Can interaction make you think?  
Increasing critical engagement with data through interactive visualizations

Open data and online news have powered the rise of data journalism, enabling reporters to pub­lish detailed factual analyses. At the same time, public trust in the media is at historic lows. Rather than enga­ging with in-depth analyses readers live in echo chambers and, fall for fake news, misled by their biases. There is a curious paradox between *authority* and *accessibility*: data makes news more authori­tative but less accessible, while readers favour accessibility over authority.

We introduce a new way of presenting data that promotes both authority and accessibility. We argue that this has the potential to reverse declining trust in the news. Our approach promotes data literacy and encourages readers to question their assumptions about data. Our contributions are twofold. First, we develop an open-source library of interactive data visualizations that allows novel presentation of various kinds of data. Second, we present an empirical evaluation TODO: What do we empirically evaluate.

# You guess visualizations

TODO (Tomas): Write a paragraph to describe how the interaction works, how it is supposed to make the reader think before showing the answer and how we encourage transparency by having source code with data sources. Also describe three different visualizations (draw line, draw bars, align timeseries).

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |

**Figure 1.** Three interactive “You Guess” visualizations: (left) User has to complete a line before the   
second part is shown; (middle) User has to guess value for each bar before correct sizes are shown and   
(right) user needs to align a time series with outlined events by dragging it up or down.

# Experimental evaluation

Aaa

# References

aaa

[OLD CONTENT]

Read/Write News: Increasing media trust and understanding through data journalism

Open data and the digital delivery of news have powered the rise of data journalism, enabling skilled reporters to present rich information in compelling ways. Yet public trust in the media is at historic lows in many developed countries, at a time when echo chambers, propagandist bots and fake news are on the rise. This presents a curious paradox: trust in the news media has declined even as access to information has increased. In our paper we explore this paradox, and observe that *authority* and *accessibility* tend to be negatively correlated: news that is authoritative isn’t always accessible, and news that is accessible isn’t typically authoritative.

We introduce a method of presenting journalistic data analysis that promotes both authority and accessibi­lity, and argue that this has the potential to reverse declining trust in the news. Our approach is based on two principles: (i) readers should be encouraged to question their assumptions about the data and (ii) the analysis should be transparent, enabling the reader to ascertain the provenance of data and the accuracy of the analysis. In other words, our approach shifts the news from a Read-Only to a Read/Write culture (Lessig, 2008).

# 1. Visualizations that encourage critical thinking

The first way of encouraging critical thinking about data has been trialled by newsrooms such as the New York Times. The “guess-first” interface prompts the reader to provide an estimate before showing the actual data: this could be completing a time series (Buchanan et al., 2017) or guessing a number (ONS, 2017). We develop and evaluate a number of interactive “guess-first” visualizations such as the one shown in Figure 1. This way of presenting data encourages an active approach: readers need to make their assumptions about the topic explicit, before they are confronted with the accurate data.

|  |  |
| --- | --- |
|  |  |

**Figure 1.** The visualization presents the breakout of the UK government expenditure. Readers are first asked to make a guess by dragging the bars (left), before they are presented with the actual data (right).

# 2. Reports that encourage verifying data provenance

The visualizations discussed in the previous section encourage readers to reflect on their own predispo­sitions and biases, as a way to improve understanding. Other forms of active reading could similarly enhance trust, by being transparent with users about the provenance and analysis of the data.

To make transparent the provenance of data and the accuracy of analysis, data visualizations must be backed by a reproducible script that accesses data from an authoritative primary source. We explore accessible ways of presenting such scripts and letting the user trace the data through the various transformations that are applied to it. Figure 2 shows an example, where events related to the UK’s referendum on leaving the European Union are sourced from Wikipedia. We also develop a more accessible block-based way of presenting the script to non-programmers.[[1]](#footnote-1)

|  |  |
| --- | --- |
|  |  |

**Figure 2.** The script reads events from Wikipedia and searches for “Leave the EU” (left). When users navigate   
through the script, they see a preview illustrating each step and can verify the accuracy of the analysis (right).

# 3. Can Read/Write News increase trust and understanding?

Our study contributes to ongoing debates over the shifting epistemologies of newsgathering. In contrast to earlier studies, we focus on news at the point of *reception*, rather than the point of *broadcast*, by investigating how ordinary consumers both understand and trust in the evidence they are presented with. By presenting not just the end product of data journalism, but the steps involved in it, we aim to improve readers’ trust in the information presented, and set a new standard for transparency in reporting. By inviting readers to contribute their estimates, we hope to encourage critical thinking and ultimately improve readers’ understanding.

To test these hypotheses, the paper presents an experimental case study, in which we expose Mechanical Turk participants to government spending data through our interface, and measure the extent to which reported levels of (i) understanding and (ii) trust change, as compared with a more standard digital news interface.

These findings help us ascertain the extent to which changing how data journalism is experienced by users improves understanding of and trust in the news in the digital age.

# References

Buchanan, L., Park, H. & Pearce, A. (2017). You Draw It: What Got Better or Worse During Obama’s Presidency. The New York Times. Available online at: <https://www.nytimes.com/interactive/2017/01/15/us/politics/you-draw-obama-legacy.html>

Lessig, L. (2008). Remix: Making art and commerce thrive in the hybrid economy. New York: Penguin.

Maloney, J., Resnick, M., Rusk, N., Silverman, B., & Eastmond, E. (2010). The Scratch programming language and environment. ACM Transactions on Computing Education (TOCE), 10(4), 16.

Office for National Statistics (2017). Migration levels: What do you know about your area? Available online at: <http://visual.ons.gov.uk/migration-levels-what-do-you-know-about-your-area/>

# Author biographies

Tomas Petricek (PhD, University of Cambridge, 2017) is a Visiting Researcher at the Alan Turing Institute and a recipient of the Google Digital News Initiative (DNI) Innovation Fund grant. Following his PhD in theoretical computer science, where he developed foundations for context-aware program­ming languages, he has been working on programming tools for data science and, more recently, became interested in democratizing data science and making the creation of transparent, reproducible data analyses accessible to non-programmers such as data journalists.

Josh Cowls is a Research Assistant in Data Ethics at the Alan Turing Institute and a Research Associate at the Digital Ethics Lab, Oxford Internet Institute, University of Oxford. Josh’s research centers on the impact of the internet on politics and the media, and he holds graduate degrees from the Oxford Internet Institute and MIT’s Comparative Media Studies program. He has studied the implications of big data, open data, state surveillance, and the use of social media in political campaigns, and he has co-authored work appearing in *New Media & Society* and *Policy and Internet*.

1. Inspired by Scratch (Maloney et al., 2010), a visual programming language for children. [↑](#footnote-ref-1)