

# Common Core in Danger? Personalized Information and the Fragmentation of the Public Agenda

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## Abstract

The diversification of information sources has reignited the controversy on media-induced fragmentation endangering social integration. The media's capability to set the public agenda and create issues as a common core is a pivotal part of the public sphere and contributes fundamentally to society's cohesion. Algorithm-driven sources like social media that personalize content to the preferences of individuals and their social networks are considered agents of fragmentation of the public sphere. Politically extreme individuals relying on them may be particularly vulnerable to losing touch with society's common core. We employ an innovative operationalization of fragmentation on the individual level: "issue horizons"—comprising issue diversity, top issue focus, and issue overlap—to investigate how different information sources affect fragmentation. In a two-week daily diary, conducted 2016 in Germany, 356 participants named the two most important political issues of each day and reported the issue-specific sources of information. Results show that social media reliance neither increases nor decreases the compatibility of individuals' issue horizons, but news media reliance significantly increases the compatibility of issue horizons among the politically more extreme. Not relying on news media (but rather on social media) means that politically extreme persons are at risk of losing touch with society's mainstream. This attests to the news media's ongoing, indispensable integration function. Using multiple sources of political information—including the news media—appears to be of paramount importance in ensuring that most citizens are aware of the most important issues facing the nation.

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algorithmic personalization, common meeting ground, daily diary, fragmentation, information intermediaries, issue horizon, news consumption, news media, political information sources, social media

The digitalization of society infuses citizens' political information behavior: online media, social networking sites (SNS), and search engines have become indispensable information sources (Newman et al. 2020). This ample information supply entails a risk: users may use it to focus on issues they personally find relevant, potentially leading to greater heterogeneity and lower compatibility of users' personal agendas. Many selection decisions online are made invisibly in the background by so-called information intermediaries—SNS, search engines, and news aggregators (Webster 2010). Through filtering and structuring information, intermediaries determine what is visible and/or findable for individual users (Jürgens and Stark 2017). While news media supply the whole audience with pretty much identical content, intermediaries provide every individual with content they assume this individual likes. This personalization primarily relies on algorithms that employ data about users' own online behavior and the users' online network (Bozdag 2013).

This development on the individual level may contribute to the so-called “fragmentation” of society (Webster and Ksiazek 2012), a shrinking of society's common core of societally (but not necessarily personally) relevant issues. A healthy democracy requires a minimum level of consensus among its members on which issues are currently important (common core issues) (Möller et al. 2016). If one exclusively gets into contact with issues one already considers important, this precondition is endangered—and with it collective problem solving, democratic decision making and, in extreme cases, even social coexistence as a whole (Tewksbury and Rittenberg 2012). However, it is still unclear how far-reaching fragmentation empirically is (Riles et al. 2018).

Our two-week panel survey (online daily diary) of 356 German Internet users investigates how far social media and news media reliance influence whether the common core grows or shrinks and whether negative effects are more pronounced in an especially susceptible group—those with extreme political attitudes. We develop an innovative, comprehensive concept (“issue horizon”) consisting of three individual-level, issue-related indicators: diversity of political issues, focus on the top issue, and issue overlap. This concept goes beyond previous fragmentation studies which mostly looked at source diversity or focused on the aggregate level (Bright 2018; Fletcher and Nielsen 2017; Haim et al. 2018; Möller et al. 2016; Riles et al. 2018; Webster and Ksiazek 2012).

**Fragmentation and Issue Horizons***Fragmentation as a Threat to Social Integration*

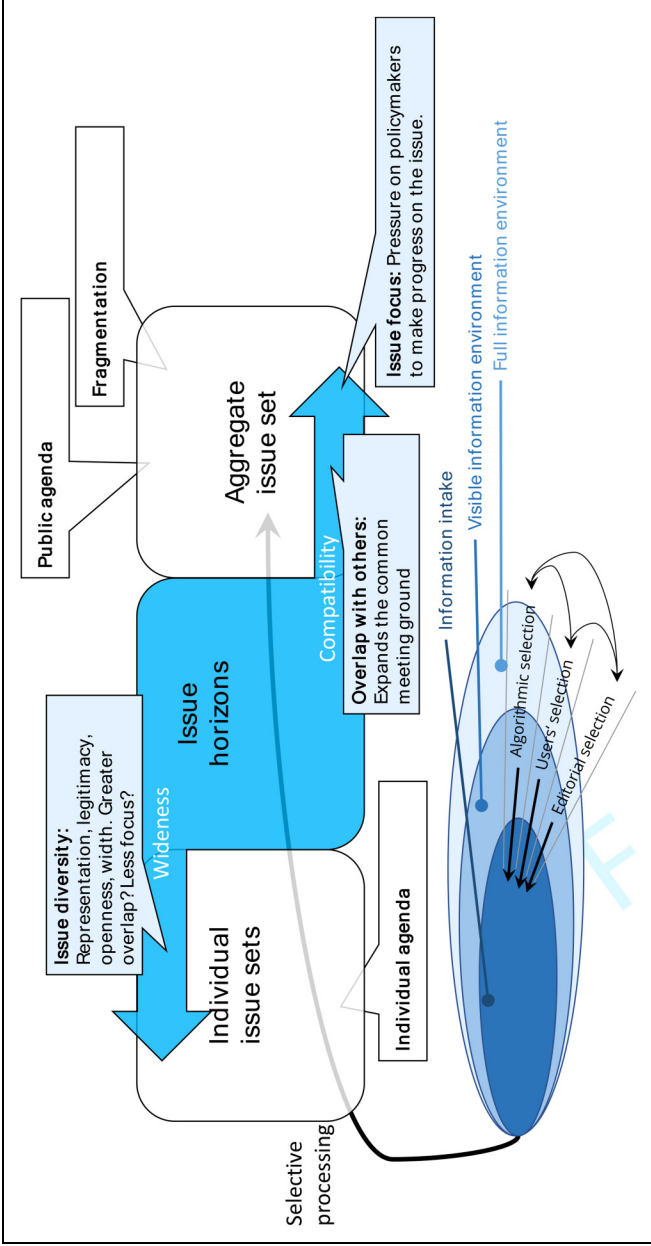
Social integration requires that all citizens share knowledge about current political issues for communicating and making political decisions (Katz 1996). Such a

common core is pivotal for citizens' shared perception of the current social reality (Echterhoff et al. 2009), the functioning of democracy, and the stability of society (Webster and Ksiazek 2012). The news media's agenda-setting function fundamentally contributes to this (Djerf-Pierre and Shehata 2017; Feezell 2018): the issues highlighted by the news media concern the citizenry as a whole and create a sense of belonging (Geiß 2015) which exert pressure on politics to deal with the issue (Protest et al. 1991). The news media's coorientation and their joint orientation towards news factors lead to a relatively uniform media agenda (Donsbach 2004).

The changing technical conditions in today's high-choice information environment have reignited the controversial debates on fragmentation (Fletcher and Nielsen 2017). Such a breakup of society would challenge its stability (Katz 1996). Each individual (or each social group) has specific, relatively stable issue preferences that can differ strongly from one individual (or group) to another. The high-choice information environment allows for highly individualized selection and use of content. The downside of this abundance of choice is that the vast information supply renders it impossible for users to make all choices actively themselves. Content selection must be increasingly automated through algorithms to prevent information overload (Napoli 2014). These algorithms can cater to individual preferences by guessing what kinds of content an individual seeks, based on what the algorithm "learns" from the data users produce. Individuals' social networks are an important component in many of these algorithms, particularly in SNS. To what degree algorithms really reinforce fragmentation is unclear and is debated heatedly (Riles et al. 2018; Webster and Ksiazek 2012).

### *Issue Horizons—Conceptualizing and Measuring Fragmentation*

This ambiguity partly stems from a lack of individual-level theorizing and measurement in fragmentation research (Djerf-Pierre and Shehata 2017; Porten-Cheé and Eilders 2019) which impedes understanding fragmentation. We propose an innovative, differentiated multidimensional conceptualization and operationalization of three indicators for individual-level processes that contribute to societal-level issue fragmentation. The complex construct we call "issue horizon" provides a conceptual link between an individual's issue set (based on which we measure individual agendas) and the aggregate issue set (based on which we measure the public agenda and the degree of fragmentation) (Figure 1) by focusing on how an individual's issue set relates to other individuals' issue sets. The horizon determines what is visible (or not) from one's point of view. If the issues others think and talk about are beyond one's horizon, one will not be able to follow and join the conversation and are excluded from the common core (increasing fragmentation). If people have wide horizons and many individuals' horizons include the same issues, the common core grows wider (fragmentation grows less likely). Some issues may even be visible for almost everyone, creating a common focus nearly everyone shares. Narrow, incompatible issue horizons can be considered a mechanism that produces fragmentation and an expression of the current degree of fragmentation.



**Figure 1.** Issue horizons, their three components, and their role in linking individual issue sets with aggregate-level fragmentation.

*The Components of Issue Horizons.* Issue horizons are the set of issues an individual views as relevant and how compatible this set is to other individuals' issue sets.

1. *Issue diversity:* The more different issues each individual mentions as relevant (horizon wideness), the greater the chance of having more points of connection with more other individuals. To capture this, we analyze how many different issues an individual has on his/her issue set. This individual-level agenda diversity has been conceptualized and measured before (e.g., Peter and de Vreese, 2003). However, we view it as a component of issue horizons regarding the chance to overlap with others' issue sets which changes the interpretative context and analytical focus.
2. *Top issue focus:* The ability of the public to focus on one top issue helps exert pressure on policymaking (Protess et al. 1991), to deal effectively with major crises and conflicts, and contributes to identity-building collective memory (Tenenboim-Weinblatt 2013). To capture this, we measure how prominent the current top issue is in an individual's issue horizon. If it is not mentioned at all, the individual's top-issue focus is zero; if mentioned as one of many other issues, the top-issue focus is low; if mentioned repeatedly (e.g., with its different aspects), the top-issue focus is high. This indicator measures what share of one's total issue attention is devoted to the issue that society currently regards as most important.
3. *Issue overlap:* If the issues in an individual's issue set are regarded relevant by many other people as well, issue overlap is large. Such shared issue priorities widen the common core even for strangers to discuss politics on a variety of issues, facilitating interpersonal communication, connectedness, certainty regarding one's perception of reality (Echterhoff et al. 2009), and the building of collective memory (Tenenboim-Weinblatt 2013). To capture this, we calculate the degree to which an individual's issue set overlaps with the individual issue sets of other survey participants.

*Relations Between the Components.* The different indicators of issue horizons are not conceptualized as indicators of an underlying common construct. For instance, there is a partial trade-off between focusing on the top issue and naming many diverse issues. Rather, the components of issue horizons are conceptualized as different theoretical facets of issue horizons, bound together by their function to relate individual-level issue sets to aggregate-level fragmentation.

In contrast to the trade-off between top issue focus and issue diversity, we expect a substantial positive correlation between issue diversity and issue overlap: the more different issues individuals mention, the greater the likelihood of "random" overlaps. The synchronizing and integrating power of the public sphere may strengthen the correlation between issue diversity and issue overlap further, producing not only "random" but also "coordinated" overlaps: Agenda-setting effects can synchronize the issue sets of different individuals, and every additional mention has an even greater chance of being a "match" with many others' issue sets because all tend to mention

those issues the media emphasized. However, if a homogeneous media agenda is absent and individuals use strongly differing sources, the link between diversity and overlap is weakened (“negative coordination”) and (segmented) agenda-setting effects can even contribute to fragmentation (for the potential effects of social media on the public agenda see also Cardenal et al. 2019; Feezell 2018).

*Atomized and Segmented Fragmentation.* It is useful to distinguish two ideal-typical forms of fragmentation: *Atomized issue fragmentation* means that each individual has a highly idiosyncratic issue set, as described by the filter bubble metaphor (Pariser 2011). Overlaps with other individuals are unlikely. Societally relevant issues that an individual dislikes can become invisible for him/her. People may lose touch with the societal mainstream, to a point where a common core is lost. *Segmented issue fragmentation* means that different societal subgroups’ issue sets are largely incompatible, while the homogeneous issue sets within each subgroup strongly overlap. Political camps become alienated, society runs out of shared issues for discussion (Iyengar and Westwood 2015), discussions across camps become difficult, prone to misunderstandings, and potentially increase political polarization (Stroud 2010). Both forms would decrease overlap and weaken the relationship between diversity and overlap.

## **Information Environments, Attitude Extremity, and Issue Horizons**

One principal advantage of analyzing individual issue horizons is that this sheds light on the factors that affect the compatibility of issue horizons—and with it, societal (des) integration. We consider two factors: the *reliance on political information sources* and the *extremity of the individuals’ political attitudes*. Reliance on specific sources may affect issue horizon wideness and compatibility by itself. However, theoretical arguments and empirical findings suggest that individuals with extreme political attitudes will be much more vulnerable to such effects (Bruns 2019).

Our study focuses on broad differences between types of information sources and their typical way of selecting and curating information to their users rather than individual outlets within those categories. By selecting and ranking content (e.g., according to relevance or urgency), all information sources define the spectrum from which users can choose and predetermine to a considerable extent which information gets a realistic chance to reach and affect the users. With broad brush strokes, our hypotheses and research questions contrast traditional *news media* and *social media* in this respect.

### *News Media Reliance and Issue Horizons*

*General Widening Effect.* News media (offline/online) supply a relatively consonant “media reality” across different outlets that has the power to transmit issues even through boundaries between “secluded” social groups. Of course, different outlets

select somewhat differently, and (hyper-)partisan media may feature segment-specific agendas. However, (hyper-)partisan media are largely unimportant in Germany. The most popular Internet news sites—all tied to established news organizations—address general (“mainstream”) audiences or broad center-left/center-right political strata rather than narrow ideological strata (Newman et al. 2020). Thus, those who heavily rely on German news media for political information have a great chance to come across many mainstream issues, increasing the chance to develop a wide, compatible issue horizon. *H1: The more an individual relies on news media for political information, the greater (a) issue diversity, (b) top issue focus, and (c) issue overlap of that individual’s issue horizon.*

**Conditional Widening Effect on People with Extreme Attitudes.** People with moderate attitudes may already have a wide, compatible issue horizon to begin with. This leads to less potential for further widening their issue horizon through news media (ceiling effect). In contrast, people with extreme attitudes are at risk of losing touch with society’s common core (Abelson 2014; Rodriguez et al. 2017) and more likely to have narrower, less compatible issue horizons. Being confronted with “mainstream” issues in the news media that they might overlook when receiving more personalized/group-specific information may widen their issue horizons. Even if they disagree with society’s mainstream, their likelihood to remain in touch with the mainstream would increase. *H2: The more extreme an individual’s political attitude, the more strongly does relying on news media for political information increase the (a) issue diversity, (b) top issue focus, and (c) issue overlap of that individual’s issue horizon.*

## Social Media Reliance and Issue Horizons

**General Narrowing Effect?** Social media use automated, personalized content curation. Therefore, heavy reliance on them for political information could contribute to narrower, less compatible issue horizons. Even if the algorithms and general curation concept of different social media (e.g., Facebook, Twitter, YouTube) obviously differ, their logics of filtering, sorting, and personalizing content based on data collected about the users (Jürgens and Stark 2017) systematically diverges from news media’s curation.

Two processes are conceivable that are working in opposite directions. (1) *Social media can increase users’ connectedness with the common core*, for example, by increasing the probability of incidental news exposure (Kümpel 2019), particularly if users have diverse interests and heterogeneous networks (Bodó et al. 2019). Also, extremely popular “viral” messages spread quickly and comprehensively (Bampo et al. 2008) across camps. (2) *Social media’s automated personalization can narrow their horizons by rendering contact with issues users “like” (“dislike”) more (less) likely.* An extreme version of this scenario—highly individualized, isolated information environments, disconnected from the outside world—has been described with the popular filter bubble metaphor (Pariser 2011). Research has debunked this extreme scenario (Bruns 2019; Haim et al. 2018; Hindman 2012; Mahrt 2020;

Möller et al. 2018; Zuiderveen Borgesius et al. 2016); if any, filter bubbles must be regarded a “fringe” phenomenon that is likely to occur only under specific conditions. Thus, algorithmic content curation will usually not lead to completely different, individualized issue sets. Even though these mechanisms might not lead to the extreme pathological case of completely isolated bubbles, they could still decrease individuals’ contact with the topics that others care about.

Based on the current state of research, it is not possible to make a call as to which of these two competing oppositional processes is dominant in balance, preventing us from formulating a directed hypothesis. Rather, we will explore how heavy reliance on social media for political information affects the wideness and compatibility of issue horizons. *RQ1: How does the extent of an individual’s reliance on social media for political information relate to the (a) issue diversity, (b) top issue focus, and (c) issue overlap of that individual’s issue horizon?*

*Conditional Narrowing Effect on People with Extreme Attitudes?* Research suggests that reliance on social media for political information will particularly narrow the information input of individuals with extreme political views (Bruns 2019). These are viewed as particularly vulnerable because they tend to have an ideologically more homogeneous social network (online and offline), a greater motivation to avoid ideologically inconsistent viewpoints and seek out consistent viewpoints, and more often experience cognitive dissonance when confronted with mainstream news (Abelson 2014; Rodriguez et al. 2017). The ideas of issue ownership (Petrocik et al. 2003) and instrumental actualization (Kepplinger et al. 1991) suggest that some issues tend to be instrumental for the political left (e.g., climate change) or for the political right (e.g., migration). Therefore, more ideologically extreme individuals who rely heavily on social media for political information may hold narrower and less compatible issue horizons, but this has been insufficiently researched yet. *RQ2: How does the extremity of an individual’s political attitude change the way relying on social media for political information affects (a) issue diversity, (b) top issue focus, and (c) issue overlap of this individual’s issue horizon?*

### ***A Probabilistic Source Categorization***

Obviously, our hypotheses and research questions are highly probabilistic: most individuals use a great variety of information sources (Newman et al. 2020). Each user can use both social media and news media in different ways that modify the structure of issue exposure. The structure of social networks and their ideological range varies, as does users’ openness for cross-cutting messages. Lastly, sources’ content structures and modes of content curation develop over time. In effect, not everyone using social media will incessantly receive only (or predominantly) information matching their interests; some may use social media like a newsstand. And some news media users will sometimes actively avoid issues they “dislike.” But given their mechanics, there is a higher probability of personalized issue curation in social media vis-à-vis news media. Only the repeated small effects of moderately higher probability of personalized



issue curation in social media (one-size-fits-all information curation in news media) across many individuals would show as an “effect” of reliance on social media (news media).

### *Other Information Sources*

Although search engines also engage in algorithmic content curation, we omitted them so far. Different from social media, in case of search engines and other “search prompt-based” online services, user must actively express their interest with the search query. Algorithms mostly serve here to disambiguate what the users meant. Therefore, search engine reliance for political information is unlikely to result in an algorithmically amplified partisan-biased issue selection (Magin et al. 2015; Unkel and Haim 2019). Our data show no specific relation between search media reliance and issue horizons (Table 1). However, including all major information sources is important because reliance on different sources tend to be highly (positively) correlated. The chance to mistake effects of misattributing certain outcomes to a certain information source (omission bias) increases if not controlling for major information sources (e.g., search engines, personal conversations) (Geiß et al. 2021).

## **Method**

### *Study Design and Sample*

The analysis utilizes data from a two-week panel survey (online daily diary; September 6–19, 2016, last possible responses on September 20, 2016), supplemented by a screening (August 19–September 04, 2016), and a completion survey (September 24–28, 2016). The population was defined as Internet users in Germany (14–69 years). Quotas were defined regarding age, sex, education, and Facebook use to match the population’s demographics (reference for quotas: media planning study “Best for Planning” (2016)). The market research institute executed the fieldwork, drawing on an existing commercial access panel fulfilling the ISO 26362:2009 requirements. The panel members self-selected to participate, as long as they matched to quotas. Invitations were sent out on day 1 and 3. The daily surveys (computer-assisted self-interviews) could be filled within 24 h. Participants received €3.50 in “bonus points” for participation in the screening and final survey, and €1.00 per participation in the daily surveys. The targeted sample size was 350. One thousand eight hundred and eighteen people were contacted, 459 agreed to participate, 359 completed all three parts of the survey, 356 remained after data cleaning. Respondents were dropped during data cleaning if completing less than 50 percent of the daily surveys; most respondents participated on 13 or 14 out of 14 days (probably because of the incentives). The American Association for Public Opinion Research (AAPOR) response rate (type 1) was 25 percent (recruitment) and 20 percent (ready to analyze).

## Measurement

The following variables were measured on two levels (level 1: issue mentions; level 2: participants). For the analysis, all variables measured on level 1 (issue mentions, information sources) are aggregated on level 2. All analyses are run on level 2.

*Issue Mentions (Dependent Variable).* In a daily, open-ended question, we asked for the two most important political issues of the respective day for the participants personally (for questionnaire see Supplemental Information file). This resulted in 8,930 political issue mentions by 356 respondents over 14 days (the maximum number of issue mentions would have been  $333 \times 14 \times 2 = 9,968$ ; nonpolitical issue mentions (e.g., sports, personal matters), were excluded). In open-ended questions, respondents typically mention around two issues they find important (Peter and de Vreese 2003). The participants had little problem mentioning two issues every day, also because they could mention the same issue(s) every day. We inductively developed a coding scheme, distinguishing fifty-seven different issues (Table A2 in the Supplemental Information file). Three student coders (intercoder reliability based on coding of forty randomly selected issue mentions by all three coders:  $\alpha_{\text{Krippendorff}} = .740$ ; 95 percent CI [0.616;0.864]) coded all 8,930 issue mentions (i.e., assigned them to one of the fifty-seven different issues each). Each issue mention was treated as a separate mention, even if the same issue was mentioned several times by the same respondent (which was often the case, e.g., multiple mentions of “refugee crisis”) or several sub-issues of the same issue were mentioned (e.g., “refugee crisis” and “asylum policy”).

The so-called “refugee crisis”—the tremendously increased number of immigrants to Germany in 2015—clearly emerged as top issue complex. By “issue complex,” we designate a term/label that connects several distinct issues by identifying a similarity or common point-of-reference for all these issues. The issue complex “refugee crisis” bundles (1) migration and asylum policy (e.g., border control, limitation of immigration), (2) domestic security (e.g., crime, terrorism), (3) political changes at least partly attributed to increased immigration (e.g., increased popularity of the right-wing populist party Alternative for Germany (AfD), EU crisis summits). Thereby, the issue complex “refugee crisis” bundled twenty-one subissues, as many of the open-ended responses revealed, which accounted for 5,125 (57 percent) of all issue mentions. The issue mentions by the same respondent were aggregated to the respondent level in three different ways, leading to the three indicators of compatibility of individual issue horizons.

1. *Issue diversity.* We calculated how many different unique issues each respondent mentioned. This number is divided by the theoretical maximum of twenty-eight issue mentions per individual, thus standardizing it to a value range from 0 (no issue mentioned) to 1 (maximum diversity). Here, we treated the twenty-one subissues of the issue complex “refugee crisis” to be separate issues (rather than treating all as one big issue) since we consider it relevant how far individuals grasp the

different facets of the “refugee crisis.”<sup>1</sup> For example, mentioning fourteen different issues results in a score of  $14/28 = 0.500$ .

2. *Top issue focus (complex)*. We summed the number of issue mentions per individual belonging to one of the twenty-one subissues of the top issue “refugee crisis.” Here, we collapsed them because we consider a common focus on the top issue as a minimum requirement for a “common core.” To that end, referring to the same issue complex (not necessarily the same subissue) suffices to create a sense of commonality. We divided this sum by the individual’s total number of issue mentions, thus standardizing it to a value range from 0 (no mention of top issue) to 1 (all issue mentions of the individual belong to the top issue). For example, an individual who cited the “refugee crisis” or its subissues twelve times and cited twenty-seven issues in total received a score of  $12/27 = 0.444$ .
3. *Issue overlap*. We compared the issue mentions of all participants pairwise, treating the twenty-one subissues of the complex “refugee crisis” separately again (due to the reasons explained under *issue diversity*). For each pair of participants (dyad), we counted how many unique subissues both participants shared (match) and how many issues only one of them mentioned (nonmatch) or were not unique matches (i.e., the same issue matches several times in the same dyad). The average number of matches for each respondent served as indicator of issue overlap. For instance, a participant with 2,130 issue matches with the 355 other participants has an issue overlap score of  $2,130/355 = 5.611$  (roughly six issue matches with any other participant on average).

Issue overlap and issue diversity are very strongly correlated ( $R = .917$ ;  $p < .001$ ), sharing 84 percent of their variation. This does not mean that the measures are generally redundant, however. Rather, the high redundancy in the specific context we are studying reveals something important about the coordinating/synchronizing force of political information content that cannot be taken for granted in all contexts: If greater individual-level issue diversity translates into greater overlap, each additional issue and individual mentions to a large degree matches the issues other individuals mention. In segmented or atomized fragmentation, the pattern would be different: additional issue mentions either have a generally low likelihood to overlap with issues other persons mentioned (atomized), or they would systematically overlap only with the issue sets within one’s own opinion camp (segmented). The correlation between diversity and overlap would be moderate, low, or even absent in those cases. Put differently, if issue diversity produces large issue overlap, the dangers of segmented or atomized fragmentation are low. If individual issue sets (we use the empirical marginal distribution of issue frequency we found in this study) were completely randomized, overlap and diversity would be correlated at  $R = .753$  (56.3 percent of shared variance) in our study. Thus, the observed overlap ( $R = .917$ ) is greater than expected if the issues were chosen uncoordinatedly ( $R = .753$ ); we observe a “positive coordination.” In case of atomization/segmentation, we would see a “negative coordination” that would lead to a correlation substantially below .753.

Overlap and focus are weakly correlated ( $r = .184$ ;  $p < .001$ ); diversity and focus are mostly unrelated ( $r = -.072$ ;  $p = .190$ ).

*Reliance on Political Information Sources (Independent Variable).* The reliance on information sources was measured separately for each issue mention. The participants indicated on a 5-point scale (recoded to 0 = not important at all; 1 = less important; 2 = somewhat important; 3 = important; 4 = very important) how important several sources had been to inform about this issue on the respective day. Our measures cover all sources widely used in Germany for political information, with a greater resolution for online content, which was in the focus of the study. A first question asked for the importance of (1) offline media, (2) personal conversations, and (3) the Internet. A follow-up question for those who referred to the Internet as at least “somewhat important” asked them to specify the importance of eleven online sources: (a) Facebook, (b) Twitter, (c) other SNS, (d) daily newspapers online, (e) news magazines online, (f) broadcasters online, (g) YouTube, (h) other video platforms, (i) search engine Google, (j) other search engines, and (k) Wikipedia. These information sources are grouped into four types of information sources (Table A1 in the Supplemental Information file), of which two (*news media* and *social media*) are immediately relevant for testing the hypotheses. The other two (search media, conversations) are included to avoid omission bias.

*News media.* Reliance on the news media (per issue mention) was the highest value measured for (1), (d), (e), or (f). If an individual, for example, considered broadcasters “very important (=4)” and the three other sources “somewhat important” (=2) to get information about the issue, news media reliance score is “very important (=4)” in our analysis. We use the maximum value rather than the average value per individual. Our argument for using the maximum value is that the reliance on a source category does not increase with the number of sources relied upon within the category. One can be highly news media reliant by relying, for example, on only a single newspaper; relying on several newspapers does not increase reliance on news media. Moreover, choosing the maximum value increases the compatibility of measures collected for broader (“Offline media”) and narrower categories (“Facebook”): Individuals who rate the importance of offline media would not mentally average across all news outlets, but rate how important the most important offline medium was for them (maximum). This same logic is applied for “social media,” “search media,” and “conversations” as well. For each individual, we computed the average importance of news media across issue mentions.

*Social media.* Reliance on social media (per issue mention) results from the highest value measured for (a), (b), (c), (g), and (h). Again, one does not have to rate all social media as “very important” to obtain a high score; for example, rating “Facebook” as “very important” was sufficient to classifying a person as strongly reliant on social media. For each individual, we computed the average importance of social media across issue mentions.

*Personal conversations.* Per issue mention, the reliance on (2) was measured directly. For each individual, we computed the average importance of personal conversations across issue mentions.

*Search media.* Per issue mention, the reliance on search media results from the highest value measured for (i), (j), and (k). Wikipedia is included here since it is

often ranked first in search engine results pages (Steiner et al. 2020) and its users most often use a within-page keyword search to find relevant entries (Geiß et al. 2015). For each individual, we computed the average importance of search media across issue mentions.

*Extremity of Political Attitudes (Moderator).* The participants indicated their political attitude (in general; not related to certain issues) on a 7-point scale from 1 = extremely left to 7 = extremely right. The answers were recoded to indicate how far the participant's answer was off the scale's center (=4). Thereby, 0 means moderate (4 on the original scale), 1 means slightly left/right (3 or 5, respectively), 2 means clearly left/right (2 or 6, respectively), 3 means strongly/extremely left/right (1 or 7, respectively).

*Controls.* To control for other plausible influences on issue horizons, all analyses include sex (1 = female; 0 = male), age (years, centered), education (nine ranks, centered), per capita household income (in 100€, centered), employment status (1 = full-time; 0 = not full-time), political interest (from -2 = low to +2 = high), duty to keep informed (four Guttman-type items; from 1 = do not agree at all to 5 = fully agree), personality strength (ten Likert-type items; from 1 = does not apply at all to 5 = fully applies) and need for orientation (NFO; nine Likert-type items; from 1 = fully disagree to 5 = fully agree). We factorized duty to keep informed, personality strength and NFO by use of a principal components analysis with Varimax rotation, after checking for sufficient internal consistency (all Cronbach's  $\alpha$ 's > .70). NFO had to be split into two main components—need for information and need for opinions to achieve sufficient internal consistency.

## Analysis

We analyze which factors increase or decrease the compatibility of issue horizons using linear regression models. The higher issue diversity (top issue focus, issue overlap), the wider (more compatible) is an individual's issue horizon with others' issue horizons. Per dependent variable, we compare three nested models with different sets of predictors: Model (1) considers the reliance on information sources in isolation. Model (2) adds control variables. Model (3) introduces interactions between participants' political attitude extremity and the importance of sources of information on top.

## Results

### *Issue Diversity (H1a, H2a, RQ1a, RQ2a)*

Table 1 shows a positive interaction between extreme attitudes and news media use, but no simple effect of news media use. A visual inspection of the interaction ((Figure 2, top) indicates that among the politically more extreme participants,

**Table 1.** Political Information Sources and Issue Horizons.

	Issue horizon indicators					
	Structure		Compatibility			
	Issue diversity [0–1] ( <i>n</i> = 333)		Top issue focus [0–1] <sup>a</sup> ( <i>n</i> = 333)		Issue overlap [0–28] <sup>a</sup> ( <i>n</i> = 333)	
	Model 3		Model 1 <sup>b</sup>		Model 3	
	<i>B</i>	( <i>SE</i> )	<i>B</i>	( <i>SE</i> )	<i>B</i>	( <i>SE</i> )
(Intercept)	0.52***	(0.07)	0.45***	(0.05)	4.97***	(0.63)
Controls <sup>c</sup>						
Extremity of political attitude [0–3]	–0.10**	(0.03)	—		–1.00**	(0.31)
Personality strength [z-std.]	–0.01	(0.01)	—		–0.11	(0.08)
Duty to keep informed [z-std.]	0.03**	(0.01)	—		0.38***	(0.10)
Political interest [–2; +2]	0.02	(0.01)	—		0.13	(0.12)
Reliance on sources of information						
News media [0–4]	–0.01	(0.02)	0.05***	(0.01)	–0.01	(0.16)
Social media [0–4]	–0.00	(0.01)	–0.01	(0.01)	0.04	(0.12)
Personal conversation [0–4]	–0.02	(0.01)	–0.01	(0.01)	–0.29*	(0.13)
Search media [0–4]	–0.00	(0.01)	–0.01	(0.01)	–0.07	(0.13)
Extremity × Source reliance						
Extremity × News media [0–12]	0.03**	(0.01)	—		0.27**	(0.10)
Extremity × Social media [0–12]	–0.00	(0.01)	—		–0.09	(0.09)
Extremity × Pers. Conv. [0–12]	–0.00	(0.01)	—		–0.01	(0.09)
Extremity × Search media [0–12]	0.01	(0.01)	—		0.10	(0.09)
<i>R</i> <sup>2</sup>	.203***		.038**		.272***	
<i>R</i> <sub>adj</sub> <sup>2</sup>	.154		.026		.223	
Change in <i>R</i> <sup>2</sup> (model 2 to model 3)	.025*		—		.022*	

Note. Ordinary least squared (OLS) regressions. Scaling of variables described in square brackets.

<sup>a</sup>In the sample all values measured ranged between 0.21 and 7.24.

<sup>b</sup>Models 2 and 3 did not significantly increase model fit. Model 1 is used to test hypotheses.

<sup>c</sup>Sex [binary], age [in years, centered], education [nine ranks, centered], full-time employment [binary], income [in 100€, centered], political interest [–2 to +2], need for orientation (information, opinion) [both z-standardized] were controlled, but had no significant influence.

\**p* < .05; \*\**p* < .01; \*\*\**p* < .001.

higher importance of news media leads to a strong increase in issue diversity (in line with *H2a*). Among the politically moderates, reliance on news media for political information does not affect issue diversity (contrary to *H1a*). The reliance on social media does not affect issue diversity (*RQ1a*), and there is no interaction with political attitude extremity (*RQ2a*) (Table 1).

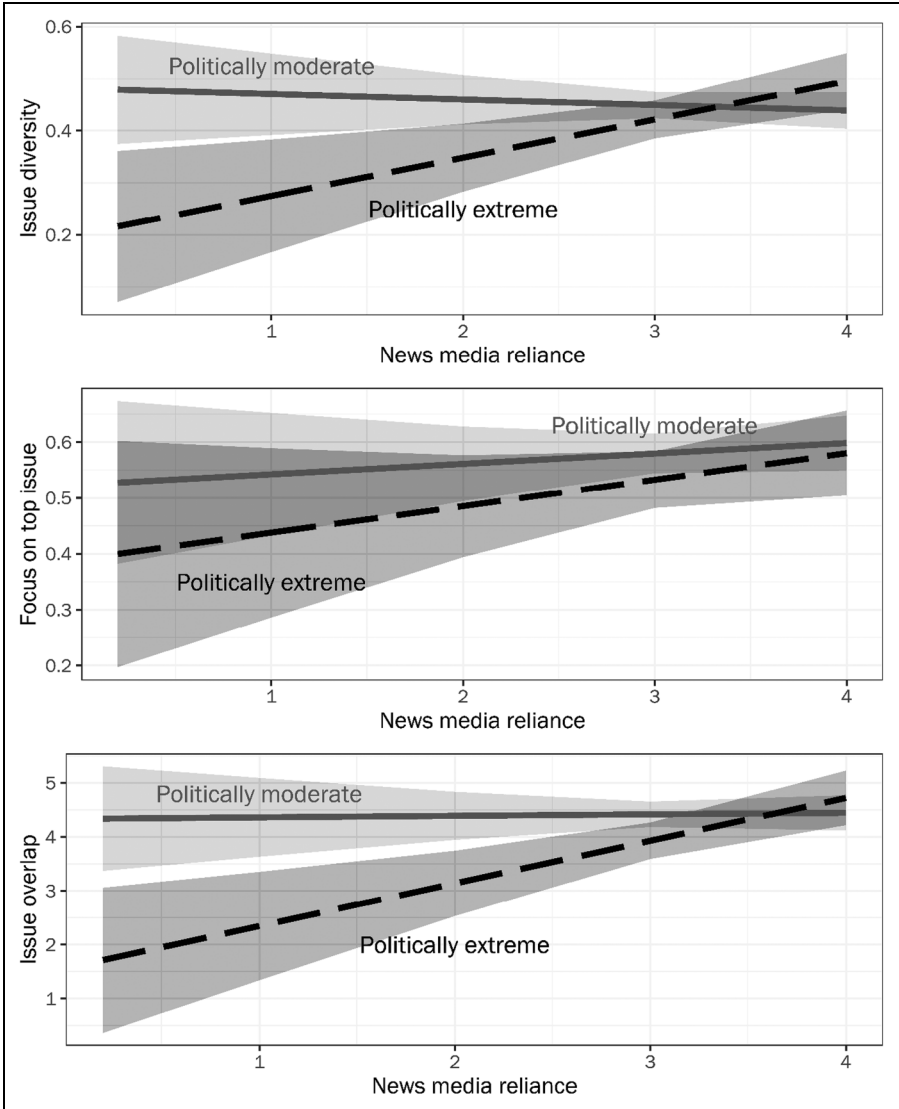


Figure 2. Extremity of political attitudes and importance of news media.

### Top Issue Focus (H1b, H2b, RQ1b, RQ2b)

News media reliance leads to a slightly higher top issue focus, supporting *H1b*. In contrast, the use of social media has no effect on top issue focus (*RQ1b*) (Table 1). We do not consider models (2) and (3) which add the interaction terms addressed since they do not add explanatory power (Supplemental Table A6). If interactions do not add to

explanatory power, *H2b* must be rejected and the answer to *RQ2b* is that social media reliance does not interact with attitude extremity regarding top issue focus (see also Figure 2, center).

### *Issue Overlap Between Individuals (H1c, H2c, RQ1c, RQ1c)*

Reliance on news media increases issue overlap significantly according to models (1) and (2), which seems to support *H1c* (Supplemental Table A7). When adding the interaction between news media reliance and political extremity into the equation (model (3)) (Table 1, Supplemental Table A4), however, it becomes apparent that this effect is limited to those with extreme political attitudes (as observed for diversity), while overlap is not affected by news media use among political moderates (Figure 1, bottom) (*H2c* confirmed). Reliance on social media neither affects overlap (*RQ1c*) nor does it interacts with political extremity (*RQ2c*).

### *Additional Findings*

The more a person relies on personal conversations for obtaining political information, the narrower the overlap with others, independent of an individual's attitude extremity. Relying on personal conversations can thus limit issue horizons among both politically moderate and politically extreme individuals (Table 1).

## **Discussion**

Healthy democracies need a common core, built around collectively relevant issues. A shrinking common core can endanger societal integration. The news consumption in the high-choice information environment has reignited the controversy on this threat's actual extent: many users rely on algorithm-driven intermediaries like Facebook (Newman et al. 2020) that provide them with tailored information. Pundits have voiced concerns that this may lead to personalized news diets that dismiss relevant issues if the individual dislikes them. We investigated how reliance on different information sources and the extremity of political attitudes jointly affect the fragmentation of individual issue horizons, consisting of issue diversity (horizon wideness), top issue focus, and issue overlaps (horizon compatibility). While the majority of previous studies investigated source diversity at the aggregate level (e.g., Bright, 2018; Webster and Ksiazek, 2012), our innovative operationalization reflects the complexity of fragmentation as a multilevel phenomenon. It links individual level issue sets (agendas) to aggregate level issue sets (agendas) by individual's issue horizon wideness and compatibility. With their inherent link to aggregate-level fragmentation, these measures are particularly suited to investigating how fragmentation comes to happen at the individual level.

### *Impact of Source Reliance on Issue Horizons*

In line with the rare previous research (e.g., Djerf-Pierre and Shehata 2017; Fletcher and Nielsen 2017), our results suggest that the concerns regarding a disintegrating



effect of intermediaries may be overstated: relying on social media for political information does not decrease the compatibility of individuals' issue horizons. If anything, one can conceive the absence of positive effects as a negative effect since social media do not increase the compatibility of issue horizons either. That is because reliance on news media (online and offline) clearly makes issue horizons more compatible among those with extreme political attitudes. By informing a large, dispersed audience on a relatively manageable number of issues, news media can build bridges and facilitate that people with extreme views (re)connect with the common core. Those strongly relying on intermediaries—but not on the news media—miss the news media's reconnection effect.

Interestingly, issue overlap was systematically lower among those strongly relying on personal conversations. They run a higher risk for ending up with an incompatible issue horizon and losing touch with the common core than persons relying on social media.

### *Trajectory of Information Repertoires*

But in contrast to personal conversations (whose importance is most likely stable), social media have become and probably will continue to become more important over time. Currently, the news media are still the most important information source while only very few people rely solely on intermediaries. Most people (in Germany) have broad information repertoires (Stark et al. 2017), preventing the widespread emergence of incompatible issue horizons. However, the news media have lost importance (Newman et al. 2020). If this tendency continues, individual issue horizons and with them the common core might shrink. This does not mean that recipients will not use news media anymore as intermediaries heavily draw on content produced by news organizations (Fletcher and Nielsen 2017). But if intermediaries serve the users with personalized information from different providers, their issue horizons are no longer rendered more compatible as happens by the regular, traditional use of "their" news outlet(s).

### *Methodological Limitations*

Before discussing generalizability and context dependency, we point out some significant methodological limitations that should be considered: (1) The political camps were reconstructed solely based on self-classification on a left-right scale. (2) The measurement of issue overlap would require a fully representative sample of the entire population for optimal results. Despite all efforts to create a sample representative of Internet users in Germany, sampling bias cannot be avoided (and Internet nonusers are not studied). (3) We traced solely which issues interviewees viewed as relevant and did survey which beliefs or opinions they held regarding the issues—but stark contrasts in beliefs and opinions may contribute to social disintegration even if two individuals care about the same issue.

## *Other Countries*

The above assessment of impact and trajectories describes the situation in Germany, which most likely resembles the situation in many less-polarized Western and Northern European countries. Clearly, a highly partisan information environment can change the game. When important news media cater to specific camps rather than the public (as currently in the United States), the widening of issue horizons may apply only to mainstream media. Consequently, the analysis would need to distinguish reliance on partisan (or hyperpartisan) and on mainstream news media. Comparing between the effects of partisan news media and social media would be interesting since it is unclear how they relate to the wideness and compatibility of issue horizons. Chances are that using hyperpartisan news media contribute to producing segmented issue fragmentation.

## *Algorithm Variability*

Social media's algorithms do not only vary between different services (Facebook, Twitter, YouTube), but also change substantially over time. Facebook, for example, has changed its algorithm so that preference is given to user-generated content at the expense of news. However, our categorization does not make strong assumptions regarding the exact nature of the algorithm curating the content and views it as an extension of editorial, social, and user selectivity that are present anyway (Figure 1). Therefore, our arguments still apply as long as content curation still follows their typical design features (DeVito 2017). We see no signs of a general paradigm change in how these algorithms operate. Still, longitudinal studies mapping fragmentation as a long-term process are highly desirable to clarify that.

## *Crisis and Routine Situations*

The "refugee crisis" has been one of the most pervasive issues in Germany in recent years, with extreme media and public salience (Haller 2017). Our study was conducted one year after the decision to accept refugees in Germany. This was followed by debates about immigration policy, criminal acts by immigrants, the rise of the immigration-critical party AfD, and a "news wave" about migration numbers. Do our findings just reflect that idiosyncratic moment? Such major crises certainly do not occur every day. However, major "news waves" are not anomalies either but rather a real, relatively frequent phenomenon (Geiß 2018). Other recent examples are the financial crisis 2007/2008, the Euro currency crisis, and the Coronavirus pandemic. In case of severe fragmentation, however, the media might not even succeed in building a public for that one issue. Despite the value of our findings for this type of situation—which are highly significant for building and maintaining a common core—our findings do not immediately translate to "routine" situations. This calls for applying our concept of issue horizons in more diverse contexts to explore commonalities and differences. The basic mechanisms we identified can serve as working hypotheses.

## *Issue Dominance*

The predominance of the “refugee crisis” in our study reminds us of the impact of the landscape of issues for policymaking and the party landscape: the “refugee crisis” is a popular issue of the political right. Its continued dominance clearly created beneficial conditions for the rise of the right-wing populist AfD (Augstein 2018), which was strongly associated with (and deemed competent for) the immigration issue. More generally put, a strong and long-lasting focus on one top issue can impact the long-term development of the party system in a country. Additionally, the long-term dominance of a single issue raises the question how compatible and wide individual issue horizons must be to ensure a functional common core: if a society focuses too strongly on one top issue, other important matters are likely to be overlooked.

## *Knowledge Needs*

Moreover, the tension between issue diversity and top issue focus further illustrates that fragmentation must be measured using several indicators. Our innovative three-part operationalization of issue horizons has proven to be useful for this purpose: it enables capturing the nature and size of fragmentation nuanced, leading to a differentiated diagnosis, and allowing for a targeted treatment. For instance, issue overlap would increase if the news ecosystem emphasizes a limited set of recurring issues (issue oligopoly). Issue focus would increase if it prioritized only one major issue (issue monopoly). We need repeated investigations of issue horizons, however, to establish how wide and compatible issue horizons typically are and which individual, content, and contextual factors influence which dimension of issue horizons. Normative work providing standards and criteria for desirable levels of issue diversity, issue focus, and issue overlap would be a helpful guideline for future research.

The current study shows that the common assumptions about fragmentation are too simple and that investigating issue horizons can help us understand the link between information environments and fragmentation in a more nuanced way. The fragmenting consequences of the rise of algorithm-driven, personalized information sources are currently not to be found unconditionally, but rather in subpopulations—with extreme political attitudes emerging as the primary “risk factor”—or under specific contextual conditions.


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## Supplemental Material

Supplemental material for this article is available online.

## Note

1. If they are collapsed into a single issue category, the level of the diversity index decreases, but the results of the regression analyses hardly differ. Since the twenty-one issues would be counted as independent issues if the current bundling event creating the (temporary) issue complex were absent, we refrain from collapsing them.

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