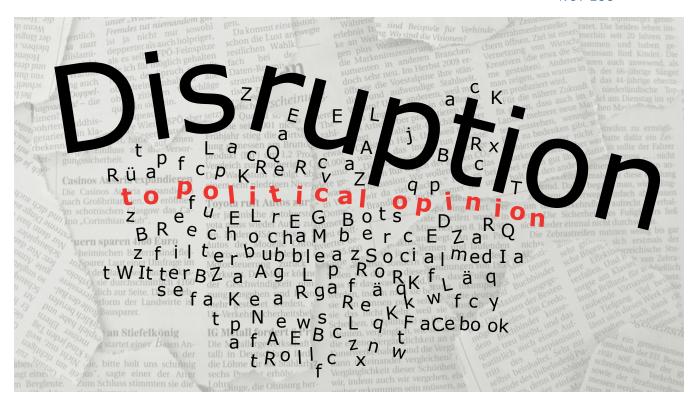# Disruptions to political opinion

Political debate in the age of echo chambers and filter bubbles

Simon Hegelich | Morteza Shahrezaye

Key Points

■ The digital revolution is a societal transformation largely characterised by the mass use of technology. With the use of modern media, citizens are playing their part in shaping public opinion.

■ The echo chamber is a phenomenon in the field of cognitive information processing. In a political context, this effect conflicts with the ideal of political discourse, namely that the best ideas prevail as a result of open and rational discussion.

■ The filter bubble metaphor wields its power through inaccurate generalisation. Users aren't in a bubble – they communicate in various networks and on different topics. They can decide at any time to discuss ideas that go beyond their own ideological confines.

■ Finding the suitable infrastructure that is needed for public opinion-forming and by extension political debate is one of the greatest challenges we face today. In the digital Information Age, setting up a digital platform for political debates is of utmost importance to society.

Introduction

In the first week of April 2017, there were 21,000 tweets featuring the hashtag #Merkel (authors' own study, based on a API search query containing key words and names of political representatives). In our ever-connected society, politicians' Facebook posts travel faster than press agency reports.

What was predicted only a few years ago has now become fact: People are increasingly building their political opinions via social networks.

In terms of democratisation, this development was seen with great hope but the latest debates on fake news, filter bubbles and social bots show that there is now considerable unease: Is shaping of opinions online a problem? Is it even perhaps a threat to democracy?

Or has the whole debate gone too far, proof only of an anti-technology, anti-innovation mindset? These questions we will be discussed in the light of recent research. The answers – as is so often the case – are not quite as straightforward as the questions.

It should be noted, first of all, that we currently have two major overlapping social developments - digitalisation on the one hand and political frictions on the other, manifesting themselves in various crises and with the rise of populism. For starters these developments do not actually have anything to do with each other. Yet with every current political event, the two developments are examined simultaneously, making it extremely difficult to distinguish cause from effect.

Taking it to the extreme, you could question for example whether Donald Trump rose to power because of Twitter or whether Twitter continues to exist solely because the President of the United States creates so much "advertising" for the platform.

The Information Age

Our society is in the midst of a digital revolution, the effects of which on our future are far from predictable. Three interrelated developments are pivotal:

- The Internet has become a global information infrastructure.
- Mobile internet allows us to share information whenever, wherever.
- Social networks create a communication structure whereby everyone is both a recipient and a potential sender at the same time.

One argument often waged against the theory of a digital revolution – i.e. a rapid and far-reaching societal transformation – is that every development in its own right does not constitute an upheaval but a logical evolution. Putative analogies will also often be constructed that are designed to show that these technological possibilities have "in principle" long been available to us: The Internet has been around since the 1980s. And we have been receiving news from around the world by radio for a very long time. Leaflets and self-printed newsletters, even speeches in public places have always allowed individuals to propagate news.

The digital revolution is a societal transformation.

Unfortunately, these objections completely disregard the fact that that the so-called digital revolution is a societal transformation. Technology – taken in isolation – is not the most important factor, but rather the mass use of this technology across all

Konrad
Adenauer
Stiftung

borders. According to a Cisco study (Cisco 2016), the volume of user-generated content transmitted on the Internet is set to double again in the period from 2015 to 2020. As for mobile data transmissions, the volume will increase by a factor of 13 over the same period. In 2002, 100 gigabytes were transmitted every second. In 2018 it will be 50,000 gigabytes per second.

Every social interaction, in principle all human activity – at least in the industrial nations – is increasingly involving information from the Internet, is often dependent on the flow of information, and generates further information itself which is then transmitted. And this is only the beginning of this development.

This does not mean, however, that the digital revolution will quash all of our other societal mechanisms. We will continue to trade, to vote, to govern, to make friends and to prevaricate as we always have done. We will just do it via digital media instead.

Compared with the momentum of technological development, society is changing at a rather slow pace. The digital revolution is eroding institutions that were supposed to be stable: in the political arena, for example, the shaping of public opinion. The disruptive nature of the digital revolution does not mean public opinion is being shaped in a completely different way, it simply means developments that were previously unthinkable are becoming possible, like the real-time merging of social media users' political discussions with the flow of information received from traditional media outlets. Triggered by this development, news outlets are increasingly shifting towards sinister-like real-time reporting. Today's citizens communicate in parallel with the established media and are therefore playing their part in shaping public opinion.

The citizens of today are communicating in parallel with the established media.

The flow of information on social networks

The thrust of the change in the shaping of political opinions lies in the fact that social networks have vastly increased the amount of information we are receiving. There are three fundamental and interrelated logics involved in this change: the logic of classical rationality, the logic of cognitive information processing and the economic logic of the operators of social networks.

The logic of rationality

Firstly, more information means that everyone can become better informed. As a result, our decisions are more rationally grounded. Nowadays, if you want to know how a party or even a specific politician stands on a certain subject, such information can easily be found and used to decide who to vote for. From party manifestos, videos of campaign appearances and parliamentary debates through to direct communication between MPs and citizens, we have a wealth of new and useful digital information channels available to us (Hegelich/Shahrezaye 2015).

Moreover, the filtering mechanisms once employed by traditional media in their products can now be bypassed.

It is easy for anyone to get information about political issues, including via foreign media.

People can get information about political issues without too much effort, including via foreign media or activists' websites. Even private political communication has been liberated, inciting debate with others via the various social media platforms. Like no other technology, our access to information via the Internet and social networks is contributing to the rationalisation of the shaping of political opinion. Nothing,

in principle, can stand in the way of rational, independent discourse. Nevertheless, there are barriers: the limits of rationality and the existing structures, which will be touched upon in the next two points.

The logic of cognitive information processing

This flood of information is resulting in cognitive overload. Political scientist and Nobel Prize winner Herbert Simon has proven that as humans we are generally not able to process more than seven concepts at a time in our short-term memory (Simon, 1996). For information to pass from short-term into long-term memory, it generally takes 5 seconds. Even just to acknowledge the aforementioned 21,000 tweets on the hastag #Merkel would take well over four hours of intensive work. If we were then expected to think about sets of seven tweets at a time, even just for 10 seconds each, we would be well over the 40-hour week mark.

Not everything on the Internet will be noticed.

So not everything written on social networks will necessarily be acknowledged. Quite the contrary: The vast majority of comments on social networks will go more or less unnoticed. Of the aforementioned tweets, for example, only one in ten were re-tweeted. Human users – i.e. not social bots (Hegelich, 2016) – follow around 100 other users. Let us imagine, for a second, that these users posted an average of five messages per day. You would need to spend at least an hour on Twitter to process even a surface impression of these tweets. In this respect, it is also becoming clear that any theory that deals with the dangers of forming our political opinions on the Internet must also take indo consideration who actually reads all of this information.

Information from friends is judged to be more credible.

For users, this cognitive overload is by no means an immediate problem: They filter the content. Nobody can read the entirety of Facebook. We look at our friends' posts, actively visit pages we are familiar with, look up information on specific topics and follow links we trust. The less rationally users reflect on their filtering habits, the more subconscious the decisions become with which we structure our behaviour: Information from people we know is judged to be more credible and we spend more time processing it than we do for notifications whose senders we are unable to fully ascertain. Comments with visual content get more clicks. Posts that already have lots of likes get more attention.

Rational reflection aside, users are constantly streamlining the complexity of content they see simply to process the flood of information more quickly: "Thinking fast and slow" is how Nobel Prize winner Daniel Kahneman chose to encapsulate these two modes of thought (Kahneman, 2011). What is important is that users have the option at any time to switch from one system of thought to the other. At any time you can think long and hard on certain bits of information, but it comes at the cost of speed.

The economic logic of platform operators

Social networks only work because platform operators offer a wealth of support settings to offset this cognitive overload. Users can categorise other users – by marking them as friends for example, follow them or subscribe to channels. And they can also rate content. This "metadata" is then attached to the actual information so that everybody can see how many friends a user has or which posts have a lot of shares, likes or re-tweets. What's more, platform operators actively suggest content to users that similar users have also liked or which is currently trending, and can organise how users network with one another with the help of sophisticated recommendation systems.

The platforms' business aim: as many interactions as possible between as many users as possible

Without providing this service to users, social networks would not actually be of any use. At the same time, it is important to bear in mind that the platform operators' motivation is a financial one. Their business model is all about keeping users on the platform for as long as possible. On the one hand this is about advertising revenue. Other companies are happy to advertise on social networks because users spend so much time on these sites. They can also use them to target very specific user groups, made possible by the fact that platform operators conduct detailed analyses of user behaviour on their sites.

On the other hand the data itself is a product that businesses want to buy into. Indeed, financial investors place great hope in social media sites and in these platforms generating a business deal if only user numbers could be high enough. Bottom line: What platform operators are interested in is generating as many interactions as possible between as many users as possible.

The so-called "user experience" plays a key role in this: If users do not enjoy using the site or if it provides no added value for them, this is bad for business. Conversely, this business model does not necessarily imply that it would be in the platform operators' interest for users to engage as closely as possible with the content. Quite the opposite: The longer a user stays on a particular page the fewer opportunities there are to display advertisements or collect data. Mindless surfing makes for a better marketing tool.

It is hardly surprising, then, and perfectly legitimate that platform operators would design their recommendation systems and entire platforms around encouraging user behaviour that serves their business interests: Keeping users on their platform for as long as possible by getting users to move from page, to page, to page.

Shaping political opinions via social networks

From the described logics it is clear that social networks pose a considerable challenge for political opinion-forming. Each of the described logics is susceptible to manipulation: Rational-minded users who will defend their every point are easy prey for trolls, users who sabotage discussions with malicious intent (Thieltges et al., 2016). Social bots and heavily active users create the illusion of popularity which then influences subconscious user behaviour. Fake news attracts a lot of attention, and as a result advertising revenue, by generating bogus or exaggerated news stories.

Is the structure of social networks suitable for political debate?

It is increasingly being asked whether the structure of social networks is really suitable for political debate. These objections will now be discussed using the described logical paradigms.

In terms of the logic of rationality it is argued that, by nature of its volume, "judicious" political content does not belong on social networks because users of these sites are only prepared to read short blocks of text. But if we take a look, for example, at comments posted on the pages of the German political parties, it instantly becomes apparent that even though the vast majority of posts are kept very short, time and time again longer, more argumentative passages do crop up. In any case, it is very common on social networks to find links to other sites. So on a technical and practical level, informed political discourse on social networks is certainly not out of the question, even if the majority of comments are kept rather short and simple.

Echo chambers

The logic of cognition can be linked to the concept of the echo chamber. What this means is that users on social networks engage with content that confirms their own ideological position. Studies have clearly shown that users prefer to network with other users who share a similar position. This pattern fits in very neatly with the logic of cognition: Provided people more or less subconsciously filter the mass of information by what is relevant and what is not, they are more likely to be exposed to users who have similar interests and who therefore also have a tendency to share similar ideological content. Controversial content, on the other hand, demands a switch to slower, more rational logic. This effect, whereby networks are split into ideological camps, is known in networking theory as *homophily* (first coined by Lazarsfeld/Merton, 1954). While not strictly a problem in and of itself so long as it is in the context of friendships, personal preferences or even thematic networks, in a political context the effect conflicts with the ideal of political discourse: Topics are to be discussed openly and rationally and the best ideas will prevail. Echo chambers, on the other hand, arise out of users' own – often subconsciously made – decisions and lead to a situation whereby, far from reaching almost everyone, political news is shared disproportionately amongst their own networks.

Echo chamber: Users engage with content that confirms their ideological position.

This is clearly evidenced in a study by the author based on the refugee debate on Facebook.[1] The study analysed over 30 million posts, comments and likes on the Facebook pages of political parties, Pegida and organisations that, for their part, support refugees. These pages are connected by the fact that there are users who comment or like content on multiple pages. Clear clusters were identified: Anti-refugee pages were linked much more tightly with one another than they are with other sites.

The same applies to pro-refugee pages, albeit not quite as strongly. While the empirical evidence is by no means trivial, the results are hardly surprising. The potential political consequences, however, should not be overlooked. Anti-refugee information – for example the false reports about alleged rapes – will spread far faster among the anti-refugee clusters as it will among the network as a whole. Clusters do share information with one another but only via the few existing connections between them. It is highly likely, therefore, that information diverging from your cluster into the other will already have been commented on several times in your own cluster. So instead of having independent discourse, what we often experience on social networks is a frantic curtailment of "conflicting" arguments, resulting in increasing polarisation. Instead of clusters receiving information through a range of channels we are seeing a continuing escalation of ideological conflict. In politics this phenomenon is known as the "devil shift" (Sabatier/Hunter/McLaughlin, 1985): Political opponents are seen as much more powerful and dangerous than they are in reality.

"devil shift": The continuing escalation of ideological conflict

While every user in principle has the option to look up the original source of the information and consume unbiased information, this again requires a switch to rational logic. The architecture of social networks does not prevent this from happening. But Facebook, Twitter, etc. are designed for private exchanges between friends where, as a matter of principle, *homophily* is welcomed and poses less of a problem.

With the refugee debate on Facebook, we are seeing less and less informational content within the clusters.

Moreover, echo chambers can lead to a situation where the content the individual user even looks at is less varied altogether. Although all manner of content is available in principle, users so often show an interest in similar content that they have no idea this level of variety even exists. It is important to remember that this effect also takes hold of the traditional media and in many cases is even stronger, as can

be seen with FOX News or CNN, for example. With the refugee debate on Facebook we were able to show that the informational content (measured in terms of *entropy*) is significantly decreasing within clusters. Whoever operates in these clusters will thus only ever see a small proportion of the wealth of information out there.

Filter bubbles

The filter bubble accusation is made in connection with the financial logic of the platform operators. What the term implies is that the platforms' algorithms prevent users from looking at divergent content. The term was coined by Eli Pariser, who argues that the data-based personalisation that occurs on social networks and on the Internet in general leads to a situation whereby users are only suggested content that fits with their pre-analysed preferences. Facebook researchers have attempted to rebut the filter bubble claim by conducting expensive empirical studies (Bakshy et al., 2015). According to their research the Facebook algorithm has a relatively minor influence on the amount of ideologically diverse content that a user will look at. They divide the filter effect into three layers: The friendship network, suggestions made by the Facebook algorithm and user selection.

Filter yes, bubble no. The platforms' algorithms do not produce significant ideological distortion.

A closer look at US conservatives and liberals on Facebook, for example, will initially reveal that the Facebook friends of conservatives share an average of 35 percent liberal content and that 24 percent of the content shared by Facebook friends of liberals is conservative. The number of ideologically diverse news stories then suggested by Facebook differs only slightly from these figures. Self-selection by the user (i.e. the echo chamber) then means that conservatives will only actually look at 29 percent of the liberal content suggested to them and liberals 20 percent of the conservative content. The study, published in Science, therefore suggests that Facebook produces no such filter bubble.

The data on which the study based its conclusions can, however, be interpreted differently (original figures from the study, rounded off): 103,000 conservative stories could be seen by liberals if they actively sought it out.

24,000 of these stories were shared by Facebook friends of liberals. 5,400 of these stories appeared in liberals' newsfeeds. 1,100 conservative stories were ultimately seen by liberals, in other words roughly one percent of conservative content that was published on the network. It may not produce significant ideological distortion but the Facebook algorithm – together with the described cognitive logic – certainly acts like a very strong filter. The article fails to examine the impact that Facebook algorithms have on our choice of friends. Yet who users network with has a significant bearing on the information made available to them in the first place.

It would not be in Facebook's financial interests, either, to make suggestions about similar ideological content.

From a financial point of view, it is indeed unlikely that Facebook would deliberately suggest similar ideological content. What users look at is of little interest to Facebook. What is important is that suggestions lead to maximum use of the platform. Simple figures like the number of likes and shares for a post are considerably easier for these algorithms to handle than a political ideology which would be difficult to quantify.

But there is another reason why the filter bubble metaphor is actually not fit for purpose when it comes to characterising the effects on social networks: It draws its strength from a false generalisation. Users are not in a bubble – they communicate in a variety of networks on different topics and about a variety of interests. They can decide at any time to seek beyond the confines of what is suggested to them.

With regard to the refugee debate there can be no question, for example, of a filter bubble. The comments alone show that many users are active in their respective ideological enemy's camp – not for the purposes of entering into open discourse but to speak about the enemy in an extremely negative way. Added to this, the networks themselves work in extremely different ways. An independent study (Barberá et al.) which looked at political communications on Twitter arrived at similar results to the Facebook study: People do exchange views across ideological boundaries. The data from this study does show, however, that US liberals are more likely to share more ideologically diverse content than conservatives, which is contrary to the Facebook study.

Conclusion

Therefore, it seems rather difficult to generalise empirical results.The same applies to the studies investigating the refugee debate on Facebook (1). It is not yet known whether these results will be replicated with respect to other issues. For science, too, is overwhelmed by the momentum of the digital revolution. The object of inquiry is constantly changing, theoretical concepts are unravelling and the established disciplines are finding it extremely difficult to investigate the interface between technology and society in sufficient depth (Hegelich 2017). Whether the questions we are asking and discussing today will still be relevant in 2021 remains to be seen.

Do we need a new infrastructure for political debate?
In theory, a social media platform would be a suitable place for people to have discussions and start debates. But their attention is more likely to be diverted than it is to stay focused on the rational aspect; rather than on reflection and questioning. As a result the envisaged debate becomes lost in the far reaches of the Internet – often to be further distorted by hate speech, fake news and social bots.

The challenge:
Developing a new
infrastructure for
political debate

At the practical level, what social media sites offer is far from a general forum for ideas where open and rational political discourse can take place. The mass principle preferred by the Internet and its algorithms does not quite seem to ally with our vision of a living and diverse democracy.

Finding the suitable infrastructure that is needed for public opinion-forming and by extension political debate is one of the greatest challenges we face today. The continuing disruption of opinion-forming online should therefore be seen as a chance to develop new forms of political debate. Especially in the digital Information Age society is in need of a place for political communication.

1| *This study has not yet been published. Initial results can be found at https://politicaldatascience. blogspot.de.*

REFERENCES

- *Bakshy, E., Messing, S., & Adamic, L. A. (2015). Exposure to ideologically diverse news and opinion on Facebook. Science, 348(6239), 1130-1132.*

- *Barberá, P., Jost, J. T., Nagler, J., Tucker, J. A., & Bonneau, R. (2015). Tweeting from left to right: Is online political communication more than an echo chamber? Psychological science, 26(10), 1531-1542.*

- *cisco (2016). "Cisco visual networking index: Forecast and methodology, 2015–2020," Tech. Rep., june 2016.*

- *Hegelich, S. (2017). Deep Learning and Punctuated Equilibrium Theory. Cognitive Systems Research.*

- *Hegelich, S. (2016). Invasion der Meinungs-Roboter, Analysen & Argumente, Konrad Adenauer-Stiftung, 221, 1-9.*

- *Hegelich, S. and Shahrezaye (2015). M. The Communication Behavior of German MPs on Twitter: Preaching to the Converted and Attacking Opponents, European Policy Analysis 2015, 1/2, 155-174.*

- *Kahneman, D. (2011). Thinking, fast and slow. Macmillan.*

- *Lazarsfeld, P. F. und Merton, R. K. (1954). "Friendship as a Social Process: A Substantive and Methodological Analysis". In: Freedom and Control in Modern Society. S. 18–66.*

- *Pariser, E. (2011). The Filter Bubble: What the Internet Is Hiding from You.*

- *Penguin Press, New York.*

- *Sabatier, P., Hunter, S., & McLaughlin, S. (1987). The devil shift: Perceptions and misperceptions of opponents. Political Research Quarterly, 40(3), 449-476.*

- *Simon, H. A. (1996). The sciences of the artificial. MIT press.*

- *Thieltges, A., Schmidt, F. and Hegelich, S. (2016). The Devil's Triangle: Ethical Considerations on Developing Bot Detection Methods, 2016 AAAI Spring Symposium Series, 253-257.*

Authors

Prof. Dr Simon Hegelich, Bavarian School of Public Policy, Munich (HfP)

The research of Simon Hegelich (b. 1976) focuses on the connection between political science and data science. He is interested in the political dimension of the ongoing digital revolution as well as in implementing new methods in political science such as machine learning, data mining, computer vision and simulations. Hegelich studied political science at the University of Münster (Germany), where he also received his doctorate and acquired his postdoctoral teaching qualification (habilitation). From 2011 to 2016, he was managing director of the interdisciplinary research center FoKoS of the University of Siegen. In 2016, Simon Hegelich was appointed associate professor at the Bavarian School of Public Policy.

Morteza Shahrezaye, Bavarian School of Public Policy Munich (HfP), is a research associate of Prof. Dr Hegelich.

www.kas.de