccine, in the development of the various phases of vaccination? How do they use the near-synonyms *booster* and *dose*? By way of a preliminary analysis, we also thought it would be useful to investigate how scientific and journalistic discourse reflect negative attitudes towards vaccines, thus taking into consideration expressions like *no-vax*, *vaccine hesitancy*.

The paper is organised as follows: section 2 introduces the corpora and the methodological framework used for our study. Section 3 presents the results of the preliminary overview of the expressions *no(-)vax* and *vaccine hesitancy* – together with its synonyms, and subsequently provides a qualitative analysis of their collocations. Sections 4 and 5 look at *booster* and *dose*, with a focus on *fourth dose* and *second booster*, examining frequencies, collocations and attribution to different textual voices. The conclusion summarises the comparative outcomes of the analysis of different forms of knowledge communication.

2. MATERIALS AND METHODS

In order to explore how vaccine discourse is presented in two different genres and forms of knowledge communication, we used two databases available online, namely the COVID-19 Open Research Dataset corpus (CORD-19)² and the Coronavirus Corpus³. On the one hand, the former consists of more than 370,000 scientific articles (1,794,546,039 tokens) about coronavirus and related topics which were released as part of the COVID-19 Open Research Dataset and that is now available on Sketch Engine. On the other hand, the Coronavirus Corpus is representative of online media discourse as it consists of newspapers and magazines belonging to twenty different English-speaking countries. It is a 1,492,979,248 words corpus and it has been regularly updated by 4 million words each day from January 2020 to December 2022. It is built from a subset of the NOW Corpus (Davies 2021), and it contains news collected from the daily scraping of more than 1,000 websites where at least two occurrences of the terms *coronavirus*, *COVID* or *COVID-19* appear.

² Available on Sketch Engine: <https://www.sketchengine.eu/covid-19-corpus/>.

³ Available on English-Corpora: <https://www.english-corpora.org/corona/>.

Our analysis followed two main steps. First, we looked at the general associations of modifiers, nouns, and verbs related to the set of word forms that defined negative attitudes to vaccines, such as *no-vax* – and all its possible written forms, i.e., *novax* and *no vax*, and *vaccine hesitancy*, which has also been cited by the WHO as an important issue when facing the immunization programme⁴. To have a complete overview, we also included *hesitancy*'s synonyms, namely *skepticism*, *reluctance*, *indecision*, *irresolution*, and *uncertainty*, which were retrieved from Thesaurus⁵. We then focused on *booster dose*, *booster* and *dose*.

On Sketch Engine, from which we had access to the CORD-19 Corpus, we were able to carry out a comparison using the function “Word Sketch Difference” which allows to visualise and compare collocates of the selected words under scrutiny. On English-corpora instead, from which we had access to the Coronavirus corpus, we carried out the same analysis by using the function “Collocates” and then selected the type of collocate we wanted to analyse for each of our words of interest (e.g., adjective, noun, verb). Within the lists generated by both platforms, we then investigated collocations and semantic preferences (Sinclair 2004) of the two sets of word forms. Frequencies were normalised for 1,000,000 words (pmw).

As our aim is to focus on a comparison between knowledge dissemination in both scientific and press discourse, for the main stage of our analysis we also studied and compared the use of *fourth dose* and *second booster* in both of our corpora. In this case, we selected 200 random concordances for each of our words of interest in both databases and examined both pragmatic functions and phraseological patterns of our node words. Specifically, we looked at how such terms are presented within the debate on vaccines, and related their use to the textual choices adopted to present such issues.

⁴ <https://www.who.int/news/item/18-08-2015-vaccine-hesitancy-a-growing-challenge-for-immunization-programmes#:~:text=In%20a%20special%20issue%20of,despite%20availability%20of%20vaccination%20services> [14/11/2023].

⁵ Thesaurus: <https://www.thesaurus.com/>.

3. PRELIMINARY ANALYSIS: A GENERAL OVERVIEW

Table 1 below shows the relative frequency pmw of *no-vax*, *novax*, *no vax*, *vaccine hesitancy*, *vaccine skepticism*, *vaccine reluctance*, *vaccine indecision*, *vaccine resolution*, and *vaccine uncertainty* in both our corpora. As we can see, *vaccine hesitancy* is not only mostly preferred among its synonyms in both corpora, but it is also generally more frequent than *no(-)vax*. Moreover, *no(-)vax* seems to be used more frequently in news discourse (with a total of 0.20 hits) in comparison with scientific discourse (0.06 total).

Table 1. – Frequencies of “no-vax”, “vaccine hesitancy” and its synonyms in the CORD-19 and in the Coronavirus Corpus (frequency pmw).

SEARCH TERMS	CORD-19	CORONAVIRUS CORPUS
<i>no-vax</i>	0.02	0.04
<i>no vax</i>	0.03	0.14
<i>novax</i>	0.01	0.03
<i>vaccine hesitancy</i>	15.92	8.41
<i>vaccine skepticism</i>	0.15	0.62
<i>vaccine reluctance</i>	0.08	0.08
<i>vaccine indecision</i>	0	0
<i>vaccine resolution</i>	0	0
<i>vaccine uncertainty</i>	0	0.01

• *no(-)vax*

The use of the various forms of *no(-)vax* is extremely limited in Research Articles (RAs), with a total of 107 occurrences (0.06 hits pmw). It is mostly used to qualify terms referring to social agents (e.g., *faction*, *follower*, *movement*) and to explain or reformulate specific technical terms (e.g., *vaccine hesitancy*) in more popular terms. In most cases the expression refers to pre-COVID situations (1).

- (1) The missed vaccination issue is part of the wider phenomenon of the parental vaccine hesitancy (“*no-vax* movements”) in which religious and moral beliefs, complacency and skepticism made the perception of vaccine as scary and unnecessary.

In the Coronavirus Corpus instead, *no(-)vax* is comparatively much more frequent than in the CORD-19 one, with 302 occurrences (0.21 pmw). Moreover, by exploring the diachronic trend of the use of *no(-)vax* in the

Coronavirus Corpus, we see that it is mostly concentrated between February 2021 and June 2022, which might coincide with the later vaccine campaigns. The expression *no(-)vax* is used to qualify groups of people that do not want to receive a vaccine (e.g., *health care workers, nurse, people ...*). However, in journalistic discourse it refers systematically to vaccines against COVID-19. It also more often qualifies single individuals and carries a wider range of negative connotations. The phraseological constructions that include *no(-)vax* seem to depict no-vax people as the cause of the spread of the contagion of the virus (e.g., [contagion] caused by a “no-vax nurse”), or as a problem that cannot be avoided (e.g., *no-vax people exist everywhere*) and that needs to be eradicated (e.g., *no-vax are to be eliminated*). All this conveys the general idea that no-vax people represent danger themselves. *No-vax* also appears in relation to government measures and policies for those who are not vaccinated, and it is mostly reported in slogan-like formats (e.g., *no vax no gigs; no vax no job; no vax no ride, no vax no service*). This clearly highlights the negative connotations of the expression and, in particular, its oppositional and ambivalent nature, as slogans summarise the various social problems created by the contrast between public health policies and no-vax positions. However, as we are dealing with news discourse, it is not surprising to find *no-vax* followed by speech verbs (e.g., *argue, believe ...*), which give visibility to the movement and report the voices of people who are not in favour of the COVID-19 vaccine (e.g., *no-vax health care workers argue that ...*). Altogether, the expression is used mostly in news discourse and mostly to qualify movements and individuals in relation to the problems they cause to health policies, with the effects of polarising positions.

• *Vaccine hesitancy*

We will specifically focus on *vaccine hesitancy*, not only because it is the most frequent collocation among its synonyms, but also because it is in line with the terminology adopted by the WHO (see section 2).

Vaccine hesitancy is by far the more neutral term. In the CORD-19 Corpus *vaccine hesitancy* occurs 28,574 times (15.92 pmw), so it is much more frequent than *no-vax*. It is often followed by predicative adjectives which mostly specify the extension/expansion of the phenomenon (e.g., *vaccine hesitancy is common/higher, present/widespread ...*) and its consequences (*effects of vaccine hesitancy are widespread ...*). Moreover, *vaccine hesitancy* frequently co-occurs with *misconception, mistrust* and *distrust*,

especially in terms of cause-effect relation (e.g., *COVID-19 vaccine hesitancy is high due to mistrust in the medical establishment*), despite providing very little or no further explanation on such matter. Furthermore, *vaccine hesitancy* appears to carry a negative aura when preceded by verbs that belong to the semantic field of battles and war (e.g., *combat, fight, fuel, tackle* ...): such hesitancy is represented as a position to be opposed especially because of its threatening nature. When looking at the verbs that follow *vaccine hesitancy*, we notice that it is not only a problem that needs to be solved: it is a phenomenon to be monitored in its (limited) evolution (e.g., *grow, persist, remain*) and one that clearly represents a risk for the realization of public health policies (e.g., *hamper, hinder, threaten* ...).

In the Coronavirus Corpus, instead, *vaccine hesitancy* appears 12,525 times (8.41 pmw), so less frequently than in the CORD-19 one. The diachronic trend of *vaccine hesitancy* for the years 2020-2022, shows a peak between April and December of 2021, which respectively coincide with the first mass vaccination programme and the beginning of the booster campaign. *Vaccine hesitancy* is mostly used to define groups of people (e.g., *among the American community, employers, residents*) and, similarly to the CORD-19 corpus, it is followed or preceded by verbs belonging to the field of battle (e.g., *combat, address, tackle*). Once again, *vaccine hesitancy* is seen as a problem that needs to be addressed. As such, it is also reported in relation to evolving trends and times in more dramatic terms (e.g., *has been a problem, has risen sharply, ongoing issues*). This identification of vaccine hesitancy as a problem is also confirmed by the fact that it is often explained in relation to *misinformation* which seems to be addressed as one of the causes of *vaccine hesitancy* (e.g., *misinformation is fueling vaccine hesitancy, with misinformation sparking/causing vaccine hesitancy*).

In general, it can be observed that the term *no(-)vax* is commonly found in more hostile contexts (e.g., linked to danger, government measures – see *no(-)vax* subsection), while *vaccine hesitancy* is associated with informative facts related to the pandemic. Both terms are acknowledged as issues that require resolution in both datasets. Scientific discourse tends to avoid using the slogan-like term *no(-)vax*, instead preferring *vaccine hesitancy*, which encompasses a broader range of positions, mostly associated with issues of mistrust. It is also worth noting that this expression aligns with other nominal phrases often used in medical discourse to describe attitudes towards health policies and recommendations, such as *medication adherence* and *treatment compliance*. Conversely, news

discourse employs the more polarising term *no-vax* more frequently and even with *vaccine hesitancy* pays much more significant attention to the social problems faced or created by these groups, as well as to the perceived causes of vaccine hesitancy, often associated with misinformation. When referring to negative positions towards vaccines, it is not surprising that – within the framework of a largely shared set of collocations – scientific discourse should show a marked preference for the more specialised expression and an emphasis on the impact of the problem, while news discourse will be more open to polarised expressions and to exploring (if not trying to counteract) the causes of negative positions. However, scientific discourse discusses hesitancy in relation to people's mistrust in expert discourse, while news discourse sees misinformation as the main cause.

4. FOCUS ON “BOOSTER” AND “DOSE”

The sequence of vaccination campaigns during the pandemic extended the debate over vaccine hesitancy, which was further reinforced by the uncertainty over vaccine efficacy after the first dose (Kissler *et al.* 2020). Initially worried about the potential side effects of the vaccine, and later frustrated by the need to repeat the vaccine, many people needed to be reassured of the importance of these renewed campaigns. In medical terms a dose is simply the quantity of a pharmaceutical product that is necessary to obtain a specific effect. A booster, instead, is a vaccination given after a previous vaccination that helps maintain or increase a protective immune response. How far is this difference reflected in scientific discourse and in the news?

Table 2 below displays the quantitative use of *booster dose*, *booster*, and *dose* in RAs (CORD-19) and in the news (Coronavirus Corpus). As we can see, while the use of *booster dose* is relatively rare in both corpora, *booster* is rarely used in RAs (18.45 hits pmw), and much more frequent in the news (107.20 hits pmw). *Dose* is clearly predominant in both corpora with a frequency of 294.35 hits pmw in RAs and 168.20 hits pmw in the news.

Table 2. – Frequencies of “booster” and “dose” in the CORD-19
and in the Coronavirus Corpus (pmw).

SEARCH TERMS	CORD-19	CORONAVIRUS CORPUS
<i>Booster dose</i>	5.28	12.33
<i>Booster</i>	18.45	107.20
<i>Dose</i>	294.35	168.20

Table 3 below shows the relative frequency of the number of boosters and doses’ shots (e.g., *first/second/third/fourth dose*, and *first/second/third booster*) in the two corpora under study. As we can see, *first* and *second dose* are the ones mentioned the most in both corpora, especially in news discourse. Now, *third dose*, *fourth dose* and *fifth dose*, which respectively correspond to *first booster*, *second booster*, and *third booster* do not show a systematic trend. As a matter of fact, while *third dose* is used more frequently than *first booster* in both corpora, in news discourse there is a preference for *second booster*, while in the academic and scientific one *fourth dose* is the one used the most. *Third booster*, instead, is preferred over *fifth dose* in both corpora. However, in the RAs corpus, starting from *third dose*, all expressions are used seldom, suggesting that scientific interest in the specificities of these doses is comparatively low, whereas news discourse shows much greater interest.

Table 3. – Frequencies of “first-second-third-fourth dose”
and “first-second-third booster” in the RAs and in the News Corpus (pmw).

[No.] “DOSE”/“BOOSTER”	CORD-19	CORONAVIRUS CORPUS
<i>first dose</i>	12.93	32.21
<i>second dose</i>	17.37	30.79
<i>third dose</i>	3.52	9.59
<i>fourth dose</i>	0.45	2.75
<i>fifth dose</i>	0.03	0.08
<i>first booster</i>	0.08	1.30
<i>second booster</i>	0.18	3.67
<i>third booster</i>	0.32	1

Before examining *booster* and *dose* in each of our databases, we will briefly compare the use of *booster dose* in both corpora. Table 4 below provides the reader with an overview of the lexical choices and functional units that characterise *booster dose* in both corpora.

Table 4. – Lexical choices and functional units of “booster dose” in the CORD-19 and Coronavirus corpus.

	CORD-19	CORONAVIRUS CORPUS
Lexical choices	Technical modifiers	General modifiers Numbers and percentages
Functional units	Stating cause-effect Presenting hypothesis/ stating methods Providing recommendations	Reporting vaccine administration Describing advantages and disadvantages Providing explanation

By looking at its use in RAs, we see that it is mostly preceded by technical items referring to the type of vaccine (e.g., *heterologous*, *homologous*, *mRNA*, *Pfizer-BioNTech*) or to the number of shots (e.g., *first*, *second*, *third*, *fourth*). *First booster dose* refers to the second shot of vaccine, while *homologous* and *heterologous* respectively refer to whether or not the booster shot involves the same brand of vaccine as the one that had been previously administered. In RAs, *booster dose* is mostly presented in terms of cause-effect (e.g., *after a first/third booster dose* ...), hypothesis of research or stating methods (e.g., *we assumed that 7 days after receiving a booster dose, effectiveness against infection and hospitalisation is 95%*) or for recommendations which might be stated by citing health and governmental institutions (e.g., *NHMRC recommends booster doses every ten years for all adults*) or through agentless author forms of self-mention (e.g., *a booster dose is recommended after 5 years*).

Within news discourse, instead, we notice that *booster dose* is mostly preceded by more general modifiers (e.g., *at least one*, *bivalent*, *even a single*, *precautionary*), contributing to a sense of vagueness surrounding the narrative concerning boosters and vaccines. At a phraseological level, the focus is mostly on people and administration of the vaccine (e.g., *administered*, *got*, *received* ...) rather than on experimental procedures like in RAs. Phrases are mostly informative, not always providing precise numbers and percentages of people who have received a booster dose (e.g., *the number of adults who had received their COVID-19 vaccine booster dose had increased to 12,157,974 individuals*). Advantages and disadvantages of booster doses are also reported (e.g., *data from other countries indicate that a booster dose may provide marginal benefit only for* ...) as well as institutional voices that prompt the public to take the booster. In other cases, *booster dose* is followed by explanation (e.g., *a booster dose is given to boost the antibodies* ...) most likely to reassure and inform the wider public.

4.1. *Booster and dose in RAs*

When exploring the collocations of our node words, we notice that *booster* is mainly preceded by scientific terms and acronyms which reveal specificities and details on the type of booster (e.g., *AZD1222*, *MRNA*, *third dose*, *fourth dose*, *tetanus*), with the interesting exception of *morale*, which is used to describe the encouragement that boosters are giving to people (2).

- (2) The vaccination programme was described as a *great morale booster*, coming at a time when many GPs and the wider public needed hope.

Nominal constructions qualified by *booster* are related to the vaccine administration (e.g., *dose*, *immunization*, *jab*, *shot*, etc.), the health campaign (e.g., *campaign*, *uptake*) and people's attitudes towards it (e.g., *hesitancy*, *intention*, *willingness*). Verbs collocating with *booster* are mostly related with the administration of the vaccine (e.g., *administer*, *give*, *receive*) and with its recommendation (e.g., *In September 2021, CDC initially recommended Pfizer vaccine boosters for older persons and those at heightened risk*).

Conversely, *dose* seems to be a more general term adopted in various contexts and it does not always appear in relation to the COVID-19 vaccine. As a matter of fact, it frequently collocates with items related to medical treatments or to potential interactions and side effects of the dose (e.g., *infectious*, *lethal* ...), mostly in experiment and laboratory situations. When referring to COVID-19, it is mainly preceded by ordinal numbers (e.g., *first*, *second*, *third* ...) referring to the respective vaccine administration, and by lexical items related to quantifications and changes (*escalation*, *modification*, *reduction* ...). When in relation to the vaccine, verbs that co-occur with *dose* mostly refer once again to its administration (e.g., *administer*, *receive*, etc.). In scientific discourse, to sum up, the preference for *dose* is much more marked and clearly associated with the description of administration procedures.

4.2. *Booster and dose in the news*

On the one hand, when looking at the modifiers of *booster* in the news, we find fewer technical terms than in RAs; the preferred qualifiers point at the current social and political issues (*broad*, *social*, *wider*, etc.), while nouns refer to the health campaign (e.g., *a booster blitz*, *a fall booster cam-*

paign, *morale booster for the troops*). Such nouns (e.g., *blitz*, *campaign*, *troops*) are once again associated to a military lexicon. Verbs co-occurring with *booster*, instead, can be mainly divided into two categories. The first includes references to the administration of the shot, with a focus on people who have (or have not) received the booster (e.g., *get*, *give*, *receive* ...). The second one includes voices of governmental and health institutions approving or recommending vaccines (e.g., *The FDA has authorized the COVID-19 vaccine booster shots for ...*, *Dr. Chierian recommends getting your COVID-19 booster* ...). It also co-occurs with verbs reporting scientific results on its efficacy (e.g., *a study found that a third booster dose* ...).

On the other hand, *dose* typically refers to the types of trials administered during the vaccine campaign (e.g., *double*, *triple*), while still being preceded by more evaluative terms (e.g., *harsh*, *safest*, *smallest*), most of which seem to respond to the need to reassure the general public (3).

- (3) [...] correct amount of dose, to ensure that people get the correct second dose.

Dose is also frequently found in a metaphorical use, even if not strictly related to the booster itself, but still to the pandemic situation (e.g., *a harsh dose of reality*, *a hefty dose of uncertainty*). Moreover, nouns in relation to *dose* are related to the field of quantification (e.g., *milligrams*, *percentages*, etc.) and to specific pharmaceuticals (e.g., *aspirin*, *examethasone*, *remdesivir*, etc.), concentrating on potential therapeutical indications. Verbs co-occurring with *dose* are similar to those that are used with *booster*, namely speech verbs reporting institutional voices recommending the vaccine (e.g., *need*, *recommend*, *require*). *Dose* also co-occurs with verbs regarding the administration of the vaccine (e.g., *administer*, *get*, *give*, etc.), highlighting once again the attention on people.

Overall, from a first analysis it seems that the use of *booster* and *dose* shows many common elements in the two corpora. However, while in RAs both terms are more associated to technicalities and administration procedures, in the press – where booster represents a more important proportion of occurrences – both expressions seem to be more related to the communication of therapeutical indication and on the part of various authorities. Knowledge dissemination through news discourse is thus characterised not only by a higher incidence of the word *booster* (implying that the subjects are already immune and that their immune system is being stimulated), but also by the choice of clearly reporting the institutional voices recommending vaccines. All this seems to contribute to the

public role of the media and could be related to the intention of reassuring the wider public about the efficacy of public health policies through the reported voice of medical experts.

5. FOCUS ON TEXTUAL VOICES: THE CASE OF “FOURTH DOSE” AND “SECOND BOOSTER”

As we understand that both academic discourse and news discourse do not simply represent the voice of the author, we chose a case study for a closer analysis of which voices are reported and what preferences they show. An investigation of *fourth dose* and *second booster* in both corpora might also help further highlight the difference between the two discourses.

5.1. *Textual voices in RAs*

The analysis of concordances of the terms in RAs shows that in 80% of the cases, their use is explicitly or implicitly attributed to the authors, describing the research carried out. Both terms are used within phraseological patterns describing cause and effect of the phenomena observed (*after/following/when receiving a second booster*), which are typical of the methodology and results section:

- (4) Following a *second booster dose*, circulating neutralizing antibody levels were sustained without any discernible decay over a 9-month period.

The researcher remains mostly invisible and implicitly cited in the conducted work (5), even if there are also few cases in which researchers address themselves and give their opinions and recommendations through a form of “exclusive we” (6).

- (5) In addition, the patients received a *second booster dose*, which influences the day 42 and 3 months responses.
- (6) [...] consideration the waning immunity, we suggest a *second booster dose* with BNT for the individuals [...].

The literature review, instead, typically attributes the expression to other scholars or even to the general debate (7). In a limited number of cases reference to boosters or doses is attributed to studies conducted by health institutions, pharmaceutical houses, and government authorities (8).

- (7) A *second booster dose* of COVID-19 vaccine is a widely discussed issue globally.
- (8) French National Authority for Health has recommended the use of a *second booster* dose in immunosuppressed patients. (Santé 2022)

Overall, in RAs there are no significant differences in the use of the two expressions according to voice. In both cases, the dominant voice is that of the author, who can be held responsible for the widely held preference for the phrase with the more neutral term *dose*. There also seems to be a preference for an impersonal style where the researchers' voices are mostly invisible and are present through agentless and locational forms of self-mention. This might contribute to increasing the reliability of the objectivity of results and information regarding COVID-19 vaccines.

5.2. Textual voices in news discourse

Figure 1 below looks more closely at the textual voices involved in news discourse. It shows the quantitative distribution of *second booster* and *fourth dose* in the press, according to whether the use of the word is unattributed (directly manifesting the journalist's choice) or attributed to experts, public authorities, other governments, or lay people. Both *fourth dose* and *second booster* are frequently reported through public authorities and experts' voices and are rarely unattributed.

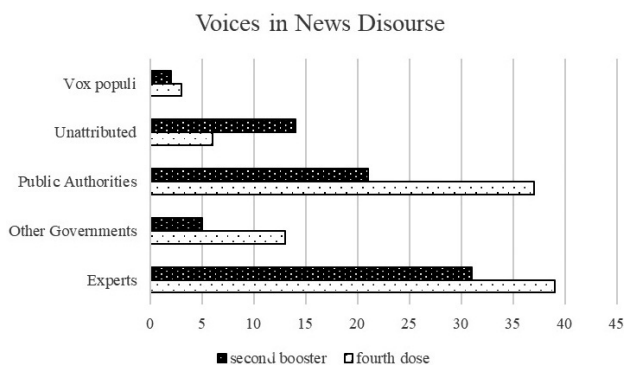


Figure 1. – Distribution of voices regarding “second booster” and “fourth dose” in news discourse.

The figure shows that there are no relevant differences in the use of second booster and fourth dose, except for the voice of the journalists,

which is the only one confirming a decided preference for *booster*. However, both terms are mostly reported through the voices of scientists (e.g., *CDC*, *Dr [Surname]*, *researchers* ...), and institutional authorities (e.g., *Biden*, *FDA*, *Government*, *Minister* ...), which are also mentioned in a less explicit way (*data*, *in clinical trials*, *studies* ...). It thus becomes noticeable that the voices of experts are reported in ways that by no means reflect their own lexical choice, but rather that of the journalist, as the frequency of *booster* in reported medical discourse is surprisingly high. The expression is obviously felt to be more suited to knowledge dissemination – even if hardly used in expert-to-expert communication.

To sum up, in news discourse dissemination of information on the second booster (fourth dose) seems to be realised through specialists and authorial institutional voices, so to achieve credibility and trustworthiness. In conveying information about the vaccine, the press seems to be part of a process of knowledge dissemination that provides information to the audience in what seems to be the most relevant terms, by choosing the reassuring implications (immunity strengthening) of *booster*.

6. CONCLUSIONS

To conclude, our study has explored convergences and divergences of expert and media discourse in the use of specific lexical choices during the pandemic. The aim was to look at how vaccine-related vocabulary varied according to the communicative functions of different genres and discourses: academic research articles and news stories.

The preliminary analysis of *no(-)vax* and *vaccine hesitancy* has confirmed a different use and function of such expressions in the scientific and news contexts. As a matter of fact, *no(-)vax* is used to describe an opposition group in mostly evaluative terms, whereas *vaccine-hesitancy* carries nuances of uncertainty through a more descriptive function. While scientific discourse shows very limited use of *no(-)vax*, news discourse refers to *no(-)vax* in a more subjective way, with strong connotations and often manifesting solid positioning. The more scientific *hesitancy*, instead, is used to map different positions within the issue of vaccines, but at the same time often provides no further explanation on the debate. It was also noticed that scientific discourse discusses hesitancy in relation to people's mistrust in expert discourse, while news discourse sees misinformation as the main cause.

The overview on *booster* and *dose* has shown that *dose* is clearly the preferred expression in scientific discourse, whereas *booster* and *dose* are much more similar in frequency in the news. Overall, while in RAs both terms are more associated to technicalities and in particular to general administration procedures, in the press both expressions seem to be more related to the communication of therapeutical indication and on the part of various authorities.

On the one hand, the decided preference of scientific discourse for the more neutral term *dose* may be seen as one of the many signs of caution typically presented by research communication: as *booster* implies a strengthening of the effect of the previous vaccine, medical discourse prefers to use the more neutral term with no such implications. This may also be related to the frequent choice of heterologous vaccination, where a combination of viral vector vaccines and mRNA vaccines makes it difficult to consider one a booster of the other. On the other hand, the corpus of media texts showed greater interest in the term *booster*, with its implication that the successive dose would be strengthening a response that is already there. The presence of authoritative institutional voices supporting official policies emphasises the message about the efficacy of vaccination. If the choice of impersonal forms in scientific discourse conveys objectivity, the choice of quoting experts and institutional voices in the media confirms that these textual voices are instrumental in building trust with the public and counteracting misinformation.

We also hope to have highlighted how lexical choices respond to the different purposes of the two discourses: what science uses to interpret data, the press uses to identify issues and positions. The preference for *dose* in scientific discourse is closely related to a scientific focus on correct epistemology, sound argument and clear definitions. *Dose* is perceived and reproduced as the more scientific term with specialised collocations not only to classify types of vaccines, but especially to report therapeutical indications. The greater emphasis placed by the news on *booster* and on general policies, positions, and needs can be related to their public function in knowledge dissemination, which is recontextualizing scientific knowledge for the needs of the audience and for the needs of society. The press does not adopt the same cautious lexical choice of scientific discourse and, even when quoting medical experts, tends to prefer the expression with positive implications, with a view to rebuilding trust in their readers. The interplay of lexical choices and textual voices is thus key to understanding the power of news discourse: the power not only to decide whose voices are reported and what for, but also to reinterpret scientific discourse in the light of what is relevant to the audience.

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