

# The Mechanics of new media (science) writing

## Articulation, Design, Hospitality, and Electracy

### Electracy Podcast Part 1 Transcript (Kate)

**Kate** [00:01]: I imagine for many of you, encountering the phrase New Media Science Writing may cause a moment of pause. For readers of *Kairos*, new media is readily familiar, but science writing may require a bit more clarification. Our impulse is to define science writing as synonymous with scientific writing, evoking images of prescriptively structured lab reports written in precise, impersonal prose intended for circulation amongst other scientists. Now imagine explaining what science writing is to undergraduate students with a range of academic backgrounds and career aspirations. They, too, equate science writing with scientific writing generally, recalling for many of them the drroll lectures and rigid lab reports from high school science classes. However, these instinctive interpretations of science writing lead us astray.

**Kate** [00:56]: In the first part of this podcast, I will explore this uncertainty surrounding science writing in an effort to tease out a rich definition of the profession, laying the groundwork for the epistemological concerns addressed in Part Two. Incorporated throughout my podcast are interviews I conducted with fellow students Emily Cavaliere, Chris Krull, Kelly McCarthy, and Debra Reilly. Recorded four months after the completion of our New Media Science Writing course, these interviews illustrate the uncertainty and tenuousness of our definitions of science writing, revealing the difficulty in describing this profession and its relationship with science. Throughout this analysis, I employ the metaphor of articulation discussed in the opening video segment of this multimedia project. Like my co-authors, I understand science writers' work as an articulation of scientific knowledge, a unique arrangement of the facts of scientific discovery that ultimately creates a distinct entity: science writing.

**Kate** [02:01]: Science writing refers to the genre of writing more commonly known as popular science writing: compositions typically written by a non-scientist to articulate the discoveries of a scientific paper in such a way as to make them more accessible and assimilable for a general audience. In this way, our instinctual understanding of science writing as connected to the work of scientists is somewhat correct. Science writers are *like* scientific writers in that they are both technical communicators writing about the field of science. Where they differ is in *how* the subject matter is articulated and to *whom* this information is being communicated. But it is perhaps only these characteristics of science writing that are easy to define and that exist with some fixity, for when we attempt to describe who science writers are, what they do, and what characterizes their writing, our definitions become less stable.

**Kate** [02:57]: As Timothy Ferris noted (2001), there is much confusion surrounding science writers, and they "are often misunderstood" (p. vii). For some they are equivalent to technical writers, translating the information contained in scientific papers for a general audience. For others, they are simply journalists with a science beat. For still others, science writers are merely the conduits through which the work of scientists is transmitted to the lay-public. To a degree, all of these definitions capture some element of what science writers do, but they lack the complexity and nuance of what is actually entailed in science writing compositions.

**Kate** [03:35]: To begin to tease out a rich definition of science writing, it is necessary to understand the history of science as a profession, for it is here that both scientific writing and science writing

find their genesis. Here, I lean on the history of science as told by neurologist Oliver Sacks (2003)<sup>1</sup>, as his excellent science writing is how I came to truly appreciate the interconnectedness of these professions.

**Kate** [04:01]: Modern science as an academic discipline was born in the early nineteenth century. This is when the study of space, Earth, and its contents became more than just natural philosophy or the work of savants but something professionalized, standardized, and taught in institutions. By 1830, the term *scientist* appears in the English language to describe the individuals who perform this work. Not long after, the profession of science writing begins to take shape, as the popular science magazine *Scientific American* is founded in 1840. It is at this time that a flurry of scientific innovation takes place. Most notably, the industrial revolution forced the general public to confront rapidly changing technology, but a similar "revolution [in the fields of] chemistry, natural history, and biology" was also taking place (Sacks, 2003, p. viii). Scientists were necessary to participate in this work, Sacks (2003) argued, and science writers were vital in disseminating this information "in terms that the layman could readily comprehend" (p. viii).

**Kate** [05:06]: But the end of the Industrial Revolution did not slow down the pace of scientific discovery. No, science has progressed at a rapid clip ever since, arguably achieving another groundbreaking period of innovation from the 1950s to the 1970s. After World War II, science became a more pressing household concern. Because of the atomic bomb, the general public began to discuss topics like nuclear fission and fusion, and the launch of Sputnik in 1957 generated both panic and curiosity about this final frontier. According to science writing scholars Emerson Clarke and Vernon Root (1972), the Space Race era saw the amount of scientific knowledge double, leading them to forecast that such knowledge would "multiply not two times, but three or four times" (p. 17) in the 1970s and beyond. This is a rather conservative estimate. As Oliver Sacks (2003) noted, the thirty year period from the 1970s to the new millennium "[has] seen so huge an explosion [of] scientific knowledge, the creation of so many new disciplines and sub-disciplines, that it is no longer possible for a single person to keep current on all fields of science, and it is difficult for any but the most specialized to read most scientific journals" (p. viii). It is no surprise, then, that it is during this period that we see science writing flourish into a robust profession. The National Association of Science Writers (2013) had only twelve members when it was founded in 1934. By 1950, it had grown to 113, up to 413 by 1960, and to 830 members in 1970, according to Dorothy Nelkin (1987). By the mid-1980s, it had 1,200 members, and today it has nearly doubled to 2,163 members, according to the The National Association of Science Writers' latest figures (2013). As the sciences continue to advance to increasingly complex topics, the need for science writers to communicate these findings in an exciting and accessible way to the everyday person persists. By articulating these scientific events in such a way, science writers facilitate the general public's comprehension of and engagement with scientific discoveries.

**Kate** [07:29]: Thus, science writing is at once deeply connected to the field of science and the work of scientists, but exists as something distinct and outside of these fields. Science writers are not performing the scientific experiments and making scientific discoveries, but they are articulating these events for an audience.

**Kate** [07:50]: However, this distinction can be a bit misleading, as it emphasizes the communicative role of science writers, assuming their minimal involvement in the science itself. True, science writers are often individuals with limited backgrounds or expertise in scientific fields. The prolific science writer Carl Zimmer, for example, has a degree in English, not one in the sciences. But just as

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<sup>1</sup> See Sacks, Oliver. *The Best American Science Writing 2003* (2003). p vii-viii.

often, science writers are actual scientists. Ranging from science graduate students and post docs to credentialed, practicing scientists, all manner of scientific experts can and do practice science writing. If we asked the brilliant yet curmudgeonly Richard Dawkins (2008), good science writing is *only* writing produced by "professional scientists, not excursions into science by professional writers" (p. xvii). In truth, some of the best science writers *have* been scientists themselves. When I asked Chris to name who he thought were some the best science writers, all the individuals he named were *scientists*.

**Kate** [08:53]: What is it about their science writing [David Quammen and Stephen Jay Gould] that makes it so good? Because the guys that you named are actually scientists... not journalists.

**Chris** [09:01]: Uh, I think, yeah, I think, uh, they're so good because they're kind of a rare-breed because they're so smart. In fact, I think I just heard on a podcast that if you can, um, the smartest people can explain anything to a third grader. So I think that's kind of their, that they're so smart that they can even break it down so that, um, even an idiot like me can understand it. So that's why.

**Kate** [09:23]: What drew Chris to his examples was these individuals' unique ability to share their expertise. This skill of being able to explain an immensely complex subject to the even most elementary audience is what made Nobel prizewinner Richard Feynman so renowned and is how Carl Sagan made Americans fall in love with space long after Neil Armstrong first walked on the moon. Though it can be advantageous, it is not required for a science writer to have a science background. What makes a science writer is one's ability to explain the complex topics of science in a comprehensible and engaging way for an audience.

**Kate** [10:01]: Perhaps the most salient feature of science writers, then, is their role as technical communicators of science. Clarke and Root (1972) described science writers as the "bridgers" between scientists and society, helping to navigate the gap between scientists' jargon-filled writing and the everyday language of the general public (p. 18). Truly, science writers are, at the very least, the intermediary between scientists and the layman. As Jack Bushnell (2003) observed, it is through science writing, not scientific writing, that "most of us get our science" (p. 260). In this way, science writers are seen as technical writers, since they perform what seems to be some kind of translational work. However, Clarke and Root (1972) saw science writers as different from technical writers due to a difference in audience. Technical writers, the authors note, are writing about science for a "*technically trained* audience," while science writers are communicating with a "*general* audience, usually the general public" (p. 18). Thus, Clarke and Root (1972) would presumably describe *scientists* as technical writers, not science writers. Yet, for these authors, the function of science writers is no different than that of technical communicators. For Clarke and Root (1972), science writers bridge the communication gap between scientists and society by translating and conveying scientific discoveries in an understandable way. They may not use the same genre as technical writers, but science writers are technical *communicators*.

**Kate** [11:35]: But this identification of science writers as translators between a technically trained audience of scientists and the general public is overly reductive. While their role as bridgers between science and society seems to involve merely a translational act, science writers do more than transmit. They fully participate in the practice of articulation. Science writers articulate scientific discoveries in a different way, joining together science and the general public in the production of scientific knowledge.

**Kate** [12:08]: As not quite scientists, not quite technical writers, science writers exist in a liminal space between the scientific world and the general public. Their subject matter exists in the realm

of science, but in order to articulate these findings for a wider, untrained audience, science writers often deviate from a scientific style of writing in favor of one that is a bit more literary. In order to present the typically complex and challenging content of a scientific discovery in an engaging way for a general audience, science writers utilize what Robert Gannon (1991) described as "pleasing styles, colorful anecdotes, sparkling quotes, clever descriptions, and other [literary] devices" (1991, p. v). In this way, science writing is a hybrid of the often-dichotomous fields of science and English. Indeed, as English professor Jack Bushnell (2003) noted, by using literary tools like "diction, voice and tone, metaphor and analogy, rhetorical strategies and tactics, and organization," a science writer draws on familiar and approachable narrative techniques, enabling them to articulate complex scientific topics in such a way that is exciting, factual, and accessible to an audience (2003, p. 253). Thus, a good science writer is able to "seamlessly intertwin[e] scientific exposition and narrative tension," as science writing blogger Emily (2010) described in "A Living Elements of Style," creating what Oliver Sacks (2003) called a "wonderful fusion, as factual as a news report, as imaginative as a novel" (p. ix). It is important to emphasize, however, that the use of literary tools like metaphor and voice are not corruptions of scientific knowledge. Because their work is an articulation of a scientific discovery, science writers, as authors, make deliberate choices about the arrangement, style, media, and delivery of their piece. They use appropriate rhetorical means to engage with their intended audience.

**Kate** [14:09]: However, to describe science writing as literary is not entirely correct, either. True, science writers like Carl Zimmer are undoubtedly helped by their undergraduate degrees in English, but science writers are not always of a literary persuasion. Science writers are indisputably writers, but pinning down exactly what kind of *writers* seems to be at the heart of the confusion surrounding science writing. Indeed, although I, a graduate English student, would naturally ally science writing with my own field, journalists can also justifiably claim science writers as their colleagues. The Council for the Advancement of Science Writing describes science journalists as one of the two basic categories of science writers ("Who Are Science Writers?", n.d.), and Jack Bushnell (2003) observed, "scholarly literature assumes that science writing belongs to journalism" (p. 253). This definition of science writers as journalists is so dominant, in fact, that it was the prevailing descriptor of science writers that emerged in my interviews with my fellow classmates.

**Kate** [15:14]: Although my classmates almost unanimously agreed that science writers are journalists, their interviews reveal a sense of uncertainty and tentativeness about their definitions. For example, Chris, a second year graduate student studying communication, readily stated that he thought science writers are essentially journalists.

So, we had talked about this in one of our previous interviews last semester, but do you think that science writers are essentially journalists?<sup>2</sup>

**Chris** [15:44]: I would say essentially, ah, ostensibly, ah, for all intents and purposes science writers are doing very similar work to journalists.

**Kate** [15:52]: And why do you think science writers are essentially like journalists?

**Chris** [15:57]: Um, I think they're doing just a very similar thing. They're reporting, um, about something that, uh... The idea of journalism is that everyone can't be everywhere at once and that's

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<sup>2</sup> A previous interview with Chris was conducted in December 2012. However, due to complications with the audio recording, Chris was re-interviewed in April 2013.

the journalists' role is to make everyone be everywhere at once. And that's basically what science writers are doing.

**Kate** [16:15]: Because they report on scientific findings and transmit that information to a general audience, Chris views science writers as journalists. Yet, it is important to note that Chris repeatedly describes science writers as "similar" to journalists, a modification of the original question's phrasing of "essentially." When asked the same question, Kelly, a senior communication sciences and disorders major, responded in a similar way to Chris, though her explanation was perhaps a bit more nuanced.

**Kelly** [16:47]: I definitely think, um, science writers are very similar to journalists because they are basically reporting on a piece of science or news or something, you know, research that's going on, um, and writing up a paper or some kind of work about it.

**Kate** [17:09]: Now, I'm interested because the way I phrased the question is that I said "essentially journalists," but you turned it around and you said that they are "similar to journalists." Is there something that makes you kind of hesitant to say that they're exactly like journalists because they do things maybe a little bit differently?

**Kelly** [17:25]: Um, I mean, no I guess... No I don't think so. I mean, I guess maybe they're just journalists that are solely focused on science writing?

**Kate** [17:35]: Like that's their beat?

**Kelly** [17:36]: Yeah.

**Kate** [17:38]: Although she dismissed my observation about her word choice of "similar to" rather than "essentially," Kelly adhered to the definition of science writers as journalists because of their science "beat." But for Emily, a senior English major, it was science writers' way of describing science in easily understandable terms that allied them with journalism.

**Emily** [18:00]: Yeah, I think, I mean, that kind of was my takeaway from the class because I didn't... when we were kind of in that brainstorming part of the class, like, thinking up stories and ideas, we weren't looking at the hard science. We were looking at... he [Professor Nathaniel Rivers] asked us to, like, bring in things that interest us and why so I think that's a lot of what journalists do. So, we were finding science to go along and tell a story, but we weren't necessarily bringing in these hard, you know, sets of data and trying to weave a story out of them. The story kind of came first.

**Kate** [18:31]: So how do you see those activities as being journalism?

**Emily** [18:34]: Well, I see those exercises and the work that we did as really journalistic because we had to think of things that were interesting and then we kind of think of a story we might like to tell, find evidence that kind of helped us tell the story, and then our kind of final, like, last month of class was weaving the story and, like, perfecting it and trying to leave our audience with something. So I think, um, the way we went about *that work was kind of, was very journalistic of us*.

**Kate** [19:08]: Because science writers choose to articulate scientific findings in a way that is more of a story and less about data, Emily predominantly views science writers as journalists. Yet, when I asked Debra, a junior majoring in English and studio art, whether she thought science writers were essentially journalists, her reaction was an adamant rejection.

**Debra** [19:31]: I don't feel, I don't feel they're journalists. Um, I guess I'm used to considering journalists as print and photograph journalists or even maybe almost documentary kind of people. But as far as new media science writers... the podcast I just described [National Public Radio (NPR)'s *This American Life*], that's more like radio broadcasting. I mean it literally is because it's on NPR. And the TED Talks, those are like presenters, you know? They can be journalists but they can be so much more than that. So I don't want to pigeonhole them to journalism.

**Kate** [20:14]: So, what do you find limiting journalists that you see as freer for science writers?

**Debra** [20:21]: Journalists I feel... it's more constrained with their media. I feel journalists... they publish on, like, certain sites or for certain things. Like if you're a journalist for, you know, the *New York Times* you don't all of a sudden, like, "Oh hey can I incorporate a video into this article?" Maybe if it's on the online version but that's still not going to be your primary way of publishing. It's not going to be through video and through podcasts. It's going to be through one way. And, um, I guess journalism, it's just, I feel like it's very fixed with print or with typing, even if it's, like, an online article. So I just... or like I said, like, very fixed, like, you're a photograph journalist or you're print journalist. There's not the freedom to move around, incorporate new media. And just the variety of media presentations that new media *science writing* I have seen seems to be outside of that scope.

**Kate** [21:34]: For Debra, the medium of journalism is too restrictive. Since she views journalism as limited to traditional media of print or photographs, Debra considers science writers, who often use new and mixed media, as something very different. New media equips today's science writers with greater tools to articulate scientific discoveries, since the ability to use audio, video, and text simultaneously provides a rich means of representing scientists' work. Although journalists often *do* use new media, Debra's perception of journalists as rooted in old media hits on an important evolution in science writing. Knowing how science writing has changed since its inception to the new millennium is essential for understanding how such disparate impressions of science writing's relationship to journalism came to be.

**Kate** [22:30]: When science writing first emerged as a profession in the early 20<sup>th</sup> century, it was, for all intents and purposes, journalism. Clarke and Root (1972) noted that during its nascent phase, most science writers were employed by newspapers, major news and trade magazines, and occasionally practiced as freelancers (pp. 24-33). Primarily, they reported this science news as a traditional print media source would: utilizing words and the occasional picture to report on a science related topic. But in the 1960s a new form of journalism emerged, creatively called new journalism. This is where the science writing we are familiar with begins to form, as journalists started to "fuse the techniques of fiction with the craft of nonfiction," as Robert Gannon (1991) described (p. 188). Using varying amounts of "imagery, topographic variation, hip language, and personal first person narrative," Gannon (1991) noted this "new journalism" helped breathe life into science writers' compositions and the scientific topics discussed (p. 188). It is this style that continues to define science writing. The invention of the Internet and new media techniques only further enhances the abilities of journalists and science writers alike, enriching representational possibilities through the use of multimedia formats.

**Kate** [23:47]: Thus, science writers and journalists share a history and are often synonymous professions. Yet, it is important to note my classmates' hesitation at describing the work of science writers as *essentially* journalism: they are similar, but they are not exactly the same. Arguably where the two diverge is not in their medium, but in the way they choose to articulate. A journalist writing a short press release will necessarily select a limited number of need-to-know facts from an

original scientific publication. Given the quick turnaround required for such an assignment, minimal literary flourish or multimedia content is likely used. In contrast, a freelance science writer may have more space and time to allow a rich story to unfold, enabling the use of audio and visual elements to explain challenging scientific topics.

**Kate** [24:38]: And perhaps it is in their interpretation of this word, story, that best captures how science writers articulate differently than journalists. Science writers are interested in *storytelling*, representing the adventure involved in a scientific discovery by using a more literary format. The story for journalists is more often an account of events, the steps involved to reach a new scientific finding. As a result, science writing "feels more interactive and interrogative rather than narrowly investigative," according to journalist Alexis Madrigal (2012). The science writer is alongside the reader throughout the story, rather than speaking as a privileged insider relaying information. Depending upon the situation, a science writer may be a journalist presenting a hard news release or an essayist writing a detailed, feature-length composition about a science topic. A science writer may work for a daily newspaper or a popular science magazine, or produce podcasts, videos, and blog posts as a freelancer. Due to the constraints and opportunities afforded by their medium and the context of their publication, science writers necessarily make different choices in articulating scientific events. Therefore, science writers *can* be journalists, but they are not *always* journalists.

**Kate** [26:16]: In the end, it is still difficult to define science writing with any certainty. It is not scientific writing. It is not technical writing. It is not journalism, but not literary fiction either. The difference, as Robert Gannon (1991) astutely described, "lies mostly in [science writing's] audience" (p. v). Writing not for other scientists or technicians, but for a broad audience of non-scientists, science writers necessarily adjust their prose to accommodate their lay readers. As they attempt to "make complex [scientific] theories and systems clear to a large diverse readership," Gannon (1991) said, science writers necessarily utilize all available rhetorical means to "win and hold the attention of readers who don't need the information [and] are easily bored" (p. v). For science writers, the creative nonfiction techniques of literature are essential for attracting the general reader, keeping them engaged, and explaining complex scientific topics. Through rhetorical decisions about arrangement, style, media, and delivery, they generate a new articulation of the knowledge contained in a scientific publication. It is this version of events that reaches the general public, this articulation that generates scientific knowledge.

**Kate** [27:38]: Hence, science writers play a significant, though often overlooked, role in the epistemology of science. It is this relationship that I explore in Part Two, analyzing how, through articulation, science writers contribute to the creation of scientific knowledge.

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