How Data Visualisation Enhances the Impact and Visibility of Science

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Abstract

Most funding bodies demand research findings to be made publicly available, but the public is not the target audience of scientific literature. Translating complex ideas and findings into a comprehensible, jargon-free language is generally left to the media. However, researchers tend to be fearful of misrepresentation and loss of control over how journalists portray their work. We argue that interactive online data visualisation is a powerful tool for effectively communicating research directly to the public, and for increasing the visibility and citation record of research output. With more and more open-source data visualisation tools available, it has become much easier for researchers to create visual representations of their work that allows direct dialogue with peers, policy makers and the wider public, while keeping control over how science is portrayed. We draw on our own experiences to demonstrate how data visualisation can create mutual benefits for science and the public.

Extended Abstract

"Scientists must learn to communicate with the public,
be willing to do so and indeed consider it their duty to do so."

(Royal Society, 1985)

Background

Despite a large fraction of research being publicly funded, little attention has been paid in the scholarly literature to role of science communication in sharing scientific knowledge across disciplinary boundaries. Researchers tend to engage in science communication because of personal interest rather than institutional incentives. This is also true for our dissemination project, which gave rise to this paper. The project began with the development of a new data visualisation to validate and interpret a large, complex dataset on global international migration flows. The resulting visual representation of bilateral flow data shown in Figure 1 enabled us to evaluate the data and to effectively communicate our research output to a wider audience. We created a static plot for printed materials (including posters and saw the potential for further development as an interactive online version.

Figure 1: The Global Flow of People – Interactive data visualisation (www.global-migration.info)

We published our interactive data visualisation project "The Global Flow of People" that shows global migration flows between and within regions for five-year periods, 1990 to 2010 (Sander et al. 2014) on the same day as a journal article by Abel and Sander (2014) on global international migration flows was published in *Science*. The data visualisation and the journal article attracted substantial interest by the media, policy makers, academics, teachers and members of the public. Our scepticism towards the media and the public, particularly in light of growing anti-immigrant sentiment in many parts of Europe turned out to be unwarranted. The heightened visibility of our visualisation is directly reflected in the metrics for the related journal article (>30,000 views on www.sciencemag.org since March 2014). Online comments and feedback provided valuable insights into how effective communication can cause users to reflect on conventional wisdom and earlier perceptions about global migration. For instance, several tweets criticised the nationalist rhetoric of French politician Marine Le Pen during the 2014 European election campaign, stating that "African migrants aren't invading us, and here's the data to prove it" (see Fig. 2).

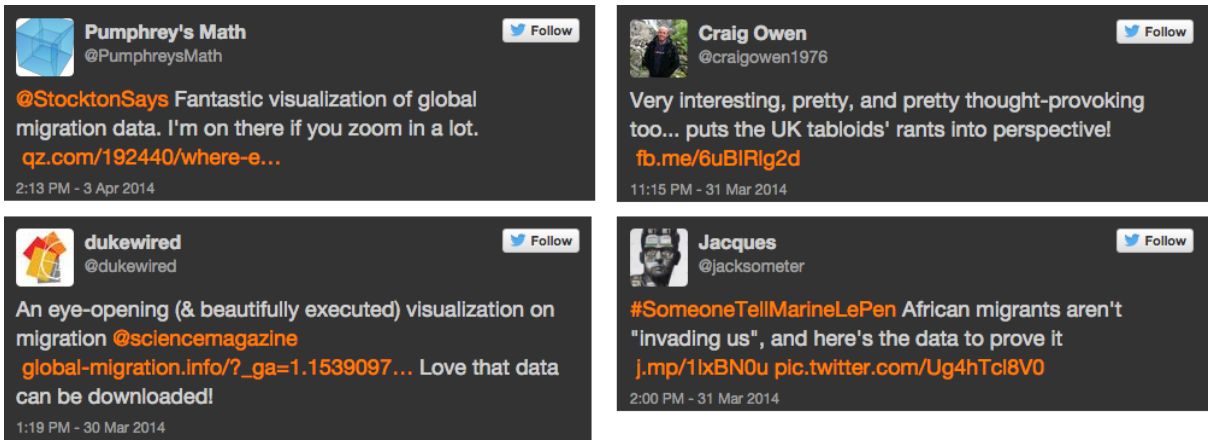

Figure 2: Twitter comments on the data visualisation "The Global Flow of People"

The state of science communication

Our experience made us realise that the digital era has blurred the lines between science, journalism and the public, creating new challenges and opportunities for science communication. Research has become more accessible for the public, but new challenges have emerged for researcher wanting to communicate their findings effectively. University education and post-graduate training courses rarely touch on how to condense complex and technical research into non-jargon, comprehensible messages that can be understood by a wider community.

Yet how researchers communicate their findings becomes increasingly important in the digital era, when the volume of scholarly literature increases steadily. It is well established that visualising information can make a substantial difference on journalists' and the public's understanding and engagement. Data visualisation can be seen as a valuable tool that facilitates data discovery and exploration, and it tends to be more effective than traditional text-based reporting of research

results in reaching non-academic audiences. But concerns have been raised about whether digital media coverage and social media commentary is beneficial to scientific progress. Moreover, researchers are given very few incentives for science communication, although more and more grant schemes now require an outreach component.

Bridging the science-society gap with data visualisation

In this paper, we argue that data visualisation can bridge the widening gap between science and the public. Data visualisation, especially online interactive versions facilitate direct dialogue, and gives the researcher rather than the media control over which findings are highlighted and how they are portrayed. Hence, data visualisations enable researchers to create interest in the public without betraying the scientific truth, creating mutual benefits for both scientists and interested members of the public.

We review the relevant literature on science communication in the digital era and discuss what we see as the shortcomings of the current science communication practice: reliance on the media, limited awareness of public's interest in science and the importance of jargon-free language, and the strong focus on text-based formats. We highlight the potential for data visualisation to enhance science communication, facilitate public engagement and have positive effects on scientific careers. We summarise the mind and skill set required by researchers to communicate visually, and we stress the need for institutional settings that support scientists who are ready, willing and able to engage with the public using data visualisation.

Conclusions

The interactive visualisation on global migration flows highlights the potential of data visualisation for creating mutual benefits for scientists and the public. It enables the interested public – formally addressed as readers (of literature) or visitors (of static web pages) – to literally become users of scientific findings. The topics of discussion among members of the public can be useful in developing new research projects.

References

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