Homogeneity on Social Networking Sites: Evaluating Users' Perceptions[1]

Research Report

Manuel Cargnino & German Neubaum
Junior Research Group: Digital Citizenship in Network Technologies

Homogenität auf sozialen Netzwerkseiten: Wie Nutzende sie wahrnehmen
Forschungsbericht

global young faculty

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[1] All data used for this research report can be publicly accessed within the OSF. For further information, please contact us: manuel.cargnino@uni-due.de

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1. SUMMARY

1.1 Key Findings

- Social media users perceive their social networks – online and offline – overall as moderately similar to themselves

- The level of perceived homogeneity varies slightly along different dimensions (e.g., skin color and financial status of one's network)

- Perceived homogeneity varies – to a limited extent – between online and offline communication
  - Offline homogeneity is perceived as higher than online homogeneity regarding individuals' residential area, financial status, and professional interests
- Perceived homogeneity of political opinions and ideologies does not differ between online and offline communication

- Ideological extremity and frequency of social media use is positively, albeit weakly, associated with online homogeneity perceptions

- A considerable percentage of social media users does not feel able to gauge similarity between them and their online and offline ties

1.2 Hauptbefunde

- Nutzende sozialer Medien empfinden ihre sozialen Netzwerke insgesamt als moderat ähnlich zu ihnen
- Das Ausmaß an wahrgenommener Homogenität variiert minimal zwischen verschiedenen Dimensionen
- Wahrgenommene Homogenität unterscheidet sich leicht zwischen Online- und Offline-Kommunikation. Homogenität politischer Meinungen und Ideologien wird von Usern für Online-Netzwerke jedoch nicht höher eingeschätzt als für Offline-Netzwerke
- Ideologische Extremität und Häufigkeit der Nutzung sozialer Medien hängt positiv, wenngleich schwach, mit der Wahrnehmung von Online-Homogenität zusammen
- Ein substanzieller Teil der User kann Ähnlichkeiten innerhalb der eigenen Netzwerke nicht einschätzen

2. BACKGROUND

Homogeneity and related concepts such as homophily have been extensively researched in different disciplines such as social psychology (e.g., Pickett & Brewer, 2001; Simon & Brown, 1987; Simon & Pettigrew, 1990), sociology (e.g., McPherson, Smith-Lovin, & Cook, 2001; Smith, McPherson, & Smith-Lovin, 2014), or communication studies (e.g., McCroskey, Richmond, & Daly, 1975). In conceptual terms, the present report refers to perceived homogeneity as the extent to which individuals assess their social environment to be similar to themselves. This subjective assessment of similarity, though, can occur along different dimensions as suggested by the notion of multidimensional homophily (Block & Grund, 2014): ethnical background, financial status, educational level, sexual orientation, religion, or political ideology, etc. When investigating these dimensions, sociological research has corroborated empirically the existence of homophily in social networks in the sense that people who are alike, for instance, in race (Quillian & Campbell, 2003), religion (Leszczensky & Pink, 2016), family affluence (Block & Grund, 2014), education (Skopek, Schulz, & Blossfeld, 2011), or political ideology (Huber & Malhotra, 2017) are more likely to get acquainted with each other than those who are not (for an overview, please see Smith et al., 2014).

Reasons for homophily can be found in social psychology: Similarity in interpersonal relationships makes it easier to predict others' behavior and, therefore, facilitates developing mutual trust (Festinger & Hutte, 1954; Singh et al., 2015), so that human beings – be it consciously or unconsciously – strive for similarity in their social environment. In terms of personality traits, it was found that those with a higher need for cognitive closure (i.e., stronger desire for definite answers) find it more appealing to connect with people with whom they share realities (Kruglanski, Shah, Pierro, & Mannetti, 2002). This striving for a congenial interpersonal environment can manifest itself in either selecting or actively exposing oneself to social ties based on the criterion of similarity or aligning oneself and one's changeable attributes (e.g., political attitudes) to one's social environment (Byrne, 1961; Deutsch & Gerard, 1955; Huber & Malhotra, 2017; Lazer, Rubineau, Chetkovich, Katz, & Neblo, 2010).
The phenomenon of homophily has received much scholarly attention since the degree of homogeneous clusters in larger networks can be indicative of social fragmentation, that is, a disconnection between different subgroups with in-group versus out-group biases in society (Bishop, 2008; Smith et al., 2014). Fragmentation, in turn, is thought to foster a series of negative outcomes in democratic societies such as individuals in homogeneous groups becoming narrow minded and polarizing themselves (Dahlberg, 2007; Sunstein, 2002). Still, in-group homogeneity can also have positive social psychological effects such as developing a positive social identity, having a sense of belongingness, and fostering social cohesiveness which, in turn, increases collaboration and improves group performance (Evans & Dion, 2012; Robbins & Krueger, 2005; Simon & Pettigrew, 1990).

The discussion of potentially detrimental effects of homogeneous groups on society has become even more pronounced with the emergence of social media technologies. Since these technologies allow individuals to allegedly be even more selective with the composition of their social network and, therefore, their information sources and interaction partners, concerns arose that users could withdraw themselves from public deliberation into so-called "echo

chambers," wherein they are surrounded by similar and/or like-minded others (O'Hara & Stevens, 2015; Sunstein, 2017; Taylor et al., 2018). These concerns, in turn, prompted a line of network analyses that focused on political homophily and identified that, indeed, social media users are more inclined to get connected to users with a similar political ideology than with ideologically dissimilar others (e.g.,Bakshy, Messing, & Adamic, 2015; Barberá, Jost, Nagler, Tucker, & Bonneau, 2015; Boutyline & Willer, 2017; Colleoni, Rozza, & Arvidsson, 2014).

When it comes to estimate the level of like-mindedness in online communication, an alternvative approach, though, could be to directly ask social media users to what extent they perceive their online network to be similar to themselves. In this regard, though, it has to be considered that human beings have been found to overestimate their similarity with their in-group or social environments in general (Goel, Mason, & Watts, 2010; Krueger & Clement, 1995; Robbins & Krueger, 2005). In fact, a study revealed that while Facebook users would estimate their political agreement with a typical Facebook friend to be 78%, it is actually 67% (Goel et al., 2010). The authors come to the conclusion that individuals do not accurately perceive the disagreement prevalent in their online environment.

Considering this gap between perceived and actual similarity with one's social network, the present report is intended to offer a descriptive overview of the extent to which individuals perceive homogeneity in their networks. While related previous works have focused on either online or offline homogeneity, this report presents evidence regarding both communication channels and offers a systematic comparison of subjective homogeneity in face-to-face and online encounters. Homogeneity, moreover, is not only measured on a political level, but also along further dimensions that have been considered by homophily research (Block & Grund, 2014; Smith et al., 2014). Besides offering evidence on perceived homogeneity online and offline, this report provides preliminary evidence on the socio-demographic and psychological dispositions that might be associated with different levels of perceived homogeneity.

3. METHOD

All data included in this report were originally collected within the context of an online experiment investigating the contact hypothesis in social media communication and are used here as part of a secondary analysis. Sampling was carried out by the *respondi AG* which provides a survey panel with representative pools of research subjects. Data were collected from August 30th, 2018, until September 5th, 2018. We used data on perceived social network homogeneity, need for cognitive closure, social networking site use, political ideology, and demographics within this report. Participants provided informed consent before participation and were debriefed after concluding the study. The study was approved by the local IRB.

3.1 Sample

To participate, subjects were required to have a Facebook account and to be at least 18 years old. This led to a final sample of N = 1086 which was approximately representative with regard to age and gender of German Facebook users (our sample was somewhat older and included relatively more female participants, see Table 1 and Figure 3, see also, Gesellschaft für Integrierte Kommunikationsforschung, 2017). Figures 1 and 2 show the sample distributions of profession, education, and social networking site use. It appears that Facebook users are mostly not active on other networking platforms (Figure 1a). Among the platforms, Facebook was also

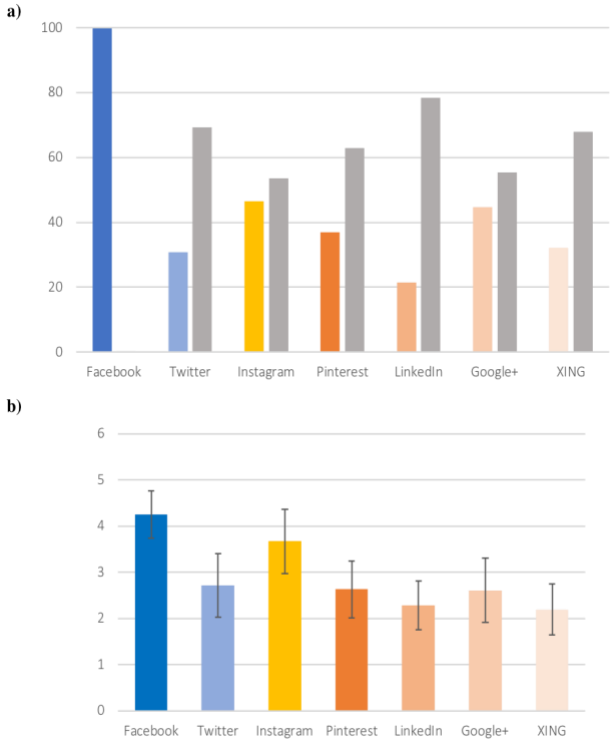

Figure 1. a) Percentage of subjects who use social media platforms (grey bars: non-use), b) Frequency of social media use (error bars: standard deviations).

network to be similar to themselves regarding a variety of dimensions, such as political opinion, personal interests, and age (see Table 2).

Need for Cognitive Closure

Need for cognitive closure was assessed by a German 19-item version of the NFCC short-scale (Von Collani, 2003; Webster & Kruglanski, 1994). Subjects were shown 19 statements regarding their individual preference for structure and order, e.g. "I believe that clear rules and structures at work are critical to success." (1: strongly disagree, 6: strongly agree).

Social Media Use

We assessed frequency of social media use (Facebook, Twitter, Instagram, Pinterest, Google +, Xing, LinkedIn) by the item "How often to you access the following social networking platforms?" (1: rarer than once in a couple of weeks, 5: several times per day).

the most frequently used which results from our participation criteria, but also resembles the significance of Facebook in German user populations (Frees & Koch, 2018). It appears that intense Facebook users are also using Instagram with high frequency. Yet, while frequency of Instagram use is related to younger age (r = -.40, p = .01) and is higher among female users (M_{female} = 3.91, SD_{female} = 1.35; M_{male} = 3.38 , SD_{male} = 1.37 ; *Cohen's* d = 0.39), Facebook is equally used by older and younger subjects. Lastly, our sample appeared to differ from the German Facebook population in terms of education which was somewhat higher in the present sample.

3.2 Measures

Perceived Social Network Homogeneity

Subjects were asked to state to what extent they perceive their offline and online social

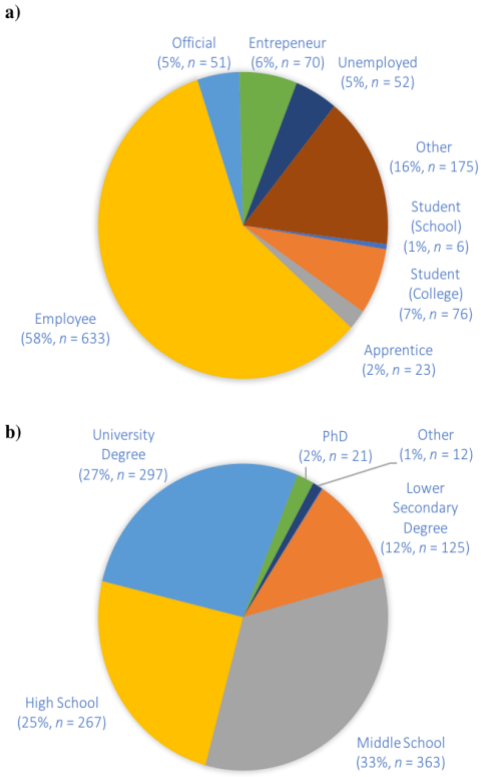

Figure 2. Sample distribution of a) profession and b) education.

Table 1
Sample distribution of age and gender.

N		1086
Age	*M / SD*	42.85 / 13.85
	Min. / Max.	18 / 89
	18 - 29 (%)	217 (20)
	30 - 39 (%)	250 (22.1)
	40 - 49 (%)	274 (25.2)
	50 - 59 (%)	259 (22.3)
	60 - 95 (%)	86 (9.5)
Gender	*Female (%)*	568 (52.3)
	Male (%)	516 (47.5)
	Other (%)	2 (0.2)

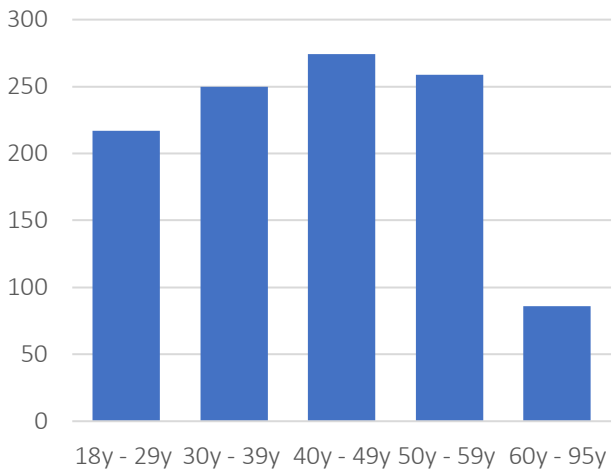

Figure 3. Absolute frequency of age groups.

Table 2
Assessment of perceived homogeneity of online and offline social networks.

Instruction (Online Homogeneity):
Now, if you think about your network on the internet (for example, Facebook friends or Twitter followers, or people you follow on Twitter), how similar are these people to you?

Instruction (Offline Homogeneity):
Now, when you think of the people you encounter face to face in everyday life (outside the internet), how similar are these people to you?
Please express the similarity using the following properties.
(1: not at all similar, 2: not similar, 3: partly similar, partly dissimilar, 4: similar, 5: very similar, rest category: I cannot judge)

1) Skin color
2) Appearance (e.g., clothing)
3) Private interests (e.g., sports, music, art)
4) Professional interests
5) Sexual orientation (e.g., heterosexual, gay, bisexual)
6) Age
7) Religion
8) Education
9) Opinions (in relation to political, social issues)
10) Country of origin (i.e., country of birth)
11) Political ideology (liberal or conservative)
12) Gender
13) Current residential region
14) Financial status (e.g., in terms of income level)

Political Ideology, Extremity and Demographics

Political ideology was assessed via an ideological self-assessment by the following item: In politics there is the "left" and the "right." Where would you personally locate your political ideology? (1: left, 11: right). Ideological extremity was calculated by folding subjects' ideological self-assessment, i.e., values were transformed into the modulus of their deviation from the scale midpoint (6). Thus, higher deviations from the scale midpoint indicated higher ideological

extremity (see Table 3 for descriptive values). We furthermore assessed subjects' age, gender, profession, and education.

Table 3
Descriptive values of our measures.

		N	*MIN*	*MAX*	*Mean*	*SD*	*Skewness*	*Kurtosis*
Correlates	Twitter Use	334	1	5	2.72	1.37	0.25	-1.18
	Instagram Use	505	1	5	3.67	1.38	-0.65	-0.85
	Pinterest Use	402	1	5	2.63	1.22	0.28	-0.83
	LinkedIn Use	234	1	5	2.28	1.06	0.42	-0.61
	Facebook Use	1083	1	5	4.25	1.02	-1.35	1.18
	Google+ Use	484	1	5	2.61	1.38	0.37	-1.08
	XING Use	349	1	5	2.19	1.10	0.63	-0.40
	Political Ideology	1086	1	11	5.62	2.11	-0.02	-0.12
	Ideological Extremity	1067	0	5	1.72	1.17	0.71	-0.22
	Need for Cogn. Closure	1086	1	5.26	3.66	0.56	-0.53	1.84
Online Homogeneity	Opinions	870	1	5	3.29	0.77	0.04	1.08
	Ideology	801	1	5	3.28	0.87	-0.24	0.75
	Education	923	1	5	3.33	0.75	-0.02	1.04
	Appearance	899	1	5	2.99	0.74	-0.35	1.39
	Private Interests	946	1	5	3.32	0.82	-0.12	0.91
	Professional Interests	865	1	5	2.86	0.87	-0.17	0.49
	Country of Birth	969	1	5	3.55	1.03	-0.37	-0.05
	Age	996	1	5	3.23	0.82	-0.12	0.91
	Gender	983	1	5	3.1	0.71	0.17	2.97
	Financial Status	774	1	5	2.91	0.83	-0.34	0.84
	Sexual Orientation	804	1	5	3.5	1.01	-0.35	0.2
	Religion	740	1	5	3.1	0.97	-0.26	0.35
	Place of Residence	959	1	5	3.02	0.93	-0.15	0.28
	Skin Color	970	1	5	3.66	1.03	-0.41	-0.04
Offline Homogeneity	Opinions	902	1	5	3.28	0.73	0.18	1.27
	Ideology	852	1	5	3.34	0.79	-0.09	1.04
	Education	963	1	5	3.3	0.78	0.09	0.94
	Appearance	993	1	5	3.11	0.73	-0.05	1.13
	Private Interests	945	1	5	3.26	0.79	0	0.83
	Professional Interests	921	1	5	3.12	0.81	-0.05	0.83
	Country of Birth	995	1	5	3.61	1.01	-0.27	-0.13
	Age	1021	1	5	3.21	0.78	0	1.06
	Gender	1014	1	5	3.13	0.64	0.41	3.94
	Financial Status	873	1	5	3.11	0.77	-0.14	1.2
	Sexual Orientation	872	1	5	3.53	0.94	-0.23	0.29
	Religion	829	1	5	3.2	0.93	-0.14	0.56
	Place of Residence	1003	1	5	3.63	0.93	-0.25	-0.02
	Skin Color	1009	1	5	3.69	0.97	-0.27	-0.2

Note. Variables listed next to "Online (Offline) homogeneity" are the perceived homogeneity of social ties on the various dimensions. *N*s vary due to "I don't use" / "I cannot tell" answers which are not represented here. Values of Need for Cognitive Closure base on scale means.

4. RESULTS

4.1 Overall Level of Perceived Homogeneity in One's Network

As there has so far been no systematic analysis of different dimensions of perceived network homogeneity for online and offline communication settings, we first assessed homogeneity on a global and descriptive level. Consequently, we statistically compared different dimensions of homogeneity in two different communication channels – offline and online social networks.

Figure 4 shows the shares of subjects who rated their social ties as either similar or very similar to themselves regarding each dimension and communication channel.

- **Politicial opinions:** 26% stated that their online and offline ties are similar or very similar to themselves with regard to political opinions (while between 48 and 52% perceived them as partly similar, partly dissimilar)
- **Political ideology:** Between 26 and 28% perceived their ties as similar or very similar when it comes to ideologies (while between 40 and 44% perceived them as partly similar, partly dissimilar)
- **Skin color**: About 50% of subjects felt their contacts to be similar or very similar to themselves (while about 37% felt them to be partly similar and partly dissimilar)
- **Country of birth**: About 45% indicated that their online and offline ties are similar or very similar to themselves in this respect (between 36 and 40% indicated partly similar, partly dissimilar here)
- **Gender**: Only 15% of subjects found their online and offline ties to be similar or very similar to themselves when it comes to gender (between 68 and 73% perceived them partly similar, partly dissimilar)
- **Physical appearance:** 15% rated their online ties as similar or very similar in this regard, while 22% did so for offline ties (between 53 and 57%: partly similar, partly dissimilar)
- **Place of residence**: 22% perceived their online ties to be similar or very similar to themselves in terms of the geographical place they live, offline 48% did so (while 38% perceive their offline, 47% their online ties to be partly similar, partly dissimilar)

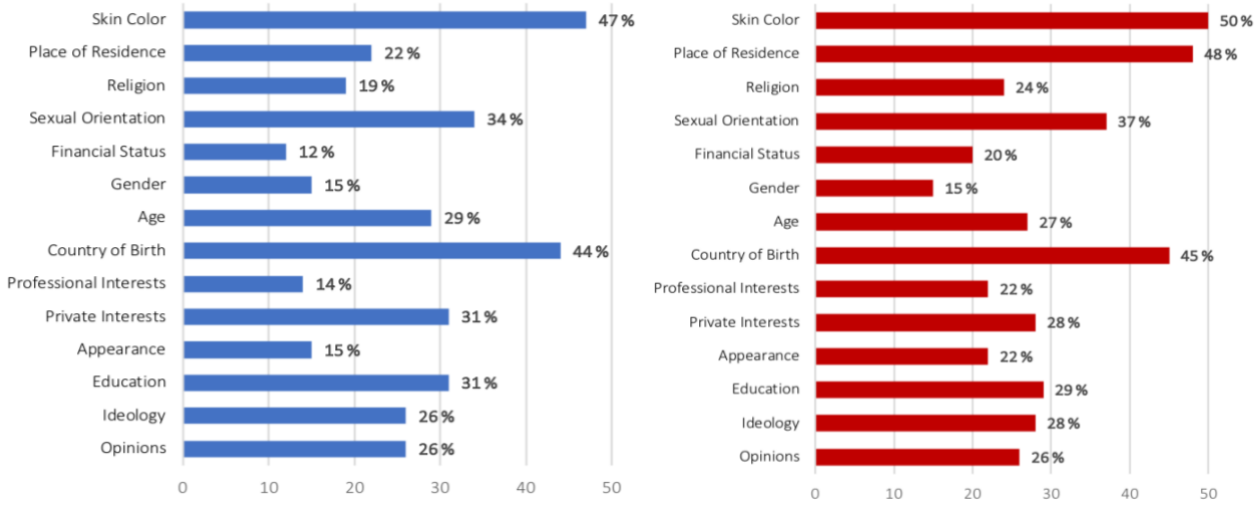

Figure 4. Distribution of "similar" and "very similar" responses of network (blue) and offline (red) ties.

Figure 5 shows the means and standard deviations (displayed as error bars) of perceived homogeneity split up for the various dimensions. Subjects perceived their online and offline networks as moderately similar to themselves with respect to nearly all dimensions. Yet, some dimensions differed between each other. An analysis of variance (ANOVA) for repeated measures with dimension of homogeneity (14 dimensions) and setting (online, offline) revealed a significant main effect of the dimension, $F(13, 3830) = 50.18$, $p < .001$, $\eta_p^2 = .10$ (see Figure 6).

- Some socio-demographic characteristics are perceived as particularly homogeneous, i.e., skin color, sexual orientation, country of origin, and residential area of offline ties. These dimensions differ significantly from all other dimensions
- Sex, financial status, professional interests, and appearance are perceived as relatively heterogeneous. Mean homogeneity ratings are significantly lower than for most other dimensions
    - Overall though, homogeneity perceptions are quite similar across dimensions

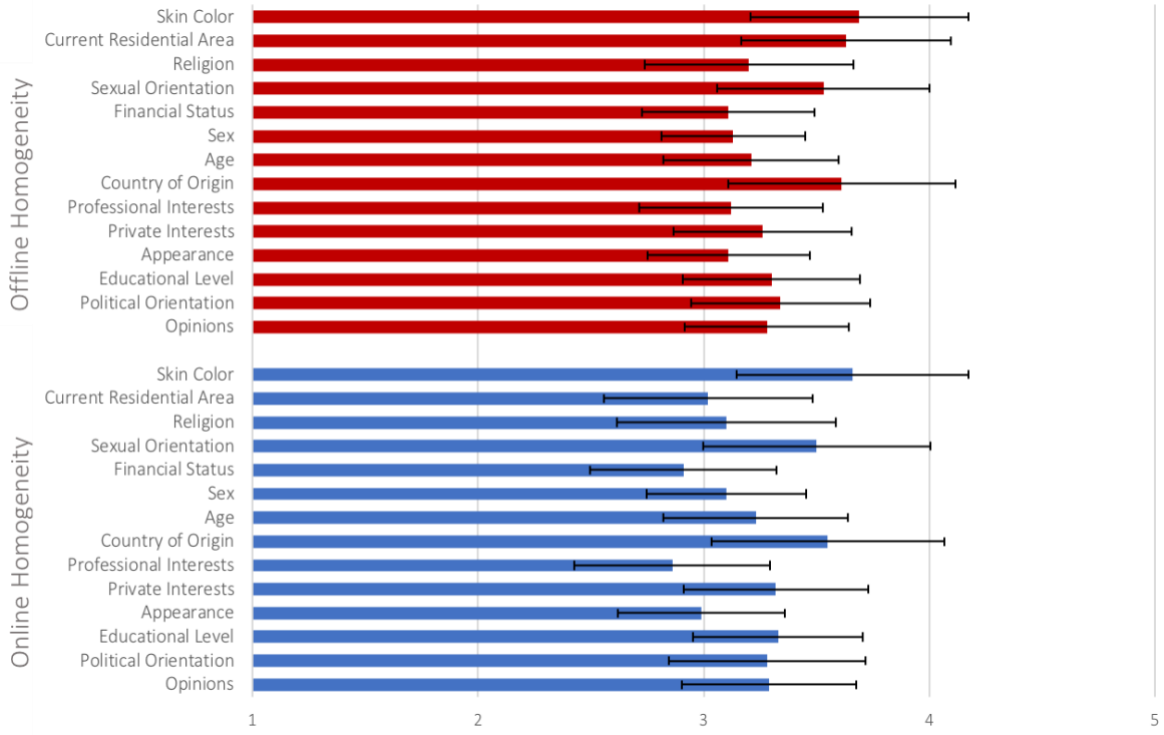

Figure 5. Dimensions of perceived homogeneity. Means and Standard Deviations (error bars).

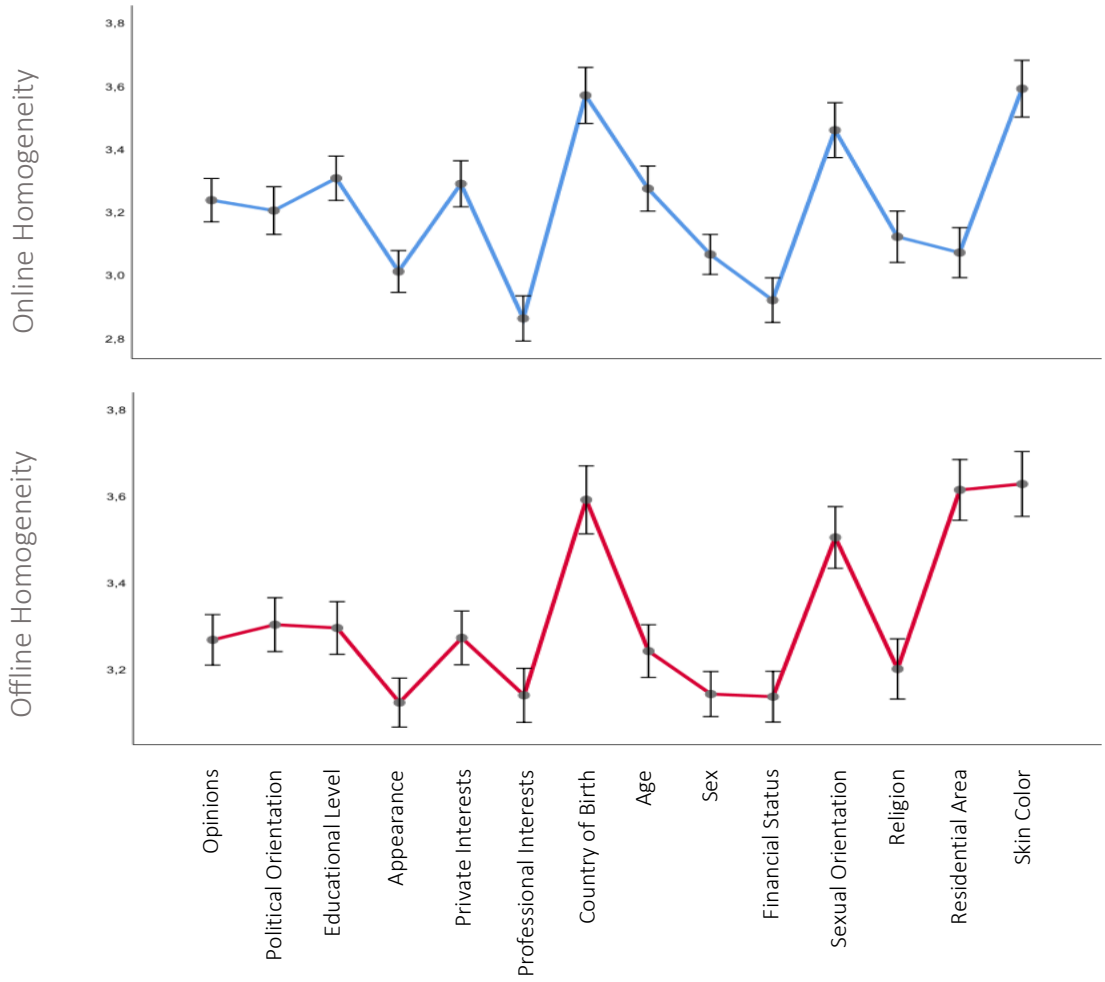

Figure 6. Differences between dimensions of perceived (online and offline) social network homogeneity. Error bars indicate the 95% confidence interval. Non-overlapping confidence intervals represent significant differences at $p < .001$.

4.2 Comparison of Perceived Homogeneity in Offline versus Online Communication

Perceptions of homogeneity online and offline are strongly related to each other when summarizing them across dimensions ($r = .73$, $p = .01$). For most of the dimensions, mean homogeneity ratings are quite similar. Subjects seem to perceive their ties as rather similar to themselves regardless of whether they refer to their environment in social networking sites or face-to-face interactions. Yet, as there also were certain differences with regard to dimension and setting, the ANOVA reported above additionally revealed a significant main effect of the communication channel, $F(1, 472) = 23.60$, $p < .001$, $\eta_p^2 = .05$, see also Figures 7 and 8.

- Perceived similarity of political opinions and ideologies do not differ between online and offline networks which does not support to the notion that politically homogeneous echo chambers and filter bubbles are especially prevalent in online communication (Sunstein, 2017)
- There is a weak difference between online and offline homogeneity perceptions regarding the current residential area, financial status, and professional interests. Offline contacts are perceived as more similar on these dimensions than online contacts
    - This is in accord with the notion that online networks have the potential to bridge spatial and social barriers (Ellison, Steinfield, & Lampe, 2007)

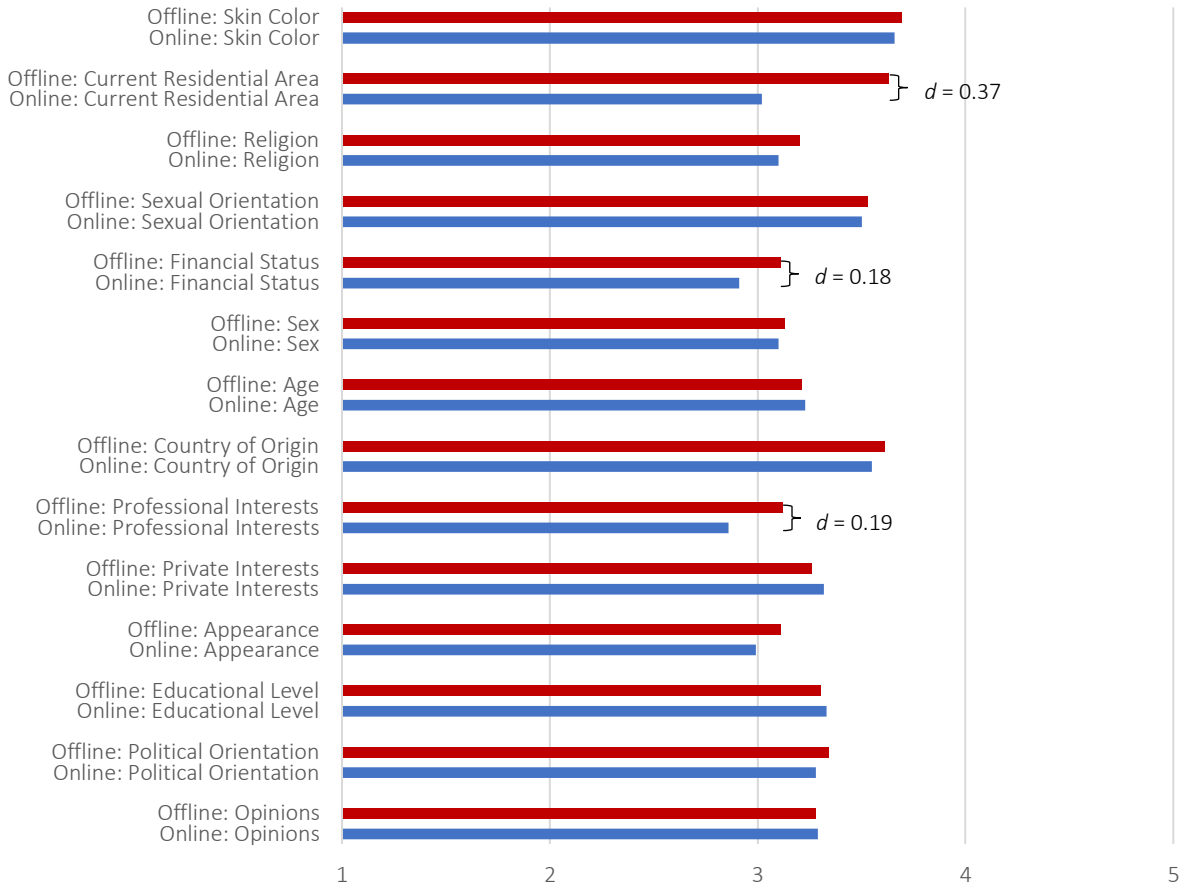

Figure 7. Comparison between perceived online and offline network homogeneity. Highlighted differences are significant at p < .001.

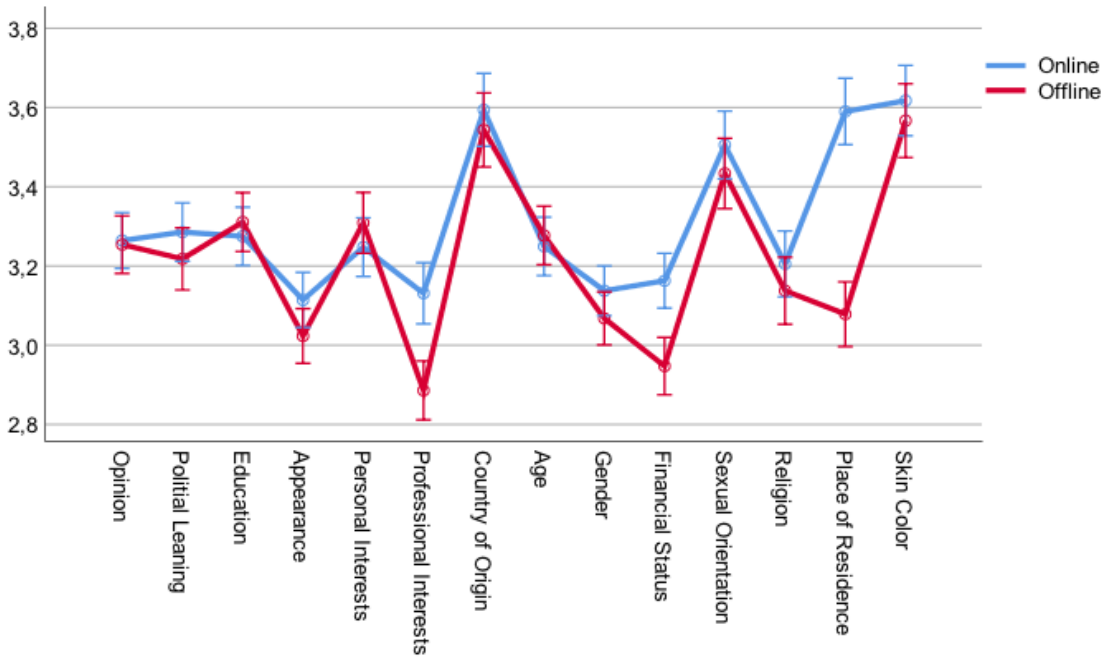

Figure 8. Profile plot of perceived network homogeneity online and offline. Error bars indicate 95% confidence interval.

4.3 Limits of Subjective Assessability of Homogeneity

We found that quite a number of subjects was not able to estimate the homogeneity of their social networks both, online and offline. Instead, they indicated "I cannot judge" when being asked about their similarity to network ties. Figure 9 shows the distribution of "I cannot judge" responses along the various dimensions for the offline and online setting.

As for online communication:

- Between 29% and 32% of users are not able to estimate homogeneity regarding financial status and religion
- 26% cannot gauge network homogeneity of political ideology and sexual orientation
- Between 17% and 20% of users are not able to indicate homogeneity regarding physical appearance, professional interests, and political opinions
- Between 12% and 15% and are not able to infer homogeneity of place of residence, personal interests, and education
- Between 8% and 11% cannot gauge homogeneity of age, gender, skin color, and country of birth

As for offline communication:

- Between 22% and 24% are not able to indicate homogeneity of political ideology and religion
- Between 17% and 20% cannot gauge homogeneity of political opinions, financial status, and sexual orientation
- Between 11% and 15% cannot state network homogeneity regarding education, personal interests, and professional interests
- Between 6% and 9% are not able to gauge homogeneity of age, gender, skin color, place of residence, and physical appearance

Subjects' ability to indicate their social (online and offline) network homogeneity was moderately to strongly correlated between the various dimensions, i.e., subjects who were not able to gauge homogeneity on one dimension were likely to also be not able to gauge homogeneity on other dimensions. Also, ability to estimate online network homogeneity (summarizing all dimensions) was positively related to the ability to gauge offline homogeneity ($r = .69$, $p = .01$). Still, online homogeneity seems overall to be somewhat more difficult to infer, $t(1085) = 7.12$, $p < .001$, $d = 0.21$.

- Individuals who do not feel able to infer homogeneity on one dimension likely do not feel so with regard to other dimensions as well
- For individuals, it seems more difficult to estimate the similarity to their network ties in online compared to offline communication

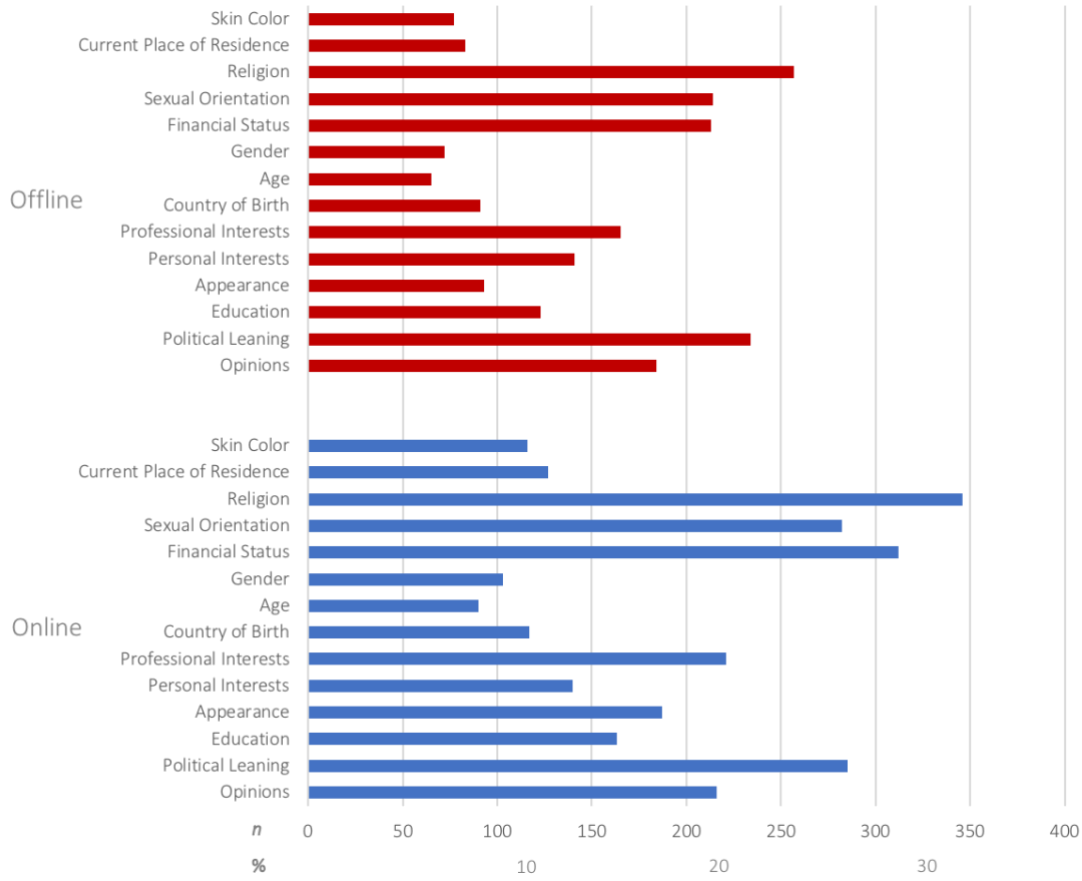

Figure 9. Absolute and relative frequency of participants who indicated "I cannot judge" when being asked about the homogeneity of their social networks.

4.4 Socio-Demographic and Psychological Correlates of Perceived Homogeneity

Besides perceived homogeneity, we considered a number of third variables that – based on previous research – could be linked to network homogeneity. Figure 10 shows the correlational patterns between perceived homogeneity online (blue), offline (red) and socio-demographic (i.e., age, gender) and dispositional variables (i.e., need for cognitive closure, ideological extremity, ideology) as well as frequency of social media platform use. Within this figure, darker colors indicate stronger correlations, red colors indicate positive, blue colors negative correlations (for a correlation table, see Appendix B).

The upper triangle of exclusively red colors depicts the consistently positive correlations between the various dimensions of social network homogeneity. The much lighter streak at the bottom shows correlations between perceived homogeneity, social media use and other third variables. These correlations are far lower than the relations within homogeneity dimensions. Frequency of social media use yielded weak positive relations with a variety of perceived homogeneity dimensions, ranging between r = .10 and r = .24. Interestingly, only frequency of Facebook use was not related to any of the homogeneity dimensions.

For age, there are negative correlations with perceived homogeneity (see the rather blue streak at the bottom) ranging between r = -.10 (online homogeneity of financial status) and -.34 (online homogeneity of age) indicating that the older subjects were the less they perceived their online and offline ties similar to themselves. For gender, we observed no significant effects. For level of education, there were no significant differences in perceived homogeneity

(not represented within the figure). Ideological extremity was weakly and exclusively related to the perception of political opinion homogeneity offline (r = .13, p = .01), indicating that the more politically extreme people were the more homogenous they perceived their offline network to be. Also, political ideology showed a weak but negative relation to perceived opinion-based (r = -.10) and ideological homogeneity online (but not offline), r = -.15, indicating that the more ideologically left subjects were the more intense they perceived political like-mindedness within their networks. Need for cognitive closure yielded weak and positive correlations with several of the homogeneity dimensions, e.g. opinion-based homogeneity offline (but not online) indicating that more closed-minded subjects were the stronger they perceived similarity to their ties.

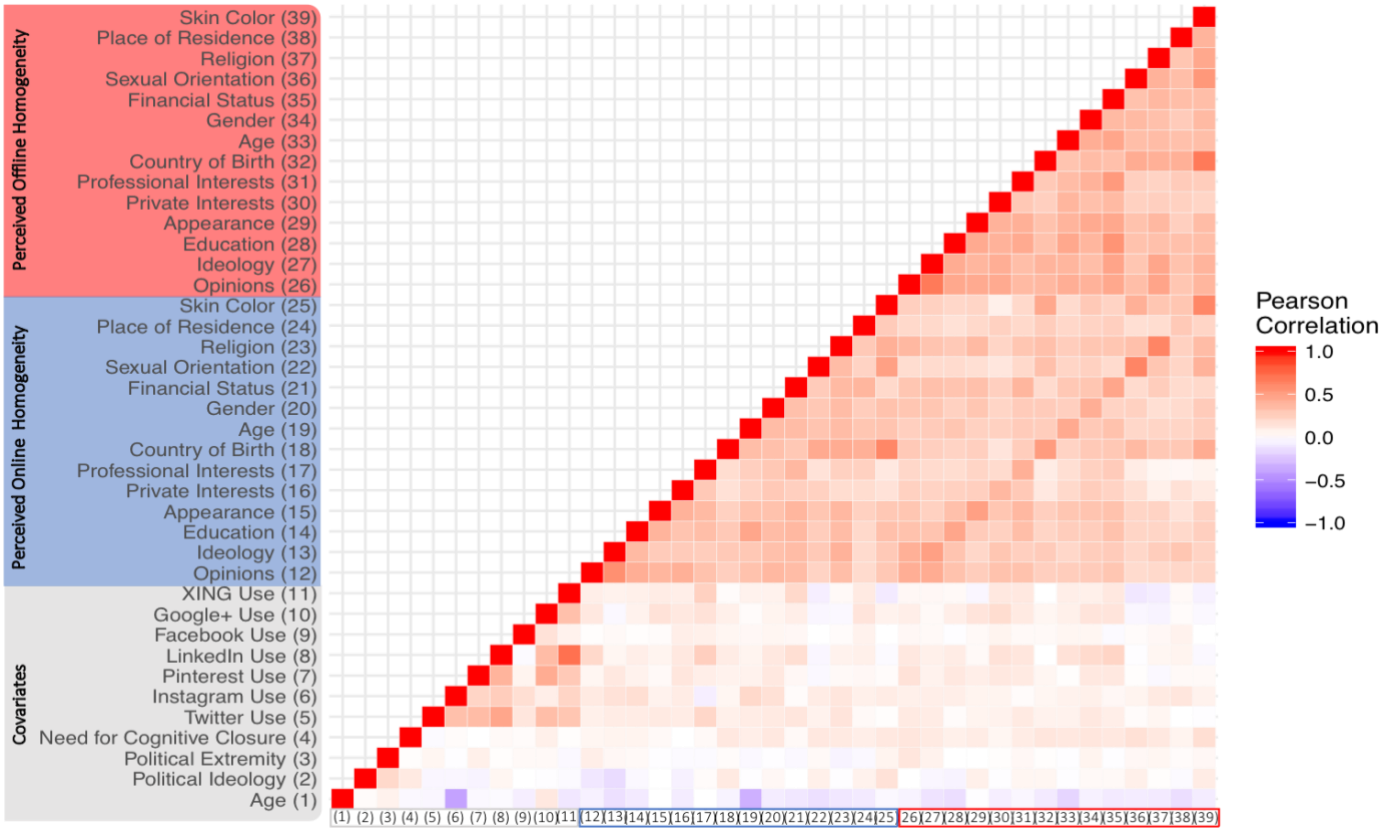

Figure 10. Correlation patterns between perceived network homogeneity and third variables. Darker colors indicate stronger correlations, red colors positive, blue colors negative correlations.

Furthermore, we found a small correlation between ideological extremity and the ability to estimate similarity indicating that those users who are more extreme felt more often able to judge social network homogeneity. More precisely, individuals who were ideologically more extreme felt more able to judge similarity across all dimensions within the online setting, while within the offline setting they did so only for political ideology.

To summarize the evidence on a correlational level:

- Perceived social network homogeneity is considerably related across dimensions
  - These inter-relations appear somewhat stronger in offline communication compared to online communication

- Frequency of social media use is weakly associated to various dimensions of homogeneity, including homogeneity of political opinions
  - Only frequency of Facebook use is not related to any homogeneity dimension

- Older individuals perceive their social networks as somewhat less homogeneous, e.g., with regard to political ideology and age

- Ideological extremity is positively, albeit weakly, associated to political opinion-based offline homogeneity

- Left-leaning users (compared to right-leaning users) perceive their online network ties as somewhat more similar to themselves when it comes to political ideologies and opinions

- Individuals high in the need for cognitive closure perceive their online and offline network ties somewhat more similar across various dimensions

5. DISCUSSION

The present research report intended to offer descriptive and preliminary correlational evidence on social media users' perceptions of the homogeneity in their online versus offline environments. The data show that – across several dimensions – individuals perceive their offline and online networks as moderately homogeneous. Although perceptions of social network homogeneity are substantially correlated between different dimensions and communication channels, we also observed some notable differences. Also, we found that users' ability to gauge their similarity to network ties to vary depending on the respective dimension of reference. External correlates such as usage of online networks, the personality trait of need for cognitive closure and certain demographics appear to covary with perceived network homogeneity.

Summary of findings

In particular, we found evidence on an exploratory level that…

…across different dimensions, users tend to perceive their online and offline social networks as moderately homogeneous
  - Ties are perceived most similar with regard to skin color and country of birth
  - Sex, appearance, financial status, and gender are perceived as relatively heterogeneous

…homogeneity perceptions are similar for online and offline communication

- Slight differences can be observed for the geographical place one lives, financial status, and professional interests: For these, offline ties are perceived as more similar to oneself than online ties

…individuals' capacity to estimate social network homogeneity is limited

- It is particularly difficult for social media users to gauge their ties' financial status, religion, political ideology, and sexual orientation
- In comparison, most individuals think that they are able to infer similarity with regard to age, gender, skin color, and physical appearance of their ties
- People are somewhat better in gauging offline compared to online homogeneity

…perceived homogeneity is higher among more active social media users, younger individuals and those high in the need for cognitive closure

- Among social media platforms, only Facebook use is not related to homogeneity

In light of the prevalent debate on political homogeneity in social media communication, our data reveal the following:

- For both, homogeneity in political ideology and political opinions, a majority of users perceive their network to represent similarity as well as dissimilarity

- In users' perception the level of homogeneity regarding political ideology and political opinions does not differ between their online and offline environment

- It is somewhat easier for users to infer homogeneity for political opinions than for political ideology (see Figure 9)

- Ideologically more…
  - …extreme individuals perceive greater homogeneity of political opinions within their offline network
  - …extreme individuals generally feel more able to gauge similarities to their ties
  - …left individuals perceive greater homogeneity of political opinions and ideologies within their social networks

As for subjective user perceptions of their social networks, it does not appear that political opinions and ideologies are more homogeneous than other attributes. In the contrary, we found homogeneity to be perceived as higher in several other dimensions. Also, and particularly noteworthy, online network ties are not perceived more similar in political regards than offline ties. This may challenge concerns about echo chambers and filter bubbles within online communication (Boutyline & Willer, 2017; Dahlberg, 2007; Sunstein, 2017). Holding in mind that individuals tend to overestimate similarities within their interpersonal relationships (Goel, 2010) and that political homogeneity was perceived, at most, moderate within our sample underscores this notion. Furthermore, intensity of social media use was not linked to opinion-based or ideological homogeneity with regard to the use of Facebook which was (at the time the study was conducted) the most popular social media platform and therefore might have – compared to other platforms – a higher impact on the formation of political opinions. Two other aspects still have to considered: First, online political homogeneity is not limited to the like-mindedness of social media contacts. Rather, a homogenous social media environment is

contingent on the information users encounter and these may originate from other sources, e.g., discussions between strangers and mass media content. Second, while perceived similarity in terms of politics was modest for most individuals within this study, it varied between individuals and was higher for certain sub-groups (e.g., those who were generally more closed-minded or ideologically more extreme).

Within this research report, we analyzed perceived network homogeneity on an exploratory and self-report level, primarily, in order to gain an impression on how users perceive their network ties in political terms (compared to other dimensions) and to complement studies that used online network data (e.g., Bakshy et al., 2015; Barberá et al., 2015). Although our results have to be interpreted with caution as they are based on exploratory analyses, a very specific assessment rationale and the German population of Facebook users, we believe that this research report may offer some valuable insights which can inform future work on social network homophily, particularly with regard to political opinions and ideologies in online networks.

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Appendix A: Original Items on Perceived Homogeneity

Items zur wahrgenommenen Homogenität sozialer Online- und Offline-Netzwerke

Wenn Sie nun an Ihr Netzwerk im Internet denken (z.B. Facebook-Freunde oder Twitter-Follower oder Menschen, denen Sie auf Twitter folgen), wie ähnlich sind Ihnen diese Menschen? / Wenn Sie nun an die Menschen denken, die Ihnen im Alltag von Angesicht zu Angesicht (außerhalb des Internets) begegnen, wie ähnlich sind Ihnen diese Menschen?

Bitte drücken Sie die Ähnlichkeit mit Hilfe der folgenden Eigenschaften aus.
(1: überhaupt nicht ähnlich, 5: sehr ähnlich, Restkategorie: kann ich nicht einschätzen)

Hautfarbe
Aussehen (z.B. hinsichtlich Kleidung)
Private Interessen (z.B. in Bezug auf Sport, Musik, Kunst)
Berufliche Interessen
Sexuelle Orientierung (z.B. heterosexuell, homosexuell, bisexuell)
Alter
Religion
Bildungsgrad
Meinungen (in Bezug auf politische, gesellschaftliche Themen)
Herkunftsland (d.h. Geburtsland)
Politische Gesinnung (z.B. eher linksliberal oder rechtskonservativ)
Geschlecht
Aktuelle Wohnregion
Finanzieller Status (z.B. in Bezug auf Einkommenshöhe)

Appendix B: Correlations Between Perceived Homogeneity and Third Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Correlates																
(1) Age	—															
(2) Political Ideology	.024	—														
(3) Ideological Extremity	.071*	.203**	—													
(4) Need for Cognitive Closure	-.027	.113**	.009	—												
(5) Twitter Use	-.044	-.037	.05	-.018	—											
(6) Instagram Use	-.401**	-.038	-.014	.02	.333**	—										
(7) Pinterest Use	-.034	-.046	.083	-.004	.346**	.218**	—									
(8) LinkedIn Use	-.022	.048	.013	.029	.462**	.255**	.393**	—								
(9) Facebook Use	-.068*	.002	.029	.019	.126*	.173**	.055	-.016	—							
(10) Google+ Use	.121**	-.013	.03	.077	.340**	.09	.426**	.348**	.148**	—						
(11) XING Use	-.101	-.023	-.031	.009	.295**	.219**	.281**	.708**	.068	.327**	—					
Online Homogeneity																
(12) On. Opinions	-.056	-.103**	.087*	.05	.08	.115*	.055	.198**	.008	.115*	.088	—				
(13) On. Ideology	-.133**	-.153**	.042	.06	.104	.155**	.121*	.054	.033	-.035	.07	.568**	—			
(14) On. Education	-.090**	-.033	.028	.059	.095	.171**	.072	.086	.014	.073	.077	.425**	.355**	—		
(15) On. Appearance	-.004	-.002	-.007	.028	.107	.071	.026	.064	.021	.151**	.104	.385**	.274**	.393**	—	
(16) On. Private Interests	-.081*	-.061	-.019	.003	.103	.101*	.134*	.116	.093**	.121*	.09	.410**	.268**	.306**	.401**	—
(17) On. Professional Interests	-.004	.019	-.024	.028	.210**	-.072	.085	.254**	.081*	.155**	.236**	.322**	.264**	.342**	.356**	.285**
(18) On. Country of Birth	-.045	.112**	.023	.125**	.081	.051	.073	.101	.051	.083	.025	.252**	.279**	.280**	.237**	.161**
(19) On. Age	-.344**	-.009	-.031	.089**	.099	.202**	.074	.06	.044	.015	.069	.319**	.287**	.463**	.321**	.232**
(20) On. Gender	-.082*	.037	-.006	.120**	.115*	.160**	.121*	.116	.047	.061	.074	.372**	.332**	.351**	.324**	.279**
(21) On. Financial Status	-.096**	.002	-.028	.03	.135*	.024	.042	.173*	.038	.089	.204**	.350**	.347**	.366**	.384**	.253**
(22) On. Sexual Orientation	-.126**	.082*	.028	.124**	.07	.098	-.025	-.035	.005	-.043	-.069	.231**	.282**	.261**	.299**	.244**
(23) On. Religion	-.099**	-.007	-.053	.110**	.139*	.129*	.026	.073	.017	-.026	.031	.336**	.403**	.354**	.372**	.183**
(24) On. Place of Residence	-.085**	.067*	-.03	.090**	.03	.075	.037	.082	.068*	.135**	.113*	.190**	.191**	.205**	.237**	.183**
(25) On. Skin Color	-.031	.147**	.06	.122**	.009	.104*	.023	-.021	.002	.073	-.086	.293**	.281**	.328**	.295**	.154**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Offline Homogeneity																
(26) Offline Opinions	-.05	-.001	.134**	.125**	.111	.079	.146**	.118	.043	.087	.044	.419**	.411**	.323**	.302**	.236**
(27) Off. Ideology	-.125**	-.045	.073*	.114**	.098	.091	.075	.085	.03	.027	.042	.434**	.493**	.308**	.242**	.226**
(28) Off. Education	-.135**	-.049	.003	.077*	.022	.088	.124*	.102	-.011	.088	.028	.325**	.312**	.456**	.326**	.236**
(29) Off. Appearance	-.005	.078*	-.004	.100**	.065	.061	.085	.025	.028	.141**	-.039	.261**	.213**	.269**	.492**	.245**
(30) Off. Private Interests	-.065*	-.015	.011	.053	.074	.058	.121*	.149*	.057	.176**	.121*	.316**	.297**	.241**	.300**	.370**
(31) Off. Professional Interests	-.035	.053	.037	.095**	.108	.021	.109*	.131	.025	.113*	.124*	.323**	.249**	.342**	.365**	.283**
(32) Off. Country of Birth	-.086**	.047	.012	.128**	.075	.052	.055	.003	.029	.049	-.003	.246**	.270**	.222**	.247**	.121**
(33) Off. Age	-.176**	-.009	-.013	.118**	.07	.067	.012	.148*	.045	.079	.089	.259**	.212**	.256**	.302**	.198**
(34) Off. Gender	-.063*	.03	.06	.129**	.118*	.081	.123*	.191**	.049	.135**	.077	.270**	.257**	.258**	.312**	.257**
(35) Off. Financial Status	-.088**	.03	-.009	.122**	.094	.043	.115*	.223**	-.017	.138**	.120*	.295**	.271**	.325**	.322**	.228**
(36) Off. Sexual Orientation	-.080*	.075*	.036	.158**	.021	.064	.005	-.006	.02	-.035	-.104	.187**	.208**	.220**	.219**	.172**
(37) Off. Religion	-.091**	.006	.052	.123**	.054	.109*	-.031	.048	.037	-.049	-.083	.196**	.258**	.216**	.233**	.076*
(38) Off. Place of Residence	-.138**	-.016	.024	.058	.005	.128**	.027	.063	.073*	.019	.035	.214**	.295**	.202**	.146**	.160**
(39) Off. Skin Color	-.084**	.098**	.041	.166**	-.015	.072	.033	-.032	.002	-.034	-.058	.225**	.228**	.247**	.231**	.106**

Note. * p = .05, ** p = .01.

Appendix B (continued)

	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)
(17) On. Professional Interests	—																						
(18) On. Country of Birth	.181**	—																					
(19) On. Age	.249**	.337**	—																				
(20) On. Gender	.293**	.331**	.348**	—																			
(21) On. Financial Statu	.374**	.291**	.351**	.331**	—																		
(22) On. Sexual Orientation	.152**	.436**	.305**	.291**	.266**	—																	
(23) On. Religion	.239**	.426**	.346**	.349**	.364**	.346**	—																
(24) On. Place of Residenc	.239**	.408**	.298**	.265**	.381**	.228**	.280**	—															
(25) On. Skin Color	.115**	.606**	.311**	.322**	.199**	.495**	.410**	.272**	—														
Offline Homogeneity																							
(26) Offline Opinions	.209**	.282**	.250**	.295**	.296**	.183**	.369**	.204**	.248**	—													
(27) Off. Ideology	.193**	.255**	.268**	.303**	.332**	.195**	.306**	.201**	.237**	.670**	—												
(28) Off. Education	.178**	.230**	.305**	.235**	.313**	.192**	.284**	.162**	.208**	.453**	.431**	—											
(29) Off. Appearance	.224**	.251**	.241**	.297**	.330**	.173**	.365**	.199**	.217**	.444**	.377**	.442**	—										
(30) Off. Private Interests	.185**	.136**	.239**	.223**	.254**	.127**	.216**	.235**	.084*	.437**	.425**	.402**	.400**	—									

(31) Off. Professional Interests	.415**	.265**	.270**	.270**	.376**	.198**	.298**	.201**	.195**	.364**	.335**	.438**	.413**	.291**	—							
(32) Off. Country of Birth	.102**	.509**	.260**	.269**	.195**	.328**	.327**	.263**	.450**	.367**	.388**	.324**	.315**	.245**	.280**	—						
(33) Off. Age	.170**	.231**	.436**	.253**	.292**	.225**	.260**	.210**	.187**	.421**	.380**	.450**	.394**	.382**	.351**	.312**	—					
(34) Off. Gender	.239**	.281**	.278**	.423**	.301**	.242**	.302**	.234**	.276**	.403**	.341**	.378**	.443**	.328**	.404**	.351**	.422**	—				
(35) Off. Financial Status	.272**	.293**	.317**	.230**	.464**	.186**	.303**	.245**	.230**	.450**	.470**	.546**	.449**	.364**	.516**	.334**	.457**	.362**	—			
(36) Off. Sexual Orientation	.105**	.364**	.206**	.236**	.186**	.625**	.329**	.167**	.408**	.337**	.305**	.321**	.320**	.239**	.245**	.434**	.345**	.358**	.317**	—		
(37) Off. Religion	.053	.293**	.216**	.174**	.262**	.297**	.622**	.181**	.297**	.466**	.461**	.328**	.366**	.249**	.232**	.415**	.353**	.335**	.372**	.404**	—	
(38) Off. Place of Residence	.044	.294**	.221**	.189**	.186**	.216**	.241**	.278**	.299**	.305**	.322**	.328**	.252**	.236**	.270**	.408**	.326**	.270**	.344**	.343**	.304**	—
(39) Off. Skin Color	.061	.432**	.260**	.270**	.196**	.402**	.349**	.216**	.606**	.380**	.387**	.343**	.348**	.221**	.256**	.667**	.337**	.363**	.339**	.526**	.446**	.390**

note. * p = .05, ** p = .01.

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