Are News Audiences Increasingly Fragmented? A Cross-national Comparative Analysis of Cross-platform News Audience Fragmentation and Duplication

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Abstract

The move to high choice media environments has sparked fears over audience fragmentation. We analyse news audiences across media platforms (print, television, and online) in six countries, going beyond platform-specific, single-country studies. We find surprisingly high levels of news audience duplication, but also that cross-platform audiences vary from country-to-country, with fragmentation higher in Denmark and the United Kingdom than in Spain and the United States. We find no support for the idea that online audiences are more fragmented than offline audiences, countering fears associated with audience segmentation and filter bubbles. Because all communication exists in the context of its audience, our analysis has implications across the field, underlining the importance of research into how trends play out in different contexts.

Keywords: audience behaviour; fragmentation; duplication; news; comparative research

One of the most important questions of our time is whether the forces that drive us apart are more powerful than those that hold us together. With the erosion of twentieth-century mass audiences, media and communication researchers have approached this question in terms of audience fragmentation versus audience duplication—audience fragmentation describing a situation where people increasingly use media they only share with small groups of like-minded individuals, and audience duplication a situation where the audience for individual outlets may seem small and circumscribed, but most people in practice use many different media, and many media are used by people of many different persuasions. The underlying concern is whether a fast-changing media environment characterized by more and more abundant information, and more and more sources to choose from, will provide the kind of shared space of information, debate, and engagement that various political theorists argue a well-functioning democracy needs (Delli Carpini & Keeter, 1997; Neuman, Just, and Crigler, 1992; Dahlgren, 2009; Habermas, 1989).

Media and communication researchers have different views on the issue. On the one hand, a number of prominent authors have warned against the social and political implications of what they see as a more and more fragmented media environment, characterized by self-selecting news and opinion "echo chambers" (Jamieson & Cappella, 2008; Berry & Sobieraj, 2014) and more personalized, segmented, or "balkanized" audiences (Stroud, 2011; Sunstein, 2009; Turow, 1997; Katz, 1996), driven at least in part by the development of digital media. On the other hand, a growing number of audience researchers have pushed back and argued that, beneath what James Webster (2005) has called the "veneer of fragmentation", there is a high degree of audience duplication suggesting a "massively overlapping culture", even in a time of unprecedented media choice (Webster, 2014, p.98; see also Gentzkow & Shapiro, 2011; Trilling & Schoenbach, 2013; Webster & Ksiazek, 2012; Weeks, Ksiazek, and Holbert, 2016).

The debate around fragmentation and duplication raises profoundly important questions about the role of media in democracy as we continue the move to a relatively high choice media environment with an increased potential for fragmentation (Prior, 2007; Neuman, 2016). While in large part motivated by normative concerns, the question at hand is also fundamentally empirical. To what degree are audiences fragmented, and to what degree do they duplicate? In this paper, we present a cross-national comparative analysis across six countries (Germany, Denmark, France, Spain, the United Kingdom, and the United States) of cross-platform news audiences (including print, television, and online) to advance our understanding of this question. We start from the audience-centric approach pioneered by James Webster and his collaborators, which aims to use techniques from social network analysis to map the degree of fragmentation or duplication within a media environment by measuring the extent to which the audiences for different outlets overlap with one another (Webster & Ksiazek, 2012; Webster, 2014; Yuan & Ksiazek, 2015; Taneja & Webster, 2016; Taneja, 2016). As such, we pursue the idea that audience fragmentation and duplication can only be understood if one considers both supply (the media structure) and demand (media use). In the broader discussion we engage with, definitions, operationalizations, and diagnoses vary, as different authors have built their analysis around different terms. But, the core underlying concern is the same—the potential erosion of a shared space of information, debate, and engagement. We focus specifically on the issue of fragmentation versus duplication which (i) is substantially important, and (ii) can be consistently measured both across countries and across offline and online platforms, thus bringing empirical clarity to a contentious and consequential issue.

We build beyond Webster et al.'s work in three important respects. First, in line with the idea that we need to consider both media structure and media use, we move past the national focus that characterizes most of the work cited above, and present a cross-national,

comparative analysis of the relative balance between audience fragmentation and audience duplication across a strategic sample of six structurally different high-income democracies with different media systems (Hallin & Mancini, 2004; Brüggemann et al., 2013). Second, in line with the idea that any examination of fragmentation and duplication should put the audience—and not any one individual media platform—at the center of the analysis, we present a cross-platform analysis of media use across the most important platforms, including print, television, and online. Third, because the reason we are interested in the relative balance between fragmentation and duplication is primarily concerned with the social and political role of media as a shared space for information, debate, and engagement—and not with, for example, entertainment—we focus specifically on audience fragmentation and duplication when it comes to news.

Based on data from the 2016 Reuters Institute Digital News Report (Newman et al., 2016), we find (i) that cross-platform audience duplication varies from country to country, with audiences in the United States—the focus of almost all previous studies—and Spain overlapping to a greater extent than those in Denmark and the United Kingdom, where a few very widely used sources tend to dominate the information environment. We also find (ii) that the higher choice online news media environment is no more fragmented than the comparatively low choice offline news media environment—in some cases in fact significantly less fragmented, meaning that there is little evidence to support the widely-held assumption that higher choice in itself inevitably produces fragmentation.

Our findings caution against the use of single country studies to speak about news audiences throughout the rest of the world, even as more and more people access news online and the potential for convergence in media use increases, and underlines the need for further comparative research to develop our understanding of the interplay between structural differences in media systems and audience difference in media use in different countries. In

the concluding discussion, we lay out the wider implications our findings have across different parts of the field of communication research.

Literature Review

Different normative standpoints offer different starting points for thinking about fragmentation and duplication, and different ways of interpreting empirical results. Consider just two possible starting points. For people committed to minimalist views of democracy centered on, for example, effective elite competition (e.g. Schumpeter, 1992), a core component of a well-functioning democracy is a media environment that provides a shared basis of information that helps people understand how society works, how it is governed and by whom, and what political alternatives exist (see e.g. Delli Carpini & Keeter, 1997; Neuman et al., 1992). For people committed to more maximalist views of democracy centered on, for example, deliberation (Habermas, 1989) or participation (Pateman, 1970), the media have an even more demanding role, not only as providers of information, but also as enablers of broad-based political participation and inclusive, rational-critical debate (Couldry, Livingstone, and Markham, 2010; Dahlgren, 2009). None of these views see audience fragmentation as an absolute evil, or audience duplication as an absolute good. Some degree of fragmentation is bound to accompany any diversity, and diversity can enable both a more informative, deliberative, and participatory media environment. But all of these views have reservations about the ability of media to enable a well-functioning democracy in a completely fragmented scenario, with little in terms of shared information, debate, and engagement.

That is why the move from a low choice media environment characterized by mass audiences and low levels of audience fragmentation to a high choice media environment with a potential for much higher degrees of audience fragmentation is so important. In the United

States, one team of researchers have estimated that the number of minutes of media content available in the average household for each minute of audience attention has grown from 82 in 1960 to 884 in 2005 (Neuman, 2016, p.132)—and the supply has only grown further since. If the entrepreneur and technology commentator Chris Anderson is right in his assertion that "infinite choice equals ultimate fragmentation" (Anderson, 2006, p.181), this structural change is bound to lead to a far more fragmented environment, one where media may no longer provide even the potential for shared information, debate, or engagement.

Indeed, a range of prominent researchers have suggested our media environment is increasingly characterized by "echo chambers" (Jamieson & Cappella, 2008; Berry & Sobieraj, 2014), more personalized, segmented, or "balkanized" audiences (Stroud, 2011; Sunstein, 2009; Turow, 1997; Katz, 1996), and "filter bubbles" (Pariser, 2011). The underlying assumption in each case is that preference-driven loyalties will lead audiences into distinct niches, and that people's ability to self-select into these niches is empowered by the expansion in choice. In the case of filter bubbles, it is argued that self-selection will be reinforced by algorithms that are designed to show people more of what they like, and less of what they do not. Some have developed more nuanced positions, for example arguing that preferences for opinion-reinforcement do not necessarily cause people to avoid opinion challenges (Garrett, 2009). Others have argued, similarly, that most people are in fact omnivores, who may have some niche interests, but also many preferences they share with many others, and will in fact—even in a high-choice media environment—self-select media in ways that produce high degrees of audience duplication (Webster, 2014). Fundamentally, this is an empirical question.

One way of approaching the question of audience fragmentation versus audience duplication across media platforms and across different media systems is through the audience-centric approach developed by James Webster and his collaborators (Webster &

Ksiazek, 2012; Webster, 2014; Yuan & Ksiazek, 2015; Taneja & Webster, 2016; Taneja, 2016; Weeks et al., 2016). According to this stream of work, audiences within media environments can be characterized by placing them on a spectrum that ranges from 'fragmented' to 'duplicated'. This characterization is determined by measuring the degree of audience 'overlap' between each pair of outlets within the environment, which is simply the proportion of the population who use both. A fragmented media environment is one where the audiences for each media outlet within that environment tend to overlap very little—or not at all—with one another. Audiences for particular outlets may be very small or very large, but if most people who use them do not tend to use other outlets as well, the degree of fragmentation will be high because audiences remain separated. In contrast, a duplicated media environment is one where the audiences for most (if not all) media outlets overlap. Again, the size of the audience for a particular outlet may vary, but if people tend to spread their consumption across multiple outlets then audiences may be duplicated.

In contrast to media-centric approaches looking at audiences only from the point of view of media outlets (print circulation, television ratings, monthly unique visitors for a website or app, and so on) or individualistic approaches examining individual media repertoires, this audience-centric approach offers a macro-level way of characterizing audiences on the basis of the combinations of media they use. It incorporates a structural component taking into account supply, by describing the audience for particular media outlets. It simultaneously integrates media use by capturing the varied repertoires of audience members at the aggregate level (Webster & Ksiazek, 2012). In this way, it aims to capture the distribution of audience attention across a media environment, and gives us a way of measuring the relative degree of fragmentation or duplication in different media environments, and compare across them in a consistent way. The idea is to integrate both the push from the supply side (defined by media structure in a given country or market) and the

pull from the demand side (defined by what audiences pay attention to) (Webster, 2014). What ultimately results from this approach is a networked map of audience behavior, with each node in the network representing the audience for a particular named outlet, and the links between any two outlets indicating that their audiences overlap (see Figure 1 for an example).

<FIGURE 1 HERE>

More specifically, Webster and Ksiazek's (2012) method is operationalized as follows. First, for every possible pair of media outlets for which audience data exists, the proportion of the total population that used both within a given time period is identified. But because a certain proportion will have used both by chance, a threshold is set by multiplying the individual reaches of each of the two outlets considered. If the observed overlap exceeds this threshold, then it can be said their audiences are duplicated. (Importantly, audiences do not have to completely mirror each other in order for them to be classed as overlapping according to this operationalization.) Established techniques from the field of social network analysis (see e.g. Wasserman & Faust, 1994) can then be used to construct a network based on these relations. The nodes with a network are the media outlets, and the links between them denote audience duplication. Links are un-weighted, in that they either exist fully or they do not exist at all (as opposed to having a value that indicates their strength), and are un-directed, in that they do not imply an inward or outward direction with respect to particular nodes. Once every possible pairwise comparison has been considered, the full network can be generated, visualized, and analysed. Network visualizations provide a powerful description of network structure and the relations between different nodes. Furthermore, a range of network

statistics can be computed that numerically describe the nature of the network, some of which may tell us something about the degree to which audiences are fragmented or duplicated.

Webster and Ksiazek (2012) applied this approach to television and online tracking data from the United States collected by Nielsen in 2009. They found that despite the conventional 'long-tail' distribution in terms of overall reach for each of the 236 media outlets considered—which could imply fragmentation amongst all but the most widely used outlets—there nonetheless existed an extremely high degree of audience duplication. They found almost every node in the network, including those with a very small overall reach, was connected to all of the others. This, they concluded, directly challenged the fragmentation thesis. Their analysis shows how simply looking at the reach of individual outlets on the supply side without considering the possible underlying overlap at the demand side can lead one to exaggerate the degree of audience fragmentation in a given media environment. The fact that brand *x* reaches 50% of news users and brand *y* only 5% is not evidence of fragmentation (let alone echo chambers) if many people use both.

Recently, several follow-up studies have utilized and developed this approach. Weeks et al. (2016) also found evidence of very high duplication specifically among audiences for news outlets. They used 2008 National Election Survey data from the United States to show that general interest media outlets such as local newspapers and CNN exist at the core of networks, meaning that their audiences overlap with other outlets in the network more than those with partisan output. Furthermore, the same is true even when data from partisan individuals is used to construct the networks, suggesting that they are no more likely than neutrals to employ more selective media diets. Again, the take home message was that fears associated with partisan selective exposure might be exaggerated. In the only comparative study that we are aware of, Yuan & Ksiazek (2015) compared audience networks for television in China and the United States. Again, they observed a very high degree of

audience duplication in the United States. However, in China they found that the network was much more centralized, with a core of dominant channels—each with a high degree of overlap—surrounded by a periphery of smaller channels that did not overlap with one another. This, they argued, "reflects both the central-local dynamic and the state-market tension, which results from the rapid trend of marketization and decentralization in China's TV market" (Yuan & Ksiazek, 2015, p.74). The network approach has also been applied to audiences for the world's most popular websites. Here, duplication is typically lower, but the clusters within these networks that this creates can be best explained by differences in language and geography rather than politics (Taneja, 2016; Taneja & Webster, 2016).

Though the audience-centric approach is still being developed and improved, we currently lack an analysis of news audience fragmentation/duplication that is truly cross-platform (no study has yet considered print consumption in isolation, let alone combined with online and television), as well as a more systematic comparison between a larger set of different countries. Perhaps more importantly, and despite the fact that research in this area has been prompted by concerns over the consequences of transitioning to high-choice media environments, we lack a comparison between offline environments (which are comparatively low choice) and online environments (which are comparatively high choice).

Hypotheses and Research Questions

With this in mind, we can formulate a series of hypotheses and research questions. Though the underlying move from a low choice media environment to a high choice media environment is a structural transformation that has played out in different ways from country to country, even within the relatively similar world of high income democracies (see e.g. Levy & Nielsen, 2010; Nielsen, 2012), and despite the fact that previous analysis has established that media system differences shape media use in significant ways (Shehata &

Strömbäck, 2011; Blekesaune, Elvestad, and Aalberg, 2012; Perusko, Vozab, and Čuvalo, 2015), analysis of audience fragmentation and audience duplication has primarily been pursued in single-country case-studies, predominantly of the United States. Moreover, although early pioneers in comparative media research argued that one of the most important dimensions along which different media systems should be compared are differences in "audience orientation to political communication" (Blumler & Gurevitch, 1995, p.5), comparative media research has primarily been focused on differences in media markets, media policy, journalistic professionalism, and news content; not audience behavior (see e.g. Hallin & Mancini, 2004; Brüggemann et al., 2013).

To systematically compare degrees of audience fragmentation versus duplication across countries, we examine a strategic sample of six high-income democracies with different media systems: Germany, Denmark, France, Spain, the United States and the United Kingdom. It is possible to compare these countries across many different dimensions, but in Germany, Denmark, France, and the United Kingdom, there is a relatively high degree of state intervention media markets, resulting in widely-used and well-funded public service media. Considering online consumption complicates this picture somewhat, because although public service media has a strong online presence in Denmark and the United Kingdom, the same in not true in France and Germany. In Spain, newspaper readership is lower, and state intervention is less substantial. The United States has had high levels of newspaper readership, but has little in the way of public service media.

Cross-nationally comparative audience research is relatively rare, and findings from studies of television (Aalberg et al., 2013) and newspapers (Elvestad & Blekesaune, 2008) have found only partial support for the idea that audiences mirror structural differences in media systems. But several studies, including those looking across both television and newspapers (e.g. Curran et al., 2009) have found that countries like Denmark and the United

Kingdom, with relatively centralized media systems (as opposed to more decentralized, regionally organized media systems like in, for example, Germany), historically strong newspapers (unlike France and Spain), and relatively well-funded public service media (unlike the United States), have more inclusive political information environments (see also Esser et al., 2012). We therefore hypothesize the following:

> *H_1: Countries with centralized media systems, historically strong newspapers, and relatively well-funded public service media have higher levels of cross-platform news audience duplication.*

The key motivation for studying news audiences in the twenty first century is the fear expressed by some that the development of a high choice media environment will necessarily lead to fragmentation. Audience-centric studies have argued that this is not the case by highlighting very high degrees of duplication within high choice environments. However, it is difficult to interpret these measures without being able to compare them to measures of duplication in comparatively low choice environments. On this basis, it is useful to compare offline news consumption and online news consumption using the same measures and techniques to see whether there are any differences.

> *RQ_1: Does audience duplication for the most popular online news sources differ from that for the most popular offline news sources?*

Data

The data we will use to test our hypotheses and answer our research questions comes from the 2016 Reuters Institute Digital News Report survey (Newman et al., 2016). The survey

was conducted by YouGov in partnership with the Reuters Institute during late January and early February 2016. An online questionnaire was used to survey over 50,000 respondents across a total of 26 countries. Samples were drawn from YouGov's panels within each country, and respondents were invited to complete the survey in order to meet quotas based on age, gender, and region. Samples were then weighted according to census data to match the national population (see Table 1 for descriptive statistics). Respondents who said that they used news less than once a month were filtered out at an early stage.

<TABLE 1 HERE>

Most previous studies in this area have been based on audience tracking data. However, there is a precedent for the use of self-reported survey data to examine news audience duplication (Weeks et al., 2016). Ultimately, different measurement techniques will produce different data. As with all surveys of media use, reliance on recall means that the data may not always provide a completely accurate picture of people's actual news consumption. More specifically, it has been shown that people tend to over-estimate their news use when asked to recall it, if tracking data is used as a ground truth (Prior, 2009). However, we might also question the use of tracking data as a ground truth, given that it can count someone as having used a television channel if they access it for one minute or more during a one month period, and a website if they access it for just one second (Webster & Ksiazek, 2012). In this sense, a reliance on self-reported data might have some advantages. Ultimately, our core interest here is the structure of news audiences, not media behaviour, and if people are unable to recall using a given source of news in the past week, it is unlikely to have contributed much to their knowledge of and engagement with public affairs.

The primary reason for using a survey in this case was that it provides 'single source' data (meaning data from the same person) on cross-media use (print, television, and online) as well as the cross-platform use of specific sources (online, offline, or combined) (Taneja & Mamoria, 2012). Single source data is considered the gold standard of audience measurement, because it does not rely on data fusion in order to produce a cross-platform, cross-media dataset. Aside from the fact that it is hard to see how tracking data could be employed to measure the use of print media, surveys can also produce cross-media audience data using the same currency, as opposed to a mixture of different measures for each platform that are difficult to compare.

There are also some specific strengths associated with the Digital News Report data. First, the survey captured data using the same questions at the same point in time across a range of different countries, thus affording a comparative analysis. Second, the survey asks several questions at the news outlet level. In other words, respondents within each country are asked about their use of particular news brand both online and offline. Lastly, in contrast to much tracking data, the survey aims to measure—and specifically asks about—news brand use via apps and social media, rather than just website access.

All of the data used in the analysis that follows comes from two survey questions. The first asked all respondents to specify which news outlets they used *offline* during the previous week. The second asked which news outlets they had used *online* during the previous week. Respondents in each country were able to select from a list of around 30 of the most popular offline and online news outlets in each country, with a separate list for each.

There are, however, limitations associated with this approach. Here, we are only able to consider the 14 most popular news outlets in each country, as defined by the 2016 Digital News Report (Newman et al., 2016). It was not practical to ask about the use of more than around 30 news brands in each country, and 14 was the smallest number left (in Denmark)

after those news sources with a very small reach had been removed (we trimmed all of the other networks to 14 nodes in order to make them comparable). As such, we are unable to examine potentially important differences in fragmentation/duplication in the long tail of the less popular news brands in each country, as other studies have done. This is an important limitation, and prevents us from offering a complete description of the news media environment within countries. Rather, the focus here is placed on the audiences for the most-widely used news outlets, where evidence of differences in levels of fragmentation might still be important.

The data also has some other limitations that need to be kept in mind. Importantly, it is drawn from an online panel, and as a result, the respondents do not represent a fully random sample. The results will also under-represent the media habits of those who are not online. Those under-represented are typically older, less affluent, and have lower levels of formal education. This is particularly important to keep in mind when considering Spain, where around 20 percent of the population is still offline. This is a far smaller problem in the other three countries, where internet penetration is around 85 percent or higher.

The use of survey data also makes it necessary to consider modifications to Webster and Ksiazek's (2012) procedure. Estimates of media use from tracking data are typically based on very large samples. As such, the use of tracking data permits a link between two nodes to be formed when the observed audience overlap exceeds what we might expect to occur by chance, itself defined by multiplying the reach of each of the two outlets examined. However, given that surveys use much smaller samples for practical reasons, and therefore carry a bigger margin of error, we should question whether the observed overlap exceeds what we might expect by chance by a statistically significant amount. Webster, Phalen, and Lichty (2006) suggest that a simple chi-squared test can be used to test whether the observed audience overlap between two outlets is significantly greater than the expected overlap.

Therefore, during the analysis, for every possible pair of nodes within the network, this test will be applied to the data for each, and a link only created if the observed overlap is significantly greater than the expected overlap ($p < .05$). Given that the thresholds for what counts as overlap are somewhat arbitrary, we have adopted this more conservative approach that sets the bar high to avoid creating the impression of a very high degree of audience duplication that may on closer inspection be an artefact of a very liberal definition of overlap.

Results

To address our hypothesis and research question we will make use of the "five number summary" suggested by Luke (2015). Luke defined this as the five most useful statistics for describing networks. (i) Size: the number of nodes in the network; (ii) Density: the proportion of possible links between nodes that are actually present; (iii) Components: the number of subgroups that are not linked to other subgroups within the network; (iv) Diameter: the shortest path (in terms of number of links) between the two most separate nodes in the network, and; (v) Transitivity (or Clustering Coefficient): the proportion of closed triangles within a network compared to the number of unclosed triangles. Where we make use of the five number summary, we also break down size into the number of each outlet type, which we have defined as broadcaster, print, and digital-born. These refer to the outlets heritage (i.e. whether they started out as a broadcaster, print publication, or were 'born' online). As such, the BBC is referred to as a broadcaster, even if a particular respondent may have used it online.

The bulk of the network analysis was carried out using the 'igraph' package for the statistical language R, as well as UCINET 6. We also make use of network visualizations (see e.g. Figure 2). In the visualizations included here, node size is determined by the weekly news reach of the outlet, and node colour is determined by the outlet type. The layout of each

network is determined by the Fruchterman-Reingold algorithm, meaning that nodes are forced to be evenly spaced out with links of roughly equal length.

We expect degrees of audience fragmentation and duplication to vary between countries and have specifically hypothesised (H_1) that countries like Denmark and the United Kingdom, with centralized media systems, historically strong newspapers, and relatively well-funded public service media will have higher degrees of audience duplication than the other countries in our sample. At a glance the results in Table 2 show that density, and therefore news audience duplication, does indeed vary from country to country. However, the findings are not in line with the expectations behind H_1. Network density is highest in Spain (.93), followed by the United States (.87) and France (.80). Density is lower Germany (.73) and Denmark (.56), and lowest of all in the United Kingdom (.44) where less than half of all possible links are actually present. This is a surprising finding, given our expectation that a combination of strong newspapers and public service media would lead to a high degree of audience duplication. We also see differences in network 'diameter' (the shortest path between the two most distant nodes in a network). In Spain, Germany, France and the United States the diameter is 2, meaning an audience for a particular outlet will be at most only one step removed from overlapping with that of any other outlet in the network. In Denmark and the United Kingdom, the diameter is 3, meaning that some outlets have up to two other nodes between them, suggesting that audiences can be more 'distant' from one another.

<TABLE 2 HERE>

Figure 2 visualizes the cross-platform network for each country. Even though they contain the same number of nodes, the networks look quite different. The United Kingdom and Denmark networks are visibly less dense than, say, the United States or Spain. Some

networks, typically those with lower densities, appear also to be dominated by one or more broadcaster(s) with a very large reach (indicated by the size of the node). The networks with a higher density appear to exhibit less variation in terms of reach. It is also noticeable that in Spain, Denmark and Germany, outlets of a similar type tend to be clustered together, indicating that their audiences are more likely to overlap with one another, and that there might be some divisions between print, broadcast, and digital-born news audiences. In the other three countries, outlets of each type are more evenly dispersed.

<FIGURE 2 HERE>

Faust & Skvoretz (2002) note that most social network analysis examines only a single network at a time. As a result, we lack a standardized set of methods for comparing multiple networks. Although the use of inferential statistics is common in the social sciences, the basic techniques used to test hypotheses relating to the distribution of cases and variables—such as estimating standard errors and computing test statistics—cannot be applied to network data because they assume independence of observations (Hanneman & Riddle, 2005), and as a result tend to produce type I errors (false positives). Snijders & Borgatti (1999) have described how bootstrapping—a general-purpose statistical method that creates a large number of artificial datasets using the observed data, and then uses the variability to compute measures of accuracy—can be applied to network datasets to produce robust standard errors, which can in turn be used to compute t-statistics. We utilize this technique here, using 1000 bootstrapped samples in each case.

Table 3 displays the results of a series of t-tests that were used to test for the differences in density between each pair of networks. Overall, the table reveals that in about half of the comparisons, the network densities are significantly different from one another.

They are not distinct in every case, but this is to be expected. In other words, this suggests that duplication for cross-platform news audiences varies from country to country. However, while we find clear and significant differences in the degree of audience fragmentation versus duplication across countries, H_1 is not supported. Contrary to our expectations, news audiences in Denmark and the United Kingdom, with their more centralized media systems, historically strong newspapers, and relatively well-funded public service media in fact have, in the case of the United Kingdom, more fragmented audiences than all other countries, and in the case of Denmark, more fragmented audiences than Spain and the United States. Explaining these differences, and this surprising finding, will require more research. One possibility is that they can be partially explained by demographic differences within countries (or within samples). For example, the Danish sample contains a larger proportion of university educated individuals (see Table 1). As a partial consequence, frequency of news use is higher in Denmark than in any of the other five countries. We might expect this to produce more overlap between audiences because people are consuming more news, but this does not appear to be the case. It is difficult to map onto the results other potentially relevant measures within the data, such as levels of interest in news and news avoidance, in ways that are illuminating. But, let us note here one distinct feature that sets both Denmark and the United Kingdom apart from the four other media systems—the dominance of a single brand with very high cross-platform reach. In Denmark, 77.92% of respondents use DR online and/or offline, and in the United Kingdom, similarly, 77.72% use BBC online and/or offline, and a significant number of these users do not report having used any other sources of news in the last week. The most widely used news source in each of other four countries have much lower cross-platform reach, ranging from 36.77% (Fox News in the United States) to 56.36% (ARD in Germany).

<TABLE 3 HERE>

RQ_1: Does audience duplication for the most popular online news sources differ from that for the most popular offline news sources?

Next, we turn to the question of whether audience duplication online differ from audience duplication offline (RQ_1). Visualizations of the online and offline networks are contained in Appendix A and Appendix B. Network statistics can be found in Table 4. The statistics show that for all six countries, the online networks have a higher density score than the offline networks. This suggests greater duplication among online news audiences than for offline news sources. The difference is greatest in Germany and the United Kingdom (.2), but smaller in Spain (.06). Again, we can use the bootstrap method to compute standard errors, and then use these to produce a t-statistic. When we do this, we find that the difference is statistically significant in Germany ($t(90) = 2.03$, $p = .04$), but not in Denmark ($t(90) = 1.15$, $p > .05$), France ($t(90) = .95$, $p > .05$), Spain ($t(90) = .79$, $p > .05$), the United Kingdom ($t(90) = 1.53$, $p > .05$) or the United States ($t(90) = .92$, $p > .05$). However, this is most likely due to the small size of the networks producing relatively large standard errors. Therefore, our answer to this research question is that across all six countries in our sample, our analysis consistently finds that online news audience are no more fragmented than offline news audiences.

For those who have feared that the move to a higher choice media environment necessarily leads to less audience duplication and more audience fragmentation, this should be a welcome finding, even though it may seem puzzling that online (as a comparatively higher choice media environment) is not more fragmented than offline (as a comparatively lower choice media environment). In fact, we would argue, our results lend support to the

more general interpretation of contemporary media use offered by James Webster and his various collaborators, characterized by a surprisingly high degree of overlap underneath a veneer of fragmentation. One reason for this may be that in high choice environments, the increase in choice is often accompanied by a decrease in associated information 'costs' (Downs, 1957), such as time and effort. This, combined with the fact that much online news can be accessed for free, may enable highly motivated individuals to consume news from multiple outlets of different types offering different viewpoints, rather than from, say, a single newspaper to which they are particularly loyal. For those who are less motivated, the rise of platforms such as Facebook are likely to play a critical role. Though some suspect that they reinforce preference-driven loyalties through algorithmic selection in ways that might lower duplication, they may simultaneously enable incidental exposure to news, even as people simultaneously self-select based on other interests. This has the potential to produce a wider variety of news repertoires among the online news consuming population, which may be one reason we see lower fragmentation online.

<TABLE 4 HERE>

Discussion

In this study, we have produced, for the first time, measures of cross-platform, cross-media news audience duplication in six high-income democracies to empirically examine whether news audiences across platforms in different media systems are in fact increasingly fragmented. We have attended to some of the measurement issues associated with the use of survey data for the audience-centric approach we adopt, and have compared the cross-platform news audience networks from Germany, France, Denmark, Spain, the United Kingdom and the United States. In doing this, we have found significant differences between

them, with news audiences overlapping less in the United Kingdom and Denmark than in Spain and the United States. This finding suggests that audiences in some countries are fragmented largely because of the dominance of a few sources with very high reach (and many of their users not using any other sources of news). It is important to note that this kind of fragmentation is very different from the fears associated with, for example, partisan polarization, echo chambers, and "balkanization". What we should make of this finding depends in large part on the diversity and quality of the content provided by these media organizations, in both Denmark and the United Kingdom public service media organizations that scholars have previously found offer diverse content with a high proportion of hard news (see e.g. Curran et al., 2009).

We also observed that in every country online news audiences overlap to a greater degree than offline news audiences. (However, despite being quite large, in most cases the differences were not statistically significant.) Against the assertion that "infinite choice equals ultimate fragmentation" (Anderson, 2006, p.181) and fears of online media inexorably driving audience fragmentation, balkanization, and the formation of online "echo chambers", our analysis (focused specifically on news) lends support to the broader argument made about media use by James Webster and his colleagues, that in a high-choice environment, most media users will use a combination of a niche media (that they share with few others) and media with broader appeal (that they share with many others) and thus actively make choices in ways that produce surprisingly high degrees of audience duplication.

So in response to our opening question, whether the forces that drive us apart are more powerful than those that hold us together, our empirical answer is that the structural move towards a high choice media environment with far greater potential for audience fragmentation has so far not in fact been accompanied by widespread fragmentation of news audiences, in large part because most people across all six countries covered here still self-

select, or are incidentally exposed to, news sources used by many other citizens, rather than sorting themselves into separate echo chambers. Whether this will continue to be the case hinges in part on the continued structural changes in different media environments, but also, importantly, on social factors, including whether increased social stratification or political polarization may in the future lead to the kind of fragmentation many fear.

The findings presented here have important implications, especially for audience research, journalism studies, and political communication research, but also for our field as a whole. All communication exists in the context of its audience. This context is changing around the world, in part due to large trends like the rise of digital media that many associate with a more fragmented media environment. But closer examination of the actual interplay between media structures (supply) and media use (demand) shows both significant cross-country variation as well as documenting that online news audiences are not more fragmented than offline news audiences (if anything they are more overlapping, though not always significantly so), at least in the six countries we cover here. This substantial finding is as important for environmental communication, health communication, and public relations research as it is for audience research, journalism studies, and political communication. And the analytical approach we have developed here on the basis of pioneering work by James Webster and his collaborators is one that will enable further comparative analysis to help us better understand audience formations all over the world.

The main limitation of our analysis is that we do not have a concrete explanation for the national differences we observe. This is an important area for future research, and opens up new questions concerning how the interplay between large trends, media structures, and media use in different contexts shape audiences, and what the relative importance of technology, supply, and demand is. We clearly need more studies that systematically link media structure and media use, and compare findings and explanatory factors across

countries with different levels of digital media use. At this stage, we would suggest that any explanation will be at least in part grounded in structural differences between media systems (Hallin & Mancini, 2004; Brüggemann et al., 2013), and path-dependent developments over time as new technologies are integrated into existing media systems (Nielsen, 2013). But ultimately, audience preferences will also be critical, underlining the importance of understanding the role of, for example, social stratification and political polarization, and how this intersects with media choice in different contexts. The potential for interdisciplinary work is clear, drawing for example on the rich tradition of comparative political sociology mapping differences and similarities in popular participation and cultural orientations, as well as their drivers, across the world (see e.g. Norris & Inglehart, 2009).

Empirically, the results of our study do not provide empirical support for the idea of increasing audience fragmentation. Whether one subscribes to a minimalist view of democracy focused on effective elite competition (Schumpeter, 1992) or various maximalist views of democracy centred on deliberation (Habermas, 1989) or participation (Pateman, 1970), we might therefore think that there is little evidence for immediate concern. The same might be said of the more specific ideas around echo chambers, balkanization, and filter bubbles, given the lack of empirical evidence to support their existence. However, we should be cautious, because as we alluded to in our introduction, offering an answer to the empirical question of whether news audiences are becoming more or less fragmented cannot address normative concerns about what the most democratically desirable level of fragmentation or duplication might be. Moreover, fears around the potential damage to debate, the shared public agenda, and common culture do not have to take the form of fragmentation in order to be realised in high choice media environments, because it may not capture the subtler ways in which online news consumption is different. For instance, we might question whether people spend as much time-consuming news online as they do offline, with implications for

understanding and information retention. It is not immediately clear that an increase in duplication driven by incidental exposure to headlines and snippets in search results and social media feeds, rather than full articles, would translate into more informed debate. Finally, it is important to remind ourselves that much of the consequences for debate, shared public agenda and common culture are rooted in news content and not in news sources. If the content provided by each news outlet within a media environment is not duplicated, then no amount of duplication among audiences will help uphold a shared public news agenda. To know whether we should be concerned about the move to a high-choice media environment, we should ideally complement audience-centric studies with a more fine-grained understanding of how people consume information online, and what specific content they in fact access and use.

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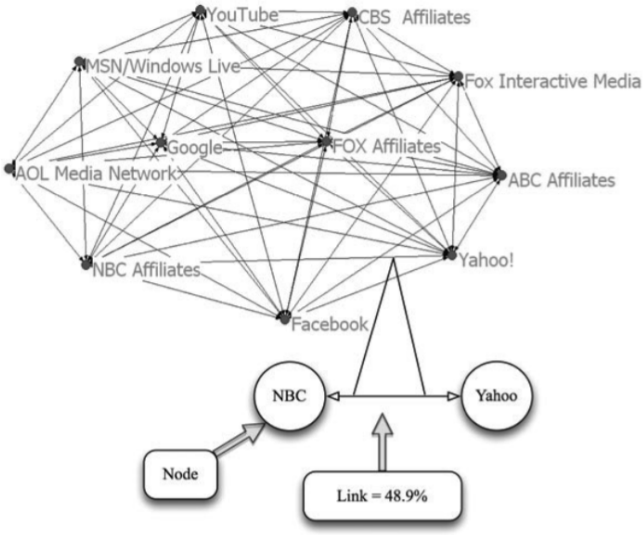


Figure 1. Example network showing audience duplication in the United States. Reprinted from Webster & Ksiazek (2012).

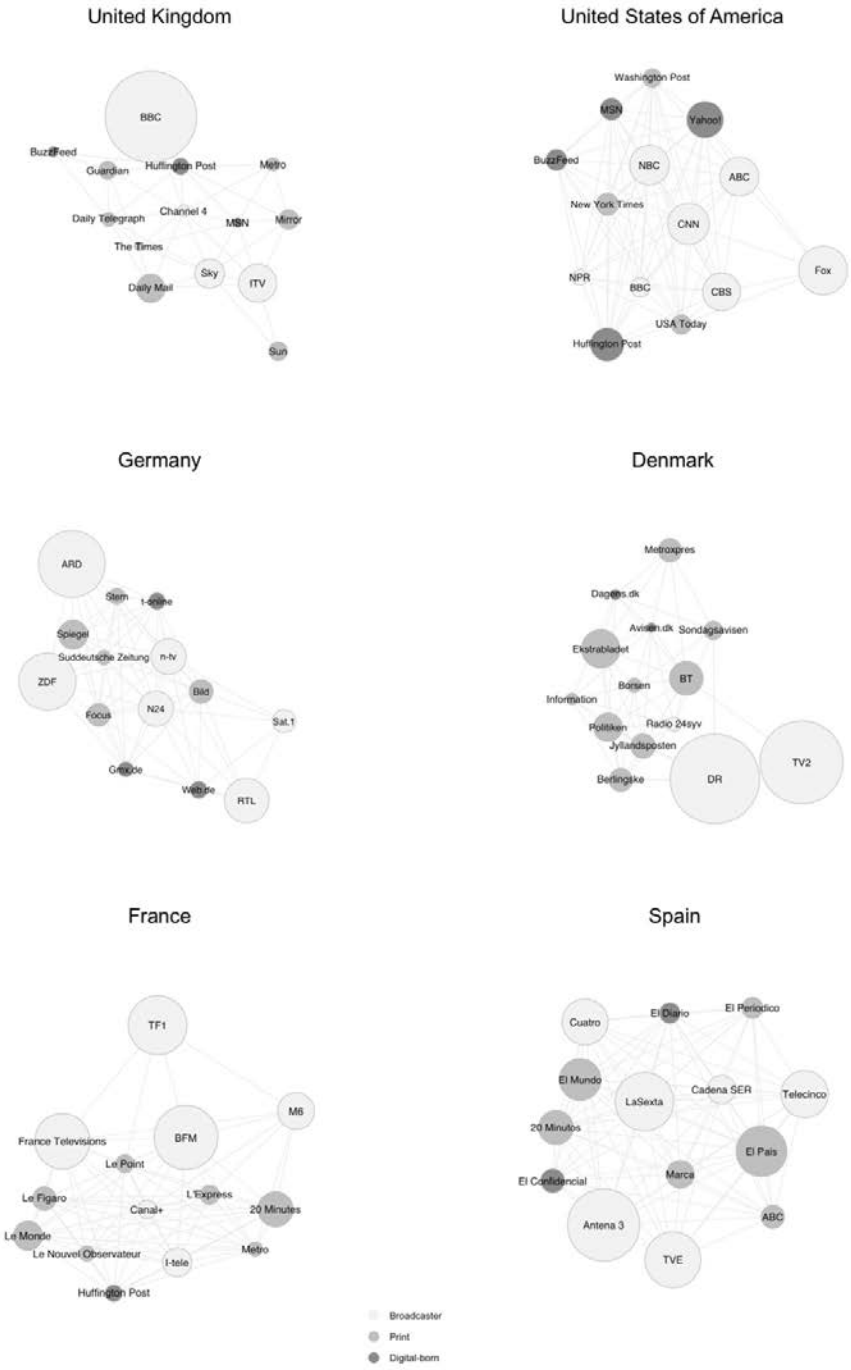


Figure 2. Cross-platform networks in six countries

Table 1

Descriptive statistics for each country

Statistic	UK	US	Germany	Denmark	France	Spain
Age (M, SD)	47.13, 16.53	46.73, 17.47	47.40, 15.69	45.81, 16.42	47.30, 16.04	45.47, 14.57
Gender (female)	51.90%	50.57%	51.51%	49.89%	52.00%	51.06%
University educated	30.93%	29.65%	22.11%	40.87%	33.52%	43.94%
Sample size	2024	2197	2035	2020	2162	2104
Internet penetration	92%	87%	88%	96%	84%	77%

Note. Internet penetration from Internet World Stats. Retrieved from www.internetworldstats.com

Table 2

Five number summaries for cross-platform networks

Statistic	UK	US	Germany	Denmark	France	Spain
Size	14	14	14	14	14	14
Broadcaster	3	7	6	3	6	6
Print	8	3	5	9	7	6
Digital-born	3	4	3	2	1	2
Density	.44	.87	.73	.56	.80	.93
Components	1	1	1	1	1	1
Diameter	3	2	2	3	2	2
Transitivity	.56	.91	.81	.63	.87	.93

Table 3

Results of multiple pairwise t-tests (showing t-statistic)

Country	UK	US	Germany	Denmark	France	Spain
UK	-	-	-	-	-	-
US	3.30 *	-	-	-	-	-
Germany	2.24 *	-1.18	-	-	-	-
Denmark	.89	-2.38 *	-1.30	-	-	-
France	2.79 *	-.53	.64	1.87	-	-
Spain	4.80 *	.70	2.29 *	3.65 *	1.40	-

* $p < .05$

Table 4

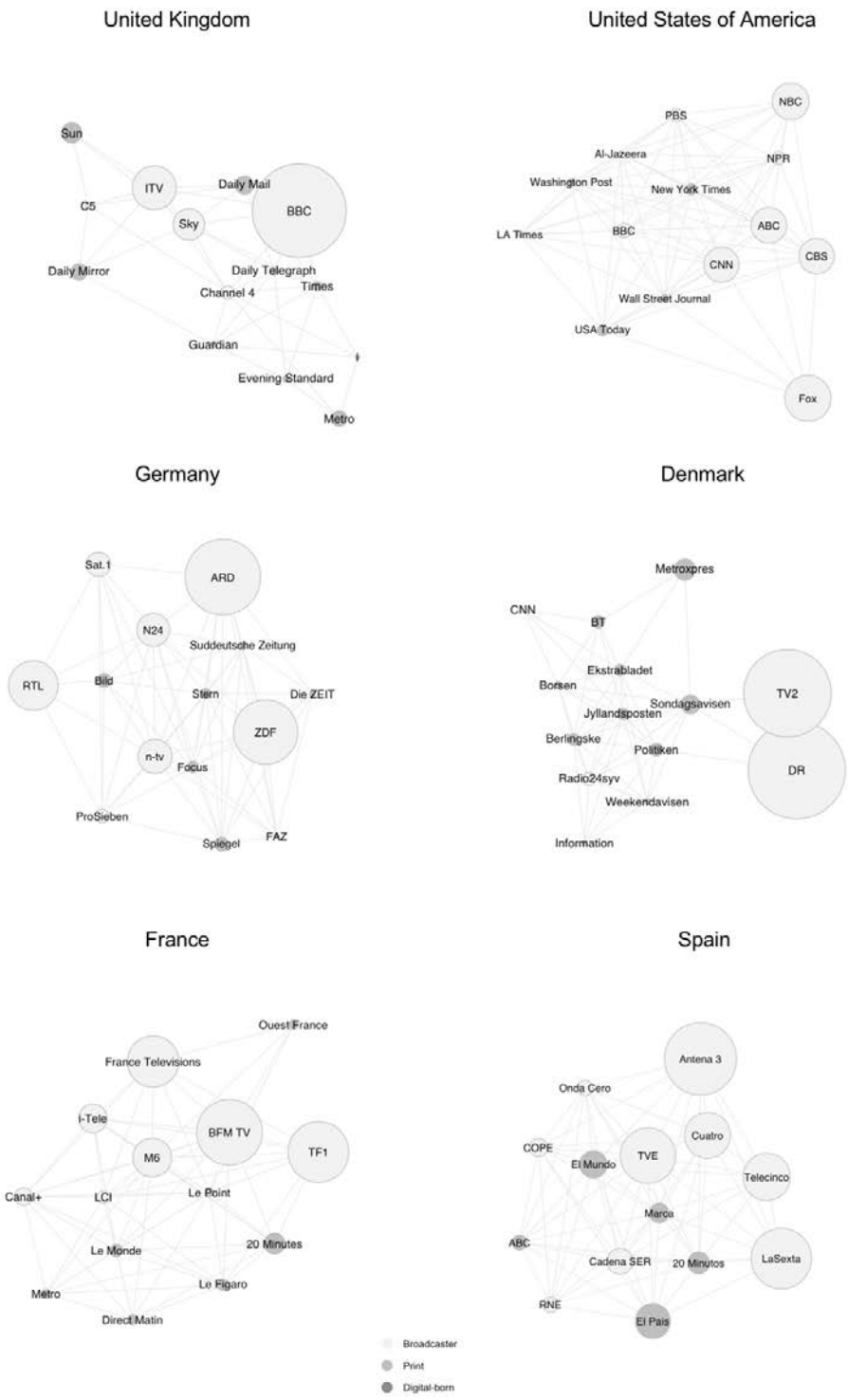
Network five number summaries

	Offline					
Statistic	UK	US	Germany	Denmark	France	Spain
Size	14	14	14	14	14	14
Broadcaster	5	9	7	4	7	9
Print	9	5	7	10	7	5
Digital-born	-	-	-	-	-	-
Density	.44	.82	.70	.53	.70	.80
Components	1	1	1	1	1	1
Diameter	3	2	3	3	2	2
Transitivity	.52	.86	.79	.67	.74	.82

	Online					
Statistic	UK	US	Germany	Denmark	France	Spain
Size	14	14	14	14	14	14
Broadcaster	3	6	5	3	3	3
Print	7	4	6	9	7	6
Digital-born	4	4	3	2	4	5
Density	.64	.91	.90	.69	.80	.88
Components	1	1	1	1	1	1
Diameter	3	2	2	2	2	2
Transitivity	.76	.92	.90	.69	.86	.90

Appendix A

Offline network maps for all six countries



Appendix B

Online network maps for all six countries