Disciplinary tribes and the discourse of mainstream media expert opinion articles: evidencing COVID-19 knowledge claims for a public audience

Article

Published Version

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https://doi.org/10.1515/applirev-2023-0260
Received November 12, 2023; accepted November 20, 2023; published online April 17, 2024

Abstract: Much applied linguistic research has investigated how experts from different disciplines – different "disciplinary tribes" – present knowledge claims, drawing on taken-for-granted disciplinary ideologies and epistemologies. However, this research has mainly focused on specialist to specialist communication rather than specialist to non-specialist communication. This article aims to fill this gap by examining a corpus of mainstream media "expert opinion articles", written by experts for members of the public, on the topic of the COVID-19 crisis and published in The Guardian and The New York Times. The corpus included articles by experts in Medical Science, Medical Practice, Science, Humanities and Social Sciences, Law, and Economics. Using corpus-based discourse analysis, we consider the effect of discipline on the way that experts present and evidence knowledge claims. We compare the kinds of experts, their content focus, and forms of evidentiality seen in verbal evidentials used in the articles. The analysis identifies four discourse strategies: (1) deriving knowledge from experience; (2) invoking the knowledge of the expert community; (3) invoking vernacular knowledge; and (4) raising claims in argument or critique. Differences in disciplinary epistemologies lead to systematic differences in presenting and evidencing knowledge claims, even in texts primarily intended for a wide public audience.

Keywords: disciplinary discourses; media discourse; opinion article; evidentiality; corpus-based discourse analysis

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1 Introduction

One of the features of the COVID-19 pandemic, especially prominent near its beginning, was the high level of uncertainty in scientific knowledge. Faced with an entirely novel coronavirus, expert scientists and academics in a wide range of fields moved quickly to attempt to plug gaps in specialist knowledge (Palayew et al. 2020) as well as to respond to a strong demand for expert knowledge about COVID-19. One part of this activity was the publication of what we refer to as "expert opinion articles", i.e., opinion articles written by scientific experts and published in the mainstream media for a lay audience, with the purpose of communicating scientific knowledge to the general public. As we will show, experts from a wide range of disciplines engaged in this activity, each addressing pandemic-related questions from the perspective of their own "disciplinary tribe" and expertise. Such articles provide an interesting opportunity to contrast how different kinds of experts discursively constructed this specialist to non-specialist communication, all responding, as they do, to the same rhetorical situation and broadly falling within the same topic area (though, as shown below, with some obvious disciplinary differences in focus).

While previous applied linguistic work has examined disciplinary differences in specialized genres (e.g., Biber et al. 2004; Hyland 2000), little work that we are aware of has considered disciplinary differences in the language and communication practices adopted in communication with non-specialists (but see Della Giusta et al. 2021). Do experts make epistemological assumptions when they present their knowledge claims and, if so, how? Are these assumptions consistent from one academic "tribe" to another, or do experts from different disciplines present and evidence claims differently when addressing the general public? In this article, we examine such questions through an analysis of a corpus of expert opinion articles by writers in different disciplines. We compare the kinds of experts (i.e., what discipline they came from), the content of the opinion articles, and the use of expressions of evidentiality in order to understand how different disciplinary writers make knowledge claims to inform the public about issues posed by the global pandemic.

2 Expert/lay communication and the genre of expert opinion article

The broader practice that this article engages with is the practice of experts communicating with lay people, or, in this case, experts writing for an interested lay public. In particular, the study focuses on writers with expert academic and

professional knowledge and the way that they go about presenting and evidencing this knowledge for the lay audience. Such expert knowledge can be derived from training, study, and experience of academic, scientific and professional practices. As Sarangi (2016) points out, such knowledge tends to be tacit (i.e., taken for granted by the experts) and so is often assumed (and therefore unexplained) in experts' communication with lay people. This complicates communication, as experts can be prone to overlooking the fundamental assumptions that a lay public simply has no access to. Furthermore, the kind of tacit knowledge that we are dealing with here includes epistemologies, the culturally taken-for-granted "ways of knowing", i.e., understandings of how it is possible to know. Such epistemologies and the way that associated knowledge claims are expressed in discourse vary across disciplines, though clearly not in a straightforward way as multiple paradigms can easily co-exist in a single discipline (Kwan 2017). When experts make knowledge claims, they do so on the basis of epistemologies that: (1) may be quite different to those employed by the general public; and (2) may vary from one disciplinary culture (Hyland 2000) or academic "tribe" (Becher and Trowler 1989) to another. In terms of expert/lay communication in mainstream media opinion articles, this presents a clear difficulty: when communicating their epistemologically grounded assumptions, expert writers may be mistaken in thinking their readers can actually use similar frames and produce similar patterns of reasoning.

Studies concerned with texts that communicate expert knowledge to wider audiences in the mainstream media have examined their discursive construction both in terms of the processes and products involved (e.g., Fahnestock 1986; Hyland 2010; Myers 1990; Parkinson and Adendorff 2004). The process is one which is frequently mediated by journalists, who may: (1) communicate the scientific research directly to the public audience in a news writer role; (2) work in collaboration with the scientist authors in an editing or similar role to communicate the research (e.g., Myers 1990; Rowley-Jolivet and Carter-Thomas 2019). These studies of mainstream media popularizations have tended to focus on the genres of news report or popular science article, especially reports and articles that summarize a single study for a lay audience in publications like *Scientific American* or *Popular Science*. In contrast, the present study engages with an under-researched, editorial genre, i.e., the expert opinion article.

We see the expert opinion article as a form of popularization in which various kinds of experts (e.g., medical experts and scientists but also lawyers, economists, historians and other experts in humanities and social science) disseminate knowledge to a general audience. In this sense, one purpose of the genre is to inform. It is, of course, also a news genre, a kind of editorial, which gives the opinion of the writer, using an expert voice in an effort to "persuade, recommend, and exhort" (Hohenberg 1960: 182, cited in Bray 2019; see also Ansary and Babaii 2005). The communicative

purpose can thus be summarized as not just to inform, but also to persuade the audience of a particular position, and potentially to persuade them to take particular actions. As with any public communication, the genre has multiple possible audiences, and so it is possible that authors write not only to inform and persuade the general public but also to argue for particular policy implications and policy actions in a way that plays into debates between experts and also addresses policy makers. Hafner (2020) analyzed expert opinion articles that took different positions on the issue of masking during the pandemic. Both sets of experts made claims about what was known and unknown on the basis of two different kinds of evidence: (1) the experience of other countries; or (2) the results of scientific studies. Evidence played a crucial role in these arguments, with different conclusions reached depending on what was considered to "count as" evidence. But rather than simply serving as epistemic support for scientific claims, in this genre, evidence provides the epistemic basis for claims that are made in support of a position that argues for one kind of practical action or another (like wearing masks or not).

3 Disciplinary cultures, epistemologies and evidentiality

Different academic disciplines have different approaches to the generation of knowledge and these approaches are rooted in different disciplinary "ways of thinking". Becher and Trowler (1989) refer to these different disciplines as "academic tribes", highlighting the way that such groups band together and stake out academic territories. Members of academic tribes are united (at least to some degree) not only by their shared interest in a particular domain but also by their shared values, beliefs, and community practices. That is to say, they share a disciplinary culture, expressed through "particular norms, nomenclature, bodies of knowledge, sets of conventions and modes of inquiry" (Hyland 2000: 8). In applied linguistics, Hyland's (2000) seminal work on disciplinary discourses has sparked a considerable amount of research, which examines contrasting discourse practices in such academic tribes in order to better understand how the members of particular disciplinary cultures use discourse and how this discourse then contributes reciprocally to the construction of disciplinary cultures. This work is especially interesting given that many of the practices described are the result of tacit, taken-for-granted disciplinary ways of thinking, doing and meaning and are therefore often difficult for expert practitioners to articulate.

One aspect of this work focuses on disciplinary epistemologies by examining the way that knowledge claims are made and supported in academic publications in

different disciplines. Given that such knowledge claims need to be carefully negotiated with the expert audience following community norms, a focus on knowledge claims has the potential to reveal unstated cultural expectations. For example, investigating the way that evidence for claims is presented in research articles, Hyland (2000) found that researchers in "softer disciplines" (e.g., philosophy or sociology) used in-text citations differently to researchers in the "harder" physical sciences (e.g., biology or physics). In the softer disciplines, researchers were much more likely to use "integral citations" where the citation itself was given prominence by grammatically incorporating it into the sentence, e.g.: "Hyland (2000) found that … ". By comparison, such a practice was much less common in the physical sciences, where in-text citations were incorporated in a non-integral way by appending them at the end of a sentence, for example. These findings can be attributed to different disciplinary "ways of thinking" about knowledge and the role of individual researchers in knowledge creation, i.e., whether "to give greater emphasis to either the reported author or the reported message" (Hyland 2000: 23). A focus on the message found in research articles in the physical sciences is consistent with scientific values that downplay the role of human agency in knowledge creation.

In order to investigate disciplinary epistemologies, specifically the way that evidence for claims is presented in texts from different disciplines, the linguistic category of evidentiality is highly relevant. Evidentiality includes the set of linguistic devices whose function is to specify the source of a statement or knowledge claim (Yang 2014). Examining the question "what counts as evidence?" for a claim in a particular disciplinary context opens up an investigation of the tacit beliefs and values that surround knowledge claims in the discipline. It means asking questions like: Who can legitimately make knowledge claims? How are such claims authoritatively supported? And how can claims and support be appropriately discursively constructed, including in terms of how strongly such claims can be made? Because evidentials function to make and support knowledge claims, studying how they are used in discourse provides insight into these kinds of questions. Comparing the use of evidentials in different disciplines is likely to shed light on disciplinary – or "tribal" – epistemologies, the focus of this special issue.

The notion of evidentiality can be construed in more or less narrow ways. Some scholars have argued for a broad conception of evidentiality that allows for the investigation of a "natural epistemology", i.e., "the ways in which ordinary people … naturally regard the source and reliability of their knowledge" (Chafe and Nichols 1986: vii). This broad approach conceives evidentiality as going beyond the marking of evidence to include linguistic devices that involve "attitude towards knowledge" (Chafe 1986). Such a definition clearly overlaps with categories like "stance" (see Hyland 2005; Jaffe 2009) but it is beyond the scope of this article to engage in a discussion of precisely where the boundaries lie. For our purposes, we make use of

a broad definition of evidentiality as a starting point to investigate disciplinary epistemologies expressed in expert opinion articles. Expanding on Yang's (2014) categorization, evidential markers considered include: "sensory evidentials", where the source of the statement is based on senses (e.g., I/we see, feel); "belief evidentials", where the source is based on belief (e.g., I/we think/believe/suggest); "reporting evidentials" (e.g., say, argue, maintain); "inferring evidentials" (e.g., seem, appear); and "epistemic evidentials" (e.g. I/we know/understand/recognize, see below).

In this study, we are especially interested in the way that different kinds of verbs (which we refer to as "verbal evidentials") are used as linguistic devices of constructing and evidencing knowledge and providing evidence for knowledge claims. Verbs are a useful focus because they are the core element of any clause, the second most frequent part of speech in news discourse (Biber et al. 1999) and one of the major lexical devices through which evidentiality is constructed. Examining verbal evidentials, along with the kinds of modifiers, grammatical subjects, and objects that accompany them, allows us to see how knowledge claims are made in the genre of expert opinion articles, who or what the knowers are, who or what the evidence for knowledge is taken to be. Comparing the use of such verbs across disciplinary tribes provides insight into the status of knowledge – the epistemologies – of those different academic tribes. We are guided by two research questions, namely: What is the effect of discipline on: (1) the content focus of expert opinion articles? and (2) the way that writers of expert opinion articles present evidence for knowledge claims?

4 Methodology

Our approach is multi-method and combines techniques of discourse analysis with a corpus-based methodology, as commonly applied in corpus-assisted discourse analysis (Partington et al. 2013). While identification of the disciplines and dominant topics offers us a bird-eye perspective on the kind of disciplinary voices and the contents and themes addressed by the experts, a corpus-assisted discourse analysis zooms in to the lexical level to allow for a more detailed analysis of the dominant ways in which the experts discursively construct knowledge and evidence. The analysis is based on a large, specialized corpus of expert opinion articles published in the first five months of the COVID-19 pandemic. The corpus was explored using the linguistic software program Sketch Engine, focusing specifically on word frequency, collocations and concordancing. This section discusses in detail the procedures adopted to compile the specialized corpus and the techniques used to reveal linguistic features associated with the disciplines to which the different experts belong, the topics they raise, and patterns of evidentiality across the different disciplinary voices.

4.1 Corpus compilation

We used the Factiva database to collect mainstream media expert opinion articles from two publications, *The Guardian* and *The New York Times*. These newspapers were selected because they commonly follow the practice of inviting experts to write opinion articles – that is, they commission articles from them directly, rather than asking journalists to report on the views of experts, as some other publications that were also considered for selection tend to do. In each publication, we conducted the following search: (1) keywords: "COVID-19" or "Coronavirus", (2) content type: commentaries/opinions; (3) date: January 7, 2020 (the day that Chinese scientists confirmed the discovery of a novel coronavirus) to May 31, 2020, 145 days later. The selected time span thus includes the period of rapid change and great uncertainty that was experienced in the initial stages of the pandemic, with the corresponding public and media demand for expert advice and opinion that this generated. We manually examined the articles in the search results and kept those articles that were clearly focused on the topic of the coronavirus and written by academic or professional experts, including scholars at universities from a range of different kinds of disciplines and medical practitioners, like practising doctors and nurses. Our final corpus – the *Expert Opinion Corpus* (385,900 words) – consists of 203 articles from *The New York Times* and 160 articles from *The Guardian*. The articles were grouped into six disciplinary areas, as described below.

Overall, the corpus can be divided into those areas allied with "harder" science disciplines, such as Medical Science, Medical Practice, and Science, and those that are commonly referred to as "softer" disciplines, such as Humanities and Social Sciences (H&SS), Law, and Economics. As Table 1 shows, the Corpus is largely dominated by experts from the medical discipline and H&SS, constituting three quarters of the whole corpus of 363 opinion articles. Of these, 145 articles (40 %) were from experts in the medical discipline (90 from Medical Science and

Table 1: Corpus size and disciplinary areas.

Discipline/corpus	No. of articles	No. of words
Medical science	90	95,730
Medical practice	55	55,840
Science	19	21,949
Humanities and social sciences (H&SS)	127	136,655
Law	31	28,716
Economics	41	47,010
Total expert opinion corpus	363	385,900

55 from Medical Practice), while 127 (35.0 %) were from experts in the H&SS disciplines. For the remainder (25 %), 41 articles (11.3 %) were written by economics experts, 31 (8.5 %) by law experts, and 19 (5.2 %) by science experts.

Appendix provides a full breakdown of specific subject areas, as identified in the article biodata. The Medical Science corpus includes articles written by experts in public health, epidemiology, health policy, global health, etc.; the Medical Practice corpus includes health care experts, anesthesiologists, critical care doctors, geriatricians, oncologists, etc. The H&SS corpus includes experts in history, philosophy, political science, psychology, sociology, etc. As for the Science corpus, this includes experts in mathematics, physics, biology, etc. This categorization was done according to the disciplinary "home" of the author rather than the topic of the article, so that articles in the Science sub-corpus are those written by scientists but could be on a range of topics related to the pandemic. Detailed categories of the sub-disciplines/areas of study as identified in biodata are provided in the Appendix.

Although each corpus varies in size, it represents the number of texts that were produced by experts from the different disciplines in the two media sources during the period of data collection. Thus, the corpus composition gives a good indication of the extent to which different disciplinary voices participated in the construction and dissemination of knowledge around COVID-19 in the media in the early stage of the pandemic. Regarding the time of publication, 10 articles (2.7 %) appeared in January and February, 87 (24 %) in March, 147 (40.5 %) in April and 119 (32.8 %) in May. This likely reflects a greater demand for expert knowledge about COVID-19 as the pandemic progressed.

4.2 Data analysis procedures

4.2.1 Identification of disciplines and topics

We started our analysis by categorizing the disciplines of the experts. We first identified their disciplinary expertise by looking at their affiliation, position, and the content of the article. Each article was given a discipline code (1: Medicine; 2: Law; 3: Economics; 4: H&SS; 5: Science). In the case where there was more than one author, we followed the discipline of the first author. As we started to observe the differences within the discipline of medicine, we further categorized those articles into Medical Science (1a) and Medical Practice (1b). Subsequently, each article was thematically coded for the dominant topic.

4.2.2 Identification of patterns of evidentiality

Based on past research into evidentiality (Chafe 1986; Hyland 2005, 2010; Yang 2014), we treat evidentiality as a semantic category involving lexical items that indicate source or sources of knowledge and information as the core meaning. As mentioned above, we focus on verbs in this study. Following procedures adopted in previous corpus-based research (e.g., Biber et al. 2004), we retrieved from the whole *Expert Opinion Corpus* all verbs with a frequency of at least 40 per 1 million words. This produced a list of 428 lexical verbs, which we deemed important lexical devices in the context under study. Using the concordance function in Sketch Engine, we subsequently scrutinized the verbs to see whether they had evidential meanings, that is, whether their use pertained predominantly to knowledge construction or knowledge claims. Based on Yang (2014), we identified 82 verbal evidentials (VEs) that we further categorized into semantic types of evidentiality including: (1) belief evidentials, (2) sensory evidentials, (3) inferring evidentials, (4) reporting evidentials, and (5) epistemic evidentials. Whereas categories one to four have been identified in previous research (Yang 2014), we added epistemic VEs to the classification to include verbs like *know*, *understand*, *recognize*, *identify, learn* – some of the most frequent lexical verbs in the corpus – that assert knowledge on the basis of cognitive reasoning processes. We subsequently compared the frequencies of the 82 types of VEs in each corpus and evaluated disciplinary similarities and differences in terms of verbal knowledge claims in the studied context. In the following analysis, we discuss the most frequently used VEs in context by exploring some of the most frequent patterns in which they occur and the functions that they perform. This is accomplished by studying in detail concordance lines and, when necessary, using the tool of collocation to identify some of the most typical associations of the studied verbs. Collocations were retrieved using the default options on Sketch Engine with the span of 4 words to the left and 4 words to the right of the search term, and LogDice as the measure of the strength of the association (Brezina 2018).

5 Findings

5.1 What the experts write about

A thematic analysis of the opinion articles shed light on the different foci of knowledge construction of experts from different disciplines. Table 2 presents the top themes discussed by discipline.

As seen from Table 2, the most frequent topics discussed were: (1) politics and governance; (2) public health and health care issues; and (3) business and economy.

Table 2: Top 10 themes discussed in the *Expert Opinion Corpus* by discipline.

Topic	Discipline						
	Total no. of articles	Medical Sciences	Medical Practice	Law	Economics	H&SS	Science
Politics and governance	59	10	2	4	2	**41**	0
Public health and health care system/workers	52	**20**	**19**	4	2	6	1
Business and economy	33	3	0	**5**	**17**	8	0
Personal experiences or emotions	25	3	**14**	1	0	5	2
Infection/modelling	23	**11**	3	0	1	1	**7**
Social activities	23	2	0	0	2	**18**	1
COVID testing	14	9	1	1	1	0	2
Education	12	6	0	0	2	4	0
(In)equality	12	3	1	1	4	3	0
Mental health	11	0	3	0	1	7	0

Higher frequency topics are given in bold.

(For the most frequently discussed topic(s) in each discipline, the frequencies are in bold.) At the same time, cross-disciplinary differences in topic focus were observed. As one would expect, medical experts tended to write about public health and health care issues, and law and economics experts were mostly concerned with topics related to business and the economy. Experts in H&SS paid attention to government/governance and social activities, whereas science experts focused on infection and/or modelling. Comparing experts in Medical Practice with those in Medical Sciences, while both wrote on the topic of public health, a large number of medical practitioners (e.g., doctors, nurses) wrote about personal experiences, far more, in fact, than any other group in the corpus,.

5.2 How experts from disciplinary tribes construct and disseminate knowledge to wider audiences

5.2.1 Overview of evidential verbs across the disciplinary perspectives

Figure 1 (see also Table 3 and Table 4) shows the relative frequency of different kinds of verbal evidentials across the different sub corpora. As the figure indicates, experts from Science, Medical Science, and Medical Practice relied more on verbal evidentiality than specialists in the other areas, as evidenced by the more frequent

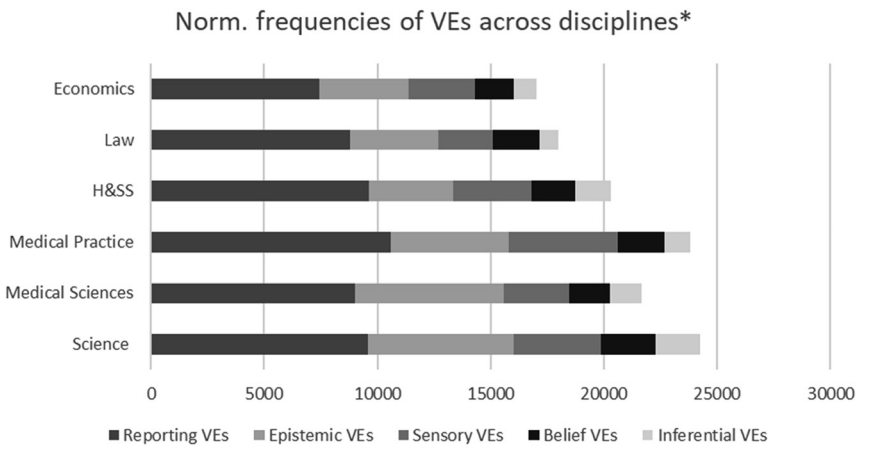

Figure 1: Normalized frequencies of VEs across disciplines.

Table 3: Raw frequencies (tokens) of VEs in the corpora.

	Science	Medical Sciences	Medical Practice	H&SS	Law	Economics
Reporting VEs	210	864	590	1,317	252	349
Epistemic VEs	142	627	293	507	112	185
Sensory VEs	84	278	269	507	70	138
Belief VEs	53	169	115	263	58	80
Inferential VEs	43	138	62	213	24	48

Table 4: Normalized frequencies (tokens) of VEs per 1 million words.

	Science	Medical Science	Medical Practice	H&SS	Law	Economics
Reporting VEs	9,568	9,025	10,566	9,637	8,776	7,424
Epistemic VEs	6,470	6,550	5,247	3,710	3,900	3,935
Sensory VEs	3,827	2,904	4,817	3,476	2,438	2,936
Belief VEs	2,415	1,765	2,059	1,925	2,020	1,702
Inferential VEs	1,959	1,442	1,110	1,559	836	1,021

use of VEs in these three disciplines. This does not necessarily mean that they were making more knowledge claims; it could be that experts from "softer" disciplines used forms of evidentiality other than verbal evidentials, which we do not explore here. In terms of types of verbal evidentiality, experts across the disciplines used

mostly reporting VEs, which is not surprising given the general prominence of reporting verbs in media discourse, especially newspapers (Biber et al. 1999). Although reporting verbs dominate the genre, Figure 1 highlights some differences in the types of VEs used across disciplines. For example, sensory verbal evidentials were more frequently used in opinion articles produced by medical practitioners but were used less frequently in articles written by experts in other disciplines. The differences are statistically significant (LL = 49.64, df = 5, $p < 0.01$). When making knowledge claims in relation to the pandemic and the virus, medical practitioners thus tended to focus on personal experiences of working in hospitals and therefore on *seeing*, *feeling,* and *looking at* a growing number of patients with COVID, something which we explore in greater detail in the section on sensory verbal evidentials below. In terms of epistemic VEs, these were more frequently used in opinion articles written by experts from the "harder" sciences, especially Medical Science and Science, and were also quite prevalent in the Medical Practice corpus (see Figure 1). These differences are also statistically significant (LL = 118.09, df = 5, $p < 0.001$). This is perhaps not surprising given that some of the experts from Science and Medical Science were involved in reviewing and/or assessing ongoing research and data in relation to the pandemic. In general, belief and inferential VEs were used less frequently in our corpus, which shows that, in the context of the pandemic and media discourse, knowledge claims were more often constructed not as a matter of beliefs (*believe*, *imagine*) or tentative hypotheses (*appear*, *seem,* etc.) but more often as a matter of fact (*know*, *find out*) (see Figure 1).

Examining the proportion of each VE type in each corpus as a percentage of all VEs in that corpus allows us to compare the corpora in terms of which VE type is preferred by different kinds of experts. Figure 2 shows that, compared to other disciplines, experts in Medical Practice had a stronger preference for sensory verbs (20 % of all VEs used in that corpus). Medical scientists (30 %) and scientists (27 %) had a stronger preference for epistemic VEs compared to other kinds of experts. Finally, compared to other disciplines, lawyers showed the strongest preference for reporting verbs (49 % of all VEs used in the Law corpus) followed by experts from H&SS (47 %).

In order to shed light on the kind of VEs that the experts were using, we will turn to the most frequently used types of VEs by different kinds of experts, focusing on the most distinctive and frequently found patterns, that is: (1) sensory VEs, more prominent in opinion articles written by medical practitioners; (2) epistemic VEs, more prominent in articles by experts from "harder" sciences (scientists and medical scientists); and (3) reporting VEs, more prominent in articles produced by legal experts.

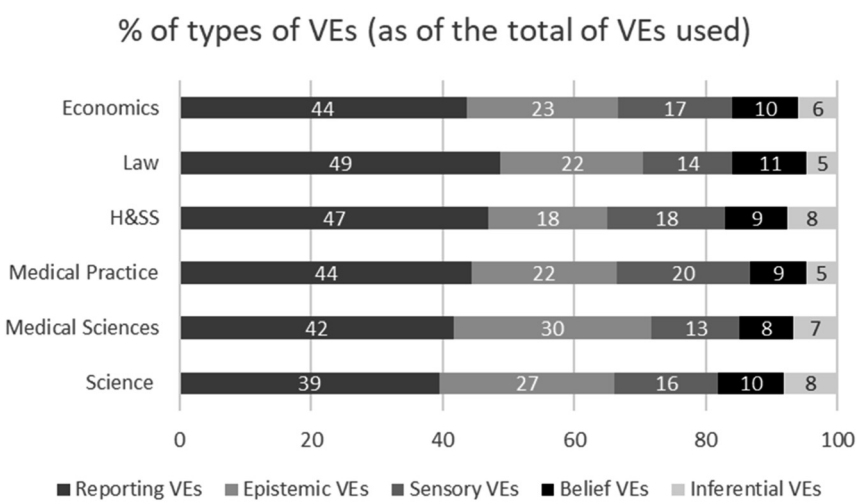

Figure 2: Percentage of VE types as a proportion of total VEs in each corpus.

5.2.2 Sensory verbal evidentials

Sensory verbal evidentials were particularly prominent in articles written by medical practitioners. The top three were the verbs *see*, *feel*, and *look*. Other experts used these VEs too but with lower relative frequency (see Figure 2). When medical practitioners employed sensory VEs, they did so to report on what they saw and experienced daily while working with other staff and treating people with COVID-19. The verb *see* can have two dominant but related meanings; the first refers to perceiving with the eyes, while the second meaning denotes a mental process of recognizing or becoming aware as an result of seeing (Oxford English Dictionary, OED). In most cases, medical practitioners used the verb in the first sense to report what they were observing in hospitals and clinics. Extracts 1–3 below illustrate this pattern:

1. Many of the patients we saw in our emergency rooms had advanced cases of COVID-19 pneumonia when they arrived and many of those critically ill patients came from nursing homes. (Medical Practice)
2. Our ongoing research has found that out of 868 UK healthcare workers surveyed, more than 60 % have felt down, depressed or hopeless during the pandemic; nearly 80 % have had sleeping difficulties; and 60 % have felt lonely. As a frontline clinician who was redeployed to intensive care, I have seen this first hand. (Medical Practice)

3. We have all heard horror stories about what is happening in New York hospitals. While it is real, I have also seen amazing displays of valor and sacrifice. (Medical Practice)

The second most frequently used verb in this category is *feel*. *Feel* can refer to the sensation of touch (touching or being touched) or expressions of various sensations, emotions or attitudes (OED). In the opinion articles, medical practitioners used the verb to describe their own physical and emotional sensations sometimes in a confessional style, reporting on their anxieties, frustrations and guilt. Below are some examples of this pattern found in abundance in our corpus:

4. I really wish I wasn't a doctor. I feel completely depressed, stressed and showered with COVID-19 after more than a month of doing this. I am anxious about all the patients and feel guilty about any who die. (Medical Practice)
5. We doctors and nurses feel just as baffled as everyone else. (Medical Practice)
6. I'm an emergency room doctor in Boston. I can't help but feel like Cassandra these days. (Medical Practice)

What stands out in the use of the two verbs is that they are mostly employed in what we can describe as short narratives or recounts, and that they are mostly used in the first person, with their top collocates being *I* or *we*. *I* occurs 19 times in the vicinity of *see* and is the top collocate of the verb (LogDice 9.99), while for *feel*, it is the third most frequent collocation with 16 occurrences (LogDice 9.75). *We* is the 10th strongest collocate for both verbs with 11 occurrences (LogDice 8.99 for both verbs, *feel* and *see*).

Similar to *see*, the verb *look* can refer to using one's gaze in a specific direction and watching someone or something (OED). As a common phrasal verb, it can also have other and often more metaphorical meanings. As above, medical practitioners used the verb mostly in recounts of their first-hand experience in hospitals (see Extracts 7–9). Furthermore, *look* and *see* occurred three times in each other's vicinity (e.g., Extract 9):

7. I sat at the central nurses' station with a headset on while my patient, just a few paces away down the hall, talked to me through the iPad next to his bed. The machine was at an odd angle, it was nearly impossible to look at him head-on, and behind me the alarms blared … (Medical Practice)
8. He is pacing the room, looking dejected. But his numbers look so good that I feel a stirring of happiness. "Would you like to go home today?" (Medical Practice)
9. What does COVID-19 itself look like? I see an average of six to eight probable cases a night, and end up admitting one to two of them. And that's just one A&E doctor. (Medical Practice)

Other experts used the same sensory verbs but in smaller proportions and sometimes in their secondary meanings. For example, experts from other disciplines used *see* more often in the sense of recognizing something often after considering specific data. The top collocate of *see* for disciplines other than Medical Practice was the first person plural pronoun *we* further suggesting that the process of seeing was likely to be a matter of a collective activity or judgment in those cases. The exception were economics experts who often used the verb with inanimate, abstract subjects such as *economy* or *markets*, which through this use become personalized. Extracts 10–14 demonstrate the use of the sensory verb *see* by experts other than medical practitioners:

10. Multiplying those numbers, we can see that, if we pursue herd immunity, the best-case scenario has between 43,000 and 100,000 people in Australia dying. (Medical Science)
11. As governments move toward biosurveillance to contain the spread of the pandemic, we are seeing an increase in tracking, automated drones and other types of technologies … (Law)
12. We tend to see this as a public health failure, but it is also a moral failure. (H&SS)
13. As we see it, now is far too early to throw up our hands and proceed as if a vast majority of the world's population will inevitably become infected before a vaccine becomes available. (Science)
14. As a result, our service-based economy, which relies on consumer spending, has seen demand dwindle and commerce grind to a halt. (Economics)

5.2.3 Epistemic verbal evidentials

While sensory verbal evidentials were prominent in accounts written by medical practitioners, epistemic VEs were used more frequently by experts from the "harder" sciences (see Figure 1). *Know*, *test* and *find out* were the top epistemic verbs in this category used by scientists and medical scientists. We focus here on the cognitive verb *know*, because this verb is one of the most typical linguistic means through which we signal knowledge (or lack thereof) and make knowledge claims (Biber et al. 1999). *Know* can explicitly point to who or what the source of knowledge is (and therefore assumes some kind of epistemic authority), and what the objects of knowledge are. The scientists in our corpus used the verb to construct knowledge claims but interestingly they mostly did so from the perspective of the scientific community. In other words, the most frequently used subject of *know* was the inclusive first-person plural pronoun *we* with 14 instances (LogDice 11.00), while *I* was used only 4 times in the Science corpus. Although there is a degree of certainty associated with collective knowledge claims – there were only 3 instances of *know*

being negated in the Science corpus (137 per million words) – most claims are hedged with time references such as *at this point* or *so far* or quantifiers suggesting that what is known is contingent or conditional (see Extracts 15–17).

15. Which is all the more reason to abide by one of the things we do know at this point: You should wash your hands regularly. (Science)
16. Most of what we know about the impact of school closings on disease transmission relates to influenza, to which children can be particularly vulnerable … (Science)
17. And so based on what we know so far, COVID-19 seems to be much less fatal than other coronavirus infections and diseases (Science)

The sense that knowledge is contingent and temporary is even highlighted explicitly in one of the opinion articles written by a scientific expert (Example 18):

18. The operative words here are "based on what we know so far" – meaning, both no more and no less than that, and also that our take on the situation might need to change as more data come in. (Science)

Emphasizing the contingent and temporary nature of knowledge was prominent in the opinion articles by medical scientists. They too used the plural *we* as the "knower", which is the most frequent collocate of *know* with 54 instances (LogDice 10.99) and, like the scientists above, hedged such collective claims with time references including *so far*, *still* and *yet* (see Extracts 19–20).

19. We still do not know what the long-term complications of COVID-19 are. (Medical Science)
20. But everything we know so far about the coronavirus tells us that blaming density for disease is misguided. (Medical Science)

Yet, in contrast to scientists, medical scientists were more likely to emphasize a lack of knowledge as evidenced in the higher proportion of the use of *n't know* in the Medical Science corpus (31 times, 324 per million words). Apart from the pronominal subjects, scientists named other knowers including other experts (*virus experts*, *scientists*) as well as other human and non-human entities (*everyone*, *the virus*, *viruses*), while medical scientists mentioned mostly experts such as *physician*s, *scientists, health workers* and *experts*. For these tribes, the source of knowledge was mostly their own expert community and occasionally related entities such as *the virus* or *viruses* that in a personified way were also designated as knowers:

21. Health workers are highly trained experts who know how to correctly use face masks. (Medical Science)
22. Physicians knew that much of this care was not particularly helpful. (Medical Science)

23. Viruses know no borders and respect no ideology. (Science)
24. Virus experts know that viral dose affects illness severity. (Science)

Interestingly, *experts* were not named as knowers by writers from disciplinary tribes other than Science and Medical Science. In the other corpora, other kinds of knowers appeared in subject position of the verb *know*. For example, *people*, *citizens*, *leaders*, *policy* and *government* were named in articles written by scholars from H&SS, while *midwife*, *people, patients, anyone* and *no one* in those produced by medical practitioners. *Employer* and *markets* featured in texts by economists and *Congress* and *airlines* in lawyers' opinion articles. References to people (*people*, *citizens*, *anyone*) as sources of knowledge points to a more "vernacular" epistemology, which contrasts with the reliance on established experts and scientific non-human entities, which was more typical in the Science and Medical Science corpora. For example, there were no occurrences of *people* as the subject of the verb *know* in opinion articles written by scientists and medical scientists. This suggests that when making knowledge claims, experts from across the disciplines refer to those who have an established epistemic authority within the discipline and that in "softer" sciences a much wider range of "knowers" seems to be accepted.

5.2.4 Reporting verbal evidentials

Finally, we explored the use of reporting verbs as instances of reporting VEs. This type of verbal evidentiality was the most frequently used across the disciplines, a feature of the media genre studied here. The top reporting verb for all disciplines was *say* often used in the past tense *said*, common in press discourse. Yet, apart from *say*, other high frequency reporting verbs varied from one corpus to another; more importantly, different voices or entities were reported as sources of the reported statements and/or knowledge claims.

While all experts used a range of reporting verbs, opinion articles written by legal experts included a greater proportion of this type of VE (see Figure 2). In the corpus of articles written by legal specialists, *say* was followed by two other communication verbs: *call* and *argue.* When exploring the concordance lines of the three most frequent reporting verbs, what became apparent is the use of the structure *reporting verb + that.* For example, the verb *say* was used by legal experts 36 times, opening a *that* clause 10 times. This kind of pattern is a common structure in reporting someone's opinions, arguments or claims, and is often employed to foreground the source of information or the reported author (Hyland 1999). In the case of the legal specialists, the most common source of information were human subjects who are generally considered powerful or authoritative, mostly politicians and professors, as seen in Extracts 25–27:

25. But that's not what Professor Taurek would do. He argued that the numbers don't matter. (Law)
26. The health secretary, Matt Hancock, says the biggest challenge is "one of distribution rather than one of supply". (Law)
27. Treasury Secretary Steven Mnuchin said that the airlines, including American, would be "on the top of the list" for federal loan relief. (Law)

Medical scientists and medical practitioners also used *say*, which was followed by *report* and *ask* in the Medical Science corpus and *tell* and *ask* in the Medical Practice corpus. When using *say*, medical scientists were more likely to report the voice of medical and scientific experts as well as non-human entities (*evidence*, *numbers*), while medical practitioners cited medical staff and patients. Extracts 28–31 illustrate patterns found in both corpora:

28. Scientists like us said lock down earlier; we said test, trace, isolate (Medical Science)
29. But what does the evidence say about how well face masks work, and who should wear them? (Medical Science)
30. As a co-worker said ruefully to me, "Our colleagues could soon be our patients." (Medical Practice)
31. As I ran into the room, a wise senior colleague said, "Sharon, the first thing to do at a code is to check your own pulse." (Medical Practice)

Experts from the fields of social sciences and humanities foregrounded a wide range of human sources of information from the general public to specific experts, politicians, philosophers and organizations. There was less reporting in which the source of information was a non-human entity (see Extracts 32–35):

32. Our fundamental moral duty, John Stuart Mill said, is to produce the greatest happiness of the greatest number. (H&SS)
33. Montaigne says that he developed the habit of having death not just in his imagination but constantly in his mouth. (H&SS)
34. "I'm scared of the loss of income, for sure," a woman with a suddenly precarious job in the arts said to me recently, "and obviously my health." (H&SS)
35. The other day, our fifth-grade son said shakily: "How long until I get to see my friends again?" (H&SS)

When it comes to the reporting of different voices and entities, the analysis also highlights some interesting disciplinary variation in terms of the discourse function of such reported statements. Experts from the legal discipline frequently reported the statements of powerful social actors like government ministers, *in order to*

criticise those very statements. For example, the reporting verb *say* was used 21 times to report a voice of an authority and 18 of these instances were followed by a critique or questioning of the statement or the authority exposing contradictions or inequalities. Extracts 36 and 37 illustrate this dominant pattern:

36. Treasury Secretary Steven Mnuchin said on Wednesday that the airlines, including American, would be "on the top of the list" for federal loan relief. As the government considers what we, the public, should do for the airlines, we should ask, just what have they done for us? (Law)
37. The health secretary, Matt Hancock, says the biggest challenge is "one of distribution rather than one of supply". Should more have been done to meet this challenge, and if so what? … (Law)

This approach is consistent with an epistemology found in the legal discipline that values debate and competition between contrasting positions, as a means of generating solutions to problems. A similar pattern was observed in the H&SS corpus. For example, the verb *say* was used 165 times, of which 58 times to report an authoritative voice including philosophers, academics, politicians, entrepreneurs or institutions. Of the 58 instances, 36 involved a follow-up critique (see Extracts 38–40).

38. "This cure is worse than the problem," Trump said. This is beyond immoral. It's profoundly stupid. But this mode of thought is all too common. (H&SS)
39. "Logistically, it's stunning," the US public health expert William Schaffner said of the Wuhan quarantine. "It was done so quickly." This wonder at China's logistical prowess is symptomatic of a recurrent trope among western commentators … But when it comes to a public health epidemic, there are worrying limits to the Chinese Communist party's control … Although the first case of coronavirus was reported on 8 December, the Wuhan health authorities took more than three weeks to issue a notice. (H&SS)
40. Musk says his factory is safe, but a worker who returned to the production line told the New York Times that little has changed, and "it's hard to avoid coming within six feet of others". Why is Musk so intent on risking lives? (H&SS)

In both the Law and H&SS corpora, reported knowledge (introduced by reporting VEs) is frequently treated as a "perspective" that is open to critique and debate, signaling a particular way of thinking about such knowledge in those disciplines. In contrast, experts from a range of other disciplines frequently introduced reported statements *in order to align with* those statements, i.e. as support for arguments that the experts were making. Experts from H&SS did this as well but mostly when referring to renowned philosophers, artists or scholars. So, when the voice of, for example, John Stuart Mill, Blaise Pascal or T.S. Eliot was reported, it was to introduce

or support a particular argument or interpretation (see Extracts 41–42), while statements of more "recent" and specifically political or institutional authorities were more likely to be critiqued.

41. But a philosophical life has to begin from an impassioned affirmation of our finitude. As T.S. Eliot said of the Jacobean playwright John Webster, we have to see the skull beneath the skin. (H&SS)
42. And our dignity consists in this thought. "Let us strive, Pascal says," to think well. That is the principle of morality. (H&SS)

In the case of Science and Medical Science, it is interesting that the source of reported statements is frequently a non-human participant (e.g., *evidence* or *survey*). This is in line with a disciplinary epistemology that seeks to downplay the human element in knowledge construction. It contrasts with the approach taken in other disciplines, where a range of human actors could be the source of reported statements.

6 Discussion and conclusions

As our study has shown, during the initial months of the COVID-19 pandemic, there were a variety of disciplinary voices contributing to expert opinion articles in mainstream media. Knowledge from multiple disciplinary "tribes" was represented, including both "harder" disciplines (e.g., Medical Science, Medical Practice, Science) and "softer" disciplines (e.g., H&SS, Law, Economics). Somewhat surprisingly perhaps, there is a larger number of articles from "softer" disciplines (199 articles) than from "harder" ones (164 articles), suggesting that expert opinions from multiple disciplines were deemed relevant by the editors of the media outlets in question. As one would expect, there was disciplinary variation in terms of the topic focus of articles, with "harder" disciplines mostly concerned with public health and the virus itself (e.g., modelling, infection rate, transmission, treatment), and experts from "softer" disciplines paying attention to the social, legal, economic, and political dimensions of the pandemic.

The patterns observed in use of VEs show clear differences across disciplines. Four main discourse patterns emerge from the analysis, which we can designate as follows:

1. Deriving knowledge from experience, common in the Medical Practice corpus;
2. Invoking the knowledge of the expert community, common in Medical Science and Science corpora;
3. Invoking vernacular knowledge, common in non-science corpora;
4. Raising claims in argument or critique, common in the Law and H&SS corpora.

The first pattern, "Deriving knowledge from experience" through use of sensory VEs was found almost exclusively in the Medical Practice corpus. This was expressed through the frequent use of *I/we see/feel/look*, in order to construct personal narratives, where knowledge claims were made on the basis of personal experience available to the writer as medical practitioner with first-hand knowledge of circumstances. The underlying epistemology holds that knowledge can be legitimately constructed from personal experience and can be derived by individuals (*I see*) or by individuals as part of a group of practitioners (*we see*). The media outlets publishing the opinions valued the narratives of individual experts as sources of knowledge. Such personal stories told from the point of view of an "experiencing" expert tap into the power of narratives as a way of organizing experience and constructing knowledge (Bruner 1991) and therefore have a real potential to influence readers' perceptions and behaviours (Jones 2016).

The second pattern, "Invoking the knowledge of the expert community" was more commonly seen in the Medical Science and Science corpora, with use of sensory and epistemic VEs in conjunction with *we*, e.g., as in *we see* or *we know*. Such experts construct knowledge or lack of knowledge as a collective experience, something that is shared within their respective communities. This is evidenced by the very frequent use of the first-person plural pronoun *we* as the pronominal subject of *know*. The knowledge of the expert community is also invoked by referring to *physicians* and *scientists*, echoing a strategy seen in popularizations, which seek to establish authority by appealing to the credentials of scientists in authoritative positions (Hyland 2010). This pattern is also evident in the use of reporting VEs with non-human subjects like *evidence, survey* or *virus* in opinion articles written by scientists and medical scientists, that emphasize scientific community as the source of knowledge.

It is interesting to consider the degree of (un)certainty with which knowledge is constructed. In the Medical Science and Medical Practice corpora, *know* is more often hedged with modifiers or used in the negative, when compared with other disciplinary tribes. In other words, in these corpora, *know* is more often used to present a state of uncertain, contingent, or lack of knowledge. Furthermore, the hedging observed often invokes time, with phrases like: *we still don't know*, *what we know so far*, *we don't know yet*. It is interesting to note this tendency for greater hedging in the medical disciplinary tribes: given their field of expertise, medical scientists/practitioners would seem to be best placed to provide *certain knowledge* about the pandemic. A useful way of understanding this disciplinary difference may be through the notion of *knowledge timescales*, i.e., the idea that knowledge may be developed on different timescales (more or less quickly) depending on the specific concerns of the discipline. It is possible that medical scientists/practitioners were working on a different (shorter, quicker) timescale to experts from other tribes:

one which began with knowledge of the virus' existence, followed by knowledge of its genetic code, followed by knowledge of its epidemiological properties, all emerging incrementally over a short period of time. The use of temporal modifiers observed supports such an interpretation.

The third pattern, "Invoking vernacular knowledge" was more common in the H&SS and Medical Practice corpora, evidenced by the use of epistemic VEs with human subjects other than *we*, including *people*. Indeed, the H&SS and Medical Practice corpora were the only ones where *people* appeared in subject position, albeit mainly in the negative to reflect a lack of knowledge. Writers in other disciplines did not concern themselves with the state of knowledge of "average people". These findings suggest that the range of legitimate knowers is narrower in the Medical Science, Science, Law, and Economics corpora. The findings therefore raise the question "whose knowledge matters?" As we can see from this analysis, writers from different disciplines have different answers to this question, reflecting different disciplinary epistemologies.

The last pattern, "Raising claims in argument or critique" was seen mainly in the Law and H&SS corpora, where statements of authority figures like government ministers or politicians were reported so that they could be examined and critiqued. This both indicates an assumption that it is the views of powerful social actors that really matter, while at the same time signalling that such views are always up for debate. This pattern contrasts with those in other disciplines where writers tended to align with statements that were reported. The pattern suggests a different purpose, not just to *inform and persuade* but also to *criticize and persuade*. As mentioned above, it is consistent with a disciplinary ideology that values argument, critique, and the evaluation of competing positions as a way of solving problems.

These observations of similarities and differences in disciplinary epistemologies make a useful contribution to existing applied linguistic work on disciplinary discourses (e.g., Hyland 2000) and the popularization of science (e.g., Myers 1990; Parkinson and Adendorff 2004). Previous research into popularization genres like popular science articles has examined the way that such genres present knowledge in a different way to corresponding academic genres like academic research articles. This research shows, for example, that popular science articles frequently use a range of strategies to construct "proximity" between writer and reader (Hyland 2010). We can see these differences as arising largely from the *needs of the audience*. However, the existing research has not considered the possible effects of the *needs of the disciplinary specialist writers* to convey their knowledge to the lay audience according to disciplinary epistemologies. The present study sheds light on the way that the writer's disciplinary epistemologies and goals can lead to systematic differences in presenting and evidencing knowledge claims. In addition, as such disciplinary epistemologies likely operate at a level below consciousness, the study

raises questions about how effectively experts are able to communicate with the lay public. As Myers (2003: 269) puts it, "debates in the public sphere have to draw on arguments that work in the public sphere. Specialist expertise gives some strong arguments in this sphere, but they are not the only possible arguments".

Above all, our findings show the importance of a diversity of disciplinary voices when it comes to understanding and responding to a crisis such as the COVID-19 pandemic. It seems that such diversity was valued by the two media outlets studied here. As our analysis of experts, topics, and patterns of verbal evidentiality have shown, each discipline brought different and important perspectives to the understanding of COVID-19 and its impacts. While the effects of COVID-19 as a medical condition primarily play out in the human body, the human body does not exist in a vacuum but together with other "bodies" in complex socio-political structures, which too have to deal with the impacts of a health crisis. Individuals need support mostly from those who are responsible for governing these structures – the leaders who we expect to devise policies and actions that will protect individuals from harm (see Jaworska and Vasquez 2022). As the experience of the COVID-19 pandemic has shown, leaders and their governments across countries were not always up to the challenge, putting lives and livelihoods at significant risk. Leaders and their voices need to be scrutinized and made accountable because they are the ones who are ultimately responsible for devising appropriate solutions (see Jaworska and Vasquez 2022); as our analysis has shown, a prominent voice that engaged in such a scrutiny was that of experts from Law and H&SS, who frequently engaged with topics of politics and governance and were not afraid to engage in criticism. They also discussed wider societal dimensions of the pandemic, especially its impacts on disadvantaged groups and the inequalities that it exacerbates.

Currently, governments and education systems tend to privilege STEM subjects (science, technology, engineering, and mathematics) and their epistemologies as an the keysources of knowledge and expertise needed to address societal challenges. In contrast, humanities (and some social sciences such as education) are often undermined as less relevant. More resources aare devoted to STEM subjects in schools and universities, for example, while humanities subjects remain embattled and underfunded (Gleason 2020). Crises such as the COVID-19 pandemic demonstrate the importance of epistemologies from a range of disciplinary tribes. Each disciplinary tribe brings different epistemological assumptions and perspectives – different ways of knowing – to bear on real-world problems, thus contributing to a more comprehensive understanding of issues and potentially more creative and effective solutions. The value of humanities lies in seeing a problem from the human, ethical and moral point of view; in doing so humanities can foster the critical thinking and empathy that have been significantly eroded over the last decades and are needed more than ever to face multidimensional, global crises (Nussbaum 2017).

Appendix: Categories of sub-disciplines/areas of study as identified in biodata

Table 1: Categories of sub-disciplines/areas of study in **Medical Science** as identified in biodata

Sub-discipline/area of study	Frequency
Medicine	24
Public health	18
Epidemiology	13
Health policy	7
Global health	5
Infectious disease	3
Infectious disease epidemiology	2
Nursing	2
Psychiatry	2
Disaster and operational medicine	1
Epidemiology and immunology	1
Epidemiology and medicine	1
Epistemology	1
Evolution and epidemiology	1
Global health policy	1
Healthcare	1
Immunology and infectious disease	1
Internal medicine and epidemiology	1
Medical science	1
Molecular virology	1
Pediatrics	1
Preventive medicine and public health	1
Viral immunology	1
Total:	90

Table 2: Categories of sub-disciplines/areas of study in **Medical Practice** as identified in biodata

Sub-discipline/area of study	Frequency
Medicine	41
Health care	2
Medicine and health	2
Public health	2
Global public health	1
Health	1
Lung and esophageal cancer	1
Nursing	1

Table 2: (continued)

Sub-discipline/area of study	Frequency
Otolaryngology	1
Pediatric surgery	1
Respiratory disease	1
Urology	1
Total:	55

Table 3: Categories of sub-disciplines/areas of study in **Science** as identified in biodata

Sub-discipline/area of study	Frequency
Mathematics	2
Physics	2
Biological sciences	1
Biology	1
Cell biology	1
Chemistry and genomics	1
Computational and systems biology	1
Computer science	1
Ecology and evolutionary biology	1
Engineering	1
Environment science	1
Evolutionary biology	1
Microbiology	1
Molecular biology	1
Risk and disaster reduction	1
Risk engineering	1
Statistics	1
Total:	19

Table 4: Categories of sub-disciplines/areas of study in **H&SS** as identified in biodata

Sub-discipline/area of study	Frequency
History	21
Public policy	9
Philosophy	8
Social science	8
Political science	7
Politics	7
Psychology	6

Table 4: (continued)

Sub-discipline/area of study	Frequency
Sociology	5
Journalism	3
Arts	2
Cognition	2
English	2
Geography	2
Policy	2
Political philosophy	2
Public affairs	2
Public relations	2
Urban studies	2
Africana studies	1
African American studies	1
Asian affairs	1
Asian studies	1
Chinese studies	1
Climate policy	1
Clinical psychology	1
Communication studies	1
Contemporary visual cultures	1
Culture	1
Ecological politics	1
Economic sociology	1
Education	1
Educational leadership	1
Environment	1
Ethics	1
Global communication	1
Health and human right	1
History of science	1
Human rights	1
Humanities	1
Islamic studies	1
Language	1
Media	1
Middle East policy	1
Middle East studies	1
Modern China	1
Modern literary	1
New testament	1
Politics and global studies	1
Social ethics	1

Table 4: (continued)

Sub-discipline/area of study	Frequency
Social policy	1
Social psychology	1
Technology policy	1
Transport policy	1
Total:	127

Table 5: Categories of sub-disciplines/areas of study in **Law** as identified in biodata

Sub-discipline/area of study	Frequency
Law	24
Chinese law and politics	1
Government and law	1
International bankruptcy law	1
Law and diplomacy	1
Law and policy	1
Legal policy	1
Security policy and law	1
Total:	31

Table 6: Categories of sub-disciplines/areas of study in **Economics** as identified in biodata

Sub-discipline/area of study	Frequency
Economics	32
Economics and public policy	4
Business	1
Economic and policy research	1
Economic policy	1
Finance	1
Trade policy	1
Total:	41

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