Scientific persona performance through online biographies and their relationship to historical models

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Abstract:

In this chapter, Barbour et al. explore the relationship between historical models of scientific personas and the ways in which present-day scientists represent themselves through their online biographies. The core argument is that identifiable features of the personas produced by historical scientists continue to be reproduced, at least in part, by scientists working in the present day. These personas, which were based on the socio-cultural expectations of their times, particularly in the period in which 'science' became formalized and recognized, have become part of the discourse about what it means to be a scientist on an international scale. Hence, some key themes are shared between historical scientific personas and contemporary personas constructed through online biographies by scientists who seek to communicate to, and engage, with the broader public.

Introduction

Science communication involves the communication of scientific concepts, ideas, and knowledge to non-scientists, and often takes the form of popular science publications and events, or science education efforts. Science communication also serves additional purposes such as marking off experts from non-experts, science from other forms of enquiry, and scientists from other types of professionals or people[1]. Early ideas related to good science communication focused on increasing literacy, interest in, and support for science, particularly amongst groups who may be less likely to be exposed to science education. More recently, there has been greater focus on science engagement and public understanding of science, in part out of recognition that the older 'deficit' model that underlay much of the work in science communication is insufficient: The assumption that the general public is somehow 'deficient' in knowledge or understanding, and that imparting more scientific information will result in more support for, and interest, in science, has been shown to be inaccurate[2, 3, 4]. Hence more complex models that do not rely on a simple transmission of ideas or concepts have become increasingly favoured, including participatory methods (e.g., see Hilgartner[5,] and Gregory & Miller [6]). Although science and technology studies scholars have extensively documented the theories and approaches associated with more sophisticated forms of engagement in contrast to unidirectional communication, many public-facing efforts tend to continue to rely on unidirectional transmission of information and education in the name of public engagement in science.

Against this backdrop, and building on research into the ways in which humanities and social science academics produce online persona[7, 8], we analyse different ways in which contemporary scientists[i] present themselves in online spaces in order to develop a deeper understanding of online scientific personas.[ii] One way in which science communicators increasingly get their messages across to the general public is via social media, including public-facing profiles and websites. Although there are increasing numbers of professionals trained specifically in science communication, there also is a strong presence in Australia of practising and non-practising scientists who are recognised as science communicators and promoters, and who are rewarded with major prizes for their public-facing activities. In this chapter, they are our primary focus.

There are at least two broader goals underlying this chapter: First, we seek to provide a "history of the present" perspective on how scientists in their online presentations incorporate and reproduce persona in order to present themselves and their work to the public. We document considerable continuities between key features of personas produced by contemporary and historical scientists and contend that such features have become part of the discourse about what it means to be a scientist.

Second, studying the ways in which contemporary scientists produce online personas is particularly important given rising concerns about the devaluation of scientific expertise and evidence in public discourse, claims about the prominence of 'science denial' and the decline of 'trust in science'[9], and fear of increased anti-science sentiments and their potential social and political effects, despite the admittedly problematic nature of this label[10]. Scientists increasingly are relying both on their tried and true methods, such as presenting compelling scientific evidence, while also recognising the need to motivate the public through personal anecdote, emotional appeals, and other methods to establish their expertise and credibility. While there are a myriad of causes relating to the rising scepticism in some quarters about science and scientists, exploring how scientists can be presented as credible, ethical, and experienced experts who also are open to public debate over critical issues, and drawing from successful historical models where appropriate, could aid in supporting the wider public's trust in scientific evidence, as well as in engaging the public more fully in scientific debates.

Online scientific persona & public intellectuals

Select scientists working within universities or other professional settings have long had some degree of connection with the public, whether through popular writing, public lectures, expert commentary, media engagement, or political connections. Indeed, some scientists have attained true celebrity status through these sorts of activities: Consider Charles Darwin[11] and Marie Curie as historical examples, and Susan Greenfield, Brian Cox, Neil deGrasse Tyson, and Stephen Hawking as more contemporary examples.[12]

[i] We rely on the somewhat narrow Anglo-European/Australasian meaning of the term 'scientist,' namely those professionals trained in and involved in practicing the natural, medical, or experimental sciences (the so-called 'hard' sciences) rather than those who work in the social or human sciences.

[ii] This chapter arose out of collaborations and funding from the Public Engagement in Science and Technology Research Cluster Adelaide (PESTA) at the University of Adelaide which seeks to explore a range of issues associated with public engagement and communication in STEM including best practices.

Although a relatively small percentage of scientists attain the status of public intellectuals, most contemporary scientists tend to cultivate public- and peer-facing persona. The capacity of working scientists to undertake outreach and engagement both with those within and outside of academia has grown dramatically since the development of the internet generally and social media in particular. Institutional profiles on university websites featuring leading scholars have expanded to encompass all researchers associated with an institution or research group, including those still studying in post-graduate positions. Media organisations include biographical statements for regular contributors, and organisations that promote and supply guest speakers for corporate events include details of the scientists on their rosters. Beyond these job-specific promotional activities, individual scientists have personal profiles on sites such as Facebook and Twitter, as social media presence has become ubiquitous, serving both professional and personal networking needs. These disparate presences contribute to the individual's online persona, "the strategic performance of identity through digitally networked media"[13]. For those scientists working in science communication and engagement, this online persona can locate them within their network of peers, frame their contributions and impact, and demonstrate authenticity and expertise.

The bulk of existing work on scientific personas comes from the study of historical figures (for a review, see Niskanen et al.[14]). The work on scientific personas as cultural or social categories, as reported in the 2003 special issue of *Science in Context* (edited by Lorraine Daston and H. Otto Sibum[15]), provides insights into a range of historical figures who constructed personas of themselves as scientists by drawing on existing tropes, stereotypes, and identities. The authors of the articles collected in this important special issue make the case that "personae are not individuals, nor are they simply stereotypes or social roles," and that adopting a persona can be understood as "transformative, to attain rather than to suppress genuine selfhood"[16].

Building on this earlier work, Mineke Bosch[17] argues that being perceived as a 'reliable and trustworthy' scientist or scholar is at the core of the persona that scientists can perform in a specific context. By applying these concepts to the scholarly personas of historians, Bosch discusses the ways in which these scholars drew on existing repertoires of identity performance associated with embodiment, and which variously emphasised illness, robust health, celibacy, and "actively practiced heterosexuality" (48), among other elements. In analysing the personas of specific historians, Bosch demonstrates clearly that the personas produced are a combination of existing tropes and stereotypes, together with the influences of the scholars themselves as agents in their own presentational practices as performance is critical to personas. These findings align closely with the arguments presented by persona studies scholars working in the cultural studies/celebrity studies tradition (e.g., see work of P. David Marshall, Kim Barbour, Chris Moore, and Katja Lee[18, 19, 20, 21]). Indeed, as Bosch states, "knowledge cannot be recognised as valuable when it is not performed in a way that the scholar or scientist is seen as a trusted member of the scientific or scholarly community" (53)[22], which underscores the need for research into contemporary scientists such as that undertaken in this chapter.

An additional key theme in the existing literature focuses on the differences between public characters deliberately produced by scientists as compared to the images produced in public contexts which in turn produce alternative personas: as Janet Browne[23] argues, Darwin provides an excellent example of such contrasting views. In contrast to the often unflattering artistic caricatures published in the popular press, Darwin (and his supporters) structured his public appearances (both in professional contexts and when he received guests at his home) to his advantage, creating ritualised ways of "showing himself," and hence acknowledging and reinforcing his status as a celebrity intellectual. Cathryn Carson[24] explores the ways in which the physicist Werner Heisenberg's persona evolved in the cultural context of post-World War II Germany, as he reconsidered what it meant to be 'objective' and even what it meant to be a 'scientist.' In the case of the early 20th century Belgian botanist Joséphine Schouteden-Wéry, Sarah Erman[25] illustrates how she constructed her public image as a professional teacher-scientist using various pre-existing cultural repertoires for female popular science writers and for scientists. However, as a result of combining these repertoires she created a hybrid and complex public self (what might be termed a 'bricolage' as utilised by Bosch[26], or perhaps even an early version of what we in the digital era would now term 'multiplied selves'), the various facets of which were sometimes internally in tension. The examples of both Darwin and Schouteden-Wéry are instructive in demonstrating that scientists across history played different roles for different purposes; equally, the multiplicity of identity performance visible in contemporary online spaces has historical precedence.

Similarly, Sam Schweber[27] documents the physicist J. Robert Oppenheimer's struggles to integrate his distinct activities and personas into a consistent public image, particularly in the post-war period. These studies show the ways in which scientists can draw on myths, stories, and repertoires to construct their identities, particularly in association with gender, race, and class (see also Bosch[28]). These examples can be viewed as parallel to the way in which contemporary scientists can 'show themselves' particularly through social media in order to establish themselves as celebrity scientists and science communicators, as will be illustrated below, but also how such personas are necessarily grounded within their sociocultural contexts. As a number of scholars have stressed, although these personas may begin as externally staged selves that could be viewed as inauthentic, they often evolve over time into real selves reflected in altered personalities and emotional attachments, even establishing a deeper ethos associated with key qualities of what it means to be a scientist: thus scientific personas can be viewed "collective entities, a kind of cultural and social repertoires on how to be a person of science"[29] (1).

Professorial voice also has been emphasised[30] as a critical part of the scientist's persona, which in turn reinforces the authority associated with science due to its supposed 'objectivity.' Essential characteristics of professorial voice found in historical cases include that it is authoritative and that it speaks on behalf of public welfare, themes which again are echoed in the contemporary context. In addition, the attribution of 'objectivity' as a key attribute of what makes a scientist emphasises that there is a scientific 'type,' which goes well beyond specific individuals and points toward a broader reality and consensus that can be conveyed by scientists as 'knowers'[31, 32]. Such "self-abstracting" type (261)[33], as Carson terms it, is undoubtedly present in the contemporary personas established by scientists who are science

communicators, as can be seen in the very language that they use, which evokes broader consensus and lack of individual views. However, in some historic contexts, there have been purposive efforts to create a 'disembodied' type of scientific persona, for instance in order to emphasize meritocracy and the universality of science, and to deemphasize more personal attributes, such as gender, as in the case of the fellowship programmer of the International Federation of University Women during the interwar period as analysed by Anna Cabanel[34] (2018). In our analysis of contemporary science communicators, there are clear trade-offs between the inclusion of personal details and stress on more universal, abstract, and disembodied qualities of scientists.

Methodology

To develop a typography of existing online personas, as well as to explore the ways in which specific scientists perform their scientific personas online, we focused our attention on Australian scientists who are actively and explicitly seeking to engage the public and who have been nominated for, or awarded, prizes for public engagement with science or science communication within Australia in the past decade. From an initial sample of over 230 names, we purposively selected a subset of highly visible scientists and conducted quantitative content analysis, while another 70 who met minimal requirements in terms of their available information were identified for inclusion in a process of qualitative data analysis. Online biographical statements (from here on 'biographies'[iii]) were collected from a diverse range of sources for each scientist, with academic profiles being by far the most common.

Biographies were coded using a coding schema developed as part of the pilot; the coding categories were designed to identify whether and how scientists were using traditional academic markers to demonstrate their expertise; whether they used accessible language to engage with the public; and when and how they incorporated elements of their personal lives into their professional profiles. Consideration of whether biographies were appropriate for the platform on which they appeared (i.e., a profile for *The Conversation* would be expected to have a different tone to a Twitter bio) was also included as a coding scheme category.

Findings

When looking at the range of biographies presented in different spaces, it was clear that many scientists tailored their presentations to the likely audience of the site. Also interesting were the attempts to balance discipline expertise and accessibility: In some cases, the biographies included a significant quantity of discipline-specific terminology (coded by us as 'jargon'), while including claims of being science translators, which we note may well be contradictory. Finding a balance between demonstrating expertise and making work accessible may be more straightforward for some disciplines than others: For instance, a scientist working on experimental cancer treatments depended heavily on long lists of terminology (he was also the

[iii] Here we use the term 'biography' to refer to these short statements that are a familiar part of academic life, often shortened to 'bio' in English. Although in literature 'biography' indicates a text written by someone other than the subject, academic bios are most often autobiographical. These biographical statements may include details of research interests and achievements, publications, teaching responsibilities, and institutional connections, among other elements. The usage of 'biographical statements' in this chapter does not encompass comprehensive or book-length literary accounts of people's lives written by others.

most consistent across all biographies), while an ecologist was able to discuss her field site in uncomplicated, accessible terminology. However, we do note that biomedical scientists often translate their work for the public, in clinical practice and otherwise, and hence there is not likely to be a straightforward relationship between discipline and accessibility.

Awards, publications, qualifications, and academic positions were predictable elements of almost all of the biographies collected and made up the bulk of the text. Indeed, the lack of information about the scientists' current academic positions was more telling than its inclusion, particularly when this was absent from engagement-focused sites such as Twitter. Further survey or interview-style research would be required to determine if this was a protection mechanism to attempt to separate (however minimally) Twitter profiles from institutional profiles, whether to ensure academic freedom or to protect their institutions from blowback should the scientist draw the interest of trolls or negative media attention. A number of biographies specifically discussed the scientists' international profiles or invitations, often in a manner clearly designed to establish their expertise. Whether this tendency is distinctive in Australia warrants further investigation, particularly given the tendency to look toward the United States, the United Kingdom, and the European Union for credentialing and recognition, often referred to in Australia as the 'cultural cringe.'

Superlatives were used relatively sparingly in the biographies and were evenly distributed between descriptions of the scientists themselves and their work. Descriptors such as 'passionate,' 'exceptional,' 'highly awarded,' and 'accessible' were used in the scientists' biographies to emphasise their achievements, while their research work was described variously as 'novel,' 'cutting-edge,' and 'world-leading.' This type of wording was most likely to be in evidence on non-academic sites such as media organisations, with only the most mild language ('novel,' for example) typically found on university profiles, and tending to refer to the scientists' work rather than to his or her personal attributes. Again here, a bigger data set is required to investigate explanations for these patterns, but one hypothesis relates to the common 'Tall Poppy Syndrome' [35, 36], which refers to the tendency to resent, attack, or criticise those of high status and hence, in turn, results in some underplaying their accomplishments (except perhaps in sporting contexts); trends which continue to have considerable influence in Australian culture.

We hypothesized that there might be gendered differences in presentation and hence converted women's and men's data[iv] into percentages to make comparisons. We sought to analyse the ways in which the two groups were most similar or different and to determine what factors might be contributing to these differences. We note that without doing further research with scientists, this interpretation and discussion of gender influences is only exploratory, and interview or focus group research with scientists are likely to provide data to support additional or even contradictory interpretations.

Most biographies were written in the third person, presenting an arms-length view of the scientists and their work. This type of phrasing helps to position the scientist as an expert and

[iv] An option was included in the data collection framework for people who did not identify as either a woman or a man but was not utilised as all fell into one of the two most common gender identifications.

gives the impression that the biography is a sort of testimonial, or perhaps that scientists 'have someone to do this for them.' However usage of the third person also creates a sense in which the scientist is being held apart from the reader, rather than speaking directly to them as a peer. Although women are just as likely to use third person in their biographies as men, women are much more likely to include passionate declarations about their work and its impact, positioning themselves as deeply invested and enthusiastic about their scientific endeavours.

Such emphatic declarations of one's enthusiasm and effort in relation to science aligns with early views of science as requiring considerable or complete self-sacrifice, and related terminology of 'brides of science,' such as evidenced in discourse of Marie Curie.[37] However, such statements are in contrast with the "narrative of unsought success," such as found in the historic example of Annie Rommein in the nineteenth century, and thus could be viewed as downplaying proactive, goal-oriented work rather than luck as the foundations of female professional success (53)[38]. Drawing on our data, by contrast, men are very unlikely to make these sorts of personal connections with their work explicit in their bios (although presumably they still exist), instead tending to present dispassionate views. This gender split is interesting and warrants continued investigation: The inclusion of such information in women's bios might be due to stereotypes or cultural norms about women's roles in society and their openness about emotions. Alternatively, the lack of inclusion in men's bios could reflect other norms, namely that men are expected to be naturally invested in and enthusiastic about their work and so such assertions are taken as unnecessary.

Although it was more common for men to use discipline-specific jargon than women in at least one of their bios, the frequency of the use of jargon was relatively even. The use of technical terminology was relatively infrequent across the board, which bodes well for the levels at which scientists are engaging with the public, since the use of disciplinary-specific terms without explanation can cause scientists' bios to be less easily interpreted by non-expert readers. Using jargon can have two possible main effects, one that is positive—namely that scientists sound more knowledgeable and have high levels of scientific expertise as they use nomenclature that is not easily understood—and an alternative that is negative—related to jargon causing scientists to sound elitist and inaccessible to the public as they are viewed as using 'big words' that no one understands.

Our analysis revealed that scientists use their bios to ensure that they are seen as credible and authoritative. A range of specific strategies that help do this work include listing their institutions, positions, and markers of international recognitions (along with awards and publications, although these are not as common). However, women appear to work harder than men to credential themselves, as they are more likely to include their titles and qualifications in their bios. It is possible that this tendency seeks to counter prevailing expectations that scientists are men; or perhaps it is related to recent movements in the academy to combat sexism by ensuring that women are addressed by their titles (a recent Twitter campaign emphasised including 'Dr' in tweet handles, for example). More research is needed to explore this theme, as it could either be evidence of a push against the prevailing male dominance of the hard sciences in Australia, or conversely point toward the continuation

of such dominance: If women have to do more to prove their expertise and credibility than men, then this additional labour is worth highlighting.

Neither men nor women are likely to list their media experience, such as interviews, news articles, or television appearances, perhaps because such activities are not viewed as part of their roles as scientists. Such a finding was unexpected, particularly because these people are acknowledged and usually self-described science communicators. The absence of this type of information may point to fears of seeming 'populist' (and hence echoes some of the findings in the historic literature reviewed previously), or may once again be connected to the Tall Poppy Syndrome, as providing more detail would mean they would 'stick out too much' and thus open themselves up to being cut down. However, in connecting this data to the more detailed case studies produced by the pilot project, we found that the more prominent people featured in the pilot tended to have more engaging personas than those in the larger set, based on our qualitative reviews of the bios. The cause and effect of this finding would be interesting to tease apart through interviews or focus groups: We would predict that there is an intertwined or a spiralling effect in play, in that as people get more attention for something, they then put more effort into their online presence, which in turn leads to more attention and potentially greater assistance or advice on presenting themselves to their audience. There also may be effects of seniority in the field or age, though it is not clear whether people tend to develop more engaging personas as they get older, or better engage when younger, are more inventive, or wishing to make themselves distinctive.

The common usage of the third person, along with other components of key information that were regularly included, meant that the biographies for any one person tended to be very consistent. This finding was unsurprising, given that people generally take an existing bio as a starting point and then adapt this to each new site. Such consistency also could indicate that scientists are trying to present consistent personas online. By presenting coherent identities across multiple sites, scientists make it easy to identify them given they are relying on consistent markers or descriptors. However, such tendencies could also mean that they are missing opportunities to connect with their audiences and create richer and more persuasive identities, making it harder for them to truly engage and enact change, which can be part of the agenda of these types of science communicators, for example in connection with environmental or health issues. As seen in various historical examples such as with Darwin, hybrid identities can sometimes be more effective and compelling than simplified, unitary personas.

Scientists' online personas: Historical continuities and further research

Now more than ever, scientists recognise the need to engage with a wide range of audiences to advance the perceived role of science in benefiting society, as well as to combat the rise of so-called science denial and the devaluation of scientific evidence that many view as becoming more common in public discourse, for example in relation to climate change crisis and challenges to vaccination efficacy. Drawing on historical insights of the portrayal of scientific personas beyond academic audiences, we contend that our research on contemporary science communicators can contribute to our understanding of ways in which scientists establish their

presences and portray their public personas across recent and more traditional media channels, and potential avenues for improving these practices.

It is clear that credibility and expertise, along with openness to public discourse and relatability, are key characteristics that are critical to contemporary scientists who wish to engage with the public. In building their personas online, we expected that scientists would aim to achieve credibility and recognition of their research expertise as part of their efforts to engage with the broader public. Our findings indeed showed that science communicators use a variety of techniques to build credibility and establish their expertise, such as the use of third person language; the building of credentials through association with institutions, positions, and awards or other types of recognitions; and the use of discipline-specific jargon. These practices are well-aligned with historic findings about the important role of professorial voice[39]: By emphasizing the abstract qualities and references to science rather than highlighting personal attributes or interests, the modern scientist personas examined here strongly echo prominent historical examples. In addition, these findings emphasize the importance of the role of the attribution of 'objectivity' and related 'epistemic virtues' that are particular to science. It could be contended that the personas of scientists are similar in an important way to what Lorraine Daston and Peter Galison[40] describe as the fifth (and most recent) epistemic virtue, that of 'presentation.' In their analysis of scientific images, they note that images no longer merely represent scientific entities but are even used to manipulate and engineer them; similarly the personas analysed here are not just representations of scientists but evolving and plastic presentations that are constantly iterated and modified but which are grounded in key epistemic norms.

However, it is critical to note that these more traditional techniques aimed at strengthening perceptions of reputation, credibility, and objectivity may have unintended effects, such as distancing scientists from the publics which they hope to engage. The irony is that the techniques that could engage the community on a more personal level, and hence connect scientists with the broader community and enhance public interest and passion for science, such as using passionate terminology or the first person, creating narrative structures, and including personal interests, often are viewed as potentially undermining credibility not only of individual scientists but of science more broadly. Thus perhaps unsurprisingly, such attributes appear to be downplayed in the biographies analysed in this study. Experimental research examining perceptions and attributions of the public toward scientific personas built on self-abstracting as compared to highly personal narratives could enable us to draw more refined conclusions as well as recommendations for scientists, particularly those seeking to be science communicators. Interestingly, our findings do indicate that female scientists are more likely to engage in passionate declarations about their research and in outlining their personal interests as compared to their male counterparts. This result clearly diverges from historical examples in which women scientists were found to either demonstrate their full commitment to science above all personal interests, or in which scholarly pursuits and interests were hidden behind narratives of indifference. The stronger contemporary presence of personal interests and passion hint at potentially changing gender roles in relation to public scientific personas, and further research is necessary to obtain insights as to the underlying reasons for such shifts.

Some of our findings may be distinct to the Australian cultural context, for instance the presence and effects of the Tall Poppy Syndrome. While the scientists studied here appear to be comfortable with aspects of their expertise, they also do not wish to appear to use language that denotes too much about their success or to be seen to be self-promoting. These concerns also could help to explain the lack of mentions of previous media experience. Whether this phenomenon exists outside of this cultural context remains to be investigated. Finally, it is critical to note that we have relied on a working assumption that online profiles that are engaging, accessible, and personal are 'better' in a critical sense, namely that they will attract more attention and be more effective at engaging the public in the scientists' messaging. However, it is possible that taking these steps to make science and scientists themselves more accessible and engaging could backfire in some cases, particularly if the audience thus views the scientists' activities as not sufficiently rigorous, and hence more fine-grained analysis of the effects of varying degrees of accessibility is warranted.

It is possible to read these findings as both performance and performative. It can be seen as performance in the sense conceptualised by Erving Goffman[41], who used a dramaturgical analysis to explore the ways in which people enact contextually appropriate roles. These biographical statements are well and truly 'front stage' performances, produced for an anticipated audience and "informed by the parameters defining the situation and any prior or advanced knowledge" of how that performance will be engaged with (31)[42]. That prior knowledge could include how others in their field have previously written statements by using third person; the anticipated level of understanding of the audience as signalled through the use of discipline-specific terminology; or the deliberate surfacing of international recognition or academic service as a form of "dramatic realisation," as previously discussed in relation to academic CVs (138)[43]. Equally, the exclusion of personal information such as family or marital status, non-academic interests, and non-academic work experience could reflect Nod Miller and David Morgan's discussion of Goffman's "maintenance of expressive control," which noted that academics avoid "unwelcome intrusions from other areas of life into the front stage of the on-going presentation" (p. 139). The deliberate choice to include more personal information would signal rejection of these types of strict performance management that could be read as a political statement of a type, or alternatively reflective of a misunderstanding of the ways in which academics should produce performances of themselves for public consumption.

By focusing on those scientists recognised for their public engagement work, the sampling strategy used in this project seeks to inform and guide those scientists interested in public engagement or in being viewed as science communicators; hence our results may be considered to be irrelevant to scientists more broadly. Admittedly, the building and maintenance of online personas, along with other types of public engagement work such as talks, workshops, and media engagements, can be time-consuming and may seem to serve as distractions from scientists' core research, teaching, and other roles. However, given the current global trends towards anti-intellectualism and resistance to scientific discourse, along with increasingly pressing social and environmental pressures which require evidence-based solutions, many would contend that all scientists should view themselves as publicly accountable. Thus finding ways to bridge the gaps between scientists and non-scientists is critical, and understanding how best to develop effective, engaging, and credible online

personas by reflecting on both historic and contemporary tropes is a significant part of this process. Finally, the continuities between key features of personas produced by contemporary and historical scientists are striking, despite the different forms of media now in use, and warrant further reflection and analysis in different contexts as they clearly continue to ground our understandings about what it means to be a scientist.

Acknowledgements

We gratefully acknowledge receipt of funding for this study from the 2017-18 Interdisciplinary Research Funding scheme at the University of Adelaide via the Public Engagement in Science and Technology Adelaide (PESTA) research cluster. We also extend our thanks to our research assistants: Aislinn Rossi for her work on the pilot project, and Caitlin Adams for the second round of data collection and coding.

References

1. Jane Gregory, "Science Communication." In *International Encyclopedia of the Social and Behavioral Sciences,* 2nd edition, ed. James D. Wright, (Online: Elsevier, 2015), 219–24. https://doi.org/10.1016/B978-0-08-097086-8.95088-8.
2. Patrick Sturgis, and Nick Allum, "Science in Society: Re-Evaluating the Deficit Model of Public Attitudes." *Public Understanding of Science* 13 (2004), 55–74.
3. Steve Miller, "Deficit Model." In *Encyclopedia of Science and Technology Communication*, ed. Susanna Hornig Priest, (Thousand Oaks, CA: Sage, 2010) 208–9.
4. Molly J. Simis, Haley Madden, Michael A. Cacciatore, and Sara K. Yeo. "The Lure of Rationality: Why Does the Deficit Model Persist in Science Communication?" *Public Understanding of Science* 25 (2016), 400–14.
5. Steven Hilgartner, "The Dominant View of Popularization: Conceptual Problems, Political Uses." *Social Studies of Science* 20 (1990), 519–39.
6. Jane Gregory, and Steve Miller. *Science in Public: Communication, Culture and Credibility.* (New York: Plenum, 1998).
7. Kim Barbour, and David Marshall, "The Academic Online: Constructing Persona through the World Wide Web." *First Monday* 17, no. 9, (2012), http://firstmonday.org/ojs/index.php/fm/article/view/3969
8. P. David Marshall, Kim Barbour, and Christopher Moore, "Academic Persona: The Construction of Online Reputation in the Modern Academy." In *The Digital Academic: Critical Perspectives on Digital Technologies in Higher Education*, eds Deborah Lupton, Inger Mewburn, and Pat Thomson, (London: Routledge, 2018), 47–62.
9. Naomi Oreskes, *Why Trust Science?* (Princeton: Princeton University Press, 2019).
10. Anonymous, "Beware the Anti-Science Label." *Nature* 545 (2017): 133–4.
11. Janet Browne, "Charles Darwin as a Celebrity." *Science in Context* 16 (2003), 175–94.
12. Declan Fahy, and Bruce V. Lewenstein, "Scientists in Popular Culture: The Making of Celebrities." In *Routledge Handbook of Public Communication of Science and Technology*, eds Massimiano Bucchi and Brian Trench, (Online: Routledge, 2014), 83–96. https://www.routledgehandbooks.com/doi/10.4324/9780203483794.ch7.
13. Kim Barbour, "HDRs and Online Persona." Presentation at *HDR Digital Identities Workshop*, 27 March 2018, University of Adelaide, Australia.
14. Kirsti Niskanen, Mineke Bosch, and Kaat Wils. "Scientific Personas in Theory and Practice: Ways of Creating Scientific, Scholarly, and Artistic Identities." *Persona Studies* 4 (2018), 1–5.
15. Lorraine Daston, and H. Otto Sibum. "Introduction: Scientific Personae and Their Histories." *Science in Context* 16, (2003), 1–8.
16. Daston and Sibum "Introduction", 3

17. Mineke Bosch, "Scholarly Personae and Twentieth-Century Historians: Explorations of a Concept." *BMGN - Low Countries Historical Review,* 131 (2016), 33–54.
18. Kim Barbour, P. David Marshall, and Christopher Moore. "Persona to Persona Studies." *M/C Journal* 17, no. 3 (2014), http://journal.media-culture.org.au/index.php/mcjournal/article/view/841.
19. P. David Marshall, and Kim Barbour. "Making Intellectual Room for Persona Studies: A New Consciousness and a Shifted Perspective." *Persona Studies* 1, no. 1 (2015) 1–12.
20. P. David Marshall, Christopher Moore, and Kim Barbour. "Persona as Method: Exploring Celebrity and the Public Self through Persona Studies." *Celebrity Studies* 6 (2015), 288–305.
21. Christopher Moore, Kim Barbour, and Katja Lee. "Five Dimensions of Online Persona," *Persona Studies* 3 (2017), 1–12.
22. Bosch, "Scholarly Personae", 33-54.
23. Browne, "Charles Darwin", 175-94
24. Cathryn Carson, "Objectivity and the Scientist: Heisenberg Rethinks;" *Science in Context* 16 (2003), 243–69.
25. Sarah Erman, "A Teacher, a Scientist, a Wife: The Complex Self of Joséphine Schouteden-Wéry (1879-1954)." *Persona Studies* 4, no. 1 (May 4, 2018): 74–87. https://doi.org/10.21153/ps2018vol4no1art703.
26. Bosch, "Scholarly Personae", 33-54.
27. Silvan S Schweber, "J. Robert Oppenheimer: Proteus Unbound." *Science in Context* 16 (2003), 219–42.
28. Bosch, "Scholarly Personae", 33-54.
29. Niskanen et al., "Scientific personas", 1-5
30. William Clark, "On Professorial Voice." *Science in Context* 16 (2003), 43–57.
31. Carson, "Objectivity", 243-69.
32. Michael Shortland, and Richard Yeo, eds. *Telling Lives in Science: Essays on Scientific Biography*. (Cambridge: Cambridge University Press, 1996).
33. Carson, "Objectivity", 243-69.
34. Anna Cabanel, "'How Excellent…for a Woman'? The Fellowship Programme of the International Federation of University Women in the Interwar Period." *Persona Studies* 4 (2018), 88–102.
35. Stuart Macintyre, "Tall Poppy." In *The Oxford Companion to Australian History,* eds Graeme Davison, John Hirst, and Stuart Macintyre. (Oxford: Oxford University Press, 2003). Retrieved 10 Nov. 2018, from http://www.oxfordreference.com.proxy.library.adelaide.edu.au/view/10.1093/acref/9780195515039.001.0001/acref-9780195515039-e-1428.
36. Bert Peeters,"'Thou shalt not be a tall poppy': Describing an Australian Communicative (and Behavioural) Norm)." *Intercultural Pragmatics* 1 (2004), 71–92.
37. Bosch, "Scholarly Personae", 33-54.
38. Bosch, "Scholarly Personae", 33-54.
39. Clark, "Voice", 43-57.
40. Lorraine Daston, and Peter Galison, *Objectivity.* (New York: Zone Books, 2007).
41. Erving Goffman, *The Presentation of Self in Everyday Life*. (United States of America: Anchor Books, 1959).
42. P. David Marshall, Christopher Moore, and Kim Barbour. *Persona Studies: An Introduction*. (Hoboken, Wiley, 2020).
43. Nod Miller, and David Morgan, "Called to Account: The CV as an Autobiographical Practice." *Sociology* 27, (1993), 133–43.