COGITATIO

Media and Communication (ISSN: 2183–2439)
2020, Volume 8, Issue 2, Pages 425–439
DOI: 10.17645/mac.v8i2.2812

Article

"On Social Media Science Seems to Be More Human": Exploring Researchers as Digital Science Communicators

Kaisu Koivumäki [1,*], Timo Koivumäki [2] and Erkki Karvonen [1]

[1] Faculty of Humanities, University of Oulu, 90500 Oulu, Finland; E-Mails: kaisu.koivumaki@oulu.fi (K.K.), erkki.karvonen@oulu.fi (E.K.)
[2] Oulu Business School; University of Oulu, 90500 Oulu, Finland; E-Mail: timo.koivumaki@oulu.fi

* Corresponding author

Submitted: 27 January 2020 | Accepted: 23 March 2020 | Published: 26 June 2020

Abstract
In contemporary media discourses, researchers may be perceived to communicate something they do not intend to, such as coldness or irrelevance. However, researchers are facing new responsibilities concerning how popular formats used to present science will impact science's cultural authority (Bucchi, 2017). Currently, there is limited research on the microlevel practices of digital science communication involving researchers as actors. Therefore, this qualitative study explores how digital academic discourse practices develop, using the tweeting and blogging of researchers involved in a multidisciplinary renewable energy research project as a case. The results of a thematic analysis of interviews with researchers (n = 17) suggests that the researchers' perceptions form a scale ranging from traditional to progressively adjusted practices, which are labelled 'informing,' 'anchoring,' 'luring,' and 'maneuvering.' These imply an attempt to diminish the gap between science and the public. The interviewees acknowledge that scientific facts may not be interesting and that they need captivating means that are common in the use of new media, such as buzzwords and clickbait. It appears that trials and experimentation with hybrid genres helped the researchers to distinguish the contours of digital academic discourses. The implications support suggestions to broaden the trajectories of expertise and communication, including issues of culture and identity, trust, and the relevance of science. It is argued that scientists' embrace of new media channels will refine some articulations of the mediatization processes, and these findings support recent suggestions that mediatization could also be conceptualized as a strategic resource.

Keywords
communication; media research; new media; science communication; social media

Issue
This article is part of the issue "Health and Science Controversies in the Digital World: News, Mis/Disinformation and Public Engagement" edited by An Nguyen (Bournemouth University, UK) and Daniel Catalan (University Carlos III of Madrid, Spain).

© 2020 by the authors; licensee Cogitatio (Lisbon, Portugal). This article is licensed under a Creative Commons Attribution 4.0 International License (CC BY).

1. Introduction

Renewable energy development faces competing interests, and whilst solar power production generally has a neutral or positive public image globally (Nuortimo, Härkönen, & Karvonen, 2018), local opposition to wind and solar energy farms includes economic issues, noise and health impacts, ice and fire-related risks, and a generic 'not in my backyard' mentality (Rule, 2014).

Attitudes and behavioral intentions about such politicized scientific topics may not be about technology and facts as such, and ideology-based framing influences the acceptance of scientific information (Luong, Garrett, & Slater, 2019). Research on misinformation suggests that the post-truth malaise requires consideration of changes in wider societal contexts. This includes the long-term decline in social capital as trust, polarization and transformation of the media landscape, and political drivers that

discredit institutions as 'elitist,' leading to alternative epistemologies that erode trust in facts and science to the extent where facts no longer matter (Lewandowsky, Ecker, & Cook, 2017). A growing body of research suggests that the 'echo chamber' concept may be overrated, because the general predispositions of social media users influence their beliefs, regardless of the news source or algorithms used (Nguyen & Vu, 2019).

Acknowledging these changes, research efforts are needed to understand the influences of online communication environments on the nuances of public trust in science (Scheufele & Krause, 2019). For example, although researchers have adjusted their messaging to the media logics and address journalists and politicians on Twitter, they tend to be less addressed in return (Walter, Lörcher, & Brüggemann, 2019).

Meanwhile, the public expert role is challenging for scientists in balancing the dual expectations of providing guidance on non-scientific issues and concrete social problems whilst remaining highly objective (McKaughan & Elliott, 2018). "Being an expert means crossing the boundary of science, entering society as an actor," and as values and public controversies come into play, the credibility of science may be challenged (Peters, 2014, p. 79).

Other science communication scholars have concerns about the promotional interests that adversely affect the institution as a whole (Weingart & Guenther, 2016). Communicating to gain quantified attention through performance and impact measures is enabled by social media—channels that lack quality control and raise questions of trust in the medium where sources and genres of information merge with promotion and opinion (Weingart & Guenther, 2016).

In counterargument, science communication practices cannot be encompassed by the previous untainted idyll of science that has a one-dimensional distinction between truth-seeking and instrumental communication, according to Irwin and Horst (2016). In their view, different publics have specific values, and the relationship between changing scientific communities results in an evolving new ecology of science communication that needs to be recognized in all its richness, in order to understand the relationship between the new social media and the mechanisms of fluctuating public trust. Extending beyond the transfer of scientific information, Davies and Horst (2016) draw on cultural studies and describe science communication as a cultural phenomenon and a part of sense-making in society. Meanings are negotiated through cultural processes, such as representation that co-creates identities and images of science and scientists within and beyond academia (Davies & Horst, 2016).

To study sense-making through media, Couldry (2012) suggests analyzing media as an open-ended set of practices people perform in relation to media, including practices of representation. Actions involving digital technologies recognized by specific groups of people as ways of attaining social goals, enacting social identities, and reproducing sets of social relationships, may also be defined as 'digital practices' in discourse analytical approaches (Jones, Chik, & Hafner, 2015).

However, it may be challenging for researchers to connect abstract scientific knowledge to everyday discourses using adequate terms, metaphors, and concepts (Peters, 2014). In sum, there are important reasons to argue that the practices of researchers as organizational actors talking science as a social institution into being (Autzen & Weitkamp, 2019) are worthy of exploration, particularly in the current online context. Our aim is to increase knowledge of these emerging science communication practices. This qualitative study contributes to the public communication of science research by exploring how researchers shape the characteristics of their digital practices.

2. Literature Review

2.1. The Context

In Finland, the energy policy-making community consists of the government and the regime actors, whose main legitimatization is their importance to the Finnish economy and who are closely linked to large-scale energy generation, involving governmental research organizations (Ratinen & Lund, 2016). Researchers are also involved with niche actors comprising civil society associations, NGOs and campaigns that influence energy policies through public debate, background lobbying and social media (Haukkala, 2018).

This research focuses on the inter-disciplinary BCDC Energy Research project (2015–2021), which seeks solutions for using solar and wind power extensively and cost-effectively. The project involves five academic organizations in Finland with approximately 40 researchers, and is funded by the Academy of Finland's Strategic Research Council, which views interaction with society as being of key importance. The project's science communication activities emphasized tweeting and blogging by researchers, with the support of communication professionals in their organizations, including one of this article's authors. Finnish energy companies were involved in the project's advisory board.

2.2. Academic Discourse

Peters (2014) summarizes a common problem addressed in science communication research as difficulties in relating "the esoteric character of modern science, its incomprehensibility and detachment from everyday culture" (p. 74) to the relevance structure of the audience and common sense.

On the other hand, Bucchi (2013, 2017) has integrated ethics with aesthetics in the discussion of styles and the quality of science communication:

> It is increasingly important for our field to raise the question of which communicative processes may

> have contributed to changes in the cultural and social status of science….And what is the long-term impact of the fashionable wave of pop formats for presenting science to the public:…FameLab, 3-minute pitches, and so on? (Bucchi, 2017, pp. 891–892)

Writing is not a neutral space but an active and ideological process, where rhetorical features of the text make meaning and structure relationships between scientific, non-academic and professional industry audiences, by moving them closer or further apart and making science relevant (Szymanski, 2016). For example, the use of displaced agency or passive voice depict scientific knowledge as having epistemic authority over industry practice (Szymanski, 2016).

Therefore, alongside informing about or defending science, Dudo and Besley (2016) suggest enacting a more strategic approach, for example by building trust and excitement through tailoring messages and highlighting common ground. The aspects of strategic communication have received little attention in science communication research, which has often focused on the organizational level, critically connecting the strategic aspects to science public relations (Autzen & Weitkamp, 2019), triggering reminders that 'strategic' should not be interpreted as any form of dishonest communication (Besley, Dudo, & Yuan, 2018).

Whilst there have been few attempts to address the manifestation of strategic communication on the individual level, Besley et al. (2018, p. 712) conceptualize "strategic science communication as planned behavior" towards achieving social outcomes. However, it is unclear how strategically researchers behave in their communications, as they show tendencies to focus on serendipitous rather than strategic communication (Wilkinson & Weitkamp, 2013). For the purposes of this study, we combine this line of thought with the perspective that although communication cannot not be strategic, most strategies are automated in their acquisition, and used implicitly and unconsciously alongside intentional and thoughtful strategic communication (Kellermann, 1992). This allows us to study the level of the researchers' strategic awareness regarding their digital discourse practices.

As there is limited science communication research on the quality of communication strategies and styles (Bucchi, 2013), this study seeks to show how researchers combine quality with strategy in the digital environment.

2.3. Digital Communication Environment

Altheide and Snow's (1979) theoretical construction of the 'media logic' approach has not lost its relevance in arguing that media formats have become a framework of presentations in an automated way, to the extent that they generate media culture. Furthermore, media serves as major sources of legitimation in how reality is defined. Media technologies entail connotations of topical rationality, but the style in which the technology is used promotes affective and entertaining mood responses. In order for scholars to be heard, they must come out of the academic form, enter the media stage, and be declared competent according to media rules (Altheide & Snow, 1979).

Today the field prefers to talk about plural media logics, describing the various logics in effect, and the focal characterizations of new or social media include the selection of content with regards to attention-maximizing and individualization (Klinger & Svensson, 2015). 'Social media logic' (van Dijck & Poell, 2013) models the ways in which the platforms impact their users' social interactions, including popularity, which has been found to lead to a more informal tone of voice of public agencies on Facebook (Olsson & Eriksson, 2016). The online public sphere for discussing science has been characterized as broken, with incivility and trolling (Mendel & Riesch, 2018), calling into play carnivalesque techniques that may offer fruitful spaces for participation, and thereby build stable ethical and political positions. For example, the tactical and ironic utilization of media genres, as 'cultural jamming,' repurposes elements of mainstream culture for alternative viewpoints and societal impact (Lievrouw, 2011).

Klinger and Svensson (2015) take media logic to the micro-level of actors and the convergence of content producer and consumer roles. In their view, occupational practices and norms are merged into blogs and social media platforms, whilst the logic of new media penetrates professional organizations such as journalism. Emergent news values of instantaneity, solidarity, and ambience rival established journalistic news values and professions with specific claims of knowledge production, such as researchers, and demand embracing the logics of new media spaces (Hermida, 2019).

The concept of media logic is deeply intertwined with studies of mediatization, the key concern being how and to what extent a social system has mediatized, that is, adapted its processes to media logics. The present study's aim is not so grand, but follows Eskjær's (2018) perspective on mediatization as not determining the operations of other social systems through adaptive or reactive processes. Instead, by triggering self-regulated transformation, such as media training and changing communication tactics, mediatization may be turned into a strategic resource (Eskjær, 2018). There is little research that has addressed researchers' digital mediatization in particular, although it has been found that academics may utilize the structures of the media for their own agendas, to the extent that it is the media's autonomy that comes into question (Scheu & Olesk, 2018), and embrace the user control accompanied by online social channels (Koh, Dunwoody, Brossard, & Allgaier, 2016).

2.4. Digital Academic Discourse Practices

To distinguish distinctive types of social processes enacted in media-related practices, Couldry (2012) asks:

"*What are people* (individuals, groups, institutions) *doing in relation to media?*…How is people's media-related practice related, in turn, to their wider agency?" (p. 43, emphasis in original).

To target the micro-level of researchers' digital practices, discourse analytical and sociolinguistic research provides helpful conceptualizations, often drawing on genre analysis. Hybrid genres evolve for various purposes and different views regarding the research group's role in society and in relation to public audiences (Luzón, 2017). Compared to its analog predecessor, 'digital academic discourse' is characterized by more explicit writer-reader interaction and dialogicity, which are supported by digital academic hybrid genres, merging research blogs, tweets, wiki pages, and research social networking sites (Kuteeva & Mauranen, 2018). For the purposes of this study, the researchers' social actions as digital practices (Jones et al., 2015) are conceptualized as their 'digital academic discourse practices.'

Baram-Tsabari and Lewenstein's (2013) scientists' written skills clusters of clarity, style, and analogy precede the present study's focus on characteristics that are relevant to digital academic discourse practices, including metaphors, humor, and digital and visual means such as hashtags and pictures.

To summarize, there are many issues related to how academic discourses interact with the digital communication environment and what the perceived, underlying wider agency is, such as the role of science in society. By examining how academics harness the logics of the digital medium and merge various forms and purposes to appropriately respond to new, complex rhetorical exigencies (Luzón, 2017; Zou & Hyland, 2019), this article investigates the characteristics of the types of digital academic discourse practices, guided by the first research question:

RQ1: What kinds of digital academic discourse practices do researchers create?

As the new media environment continues to increase the volume of potential messages, the competition for attention will intensify, and narratives with persuasive power may be recruited for science communication more frequently, but crossing the border between science and public communication discourse may cause ethical or other considerations for researchers (Dahlstrom, 2014). It may also be challenging for academics to 'unlearn' the rhetorical conventions of formal academic discourse and familiarize themselves with the discourses of public communication (Baram-Tsabari & Lewenstein, 2013). Conscious regulation of automated linguistic strategies is difficult as they are learned tacitly, for example in the process of becoming an expert in an academic field (Kellermann, 1992).

Identification of the types of digital academic discourse practices allows us to look at what kinds of considerations they enact, with the help of second research question:

RQ2: What kind of strategic awareness and considerations do researchers have regarding their processes of creating digital academic discourse practices?

3. Method

3.1. Research Design

This article presents an analysis of semi-structured face-to-face interviews with the BCDC Energy Research project's researchers, during their ongoing process in creating digital academic discourse practices.

Underpinned by the critical realist aim of tentatively disclosing the world's configurations underlying the phenomena under inquiry—and acknowledging that human knowledge is partly a social construction—qualitative research techniques are employed in an organizational context and in accordance with the specific objectives of the study (Sousa, 2010). As the research questions are focused on researchers' views, an interview method was deemed appropriate to elicit interviewees' accounts of their perceptions, understandings and interpretations (Mason, 2004). For rich descriptive and explanatory accounts, the dialogs were ethnographic interviews in the sense that they followed an ongoing relationships and contacts in the field. The interviewer (Kaisu Koivumäki) was involved in the wider project, extending the possibilities for rapport between the parties (Mason, 2004).

In a qualitative approach, the research aims for sensitivity over objectivity, recognizing that professional knowledge may blind or enable researchers to see connections within the data (Corbin & Strauss, 2015). Reflexivity also denotes efforts to expose the social context in which knowledge is created (Sousa, 2010). Therefore, to raise confidence in this study's interpretations, the declaration of Kaisu Koivumäki's involvement with the group is acknowledged. The interpretations may be affected by bias, and therefore the reflexive approach was employed throughout the study. The interviews were conducted at the end of the interviewer's involvement with the group, and her role was made clear and explicitly discussed at the beginning of each interview.

The interview guide was shaped by the literature review, and served as a thought-provoking, inspirational tool for the interviews. A sequence of questions was planned in advance, still allowing flexibility to follow up on particular areas (Mason, 2004). The interviewees were asked to select, read, and analyze their own or another researcher's BCDC Energy Research project-related blog posts and tweets. The interview guide included questions such as, "What does the text do?," "Assess how effective and appropriate the metaphors and style of the text are for representing science," and "Why?"

3.2. Recruitment

This study was one of the project interaction research team's works that the project members were informed

of during the founding phases of the overall project. Invitations to interviews for this study were emailed and the participants gave their consent for the interview data to be used for research purposes according to the ethical principles of research in the humanities and social and behavioral sciences and the Finnish Personal Data Act.

All the interviewed researchers (n = 17) had participated in the project's communication activities by blogging or tweeting, and the majority did so without previous experience. Their fields included the sciences (n = 3), social sciences and humanities (n = 3), economics (n = 5), and information technology (n = 6). Their academic status ranged from PhD students to professors, comprising five nationalities. The interviews lasted on average for nearly two hours (54–132 minutes) and were held at their place of work or in workplace coffee rooms, during June–August 2017.

3.3. Analysis

All the interviews were conducted and audio-recorded by one author, then transcribed verbatim by an assistant. Working systematically with the data set was managed with the qualitative data analysis software NVivo. Thematic analysis was used to identify and analyze patterns of meaning, and how broader social contexts impinged on those meanings (Braun & Clarke, 2006). Although existing conceptualizations were used to organize the data in the first phases of generating codes, insights into the data drew analytical attention inductively and generated clusters of codes, which assisted in constructing major themes and sub-themes when rereading and reviewing the themes at the second level of thematic analysis. The article employs latent levels of thematic analysis to examine the underlying ideas to interpret, organize, and make interconnections between themes, with conclusions drawn from across the whole analysis (Braun & Clarke, 2006), involving cyclic iterations between the empirical data, coding process, and existing theory. The interview quotes were selected to deepen the understanding of the interviewees' views.

To systematically scrutinize how the digital academic discourse practices emerged, Kjellberg's (2014) genre theoretical approach was applied in the analytical framework. The framework includes aspects that can be used to describe and organize the sub-themes' characteristics based on form, content, and purpose. The form describes how the communicative purpose is structured visually and verbally, with the content describing the addressed topics. The purpose is used to describe the shared, recurring communicative aim and underlying wider social agency. The process is described as the researchers' perceptions of enacting digital academic discourse practices. However, it is acknowledged that the different indicators cannot be analyzed in isolation from each other, which is obvious in some parts of the analysis.

4. Results and Discussion

The analysis of the interview data allowed us to identify sub-themes and four key themes which were labelled 'informing,' 'anchoring,' 'luring,' and 'maneuvering.' Achieving visibility and the ways this was linked to academic ethos encompassed the identified themes.

4.1. Informing

4.1.1. Forms and Contents

The aspects of the informing-theme were most frequently and clearly mentioned in the interview quotes, and unsurprisingly clarity (Baram-Tsabari & Lewenstein, 2013) was emphasized. Ambiguous and figurative language as well as rhetorical questions were rejected. Lexical density and expressing the correct meaning to be easily grasped were valued, with the idea that the data makes the tweets interesting—not the captivating means. For example, many felt that the process or data must be included in the picture, only a personal portrait violates the seriousness of the content (Figure 1):

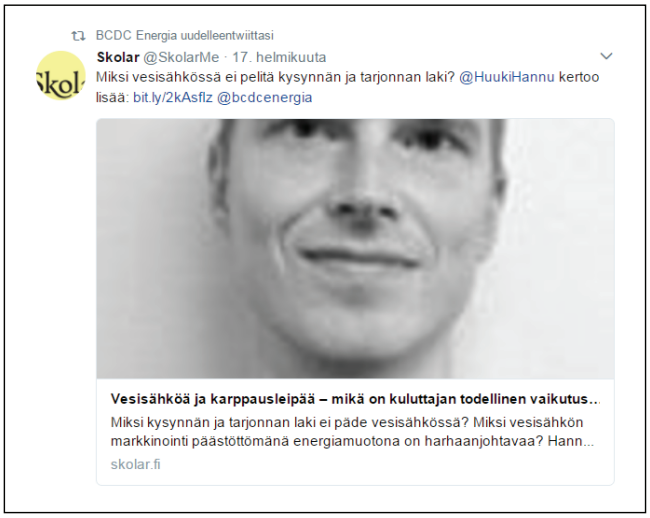
> I do not think this image belongs to science communication, it is more like personal branding or…a dating site.…Something else [other than a face], like a presentation, should have a bigger role. (Researcher 25, economics)

Occasional tweets and images from the researchers' desk highlighting scientific work were favored. However, researchers had concerns about becoming inarticulate by mostly highlighting the research aims or process, as they are not yet scientific results. Many felt that hashtags were meaningless, even visual rubbish disturbing the clarity of the tweets.

The findings support the notion of academia being resistant to mediatization (Rödder & Schäfer, 2010) on the micro-level of digital discourse practices. The informing-theme resembles scientific communication characterized by precision, epistemic modality and informativeness (Molek-Kozakowska, 2017) that may be construed in unintentional ways, such as coldness or irrelevance (Dudo & Besley, 2016).

4.1.2. Purposes

The value of informing was fundamental, and many researchers described good tweeting as being about or directly based on latest scientific developments, reflecting the traditional deficit objectives of science communication (Metcalfe, 2019). However, although building trust was not explicitly discussed, it was manifested when some researchers justified their approach with a sense of keeping things real, to awaken and remind people about the state of things and what actually is possible according to known science, and to challenge common sense or



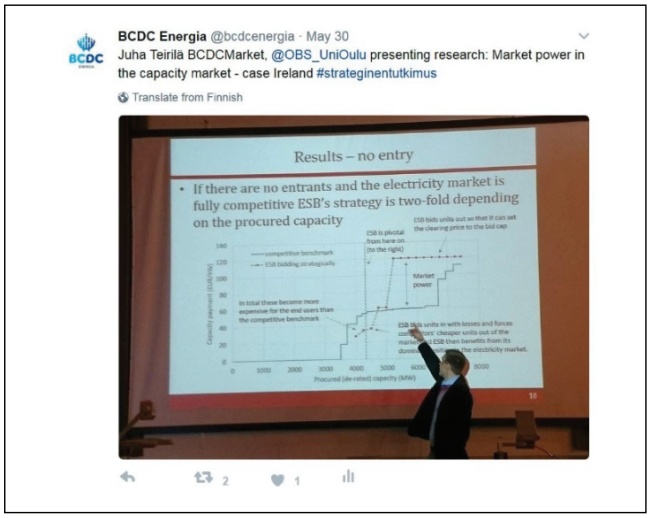


Figure 1. Examples of portraits in tweets. Source: BCDC Energy (2017a, 2017b).

general standpoints that are not well justified with facts. Such purposes may be interpreted as the intentions of reinforcing trust in epistemologies where facts still matter (Lewandowsky et al., 2017).

4.1.3. Researchers' Perception of the Process

Many researchers perceived their process of creating blogs and tweets as rather unintentional and implicit. They consciously analyzed their texts and writing process in retrospect, realizing a lack of such awareness during the writing, illustrating the differences in consciously acquired communicative strategies from those that are automated and made tacitly (Kellermann, 1992). For example, some researchers had not realized that they were using analogies or roles in relation to the public:

> Perhaps unconsciously I chose the public expert or even a teacher role that aims in a way at bringing the knowledge, to enlighten the reader….I cannot say whether I am using the text to represent science, and its role, and it is exactly these things that make me wonder why I should write these [blogs]. (Researcher 14, sciences)

In some unfortunate cases, their posts appeared in retrospect as too 'sciency,' which may only interest scholars. Many interviewees assumed that researchers, projects and blogs are automatically perceived to represent science even without explicit clues. When prompted, many researchers realized the disconnection and the lost representational power (Couldry, 2012):

> I think I should write something there, but it is something that just was left undone….Well, I should say that I am a research professor at [a research center]. (Researcher 1, sciences)
>
> Interviewer: And why?
>
> So that the followers, other people would know who I am….Surely it [researcher's profile] would be more professional and convincing. (Researcher 1, sciences)

4.2. Anchoring

4.2.1. Forms and Contents

The anchoring-theme collected quotes that, instead of informing, describe effectiveness in terms of generating visibility and convey an increasing reliance on perceived social media logics (van Dijck & Poell, 2013) such as 'popularity,' operationalized for example as image-building (Olsson & Eriksson, 2016).

Clear, 'sciency' text without any figurative expressions was perceived as ineffective and dull by some researchers. With a sense that the social relevance of science is not self-evident (Szymanski, 2016), the researchers regarded appealing familiarities, metaphors and images as suitable for creating a sense of 'dialogicity' (Kuteeva & Mauranen, 2018) by connecting the abstract world of science to concepts from the everyday world (Peters, 2014), such as weather forecasts, red traffic lights and the popular myth-busting TV format (Figure 2):

> Myth-busting as a headline has this very positive spin from the TV series of course….This tool of myth-busting can go when you have these certain conceptions of how things are that need to be updated. (Researcher 35, information technology)

However, in the same breath the researchers noted that appealing should not translate into entertaining, but into a pleasant perception of the topic and the author's skills. Analogies and a humorous tone in headlines have their place, but the writer must be very fair to avoid misleading impressions. The subsequent text must be substantial.

Many of the researchers thought that good pictures can attract attention to anything, including science.

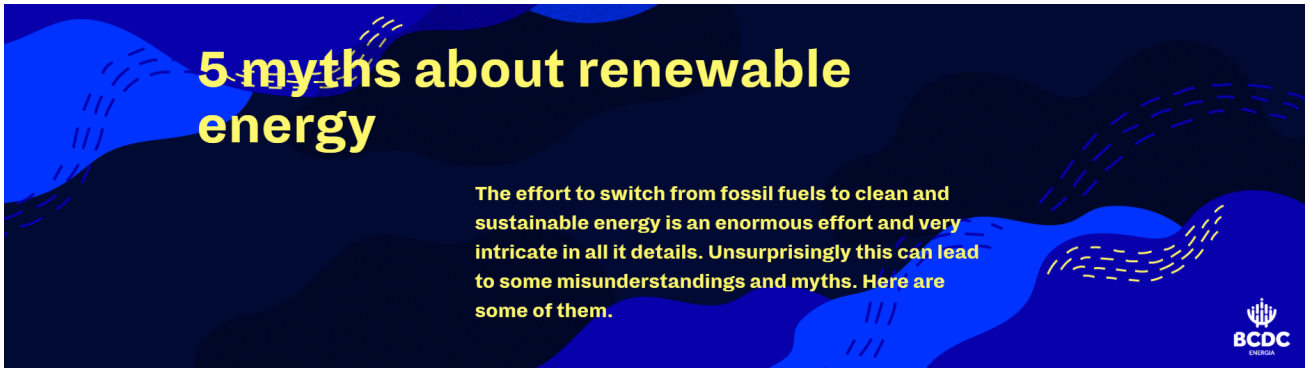


Figure 2. Anchoring with popular concepts. Source: Skolar.fi. (2017).

However, their meaning must be self-contained or provide a link to further information, otherwise they may frustrate. Interestingly, the researchers described the use of amateurish graphics to emphasize authenticity, even if the content is somewhat staged.

4.2.2. Purposes

Although most researchers emphasized anchoring their communication on scientific processes or results, for many it was also acceptable to merely emphasize the importance of science. For example, a blog about a researcher's summer house's solar panels without strictly scientific substances was discussed and justified by many with the effect the text had in terms of humanizing science.

Many interviewees saw the purpose of science to act as a relevant, useful peer or offer free consultancy. It was regarded as useful to bring research from scientists' drawers to the people, and also for the researchers to find their own role in social discussions in a deliberative fashion:

> This peer aspect integrates the public with the research community, and as I was, so everyone is able to handle these [home automation applications] even if one is not exactly an expert in them. It also implies that one's actions may have an impact on the bigger picture. (Researcher 25, economics)

Highlighting the usefulness of applied scientific knowledge is likely to derive from this study's context: the project's funding is granted partly based on societal aims. This view also resembles the understanding of scientific expertise beyond abstraction as advice on practical problems to clients or decision-makers responsible for the solutions (Peters, 2014).

4.2.3. Researchers' Perception of the Process

The unintentional and implicit sub-theme extends to the anchoring-theme, as a number of researchers had difficulties clearly differentiating the goals and intentions of the online contents of others and also their own: whether they were to represent science, inform or softly advocate. This reflects the fusion of facts and various intentions, and the potential of scholars becoming 'just another entertainer,' as prompted in Scheu and Olesk's (2018) interviews. Blurring intentions also may imply that sense-making as a form of identity building (Davies & Horst, 2016) is driven to revision when faced with the digital environment.

4.3. Luring

4.3.1. Forms and Contents

The theme was labelled luring because it collected quotes where the researchers acknowledge that simply laying out scientific facts in long, detailed blogs or churning out tweets may not be regarded as interesting, and some enigma is needed. New ways must be found and interest must be teased with captivating means while progressively adapting to digital media practices. Linguistic features such as rhetorical questions (Figure 3) were regarded as useful for creating an ambience of proximity and dialog, in line with Zou and Hyland's (2019) findings:

> If I read a question like this, it would be a very good way to get my brain into actually clicking the article. Because of course it would be a question…where the answer would be interesting to me. (Researcher 35, information technology)

> Interviewer: It is an old marketing tactic, raising questions.

> Mmhm, sure. But…I think this is very appropriate because I think this is, this curiosity about answers is what drives people to do science. (Researcher 35, information technology)

Many researchers stated that unexpectedness and references to subcultures combined with scientific content effectively spark interest, justify, and intensify the attractive effect of humor, for example, that usefully builds

Figure 3. Luring with raising questions. Source: BCDC Energy (2017c).

positive images and humanizes science. Researchers were also aware of the risks of humor (Mendel & Riesch, 2018):

> I am for the facts, but somehow the public must be tempted to read. If this [headline] were something like 'learn about hydropower,' would anyone bother? (Researcher 3, economics)

> In the past we were maybe, science was seen as very serious et cetera, but with Twitter, or other social media environments, science also seems to be more, let's say, human….You also put the scientist in the position of an ordinary person, so it also makes science more reachable, accessible to people or scientists, because you are using humor that everybody else uses, so you are removing the serious, let's say, rigid identity of science or scientists. (Researcher 26, information technology)

Strategic discourse practices were also apparent, as researchers preferred amateurish pictures and graphics to stand out and emphasize authenticity rather than thematic stock images.

4.3.2. Purposes

Striving to improve the image of science by making rather confident promises of future outcomes was identified as boosting. In some cases, the researchers intertwined the relevance of a research topic with recommendations of related applications, such as home solar power systems. This sort of promotion resembles understandings of hype as both: potentially eroding trust in science but also as a performative device constructing technological futures (Davies & Horst, 2016):

> Here the role of an expert and a decipher is visible in a grand fashion…saying that although this is a more complex problem, we will seize it and solve it…,a self-confident role boosting the research project. (Researcher 11, economics)

Furthermore, the conscious use of buzzwords (Bensaude Vincent, 2014), animation, and familiarities, even without strictly scientific news, were approved as means to attract interest. The justifications seemed to refer to the new media as representing a battle for attention, requiring adjustments of the conventional academic forms to more playful online discourses (Mendel & Riesch, 2018). Many researchers explained that the environment forced stylistic decisions, such as brief wording that casts an advert-style in tweets:

> There was one of those GIF-animations, and actually we were not saying anything there. Nothing about anything whatsoever, but there is something visual and familiar for a person following the weather, thus perhaps awakening interest in energy-research topics. (Researcher 16, sciences)

4.3.3. Researchers' Perception of the Process

The needed means sub-theme was connected to the luring-theme, as researchers often considered luring-style practices in order to be heard at all on digital media. From the limited empirical material, especially from the interviewees within information technology, this seems to prepare the ground for an unprejudiced attitude toward digital practices, reflecting Aristotle's (1997) and Puro's (2006) notion of neutrality in communication techniques, which can be utilized for any intention. Such a perception of the process also mirrors the practical balancing between complexities of ethical standards prevalent in academic communication practices (Priest, Goodwin, & Dahlstrom, 2018). The researchers discussed metaphors and analogies beyond their communicative usefulness as fundamental means of learning and creating scientific concepts, and therefore considered them not to be in opposition to scientific methods:

> It helps people to understand and put it in a certain place in the working model that they have of how things are. And so, yes, I think these all are and should be parts of scientific communication in a blog

post and even in a scientific article, and also, because they are very effective ways of communicating issues. (Researcher 35, information technology)

4.4. Maneuvering

4.4.1. Forms and Contents

The maneuvering-theme introduces the researchers' contradictory hesitations, implying limitations to the new forms of representing science that may mislead the attention away from the meaning, whilst the researchers were simultaneously aware of the effectiveness of mimicking popular formats to attract attention, such as using clickbait or a cat video (Figure 4):

> This cat video is a pretty good example of not crossing into bad taste, since it relates to this internet world. Most people surely understand the analogy, it works. (Researcher 16, sciences)

> It may wear out the credibility if topics are always introduced terrifyingly, at some point it's too much, and the viewer will not bother to follow anymore, because the contents are meaningless worst-case scenarios. (Researcher 16, sciences)

> Is awakening emotional reactions the only effective way? A counter-reaction is probable and makes the message spread, but does it get the message through? (Researcher 16, sciences)

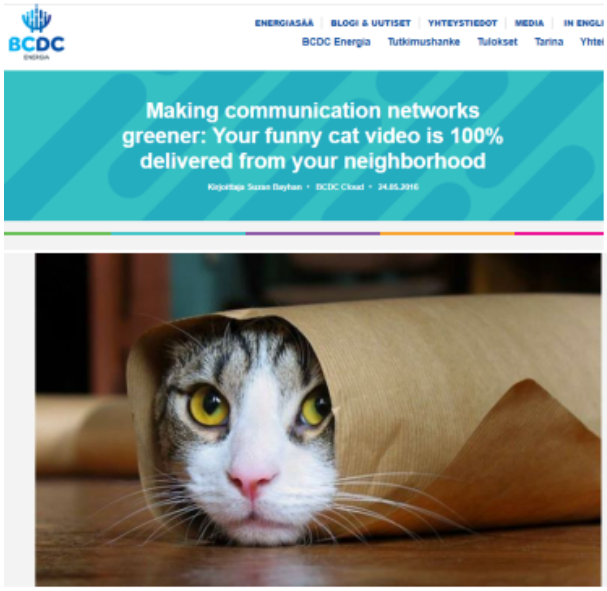


Figure 4. Maneuvering with a cat video. Source: BCDC Energy (2016).

A number of interviewees accepted the use of rhetoric and visual techniques that have traditionally been perceived as distant to scientific communication discourse: silly images or intriguing headlines of dysfunctional home electronics. However, more extreme means seemed to cross the line, such as worst-case scenario metaphors, superlatives, catchy phrases, and overwhelming visions. They were seen as forceless hyping *ad nauseam*, reducing the weight and usefulness of science. Interestingly, the reservations in the researchers' perceptions of hybrid genre mash-ups (Lievrouw, 2011) addressed the lost rhetorical power to draw attention using inflated emotive and speculative modes of stylistic cueing (Molek-Kozakowska, 2017) more explicitly than ethical aspects concerning exceeding the boundaries of the scientific discourse, as suggested by Dahlstrom (2014).

4.4.2. Purposes

Although there is less explicit recognition of marketing amongst science communication scholars (Metcalfe, 2019; Trench, 2008), many researchers interviewed in this study sharply detected and rejected promotional cues, such as wordings, exclamation marks, and visual commercial cues, because they may affect the reading of an expert blog, cast reservations on the reliability of conducted research, or violate the expectations of academic communication style (Yuan, Ma, & Besley, 2019). However, in some cases the researchers accepted the communicative act of marketing, even indicating confidence. For example, marketing a research newsletter was considered necessary and justified because it is free of charge. Marketing and societal goals were intertwined in a similar vein to Chubb and Watermeyer's (2017) results on the marketization of research impact:

> These are morally more acceptable kinds of clickbait, because they are not ads and we are not a commercial actor. We do not make money with them. We aim to gain more publicity and thereby more impact, and with more impact, more money [funding]….Our aim is to get the public interested in the project's results, and we assume that the conducted work is relevant to more than the small scientific community. So I do not consider it bad to use catchy headlines. (Researcher 6, information technology)

> This [wording in a tweet] annoys me a bit: 'the market actor's drive,' oh my! [laughing]….This is such commercial project language….It differs to what I expect to see in academic communication. (Researcher 30, social sciences and humanities)

The researchers were subtly willing to direct the publics' behavior toward generally accepted environmental action. However, statements from individual researchers were not favored, reflecting the expectations of objectivity, but on the project's behalf, statements were expected to guide the interpretation of information and act as a voice of authority (McKaughan & Elliott, 2018).

Adjusting to the surroundings was expressed by some as allying with other players on Twitter, following

Szymanski's (2016) suggestion of engendering relevance by closing the gap between scientific research and professional audiences, and addressing other professional fields' predispositions (Nguyen & Vu, 2019; Walter et al., 2019). In strategic fashion, retweeting and commenting on a commercial company's tweets were seen to lessen the gap between reality and science to display academic research as realistic and relevant:

> It [science] is criticized by companies, who say that scientists always talk about this dreamy world where it is not implemented, it is not reality at all, but, for example, some tweet like this [connecting academic research with Google] shows that what you are working on is realistic and it is really implementable or that it is really doable or it will really change the real world. (Researcher 26, information technology)

Such reassessments of the purposes and role of science and expertise may imply that it is possible to widen the normative rhetorical space of science communicators (Bucchi, 2013).

4.4.3. Researchers' Perception of the Process

A strategic approach was apparent in the data, accompanied with the researchers' careful assessments of their writing process, and cautious use of new media features that need consideration and rehearsal in order to fit in with the digital academic discourse. There was minor evidence in the data of a tendency to lightly frame the facts, which was justified as it sharpened the point with a scientifically accurate message that also resonates with the audience, as suggested by Luong et al. (2019):

> I do not see a bad moral problem there….This is a fully confirmable fact. In that sense, even if it is a little dressed up so that only the best part is displayed and the best case is mentioned in the heading, it is not distorting the truth. It is presented in a certain tone that serves the project's goals. (Researcher 6, information technology)

Some researchers considered using the ethos of science as a communicative advantage. Its effectiveness relies on a neutral expert role and style in contrast to the energy industry actors' tone of voice, for example. This reflects the idea of the researchers themselves serving as symbolic focal points for the sense-making of science (Davies & Horst, 2016), talking science into being (Autzen & Weitkamp, 2019), and contributing to the contextual dynamics of public trust (Irwin & Horst, 2016):

> Energy production might be a sensitive topic, and it is good to keep a matter-of-fact-style when representing science, not least because of the many lobbyists. A neutral narration is good to refer to when the buzz surges elsewhere. (Researcher 16, sciences)

Table 1 provides an overview of the charted types of digital academic discourse practices. The dimensions of the relationships between the digital academic discourse practices and strategic awareness are illustrated in Figure 5.

5. Conclusions

This qualitative interview study sought to broaden the understanding of how researchers shape their discourse practices in the digital communication environment. In the results, it appears that this shaping ranges from traditional to progressively adjusted practices, and is triggered amongst and in comparison with other players in the digital public sphere. Hybrid genre trials with traditional scientific and new style fusions helped these researchers to distinguish the contours of digital academic discourse practices, while the digital academic genres in turn facilitated the adoption of varying styles (Bucchi, 2013), social purposes (Luzón, 2017), relevance (Szymanski, 2016), and broadened perspectives on expertise (McKaughan & Ellliott, 2018; Peters, 2014). Striving for visibility contributed as a driver of the creative recombinations of the academic discourse with the perceived digital discourse, also conveying a goal of positioning science as a dialogical actor in the digital sphere. The researchers' representations of science co-create academic identities (Davies & Horst, 2016) through the digital academic discourse practices found in these results. Thus, this study contributes to the understanding of influences of the digital communication environment on the nuances of public trust in science from the viewpoint of researchers as actors, who are capable of creating representations of science that contribute to the reception of scientific knowledge.

The unconscious nature of automated linguistic strategies (Kellermann, 1992) are apparent in these results, in that sometimes researchers had difficulties in discerning for example which roles and intentions were conveyed in blogs and tweets. On a generic level, this conveys potentially problematic representations of science, and reinforces Bucchi's (2013) suggestion of the willingness to problematize one's own definition of science communication and the underlying rationale as one of the keys to avoiding increased public distrust.

While the current study has an applied focus, it has theoretical implications as the strategic awareness and capability to utilize the features of modern media for a variety of purposes (Scheu & Olesk, 2018) were apparent in these results. This supports recent suggestions to further conceptualize mediatization (Koh et al., 2016) also as a strategic resource beyond adaptation (Eskjær, 2018). Future research would be beneficial on the potentially positive effects of digital mediatization triggering a reassessment of academic discourse practices—in addition to the prevalent critical perspectives on mediatization. The complex digital environment and new variations in science communication allow and call for

Table 1. Characteristics of digital academic discourse practices.

Informing	Anchoring	Luring	Maneuvering
		Forms and contents	
Clarity Rhetorical questions/ambiguous language rejected	Clarity not enough, appeal needed Captivating techniques anchored in scientific substance	Scientific facts may not interest: they need enigma Teasing buzzwords, visuals and questions attract curious minds	Assessing the duality and limitations of the new media styles in representing science: catchy techniques' effectiveness and the nature of the attention gained
Emphasizing the researcher's role, 'from the desk'	Connecting: Weather forecast Myth busting Traffic lights Summer house	Humanizing science with humor and subcultures	Approving carnivalesque features: funny and surprising headlines, clickbait, cat videos, portraits
The hashtags are disturbing and unclear	Tweets require attractive or authentic pictures Composing images	Tactical amateurish pictures vs. stock images	Rejecting horror scenarios, superlatives, overwhelming visions, promotional language, person branding
		Purposes	
Updating the public with the newest developments Opening the research process, but preferring the results for trust building	Being a useful peer Free consulting Connecting abstract research to practical life	Boosting: Positive promises of the project's outcomes and related topics Captivating means approved to stand out in the new media	Marketing of science-related contents: Justified by the accessibility and independency of science Making statements: Not for individual researchers but for a research project; Advocating remotely; Adjusting to environment: Allying with companies.
		Perceptions of the process	
Unintentional and implicit Analysis in retrospect Assuming to be automatically identified as scholars		Needed means: To at all be heard For knowledge creation	Cautious use Ethos of science as a communicative advantage

a consciously strategic mindset in science communication instead of merely educating (Dudo & Besley, 2016) or transferring information beyond deficit-participatory modes, opening the floor for alternative trajectories and future research on science communication, including issues of digital culture and identity (Davies & Horst, 2016; Mendel & Riesch, 2018), as well as organizational influence (Koivumäki & Wilkinson, 2020).

This study was exploratory in nature, focusing on researchers in one research project in one country. Hence, our findings offer only a snapshot of scholars' perspectives on the evolving digital practices. They cannot pre-

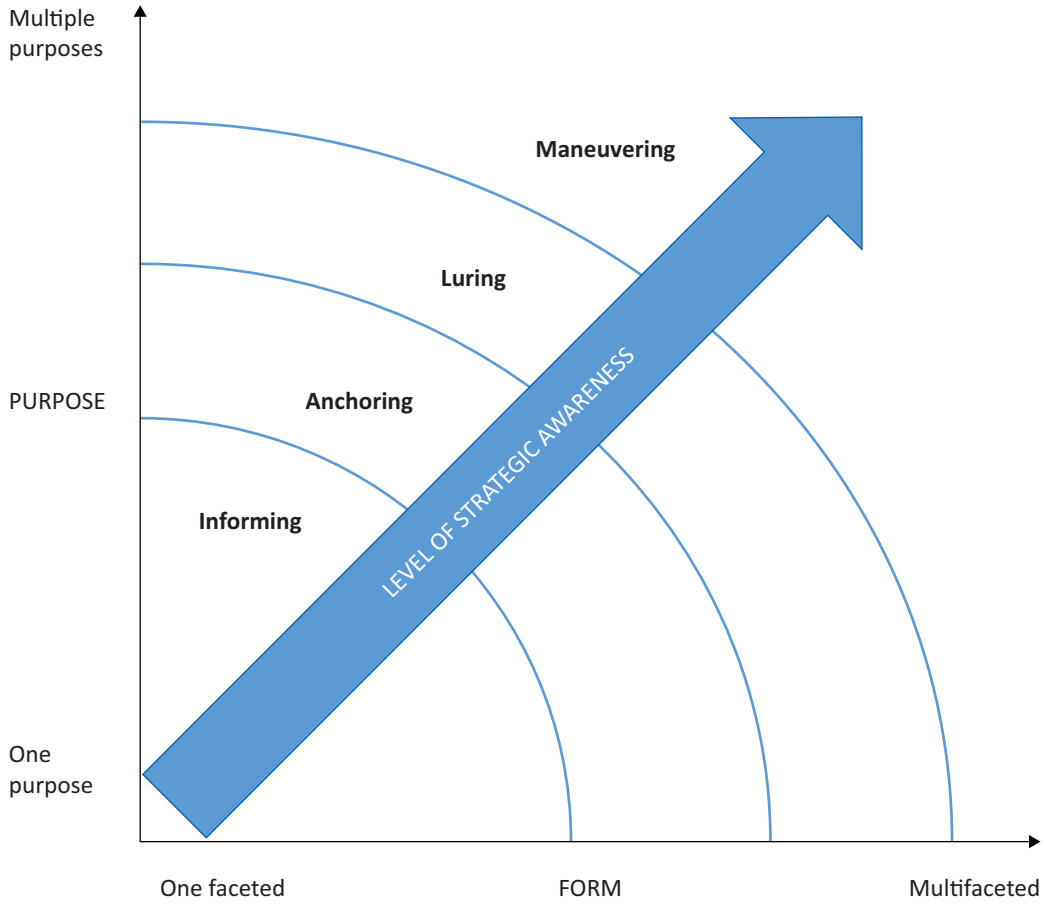


Figure 5. The relationship between digital academic discourse practices and strategic awareness.

dict their prevalence in a wider group of scientists that further research will have to investigate. Primarily, this article presents indicators that could be used to detect and discuss academic practices and can provide building blocks for future frameworks.

Acknowledgments

This study has been funded by the Strategic Research Council at the Academy of Finland, project no. 292854 and the Finnish Cultural Foundation. We are grateful to Dr. Emma Weitkamp for her useful comments on this article.

Conflict of Interests

The authors declare no conflict of interests.

References

Altheide, D. L., & Snow, R. P. (1979). *Media logic*. Beverly Hills, CA: SAGE.

Aristotle. (1997). *Retoriikka* [Rhetoric] (J. Sihvola, P. Hohti, & P. Myllykoski, Transl.). Helsinki: Gaudeamus.

Autzen, C., & Weitkamp, E. (2019). Science communication and public relations: Beyond borders. In M. Dascal, T. Gloning, & A. Lessmollman (Eds.), *Science communication* (pp. 465–484). Berlin: De Gruyter.

Baram-Tsabari, A., & Lewenstein, B. (2013). An instrument for assessing scientists' written skills in public communication of science. *Science Communication*, *35*(1), 56–85.

BCDC Energy. (2016). Bayhan, S.: Making communication networks greener: Your funny cat video is 100% delivered from your neighborhood. *bcdcenergia.fi*. Retrieved from http://www.bcdcenergia.fi/making-communication-networks-greener

BCDC Energy. [bcdcenergia]. (2017a, February 17). RT @SkolarMe Miksi vesisähkössä ei pelitä kysynnän ja tarjonnan laki @HuukiHannu kertoo lisää: bit.ly/2kAsflz @bcdcenergia [Tweet]. Retrieved from https://twitter.com/SkolarMe/status/832469630866198528

BCDC Energy. [bcdcenergia]. (2017b, May 30). Juha Teirilä BCDCMarket, @OBS_UniOulu presenting research: Market power in the capacity market—case Ireland #strateginentutkimus [Tweet]. Retrieved from https://twitter.com/bcdcenergia/status/869534369395986433

BCDC Energy. [bcdcenergia]. (2017c, February 24). Can a smart fridge stabilize the power grid? Yes! But it can also make things worse. This and more in our new

blog: http://bcdcenergia.fi/blogi-ja-uutis [Tweet]. Retrieved from https://twitter.com/bcdcenergia/status/835035832973148161

Bensaude Vincent, B. (2014). The politics of buzzwords at the interface of technoscience, market and society: The case of public engagement in science. *Public Understanding of Science*, *23*(3), 238–253.

Besley, J., Dudo, A., & Yuan, S. (2018). Scientists' views about communication objectives. *Public Understanding of Science*, *27*(6), 708–730.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

Bucchi, M. (2013). Style in science communication. *Public Understanding of Science*, *22*(8), 904–915.

Bucchi, M. (2017). Credibility, expertise and the challenges of science communication 2.0. *Public Understanding of Science*, *26*(8), 890–893.

Chubb, J., & Watermeyer, R. (2017). Artifice or integrity in the marketization of research impact? Investigating the moral economy of (pathways to) impact statements within research funding proposals in the UK and Australia. *Studies in Higher Education*, *42*(12), 2360–2372.

Corbin, J., & Strauss, A. (2015). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (4th ed.). New York, NY: SAGE.

Couldry, N. (2012). *Media, society, world: Social theory and digital media practice*. Cambridge: Polity.

Dahlstrom, M. (2014). Using narratives and storytelling to communicate science with nonexpert audiences. *Proceedings of the National Academy of Sciences*, *111*(4), 13614–13620.

Davies, S., & Horst, M. (2016). *Science communication: Culture, identity and citizenship*. London: Springer.

Dudo, A., & Besley, J. (2016). Scientists' prioritization of communication objectives for public engagement. *PloS One*, *11*(2). https://doi.org/10.1371/journal.pone.0148867

Eskjær, M. (2018). Mediatization as structural couplings: Adapting to media logic(s). In C. Thimm, M. Anastasiadis, & J. Einspänner-Pflock (Eds.), *Media logic(s) revisited* (pp. 85–109). Cham: Palgrave Macmillan.

Haukkala, T. (2018). A struggle for change: The formation of a green-transition advocacy coalition in Finland. *Environmental Innovation and Societal Transitions*, *27*, 146–156.

Hermida, A. (2019). The existential predicament when journalism moves beyond journalism. *Journalism*, *20*(1), 177–180.

Irwin, A., & Horst, M. (2016). Communicating trust and trusting science communication: Some critical remarks. *Journal of Science Communication*, *15*(6), 1–5. https://doi.org/10.22323/2.15060101

Jones, R. H., Chik, A., & Hafner, C. A. (Eds.). (2015). Introduction: Discourse analysis and digital practices. In A. Chik & C. A. Hafner (Eds.), *Discourse and digital practices: Doing discourse analysis in the digital age* (pp. 1–17). London: Routledge.

Kellermann, K. (1992). Communication: Inherently strategic and primarily automatic. *Communications Monographs*, *59*(3), 288–300.

Kjellberg, S. (2014). Researchers' blogging practices in two epistemic cultures: The scholarly blog as a situated genre. *Human IT*, *12*(3), 36–77.

Klinger, U., & Svensson, J. (2015). The emergence of network media logic in political communication: A theoretical approach. *New Media & Society*, *17*(8), 1241–1257.

Koh, E., Dunwoody, S., Brossard, D., & Allgaier, J. (2016). Mapping neuroscientists' perceptions of the nature and effects of public visibility. *Science Communication*, *38*(2), 170–196.

Koivumäki, K., & Wilkinson, C. (2020). Exploring the intersections: Researchers and communication professionals' perspectives on the organizational role of science communication. *Journal of Communication Management*. Advance online publication. https://doi.org/10.1108/JCOM-05-2019-0072

Kuteeva, M., & Mauranen, A. (2018). Digital academic discourse, texts and contexts: Introduction. *Discourse, Context & Media*, *24*, 1–7.

Lewandowsky, S., Ecker, U., & Cook, J. (2017). Beyond misinformation: Understanding and coping with the "post-truth" era. *Journal of Applied Research in Memory and Cognition*, *6*(4), 353–369.

Lievrouw, L. (2011). *Alternative and activist new media*. Cambridge: Polity.

Luong, K. T., Garrett, R. K., & Slater, M. D. (2019). Promoting persuasion with ideologically tailored science messages: A novel approach to research on emphasis framing. *Science Communication*, *41*(4), 488–515.

Luzón, M. J. (2017). Connecting genres and languages in online scholarly communication: An analysis of research group blogs. *Written Communication*, *34*(4), 441–471.

Mason, J. (2004). Semistructured interview. In M. Lewis-Beck, A. Bryman, & T. Liao (Eds.), *Encyclopedia of social science research methods* (pp. 1021–1022). Thousand Oaks, CA: SAGE.

McKaughan, D., & Elliott, K. (2018). Just the facts or expert opinion? The backtracking approach to socially responsible science communication. In S. Priest, J. Goodwin, & M. Dahlstrom (Eds.), *Ethics and practice in science communication* (pp. 197–213). Chicago, IL: University of Chicago Press.

Mendel, J., & Riesch, H. (2018). Gadflies biting science communication: Engagement, tricksters, and ambivalence online. *Science Communication*, *39*(5), 673–684.

Metcalfe, J. (2019). Comparing science communication theory with practice: An assessment and critique using Australian data. *Public Understanding of Science*, *28*(4), 382–400.

Molek-Kozakowska, K. (2017). Stylistic analysis of headlines in science journalism: A case study of New Scien-

tist. *Public Understanding of Science*, *26*(8), 894–907.
Nguyen, A., & Vu, H. (2019). Testing popular news discourse on the "echo chamber" effect: Does political polarisation occur among those relying on social media as their primary politics news source? *First Monday*, *24*(5). http://dx.doi.org/10.5210/fm.v24i6.9632
Nuortimo, K., Härkönen, J., & Karvonen, E. (2018). Exploring the global media image of solar power. *Renewable and Sustainable Energy Reviews*, *81*, 2806–2811.
Olsson, E., & Eriksson, M. (2016). The logic of public organizations' social media use: Toward a theory of 'social mediatization.' *Public Relations Inquiry*, *5*(2), 187–204.
Peters, H. P. (2014). Scientists as public experts: Expectations and responsibilities. In M. Bucchi & B. Trench (Eds.), *Routledge handbook of public communication of science and technology* (pp. 86–98). London: Routledge.
Priest, S., Goodwin, J., & Dahlstrom, M. (Eds.). (2018). How ethics matters. In S. Priest, J. Goodwin, & M. F. Dahlstrom (Eds.), *Ethics and practice in science communication* (pp. 9–12). Chicago, IL: University of Chicago Press.
Puro, J.-P. (2006). *Retoriikan historia* [History of rhetorics]. Helsinki: WSOY.
Ratinen, M., & Lund, P. (2016). Alternative view on niche development: Situated learning on policy communities, power and agency. *Technology Analysis & Strategic Management*, *28*(1), 114–130.
Rödder, S., & Schäfer, M. (2010). Repercussion and resistance: An empirical study on the interrelation between science and mass media. *Communications*, *35*(3), 249–267.
Rule, T. A. (2014). *Solar, wind and land: Conflicts in renewable energy development*. London: Routledge.
Scheu, A., & Olesk, A. (2018). National contextual influences on mediatization: The comparison of science decision makers in Estonia and Germany. *Science Communication*, *40*(3), 366–392.
Scheufele, D. A., & Krause, N. M. (2019). Science audiences, misinformation, and fake news. *Proceedings of the National Academy of Sciences*, *116*(16), 7662–7669.
Skolar.fi. (2017). Kühnlenz, F.: 5 myths about renewable energy. *Skolar.fi*. Retrieved from http://www.skolar.fi/5-myths-about-renewable-energy
Sousa, F. (2010). Metatheories in research: Positivism, postmodernism, and critical realism, In A. Woodside (Ed.), *Organizational culture, business-to-business relationships, and interfirm networks* (pp. 455–503). Bingley: Emerald.
Szymanski, E. (2016). Enacting multiple audiences. *Science Communication*, *38*(6), 724–745.
Trench, B. (2008). Towards an analytical framework of science communication models. In D. Cheng, M. Claessens, T. Gascoigne, J. Metcalfe, B. Schiele, & S. Shi (Eds.), *Communicating science in social contexts* (pp. 119–135). Dordrecht: Springer.
van Dijck, J., & Poell, T. (2013). Understanding social media logic. *Media and Communication*, *1*(1), 2–14.
Walter, S., Lörcher, I., & Brüggemann, M. (2019). Scientific networks on Twitter: Analyzing scientists' interactions in the climate change debate. *Public Understanding of Science*, *28*(6), 696–712.
Weingart, P., & Guenther, L. (2016). Science communication and the issue of trust. *Journal of Science Communication*, *15*(5), 1–11. https://doi.org/10.22323/2.15050301
Wilkinson, C., & Weitkamp, E. (2013). A case study in serendipity: Environmental researchers use of traditional and social media for dissemination. *PloS One*, *8*(12). https://doi.org/10.1371/journal.pone.0084339
Yuan, S., Ma, W., & Besley, J. (2019). Should scientists talk about GMOs nicely? Exploring the effects of communication styles, source expertise, and preexisting attitude. *Science Communication*, *41*(3), 267–290.
Zou, H., & Hyland, K. (2019). Reworking research: Interactions in academic articles and blogs. *Discourse Studies, 21*(6), 713–733.

About the Authors

Kaisu Koivumäki is a Communications Specialist and a Doctoral Student at University of Oulu, Finland. She holds two MA degrees in speech communication and literature, and her research interests in science communication include the organizational context as well as the researchers' and communication professionals' perceptions of mutual collaboration and digital science communication. Her PhD project is a recipient of many esteemed grants. She is also an experienced communications specialist with background in the fields of science, education and culture.

Timo Koivumäki is an Associate Professor of digital service business at Martti Ahtisaari Institute, University of Oulu Business School. Previously he has worked as a Research Professor of mobile business applications at VTT and at University of Oulu and as a Professor of information and communication business at the University of Oulu. Koivumäki has over 20 years of experience in the field of digital business. His research interests include consumer behaviour, open innovation, digital marketing and strategic networking.

Erkki Karvonen is a Professor of communication and information studies at the University of Oulu. He is responsible for the MA Degree Programme in Science Communication (TIEMA). His academic background is in media studies, in organizational communication studies and in social sciences. His academic interests comprise science communication, information society, political communication, brands and reputation problematics. He teaches courses in public communication of science, media culture and corporate communication.