1

Digital Scholarly Practices in Scientific Communication: Paths and Goals in Research Dissemination

Daniel Pascual, Ramón Plo-Alastrué, and Isabel Corona

1 Introduction

The mutual entente between the use of the Internet and the development of society is undeniable. As users, we take advantage of the digital medium to enact actions and pursue goals in our daily communicative encounters. The traditional dichotomies of writer versus reader, when looking into texts, and producer versus consumer, when dealing with material goods, have merged at an unequalled scale in the discourses constructed online. The infrastructure of the Web enables users to blur the boundaries around the role they play in digital communication. The duties of creation, modification, distribution and consumption of information are accordingly shared by the whole Internet community, leading to its members being regarded as 'produsers' (Bruns, 2007).

D. Pascual (✉) • R. Plo-Alastrué • I. Corona
Universidad de Zaragoza, Zaragoza, Spain
e-mail: dpascual@unizar.es; plo@unizar.es; iscorona@unizar.es

R. Plo-Alastrué, I. Corona (eds.), *Digital Scientific Communication*,
https://doi.org/10.1007/978-3-031-38207-9_1

Beyond personal and private spheres, it is remarkable how digital communication has expanded in professional environments, which have appropriated its affordances for commercial, corporate, advertising, pedagogical, entertainment and research purposes. Of special relevance is the paradigm change the digital medium has triggered for scholars and scientists. Parallel to the establishment of Web 2.0, characterised by the participatory nature of the platforms and media available to users, the notions of 'Scholarship 2.0' and 'Science 2.0' unveil new approaches in the construction and communication of knowledge, based on the cornerstones of collaboration, network technologies, accessibility and information sharing. The rapidly increasing interests of institutions, universities, research centres and associations in occupying a prominent position at the forefront of knowledge creation and research dissemination may be pushing scholarly and scientific practices towards the commodification of information and the marketisation of science. Yet, the negative implications that could derive from this view are countered with the perks of a post-modern globalised society, which also aspires to the democratisation of knowledge and the participation of citizenship.

Consequently, the ways of *doing* and *talking about* scientific research continue to flourish, becoming more varied, complex and ambitious. Research has recently attempted to depict the new genres and practices employed under the umbrella term of science communication (e.g. Bartling & Friesike, 2014; Bucchi & Trench, 2016; Davies & Horst, 2016; Luzón & Pérez-Llantada, 2019; Lorés & Diani, 2021; Mur-Dueñas & Lorés, 2022, to name but a few). More specifically, the premise of this volume is to gain understanding of current practices in 'scientific communication', which concerns communication among equals, encompassing a variety of agents in the scientific process that includes citizens, as opposed to 'science communication', which rather addresses the unidirectional communication from scientists to non-scientists (Zerbe et al., 2022).

2 Scientific Communication: Models, Approaches and Practices

A critical approach to 'science communication' is needed, since its conceptualisation very much depends on the period in time and the contexts in which it has been used. The changes in 'science communication'

throughout time have resulted in three principal conceptual models to describe the shifting directions that it has experienced in its pursuits, target publics, channels of communication and favoured ways of expression. As it may be hardly observable how agents in science communication practices have internalised these models, they should therefore be regarded probably as coexistent rather than replacing one another. In the 'Deficit Model', associated with the 1960s and giving way to the Public Understanding of Science movement in the 1980s and 1990s, laypeople are assumed to have a deficit of scientific understanding that should be repaired. An increase in the knowledge and literacy of the public is needed, which may drive to more support and legitimation of science on their part. Thus, a top-down, one-way view on scientific knowledge is contended, foregrounding "the public's inability to understand the achievements of science—according to a model of linear, pedagogical and paternalistic communication" (Bucchi & Trench, 2016, p. 155). The problem is attributed to the public rather than to science itself or to scientists in their efforts to communicate their findings. Hence, science communication is characterised by its simplicity and easy implementation, and places the public away from influencing scientific discourse. At present, it would be represented by mediated divulgation where the public is taken to be persuadable and with no judgement in scientific communication processes.

In the 2000s, the 'Dialogic Model' gained momentum to facilitate the Public Engagement with Science, bringing about a two-way dialogue between science and citizens. As a result, a greater value was placed on the interaction between academics and stakeholders. This is the point at which the dichotomy between 'science' and 'scientific' communication finds its roots, prioritising a process shared among equals. To attain the involvement of non-scientific agents in the processes of knowledge production and scientific investigation, a transition is imperative from awareness into involvement, from communication into dialogue and overall from Science *and* Society to Science *in* Society (Bucchi & Trench, 2016). Although public engagement is fostered, critical and sceptical views may remain on the grounds that the dialogue in this model is not genuinely symmetrical (Engberg, this volume). The original producers of science and its communication take over, while citizens still have no significant

role in the outcomes produced. Scientists, thus, aim at communication in authentic contexts and at attentive listening to citizenship, but in the end, they direct the exchange of views between laypeople and experts towards the latter, due to perceived knowledge deficits of the former.

As the most recent paradigm shift, the 'Participation Model', revolves around the notions of Open Science, Citizen Science, Strategic Science Communication and Upstream Public Engagement. Participation is seen as "a stronger form of engagement by the public both with scientific ideas and with the governance of science" (Bucchi & Trench, 2016, p. 157). The focus is then placed on the legitimation of scientific protagonists and the increased autonomy of institutions and individuals to promote science and its dissemination, bringing meaningful implications for scholars and citizens. The instrumentality of scientific communication is a prominent feature in this model, as the process of participating in knowledge distribution brings along reputation, credibility, impact, image-building, self-branding and positive identity construction. Subsequently, active agents are given now the possibility of participating in the scientific processes taken by professionals themselves and negotiating scientific knowledge with them. Research projects and activities count on the participation of non-scientific agents, who help generate new scientific knowledge and findings. This is accompanied by a movement towards Open Access (OA) to outlets in which results can be freely and widely consulted. As Kessler et al. (2022, p. 17) contend, "[T]he increasing number of scientists interacting with the media and conducting other public engagement activities may in itself be changing the culture of science." The conception of Science *in* Society has thus further evolved to tackle the development of Science *with* Society.

In light of the axioms in these models, scientific information and results are being exponentially communicated to ensure a more democratic knowledge and participatory culture. The previously dominant, traditional view of translating, simplifying and distorting scientific discourse, as though scientists were constitutive authorities and the public was absolutely ignorant of scientific matters, seems to be rejected. As such, the unidirectional transmission of knowledge from experts to citizens is surmounted and a wider communication is embraced, which trespasses institutional and personal networks and which credits other means

and agents of disseminating knowledge among scientists and researchers. Puschmann (2015, p. 26) affirms that "rather than merely making the fruits of scholarly research available to the public, citizens are increasingly regarded as active stakeholders in the scientific process", to which Lorés (2020, p. 8) adds that "scientific discourse is taking shape in a context of *civil science*, where policies are increasingly undertaken to make science accessible to the public, whether expert or not". The enhancement of the openness to science does not only entail widening its access to citizenship, but also boosting their interest in scientific endeavours. In this regard, the ubiquity and immediacy intrinsic to digital communication are essential. Such a change of mind reflected in still-to-be-explored opportunities within the online medium to build communicative bridges among audiences of diverse levels of specialisation nurtures the contributions of this edited volume.

Concerning the contexts of situation, 'science communication' may imply very different conceptions for different societal agents. Science researchers may conjure up exclusively academic endeavours in which they write scientific papers and speak at in-group events; science journalists may elicit images in which they mediate the information retrieved from researchers to offer it adapted to the public; science communicators may think of tailoring stimulating activities and raising awareness and interest about science in informal educational settings; and science teachers may focus on didactic perspectives that develop trainees' skills and literacies through written and oral works and foster formative assessment among peers using dialogue and teamwork to assimilate knowledge (see a practical model in Beltrán-Palanques, this volume). These approaches illustrate the variety of mindsets that influence people to communicate science.

An amalgam of competing, yet interrelated, terms (i.e. 'dissemination', 'popularisation', 'vulgarisation') has boomed and should be acknowledged to reflect these realities in the current panorama of research transfer, especially as amplified by the potential of digital practices. They all serve to depict the manifold ways in which research is transmitted and shared, pursuing various goals and manifesting dissimilar relationships between researchers and the audience. Some of them are at present more in vogue than others, responding to the democratising values and the

engaging efforts associated with research endeavours. Drawing on the framework of Knowledge Communication (e.g. Kastberg, 2010; Ditlevsen, 2011), these concepts enable us to analyse and comprehend "the intentional and decision-based communication of specialised knowledge in professional settings […] with a focus upon the interplay between knowledge and expertise of individuals, on the one hand, and knowledge as a social phenomenon" (Engberg, 2016, p. 37).

'Dissemination' may be the most neutral and commonly favoured notion in scientific communication with a focus on knowledge content and a clear reference to the circulation and delivery of academic information and research findings. By contrast, 'popularisation', defined as "science writing for the general public" (Calsamiglia, 2003, p. 139), puts the emphasis on building bridges, often through emotional bonds, among research producers and consumers. In this sense, both terms may involve expert-to-(non)expert communication, but popularisation leans much more upon the didactics of knowledge, typically in institutionalised contexts. In a broad sense, popularising practices involve, then, a recontextualisation of information in such a way that it is more comprehensible and pertinent to various audiences. In a more restricted view, "popularization includes only texts about science that are not addressed to other specialist scientists" (Myers, 2003, p. 265), as if there were two separate discourses with clear boundaries. Two more concepts derive from the notion of 'popularisation', as they alter the purposes and relationships between researchers and their audience. 'Vulgarisation' refers to the social appropriation of the public understanding of science and technology and entails discursive processes to diminish the level of specialised information to something popular, familiar and ordinary to the reader. Moreover, 'infotainment' or 'scifotainment' has also sprung up as a popularising approach, which concentrates on entertainment material based on domains of popular culture (Zhang, 2019). Thus, it seeks to engage the readership and nurture committed relationships with them and rather leaves scientific information as a spin-off (Engberg, this volume). It would not be fair to leave out other labels that also portray the reality of scientific information approaches and processes. Some of them comprise 'disinformation' and 'misinformation' (Bhatia, this volume), 'trivialisation', 'parascience', 'pseudoscience' and 'speculation' (as in predatory practices;

see Bocanegra-Valle, this volume), and help complete the fuzzy picture of the revolution caused by the digital medium in knowledge distribution and research dissemination.

The emphasis in response to all these terms characterising the communication of science differs among individuals, professional disciplines, geographical locations and sociocultural backgrounds. It is essential for researchers and trainers in scientific communication to establish shared knowledge with their audiences, whether stakeholders or non-specialised readers. There are some central terms that play an undeniable role in the directions science communication is taking and the goals researchers seek to accomplish, which we discuss in the following section.

3 Key Concepts in Research Dissemination

The community of professionals concerned with the pursuit of research, education and scholarship (to whom we generally refer collectively as 'the academia') has seen how emerging digital realities present new challenges in their discursive and professional practices. Traditional written genres, such as the research article, to name but the conventional academic genre *par excellence*, need to be reshaped in order to adapt to new platforms. Genres native to the digital medium, such as blogs or video abstracts, pose new production demands for authors while opening the research space to innovative dissemination perspectives, as reception expands to multiple audiences, who move from being just readers to active interactants, that is, participants in knowledge dissemination. The challenges and consequences of research dissemination in the digital medium bring along the attempt to achieve a higher impact of one's work. Two aspects seem to contribute to that end, namely, constructing a solid digital identity and ensuring an effective visibility of research. The opportunities provided by the affordances of the digital medium and affected by the elusive notion of audience should be borne in mind when handling research dissemination online. In what follows, we discuss four main concepts at the core of the trends in scientific communication, in general, and research dissemination, in particular.

3.1 Digital Communication

Digital communication is at the forefront of all the spheres of our lives. As such, the analysis of digital discourse has become a prominent research area to investigate the interplay of new media and social uses of language, including metalanguage and language ideology (Thurlow & Mroczek, 2011), the evolution of traditional genres into new digital hybrids (Jones et al., 2015), the construction of users' face and identity through multisemiotic resources (Bou-Franch & Garcés-Conejos Blitvich, 2019), as well as the rise of social media channels in situated communicative events and practices (Johansson et al., 2021). These concerns are naturally extensible to the dissemination of science and research, which go "hand in hand with technological development and, in general, with the need to apply scientific advancements to the improvement of human wellbeing" (Mur-Dueñas & Lorés, 2022, p. 1).

The affordances of the digital medium have a self-evident impact in the way we consume and generate new content in general, and specialised discourse, in particular. Texts produced in digitally mediated communication are characterised by their non-linearity, giving way to manifold "navigating paths" (Askehave & Nielsen, 2005) and making use of "sites for action" (Adami, 2015). In the same vein, they are inherently interactive and multimodal, comprising a combination of modes (e.g. verbal, visual, auditory) rhetorically organised to enquire "how the resources and processes of meaning-making shape and are shaped by people, institutions and societies" (Jewitt et al., 2021, p. 4).

This digital landscape has been triggering enormous consequences for scholarly work and professional communication, amplifying researchers' intended actions and enhancing the dissemination of knowledge. It is worth, then, investigating how the epistemic authority of science is at a turning point thanks to digital, multimodal communication, privileging the democratic access to information and the co-construction of knowledge. The affordances at researchers' disposal are combined in scientific communication not only to accomplish their intended actions through more and more complex meaning-making processes but also to comply with their growingly sophisticated purposes of informativity, visibility,

reputation, identity, self-branding and interaction. Thus, some immediate consequences for the research world lie in the preponderance of social media, the pursuit of speedy publication, wider dissemination of preprints and ethical questionable research practices (Bhatia, this volume).

We, as scholars, utilise digital affordances to particular situations, relationships and identities, negotiating what we can think, do and mean as much as how we can relate to others (Jones & Hafner, 2012). Overall, the analysis of trends in digital scientific communication allows us to pinpoint current practices, emergent objects of study and socioeconomic and institutional realities which altogether affect how research dissemination is encouraged and researchers' visibility promoted.

3.2 Identity

Anyone's identity is socially framed—full of individual complexities and in permanent evolution—and entails a selective self-presentation out of performance (Goffman, 1959). The notion of 'identity' should then be considered as a polyhedron with manifold sides that we construct, decorate and display based on personal, social and communicative experiences. As an intangible reflection of our self and an organising feature that permeated all spheres of our everyday life, we can assume that our identity is publicly manifest to others through (digital) discourse in such a way that we display a "networked self" (Papacharissi, 2011).

In professional contexts, the comprehension of scholars' identity has also increasingly attracted attention (cf. Borgman, 2007; Bhatia & Evangelisti, 2012; Flowerdew & Wang, 2015). In the notion of digital identity, any user understands a degree of socialisation and the exposure of their face. In research environments, at the juncture of these two issues, lie particular facets, such as reputation, credibility, accountability, leadership and competitiveness. Researchers seek to curate their digital profiles through performative actions that combine instrumental and expressive goals. Their digital face, which grows apart from their offline counterpart, enables them to build a coexistent in-group persona within given professional communities and to raise their self-projection towards the wide public. Consequently, researchers target a heterogeneous set of users and

a plethora of blurry contexts, for which they play out identities that cannot be construed in simplistic and mutually exclusive terms, that were possible earlier, such as online/offline, textual/embodied and fictional/authentic. Instead, all these characteristics fuse in a mutually constitutive way.

When users, researchers in this case, produce digital discourse, they share a representation of their 'self' with the audience through a dialectical relationship and a subsequent rhetorical performance (see, by way of instance, Rowley-Jolivet & Carter-Thomas, this volume). Researchers may take in the role of curators who select what to publish and how to do it to craft a coherent narrative of the self. They textualise themselves through carefully managed practices which are not to be taken as a transparent representation of reality, but as shaped by the way online interaction is enabled and valued for research dissemination purposes.

The ensuing complex scenario for scholars' everyday work has triggered significant changes in the construction of their personal and professional identities. The notion of identity is no longer approached as something fixed or static, but "as a fluid, plural accomplishment that is constantly under negotiation rather than a single, stable and essentialist entity" (Page, 2016, p. 403). Researchers of all disciplinary backgrounds need nowadays to *adopt* an ongoing set of practices and behaviours that may be unfamiliar to them and *adapt* previous assumptions and ways of doing to the new socioeconomic, political and digital reality that they are facing. Therefore, the notion of multifaceted identity seems to illustrate the many domains researchers are forced to excel in order to get promoted in their corresponding institutions, including teaching duties, carrying out investigations, engaging in projects, publishing high-quality papers and networking with other universities and scholars. Such a multifaceted identity gains an extra dimension in digital environments, where users feel compelled to be recurrently active in the digital sphere, and demonstrate online the many things they are constantly involved in. Digitally mediated communication seems to conform two sides of the same coin, where one side entails the inescapable endorsement of digital practices, skills and literacies to abide by the rules of the present scholarly system, whereas the other side brings along the potential establishment of an identity characterised by reputation and credibility, resulting from the

fruitful combination of these facets and the appropriate exploitation of digital resources. In fact, the development of a personalised brand of the self for professional enterprises steers researchers to maintain contact with complementary audiences other than the strictly institutional and scholarly ones.

3.3 Visibility

Confronted with the traditional publishing formats widely recognised within academia (e.g. abstracts, research articles, edited volumes, conference presentations), researchers feel the urge to embrace new practices that may supplement them. The rationale behind this urge lies in the interest in bridging the potential gaps between their work and the general public at which their work may be directed. Consequently, the objectives of the publication and consumption of scientific communication have increased and publication in the traditional format has branched out into digital environments. The discourses produced by researchers and the interactions with users to exchange knowledge may seek to focus on the transfer of data, the release of fresh output, the facilitation of complex knowledge, intellectual growth, guidance and curiosity. Eventually, the rise of the digital medium has brought about researchers' aspiration for a higher visibility that may allow them to reach a wide audience, have a bigger impact and develop a digital identity that makes their investigations recognisable and prominent.

The potential of the Internet infrastructure to afford the distribution of content makes it possible to self-promote researchers' work on a large scale. According to Page (2012, p. 182), "visibility and attention have emerged as core properties necessary for accruing status and perceived influence." In all, using digital genres and social media to display one's research and promote the visibility of the researcher is regarded as an additional facet of the researcher's work duties and digital identity, parallel to the still prevalent conventional publication system. As Lorés-Sanz and Herrando-Rodrigo (2020, p. 84) claim, such digital visibility, or else "e-visibility", is "shaped by information generated by the researchers themselves and by others', and also by the context of the researchers' network".

It is then deemed necessary to regard researchers' visibility as polyphonic. The expanding wealth of digital practices at researchers' disposal accompanied by the influence of digital factors such as interactivity and altmetrics are revolutionising the way visibility is accomplished within the scholarly system. As such, fragmentation and pluralisation play a crucial role, in that visibility is accrued by developing manifold digital practices that complement each other in diverse ways in raising researchers' visibility (see, as an example, Dontcheva-Navratilova, this volume). As a result, this negotiation of visibility is permeated by processes of interdiscursivity, where promotional, corporate and academic discourses blend together for a positive representation of scholars and scientists. In the end, the visibility of research(ers) through digital practices entails a multivoiced perspective that combines explicit and subtle demonstrations of one's work and skills. To achieve e-visibility, researchers need to cater both for the informational gaps which separate them from digital users and for the interactional bridges that may bring them closer to such digital users. The problem may lie in the neat identification of the audience reached by researchers on their digital communication and dissemination practices.

3.4 Audience

Part of the reason for researchers to be conscious of the need to build a multifaceted identity and attain visibility of their work is linked to the slippery notion of 'audience' in digitally mediated communication. The fact that scholars address potentially global, diversified audiences in research dissemination makes the management of their multifaceted identities quite complex. This entails the endorsement of a growing span of digital practices, materialised in the use of novel genres and social media. An ample list of adjectives is usually considered to characterise digital audiences for research dissemination practices, which are undefined, global, general, varied, heterogeneous, diversified, targeted, imagined, real. Therefore, scholarly practices are imbued in polycontextuality, and the need to accommodate wider audiences is linked to a malleable continuum with eroding boundaries that may comprise lay citizens, interested

readers, amateur-experts, expert audiences and professionals of the same and other disciplinary communities (Pascual & Mur-Dueñas, 2022).

Raising awareness about the potential addressees of the texts and genres in which research is encapsulated and disseminated is a relevant step that needs corresponding appropriate discursive and linguistic choices. Such metalinguistic awareness is necessary to handle the range of platforms and practices available online for researchers to establish outspreading interactional networks more than ever imaginable. Hence, heterogeneity is inevitably present in the likely readership of what researchers publish online, involving specialised users as much as the lay public that happens to visit and consume the published content. As a result, "science and the public are both much more diversified and fuzzy than their neat rhetorical separation would make us believe, and their relationship has a much less hierarchical character than in the bygone era of big science" (Puschmann, 2015, p. 33).

These ideas underline the importance and difficulty in understanding the audience in digitally mediated environments, in general, and within scholarly ones, in particular. The aftermath is that boundaries dividing professional and private networks are extensively fading. The digital identity portrayed by researchers, as affected by the likely uncertainty of the audiences targeted and the multifacetedness of their work, may be perceived as blurred, since it meshes private, personal and social traits to some extent. Such an unpredictability of the identities and characteristics of the audience to be reached has been explained through the notion of 'context collapse', especially due to the participatory and networking conditions of Web 2.0. In digital communication, context collapse is foregrounded because multiple audiences are flattened into one (Marwick & boyd, 2011), placing users from social, professional and public spheres all in the same boat. Following the dichotomy contended by Ito et al. (2010), as opposed to "friendship-driven practices", which imply dominant and mainstream practices in our everyday communicative events with our social groups, the focus of this volume is on "interest-driven practices", which enable socialisation with networks of peers and other participants based on specialised knowledge and scholarly interests.

In light of the topics discussed so far, it is clear that scientific communication can, and should, be analysed from many different angles. One of them concerns the large number of objects of study that can be

investigated in digital research dissemination. The reader of this volume will find out analyses of online newspaper comments (Chap. 2, Breeze), technology disclosures (Chap. 3, Sancho Guinda), online magazine popular articles (Chap. 4, Benelhadj), law and science blogs (Chap. 5; Diani & Freddi), predatory e-mail messages (Chap. 6, Bocanegra-Valle), video abstracts (Chap. 8, Dontcheva-Navratilova), popular science online videos (Chap. 9, Ruiz-Madrid & Valeiras-Jurado), three-minute thesis presentations of different nature, including PhD thesis presentations (Chap. 10; Beltrán-Palanques; Chap. 12, Rowley-Jolivet & Shirley-Thomas) and FameLab scientific talks (Chap. 11, Palmer-Silveira & Ruiz-Garrido), and research group videos (Chap. 12, Rowley-Jolivet & Carter-Thomas).

Not only are the objects of study in research dissemination diverse and growing, but the methodological approaches to untangle information processes are also numerous and work many times in complementary ways. Ultimately, it is the sum of diverse analytical standpoints that may provide us with a holistic picture of the digital practices that are gaining momentum in the current panorama of scientific communication. The wide array of perspectives that applied linguists and discourse analysts endorse is carefully reflected in this volume. The reader will find analytical proposals which include reflective contributions on current scientific phenomena (Chap. 7, Engberg) and challenges and directions in publication and dissemination practices (Chap. 13; Bhatia), corpus-based analyses (Chap. 2, Breeze; Chap. 3, Sancho Guinda; Chap. 4, Benelhadj), mixed-method approaches (Chap. 5, Diani & Freddi; Chap. 8, Dontcheva-Navratilova; Chap. 9, Beltrán-Palanques; Chap. 12, Rowley-Joliet & Shirley-Thomas) and qualitatively oriented studies (Chap. 6 Bocanegra-Valle; Chap. 8, Ruiz-Madrid & Valeiras-Jurado; Chap. 10, Palmer-Silveira & Ruiz-Garrido). These perspectives are combined with further analytical frameworks which allow the contributors in this volume to offer well-rounded proposals on the research of digital practices, such as Genre Analysis, Conceptual Metaphor Analysis, Metadiscourse Analysis, Knowledge Communication Analysis, Multimodal Discourse Analysis and Thematic Analysis.

Furthermore, to conduct these diverse analyses, contributors have opted both for a close reading of their data in order to map fine-grained trends in research dissemination and for a number of software

programmes which allow for more holistic analysis and help ensure methodological consistency. These two options attest the never-ending necessity of manually investigating discourse in situated contexts of production as well as the increasingly pertinent role of ICTs in our own research endeavours. Together with manual analyses (Chap. 3, Sancho Guinda; Chap. 4, Benelhadj), a spectrum of software tools is covered, comprising SketchEngine (Chap. 2, Breeze), AntConc (Chap. 5, Diani & Freddi), NVivo (Chap. 6, Bocanegra-Valle), MMAV (Chap. 9, Ruiz-Madrid & Valeiras-Jurado) and ELAN (Chap. 10, Beltrán-Palanques).

4 An Overview of the Chapters of the Volume

Drawing on a selection of papers presented at the InterGedi International Conference held in Zaragoza (Spain), December 2021, the common goal of the chapters included in this volume is to analyse some of the emerging professional practices in digital scientific communication, which make use of innovative multimodal genres and media, and explore their effects through a series of 'guiding' concepts, such as validated knowledge, visibility, dissemination and popularisation. Individual chapters in the resulting volume, *Digital Scientific Communication: Identity and Visibility in Research Dissemination,* have been organised into five parts:

Part I, "**An Introduction to Scientific Research Communication Through Digital Media"**, opens with "Prologue: State of the Art of Research Dissemination", where **Marina Bondi** addresses the changes triggered by a whole range of emerging digital practices on the traditional system of academic publication. In particular, she focuses on the way this impact brings to the fore—and often problematises—notions such as the author's identity and visibility as well as the changing roles adopted in the dissemination of knowledge, which are central to the studies presented in this book.

The present introductory chapter **1**, "Digital Scholarly practices in scientific communication: Paths and goals in research dissemination", co-authored by **Daniel Pascual** and the editors of this volume, **Ramón Plo-Alastrué** and **Isabel Corona**, draws attention to the coexisting

models, approaches and practices that are gaining relevance in research dissemination. The authors introduce and revisit key concepts that permeate the analyses undertaken and presented in this volume. The plurality of approaches has been grouped according to similarities in their objects of study, methodological perspectives or analytical proposals, so as to articulate the structure of the volume into the following sections.

Part II "Scientific Discourse and Professional Practices" tackles the consequences of the digital turn in the production and reception of scientific content. In **Chap. 2**, "'Not One of Our Experts.' Knowledge Claims and Group Affiliations in Online Discussions of the COVID-19 Vaccine", **Ruth Breeze** explores the nature of public debate on scientific issues; she takes as object of study the 'reader comments' genre, one of the first genres to develop the interactional capacity of the digital media landscape. Taking a large sample of comments in response to articles about vaccines from the UK right-wing popular newspaper *Mail Online* published during the early phase of COVID-19 in 2020, Breeze adopts a discourse analytical perspective to identify the discursive strategies used by commenters to ground their authority, make claims about science and construct their identities. The analysis shows that commenters fell persistently into two polarised groups, pro- and anti-vaxxers, and built their arguments in two different ways: pro-vaccine participants invoked experts or adopted an expert-like style, while those against vaccines challenged expertise and prioritised personal experience and "common sense". Group-building strategies were also different. Intragroup dynamics of anti-vaxxers showed strong cohesion, emotional support and even humour and irony, while pro-vaxxers were less personal and less colourful. According to the author, this may be due to the affordances provided by the medium and the genre itself, as facilitators of confrontation. In the wider context, Breeze sees the clear erosion of expert knowledge as linked to ideological factors, and as a negative consequence of dissemination.

Carmen Sancho-Guinda's **Chap. 3**, "Utmost Hybridity: Promotional Trends in Technology Disclosures", focuses on this still under-researched digital genre of technology disclosure for technology dissemination. Stemming from the current context of growing academic and professional interactions brought about by digital affordances, technology disclosures are identified and approached in this chapter within a Genre Analysis

framework at a co(n)textual, semiotic and verbal level. The resulting analysis provides a detailed picture of this evolving genre revealing its hybrid nature as one of its main distinctive features. In Sancho-Guinda's view, hybridity not only lies at the heart of those practices and promotional strategies which help configure discursive identity in technology disclosures but extends to the construction of an institutional identity, where the important role played by individual authors, "who make decisions as to format, content, conventions and connections", is also emphasised.

In **Chap. 4**, "Dissemination of Knowledge During the COVID-19 Pandemic: A Conceptual Metaphor Analysis of Research and Popular Articles", the use of metaphor to simplify new ideas and challenging concepts for the non-specialist reader is the starting point of analysis. **Fatma Benelhadj** compares a corpus of medical research articles on the COVID-19 pandemic and their corresponding popularisations, focusing on the specific functions of the most frequent metaphors in both genres. Drawing on Halliday and Matthiessen's (2014) ideational, interpersonal and textual metafunctions and on Semino's (2008) metaphorical Source Domains in medical science, Benelhadj reveals how this process of recontextualisation determines certain choices and popularising features, such as the common use of metaphors in the text. She delves into some of the functions performed by metaphors in popularisations (i.e. build the cohesion of the text, increase credibility and offer a space for researchers to express their identities) as well as in their genre-driven nature.

"Authorial Stance and Identity Building in Weblogs by Law Scholars and Scientists" is the title of **Chap. 5** by **Giuliana Dani** and **Maria Freddi.** The authors focus on the notion of stance and its contribution to the construction of identity in academic blogs. In their analysis, they combine corpus methodology and discourse analysis to compare the way law and science bloggers mark their presence and "position themselves in relation to their arguments and audience" when they disseminate their research. The results point to a functional specialisation and indicate the existence of a contrast between a more personal and subjective style (i.e. more frequent use of first-person pronouns, possessive *my*, object *me* and attitudinal verbs) among scientist bloggers as opposed to a more impersonal style in law blogs (or 'blawgs'), especially when referring to the ideational content of argumentative sections.

Part III "**Visibility and Dissemination in Scientific Research Contexts"** addresses current research on the practices related to the construction of digital identity and visibility, the emerging conflicts related to public availability and appropriation of scientific culture and the ways of validating and disseminating scientific knowledge in this new context.

In **Chap. 6**, "Predatory Journals: A Potential Threat to the Dissemination of Open Access Knowledge", **Ana Bocanegra-Valle** provides a qualitative analysis of a self-compiled corpus of 50 unsolicited messages sent by predatory publishers. She sets out to identify some 'salient themes' or prototypical features of this type of discourse (e.g. boastful language, promotional self-reference) as well as the accompanying editorial practices commonly used to persuade, or rather, mislead scholars into submitting their work for publication in these journals. Bocanegra-Valle's article reflects on the influence that some institutional and contextual factors that determine scholars' publication decisions may have on the growth of predatory publishing and concludes with a final section on how these malpractices might "flout mainstream academic publication standards", that is, the negative impact they may have on open access, peer-reviewed publications, and hence on the dissemination of reliable, validated research.

Jan Engberg is the author of **Chap. 7**, "Between Infotainment and Citizen Science: Degrees of Intended Non-expert Participation Through Knowledge Communication". He focuses on concepts such as 'popularisation', 'democratisation' and 'dissemination' that point to a specific process of recontextualisation of scientific communication to make it available to a general audience. Engberg's chapter sets out to establish some relevant differentiations among these concepts, which are often used interchangeably, by applying a distinguishing principle: the level of 'participatory ambition' involved between sender (expert) and receiver (layperson) of this information in each case; that is, the experts' varying willingness to create a common space and overcome the existing 'knowledge asymmetries'. To further characterise this continuum, he puts forward a four-stage cline (i.e. *infotainment, dissemination, popularisation* and *citizen science*) which can help readers identify relevant differences in the level of participatory ambition, classify them and explain some resulting changes in the final formulation of a text.

The increasing multimodal "empirical engagement" (Kress, 2015) for description and analysis currently being developed in English for Specific Purposes (ESP) and English for Academic Purposes (EAP) is examined in the following chapters whose aim is to explore the use and combination of different modes and their affordances in digital videos enacting different dissemination practices which perform or fulfil specific purposes. They all share the digital video as medium and the same general communicative purpose: to disseminate scientific content to a diversified, presumably non-expert audience.

Olga Dontcheva-Navratilova explores in **Chap. 8**, "Video Abstracts for Increasing Researcher Visibility", the changes this genre is undergoing with respect to the traditional monomodal character of the written abstract genre, and shows how the multimodal affordances provided by digital communication offer new dissemination opportunities and open up new possibilities for self-presentation and engagement with the audience. Taking a sample of 16 video abstracts created by the researchers themselves in the field of pure mathematics and their corresponding printed versions, she unveils significant changes in their rhetorical structure, with a more descriptive and explanatory character in the former. The identification of the different visual, spoken and written modes and their instantiation patterns in the sample analysed leads her to propose three types of video abstracts, namely, conferential (with a 'personalised' subtype), lecturing and conversational. The different combinations and weight of the verbal and the visual seem to activate specific communicative strategies in each type. A further exploration of the occurrence of metadiscourse markers conveying personality and direct address to the audience in the speech mode reveals the researcher's increasing use of visibility strategies, a growing consideration of viewers as in-group members and contrasting developments depending on the type of video abstract chosen by the researchers. The conversational type, she argues, "represents a radical reformulation", as it appears to be the most interactional type and the one which, according to its view rates, is the most appealing to viewers and consequently has a higher impact on the audience. Dontcheva-Navratilova's study suggests that the recontextualisation process of this migrated genre impinges upon the researcher's efforts not only

to persuade the audience to accept the image he/she claims for him/herself, but also to facilitate knowledge comprehension.

The next four chapters also expand the language-only object of analysis, showing a distinctive turn in EAP research to include other modes of communication to explain recontextualisation processes. A clear-cut example is the study carried out by **Noelia Ruiz-Madrid** and **Julia Valeiras-Jurado** in **Chap. 9,** "Reconceptualization of Genre(s) in Scholarly and Scientific Digital Practices: A Look at Multimodal Online Genres for the Dissemination of Science". These authors take the popular science online video as their object of study to examine how scientific knowledge is made available, understandable and attractive to a general audience. Thus, their study delves into how Open Science is professionally constructed to result in what has been referred to as a blending of science, education and entertainment (see Engberg, this volume), a process of recontextualisation that develops a number of specific communicative strategies using an array of different modes. The authors focus their analysis on four professionally produced videos dealing with topics related to Anthropology and Physics from the PBS network, available on YouTube, and apply an inductive and corpus-driven approach first, in order to identify the different modes at work, with the aid of MMAV software, a multimodal annotation tool, then to describe the strategies used, grouped into three functions or purposes, namely, to tailor information, to engage the audience and to build credibility. As a third step, the authors look into the multimodal realisations of these strategies. An interesting observation made by the authors—who consider these videos as "successful" outcomes in bringing science closer to the public—is their 'dynamic' nature, as there seems to be a permanent effort to avoid static images. Although these videos generally make use of a narrator, with embodied modes aimed at engaging the viewer, they always enrich the screen by adding visual effects of different kinds that move or change on the screen; even written text—which is, considering the video format, less frequently employed than images—exploits typography as a mode, with letters being animated to elicit specific feelings and thus contributing to fulfil a determined strategy. All in all, Ruiz-Madrid and Valeiras-Jurado open up a challenging investigative path in search for the recurrent multimodal ensembles and their sequences in these videos, an

orchestration of modes that turns a hard scientific question into a story that is both educational and entertaining.

The chapters in **Part IV**, "**Engaging the Audience Through Science Bites"**, examine the means by which researchers exploit their communication skills to reach non-expert viewers, brevity being a determining factor in engaging the audience. We know that one of the main consequences of digitalisation is the access to unlimited information. This has led to a new generation of Internet consumers that want information to be concise, clear and short. We describe the professional practices addressing this search for brevity as 'science bites', evoking the soundbite, a term that originated in North America's news editing rooms in the 1960s to refer to "an audiovisual snippet of media content in which a person is concurrently seen and heard speaking" (Bas & Grabe, 2015, p. 1) without interruption; The three chapters analyse applications of the well-known Three-Minute rule (any presentation should not exceed three minutes to grab the audience's attention span), a defining feature that has been adopted in a new series of scientific communication practices whose main purpose is to disseminate scientific knowledge in the most effective, attractive and concise way, and which has obvious generic relations (as a precedent genre) with the genre of pitch, an intrinsically persuasive professional practice in business communication (Pinvidic, 2019).

Vicent Beltrán-Palanques in **Chap. 10**, "Three-Minute Thesis Presentations: Engaging the Audience Through Multimodal Resources", adopts a multimodal pedagogical approach to the genre of the Three-Minute Thesis presentations. He explains how it can be instructed and implemented, taking into account that doctoral students—at the same time learners and researchers in this very first stage of their academic careers—need, on the one hand, to reformulate content and, on the other, make an effective use of multimodal communication skills, that is, speech and embodied modes, in order to reach non-expert audiences. In this context of situation, the genre stands in very close relationship with the metagenre (Giltrow, 2002) elaborated by the author and aimed at instructing doctoral students on how to produce these presentations, considering all their multimodal affordances.

In **Chap. 11,** "Introducing Science to the Public in 3-Minute Talks: Verbal and Non-verbal Engagement Strategies", the same time constraints

apply to the genre chosen by **Juan C. Palmer-Silveira** and **Miguel F. Ruiz-Garrido** for their study, the FameLab scientific talks international competition. In this case, the genre's competitive character and format appear to have evolved as a variant of a genre from the same medium, the TV talent show, and also relies on a metagenre, produced by the event's organisers, which establishes the rules for its realisation, with strict instructions for contestants. The authors chose the ten best young scientists who reached the final event in its broadcast 2020 edition, in which, due to the COVID pandemic, the talks were not delivered to a live audience. Instead, they were pre-recorded with a single stationary camera and uploaded. The authors describe eight engagement strategies, seven of them realised in the spoken mode, and one, termed 'visual impact', in which they include body language and the use of 'external resources', such as props, background and garments. The identification and description of the verbal and non-verbal strategies as the necessary rhetorical tools for an effective dissemination of science in this situated context is an unavoidable first step in any analytical approach to scientific communication in multimodal environments and platforms, as well as in the teaching and training of these communicative skills in the educational context.

Elizabeth Rowley-Jolivet and **Shirley Carter-Thomas** also take in **Chap. 12**, "Research Visibility and Speaker Ethos: A Comparative Study of Researcher Identity in 3MT Presentations and Research Group Videos", the Three-Minute Thesis presentation (3MT) by doctoral students as object of study to compare it with Research Group Videos (RGVs) produced by researchers in university laboratories. The authors collected a corpus of 60 videos, 30 for each genre, to explore the construction of researcher identity at different stages in the academic career as well as from different disciplinary areas, science, technology, engineering, maths and medicine (STEMM) and social sciences and humanities (SSH), taking into account the main modes at work. Modes in 3MTs were restricted to spoken language and embodied modes (vocal effects, posture or movement, gesture, gaze and facial expression), while RGVs added filmic modes (such as stills, moving images, sound effects, animations and graphics), which were incorporated by the professional agency in charge of the postproduction and editing process. The verbal analysis

focuses on interactional resources, using AntConc 3.4.0 for quantitative distribution of linguistic features. Below the umbrella function of disseminating scientific knowledge to a general audience, in both genres, researchers use non-technical arguments to explain their work. However, the obvious imbalance of the modal affordances provided by each genre goes hand in hand with their specific purposes and their different contexts of situation and culture. The entertaining function of 3MTs and their limited modal resources make novice researchers "put on a stage performance", maximising embodied modes, particularly gesture, and very colloquial language, while the institutional character of RGVs and their unlimited range of multimodal resources allow for a richer account of identities of senior researchers (institutional, professional and personal) and ultimately a projection of the scientific prestige of their universities.

The last section, **Part V, "Scientific Digital Communication for Research Dissemination: What Lies Ahead?"** has been conceived as an epilogue; **Chap. 13**, "Challenges and Future Directions in Digitally Mediated Research Publication and Dissemination", works as a final summary, where **Vijay K. Bhatia** revisits some of the current issues presented in the volume and provides a personal view of the radical changes in the ways of communicating science online. Bhatia exposes the negative side effects that researchers need to be aware of to maintain the integrity of scientific research, particularly in Open Science. Bhatia argues that the visibility resulting from speedy publication and dissemination appears to be more valuable than "scientifically robust data" and "sustainable results". The author convincingly asserts that the academic community is lowering its guard in terms of research standards, which is leading academia not only to poor quality research but also to ethically questionable practices, such as unverified preprints, thus contaminating scholarly values, particularly in medical and healthcare research. Bhatia appeals to social media to make them aware of their responsibility for the "spread of web-mediated disinformation and misinformation about science". As positive side effects of digital communication in the international context, Bhatia refers to collaborative research and participatory interdisciplinary culture. Bhatia concludes by pointing out the desirable future directions that researchers, editors and digital platforms at large need to follow to turn the current situation around.

All in all, *Digital Scientific Communication: Identity and Visibility in Research Dissemination* aspires to achieve three overriding purposes. Firstly, it has been our intention to gather information about current investigations on scholarly practices unfolded in the digital medium. A particular focus has been placed on the construction of researchers' digital identity and on the visibility of their work, their disciplinary background and their professional concerns. Secondly, we have stressed the importance of the emerging conflicts arising in various research scenarios related to online science communication. Implications are drawn as regards the public availability of information as well as the appropriation of scientific culture in digital settings. Thirdly, we have tried to foreground those avenues of communicating science to the general public through digital practices. Thus, an emphasis has been laid on the dissemination and validation of scientific information online, reflecting upon diverse scholarly and professional practices that aim at knowledge construction and audience engagement in the growingly relevant role played by digital communication.

This volume is directed at postgraduates, doctoral students, practitioners and researchers in the fields of discourse analysis, sociolinguistics, digital media, multimodality and communication studies. We hope that, in sum, this collaborative work makes a valuable contribution to current research on professional practices related to the construction of digital identity and visibility, encourages reflection on the challenges related to the public availability of scientific knowledge, and provides fresh insights into the emerging ways of validating and disseminating scientific knowledge in the digital context.

References

Adami, E. (2015). What's in a click? A social semiotic framework for the multimodal analysis of website interactivity. *Visual Communication, 14*(2), 133–153. https://doi.org/10.1177/1470357214565583

Askehave, I., & Nielsen, A. E. (2005). Digital genres: A challenge to traditional genre theory. *Information Technology & People, 18*(2), 120–141. https://doi.org/10.1108/09593840510601504

Bartling, S., & Friesike, S. (Eds.). (2014). *Opening science: The evolving guide on how the Internet is changing research, collaboration and scholarly publishing*. Springer Open.

Bas, O., & Grabe, M. A. (2015). Sound bite. In G. Mazzoleni (Ed.), *The international encyclopedia of political communication* (pp. 1–6). Wiley. https://doi.org/10.1002/9781118541555.wbiepc063

Bhatia, V. K., & Evangelisti, P., Eds. (2012). *Discourse and identity in the professions: Legal, corporate and institutional citizenship*. Peter Lang. https://doi.org/10.3726/978-3-0351-0321-2

Borgman, C. L. (2007). *Scholarship in the digital age: Information, infrastructure, and the Internet*. MIT Press. https://doi.org/10.7551/mitpress/7434.001.0001

Bou-Franch, P., & Garcés-Conejos Blitvich, P. (Eds.). (2019). *Analyzing digital discourse*. Palgrave Macmillan. https://doi.org/10.1007/978-3-319-92663-6

Bruns, A. (2007). *Produsage: Toward a broader framework of user-led content creation*. Queensland University of Technology. https://doi.org/10.1145/1254960.1254975

Bucchi, M., & Trench, B. (2016). Science communication and science in society: A conceptual review in ten keywords. *Tecnoscienza: Italian Journal of Science & Technology, 7*(2), 151–168.

Calsamiglia, H. (2003). Popularization discourse. *Discourse Studies, 5*(2), 139–146. https://doi.org/10.1177/1461445603005002307

Davies, S. R., & Horst, M. (2016). *Science communication, culture, identity and citizenship*. Palgrave Macmillan. https://doi.org/10.1057/978-1-137-50366-4

Ditlevsen, M. G. (2011). Towards a methodological framework for knowledge communication. In M. Petersen & J. Engberg (Eds.), *Current issues in specialized communication* (pp. 187–208). Peter Lang.

Engberg, J. (2016). Conceptualising corporate criminal liability: Legal linguistics and the combination of descriptive lenses. In G. Tessuto, V. K. Bhatia, G. Garzone, R. Salvi, & C. Williams (Eds.), *Constructing legal discourses and social practices: Issues and perspectives* (pp. 28–56). Cambridge Scholars.

Flowerdew, J., & Wang, S. H. (2015). Identity in academic discourse. *Annual Review of Applied Linguistics, 35*, 81–99. https://doi.org/10.1017/S026719051400021X

Giltrow, J. (2002). Meta-genre. In R. Coe, L. Lingard, & T. Teslenko (Eds.), *The rhetoric and ideology of genre* (pp. 187–205). Hampton Press.

Goffman, E. (1959). *The presentation of self in everyday life*. Doubleday.

Halliday, M. A. K., & Matthiessen, C. (2014). *An introduction to functional grammar*. Routledge. https://doi.org/10.4324/9780203783771

Ito, M., Baumer, S., Bittanti, M., Cody, R., Herr-Stephenson, B., Horst, H. A., & Tripp, L. (2010). *Hanging out, messing around and geeking out*. MIT Press. https://doi.org/10.7551/mitpress/8402.001.0001

Jewitt, C., Adami, E., Archer, A., Björkvall, A., & Lim, F. V. (2021). Editorial. *Multimodality & Society, 1*(1), 3–7. https://doi.org/10.1177/2634979521992902

Johansson, M., Tanskanen, S. K., & Chovanec, J. (2021). *Analyzing digital discourses: Between convergence and controversy*. Palgrave Macmillan. https://doi.org/10.1007/978-3-030-84602-2

Jones, R. H., & Hafner, C. A. (2012). *Understanding digital literacies: A practical introduction*. Routledge. https://doi.org/10.4324/9780203095317

Jones, R. H., Chik, A., & Hafner, C. A. (2015). *Discourse and digital practices: Doing discourse analysis in the digital age*. Routledge. https://doi.org/10.4324/9781315726465

Kastberg, P. (2010). Knowledge communication—Formative ideas and research impetus. *Programmatic Perspectives, 2*(1), 59–71.

Kessler, S. H., Schäfer, M. S., Johann, D., & Rauhut, H. (2022). Mapping mental models of science communication: How academics in Germany, Austria and Switzerland understand and practice science communication. *Public Understanding of Science, 31*(6), 711–731. https://doi.org/10.1177/09636625211065743

Kress, G. (2015). Applied linguistics and a social semiotic account of multimodality. *AILA Review, 28*, 49–71. https://doi.org/10.1075/aila.28.03kre

Lorés, R. (2020). Science on the web: The exploration of European research websites of energy-related projects as digital genres for the promotion of values. *Discourse, Context & Media, 35*, 100389. https://doi.org/10.1016/j.dcm.2020.100389

Lorés, R., & Diani, G. (Eds.). (2021). Disseminating knowledge: Digital discourse in academic and institutional contexts. *Special Issue of European Journal of English Studies, 25*(3), 249–258. https://doi.org/10.1080/13825577.2021.1988262

Lorés-Sanz, R., & Herrando-Rodrigo, I. (2020). New concepts, different approaches: Tackling e-visibility in research project websites. *Revista de Lingüística y Lenguas Aplicadas, 15*, 83–98. https://doi.org/10.4995/rlyla.2020.12782

Luzón, M. J., & Pérez-Llantada, C. (Eds.). (2019). *Science communication on the Internet*. John Benjamins. https://doi.org/10.1075/pbns.308

Marwick, A. E., & boyd, d. (2011). I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience. *New Media & Society, 13*(2), 114–133. https://doi.org/10.1177/1461444810365313

Mur-Dueñas, P., & Lorés, R. (Eds.). (2022). *Scientific and parascientific communication*. MDPI. https://doi.org/10.3390/books978-3-0365-3822-8

Myers, G. (2003). Discourse studies of scientific popularization: Questioning the boundaries. *Discourse Studies, 5*(2), 265–279. https://doi.org/10.1177/1461445603005002006

Page, R. (2012). The linguistics of self-branding and micro-celebrity in Twitter: The role of hashtags. *Discourse & Communication, 6*(2), 181–201. https://doi.org/10.1177/1750481312437441

Page, R. (2016). Moving between the big and the small. Identity and interaction in digital contexts. In A. Georgakopoulou & T. Spilioti (Eds.), *The Routledge handbook of language and digital communication* (pp. 403–407). Routledge.

Papacharissi, Z. (2011). *A networked self*. Routledge. https://doi.org/10.4324/9780203876527

Pascual, D., & Mur-Dueñas, P. (2022). Dialogic interaction with diversified audiences in Twitter for research dissemination purposes. *Círculo de Lingüística Aplicada a la Comunicación, 90*, 61–79. https://doi.org/10.5209/clac.81307

Pinvidic, B. (2019). *The 3-minute rule: Say less to get more from any pitch or presentation*. Portfolio.

Puschmann, C. (2015). A digital mob in the ivory tower? Context collapse in scholarly communication online. In M. Bondi, S. Cacchiani, & D. Mazzi (Eds.), *Discourse in and through the media: Recontextualizing and reconceptualizing expert discourse* (pp. 22–45). Cambridge Scholars Publishing.

Semino, E. (2008). *Metaphor in discourse*. Cambridge University Press. https://doi.org/10.1017/CBO9780511816802.015

Thurlow, C., & Mroczek, K. (Eds.). (2011). *Digital discourse: Language in the new media*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199795437.001.0001

Zerbe, M. J., Cutrufello, G., Hanganu-Bresch, C., & Maci, S. M. (2022). Introduction. In C. Hanganu-Bresch, M. J. Zerbe, G. Cutrufello, & S. M. Maci (Eds.), *The Routledge handbook of scientific communication* (pp. 1–12). Routledge. https://doi.org/10.4324/9781003043782-1

Zhang, Y. (2019). Scifotainment: Evolving multimodal engagement in online science news. In C. Sancho-Guinda (Ed.), *Engagement in professional genres* (pp. 243–258). John Benjamins. https://doi.org/10.1075/pbns.301.13zha