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

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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 tend to favour accessibility over authority.

We implement and study a new way of presenting data that promotes both authority and accessi­bility. Using theoretical arguments and experimental evaluation, we argue that this has the poten­tial to reverse the declining trust in the news. Our approach encou­rages readers to question their assumptions about data and promotes data literacy. 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 of how exposing readers to these data visualizations affects understanding of and trust in the information presented in news stories, as compared with text-only and conventional, static graphs.

# You Guess data visualizations

In the first part of the paper, we describe a novel library for creating interactive visualizations. Our “You Guess” visualizations ask the reader to make a guess before showing the actual data. This encourages an active approach to data – readers need to make their assumptions about the topic explicit before they are confronted with the accurate data. To promote full transparency, each visualization is also backed by simple source code, accessible via an “open source code” link, that shows where data comes from and how it has been transformed.

The library is inspired by pioneering work of newsrooms such as the New York Times [1], but we extend the idea to multiple kinds of data. Three examples shown in Figure 1 include completing a time series in a line chart (by drawing the rest of the line), guessing the relative magnitudes of a bar chart (by dragging the bars) and aligning a known time series to a list of known events (by dragging it up or down).

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**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

In the second part of the paper, we introduce the results of an experiment to ascertain the extent to which presenting information as depicted above affects how readers understand and retain it. As part of an online experiment with participants recruited through Mechanical Turk, we assign participants to one of three different stories: a text-only article; an article with a conventional, static visualisation, and the dynamic, interactive visualisation described above. After exposing participants to the article, we use a self-reported survey to assess: (i) how well they retained the information conveyed, (ii) how engaging they felt the article to be, and (iii) how likely they would be to share the article more widely. Through these follow-up questions we ascertain whether authority and accessibility are each promoted by the “You Guess” methodology of presenting data. The experiment will therefore offer tentative evidence in relation to the use of novel forms of data presentation and interaction and its impact on how the news is understood and trusted.

# References

# [1] Larry Buchnan, Haeyoun Park and Adam Pearce. You Draw It: What Got Better or Worse During Obama’s Presidency (2017). Last accessed 5 April 2018. Available online at:

<https://www.nytimes.com/interactive/2017/01/15/us/politics/you-draw-obama-legacy.html>







# Author biographies

Tomas Petricek is a Lecturer in School of Computing at University of Kent, Collaborating Fellow at the Alan Turing Institute and a recipient of the Google Digital News Initiative (DNI) Innovation Fund grant. In his PhD at University of Cambridge, he developed foundations of con­text-aware programming languages. His recent work has been focused on simplifying program­ming tools for reproducible data science and making the creation of transparent, open 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*.