Writing in the Sciences: Scientists, Scientific Writers, and the Division of Writing Labour

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Open Access Author Manuscript

Abstract: This article examines the division of writing labour in the sciences, focusing on the distinction between scientists and the often-overlooked role of professional scientific writers. Our contribution is twofold. Empirically, we provide a fine-grained account of how writing is distributed within large scientific teams. We identify distinct modes of textual production—iterative, collaborative, cross-status, and inter-status—and demonstrate how scientific writers contribute under the rubric of *writing-as-a-service*. These practices reveal a structural asymmetry: while scientists view writing as an epistemic and authorship-related task, scientific writers frame their work as managerial and largely detached from epistemic responsibility. This analysis is based on 22 qualitative interviews with scientists in the biomedical and natural sciences in Germany and the UK. Conceptually, we explore how the social division of writing reflects tensions underlying this structural asymmetry. This contributes to the debate over whether scientific writing should be considered a form of ghostwriting. We also reflect on emerging developments such as AI-based writing support and the hidden costs of outsourcing critical labour in scientific knowledge production.

Keywords: writing, scientific writing, scientific writer, knowledge production, authorship, AI

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This is a pre-copyedited, author-produced version of an article accepted for publication in *Minerva* (2025). The peer reviewed version (version of record) is available online at: https://doi.org/10.1007/s11024-025-09606-x

1 Writing and Authorship in Scientific Knowledge Production

Who actually writes science? Despite extensive debates around authorship, writing, and publishing, this social structural question remains underexplored. And yet, writing is central to the scientific enterprise—it shapes not only how research is communicated but also how knowledge is constructed, legitimized, and preserved. In this article, we offer a qualitative analysis of writing practices in the sciences, grounded in interviews with scientists and professional scientific writers. Our core research question is: Who writes scientific texts? We investigate how writing is distributed within research teams and how external contributors—scientific writers—participate in producing scientific publications. A subsequent question is: How do those involved understand the writing they do? This second question broadens our enquiry, shifting the focus from the social structural organization of writing labour to how participants symbolically identify with this labour.

By including scientific writers in our research, we foreground a group of contributors who are often invisible in accounts of scientific authorship. These professionals rarely receive formal recognition as authors, yet when involved, they contribute significantly to the communication of scientific

knowledge. Positioned largely between scientists—who write primarily for scholarly peers—and science writers—who translate research for broader public audiences—scientific writers occupy a distinct and understudied third role (see figure 1). This role is part of a profession that offers *writing-as-a-service* to core scientific staff.

While scientists and science writers are well-established roles, the position of the scientific writer is ambiguous: performing textual labour for internal scientific audiences but without epistemic involvement or authorship recognition within the scientific system. This results in textual labour that is integral to knowledge production. Yet, it remains publicly almost invisible. In a structural dimension, this underscores the risk that this contribution *can* be seen as a form of ghostwriting.

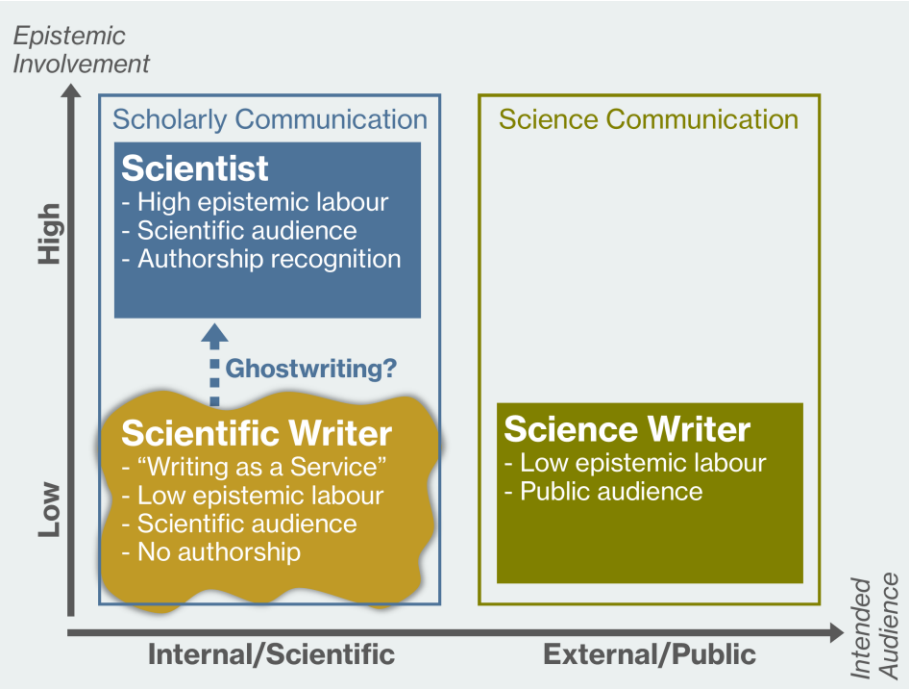

Figure 1: Typology of writers by epistemic involvement and intended audience. Scientists are highly epistemically involved—they produce (create, construct) knowledge; they communicate this internally to other scientists. Science writers—often working freelance or as journalists—communicate to the public. They are not epistemically involved in the creation of knowledge; they mostly report on it. Scientific writers occupy a middle ground. They are also not epistemically involved in the production of knowledge, but they contribute to its internal communication. Many scientific writers are trained as scientists but are not actively involved in data collection or conceptual design, creating ambiguity around their epistemic role.

The structure of this article is as follows. In the following section (2), we provide an overview of existing literature on writing in the sciences. Thereafter, we discuss our research design (3). We then present and contextualize empirical findings along themes such as iterative and collaborative writing, cross-status and inter-status writing, authorship, and the position of the scientific writer (4). Finally (5 & 6), we discuss our findings and conclude the study, expounding on the intermediatory functions of scientific writing in the broader context of knowledge production.

2 Literature on Writing, Authorship, and Knowledge Production in Science

2.1 Writing as an Epistemic Task

Writing is not rule-following proceduralism. It is a key epistemic task. The production of meaningful scientific text co-defines what the scientific endeavour is about. Critical work already clarifies that writing is more than the inscription of words as sentences; writing generally refers to a wealth of acts that go beyond such inscription (Bazerman 2013; Hyland 2015).

Pre-writing acts such as framing and selecting elements to be included in early drafts are key writing tasks, even though they might not involve much writing itself. Bazerman summarizes that '[w]riting is choice making, the evaluation of options' (Bazerman 1988: 13). He accounts for non-material acts that need to be included in a study of writing. And yet, the resulting material scientific text is in a strong grip of highly-standardized form and technical language, making the appearance of representing nature in its evidence-based ways: 'to maximize the tightness of fit between nature and its symbolic representation, all the relations between language and other contexts—the literature, the audience, and the authors—are both harnessed to and driven by the relationship between language and nature' (Bazerman 1988: 33).

All this shows that writing is more than the one moment of bringing pen to paper, and the first draft is more than its words. Writing, in this holistic perspective, is an integrated epistemic task. This perspective makes visible what is often left unaccounted for, just as thinking is all too often neglected in its ephemeral, non-material character in the study of science (Garforth 2012). The content of science—nature as the given world-to-be-researched—and form—language and structure as tools of representation—are dialectically corresponding. Moreover, as Gordin shows in his historical study of languages in the sciences (2017), scientists mediate technicalities and words with the culture structures that correspond to a used idiom. Similarly, Lepenies' account of the historic convergences of writing and science highlight that prose and cultural setting do contribute to the development of scientific writing (1988). Locke explicated the problem of representing either nature or science in writing (1992); still, the appearance of scientific text continues to bear the identity of such representation. There are dynamics of interaction at work in the resulting text that draw on codes—of politeness, subtle attack, or blatant dismissal—just as other speech acts do (Myers 1989).

2.2 Writing and the Social Structure of Science

This sort of textual production can be related to ongoing changes of material research constellations. These shape the conditions of knowledge production. Such change is first and foremost manifest in the development of scientific authorship. The amount of scientific work produced through a division of labour has been growing continuously, effectuating a rapidly increasing proportion of co-authored publications. Behind the increase in co-authorship is, on the one hand, the constant pressure to publish and, on the other, increasingly specialized expertise (Wren et al. 2007) as well as the rise of inter- and transdisciplinary research collaborations (Hornbostel et al. 2023). Taken together, the persistently high publication pressure and the increasing differentiation of the division of labour in material- and technology-intensive research disciplines such as natural and biomedical sciences are prompting a lively debate on how the various activities of those involved can be adequately acknowledged in published material (Biagioli and Galison 2003; Jabbehdari and Walsh 2017; Sauermann and Haeussler 2017).

Scientists mostly work in large, even multi-disciplinary teams today (Falk-Krzesinski et al. 2011; Liu et al. 2020). This social structural feature remains one of the most important differences from the practice of writing in the humanities, which is dominated by individual writers and single authorship

(Knöchelmann 2023). Modes of multi-authorship and various strategies of connecting work—during experiments, analyses, and also writing—to authorship designations are being applied (see, among many others: Bosch et al. 2012; Bošnjak and Marušić 2012; Breet et al. 2018; Bülow and Helgesson 2018; Hesselmann et al. 2021a; Johann and Mayer 2019; Kornhaber et al. 2015). This shows that scientists are rewarded with authorship for a variety of acts, both material (Birnholtz 2006), and even as symbolically, as gifts (Bennett and Taylor 2003; Biagioli 2022; Ngai et al. 2005). *Formal* authorship as a means to prove productivity is being criticized (Knöchelmann 2024). In the sciences, this is especially an issue in regards to the dominance of high-impact journals, accounted for by the Journal Impact Factor (JIF) and rankings (Brembs et al. 2013; Brembs 2018; Knöchelmann 2025; Lariviere and Sugimoto 2018; McKiernan et al. 2019). The self-fulfilling prophecy is at play as claims are favoured because of their publishing venue (Merton 1948). And yet, where reality conforms to belief, this belief needs to be produced beforehand. Accounting for formal means—metrics and journal venues—is one way to reason in this respect.

Developments such as that of a *Contributor Roles Taxonomy (CRediT)* in scientific publishing bear witness to very heterogeneous authorship practices and equally diversified conditions of scientific knowledge production—both individual authorship and co-authorships in small groups as well as mass collaborations are established authorship formats. At the same time, the publication organs—i.e. publishers, journals, professional societies, and non-profit organizations—are progressively providing authorship policies and guidelines in which the handling of authorship in scientific publications is increasingly explained and specified and which are referred to in the scientific community (Chang 2019; Hesselmann et al. 2021b; Kornhaber et al. 2015).

Yet the social structure in which writing is embedded remains largely unknown. On the one hand, this is a question of what happens within scientific teams. Debates about enlarging scientific teams focus on formal authorship. But these authors do not all sit together and write. On the other hand, lists of authorship leave those actors invisible who contribute without formal recognition. Recent developments on AI tools only highlight this once again (Kwon 2025). Similar to such machines, scientific writers operate structurally invisibly. They mostly remain hidden on the polished surface of authorship.

3 Research Design

3.1 Study Motivation

Instead of approaching the construction of scientific text primarily from perspectives of authorship, power, or reward, our aim is to highlight comprehensions of scientific writing in their complex, qualitative contextualities. This is necessary to gain insights into concrete writing practices among core scientific communities. Yet, the decidedly interpretative approach to the lifeworld of scientific actors should not lead to the assumption that issues of power or symbolic violence do not apply. Quite the contrary, our highlighting of empirical realities aims to provide foundations for further potential deconstructions of such issues, as is visible in our discussion.

The term knowledge production is essential for our research design. It refers to the conditions that enable scientists to produce knowledge. This more granular approach to the analysis of scientific knowledge owes much to the shift in perspective undertaken by scholars in science and technology studies. They developed analytical tools to approach science beyond general institutional conditions, focusing on the concrete research practices, procedures, motivations of scientists and their institutions. Thus, knowledge production became thematized in respect to manifold situational and epistemological implications, resulting in crucial insights into framework conditions, the

construction, and the co-production of knowledge (Knorr-Cetina 1981; Latour 1987; Niewöhner 2012). Knowledge is to be seen as situated and contextualized (rather than objective), and thus pragmatic, discourse- and resource-related. Theoretical and methodological presuppositions as well as technical apparatuses in the broader sense of socio-material structures also play a formative role in the production of scientific knowledge.

These terminological preliminaries ground our study. Firstly, scientific writing does not solely take place within the scientific community; it is also carried out by professional writers who are not necessarily part of the visible scientific staff. Professional writers can be part of knowledge production, but are often not perceived as such. Secondly, the complex cooperation, collaboration, and team structures that come to light in this study confirm the results of science and technology studies (Knorr-Cetina 2001; Latour and Woolgar 1986; Niewöhner 2016), and reveal the co-production as well as the socio-material embeddedness and narrative construction of knowledge. Building on these insights enables us to account for knowledge production with a focus on scientific writing practices in a more fine-grained manner.

Our initial motivation to look at the social structure of writing derived from the fact that the scientific writer is not sufficiently accounted for yet. This is the case even though empirical reality shows that scientific writers occupy a lively social position. To explore this, we conducted repeated cursory searches at relevant databases and scanned the job offers of the ten largest pharmaceutical companies, all of which had job offers for specific scientific or medical writers. Others, such as *Nature Careers*, list several scientific writing offers alongside other scientific jobs; the freelancer database for scientists and industry experts, *Kolabtree*, also boasts with offers of writing tasks.[1] This availability of writing support showcases the potential importance in the context of medical and biomedical science. Given this, we originally probed the use of such professional writing support in an exploratory survey question in the representative, cross-disciplinary *DZHW Scientist Survey* 2019/2020.[2] The responses showed that usage of professional scientific writing services seems to take place only at rare occasions; even when comparing subject groups, the responses hardly allowed for robust analysis and did not provide significant findings. This led us to fill this gap and invest in qualitatively studying scientific writing in the context of writing in the sciences.

3.2 Qualitative Study Design

Alongside extensive conceptual work on writing in the sciences, we conducted 22 interviews in order to understand writing practices, the social positioning of the writing actor within scientific teams, and the role of external scientific writers. These interviews aided our interpretation of writing practices. We carefully chose our interviewees based on their unique positions in their respective settings. Rather than claiming that this uniqueness constitutes incomparable cases, it is precisely the uniqueness that provides the context for qualitative insights (Flyvbjerg 2006: 223). Rather than explaining rules, we explore the writing behaviours and conventions of these 22 scientists/writers to understand their writing experiences and backgrounds. We juxtapose the practices and subjective comprehensions and framing of scientists and scientific writers to enable a better understanding of these distinct approaches.

We chose interviewees in an iterative manner so as to account for a diversity in terms of career positions and institutional backgrounds within a limited frame of natural and biomedical sciences in

[1] See, for instance: *Nature Careers* https://www.nature.com/naturecareers; or: *Kolabtree* https://www.kolabtree.com/.
[2] The *DZHW Scientist Survey* is a nationwide representative, multi-topic study on the German science system (n=8.822 academics); see: Ambrasat et al. (2020); Ambrasat and Heger (2020).

Germany and the UK. This frame was designed to account for top-level scientific production particularly in core basic science research, as table 1 illustrates. It enables a certain depth in our scientific focus group. Just this depth, however, also limits the study, as these are financially well-positioned institutions and epistemically favoured regions. Such social structural inequalities always need to be borne in mind when considering science (Knöchelmann 2021). Our study operates not across a diversity of such settings since our focus was decidedly *not* to survey social structural differences across scientific institutions or locales. Instead, we chose a specific setting with established, well-equipped scientists who are at least able to afford to hire scientific writers. Financial means are crucial in science; this plays out directly in the lab as much as it does in other areas. In the case of publishing, many scientists cannot afford premium open access options (Mekonnen et al. 2022); in our case of writing and authorship, many scientists will not be able to afford professional writing support (or even language editing). Writing can be driven by the same politics that authorship conceals on the surface of published accounts of science.[3]

Scientific writers were chosen based on our research in professional databases such as *Kolabtree* or the association bodies, *EMWA* and *AMWA*.[4]. Especially these associations were helpful resources to get to know the profession. Similarly, our research on the *Nature Careers* and *Kolabtree* job boards were helpful to get to know roles and formal requirements. We followed these sites over the course of several months, including the study design, literature review, and interview stages of this article. This allowed us to note formal commonalities of the roles of scientific writers as well as to get contact points with the profession. Table 1 provides an overview of our interviewees.

	#	Country	Native Tongue	Highest Ed.	G	Current Position	Institution	Discipline
Scientists	**sc1**	Ger	Ger	Dr rer nat	m	PI, Non-Prof	Research University	Biology
	sc2	Ger	Ger	Dr med	f	Project lead, Non-Prof	Research University	Medical-Biology
	sc3	UK	Hung.	PhD	m	Prof, PI, former director	Research University	Neuroscience
	sc4	UK	Eng	PhD	m	PI, Prof	Research University	Medical Chemistry
	sc5	UK	Eng	PhD	m	PI, Prof	Research University	Chemistry
	sc6	Ger	Ger	Dr rer nat	m	PI, Non-Prof	Non-Uni. Research Org.	Materials Science
	sc7	Ger	Eng	PhD	m	PI, Prof	Research University	Physical Chemistry
	sc8	Ger	Ger	Dr rer nat	m	PI, Non-Prof	Research University	Neuroscience
	sc9	Ger	Ger	Dr rer nat	m	PI, Non-Prof	Research University	Physical Chemistry
	sc10	Ger	Ger	Dr rer nat	m	PI, Non-Prof	Research University	Biomaterials Science
	sc11	Ger	Ger	Dr rer nat	m	PI, Non-Prof	Non-Uni. Research Org.	Chemistry
	sc12	Ger	Ger	Dr med	f	PI, Non-Prof	Research University	Psychosocial Epidemiology
	sc13	Ger	Ger	Dr Phil	f	PI, Prof	Research University	Health Care/Implementation Science
	sc14	Ger	Ger	Dr rer nat	f	PI, Prof	Research University	Epigenetics
	sc15	USA	Eng	PhD	m	PI, Prof	Research University	Biomedical Engineering
Scientific Writers	**sw1**	Ger	Ger	Dr rer nat	f	Senior Science Writer, Independent		
	sw2	UK	Eng	PhD	f	Senior Medical Writer, CEO of Science Writing Consultancy		
	sw3	UK	Eng	PhD	m	Senior Science Writer, Employed		
	sw4	Switz.	unknown	PhD	f	Senior Medical Writer, Employed at Pharmaceutical Company		
	sw5	Poland	Polish	PhD	f	Senior Medical Writer, Director of Writing Consultancy		
	sw6	UK	Eng	PhD	f	Senior Science Writer, Employed		
	sw7	UK	Eng	PhD	f	Senior Science Writer, Director of Writing Consultancy		

Table 1: Overview of interviewed scientists and scientific writers.

[3] In this respect, future studies might take up our approach and look at other concrete settings of knowledge production, those that are potentially less visible in the existing body of produced knowledge by means of authorship.

[4] Compared to scientists, we were much less familiar with scientific writers. From this followed that finding appropriate interviewees that are representative for their craft—without claiming representativeness for the profession as a whole—was much less intuitive.

We conducted semi-structured interviews which allowed us to follow central themes while also deviating from previously-defined scripts where appropriate, to gain access to the lived experiences of interviewees. The interview structure was built up from our reading in the foreground of the literature accounted for above. The themes were divided into: the writing practice; the role of the scientist as a writer; the understanding of authorship in relation to writing; and beyond writing. An exemplary interview guide can be found in the appendix. This structure was adapted for our interviews with scientific writers.

All conversations were conducted in English via telephone or Zoom between April and September 2021. The recordings were transcribed and anonymized, and afterwards coded with MAXQDA, employing a conceptually-driven, qualitative thematic approach. This problem-centred content analysis took up our initial themes to capture the transcription data in a structured way for comparative analysis. There were at least two rounds of coding per interview, conducted by both authors in intervals. Subsequent analyses used these codes and their contexts to develop a deeper understanding from within themes, employing peer debriefing to exchange insights as well as share and clear issues of comprehension. This, again, was conducted twice, with a focus on specific themes, subsequently also working with a comparative approach between literature and codes.

4 Writing in the Sciences: Empirical Realities

4.1 Writing Constellations in the Sciences: Scientists as Writers

Writing in the sciences is not a straightforward act. Scientists describe writing as 'an elaborative, stepwise process of many revisions' (sc12). Writing rarely begins with the introduction and ends with the conclusion. These sections are often finalized last, tailored to the already-developed main body. This main body is not developed beginning to end either: scientists move back and forth between hypothesizing, drafting, and revising drafts. This creative and productive meandering can take months, as all interviewed scientists generally agree. This is a matter of hermeneutics often accorded the humanities scholar. It is required of scientists, too; but it is less visible in the results which need to appear straightforward to be legitimized.

Iterative and Collaborative Writing

Scientists refer to this back and forth as a 'writing journey' (sc7). Argumentative gaps, hurdles, or points calling for further discussion during this journey are not considered problems but fruitful or inspiring aspects as they add to the 'natural process' (sc1) of production. This journey is *iterative* in the sense that it develops in subsequent steps; it is also *collaborative* in the sense that scientists usually work collaboratively along these steps.

Figure 2 shows ideal types of *iterative* and *collaborative writing*. The dominance of one of these two characteristics signifies the overall approach. It is, thus, never the act of an individual alone; nevertheless, as scientists tacitly communicate, the initial production of text *is* individualized. This pertains in particular to the question of the production of the first draft. Drafting means both conceptualizing and producing the first version of the to-be-published text; it requires coming up with the skeletal structure of the article which ultimately grounds a story.

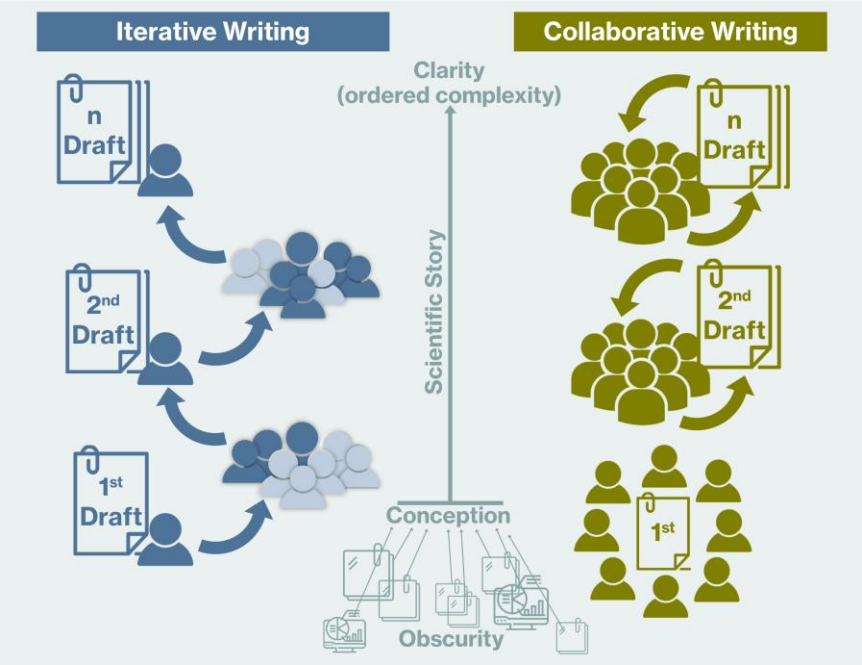

Figure 2: Ideal types of iterative and collaborative writing.

Iterative writing means that an individual is positioned to bear most of the drafting work. The draft text is subsequently circulated among colleagues. Their comments are incorporated, and the updated draft is circulated among the same or different colleagues close to the project or lab. Their comments are also incorporated, and so on, until all involved in the writing 'iterate that draft towards a final copy' (sc4). Writing, in this sense, means adding complexity to the document by iterations of internal and external reviews and revisions. The to-be-published-text is gradually being built up, involving also an 'ordering your thoughts' (sc7) in an iterative process within an entire group of co-writers, organized by a central actor.

At the other end, there is *collaborative writing* which means that the work of conceptualizing, laying out the story, and producing the first draft text is already conducted by a group, or by several individuals, in a collaborative way. Concepts and stories are usually orally discussed. Pieces of text initially written by different members of the group are assembled or already compiled in a cloud. This organization of writing is less defined and can, in praxis, even be conducted as a continuous process where lab notes directly develop into bits of texts to be assembled and incorporated in a larger document. The mode of iteration is visible in this approach, too. However, collaboration dominates and starts right at the beginning with the drafting, as an interviewee exemplified:

> I would write certain sections, and I had a shared first author that I collaborated with who would write other sections. And then we would swap sections and, you know, like, review each other. And then build a common draft together. (sc8)

> at the moment, in my group, we do it as a collaborative work. Before, where I used to work before, it was usually one person, and then you had, you know, how it is, right? There's like, some professor who takes a little bit of time looking at it and gives you some critical feedback, and that's it. (sc12)

Scientists often begin with group discussions. Together, they decide how to approach the phenomenon, frame the story, and outline the structure of what is to be told. However, framing

storylines in advance does not necessarily always work out, so that it only becomes visible during text production itself:

> sometimes, we manage in these discussions that we have initially, before we start writing, that […] it becomes clear to us how we should frame the story. So […] what questions we should pose, and in what order we should present our data, and what conclusions we want to draw. Sometimes, this only becomes clear to us during the writing process. (sc1)

The group is always relatable as each member will have their say. The weight given to each piece of writing—to each comment or conceptual advice—depends on the role of the scientist within the group, though. Particularly for scientists who are involved in a project but who are not PI or project lead—those who will be signified as middle authors—the writing can be indistinguishably iterative *and* collaborative, and it depends on the concrete group which mode of writing is employed. Nevertheless, the notion of collaboration is prevalent among most statements, even though acts of writing are individualized. Scientists tend to become aware of an informality of the writing, its meandering within a social setting, and they provide accounts of the diversity of acts involved. And yet, semantically, scientists often hold on to clearer divisions between different stages of writing. Editing in particular seems relevant to mention here.

There is a tendency among scientists to consider *editing* to be these acts concerned with specific revisions; they allude to a common assumption that editing means working on existing text. Others refer to the same acts as *re-writing*. Re-writing might be called editing depending on the amount of work on the text. In some cases, a first draft is revised extensively, which renders plausible to conceive of these revisions as part of the writing. However, when drafts are only slightly corrected, stylistically polished, or proof-read, this is often referred to as editing. Especially if it comes to an agreed-to stage of the document where the text receives only final language edits, the mode might shift from re-writing to editing. Contrary to this, there are some scientists who consider every stage of textual production beyond the first draft to be editing, including substantial re-writing. This shows the difference of perceiving the micro and macro structure of writing.

Timewise, there is no single frame for all writing. However, it is clear across the interviews that the writing considered as a whole—including editing and iterations—takes months:

> To get the first thing where we can-, so we can then use as a basis to work on, takes, I don't know, maybe a week. But then, the actual revising, rearranging, incorporating new data and so on, that can take many months. So I would guess that from saying, okay, now we start writing, to actually submitting the paper probably takes half a year or so. (sc1)

> One to five months to produce a final manuscript. (sc3)

> Three months would be realistic, I think. Weeks to months. It depends on the article. I already did it in four weeks, but this was an exception. (sc14)

Cross-Status and Inter-Status Writing

Acts of writing—of producing text in a minimal sense—are often individualized, even though actors draw on shared understandings and are constantly situated in collaborative settings. As the categorization of iteration and collaboration shows, there are varying approaches that require differing social roles for the writing. Scientists point out that the question of writing is conditioned by the division of labour in the research process; who the initial writer is 'really depends [… on]

where the research was happening' (sc10); i.e., who performs as the project lead. This can go hand in hand with the lead in the acquisition of data, but it does not have to be this way. It might be 'the person doing the experimental work' (sc5) or, just as well, 'the person who has the ideas' (sc12). Projects can also change which subsequently requires changes in the writing mode; if stories do not unfold—or sufficient evidence is not found—the determinants of the unfolding writing acts also change. Nevertheless, one or a few individuals eventually assume the role of the initial writer(s), at least in terms of coordination, and they commonly master the story to be told. As the developing of the story is intricately connected with the first draft, it is thus also the project lead on whom the reflexivity of the iterative or collaborative writing falls back on. This social positioning of writing can be categorized as *cross-status* or *inter-status writing*.

In *cross-status writing*, 'typically, one person will take the lead in drafting the first draft' (sc5), making an iterative approach more likely (except for cases in which, for instance, two PhDs collaboratively assume the project lead). Writing is an educative act here: every aspiring PhD student or Postdoc has to learn how to master discourse and storytelling so that the project lead eventually requires them to provide the first draft. Their work is mediated by the PI or professor, the so called 'desk jockeys' (sc10) who usually no longer conduct experimental work in the lab. The separation of roles and responsibilities here is an essential aspect of the progress of scientific conduct: there are always learners and masters involved, and the roles are continuously shifting. It is an arduous task to acquire writing skills since it involves both mastering the story and coordinating the back and forth of writing within a group. The senior scientist is, during this training, 'heavily involved in helping people ideate and […] frame arguments' (sc15). The writing might take longer for the whole group because of the learning process, and still the process is indispensable; without this learning, an aspiring scientist will hardly advance from being merely technical staff. They will be able to produce scientific information; but they will not learn how to craft a story. All the while, the interviewees report consentaneously that seniors usually take on the final completion such as proof reading, refining argument and style, and giving their consent for submission. Ultimately, thus, it is the senior scientist who holds the key to the master story. This can even go so far that the senior scientist will 'write everything new' for the publication (sc14).

Inter-status writing usually takes place in collaborations of groups, especially in the context of interdisciplinary or inter-lab projects. Writing requires a more collaborative approach in such contexts as the individuals involved provide respective instances of expertise that the others do not possess. Thus, just as scientists report 'a trend towards big advances being made at the interface between disciplines' (Sc4), both writing and reading become more complex as the individuals involved might no longer understand the whole of a project or article in detail. Such collaborations are circumscribed as 'multi-PI papers' (sc9) and they are all the more challenging as 'each [lead] will have a fairly strong view of how they think the paper should look and often it will be slanted towards their background' (sc.4). But collaboration requires them to acquiesce with competing narratives or stories, finding middle-grounds, and framing the evidence in a resulting dominant context as the writing unfolds. The importance of this conspiring is highlighted as scientists claim that 'usually, it requires face-to-face meetings to sort those out. You can't do by email exchange' (Sc4). In order to master these intellectually copious debates epitomizing the non-linear dynamics of collaborative writing, the central role of telling a persuasive story is brought to the fore again: at a certain instance '[y]ou have to sit down and […] ask yourselves, "What are we trying to sell here?"' (sc4).

4.2 Epistemic Labour and Authorship

While the previous section examined how writing unfolds within teams, we now turn to how this relates to authorship. Becoming a scientist requires becoming a writer. Authorship subsequently signifies this; it binds formally what takes place informally in the lab as well as in writing acts. However, authorship is not a direct reflection of writing practice. In both the collaborative construction of the scientific story and the act of writing itself, its role is often minimal. Authorship assumes its importance only in the wake of publishing and in the management of research resources and careers.

Scientists regard authorship with the frank acknowledgement of its importance and the way this impacts the scientific endeavour. A central concern is *recognition as inclusion*: how should authorship be awarded? Which activities are the basis of legitimate authorship claims? Who should be officially acknowledged with authorship? Some scientists claim, quite pragmatically, 'if you work on a project, then you should be an author' (sc15); others are more concerned with the minutiae of designating authorship: 'if you'd just acquire data […] you don't have the moral right to get an authorship' (sc11). There is a broad variety along this gamut. Scientists experience discussions and sometimes quarrels over this. Most seniors claim to making it as fair as possible, but field- and group-specific conventions can irritate and disturb this fairness.

Moreover, it cannot be read off the author list who provided the core writing (if there was an initial, individualized draft). It may be the first author as the project lead; it can also be the last author (PI or institutional director); it may also be one of the shared first authors, while the other first author led the work in the wet lab; and so on. This diversity of conventions only shows the disconnection of authorship designation and writing, and the way authorship is semantically treated not as an account of textual work, but as an account of indicating productivity in knowledge production. Writing—though it encompasses a diversity of acts—is but one doing that leads to authorship. Guidelines aiming to safeguard good scientific practice such as ICMJE and COPE, or from funding agencies such as NIH or DFG, may be helpful providing a normative frame for publishers.[5] Ultimately, however, designation depends on lab or institutional culture, its openness to fair recognition, and solidarity in the formal mediation of failure and achievement.

Guest authorship is an issue that some scientist experience as there are people 'who insist on being on the paper, just because of the title, as usual' (sc12). The plain statement of contributions in percentage points—required already by many journals—is both helping and not. It can never be ascertained really who did what in quantifiable amounts; however, it demands a degree of transparency and might raise the threshold for guest authorship (cf. Hornbostel et al. 2023).

Some writers provide anecdotes of the politicization and fierce competition surrounding authorship; these correspond to the ongoing debates about the reductive formality that authorship has become in the natural sciences. That is, authorship reduces the scientific story to a formality; This also manifests in the highly politicized conventions of author ordering and trends such as shared first-authorship: competition for authorship impacts the meaningfulness of writing negatively. The material identifiers of a publication—its aura evoked by a fixed time stamp, claims of peer review status, formal authorship denotation, DOIs, and reference list as a showcased embeddedness—provide the means to divide the chaotic, individualized acts beforehand and the afterlife of the story

[5] See, for instance: http://www.icmje.org/, https://publicationethics.org/, https://oir.nih.gov/sites/default/files/uploads/sourcebook/documents/ethical_conduct/guidelines-authorship_contributions.pdf, and https://www.dfg.de/download/pdf/foerderung/rechtliche_rahmenbedingungen/gute_wissenschaftliche_praxis/kodex_gwp_en.pdf.

as it develops in the scientific collective. To outsiders, the value of the story is attributed to individuals through authorship. This value is measured in metrics, journal name, or elsewise signifier in which claims and narratives lose their contextual significance. Nevertheless, our empirical exploration shows that scientists *do* have a feel beyond formal authorship in their day-to-day practice, and they seek to account for it within the confines of linear contributions. A meaningful story has a more lasting impact than formal authorship.

Ultimately, the question of order can assume grotesque outcomes. For some groups, fields, or in cases of articles with high-impact branded journals, first authorship is being shared so that two (or three) individuals may claim its reputation as *shared first authors*.[6] However, as one PI experienced with a group of PhD students, 'only the first authorship is really useful' (sc10), so that there was a case of being first-first author. Another scientist tells a similar story in which the 'first person was really, really pissed' (sc14), for she became first-first author instead of first-only.

4.3 Writing as a Service: Scientific Writers

Having explored how scientists experience writing as part of their epistemic labour, we now contrast this with how professional scientific writers describe their role. For scientific writers, writing is a service, a task performed as a 'jumping in at the point where the actual study execution is finished' (sw7). Correspondingly writing is described as a craft, a rather mechanical effort requiring well-organized teamwork and management skills. Scientific writers position themselves much more as experts of the translation, knowing both writing and the science. And contrary to scientists, scientific writers tend to contextualize both writing and editing as specific and individual acts. This might be grounded in the more thorough differentiation of the two because of the professional background. If you offer specific tasks for specific compensations, you are also specific about what the tasks comprise of.

The core scientific writer—working in the realm of scientific knowledge production instead of medical regulation—is more driven by rule-based proceduralism than by epistemic endeavours. They produce text as a service which fares as a rather reduced act, working in response to scientists. Sticking to rule and convention is more important than allowing the freedom to delve into inquiring exploration. Correspondingly although scientific writers mention storytelling, too, they are less concerned about big picture and ascribe much less weight and persuasive character to it than scientists do. They do refer to aspects of clarity in the language, describing their job as follows: 'to represent information succinctly, clearly and to get the messaging correct' (sw2), 'to write clearly and logically about the data' (sw7) and to make sure that 'the facts, […] come together consistently in terms of wordings, in terms of style' (sw4). Reference to style seems to be more mechanistic here in that it connects to journal styles and (medical) writing regulations.

Scientific writers are aware of the muddled back and forth that writing is. They openly clarify that writing is anything but a straightforward and uniform act, describing it as multifaceted, varying from case to case depending on the given working constellation. Since scientific writers are employed as service providers, they are individuals outside of the original research group. This necessarily makes their service a process of iterations. These iterations are conceived of as a different mode of collaboration and teamwork:

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[6] This is often indicated by a statement below the author, a symbolic reference such as: * *These authors contributed equally*. See the exemplary case: Huynh et al. (2024). See Lapidow and Scudder (2019) for a discussion of the meaning of shared first authorship.

> It's almost always collaborative. This is a team effort, crafting a document is a team effort. So, we will have a team on our side and we're always at least two people on every document and sometimes more if very complex, but we very much work as a team with the client (sw2).

Collaboration here signifies a mode of project work, most of all. Scientific writers articulate the burden of managing steps in a project: you need 'to be able to grip a team, to lead a team, to guide the team and deal with internal conflicts' (sw2); and 'you need to be willing to manage the whole document preparation and review process. So there's an element of project management in there.' (sw7) This form of collaboration concerns the coordination of the project and only subsequently the development of the content. Scientific writers act as coordinators in response to their own initial writing:

> The heavy lifting is done by the publication writer. So, it's like, you've got all these voices that are coming to you, and you're trying to sort of corral all that into a document. And then so you go through an outline phase, a first draft, second draft and usually a final draft for approval, obviously (sw3).

Scientific writers describe the back and forth as a circulation or sequences, or even as a 'ping pong game' (sw1). They take on the structuring role of iteration that allows for the quasi-collaboration, which may include a renouncement of true collaboration:

> Usually, I would produce the first draft of a document, and then send that to the client for them to review. And usually what we would want is, there'd be sort of two rounds of comments on the first draft, and then the second draft, and then ideally, you would finalize the document. So, I'm not really working in a collaborative way. You know, I'm sort of working exclusively on the document until I hand it over to the client (sw6).

The minutiae of organizing the steps of writing are outsourced from the scientific group and, all the while, scientists remain to have their say on the content. Scientific writers try to organize the document processing iterations as efficiently as possible, reducing the number of loops to the necessary minimum whilst ensuring that, indeed, everybody has their say.

Crucially, scientific writers say that they do not take responsibility for publishable work. This all the more adds to the impression of the service nature of writing: scientific writers effectively turn research findings into text; responsibility lies with those gathering evidence beforehand. Professional writers put special emphasis on the clear delimitation and separation of their responsibilities from those of scientists: they cannot 'guarantee the validity of the results' and 'have to just believe that what I receive is true. I'm not involved in running a study, so I can't know. So, a medical writer would generally never be an author.' (sw3) Being acknowledged as a service provider is generally considered sufficient, if at all. And yet, that same scientific writer was also honest about the power asymmetries involved.

5 Discussion: Epistemic Writing vs. Writing-as-a-Service

5.1 Accounting for Ghostwriters? Scientists and Scientific Writers in Comparison

Scientific writers can be called scientists-turned-professional-writers. They are trained scientists but no longer perform experimental or theoretical scientific work. Nevertheless, they remain close to the scientific community in that they contribute functionally to scientific knowledge production. Scientific writers are professionals in that they conduct writing as an employment (either self-employed or organized as an agency). And they tend to work with key account clients—labs or

pharmaceutical companies—for whom they produce text as a service repeatedly. The boundaries between types of contributions can blur. Some writing agencies offer a full range of services—from scientific publications to journalistic pieces (promoting former studies). Others focus narrowly on documentation for trials or patents.

On the basis of writing practices, we can account for key distinctions between scientific writers and scientists, as shown in table 2.

	Scientists	Scientific Writers
Role	Epistemic actor; involved in conceptualization, experimentation, interpretation	Service provider; translates scientific content into communicable form
Authorship	Formal authorship expected and often negotiated; highly political	Rarely claim authorship; typically merely acknowledged or invisible
Writing Mode	Iterative or collaborative, intertwined with experimental process; often diffuse and social	Structured and linear; includes project management, versioning, and feedback loops
Perception of writing	Central: framing results, crafting storylines, aligning with disciplinary discourse	Central: supports clarity, coherence, and journal style; limited influence on framing
Ethical Grey Areas	Power asymmetries in cross-status writing; honorary or guest authorship	Ghostwriting risk when writers contribute substantially but remain unnamed
Responsibility for Published Material	Through authorship; difficult to establish for honorary or guest authorship	Repudiate responsibility

Table 2: Key differences between scientists and scientific writers.

Role: Scientific writers are employed for professional writing tasks. They can be described as scientists-turned-professional-writers. They usually have a PhD or even Postdoc training. Yet, they left the core scientific staff and now offer a service that translates findings into publishable text. Scientific writers thus make use of their specialised knowledge without being required to endure the pressure and insecurity of the scientific system. Authorship & responsibility: In laboratory teams, formal authorship is both expected and fiercely negotiated; it anchors epistemic responsibility. Professional writers, by contrast, rarely seek authorship and explicitly disclaim responsibility. Writing mode: Scientists draft iteratively, in tight feedback loops that can even intertwine with ongoing experimentation. Writers follow a more structured, linear workflow that couples text production to project management, version control, or regulatory deadlines. Perception of writing: For scientists, writing is where results are framed, and disciplinary discourse is engaged; its value lies in crafting the story. Writers see their value in clarity, coherence, and journal conformity—framing decisions ultimately remain with the research team. Ethical grey areas: Power asymmetries inside scientific teams can lead to honorary or guest authorship, while outsourcing raises ghostwriting risks when substantial contributions remain unnamed.

5.2 Outsourcing and the Social Meaning of Writing

Potential Reasons to Outsource Writing

We can find several potential reasons for commissioning external writing support. Time scarcity sits at the top. PIs have ever more tasks to perform, especially in regard to grant writing and administrative audits. Drafting or overseeing manuscripts becomes a bottleneck. As we have seen,

the complexity of iterations and editing prolongs writing, even though a first draft might be ready within a few days. Outsourcing shortens that timeline by shifting the editorial grind away from the project lead.

Prestige pressures reinforce this logic. As the literature accounted for above confirms, in the publish-or-perish economy—especially acute in biomedicine, where journal-impact metrics still dominate—polished prose in top-tier venues more likely secures the authorship credit on which careers progress. Any service that raises the manuscript's stylistic or structural quality could therefore be welcome.

Language hurdles add a further layer, especially to non-native English speakers. As interviewees say: 'I've made the experience that this is primarily useful for people that don't have a strong background in English language.' (sc10) They call on support by colleagues: 'I always give my manuscript to native English-speaking colleagues to correct my mistakes and make sure it's proper scientific writing.' (sc3) And by professional editors, as a scientist explained that they send their draft 'to American Journal experts. Because we're not native English-speaking people.' (sc13)

Another reason, compliance, concerns medical fields more than others, particularly clinical research. Whereas basic science is governed by conventions, clinical research and drug development have a higher burden of written regulations. In the writing process, compliance can be a tedious, ticking the box task. It can therefore be a relief to offload this to professionals who know the rules and monitor changes more closely. Several writers related to this, explaining that: 'There are high-level regulations, guidance documents, and SOPs so that everything is compliant before we submit.' (sw4) We come back to the point on medical writers below.

The Risks of Outsourcing Writing

Writing is not a neutral task of transcription but a practice that is epistemically integral to what science means. Scientists describe it as a rite of passage, where rhetorical and disciplinary thinking are internalized. Outsourcing, while easing logistical burdens, risks severing this formative loop. It converts writing from an intrinsically epistemic craft into an externally traded service, separating epistemic work from project-and-review management. When writing is purchased as a commercial service, its meaning shifts from thinking-through-the-science to delivering compliant text. Scientific writers underscore that they are too far removed from the core epistemic conduct. Yet they shape how this conduct will be inscribed in the scientific record. Scientists, in turn, risk a gradual de-skilling of rhetorical practice; several interviewees fear that delegating the production of first drafts erodes the apprenticeship through which they learn to craft a story and order their thoughts. One might conclude that, for aspiring (young) scientists, the first draft is more important than the finished article. Of course, this is not what authorship accounts for.

With a nod to Durkheim's division of labour (2014), our study points to two distinct mechanisms. Within scientific teams, internal epistemic specialisation still works much as Durkheim imagined: it strengthens solidarity because contributors share the disciplinary moral code and accept common authorship and integrity norms. This is so despite the challenges of collaborating in interdisciplinary teams and of combining and harmonising different canonical bodies of knowledge. Authorship is symbolically anchoring epistemic responsibility. By contrast, outsourcing to professional scientific writers creates a division of labour that is functionally efficient but only weakly integrated in the meaningful horizon of epistemic advancement. Commercial writers do not share a team's moral charter; they deliver compliant prose, yet their epistemic responsibility ends at delivery. This is the

key ethical division that corresponds to assumptions about the meaning of writing. Scientific writers are not knit into the normative horizon of a team. The lack of authorship symbolically signifies this.

Further, in a structural dimension, outsourcing exacerbates longstanding tensions around credit and visibility. Here, the symbolic recognition of responsibility—or lack thereof—comes to the fore as a risk of ghostwriting. This is a risk because of the structural concealment of who was involved in the creation of knowledge. This concealment adds a structural distortion to the polished surface of authorship. This echoes wider concerns about epistemic injustices in science, especially as they depend on economic resources (Knöchelmann 2021). The better equipped the laboratory, the more they can purchase external support to improve "their science", at least in the way it is being communicated (think of the ability to "purchase" open access, most of all). This risk is not inherent in scientific writing.[7] It derives from the fact that the scientific system structurally places such great emphasis on authorship and its reputation practices.

5.3 AI and the Division of Labour

The rise of AI-assisted writing further complicates these politics, forcing the community to renegotiate what counts as writing—and thus as knowing—in contemporary research. The fact that AI tools already perform writing tasks is undisputed (Beta Writer 2019; Tay 2021). Recent studies show that many scientists already use tools like ChatGPT for key tasks (Kwon 2025). Only a minority of scientists reports to have disclosed this.

Unlike human scientific writers—who remain expensive and whose roles are clearly demarcated—AI tools offer low-cost, flexible support. This *appears* to make epistemic tasks easier to automate. It suggests that epistemic injustices might be overcome—that every lab can employ writing support, whether human or machine. Yet, these developments and the debates surrounding it reflect a mechanistic view of writing as a rule-based procedure. This view contrasts with the account we provide in this article. The risk remains that epistemic apprenticeship—knowing how to craft a story—becomes disconnected from the mechanism of text production.

Yet, comparing these two modes—of outsourcing to professional writers and automating with AI tools—also highlights differences. Scientific writers typically take some responsibility, at the very least, for factual accuracy and proper referencing. Truthfulness is one of the central currencies in their professional practice. By contrast, AI tools are said to hallucinate: they may generate plausible-sounding but false content, including fabricated references.[8] As a result, when scientists use AI for writing, they must take on the burden of verifying text themselves. Paradoxically, while outsourcing to scientific writers allows scientists to offload procedural tasks, outsourcing to AI shifts more procedural responsibility back onto scientists. These developments once again underscore the importance of examining how writing is valued, distributed, and made visible in scientific work.

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[7] Note the scientific writer who demonstrated knowledge about the workings of scientific authorship. They stated that in academia, as opposed to the pharmaceutical industry, 'it's kind of the Wild West': 'They assign people that haven't been responsible, […] they don't give authorship to people who have been involved and deserve to be authors. And it's a big mess.' This is said to be different 'in the pharmaceutical industry, [where] we have very rigid guidelines that we have to follow' (sw3).

[8] E.g. Retraction Watch runs an active list of *Papers and peer reviews with evidence of ChatGPT writing*: https://retractionwatch.com/papers-and-peer-reviews-with-evidence-of-chatgpt-writing/. Accessed: 14th July 2025.

5.4 The Institutionalization of Professional Writing Support in Medical Research

Having explored the reasons and risks associated with outsourcing scientific writing, we now turn to the question of who actually uses these services—and in which contexts they are most institutionalized. Within our interviewees, no scientist has outsourced the writing of articles or knows anyone who has done so.[9] Some scientists reported that they know of the existence of such professional service; others did not know that it exists beyond language editing. This results some ambiguity, as is visible in one scientist's statement:

> I have heard about it. I never went near it. But I'm sure you can take off some of the burden from scientists and they may have then more time to think and increase knowledge because they are not burdened with writing. (sc3)

This appears to be different for grant writing, where at least two scientists confirmed the use of professional support. One scientist explained that: 'I'm aware that this [complete writing support] exists, but I have actually never used it. Or I don't even know anyone who uses this. What I do know is that people use-, and I have used myself, is consulting companies for writing grant applications.' (sc10) Another scientist similarly related one with another: 'For manuscripts and publications, definitely not. For certain grant applications, particularly for things like European projects, having an external help with the drafting of proposals can often be quite helpful.' (sc5) The reason for this is that writing articles is too important to delegate, reflecting the complex meaning that scientists ascribe to it.

As the job advertisements on the websites we examined and our interview partners show, professional writing support does exist in the basic sciences. But because of the limited scope of our study, we did not find scientists who had used this service. It seems much harder to find scientists who have made use of professional support, especially since the latter is not formally recognised. This leaves open the question of who really employs scientific writing support. Our study, being qualitative in nature, cannot give conclusive answers to it.

This is different for certain types of medical writing, or with pharmaceutical companies and professional clinical organizations where the execution of trials from beginning to end is more often outsourced. For them, there is more instrumental reasoning involved where the effective execution of tasks is needed, as Sismondo shows (2009). This also mirrors that the scientific writers that we found for our study relate to medical fields more than to basic science.

There are reasons for why this is the case. Most of all, this area has a high regulatory intensity and liability. The Food and Drug Administration (FDA) in the US or the European Medicines Agency (EMA) have strict guidelines that require methodologically meticulous narratives and representations. Writing is here more a compliance task and much less a craft; the baseline for this kind of writing is rule-following and not epistemic persuasion. Further, there is a clear interest in tightened timelines in clinical and pharmaceutical practice. Speed-to-publication affects patent life; outsourcing reduces bottlenecks. As one writer explained: 'the timelines that the industry as a whole needs- to generate these documents- are just getting tighter and shorter.' (sw7) All this corresponds to the established professional infrastructure. The dominant professional writing actors are the *European* or *American Medical Writers Associations* (*EMWA* and *AMWA*). These are associations for *medical* fields, covering both clinical and pharmaceutical research. Their certification pipelines and educative efforts most likely normalise roles and concentrate supply. All this supports the institutionalisation of scientific

[9] This resonates with the responses to our original question in the DZHW survey, as outlined in section 3.

writing in medical fields. It is the task of future research to identify the scope of scientific writing also in the non-medical sciences.

6 Conclusion

With this article, we provide a comprehensive, qualitative understanding of writing practices in the sciences. We account for the division of writing labour, the relation of writing to authorship, and the contributions made by external, professional writers. We highlight the differences between writing as an integral epistemic task and writing-as-a-service that is epistemically involved only at a low level.

Our findings mirror the complexity of writing that existing literature already accounts for. We provide a social structural typology for it. The terminology we propose above—*collaborative* and *iterative* as well as *cross-status* or *inter-status*—provide ideal types that help categorizing writing practices within and across scientific teams. From the perspective of professional writers, writing can be perceived as a procedural craft, carried out individually; it needs to be managed efficiently not only in respect to content creation but to organizing team communication, too (even though the writer remains an outsider to that team). From the perspective of scientists, writing needs to be conceived as a contextualized expression of collectively coordinated, structured thinking. By choosing results and framing the perspective, scientists develop a bigger picture in order to tell a persuasive, plausible, and factual story; this needs to be as inspirational as it can be as far as it remains borne by the data.

By thinking about writing qualitatively, we wish to more generally re-direct focus on writing and the way it is comprehended by scientists as well as by those writers that usually remain in the shadows of visible practices. This is essential for addressing material injustices. Writing and its underlying, complex comprehension of crafting a scientific story stand out as central elements in being a scientist. Despite the harsh terms and reward structures of authorship and publishing, scientists often do regard their written accounts of scientific investigations as contributions of meaningful stories. Authorship is partly mediated by such stories.

Thinking about future developments, it is possible to identify a new task of scientific writers to become fact checkers of AI tools, or of their use of scientists. This, of course, is highly speculative in such a rapidly evolving context. A utopia of open scientific practice could show that AI tools nullify the form of the article altogether (Knöchelmann 2025). It is likely that the conventions of authorship will prevent this. Nevertheless, as AI-assisted composition becomes mainstream, the community must decide whether to reaffirm writing as a site of epistemic agency or accept a further commodification of textual craft.

Durkheim warned that specialisation fosters solidarity only when newcomers are woven into the community's normative fabric—a test ghostwriting seldom passes, and AI tools hardly at all. Recognising this fault-line clarifies the stakes of contemporary science: speeding publication is easy; preserving epistemic ownership is harder. How institutions choose to balance those aims—especially as AI accelerates textual outsourcing—will shape not only who gets credit, but what we mean by doing science at all.

Appendix

Topic	Exemplary Questions
Background	Introductory: What is your position and background? What discipline/ field are you working in/with? What kind of institution, lab?
Writing Practice	What kind of documents/texts do you write?
Writing Practice	Do you work with scientific writing support? Language Editing Serive?
Writing Practice	What is the average workload for specific tasks?
Writing Practice	Are there specific sections that you write? Are there sections you almost always/merely-never write?
Writing Practice	Would you describe your work to be collaborative? Rather iterative?
Writing Practice	How do you deal with problems?
Writing Practice	Who formulates the first draft of a text?
Writing Practice	Are you committed to a certain style in writing?
Writing Practice	Is there a clear distinction between writing and editing for you? Do these tasks mix in your daily work?
Subjectification: Scientist as Writer	Where did you learn about writing?
Subjectification: Scientist as Writer	Do you look at specific scientists for good writing?
Subjectification: Scientist as Writer	Do you give specific instructions to students?
Meaning between Writing and Authorship	What does authorship mean to you? Do you care about authorship?
Meaning between Writing and Authorship	Do you often talk about authorship designation?
Meaning between Writing and Authorship	Are there regularly troubles or misunderstandings regarding authorship/ contributions?
Meaning between Writing and Authorship	Do you consider yourself to be responsible for the content?
Meaning between Writing and Authorship	What are the prerequisites for being a good scientific writer?
Beyond Writing: Authorship and Publishing	When is the project finished?
Beyond Writing: Authorship and Publishing	Who decides on the venue/journal?
Beyond Writing: Authorship and Publishing	What does impact mean in this respect? Is it quantified (JIF)?
Beyond Writing: Authorship and Publishing	What about new developments (open access, preprints, open data)?
Beyond Writing: Authorship and Publishing	What do you think of peer review?

Table 3: Interview guide, scientists.

Topic	Exemplary Questions
Background	Introductory: What is your position and background? What discipline/ field are you working in/with? What kind of institution, lab?
Writing Practice	What kind of documents/texts do you write?
Writing Practice	How does your daily work as a scientific writer look like?
Writing Practice	What are the requirements for you to start a project?
Writing Practice	What instructions do you receive before/as you are writing?
Writing Practice	What is the average workload for specific tasks?
Writing Practice	Which sections do you write and to what extent do you do so? Are there sections you almost always/merely-never write?
Writing Practice	Is there a clear distinction between writing and editing for you? Do these tasks mix in your daily work?
Writing Practice	When do you formulate the first draft of the text? Or: Where do you get first drafts, which you then develop further?
Writing Practice	Are you committed to a certain style in writing?
Writing Practice	Whom do you work with as a scientific writer?
Writing Practice	How are you being reqruited/how do you get projects?
Writing Practice	Would you describe your work to be collaborative? Rather iterative?
Writing Practice	How do you deal with problems?
Writing Practice	What does writing entail? Where does writing begin and where does it end?
Writing Practice	What do you deliver? When is the project finished?
Subjectification: Being Scientific Writer	Since you deal with highly specified terminology and practice, do you need to stay up to date for the work in scientific terms?
Subjectification: Being Scientific Writer	Have there been unusual tasks you have been asked to take on?
Subjectification: Being Scientific Writer	How did you get to be a scientific writer?
Subjectification: Being Scientific Writer	What are the prerequisites to be a proper scientific writer?
Subjectification: Being Scientific Writer	How are scientific writers employed?
Subjectification: Being Scientific Writer	How is the working situation generally in the field? E.g. are most writers temporarily employed?
Subjectification: Being Scientific Writer	Are you involved in any kind of institutional setting or association?
Meaning between Writing and Authorship	Do you do (follow up/check-in) research?
Meaning between Writing and Authorship	What constitutes a good scientific writer?
Meaning between Writing and Authorship	What does authorship mean to you? Do you care about authorship?
Meaning between Writing and Authorship	Do you often talk about authorship designation?
Meaning between Writing and Authorship	Are there regularly troubles or misunderstandings regarding authorship and contributions?
Meaning between Writing and Authorship	Do you consider yourself to be responsible for the content?

Table 4: Interview guide, scientific writers.

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