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Citation: Franks, S., Joubert, M., Wells, R. & van Zuydam, L. (2023). Beyond Cheerleading: Navigating the Boundaries of Science Journalism in South Africa. *Journalism Studies*, 24(14), pp. 1734-1753. doi: 10.1080/1461670x.2022.2141820

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Link to published version: <https://doi.org/10.1080/1461670x.2022.2141820>

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Beyond Cheerleading: Navigating the Boundaries of Science Journalism in South Africa

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ABSTRACT

Science journalism faces an issue that is part of a bigger picture of media change. The economic pressures which have seen shrinking resources available for reporting news are contrasted by the relentless rise of corporate communication and public relations. Institutional science communication has become a booming industry, operating, at least partially, by bypassing the traditional roles of journalists. To interrogate how science journalists perceive the impact of these changes on their professional roles, as well as how they navigate relationships with scientists and institutional science communicators, we conducted in-depth interviews with experienced South African science journalists. Our paper summarises the results of this study, including how journalists perceive changes in their professional identities and responsibilities. We analyse the interview data and explore the extent to which science journalists perceive themselves as “cheerleaders” for science, in contrast to critical investigators tasked with holding science and scientists to account, as well as how they operate in a world of well-endowed corporate science communication. We situate these interview findings against the theoretical background of boundary work and recent discussions about the blurring boundaries between science journalism and science communication.

KEYWORDS

Science journalism; science PR; institutional communication; science and mass media; institutional science communication

Introduction and Study Rationale

The profession of science journalism faces significant challenges including shrinking career prospects and job losses for science journalists. This is because the ubiquity of free, online science content has changed the way people look for and find information about science (Brossard 2013; Dunwoody 2021). Science journalists were particularly hard hit, since their primary home worldwide has long been print media, in particular well-resourced newspapers (Dunwoody 2020).

Coinciding with this weakening of science journalism, institutional science communication (or science PR) is strengthening (Marcinkowski and Kohring 2014; Weingart and

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Joubert 2019) and PR practices are increasingly shaping mass media content (Macnamara 2016).

Several scholars have raised the alarm about these power shifts where PR takes the upper hand over journalism, especially when it comes to science reporting (Göpfert 2007; Russ-Mohl 1999; Weingart and Joubert 2019). Also, leaders in the field of science journalism call attention to the need for independent science coverage, which includes critiquing and assessing research and seeking out different points of view (Blum 2021; Carr 2019). These authors point out that, while there is a place for journalistic stories about the wonder of science, the roles and duties of science journalists must go further and include analysing the limitations, partialities and conflicts that exist within science. Therefore, they argue, it is not primarily the role of science journalists to praise and promote science, but to illuminate science independently and to scrutinise its outputs. This includes asking critical questions about the science. In contrast, the “science-boosting” mission has been taken over by science communicators and even scientists themselves, who mostly present a positive view of science. Accordingly, Guenther (2019) highlights that the quality and appropriateness of science journalism should be based on journalistic (not scientific) criteria.

In a fast-evolving science communication landscape, the roles of science journalists and science communication are changing rapidly. Science communicators typically work as institutional communicators in the science sector (for example, at universities, museums and science councils, or even within government departments), but are also employed in the private sector (for example in large pharmaceutical companies) or work independently as science communication consultants. Science journalists depend, at least to some extent, on these institutional (or corporate) science communicators for access to new findings and expert sources, while institutional communicators rely on journalists for mass media coverage of institutional science news. At the same time, scientists and institutional PR staff communicate directly with the public via social media and science amplifier platforms, while corporate science stories are increasingly re-published in the mainstream media without much editorial input (Heyl, Joubert, and Guenther 2020).

This blurring of roles is further complicated by the fact that freelance science journalists could play several roles which may include writing about science for media outlets, but also for research organisations. As such, the freelancer may migrate towards the role of a science communicator rather than an independent journalist. This article seeks to explore how this boundary issue is experienced by South African science journalists and how they navigate relationships with scientists and institutional PR staff.

Literature Review and Theory

Our research project is situated against the theoretical background of boundary work—i.e., the blurring boundaries between science journalism and science communication (e.g., Angler 2017; Macnamara 2016; Brüggemann, Lörcher, and Walter 2020). The concept of a “boundary” between professions refers to the characteristics and norms that create a distinction between a specific profession and neighbouring (or closely related) types of work (Gieryn 1983). Journalists typically adhere to specific professional norms, codes and ethics and will, therefore, try to protect the boundaries of their profession from others who may

challenge their authority, freedom and independence and threaten to take over journalistic roles and functions (Nygaard 2020).

Science Journalism as a Specialist Form of Journalism

Science journalism as a form of specialised reporting dates back to the early twentieth century; it has expanded considerably since then, but the profession remains a small subset of general journalism (Dunwoody 2021). While journalists are often expected to cover science news as part of their general journalistic beat, specialist science journalists focus on science-related stories (Gregory and Miller 1998; Weigold 2001) within a specialised journalistic beat (Guenther 2019). Amidst increasing digitisation of communication channels, science journalists face competition from many others who communicate specialist science information to general audiences (Fahy and Nisbet 2011).

These specialist science journalists and science journalism do not enjoy the same status and are said to have a lower status in the newsroom, compared to other beats, such as politics, sport, and business (Claassen 2011, 352). Literature suggests that they are distinct from other journalists, such as political or sports journalists, in several ways, and that they are pro-science, with a personal interest in the subject (Schäfer 2011). Dunwoody (2020) points out that, traditionally, science journalists defaulted into the role of “translators” rather than “judges” of information, but adds that, more recently, science journalists have begun to prioritise evidence-based claims in their stories, while paying less attention to denialist views. Similarly, Blum (2021, 323) describes how science journalism matured from a “Gee Whiz” period early in the twentieth century dominated by celebratory science coverage to a new approach of “sharp-edged investigative reporting” from about the 1960s onwards. While science coverage broadly speaking follows journalistic norms, science journalists have established their own professional set of routines and standards (Dunwoody 2021; Guenther et al. 2019) and are more collaborative and homogeneous in their views about their work than other specialist journalist groupings (Weigold 2001). Evidence of this can be seen in the increasing organisation of the profession during the twentieth century, when science journalists’ associations and corresponding meetings sprung up leading to the founding of the EUSJA (European Union of Science Journalists’ Associations) in 1971 (EUSJA 2019) and the biennial World Conference of Science Journalists which began in 1992 (Cornell 1999; Dunwoody 2021). The World Federation of Science Journalists (WFSJ 2021) was founded in 2002 at the 3rd World Conference of Science Journalists.

Today, in the digital age, science journalists are expected to work in a variety of media and across platforms (Dunwoody 2021; Secko, Amend, and Friday 2013). In common with other areas of journalism, time pressure is reported to be an increasing problem—making verification or fact-checking and investigation of stories more difficult (Schünemann 2013).

Science Journalism in Decline?

The decline in “legacy media” and the corresponding increase in online coverage as witnessed in the late twentieth century, resulted in a drop in dedicated science sections in the mass media (Dunwoody 2021) and a corresponding decrease in the number of

science journalists (Schäfer 2011; Rosen, Guenther, and Froehlich 2016; Guenther et al. 2019). Research evidence suggests that science tends to be a low priority for most media outlets compared to other subjects such as politics (Weigold 2001; Schäfer 2011). However, there is disagreement in this area, with Badenschier and Wormer (2012) arguing that science coverage has had a higher media profile since the late 1990s. More recent reports suggest that science journalism is increasing in proportion to coverage of other subjects (Schäfer 2011; Kristiansen, Schäfer, and Lorencez 2016; Summ and Volpers 2016) and reports that the occupation of the science journalist continues to grow, albeit in a freelance rather than staffer capacity (Dunwoody 2021). The global COVID-19 pandemic in 2020 has led inevitably to an intense focus on science and health reporting and given it a higher profile across the media.

The Growth of Science PR

While there is little agreement as to the current amount of science coverage in the media, there is general agreement about a notable increase in science public relations (science PR) activity coming from research organisations (Göpfert 2007; Schäfer 2011; Schünemann 2013; Williams and Gajevic 2013; Guenther et al. 2019).

The growth in science PR is fuelled by a range of drivers. Increased competition between research institutions and increased demands to demonstrate public accountability and societal responsiveness are key, as well as the fact that external funding is becoming more dependent on external visibility (Schäfer 2011; Peters 2013; Välvirronen 2021). Jointly, these drivers fuel the so-called “medialisation” of science—a concept that refers to the increasing orientation of science and research organisations towards the mass media to the extent that the mediated public sphere plays a definitive role in the public and political legitimisation of science (e.g., Rödder 2011; Välvirronen 2021). Furthermore, there is synergy between science PR and political demands to democratise science, legitimise public funding and bolster public support for science (Dudo et al. 2014; Marcinkowski and Kohring 2014; Weingart and Guenther 2016). Jointly, all of these factors add to increasing expectations that scientists will make their work more visible and accessible to external audiences, with press releases and media interviews as one of the key tools to achieve public visibility.

Along the way, institutional science communication has gained considerable traction as a tool for visibility and reputation-building amongst research organisations, as well as a tool for legitimising public funding and satisfying demands from funders and policy-makers for societal impact of research (Marcinkowski and Kohring 2014; Weingart and Joubert 2019). As universities increasingly compete for the best staff, top students and generous donors, they are using the research achievements of their top researchers to gain public attention and political support (Carver 2014). As a result, public science communication has become largely institutionalised—i.e., an organisational, rather than an individual activity—and most researchers collaborate with institutional press offices when they communicate their findings to public audiences (Peters et al. 2008; Autzen and Weitkamp 2020).

The number of PR professionals within research organisations has grown significantly since the 1980s (Davis 2002; Göpfert 2007; Peters et al. 2008; Trench 2009; Borchelt and Nielsen 2014; Weingart and Guenther 2016). Today, most universities and science councils

have well-staffed media (or marketing) offices who employ sophisticated PR tools to maximise the public visibility of their institutions nationally and internationally, as well as comprehensive media and social media metrics to track their media impacts (Autzen 2018; Heyl, Joubert, and Guenther 2020).

Dunwoody (2020, 427) notes that journalists “routinely express contempt for the public relations process even as they rely on its practitioners for story ideas,” explaining that this negativity could result from unethical behaviour of PR people. However, as far back as 1995, eminent sociologist of science Dorothy Nelkin acknowledged that PR officers employed in scientific institutions: “do contribute in important ways to informing the public” and do have a function as: “a useful source of information for journalists” (Nelkin 1995, 141). Therefore, some would argue, PR staff play an important role in making research visible and accessible to the public via mass media (Dean 2009; Duke 2002; Weigold 2001) and that there is no reason for concern as long as they do their work ethically and responsibly and avoid hype and exaggeration in the way new findings are presented (Shipman 2015). After all, Autzen and Weitkamp (2020, 476) argue, research organisations “have no choice other than to relate and build relationships through communication.” Therefore, the type of PR practiced by research institutions must sustain the trust of many stakeholders (including journalists) in the long term and, therefore, must avoid hype and exaggeration when new research findings are announced.

Tensions Between Science Journalism and Science PR

Critics of science PR point out that institutional communicators must, in the first place, make their organisations look good and will, therefore, present news about science in a positive light (Weingart and Joubert 2019). Press releases, often used as a tool to disseminate science news, are not neutral; they are designed to serve the interests of the organisation (Autzen 2018). Many press officers working in institutions used to be journalists and know exactly how to present ready-to-use media content, often accompanied by multimedia materials, thereby increasing the chances that the material will be used as is. On the receiving end, journalists who are pressed for time and lack specialist reporting skills, are increasingly reliant on press releases (Rosen, Guenther, and Froehlich 2016; Weitkamp 2014) and may quote from press releases without attribution or even re-publish them as editorial copy with no or very few changes, a phenomenon referred to as “churnalism” (Heyl, Joubert, and Guenther 2020; Van Hout and Van Leuven 2016; Davies 2009).

Moreover, science amplifier platforms such as *The Conversation* that provide a daily flow of free-to-republish science stories (written by scientists and partly sponsored by universities) are gaining popularity in a changing media ecosystem (Osman and Cunningham 2020). Guenther and Joubert (2021) describe how and why *The Conversation* challenges the traditional roles of scientists and journalists in the production of science news. The platform is funded by private donors and research organisations, mostly universities. Content is written by scientists, and edited by experienced journalists, but the authors (i.e., scientists) have the final say, thereby eroding the traditional independence and gate-keeping role of the science journalist. The articles published on this platform are, therefore, rarely critical of science but are designed to be freely re-published as editorial copy in mainstream mass media, but are also available to the public, without any

requirement to pay or subscribe. As a blend between journalism and institutional communication, The Conversation is a typical example of a boundary-spanning organisation.

In addition, science journalists receive press releases from science news services, such as AlphaGalileo and EurekAlert!, on a daily basis. These activities, at least to some extent, bypass the traditional roles of journalists and, therefore, contribute to the erosion of science journalists' place in the science-society interface.

Evidently, there is a tension between the roles of institutional science communicators and independent science journalists (Davies et al. 2021), which can be expected when journalists feel that they have to defend the boundaries of their profession against perceived intrusions (Brüggemann, Lörcher, and Walter 2020). Institutional communication is "interested" and designed to serve a research organisation (Weingart and Joubert 2019), while science journalism should be independent, with a focus on interrogating science and serving the public good, as noted by Deborah Blum, publisher of *Undark* at the 2019 World Conference of Science Journalists in Lausanne. "Science journalism is not about promoting science, nor is it about making us feel good about science," Blum said at this meeting. "Instead, it is about illuminating science independently" (Joubert, 2019, 2). More recently, Blum wrote:

And there's still a place for journalistic stories about the wonders of science. But the past century has proved that this is not the most important contribution of science reporters. Rather, it is to portray research accurately in both its rights and its wrongs and stand unflinchingly for the integrity of the story. (Blum 2021, 323)

Therefore, the widespread concern about the influence wielded by an ever-growing science PR machine over a potentially shrinking pool of science journalists relates to its potential impact on the independence of science journalism and science journalists' ability to properly interrogate science policy and findings (Dunwoody 2021; Göpfert 2007; Vogler and Schäfer 2020; Williams and Gajevic 2013). Over time, scholars warn, a decline in independent science journalism combined with the growth of science PR means that media coverage about science will be biased, over-optimistic and distorted, serving the needs of institutions rather than publics, inevitably eroding public trust in science in the long term (Göpfert 2007; Russ-Mohl 1999; Weingart 1998; Weingart and Guenther 2016).

This issue is exacerbated in the global South where journalists rely heavily on foreign sources for science news and may lack the skills and capacity to counteract the influence of vested interests, meaning that developing country public are increasingly exposed to unchecked and unsubstantiated science news (Nguyen and Tran 2019).

Concerns Over Intensifying Media Orientation of Science

Sophisticated and intense science PR efforts within research organisations have a substantial effect on scientists; they become more willing to engage with the media and increasingly comply with institutional PR demands (Marcinkowski et al. 2014; Marcinkowski and Kohring 2014; Peters et al. 2008).

A key concern is that pressuring scientists to compete for public attention via publicity may erode traditional assessment criteria whereby the quality of science is judged, which could stimulate a harmful culture of ongoing self-promotion, image-building and

attention-seeking on the part of scientists. Under pressure to demonstrate the societal impact of their work, scientists may overstate or spin their research findings (Weingart 2017), thereby adding to creating unrealistic expectations on the part of the public.

This kind of science communication—focused on getting public attention—threatens the autonomy and credibility of scientific research. This is because the desire for media visibility may cause researchers to choose topics purely on the basis of their potential for media appeal and popularity—i.e., science becomes medialised (e.g., Weingart 1998; Rödder 2011; Peters 2012; Weingart 2017). This trend is further exacerbated when media criteria and media logic become relevant within science, for example when public fame is equated with scientific standing, and scientists are recognised for the public visibility, rather than for the quality of their scientific outputs. Consequently, medialisation may not only affect the way science is done, but also what science gets funded, and these medialisation effects may be enhanced as science becomes more competitive and dependent on public and political support (Marcinkowski and Kohring 2014; Weingart 1998).

In addition to attracting positive media coverage, PR is also about avoiding or limiting negative attention in the media. As such, it may restrict scientists from participating in societal dialogue or speaking openly about science-based controversies (Peters et al. 2008; Marcinkowski and Kohring 2014; Searle 2011). The reputation-building agenda, therefore, comes at the expense of critical public dialogue and engagement about the limitations and uncertainties in science (Claessens 2014; Entradas et al. 2020). This could result in tensions between scientists and PR offices, especially in the case of post-normal science communication where scientists are expected to participate in public debate about controversial topics and issues rooted in science (Brüggemann, Lörcher, and Walter 2020).

The Current Study

This research arose out of an earlier study which focused on science journalism in Europe. As part of the 2019–2021 EU Horizon2020 project QUEST (QUEST 2020), the authors conducted a series of interviews with European science journalists and communicators in 2019. The topic of how science PR intersects with journalism and the challenges which emerge around these boundaries arose in a number of the responses and this was documented in the relevant EU deliverable (QUEST 2020) and elsewhere (Davies et al. 2021; Maiden et al. 2020). Arising from this work, the authors were interested to explore the extent to which these issues relating to the impact of science PR on the work of science journalists appear in other places—especially outside Europe. We received further funding—this time from the UK Global Challenge Research Fund—in order to conduct a study amongst science journalists in South Africa. A series of 20 in-depth interviews was conducted with a range of science journalists working in South Africa during the first half of 2021. The interview questions covered a range of issues and included a particular focus upon the topic of the intersection between science public relations and science journalism.

The purpose of our study was to interrogate how South African science journalists navigate relationships with scientists as sources within research organisations. We furthermore wanted to find out how they view the roles and importance of institutional science communicators and how concerned they are about the impacts and effects of

institutional PR. Based on these insights, our aim was to generate recommendations that will support and strengthen science journalism overall.

It should be noted that the current study (interviews with South African science journalists early in 2021) took place in the context of the COVID-19 pandemic. It is reasonable to expect that the pandemic influenced science journalism in a number of ways, including a renewed awareness of the role of specialist reporters and the need for independent science journalism.

Research Questions

Our research was designed to answer a number of research questions related to science journalists working in South Africa or for South African media outlets.

It is apparent from earlier evidence that the relationships between science journalists and scientists may, at times, be characterised by frustration and lack of cooperation (Clayton and Joubert 2012; Claassen 2011), but could also become so close and collegial that it may impair the journalist's ability to be objective (Boyce 2007; Nelkin 1995). This in turn prompted our first research question:

- (1) What is the nature of the relationship between science journalists and scientists (as sources of information)?

Earlier studies report that the relationship between science journalists and institutional communicators may range from contempt to appreciation (Nelkin 1995). We, therefore, asked:

- (2) How important are institutional communicators (and what roles do they play) in helping science journalists?

A number of scholars have called attention to the growth of institutional science PR and how this erodes the role of independent science journalists and skews media coverage of science (Göpfert 2007; Macnamara 2016). As such, our third research question was:

- (3) How concerned are science journalists about institutional PR influences?

Research Design and Methodology

Our research followed a qualitative design, employing semi-structured interviews with 20 science, health and environmental journalists based in South Africa or working for South African media outlets. The interview questions were designed to gain a clear understanding of how science journalists interact with scientists, as well as their views of institutional PR officers and related PR influences on the profession of science journalism (Table A1).

Sampling of Journalists for Interviews

Interviewees were recruited based on the researchers' knowledge of the science journalism landscape in South Africa, combined with snowball sampling. We focused on

Table 1. Description of journalists interviewed in the current study.

Interviewee number	Description	Media organisation
SA01	Senior health journalist	Bhekisisa Centre for Health Journalism
SA02	Science writer and trainer	Freelance
SA03	Science journalist	Freelance
SA04	Environmental reporter	Freelance
SA05	Environmental reporter	Freelance
SA06	Journalist	Freelance
SA07	Science, health and education reporter	Business Day
SA08	Health editor	Media 24
SA09	Founding editor	Bhekisisa Centre for Health Journalism
SA10	Health journalist	Freelance
SA11	Health journalist	Freelance
SA12	Journalist specialised in food security, nutrition, and HIV/AIDS	Freelance
SA13	Intern health reporter	Bhekisisa Centre for Health Journalism
SA14	Health reporter	Media24
SA15	Science and higher education journalist	University World News
SA16	Science journalist	Independent Media
SA17	Science journalist	Freelance
SA18	Commercial radio presenter and columnist	Primedia Broadcasting
SA19	Science journalist	Freelance
SA20	Health journalist	Freelance

journalists who report on science, health and the environment as a specialisation or as a part of their overall journalistic beats. The journalists interviewed are listed in [Table 1](#).

Data Collection

Of the 38 South African journalists approached during the initial stages of this study, 23 agreed to be interviewed. Based on the size of the South African science journalism industry, the potential participants identified as science journalists as well as their availability, affordability, and the funding for and timing of this study, 20 participants were eventually interviewed between 12 April and 19 May 2021. Due to COVID-19 restrictions, the interviews were conducted using online conferencing tools (Zoom and Microsoft Teams). All interviews were recorded and fully transcribed, with permission from the interviewees. The interviews lasted on average 56 min, with the shortest interview 31 min and the longest interview 1 h and 40 min.

Amongst the 20 participants, 12 indicated they worked as freelancers while eight were employed as full-time journalists. Almost all the participants said they worked as print or online science journalists. Those permanently employed indicated they worked for African News Agency (Independent Media), Health24 (Media24), Primedia Broadcasting, Business Day (Arena Holdings), and Bhekisisa Centre for Health Journalism (non-profit organisation). The freelancers said they regularly contribute to publications such as City Press (Media24), The Mercury (Independent Media), Die Burger (Media24), Netwerk24 (Media24), Vrye Weekblad (Arena Holdings), and Rapport (Media24), The Conversation Africa, University World News (Higher Education Web Publishing Ltd.), Sunday Independent (Independent Media), Health-e News, Daily Maverick, Mail & Guardian (M&G Media Ltd.), New Frame and GroundUp.

In terms of gender, there were thirteen females and seven males.

Data Analysis

We analysed the rich dataset according to our research questions through repeated reading and coding of the transcripts. Two of the researchers working on this study collaborated on the coding process according to a coding framework (see Appendix), which was developed according to the research questions to guide the initial coding process (see Appendix). The coders worked together to ensure the framework guided the coding process, while valuing each analyst's "interpretation of the data" (O'Connor and Joffe 2020, 3). While intercoder reliability was not specifically applied, the coders worked together to agree on the most pertinent and robust results. Similar to the methods used by Saldaña (2016), codes were grouped together to form categories and redundant categories were discarded. These clusters of codes or categories were then grouped together to address the research questions we report upon below. Two rounds of coding took place following each interview, up until approximately one month after the final interview on 19 May 2021.

Results

In this section, we present the results of the interviews in an attempt to answer the three research questions identified for this research project. Quotes have been edited lightly for length and to improve readability.

(1) **How do journalists experience their relationship with scientists as sources of information?**

From the insights gathered during the interviews, it appears the relationship between science journalists and scientists as sources of information is complex. Participants reported both positive and negative aspects of their relationships with scientists.

We identified the following themes in our research:

- The importance of building professional relationships and trust between science journalists and scientists;
- Journalists see a need for increased accessibility and media-friendliness on the part of scientists;
- Journalists noted that scientists invariably have their own research agendas they might wish to promote and see the media as necessary to push their own message;
- Scientists prefer interviews and engagement with prestigious media.

Firstly, interviewees recognised the importance of building positive, professional, and trusting relationships with scientists as sources of information. Participants indicated that building relationships and databases of scientists takes years and is an ongoing and mutual process.

I would say that it's important for science journalists to get to know scientists better ... (Participant 13, health reporter)

Journalists mentioned that scientists should be (more) media-friendly in order to improve their relationship with science journalists. One way to improve media-friendliness is to be more available to journalists. According to this participant, scientists who are not available or do not respond to journalists present a barrier.

... you get those who will read the message ... and not respond, you will phone them and when you phone the voicemail will tell you that, "no, rather send me a text," but they don't respond to the text, so that's where I've had most of the challenge with getting from them ... (Participant 20, freelance health journalist)

Yet, interviewees recognised that some scientists have had negative experiences with the media, such as being misquoted and having their results misinterpreted.

... the big limits to people (scientists) communicating, are they've been super badly burned by the media before and they think we're all a bunch of chumps ... (Participant 6, freelance journalist)

Certain journalists indicated they allowed scientists to check facts in their news stories and have a database of scientists they could approach for verification:

... we (the newsroom) have a list of scientists that we trust and are experts in their field and sometimes we'll just send them something, just to make sure that we haven't misconstrued anything from a scientific perspective. (Participant 1, senior health journalist at a specialist health publication)

However, participants expressed the need to hold scientists to account and verify the information they provide, because they have their own agendas.

Scientists are on pedestals and so we just absorb what they say without being critical about it ... Just because a scientist says something, doesn't necessarily mean that it's true. You need to be as dubious of them as you would be of a political source. (Participant 19, freelance science journalist)

In addition, some interviewees experienced scientists as increasingly accessible and willing to engage with journalists.

... I think I'm actually quite heartened by the openness of many scientists, in general terms ... (Participant 4, freelance environmental reporter)

However, challenges remain. Journalists highlighted difficulties in dealing with scientists as sources and expressed the need for media-friendly scientists. If a scientist proves not to be media-friendly or does not communicate well, participants indicated they would avoid future contact with them.

... if someone recommended someone (a scientist) to me, and it didn't work well, this person could not communicate well, I tend not to phone them again ... (Participant 5, freelance environmental reporter)

The same is true if a scientist is unable or unwilling to break down their research into understandable and relatable terms.

... I feel their [scientists'] responsibility to help break it [science/research] down and make it a lot more understandable ... (Participant 15, freelance science and higher education journalist)

Participants indicated that certain scientists prefer to be interviewed by prestigious international media organisations and science journalists.

... sometimes when the news gets crazy busy and scientists suddenly have the attention of the international press, then we're very much second in line, right. I mean, who wouldn't rather speak to the New York Times and CNN than the local media, the local reporter? (Participant 7, science, health and education report at a daily business newspaper)

(2) **How important are institutional communicators (and what roles do they play) in helping science journalists?**

While most interviewees agreed on the need for institutional communicators to provide them with relevant information for science news, uncooperative communicators can hinder, rather than help, science journalists. In addition, journalists indicated that dealing with government communicators is often frustrating and time-consuming. The following themes emerged from our interviews:

- Institutional communicators play an important role in providing access to scientists and their research;
- According to journalists, institutional communicators' competence and media skills are paramount;
- Institutional communicators are sometimes constrained by organisational rules and procedures;
- Government bureaucracy and red tape are disablers of effective communication.

Most participants agreed that institutional communicators at universities and other research institutions play an important role in providing access to scientists and their research. Journalists acknowledged that they cannot keep track of all the research conducted by scientists in diverse fields across various institutions. Therefore, communicators supply relevant and newsworthy information about research coming out of their institutions.

... science communicators play a critical role in our world and without them, a lot of what is found in science would not see the light of day. (Participant 17, commercial radio presenter and columnist)

According to another participant, good communicators are important allies for science journalists.

I think that a good institutional communicator is an astonishing ally ... They want journalists to be picking up their work and putting it out there in the world ... (Participant 6, freelance science journalist)

However, it is important for communicators to be competent.

I think the competence level and the ability of a PR person is directly related to how well the media reports an issue ... (Participant 9, founding editor of a specialist health publication)

According to the same interviewee, it is desirable to employ communicators in-house, rather than contracting a PR agency, to ensure information is conveyed correctly.

... if a science organisation appoints a PR agency, it's generally less effective ... the PR people have no clue ... If they have a permanent, full-time communicator that deals with the media, it works far better. (Participant 9, founding editor of a specialist health publication)

Furthermore, institutional communicators are often bound by the organisations and institutions they work for.

... there are also press officers who are phenomenally organised ... But even they are sometimes quite bound by the institutional rules and procedures. (Participant 7, science, health and education report at a daily business newspaper)

Another participant pointed out that certain communicators are fearful of professors in ivory towers.

Some really, really help you and they give you the cell phone numbers, and the emails and others are just, you know, cower in front of professors, which is absolutely nonsense. (Participant 3, freelance science journalist)

On the other hand, certain journalists indicated that communicators for large bureaucratic organisations and the South African government are disablers of communication.

If you try to get a hold of the spokesperson of the Department of Health, it will take you a certain amount of time, and that could be days or weeks. So, sometimes they are disablers of communication ... (Participant 13, health reporter)

(3) **How concerned are science journalists about institutional PR influences?**

The participants interviewed expressed serious concerns about so-called churnalism and the dangers of this kind of "copy-and-paste journalism" in South Africa.

The following themes emerged:

- Journalists emphasised that content from press releases should always be investigated further;
- When press releases from institutions are used in their entirety (or with minimal editorial input), it should be clear that it was not written by a journalist (i.e., no journalistic byline should be added);
- Churnalism is a result of under-resourced newsrooms and presents a real threat to science journalism in South Africa.

According to interviewees, churnalism is a result of challenges in the broader journalism industry in South Africa and beyond. Challenges mentioned include a lack of resources in newsrooms, the need for journalists to produce content for online platforms in addition to their usual workload and an increase in institutional science public relations.

... it's a fact of life, you know, we have let our newsrooms be absolutely decimated and there are so few bodies kind of on the ground to do the boring, hard work of journalism. (Participant 6, freelance science journalist)

This has resulted in science press officers writing directly for the media and blurring the lines between science communication and science journalism. According to journalists, this is problematic because science communicators serve the interests of the organisations employing them.

... you will see pieces written by press officers published as news or as opinion without flagging that they are a press officer ... I always thought it was due to the under-resourced environment in South African newsrooms ... but over time it's just become the way it's done ... (Participant 19, freelance science journalist)

However, some participants indicated they do not rely heavily on press releases for story content. Participants said they use press releases to spark story ideas, but that copy and pasting the content verbatim is an injustice to journalism.

... I think press releases are just the tip of the iceberg, they are just like the arrow that you are supposed to use to show you which direction you need to go, but I think it's an injustice to journalism to just use a press release for science reporting. (Participant 14, health reporter)

Yet, journalists indicated it was important to research further, speak to sources and create unique content. This is because press releases often leave journalists with further questions and reflect only the interests of the institution or organisation involved.

... we actually want to speak to the scientist so that they could tell the story ... we don't always want to speak to the spokesperson or just copy and paste something or repeat it. (Participant 18, commercial radio presenter and columnist)

In addition, press releases are widely distributed to newsrooms and do not offer journalists exclusive content.

It's not like you're the only one that gets a press release so if everyone is publishing the same press release as is ... it's problematic ... (Participant 11, freelance health journalist)

Interviewees agreed that science journalists who reuse content from press releases, without further research, should not have their by-line added to the article.

... I don't put my name on stories like that at all because I didn't do the work. No journalist worth their anything, worth their coin, would be proud of plastering their name on something that is copy and paste ... (Participant 11, freelance health journalist)

In the following section, we discuss the results.

Discussion and Conclusion

Journalists' Relationships with Scientists

For South African science journalists, interacting with scientists is an essential, but challenging, part of their job. Some experience scientists as open and willing to engage, while others encounter scientists who are unwilling to be interviewed or expect journalists to comply with their demands. Younger journalists and those who are working for smaller media outlets may struggle more, since scientists prefer to be interviewed by well-known journalists that they know and trust, or journalists working for prestigious media outlets. Journalists realise that some scientists may prefer to avoid media interaction as a result of a negative prior media experience and may be willing to allow

scientists to check facts in their stories prior to publication. At the same time, science journalists are aware that scientists may have their own agendas in mind, making it necessary to verify information provided by scientists. Notably, journalists tend to avoid contacting scientists again after a negative experience or in cases where scientists were unable to explain or relate their findings sufficiently. This implies that scientists who have good media skills will be contacted more frequently over time.

As discussed by Nelkin (1995), our findings demonstrate that journalists have to maintain a tricky balancing act in their relationships with scientists. On the one hand, they need scientists to trust them in order to be granted interviews. On the other hand, if they develop relationships that are too friendly and close, scientists may feel betrayed when a journalist reports critically on their findings (Nelkin 1995) which could lead to a breakdown in the relationship and lack of access to a particular scientist in future. Therefore, it is evident that journalists want to maintain their independence and authority and want to protect the integrity (and boundaries) of their profession. A better understanding on the part of scientists regarding the journalistic norms and practices, including the duty of journalists to take a critical stance, may improve mutual understanding and collaboration between these professions.

Journalists' Relationships With Institutional Science Communicators

In common with reports from earlier research including our own study as part of the QUEST project (Dunwoody 2020; QUEST 2020), South African journalists interviewed for this study recognise the role of institutional communicators in giving them access to science news and expert sources but were also critical of some press officers. Communicators that lack experience and/or skills, or those that are unduly restricted by organisational rules, are viewed as a hindrance, rather than a help to journalists who engage with them. These findings echo views from earlier scholars in the field of science journalism that have highlighted the role of public information staff (or PIOs) as important linkages between journalists and scientists, and the value they add by alerting journalists to new advances and emerging stories (Dudo 2015; Autzen and Weitkamp 2020; Dunwoody 2020).

Journalists' Concerns Over PR Influences

South African science journalists are aware of and worried about the phenomenon of "copy-and-paste journalism" (or churnalism) and view this as a threat to their profession. A study by Heyl, Joubert, and Guenther (2020) confirmed that churnalism was widespread in South African media coverage of science-based press releases issued by research-intensive universities in South Africa.

Respondents in the current study ascribe the prevalence of churnalism to newsrooms that lack capacity, and time pressures experienced by the specialist science reporters that are left in the media industry. The challenges of under-resourced newsrooms and too few specialist science writers have long been highlighted in the literature, leading to the practice, especially in smaller media organisations, of turning PR materials into text that appears as if it was generated by the media outlet (Dunwoody 2020). Like participants in our earlier QUEST study (Davies et al. 2021; QUEST 2020) and echoing Blum (2021)

South African science journalists saw themselves as both explainers or translators of scientific research but also argued that science reporting should hold scientists and science to account. Clearly, science journalists are aware that the void in science journalism is increasingly filled by skilled and often well-resourced press officers who are able to provide ready-to-use media copy, but point out that this is problematic, since these materials are written to serve particular institutional (instead of public) interests.

Consequently, journalists in our study, like several of our participants in the earlier QUEST study, (QUEST 2020; Davies et al. 2021) emphasised that press releases should be used for no more than to spark story ideas and acknowledged that journalists have a responsibility to do further research and create their own, independent, content. Notably (Autzen 2014) points out that press releases from universities and journals are mostly based on single papers explaining recently published research. However, the science journalists potentially have a more important role to play, namely, to start taking a closer look at scientific institutions, as well as to ask critical questions about research priorities and funding. "They should start showing an interest, not in how the institutions write the individual science story or press release, but how they frame science in a much broader sense," Autzen (2014, 4) argues.

Science journalists increasingly work in a sphere flooded by other sources of science news and influenced by science PR. As a result, the traditional boundaries between journalists, scientists, and corporate communicators are increasingly uncertain and porous, a conclusion that is in line with findings about the blurring of boundaries between science journalism and institutional science communication (e.g., Angler 2017; Macnamara 2016). Our findings also echo earlier research, highlighted by Schäfer (2017), that science journalism, after maturing and evolving as a critical, autonomous, and specialised form of journalism, is once again moving towards celebratory and affirmative coverage of science, including forms of churnalism. Bauer et al. (2013, 27) refers to this trend as "Churnalism and McNews type science news production."

Already in 2009, a Nature editorial highlighted that science journalism was under threat and asked the question whether science journalists are cheerleaders or watchdogs for science (Nature editorial 2009). Our study confirms that, if science journalists want to maintain their independence and play a role in critical reflection on science, they will have to re-negotiate and affirm their roles.

We conclude that journalists are generally appreciative of the roles and functions of scientists and institutional communicators in the science news cycle but do perceive churnalism as a professional boundary threat.

Acknowledgements

Any opinion, finding and conclusion or recommendation expressed in this material is that of the author(s) and the NRF does not accept any liability in this regard. This study was approved by the Research Ethics Committee: Social Behavioural and Education Research (REC: SBE) at Stellenbosch University on 22 February 2021, with the Project Number: 21638.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Funding

This research was supported by the Global Challenges Research Fund provided by UKRI. We also wish to acknowledge support from the European Union's Horizon 2020 research and innovation programme [grant number 824634]. This research formed part of activities of the South African National Research Foundation, which is supported by the South African Department of Science and Innovation (DSI) and National Research Foundation (NRF) of South Africa [grant number 93097].

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Appendix. Coding framework

Research Questions

Our research was designed to answer the following research questions for science journalists working in South Africa or for South African media outlets:

- (1) What is the nature of the relationship between science journalists and scientists (as sources of information)?
- (2) How important are institutional communicators (and what roles do they play) in helping science journalists?
- (3) How concerned are science journalists about institutional PR influences?

Table A1. Coding framework.

Code	Corresponding research question	Additional notes
Sources	RQ1: What is the nature of the relationship between science journalists and scientists (as sources of information)?	How do sources shape science journalism? What is the relationship between journalists and their (scientist) sources—are they collaborative or are journalists interrogating scientists, or both? What levels of trust are there between scientists and journalists?
Gatekeepers	RQ2: How important are institutional communicators (and what roles do they play) in helping science journalists?	What role do gatekeepers play in facilitating access to information/interviewees/stories e.g., press officers, communications people etc. How do science journalists perceive this?
PR influence	RQ3: How concerned are science journalists about institutional PR influences?	What role does PR play in the reporting of science—useful? Is there enough PR/stories/leads or is there too much? Is PR used or ignored by journalists?