

## Rethinking science communication: reflections on what happens when science meets comic art

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### **Abstract**

In this essay, we explore what happens when science meets comic art and how such meeting offers an opportunity to rethink science communication. We base our discussion on our own experience, as research scholars, of engaging in a collaboration with a comic artist. Three key reflections are developed: how comic art may help to (1) conceptualize ideas in an early research phase, (2) clarify the main argument by making the (un)written word visible; and (3) communicate science with an open end. These aspects contribute to an increased understanding of science communication in both research and society.

### **Keywords**

Science and technology, art and literature; Science communication: theory and models; Visual communication

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### **Introduction**

There is an increasing quest and need for science communication — and for developing new forms for how science is communicated. Finding new ways for communicating science is crucial for the work to promote a democratic society that builds on scientific knowledge. In the light of knowledge resistance, the rise of ‘fake news’, misinformation and disinformation, and a growing populism this is even more important [Iyengar and Massey, 2019; Scheufele and Krause, 2019]. It requires interdisciplinary collaborations and new ways of understanding science communication [Fernández-Giménez, Jennings and Wilmer, 2018].

Digitization and new media channels have reshaped the conditions for science communication, with new platforms for communication being created and competing for the public interest [Bucchi, 2019]. Increasingly many actors are competing for attention and try to make knowledge claims. New media have increased the diversity of actors using, sharing and generating science content, including their communication practices and strategies. As a consequence, voices from the academic world are just some among many other experts, ideologists, thinkers and influencers in society. In this vast and crowded public arena, it has

become even more complex and challenging to communicate science [König and Jucks, 2019]. To ensure that citizens, policy-makers and others can — or will — engage with science is further constrained by the special vocabulary used in science. The fact that the main platforms for researchers — scientific conferences and articles — are primarily aimed at other researchers further contributes to these challenges [Topp, Thai and Hryciw, 2019]. The rather rigid format of international scientific journals influences not only the way we structure and set the tone for an article, but also the content of the research that is communicated [Friesen, Van Stan and Elleuche, 2018; Weatherall, 2018].

Science communication, and attempts to find new formats for how to communicate science and attract attention from society in competition with other actors, is therefore increasingly emphasized and acknowledged [Nisbet and Scheufele, 2009; Trench, 2017]. This has also pushed for new forms to engage in communicating science and improve the ‘science literacy’ in society [e.g. Bucchi and Saracino, 2016; Bucchi and Trench, 2016]. As a result, academia is seeing the establishment and rapid growth of communication departments. According to a study by Engwall and Wedlin [2019], the number of communicators within higher education has increased by 400 % over the last two decades. ‘Science communication’ is now both a separate practice and a research field that has attracted the attention of research [e.g. Hall Jamieson, Kahan and Scheufele, 2017; Trench and Bucchi, 2010; Wilkinson and Weitkamp, 2016].

However, despite the massive increase in the number of communicators and the many activities underway in the field, we argue that there is a need to further rethink science communication: what it means and how it can be done. We base our argumentation on our own experience from collaborating with a comic artist in an attempt to try new formats for communicating science. Our experience has made us reflect on science communication, both as a practice and as a field for scholarly inquiry, and that the answer to all challenges mentioned above is not only a matter of *more* science communication. In particular, we argue that there is a need to further develop an understanding of ways to communicate and engage in dialogue about research. This needs to be done without simplifying or limiting the complexity of its results and by including also knowledge about the research process. We believe that one method is to explore what it means to cast our own analytical work through the lens of comic art and examine what happens when working not only with the written language, but also the unwritten — visual — language [Allen, 2018]. Our interest in the visual language should not be understood as an interest only in images, but rather in what happens when words meet images. What happens when we go beyond using images merely to “illustrate” written research material? In this paper, we explore and discuss how this might be done and what we can learn about science communication from such meetings.

Art is becoming a favored medium for conveying science to the public [Lesen, Rogan and Blum, 2016], and de Hosson et al. [2018, p. 1] note that the number of projects in science communication that lean towards and promote both narrative media and visualizations “through the prism of art” is increasing. There are several reasons why we — being research scholars not science communicators — are curious to learn how that meeting can help us think of and communicate science differently. One reason is that art-based research has been developed and presented

as a method for creating, presenting and interpreting science [McNiff, 2007]. The art-based methods imply that a dialogue between art and science is present throughout a research process, and could therefore be used as a method for understanding and communicating science as a process. It offers new perspectives, and, as stressed by Dowell and Weitkamp [2012], also new perspectives to the researcher's own practice. It opens up for a two-way communication approach not only between the researcher and the artist, but also between the researcher and society. Finding new ways to communicate research during the actual research process is not only important to engage the public, but also for the researcher to make visible what cannot be captured in explicit words [Jonsson, 2020]. By letting art and science meet it has been suggested that it is possible to reach beyond the cognitive learning as also emotions are affected, which will likely have a positive impact on the willingness to act on and engage in the science that is communicated [Davies, 2019; Friedman, 2013; Jee and Anggoro, 2012]. Contrary to previous understanding of science communication as a one-way approach, often referred to as the deficit model [Rodríguez Estrada and Davis, 2015], the meeting between science and art opens up opportunities to engage in a two-way approach.

The motivation and key argument for this paper, based on our own experience, is that comics can also serve as an interesting means of — or method for — re-examining science communication. By building on more recent models of science communication that stress a dialogue between the public and science, comics can offer opportunities to develop an understanding of the actual process of doing research work [Kuttner, Weaver-Hightower and Sousanis, 2020]. We explore and discuss our own experience of engaging in such a process, namely the meeting between ourselves as academic researchers and the comic artist in a research project, and more specifically the work with an edited volume with a special focus on research-practice collaboration [Brechensbauer et al., 2019]. Or, put more simply, we explore the contention that “the ‘science of science communication’ is by *doing it*” [Kahan, 2015, p. 1].

The essay is structured as follows: we introduce literature on science communication and recent developments, focusing specifically on what happens when science and art meet, with special focus on comic art. Following that, we share and discuss our experience of working — as academic researchers — with a comic artist. We argue that science communication should be understood as part of the research process, and that research comics can be seen as a tool not only for opening up the research process but also for making it visible, thereby contributing to science literacy and new ideas for understanding science communication as a practice.

## Communicating science through art — when science meets comic art

Several proponents of science communication have argued for a need to develop new forms to create a more interactive and conscious communication, and that visuals and images of science have an important role [e.g. Trumbo, 1999; Pauwels, 2005]. Trying to find new ways to communicate research is, however, important not only to reach and engage in dialogues outside the academic world, but also for the researcher. Yet, it is an aspect rarely discussed in literature on science communication [but see e.g. Dowell and Weitkamp, 2012]. Trumbo [1999], who advocates the importance of visual knowledge in science communication, believes that making scientific concepts visible is especially valuable when science is in a

conceptual phase or in the early stages of a research project, because the process itself generates new ideas and thoughts. This way of reasoning about the visual is also found among design methodologists, and it has recently been proposed that taking inspiration from the discipline of design is one way to further improve the conditions for science communication [Rodríguez Estrada and Davis, 2015]. In a later article, Trumbo [2000] develops her thoughts on “seeing science” and how it enables not only the scientists and science communicators but also the public to interact by opening up opportunities to both consume and produce images about science. It opens up for a two-way approach for science communication.

One promising — and emerging — method for “seeing” and translating science involves the engagement in art-based methods and being inspired by what happens in the meeting of art and science. As noted by O’Sullivan and Kozinets [p. 571 2019], few are aware of the “pedagogical function” that Becker [2000] argues for when discussing the potential of art, declaring that “art generates new insights by inducing reflection about the world”. Or to use the words of Dowell and Weitkamp [2012, p. 900] in their study of a collaboration between science and theatre, apart from the fact that “a wider range of people” can be reached, it “may challenge scientists to think outside the box” as science is embedded in a “cultural milieu” that widens access to ideas. Further, O’Sullivan and Kozinets [2019, p. 572] note that the value of the art-based methods “lies in their ability to render ‘visible’ implicit meanings by encouraging audiences to seek extra-ordinary viewpoints”. In the meeting between art and science this implies new ways of describing and understanding both the research process and its results.

A meeting that captures the potential of visuals and images is comic art. The comic format further offers an interesting tool as it can, among many things, “not only break down the information into more digestible units but can also reassemble them into meaningful compositions” [Farinella, 2018, p. 5]. Furthermore, when the artist’s skill [McCloud, 1993] is shared with the research, the researcher is confronted with other questions and perspectives, and knowledge that might otherwise be taken for granted is made visible [Nair et al., 2018; Tatalovic, 2009; Taylor and Greve, 2006]. Comic art, which often combines words and images, may also offer the scientist the pedagogical function that Becker [2000] describes. Several scholars, such as McCloud [1993] and Sousanis [2015], have argued that comics are powerful as they offer more than the sum of words and pictures.

Comic art is thus a promising form for engaging in the meeting between science and art, a meeting that has also recently attracted academic interest [e.g. Collver and Weitkamp, 2018]. As noted by Farinella [2018, p. 2], comics have, during the past decades, emerged as an “increasingly popular form of science education and communication”, able to reach an audience of different age groups and cultural backgrounds and with the potential to “make scientific subjects more accessible and engaging”. While comics are often perceived as an “easy and playful format”, they are at the same time suitable for presenting and organizing complex information in innovative ways through the use of symbols and metaphors. As such, comics may also offer opportunities for telling stories *about* science (both as a process and as a result) and are as such not only an effective method of communication, but also one that remains largely unexplored [Farinella, 2018]. Comics have previously been used in science as a means for communicating research results and for education and as a way to promote engagement through a “one-way” approach [Tatalovic,

2009; Wiseman et al., 2021, p. 12]. However, there is an increasing interest in using comics in the intersection of science and also communicating these attempts [see e.g. [www.erccomics.com](http://www.erccomics.com), [www.jayhosler.com](http://www.jayhosler.com) and [www.cartoonscience.org](http://www.cartoonscience.org) for examples of how to use comics as a tool of science communication, the latter including references related to the topic]. As stressed by Collver and Weitkamp [2018, p. 2] this is sometimes referred to as 'sci-art', where science is blended with the visual art and narrative attributes of the comics medium". It is this 'blend' that we are particularly interested in, and how it may open up access to new ideas.

In conclusion, we agree with Nair et al. [2018] when they argue that various creative mediums, such as film, poetry and comics do not only contribute to translating science — with regard to both the research process and the results — and an increased interest in engaging a broader audience in dialogue. To date, attempts to use the comic format in science have been conducted in areas such as medicine [Green and Myers, 2010], neuroscience [Farinella and Mbakile-Mahlanza, 2020], nanotechnology [Lin, Hong and Chen, 2013], archaeology [Kiddey et al., 2016] and business administration [Nair et al., 2018]. What these initiatives have in common is that they have all been attempts to communicate in the *final* phase of the research process: when the results already exist. However, more recently, as noted by Kuttner, Weaver-Hightower and Sousanis [2020, p. 5], researchers have also started using comics not simply to disseminate findings to various audiences but also to collect, elicit and analyze data [see also Collver and Weitkamp, 2018]. Our ambition with this essay is to discuss — based on our own experience — the comic format and the pedagogy that characterizes comic art, and how that can inspire and contribute not only to the communication of research results but also to the research process.

### Science communication through comics — three reflections

An important starting point in our effort to let science and comic art meet was that the meeting should permeate the entire process [Jonsson, 2020]. Often, a science communicator is involved either in the initial or the final phase of a research project to disseminate information about the project or its results. But by collaborating with comic artist Axel Brechensbauer and inviting him to be involved during the entire process, we were able to gain new insights not only about our texts [content] but also our own analytical process. We worked together as a group and were keen to communicate also our own process by attending various seminars and sharing our work-in-progress on social media (see <https://researchcomic.org>). Engaging in this iterative, inclusive, process made us reflect on science communication and how to think of it from our different perspectives. The setting for our joint communication work was a book project — an edited volume of essays about research-practice collaboration [Brechensbauer et al., 2019]. We chose to work with Axel Brechensbauer (who was trained at "Serieskolan" in Malmö, Sweden) on the strength of his recent comic book 'Things We Create' [in Swedish "*Saker vi skapar*", Brechensbauer, 2019], in which he, among other things, illustrates the book's message using the work of other researchers. He also works as a concept designer with other researchers, and thus has a specific interest in understanding and translating research into practice. Thus, we believe that his background and interest were beneficial to our project.

Our method is in line with what Tatalovic [2009, p. 13], with reference to Eisner [1996], has pointed out, namely “that artists and writers have to work well together in order to successfully convey a story through the medium of comics”. However, contrary to Eisner’s suggestion that the ideal process is when the “writer and artist are the same person”, in our case it was important to acknowledge not only our different roles and competences but also how we could learn from each other by engaging in reflexivity. In our role as research scholars we were both editors and authors of individual chapters. Similarly, the comic artist’s role was both as editor and co-author of two essays in the volume (the introduction and the concluding chapter), apart from his obvious role as comic artist. Although we were keen to maintain our distinct roles as researchers and as comic artist we were at the same time determined to invest time in developing an understanding of each other’s perspectives and interpretations. Instead of simply adding the comic art to each chapter once the entire edited volume had been written, we met throughout the writing process. The artist made draft drawings based on draft chapters, and we engaged in joint discussions about what we could “see” in the texts and in the art, as well as comparing what we did not see. The comic format used for our project was a “single panel comic”, rather than a comic strip (sequence), and mostly “silent” [e.g. Cohn, 2005; Meskin, 2007]. The reason for this was that the comic artist did not want to illustrate or merely summarize “the storyline” of the essay, but rather to visualize “the core message”. The decision to adopt the silent single format was valuable when discussing the comics, as the art both confirmed our ideas about the individual chapters and challenged — or sometimes even complicated — them.

Our working process with the comic artist resembles what Cunliffe [2003, p. 987] describes as the role of reflexive researchers, where “meaning is created through a constant interplay of presence/absence and what is not said is as important as what is said because each supplements the other”. From our experience and working process we have identified three aspects that we believe can serve as useful insights for how the meeting between science and comic art can be seen as a method for how — and why — we can rethink science communication.

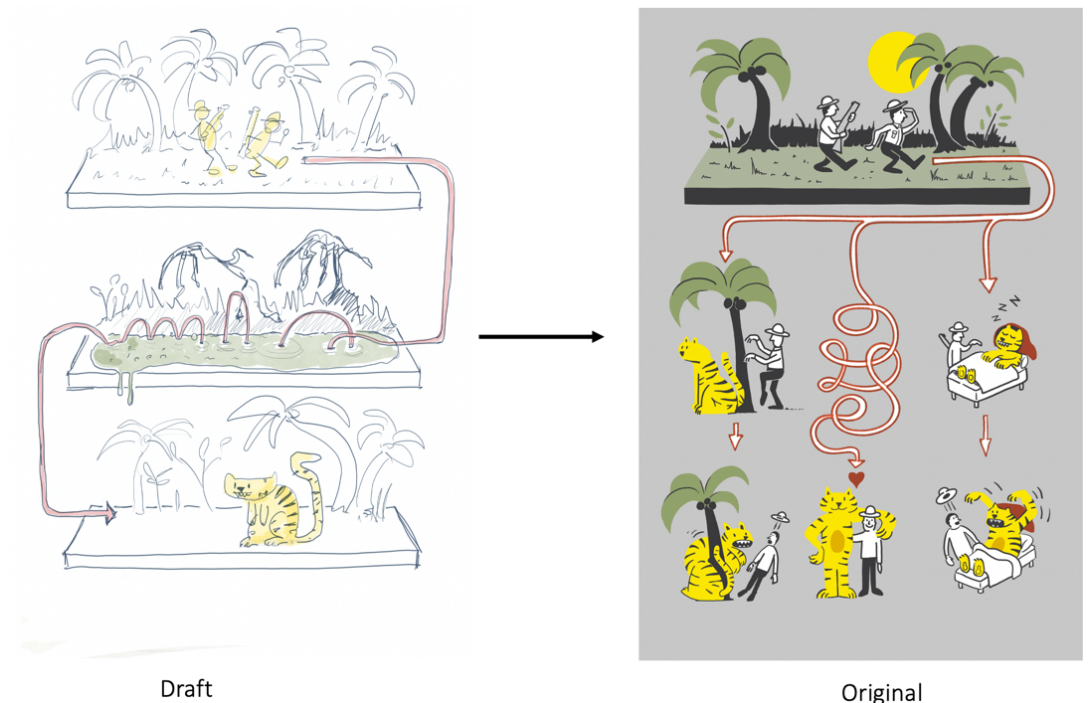
### *Conceptualizing ideas in an early phase*

In line with the arguments about the benefits of comic art, our collaboration clearly contributed to conceptualizing our ideas both in relation to the overall purpose of the edited volume and in the work with individual essays. Working with the written essays and the comic art at the same time contributed to a continuous conversation about our aim with the edited volume, which reinforced the ideas we had developed in the introduction and concluding chapter. Creating space for dialogue between the artist and ourselves, the researchers, throughout the process, meant that the meeting between art and science helped us conceptualize and develop our ideas — as well as new conditions and ideas for science communication. As a result, in our case, the comic art became part of the analysis work.

To illustrate how the work with the comic artist helped us conceptualize our ideas in an early phase, we can draw on lessons learned from working with one of our essay texts [Jonsson, 2019]. The essay contained a number of arguments, and the

central idea was not clear either to the author herself or to the others. The many arguments could be described metaphorically as a “swamp” of ideas. Interestingly, this was also the key point that she wanted to express. The artist’s first draft drawing spurred a discussion during which it became clear that while the idea of the swamp was indeed the key argument, this was not explicitly expressed in the text. From the discussions it became clear that we had read the text differently, and that “the swamp of ideas” made it especially challenging for the reader(s) — and the author — to conceptualize the main idea. The comic draft helped us identify and reflect on this.

One further interesting aspect and lesson learned from working with a comic artist is therefore how we can think of — and see — metaphors (in this case the “swamp”) in a different way. Metaphors are commonly used in research, especially in organization theory [Morgan, 2006], as a way of explaining complex matters and opening up for reflections. However, when a metaphor is used incorrectly or is unclear, it may have a counterproductive effect. Here it is therefore interesting to note Farniella’s [2018, p. 8] observation that “comics, which have been described as an intrinsically metaphoric medium [can be seen as a useful method] because everything is filtered through the eyes of the artist, comics and animations constantly require the reader to actively interpret their content”. This further corresponds with the argument put forward by design methodologists that the ability to make something visible is especially valuable when the researcher is in a conceptual phase of his/her research process — perhaps in need of alternative perspectives, following Becker’s argument about the pedagogical idea — and that the process itself generates new ideas and thoughts (see Figure 1).

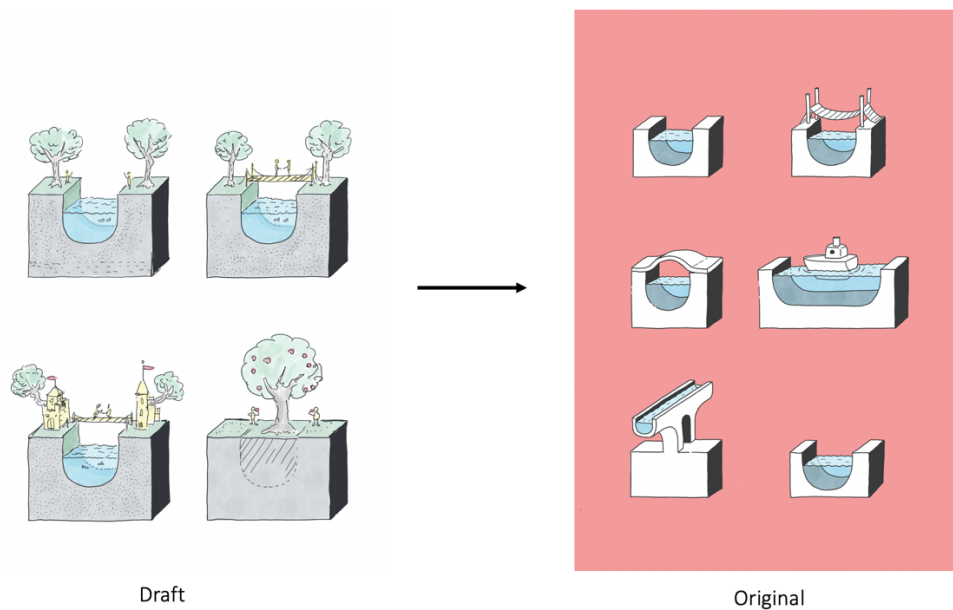


**Figure 1.** The comic art “No easy ways” introducing the essay titled ‘The collaboration chase: Maybe we’re just wise together’ (in Swedish: “*Samverkansjakten: Kanske är vi bara kloka tillsammans*”) in Brechensbauer et al. [2019, p. 39].

*Clarifying the main argument — making the (un)written word visible*

The second aspect and lesson learned is how we can clarify and develop an argument with the help of comic art. We can also understand the meeting of science and comic art as a form of review process, albeit through the use of visuals rather than textual comments (for an example of how comics were used to teach students about peer review and scientific work, see Lo Iacono and de Paula [2011]). As the visual format can open up further interpretations and make the story more complex, this is a review process that might not take the direction expected. This is shown in the above example from our own process, when one of the authors had to refine the presentation of her argument after she had seen the first comic art draft based on her text [Grafström, 2019].

It was clear from the first draft of the art for that specific chapter that the comic artist had not fully understood the key argument that the author was trying to make. However, when we discussed the comic draft, we found that we had all made different interpretations of the text. At this point there were four different readings of the text, which told the author that the analysis was quite simply not complete. The process can be understood in terms of an ordinary (non-anonymous) peer review. With the help of comic art, it was possible to capture and discuss what had *not* been written. This is in line with Kuttner, Weaver-Hightower and Sousanis [2020, p. 5] who write about the potential of analyzing through comics as it can “draw the researcher’s attention to aspects of a phenomenon that are more visual and more difficult to capture in words [and] can inspire unexpected insights”. Thus, an interesting lesson learnt is that the iterative way of writing and drawing can help to both develop and translate the scientific language. In our case, this helped both the writer and the artist to shift the focus from discussing bridges (a common metaphor used in the chapter to address the research-society gap) to a focus on the gap (see Figure 2).



**Figure 2.** The comic art “The bridge” introducing the essay titled ‘To protect boundaries through building bridges’ (in Swedish: “Att värna gränser genom att bygga broar”) in Brechensbauer et al. [2019, p. 63].

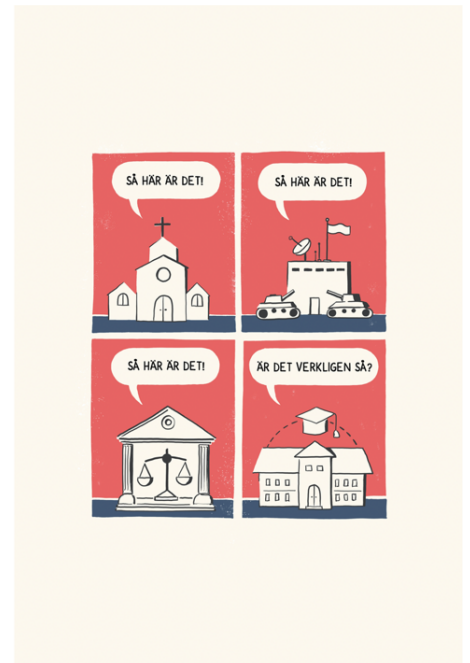


In addition to conceptualizing early ideas and making the (un)written word visible, comics may also enable us to develop ways to present our results in, to use the words of Helin [2015], an “unfinalizable” way. Based on her own experience, Helin discusses how, as academic scholars, we need to find ways to present conclusions in ways that do not “close them” but can inspire both the researcher and the reader to open up for further reflections and debate. In this respect, comics offer an interesting and inclusive opportunity for the readers — citizens, students, decision-makers and others — to make their own interpretations in a playful way [cf. van der Meij, Broerse and Kupper, 2017]. This is especially evident for the chosen comic format — the single panel comic. It may also support an iterative and interactive process of meaning making, as it creates a link between words and experiences [Cunliffe, 2002; Grafström and Jonsson, 2018]. Further, it corresponds with Brandi and Elkjaer’s [2016] call for ‘experimental playfulness’ in management education in order to understand that living and working in organizations means different things to different people. Playfulness is also addressed by Farinella [2018, p. 6] when arguing for the potential of using comics: “[...] while comics are often perceived as an easy and playful format, they may be exquisitely suited at presenting complex information in a rigorous yet accessible way”. In our case, this was one of the reasons we chose the comic format and introduced each essay in the edited volume with a single panel comic. Our hope was to encourage the reader, in a playful way, to go back and forth when observing the comic image and reading the essay. In this way, we should see the text — as we should see the comic — as something more than a “final product”. Helin [2015, p. 184], frames it as that the text should be interpreted as a way that offers “potentialities”, and that future readings of the text will determine how it will develop and what types of discussions may be sparked — and what new conclusions may be drawn.

The argument about interpretations and offering several “potentials” was actually discussed in one of the essays, which focused on Merton’s [1938] norms for understanding science as opposed to, for example, the logic of politics [Hallonsten, 2019]. What is interesting is that the corresponding comic art itself — which was also used for an opinion article that we wrote explaining our interest in science communication — has inspired many discussions and interpretations. The comic illustrates three key societal institutions that are expected to tell us “*This is how it is*” in contrast to academia that should be understood as an institution problematizing — “*Is this really how it is?*” — and not an institution that should simply communicate “black and white” answers (see Figure 3). From the feedback that we have received, this is the comic art that has attracted most attention. And perhaps we can interpret the comic art as a particularly good example of what O’Sullivan and Kozinets [2019, pp. 3–4] argue is the value of art-based approaches, namely that it “lies in their ability to render “visible” implicit meanings by encouraging audiences to seek extra-ordinary viewpoints”. This is also in line with how Farinella [2018, p. 6] discusses the potential of comics, which is that they can be read linearly (especially when it comes to sequential comics) but also that they “lend themselves to non-linear explanations, encouraging the reader to constantly reassess earlier panels in the light of new information”. Similarly, science can require “readers to make connections between multiple scales and domains of knowledge, not necessarily arranged in a hierarchical, linear order” [Farinella, 2018].



Draft



Original

**Figure 3.** The comic art “How it is” introducing the essay titled ‘The functional species’ (in Swedish: “*Den funktionella särarten*”) in Brechensbauer et al. [2019, p. 103]. In three of the quadrants the text translates to the statement “This is how it is”, while the fourth quadrant (illustrating academia) translates the question “Is this really how it is?”.

## Concluding reflection

In spite of the many activities and fruitful discussions in the field of science communication, there is a need to further reflect on its meaning in science work. In letting science meet art and reflecting on the experience of “seeing science”, something that can be described as a reflexive process, our ambition has been to learn more about how comic art in the meeting with science can provide opportunities for developing and communicating science. Trying to find new ways to communicate science during a research process is important not only for reaching the public, but also for the researcher, by making visible what does not fit or cannot be captured in explicit words. It opens up for and strengthens a two-way communication approach.

Our experience has taught us that the comic artist’s ability to make things visible was not only important when it came to conveying the essays and working with the edited volume, but also helped us see other perspectives and reflect on science communication. This process could be described in terms of knowledge exchange, where we could see new things *through* each other’s perspectives. In the literature on the meeting of art and science, this is described as a thought process that reaches beyond the given — written — information [McNiff, 2007]. Or, in the words of Dewey [2005], as quoted in O’Sullivan and Kozinets [2019, p. 3]; “[...] art-based approaches elicit and accentuate understandings of human experience by stimulating connections with the ‘universe beyond one’s self’”. In relation to how comic art is described by McCloud [1993], it can further be seen as a method of conveying “tacit knowledge” with the help of the artist’s skills. It is only by reflecting on what happens in the meeting between art and science — what is made visible through comic art — that our thinking and ways of seeing and analysing are

affected. This corresponds to our argument, also discussed elsewhere [Grafström and Jonsson, 2018], that by engaging in genre-blurring projects — such as involving a comic artist in a book project about research on collaboration — we can avoid “professional blinders”. Our experience of the meeting between science and comic art has enabled new ways of describing, understanding and making visible both the research process and its results. It has also made us reflect on how we communicate science and *why* there is a need to further rethink science communication. We strongly believe that new lenses are created and new patterns unfold at the intersections of science and other art forms and that such meetings may contribute to increased understandings of not only the actual research work but also science communication. When the artist’s skill [cf. McCloud, 1993] is shared with the researcher, the researcher is confronted with other questions and perspectives, helping the researcher to “see” tacit knowledge that they may otherwise take for granted [Nair et al., 2018; Tatalovic, 2009; Taylor and Greve, 2006].

Despite recent developments, science communication is still often understood as a practice for communicating science to society and something that is added as a final piece after the research has been completed. The research process and work are to a large extent understood as something that is separate from science communication. However, based on our experience, we believe that in order to not only reach out, and compete for public attention, but also to better engage with society, we need to rethink the view and understanding of science communication [cf. Horst and Michael, 2011]. This is not least important for the science community, as it offers opportunities to “see” science from a different perspective. Such an understanding is also sensitive to the fact that communication itself is a performative act, meaning that it will to some extent translate the actual results of science. Science communication should therefore not be seen as something that comes as an isolated piece of the puzzle at the end, but be understood as an integral part of the research work. We need to investigate further what models and perspectives exist for communicating science and allow communication to be included in the research processes.

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