Political Opinions of Us and Them and the Influence of Digital Media Usage

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Abstract. Democracies in the late 2010s are threatened by political movements from the borders of the political spectrum. Right-wing populist parties increasingly find agreement in larger parts of the population. How are these people convinced to these political beliefs? One explanation can be seen in polarization and the phenomena that arise from it such as the spiral of silence. In this article we empirically investigate how digital media usage influences the perception of polarization in Germany using a survey with 179 respondents. We use polarized opinions and measure agreement from two perspectives with them. We find an influence of social media usage on the perception of polarization in our sample. Further, polarization seems to be perceived differently depending on the topic. The results contribute to an understanding of how to adequately design presentation of sensitive or controversial topics in digital social media and could be utilized in student eduction to sensitize social media users to the effect of polarization of opinions.

Keywords: Opinion Forming, Fake News, Polarization, Social Media Use

1 Introduction

Polarization is the social process of diverging opinions forming in social groups in a society. An example for a topic for which polarization can be observed in the United States of America is gun-control. There are at least two groups of people, whose opinions seem to continuously diverge. One group strongly advocates stricter gun-control, the other argues against gun-control. Independently of which opinion one might agree with, the process of polarization can be observed in the news streams and comments sections of social media.

Polarization [1] poses a considerable risk for the stability of societies, as they promote the perception of sub-groups with strong within-group coherence and strong out-group rejection—the perception of *us vs. them*. Once polarized opinions have formed it becomes increasingly difficult to find compromise on middle ground which is necessary in democratic societies that need to be flexible enough to react to changes [2].

A core aspect of polarization are the perceptions of within-group and out-group opinions. Before the rise of social media, these perceptions where limited and cultivated by exposure in mass media such as TV, radio, and newspapers [3]. With the increasing spread and use of social media, it is possible to be exposed to the opinion of everyone everywhere, given that the algorithm that controls your news-feed presents it to you. Pariser proposed the phenomenon the *Filter Bubble* [4], referring to the positive-feedback loop of preferential media consumption and algorithmic presentation. You read what you like, the algorithm behind the news feed, presents more of what you like. More complicated, when non-factual news (or Fake News) are mixed into the equation, the feedback-loop could increase the believability of Fake News, as they match the overall impression of the news feed [5].

The question remains how much does the usage of social media influence the perceptions of opinions within a population? In Germany, the strongest polarization can currently be observed in politically hot topics such as immigration, refugees, and the right-wing party AFD (Alternative für Deutschland, transl. Alternative for Germany). But how pervasive are these perceptions, and even more importantly, how pervasive is the perception of polarization regarding these topics? Further, does the media a person uses influence the strength of perceived polarization in society?

In this paper we empirically investigate the perceptions of opinions in Germany regarding immigration, the AFD party, and some control-opinions to investigate how the selection of different media influences the perception of polarization.

2   Related work

To understand how opinion forming in different sub-groups of society works and how the resulting perception of polarization is determined by media consumption we have to look into several fields of related work.

2.1   Opinion Forming

The study of how people form their opinion has been heavily investigated since the sixties of the last century when first efforts were made to understand how opinion leaders influence their social circle and how they can be identified [6]. First, with the purpose to understand what products reach market saturation quickly and then to understand how political opinion is shaped by opinion leaders. One aim of the early research was to identify who these leaders are and how they can be characterized [7]. Opinion leaders have high domain knowledge, they are highly educated, are strongly integrated in their social network, and are extroverted in their nature.

In the seventies the effect of media on political opinion forming was studied. In particular, it was explored to what extent the media contribute to determining what topics are part of the public discourse and what topics are non-relevant.

By putting attention towards a topic, the media decides what is on the public agenda [8] and what is not. Media thus shows an indirect effect on opinion forming, by shaping what topics influence political decision making. This is particularly interesting when the media portraits some opinions to a larger extent than they are actually present in society. The availability heuristic [9] influences how humans estimate the importance of something in society. As the human brain was designed by evolution to deal with tribal life, anything that is immediately experienced or by hearsay is recognized as rather important. The media changes what is perceived as important or pervasive, by selectively exposing its consumers to highly emotional content that happens rarely (e.g. plane crashes). This biases to believe that such events are more present, important, or pervasive than they actually are. People estimate the frequency of events by the frequency of their exposure. You believe what you see often, to happen often.

The culmination of this effect is the so-called *spiral of silence* [10]. This phenomenon describes the feedback-loop of the availability heuristic. An opinion that is not being reported on in the media, is perceived to be less pervasive in society. This leads to less people holding this opinion to speak their mind, reducing the presence of this particular opinion even further—until a majority of people believes that their opinion is shared by only a select few. Similar phenomena have been observed in social media as well [11]. This complex mechanism can be seen as a direct consequence of the network effects of micro- and macro-structures in opinion networks [12]. Slight changes in the micro-structure of opinions can lead to large changes in the macro-structure of opinions.

From a social science perspective, one question that is important to understand regarding opinion forming is when do people actually change their opinion [13] regarding political topics. First insights indicate that deliberation, the rational *personal* discussion of political arguments, can lead to opinion changes at least in certain subgroups of society. The presence of heterogeneity in such discussions increases the likelihood of opinion changes. No such effect has been found in political deliberation in online media.

2.2 Polarization

If feedback mechanisms in opinion networks lead to macro-structure changes, the next question one might ask is, what are stable configurations of such structures. These depend on the heterogeneity of the underlying network structure [1]. Opinions may diverge into two or multiple separate clusters that show little common ground. The opinions have polarized. In other cases opinions converge on compromises. But what structures lead to what outcomes?

Simulation models such as the Shelling model of segregation [14] try to understand such processes from first principles. In the case of the shelling model: Does segregation occur from two simple rules? First rule – stay if more than $x\%$ of my neighbours are similar to myself. Second rule – move otherwise. Strong Segregation does occur if x is larger than 40%. Independently from individual differences, some phenomena occur predictably from structure alone[15].

When looking at opinion forming, the influence of fake news on polarization has been investigated [5]. Fake news are mostly believed if they confirm the presuppositions of the reader and thus reinforce preexisting beliefs. This concordance between fake news and own beliefs increases the positive feedback-loop and, as a consequence, may increase the speed and the extent of polarization of opinions. This is further complicated by the algorithms underlying social media that select what a user sees.

2.3   Selective Exposure And the Social Web

To improve customer time and to control customer attention on a social media web site, companies optimize and customize content for the individual user. The aim is to keep the user on the website longer, and to increase page-impressions of commercials. The underlying algorithms used to customize content are so-called recommender systems [16]. Content that is liked or frequently interacted with is compared to the content that other users like. Similar content is presented to the user to keep them interacting with the social media site. This leads to the so-called *Filter Bubble* effect proposed by [4] in 2011.

But how does the filter bubble affect political opinion making? The effect of customization and selective exposure on users has been recently investigated [17]. Dylko et al. found that the system-immanent customization features have the strongest effect on political opinion forming. Further, the effect is strongest in groups with ideologically moderate individuals and occurs most strongly with news that run against the beliefs of the user.

These mechanisms can be exploited by political campaign makers as supposedly during the Donald Trump presidential campaign in 2016. Here, possibly undecided voters were micro-targeted by analyzing personality from social media profiles and presenting them customized campaign ads [18]. Overall, it is yet insufficiently understood how the use of digital media affects political knowledge and participation in political deliberation and opinion forming [19]. Moreover, the effect media usage has on the perception of polarization has not been studied sufficiently. It is unknown what user diversity factors influence the perception of polarization.

3   Method

In order to study how media usage influences the perception of polarization we conducted an online survey. The survey was conducted in December 2016 in Germany. The survey structure is depicted in Fig.1. We assessed the following variables.

Demographics. In the survey we asked for the participants' age, gender, and level of education.

Media Usage. We also measured how frequently participants used a set of media. The set was *facebook*, *social media* in general, *newspapers*, *tv*, *radio*, and the *internet*. Usage frequency (UF) was measured on a six-point Likert scale (1
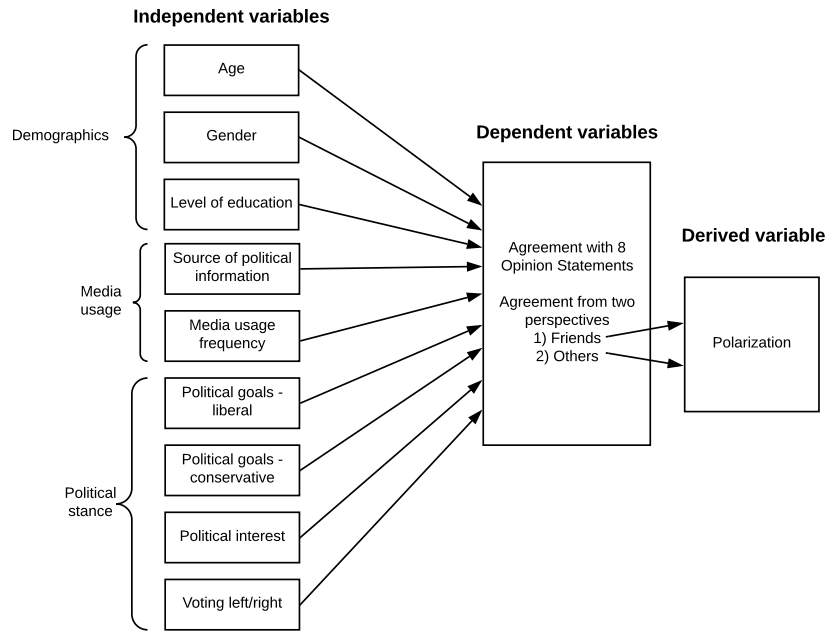
Independent variables

Fig. 1. Model of the investigated variables

- vary rarely, 6 - daily). We assessed to which of these media participants relied on as their source for political information (SPI) and added the category *friends* to assess non-media channels for political information. SPI was also measured on a six-point Likert scale (1 - not at all important, 6 - very important).

Political Stance. We further asked participants to rate a set of 10 items on their political opinion. These items were used in a principal component analysis which yielded two factors, one factor for the agreement with liberal political goals and one factor for a conservative political goals (see Table1). Interest in politics was measured using four items (i.e. *I am interested in politics.*, *I am interested in political events*, *I am interested in politics globally.*, *I am interested in politics in Europe.*). All measurements were conducted on six-points Likert scales (1 = low confirmation, 6 = high confirmation). Further we asked whether someone would vote for both right and left-wing parties.

In order to measure the difference in opinions in one owns social circle and the perception of agreement with these opinions in the general population, we presented the following opinions (see Table 2). All opinions were presented in a facebook-like comment as shown in Fig 2.

We then asked participants to rate on a scale of 0 to 100, how large the percentage of people is that would agree with such a statement. We explicitly instructed participants to estimate the real percentage and not the one present to them on social media. These topics were selected as some of them relate to polarizing topics, namely immigration and voting for the AFD. Lastly, we asked

Table 1. Item texts for political goales. The liberal scale showed a Cronbach's α of .794, the conservative scale one of .803.

Variable	I agree with the following goal:
Liberal 1	improvement of social security systems
Liberal 2	more social Justice
Liberal 3	more environmental protection
Liberal 4	more gender equality
Liberal 5	reduction of poverty
Conservative 1	more security and order
Conservative 2	more political stability and continuity
Conservative 3	more flexibility in the job market
Conservative 4	more support for top performers
Conservative 5	more national pride

participants whether or not they could imagine voting for the most left-wing party in the German party system (i.e. Die Linke) and the most right-wing party (i.e. AFD) on a six-point Likert scale (1 = very unlikely, 6 = very likely).

Fig. 2. Example forged facebook post

All participants were instructed that they were doing the survey on a voluntary basis and that no identifying data would be stored. We explicitly informed participants that we were going to ask sensitive topics, and that they should answer honestly without thinking what was "right" or "wrong". They should focus on their political opinion.

Participants were acquired by posting to various facebook groups. This convenience sampling method yields a high social media usage bias, which must be integrated when analyzing findings.

Table 2. Text used in individual opinion posts.

Variable	Opinion Text
womens' rights	Where are all the womens' rights organizations now? Women's dignity is being mistreated and nobody seems to care.
immigration	I would really like to know what this is all good for. Is Germany an immigration country now? I don't want this subordination to foreigners.
russia	Trump is going to approach Russia. This will make the world a safer place. Clinton threatened war with Russia, this was way too aggressive.
afd	The leftwing parties plan to not coalize with the CDU[1] and plan the downfall of our nation. The CDU should consider coalizing with the AFD.
afd2	CDU with Merkel has become left and green. The only conservative party remaining is the AFD. The quiet majority will cause a political earthquake in the next polls.
demosoc	We aim for a concrete goal. We fight for a society, with no kids in poverty, for self-determined peace, dignity, and social security, where we can construct a democratic society. We need a different economic system: a democratic socialism.
leftdisconnect	All these complains lead nowhere. Nobody wants TTIP or CETA. If there is going to be a surge in right wing parties, it's the leftwing governments fault. [2]
immigration2	I give away half of income for high social and educational standards, but when our government floods our country with countless, uneducated religiously fanatic, and aggressive economic refugees that want to exploit our country, I say stop! Stop destroying our children's future.

3.1   Statistical Methods

We analyzed all data using R version 3.3.2 using RStudio. We conducted correlation analysis using the *corrplot* package. Principal component analysis and reliability analysis was conducted using the *jmv* package. Likert data was analyzed using the *likert* package. For the principal component analysis we use the KMO and Bartlett criterion to test for sampling adequacy and sphericity/homogeneity of variances. We further use the simulation of the *jmv* package and the eigenvalue screeplot to determine factor count. All items with cross-loadings of more than .4 were removed. These items are no longer reported here. We use Cronbach's α to measure internal reliability and only use scales that are larger than $\alpha > .7$, indicating good internal reliability.

All data is reported using 95% confidence intervals. For null-hypothesis significance testing we set the level of significance to $\alpha = .01$. This means that when we find a correlation or difference in means, only 1 out of 100 samples would show a result as ours, even if no correlation or difference in means existed in reality. Given our sample size of 179 people we achieve a 95% power $(1 - \beta)$ for correlations larger than $r > .239$, and differences in means for within-subjects comparisons that are larger than $D > .271$ (Cohen's D). This means if an effect is present in reality there is a 95% chance that with a sample of our size the

effects larger than these thresholds would be present in the sample, given it were a truly random sample. We use non-parametric correlations (Spearman's ρ) if ordinal scales are used, otherwise Pearson's r is reported.

4   Results

We first look at the results from a descriptive point of view to understand how our sample looks like. From our 179 respondents 63 were male 116 were female. This ratio indicates a strong over-representation of female participants. The mean age of participants was 28.5 years with a standard deviation of 9.4 years.

Our participants reported to use the Internet on a daily basis, similarly social media in general. Facebook was used multiple times per week and more traditional media such as tv, radio and newspapers were used only a few times per week (see Fig. 3). Newspapers are used least frequently.

Usage frequency of different media


Error bars denote 95% confidence intervals.
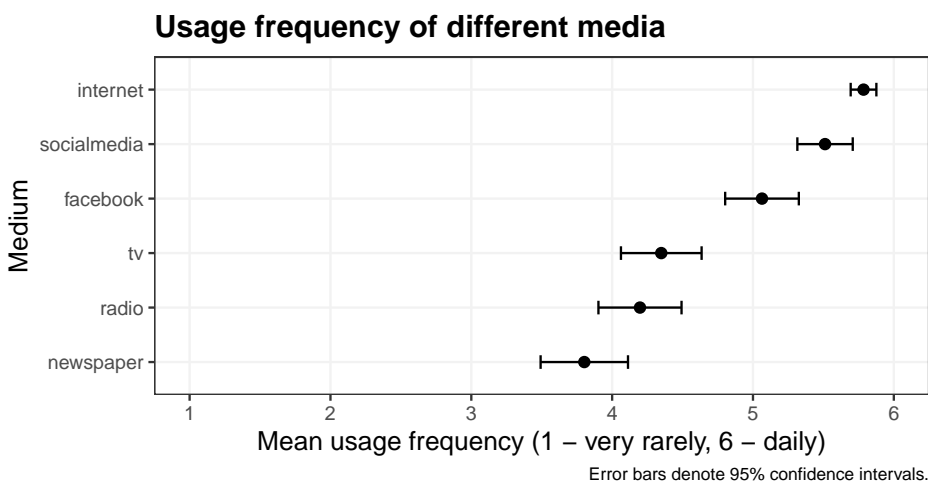
Fig. 3. Users report to use the Internet most frequently and the newspaper least frequently.

When asked where the participants go for political information a different picture unearths. Participants do report to consult the Internet as a source of political information most importantly, but immediately afterwards real social connections—namely friends—are placed. This is followed closely by the TV, radio and newspapers, while social media and facebook are considered least important as a source of political information (see Fig. 4).

Facebook users tend to also be social media users in general (Pearson's $r = .66$, $p < .001$), and radio listeners also watch TV ($r = .31$, $p < .001$). The more frequently persons use the Internet the more often they read newspapers ($r = .2$, $p < .01$) and the more often they listen to the radio ($r = .21$, $p < .01$).

Source of political information
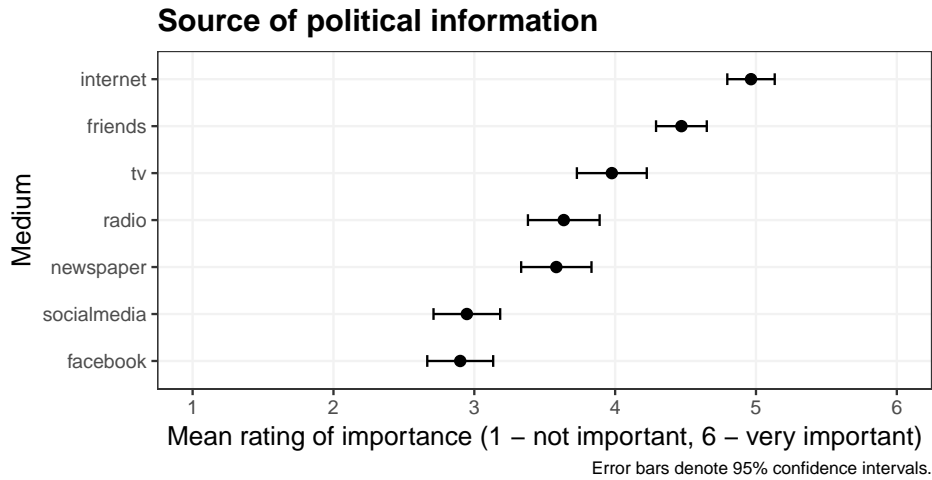
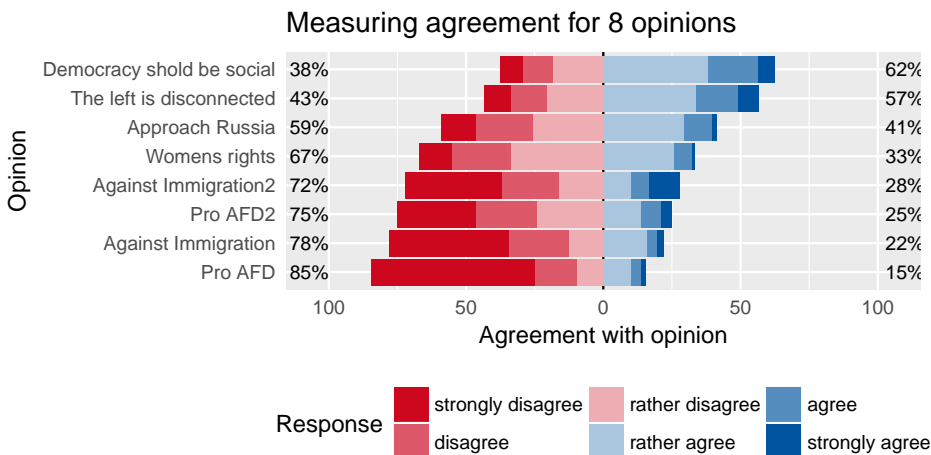Fig. 4. Where do our participants get their information about political events?

When asked about how strong the political interest is present using our four item scale we find a mean of $M = 4.63$ (SD=1.08), thus a rather high reported political interest. Participants showed a relatively high agreement with politically conservative goals ($M = 3.98$, $SD = 0.92$), and an even stronger agreement with politically liberal goals ($M = 4.81$, $SD = 0.86$).

We find an effect of gender on some of these variables. Women report to have a lower political interest than men ($t(155) = 2.68$, $p < .01$, $D = 0.442$). They further show higher agreement with liberal ($t(150) = -3.14$, $p < .01$, $D = -0.522$) but not conservative goals ($t(150) = -2.22$, $p = .028$, n.s.). They are also, on average, 3.8 years younger than the men in our sample ($t(177) = 2.77$, $p < .01$, $D = 0.434$). Age and the agreement with conservative political goals correlates ($r = .21$, $p < .01$) positively. Older participants do agree more strongly with conservative goals. When looking at reporting voting behavior voting left-wing correlates with political interest ($r = .31$, $p < .01$), liberal political goals ($r = .37$, $p < .01$) and negatively with conservative political goals ($r = -.26$, $p < .01$) and age ($r = -.21$, $p < .01$). Voting right-wing only correlates negatively with liberal political goals ($r = -.47$, $p < .001$). Interestingly the more one agrees with liberal political goals, the more they rely on friends as their source of political information ($r = .29$, $p < .001$).

4.1 Evaluating opinions

Next we look at how participants rated the opinions presented to them using our forged facebook posts. The highest personal agreement is seen for the item *demosoc*, which measures whether a person agrees with the opinion that democracy should be social (or even socialist). The next strongest agreement is given for the perception that the government and their leftwing orientation have dis-

connected from what people really want (see Fig. 5). Approaching Russia and enforcing women's rights follow and opinions that criticizes immigration and propagate voting for the AFD are the last on the list, when participants are asked, how much they agree with these opinions.

Measuring agreement for 8 opinions

Opinion	Disagree %		Agree %
Democracy shold be social	38%		62%
The left is disconnected	43%		57%
Approach Russia	59%		41%
Womens rights	67%		33%
Against Immigration2	72%		28%
Pro AFD2	75%		25%
Against Immigration	78%		22%
Pro AFD	85%		15%

Agreement with opinion

Response: strongly disagree, disagree, rather disagree, rather agree, agree, strongly agree

Fig. 5. Comparison of agreement with 8 opinions as seen for ones friends and other people in society.

More interestingly, when comparing how participants perceive these opinions to be pervasive in either their friends or in society in general, an interesting picture appears (see Fig. 6). For almost all topics the pervasiveness of an opinion is seen more strongly in society than in the individuals' friends group. However, only for the topic of immigration, AFD and the disconnect of the left-wing government do these differences become significant (within-subject t-tests: $p < .001$). When using within differences of means we can derive a score of perceived polarization.

Perceived polarization refers to the extent that a person perceives an opinion to be diverging from society in general and his own peer group. For example, if I believe that the average citizen is very strongly against gun-control, but me and my friends are very strongly advocating gun-control, it can be said, that I have a perception of polarization for the topic of gun-control. We now look at polarization for the individual opinions in the study (see Fig. 7. We can see that the strongest polarization can be seen for the topics of immigration, voting for the AFD, and the disconnect of the left-wing government—as previously shown by t-tests.

Next it is interesting to see, which of the independent variables influences polarization. When using principal component analysis to analyze the factorial structure of polarization a single factor solution becomes apparent. When drop-
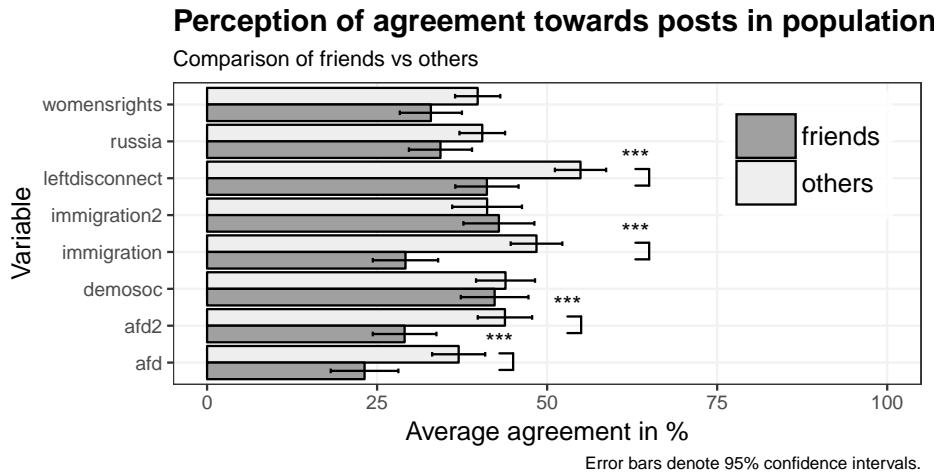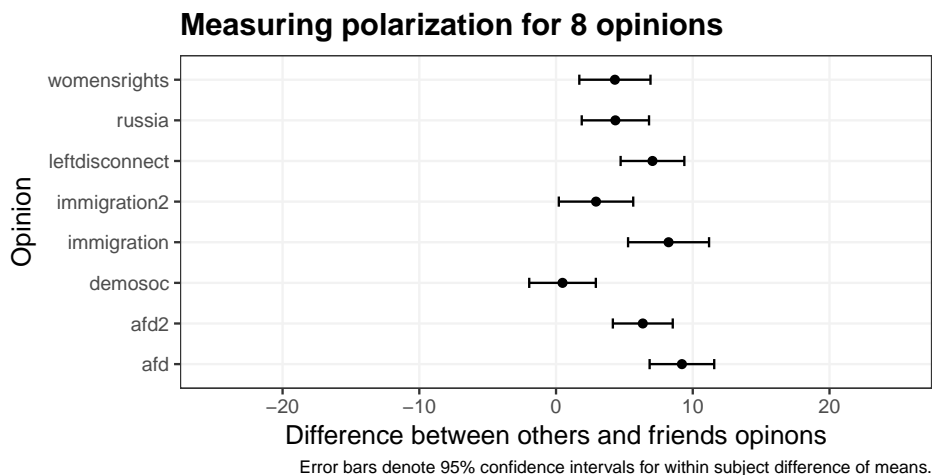
Perception of agreement towards posts in population

Comparison of friends vs others

Error bars denote 95% confidence intervals.

Fig. 6. Comparison of agreement with 8 opinions as seen for ones friends and other people in society.

ping the item *immigration2* a single scale with a reliability of Cronbach's $\alpha = .81$ results.

When running correlation analysis on this new polarization scale, we find only two variables correlate with it. First, usage frequency of social media ($r = .22$, $p < .01$) and second, usage frequency of facebook ($r = .23$, $p < .01$). This indicates that the perception of polarization increases with the use of social media and in particular with the use of facebook. It is independent of the agreement with either political goals, or political interest, or even age and gender. There is a difference in means between sexes ($D = 0.435$), however it is not statistically significant ($p = .012$) on the significance level set.

5   Discussion

The results from our study indicate that the perception of polarization of opinions is existent in the sample and has associations with the use of social media. Simply put, people who use social media and facebook in particular more often, tend to see polarization more strongly than those who use it less frequently. It is interesting to note, that not the reported source of political information has an influence on polarization, but the mere usage frequency of social media. It is the overall amount of social media usage that is predictive of perceptions of polarization, not the explicit search for political information in social media. It seems to be that an (possibly subconscious) exposure effect might affect how polarization is at work. The perception of how much an opinion is shared in the general population typically has no "ground truth". So the estimation of this is typically conducted using mental heuristics. For example: "How often do I see or hear about this opinion" is a proxy for "How many people have this opinion".

Measuring polarization for 8 opinions

Error bars denote 95% confidence intervals for within subject difference of means.

Fig. 7. Comparison of agreement with 8 opinions as seen for ones friends and other people in society.

From a social science perspective, this is interesting, as a similar heuristic is at play when risk judgments are made. The availability heuristic, which is fine-tuned to tribal life, where every meaningful event is either perceivable directly or by hearsay, fails to adjust for both mass and digital social media. The frequency of public opinion forming is heavily biased towards the polarized states, as people with centric views, rarely rally in social media crying out for a less heated debate.

As taking part in on online discussion requires users to overcome a motivational threshold—"This is important enough for me to actually type in something"—no opinion of little affective value will induce pages of comments. This "natural" state of social participation in social networks leads to a more polarized state in social media. How much the opinion space in social media actually diverges from the opinions held by the general public needs to be established, yet. Also whether users actually compensate for this distortion cognitively must be investigated in future research. It could be that users are aware of this phenomenon consciously or subconsciously and only use social media as an indirect indicator. One could argue that effects such as the *anchoring effect* to still impact to what extent polarization is perceived, yet similar things could be said about more traditional media such as TV and radio. It could also be that for these media a better understanding of distortion is present in the general public, so that news are filtered and corrected for.

The question of what the *true* proportion of people with a certain opinion is irrelevant for the questions asked in our study. We focus on the perception of polarization. It could be interesting to investigate the true proportion using indirect means such as social media mining and direct means using representative surveys. But, recent events such as the opinion polls about Brexit have shown,

that even representative sampling does not immunize against the high volatility and dynamic of opinion shifts. Opinion forming itself can be considered a chaotic system, as the individual parts (i.e. the people) adjust opinion depending on their belief about opinions. Thus, feedback loops are unavoidable. The opinion poll itself becomes the reason for opinion changes.

5.1 Limitations and Future Work

The study we conducted was performed using convenience sampling and yielded a heavily biased result. The findings must be interpreted in the light of this bias. First, the sample over-represents younger females with high education and confounds age and education. In our sample these are negatively correlated. When the young in our sample are also the educated, findings relating age and education might be inverse to what typically is present in a representative sample. This must be considered when generalizing our results. Nevertheless, the findings indicate that a skewed perception of polarization in society correlates with social media usage. Future work will have to investigate how this bias translates to other social groups and other types of media.

The opinions we used were taken from real discussions on facebook and then anonymized and without changing the wording reduced to possibly singular topics or domains. However, we still think that some of the opinions do "crossload" to other opinions. In future studies we aim for less realism and would try to create opinions that stem from more singular domains. In order to determine domains, it would be helpful to use topic modeling approaches of social media posts (e.g. latent dirichlet allocation) and then manually construct opinions that only load on singular topics.

5.2 Conclusion

In this paper we investigated the effect of media usage and user diversity factors on agreement with political opinions and the perception of polarization between the individual's peer group and the general population in Germany. We found that the perception of polarization was most prevalent in topics with right-wing political agendas. The strongest correlate with perceptions of polarization was the usage frequency of social media and facebook. Our results indicate that polarization is domain-specific, user dependent, and possibly not symmetrical. Further studies will have to investigate how these findings translate to an improved understanding of opinion forming in digital media communication.

6 Acknowledgments

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