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Newspaper Ownership, Democracy and News Diversity: A Quantitative Content Homogeneity Study

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ABSTRACT

Scholarship is recognising that news diversity is jeopardised by heightened media ownership consolidation and a lack of appropriate regulatory frameworks. Using an automated quantitative content analysis of 658,493 articles published between 2018 and 2021 by two newspapers of the same recently emerged Belgian corporation that had to comply with stipulations to safeguard diversity for five years, we find that while overall content has actually not grown more homogenous, tabloid articles risk crowding out broadsheet news. We ultimately position and contextualise our study and its findings within news diversity and democratic theory and offer suggestions for additional research.

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Introduction

As various independent structured literature reviews have recently concluded, scholarship has in recent years started to reacquaint itself with discussing the need for news diversity and how this is jeopardised by heightened media ownership consolidation and a lack of appropriate regulatory frameworks (Hendrickx, Ballon, and Ranaivoson 2020; Joris et al. 2020; Loecherbach et al. 2020). As important as analysing news content face value is to assess and contextualise within the overarching political, corporate and social structures that facilitate the production, dissemination and consumption of news content by journalists and newsrooms, although this part has thus far remained mostly absent in scholarship (Sjøvaag 2016).

Hence, to contribute to the state-of-the-art, we explore the relationship between newspaper ownership, media regulation and news diversity using a case study from the media market of Flanders (Belgium). This small market has in recent years become very concentrated following a string of mergers and takeovers that have reduced the number of media companies owning legacy news brands to just four (Vlaamse Regulator voor de Media 2021). We build on previous news content homogeneity analyses of Flemish print and online news output (Beckers et al. 2017; Hendrickx and Ranaivoson 2019) and compound this with the specific situation of the corporation Mediahuis, which was founded in 2013 after two previously separately existing firms decided to join forces. The Belgian

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Competition Authority that greenlit the merger imposed stipulations to safeguard internal diversity and editorial independence for five years. The expiration of said stipulations in 2018 forms the departure point for our study. Using computational quantitative content analysis, we assess the homogeneity of all print and online articles classified as hard news published by Mediahuis' two main newspaper titles between 1 January 2018 and 30 June 2021 ($n = 658,493$). We then operationalise our findings to discuss the need for more society-oriented media policy that better conserves content diversity in Flanders and beyond. As Mediahuis is currently already active in several other European countries (Belgium, The Netherlands, Germany, Luxembourg and Ireland), we venture that this enhances the transferability of our study's findings and discussion.

Conceptual Framework: News Diversity Between Regulation and Democracy

A common thread in academic debate on news diversity, previously defined as "the various ways of producing, disseminating and consuming news for and on different platforms within one news brand, one media company and/or one media market, directly and indirectly influenced by overarching media market and company characteristics" (Hendrickx, Ballon, and Ranaivoson 2020, 16), is the tacit link with the representation of ideas and viewpoints as presented in news output that was produced by media practitioners and disseminated through a myriad of platforms. Routinely, said representation offered by a free press is positioned as a mandatory prerequisite to successfully achieve and maintain societies that are both pluralistic and democratic in nature (Baker 2007; McQuail 1992; Napoli 1999; Sjøvaag 2016). This claim, and predominantly the lack of substantial empirical evidence in its favour, was criticised by Hendrickx, Ballon, and Ranaivoson 2020 (9), who hold the view that "that the connection between too much or too few diversity and democratic societies tends to be taken for granted and assumed rather than actually proven". Along the same lines, other authors too have recently chastised the overtly normative foundations of the relationship between diversity and democracy (Joris et al. 2020; Loecherbach et al. 2020).

A common thread throughout the studies cited above is the essentially highly normative assumption that changes in media ownership structures can negatively affect the diversity of news content in various ways and forms. These range from topic to opinion, exposure and actor diversity, depending on the researcher's interests, but typically all are argued to have potential harmful consequences for a democratic, pluralistic society (Loecherbach et al. 2020; McQuail 1992; Sjøvaag 2016). The link between news diversity and democratic theory is further enhanced and proven by comparative research projects such as the Media for Democracy Monitor. In the introductory chapter to the latest edition, lead investigators Tomaz and Trappel 2022 (11) appropriately highlight the need of structural media monitoring, as "democracy as a system of governance does not seem to enjoy its highest popularity". In a different discussion on the same topic, Trappel and Meier (2022) avowedly state the following:

The emergence and dominance of highly concentrated platform companies has pushed the problems stemming from ownership concentration in the legacy media sector into the background. Over the past 30 years, despite all economic and political ownership regulations and transparency demands, media policies in the European Union and in individual European

countries have not succeeded in dismantling oligopolistic media structures that are harmful to democracy. (161)

These lines of thought are deeply embedded in democratic theory, which is prevalent in scholarly as well as policy debates around media in general and journalism in particular, notably digitisation and news recommender systems (Helberger 2019; Moe, Hovden, and Karppinen 2021; van Drunen and Fechner 2022); this recent revival of journalistic paradigms in relation with media policy stems, amongst other relevant points, from Dahlgren's (2000) notion of a classical paradigm of journalistic practice, "based on prevailing ideas of democracy and citizenship", which is juxtaposed with journalism's widening locus following the advent of online journalism (George 2013, 499–500). The same author rightfully argues that there is within democratic theory no such thing as a one-size-fits-all democratic model, but rather a multitude of them depending on local and/or national cultures. This, in its turn, can be linked to the prior observation of Van Cuilenburg (1999, 199) that media diversity cannot be considered as isolated instances, but rather "should always be compared with relevant variations in society and social reality". Hence, we take into account changes in media ownership structures as an integral part of social reality, and consider this to be a fruitful foundation for a case study on changes in news content diversity in Flanders.

It is noteworthy that relevant scholarship remains divided on the very existence of a general (negative) relationship between media ownership consolidation and news diversity. Depending on the vantage point of researchers and the structures of the media market(s) analysed, they either found a negative link (Baum and Zhukov 2019; Vogler, Udris, and Eisenegger 2020; Welbers et al. 2018) or no link at all (de Vries, Vliegenthart, and Walgrave 2022; Sjøvaag 2014; Skärlund 2020). The former authors, for instance, use a large dataset of six million newspaper articles of twelve newspapers from four European nations to assess news diversity, and "find evidence for *increasing* topic diversity" (de Vries, Vliegenthart, and Walgrave 2022, 15, italics copied from original quote). Notwithstanding the methodological soundness and vastness of their study's scope, the study has two shortcomings which ours aims to overcome. Firstly, it neglects changes in media ownership structures and their proven effects on news production and, subsequently diversity (Hendrickx and Ranaivoson 2019). Linked to this, the multi-country study does not explicitly take into account news titles from the same media group to gauge their changes in news diversity over time. Second, the study of de Vries et al. completely ignores online news and solely focuses on print content, in spite of profound changes in how citizens consume news content, as acknowledged in studies such as the Digital News Report (Newman et al. 2022).

Just as news diversity is a multifaceted concept with various dimensions that organically alter one another, news diversity in itself is constantly acquiesced and/or constrained by policy. News diversity can only contribute to democratic society if policy collectively enables and facilitates the very existence of such societal system marked by a free press and elections. Scholarship has noted that diversity "comprises an important aspect of media regulation, involving permanent disputes in media policy and media economy literature" (Roessler 2007, 466). Epistemologically, however, content diversity and overall news diversity remain rather nebulous constructs with definitions and dimensions depending on the vantage points of individual media systems, regulators, markets

and researchers (Karppinen 2013). This renders comparing media markets and the ways they are regulated difficult as market structure and policy are typically deluged in established local traditions and norms. This is exemplified by the host of institutions each with different regulatory powers and outlooks on how to supervise media diversity, such as Ofcom in the United Kingdom, the Federal Communications Commission (FCC) in the United States and the Kommission zur Ermittlung der Konzentration im Medienbereich (KEK) in Germany.

It bears repetition that regulating media markets is usually strongly linked to maintaining the freedom of expression, frequently enshrined in nations' laws and constitutions as a basic, fundamental human right. Facilitating private enterprise and allowing competition between a diverse set of news outlets is considered fundamental in order to ensure journalistic independence (Gentzkow and Shapiro 2008; Sjøvaag 2016), although this includes potential market failures (Baker 2007). The consolidation of newspaper ownership following mergers and takeovers and its possibly adverse ramifications for the diversity of viewpoints and opinions reflected in the news has been worrying media regulators and scholars for nearly a century (Guardino and Snyder 2012). In recent years, the topic has regained academic momentum as media markets became increasingly concentrated and dominated by a few large corporations owning and controlling vast shares of legacy news outlets in various countries (Badr 2021). The heterogeneity of media markets as well as of media diversity measurement approaches makes analysing news content, with its representation of diverse ideas and viewpoints, and the overarching structures that facilitate or constrain this a convoluted task—but precisely because of that, a very important one too. In recent years, studies from various countries have signalled an erosion of content diversity as a direct consequence of heightened media ownership consolidation (Badr 2021; Hendrickx 2020; Vogler, Udris, and Eisenegger 2020), whereas other studies have found no such ramifications (de Vries, Vliegenthart, and Walgrave 2022; Sjøvaag 2014; Skärlund 2020). This is again due the variety in media market systems and begs for additional research.

We hold the view that just as there is an established mutual causality between various dimensions of news diversity, with one impacting the other and vice versa, the same goes for the wider relationship between news diversity as a holistic concept, newspaper ownership and media regulation. Revised policy measures can dramatically alter overall market structures including media ownership, which in turn will affect the various aspects of news diversity. Here too, we venture that this rapport is inherently mutual in nature. Media regulation also readily adapts to changes in media ownership structures as well as in (dimensions of) news diversity. A prime example constitutes recent policy measures on news diffusion through social media: following the growing dominance of corporations such as Alpha and Meta and their key platforms Google and Facebook, citizens' behaviour towards news consumption has altered dramatically (Newman et al. 2021). As a result, this affects news production processes and thereby other aspects of news diversity, such as brand diversity (Chen and Pain 2021), and in turn fosters a global policy debate around platforms (Meese and Hurcombe 2021).

In the remainder sections of this article, we test our paper's main research question by building on previous scholarship as outlined above: Has news content grown more homogenous over time as the result of heightened ownership consolidation in the Flemish media market, in spite of imposed regulations to safeguard diversity?

Presenting Our Case Study

The Flemish Media Market

In their 2004 book, Hallin and Mancini classified Belgium along with the Nordic and German-speaking European countries as part of the Democratic Corporatist model, that is marked by “a high reach of the press market, relatively high degrees of political parallelism, strong professionalisation, and strong state intervention, in the form of strong public service broadcasters and subsidies for the press”; Brüggeman et al. later argued that Belgium, like its neighbour The Netherlands, is more akin to the Western liberal type (2014, 1042–1043).

Belgium is a politically complex nation of just over 11 million inhabitants with different linguistic groups, regions and governments. A federal state with far-reaching authority for regional governments, Belgium is notorious for having regulatory powers shared between different layers of government. To give the appropriate example of media regulation: this is broadly speaking left to the devices of regional governments, meaning that Dutch-speaking Flanders (6.6 million inhabitants) and French-speaking Wallonia (3.6 million) have their own independently operating ministries of media and independent regulatory body overseeing compliance with local media policy. However, company mergers, including those of media corporations only operating on one side of the country, always need the approval of the federal Belgian Competition Authority. As there are little arguments to speak of a Belgian media market with news production and consumption and media ownership mostly divided by language regions, we speak of the Flemish media market, in line with other international research (e.g., Beckers et al. 2017; Hendrickx and Ranaivoson 2019). The annual Digital News Report, for instance, also distinguishes news consumption and trust scores of Flemish and Walloon citizens separately (Newman et al. 2021).

Flanders is characterised by a small, vibrant news landscape with relatively high circulation figures for print newspapers, a rather low willingness to pay for online news, comparatively high trust ratings in legacy news media and journalism and, most importantly, a very high degree of media ownership consolidation. This has been a fixture in Flemish and wider Belgian media debates for decades (Servaes 1989) and is still repeated annually in the media concentration reports of the Flemish media watchdog. Between 1950 and 2020, the number of different active newspaper companies dropped from 14 to just 3, and the number of daily newspapers decreased from 18 to 7 (SARC 2002; Vlaamse Regulator voor de Media 2021). According to the same report, the number of companies that owned all legacy news brands nearly halved between 2011 and 2021, slumping from 7 to 4; the fourth one is the public service broadcaster, that is routinely ranked as the most trusted news brand (2021, 231).

The unique characteristics of the Flemish media market and the strong media studies tradition among academics from the Belgian region enhance its interest among international scholarship. Recent studies in acclaimed journals have looked at the representation of female politicians in news reporting (D’Heer, De Vuyst, and Van Leuven 2021) and the softening of news on Flemish legacy outlets’ Facebook pages (Lamot 2021), to name just a few examples. Another component contributing to the international appeal of Flanders’ media system is the ubiquity of its two main media firms, DPG

Media and Mediahuis. Both emerged in the last decade following mergers or take-overs, and both are rapidly expanding their brand portfolios across the European continent. The Dutch newspaper market, for instance, is currently nearly completely held by the two Flemish companies (Santema 2020), with various other leading news outlets retained in such countries as Germany, Ireland, Denmark and Luxembourg.

Mediahuis as a Merged Media Company

Mediahuis (Dutch for “media house”) came into existence in 2013 when two previously existing media firms, Corelio and Concentra, announced their intention to merge. Both owned two newspapers each: Corelio had the only two remaining regional news outlets of which one was infamously loss-making at the time; Concentra the second largest and popular title *Het Nieuwsblad* and the most influential Flemish quality newspaper *De Standaard*. (According to the Centrum voor Informatie over de Media (CIM), a federal institution measuring the circulation and reach of Belgian media outlets across platforms, tabloid title *Het Nieuwsblad* in 2020 had a daily print run of exactly 196,234 copies and on average 988,818 real users visiting its website—nearly fifteen percent of the entire Flemish population. In the same year, 76,277 copies of broadsheet outlet *De Standaard* were published daily, and 324,490 people would visit its website on a given day [cim.be 2020]). The newly founded company would hold 4 of the just 7 remaining daily newspapers in Flanders, making it a very dominant player in the narrow Flemish newspaper market. The Belgian Competition Authority nevertheless formally approved the merger in October 2013, with an exhaustive, 116-page report outlining the ramifications and stipulations of the merger being made publicly available. The following are excerpts from the report, translated by the authors from the Dutch-language original:

696. The risk of an erosion of content diversity as a result of a more homogenous offering of the titles involved cannot be excluded, but rather assumed as probable. The question rises, though, to what extent homogenisation of content will occur for topics or aspects to which readers ascribe importance to diversity, or to which diversity is deemed important for the democratically important plurality of the press.

697. The risk of the erosion of content diversity must be judged with the expected positive effects of the concentration on the titles’ viability in mind, as well as the risk of further erosion caused by external factors and the fact that readers are progressively less dependent on newspapers for their news consumption.

698. The Authority nonetheless finds that the above-described risk is serious enough to demand commitment to stipulations, and judges that these can remove or at least mitigate said risk to the point where it requires no further investigation by the Authority. (2013, 113)

The merger of Corelio and Concentra thus makes for an interesting case for media policy research, as the Belgian Competition Authority attributes higher importance to the economic viability of titles than to the societal relevance of content diversity, and even goes as far as avowedly acknowledging the expected negative effects on content diversity. As a newly founded company, Mediahuis had to commit to a number of stipulations. Below, we again translate from the report:

The Parties commit to maintain all newspaper titles and all newspaper titles have a sufficiently developed newsroom of journalists and/or correspondents that are steered by

an independent editorial board consisting of an editor-in-chief, a commentator, an editor, a head of political or regional news and a chief executive for design, all on a fulltime basis and allocated specifically to the various titles. (2013, 115).

The stipulations applied for a period of five years following the publication of the report, meaning that they expired in October 2018. A manual content analysis study of the four Mediahuis newspapers comparing articles published in 2013 and 2018 already found that content overall had grown considerably more homogenous, but also that political news got more diverse and that quality title *De Standaard* had managed to diversify itself (Hendrickx and Ranaivoson 2019). The authors linked this finding to the mandatory designated head of political news per title, safeguarding diverse content in this area of reporting. A previous, longitudinal manual content analysis of articles from all Flemish newspapers between 1983 and 2013 had already concluded that while the total article overlap had mostly remained stable over time, titles belonging to the same media group were more prone to recycling each other's content (Beckers et al. 2017). We instrumentalise these two papers and their findings to launch our own content homogeneity analysis of Mediahuis' two biggest newspaper titles, as explained below.

Methodology and Main Findings

Methodology

We want to gauge whether news content at the two largest newspapers of Mediahuis has grown more homogenous since the expiration of the diversity stipulations in 2018, as set by the Belgian Competition Authority five years before. We focus on the two main titles available everywhere in Flanders as the two regional newspapers are much smaller in size and scope and of less importance for the entire Flemish media landscape. We assess both print and online news articles and are thus able to compare their homogeneity across both titles and platforms, in line with previous Flemish research (Hendrickx 2020).

Concretely, we automatically collected 658,493 articles that were all published in print and online between 1 January 2018 and 30 June 2021 by popular newspaper *Het Nieuwsblad* (henceforth abbreviated to HN) and quality title *De Standaard* (DS), both Mediahuis-owned. A vast majority (485,488 articles or 73.73% of the total *n*) was published by HB, and print articles were fewer in number than online content (350,282 articles or 53.19% of the total *n*). [Table 1](#) presents the full overview of articles divided per year, platform and title.

Our research design is to large extents identical to the one used in (Authors), in which we had already assessed content homogeneity over time among two other Flemish newspapers owned by Mediahuis' main private rival using computational content analysis. The key contribution of this particular case study is its rootedness in an analytical framework in which a causal relationship is assumed between news diversity, newspaper ownership

Table 1. Total, print and online overlap of HN and DS combined.

	2018–2021	2018	2019	2020	2021 (1st half)
Total overlap	4.08%	4.22%	4.13%	4.04%	3.94%
Print overlap	3.59%	3.91%	4.10%	3.24%	2.84%
Online overlap	4.52%	4.47%	4.18%	4.70%	4.82%

and media policy. Article collection occurred through the official Belgian media repository GoPress and using the Web-based automation library Selenium. Following data cleaning and the removal of so-called soft news articles (e.g., lifestyle, traffic reports, weather reports, sports), we were left with a vast data set of over 650,000 articles, effectively all hard news articles published in print and online within the time frame of our study. We removed said articles by training a random forest classification model on manually coded news articles using a TF-IDF (term frequency and inverse document frequency) vector as features. The manual coding was done by students after an intensive training period in which a sufficient reliability (Krippendorff's $\alpha \geq 0.85$) was reached. The rationale behind this is that we believe focusing on hard news articles, that are by default political, societal and economic in nature (Lamot 2021; Reinemann et al. 2012), corresponds better with our overall aim of bridging news diversity with newspaper ownership and media regulation from an overt democratic and societal outlook. As we want to estimate the effects of heightened ownership consolidation and the expiring of regulators' stipulations to safeguard content diversity, including the mandatory presence of a designated head for political news, we find it appropriate to concentrate on the exact type of news that is arguably most crucial to fulfilling journalism's remit to fostering a well-informed democratic society.

We calculated the homogeneity of articles by collecting all articles as xml files using an xml parser from the python Elementtree library. Next, we composed a bag-of-words for each article in which the frequency of each word was indicated. More uncommon words were attributed larger weight than more frequently occurring words (e.g., articles, prepositions) as word frequencies were offset by the number of documents in the corpus that contain that word. The actual calculation between documents materialised via measuring the cosine of the angle between their tf-idf vectors, ranging from 0 to 1 with 0 meaning no similarity and 1 indicating complete overlap. Following a manual dry run of 500 articles of a previous data set to confirm the computational approach, we found that an overlap score of 0.8 or 80% was able to successfully detect (nearly) identical articles. We present results aggregated per year to better denote differences over time following the expiring of the stipulations of the Belgian Competition Authority, meaning that we present content homogeneity results for 2018, 2019, 2020 and the first half of 2021. We distinguish the total overlap, between titles and again in both directions, print overlap, online overlap and internal overlap, with the latter relating to the percentage share of (nearly) identical news content republished across an outlet's newspaper and website.

Main Findings

Scanning the Data Set

Before proceeding to our automated content homogeneity results, we first look at the articles constituting our data set (Table 2). Taking an in-depth look at the division of articles along the axes of titles and platforms already yields a few noteworthy findings.

First, there is a notable increase of overall output. Between 2018 and 2020, the total numbers of articles published by popular brand HN and quality title DS online and in print steadily rise, but not on all accounts and nor to the same extent. Remarkably, the division between print and online articles shifts in favour of the latter type, empirically

Table 2. Total breakdown of articles per year, platform and title.

	2018–2021	2018	2019	2020	2021 (1st half)
Total n	658,493	170,948 (25.96%)	176,110 (26.74%)	209,131 (31.76%)	102,304 (15.54%)
Total print	308,211 (46.81%)	84,260 (49.29%)	84,907 (48.21%)	93,397 (44.66%)	45,647 (44.62%)
Total online	350,282 (53.19%)	86,688 (50.71%)	91,203 (51.79%)	115,734 (55.34%)	56,657 (55.38%)
Total HN	485,488 (73.73%)	119,749 (70.05%)	129,777 (73.69%)	154,821 (74.03%)	81,141 (79.31%)
<i>HN print</i>	238,144 (36.17%)	64,185 (37.55%)	64,931 (36.87%)	72,049 (34.45%)	36,979 (36.15%)
<i>HN online</i>	247,344 (37.56%)	55,564 (32.50%)	64,846 (36.82%)	82,772 (39.58%)	44,162 (43.17%)
Total DS	173,005 (26.27%)	51,199 (29.95%)	46,333 (26.31%)	54,310 (25.97%)	21,163 (20.69%)
<i>DS print</i>	70,067 (10.64%)	20,075 (11.74%)	19,976 (11.34%)	21,348 (10.21%)	8,668 (8.47%)
<i>DS online</i>	102,938 (15.63%)	31,124 (18.21%)	26,357 (14.97%)	32,962 (15.76%)	12,495 (12.21%)

confirming the much debated and often solely assumed accelerated digitisation of news production and diffusion. Even though the number of print articles actually increased, the decrease of the share for print articles over time corresponds with previous findings; for their longitudinal analysis of content overlap in nine Flemish newspapers, (*Nature Genetics*) coded a consecutive week's worth of publishing between 1983 and 2013 with ten-year intervals. The number of articles per week declined over time from 6,319 to just 3,001 articles, signifying a sharp fall of 53%. Also coding a consecutive week of print articles, (Hendrickx and Ranaivoson 2019, 2809) too noted drops in total article quantity between 2013 and 2018. For HN, the number dwindled from 546 to 404 (−26.01%); for DS, from 384 to 235 (−38.20%).

Second, our findings only confirm the shrinkage of quantitative article output particularly for DS, that endures a total drop of over nine percentage points in terms of the total number of articles per year between 2018 and the first half of 2021. It is also noteworthy that both the shares for print and online content decreased, although again the raw number of articles actually increased. We thus cannot deduce that quality outlet DS published less articles, but rather that popular title HN published considerably more of them, tilting the imbalance in total output numbers in its favour. The findings for the first half of 2021 appear to project a much sharper drop in DS-based articles and an overall drop in total numbers compared to 2020. Even though these are just projections and we are unable to empirically prove this, we venture that the outbreak of the COVID-19 pandemic fuelled the spike in output for 2020, particularly as this was coupled with heightened media and news consumption and interest (Newman et al. 2021). This will be further discussed in the next section.

Assessing Content Homogeneity

Total Content Overlap. Overall, the total overlap between HN and DS slightly decreased over time. This goes against our second research hypothesis and previous Flemish and foreign content homogeneity findings. As Table 3 shows, this is mostly due to drops in print overlap; online news content, which constituted over half of our data set, became somewhat more homogenous.

Content overlap of HN with DS. We first zoom in specifically on Mediahuis' popular news title and its percentage shares of content homogeneity (Table 3). The total overlap with DS steadily decreased between 2018 and 2021, predominantly for print articles. As we compared article overlap both across titles and platforms, we are also able to look at the internal content syndication between an outlet's print newspaper and website

Table 3. Total, print, online and internal overlap of HN and DS separately.

HN	2018–2021	2018	2019	2020	2021 (1st half)
Total overlap	5.54%	6.04%	5.62%	5.47%	4.97%
Print overlap	4.64%	5.15%	5.38%	4.18%	3.51%
Online overlap	6.40%	6.93%	5.96%	6.61%	6.18%
Internal overlap	17.65%	18.68%	12.31%	19.39%	20.47%
DS	2018–2021	2018	2019	2020	2021 (1st half)
Total overlap	15.54%	14.11%	15.73%	15.56%	19.00%
Print overlap	15.78%	16.34%	17.41%	14.89%	14.87%
Online overlap	15.38%	12.66%	14.56%	16.52%	21.88%
Internal overlap	20.14%	14.80%	15.71%	23.90%	33.00%

content. This analysis yields the interesting finding that following a sharp fall in 2019, content is progressively more recycled across the two key platforms of HN; in the first half of 2021, over one fifth of all content appeared in (nearly) identical fashion in its newspaper and on its website.

Content overlap of DS with HN. Finally, we carried out similar calculations for Mediahuis' broadsheet title, as also shown in Table 3. We denote similar declines in print overlap with HN, but it is conspicuous to see how the total, online and particular internal overlap drastically rose between the start and end point of our analysis. The large differences in percentages correspond with the divergent total number of articles analysed, meaning that fewer raw numbers of recycled articles in DS still correspond to higher percentage shares as opposed to HN where the majority of assessed articles originates from. Exactly one third of all content in the first half of 2021 was recycled across DS' newspaper and website.

A COVID-effect? When differentiating our findings from January 2018 to February 2020 and March 2020 to June 2021, or before and after the wide outbreak of COVID-19 in the Western hemisphere, we mainly see a continuation of our findings. The total overlap slightly decreased (4.19–3.97%) and we denote similar drops in print overlap and rises in online homogeneity. However, both titles became much more prone to recycling content internally between their own newspapers and websites; for HN, this constitutes an increase from 15.74 to 19.89% of all assessed content, while at DS we find an intensified rise of over ten percentage points (16.29–26.72%). As we were unable to analyse articles at the topic level, we are unable to empirically link these evolutions to the outbreak of COVID-19 and its effects on news production. Nonetheless, this finding shines interesting light on how news content can become more homogenous amidst, and thus not necessarily thanks to, a global pandemic.

Discussion & Conclusions

Ramifications for News Diversity

In this article, we carried out a computational quantitative content homogeneity analysis of all hard news articles published between 1 January 2018 and 30 June 2021 in print and online by one popular (Het Nieuwsblad or HN) and one quality newspaper (De Standaard or DS) from Flanders ($n = 658,493$), both owned by Mediahuis ("media house"), a dominant Flemish media corporation that is as of 2022 active in several European countries. The first starting point of our study was the expiring of five-year stipulations set by the

Belgian Competition Authority in approving of the merger that led to the emergence of Mediahuis in 2013 intended to safeguard editorial independence and news content diversity. The second was the thus far under-researched relationship between newspaper ownership, media policy and news diversity, that we hold the view is reciprocal with all actors influencing and shaping one another on a constant basis and that we wished to assess through our Belgian case study.

Contrary to our own hypotheses and previously published research on Flemish news content homogeneity (Beckers et al. 2017; Hendrickx and Ranaivoson 2019), we find that hard news content, mostly appropriate to assess the contribution of journalism to supporting a well-informed democratic society, did not grow more alike between the two distinct news outlets overall. However, this is mostly thanks to the hegemony of popular brand HN, with a 74% share in our total data set, where content became more diverse. This was not the case for quality brand DS, where published news articles grew considerably more homogenous between 2018 and the first half of 2021. This was also applicable to online news articles (53% of our total n), but not to print articles. For both newspapers, however, we did not find that the so-called internal overlap drastically increased, meaning that the titles separately recycled progressively more content across its own print newspaper and website. In the first six months of 2021, this was the case for exactly 33.00% of the assessed hard news content by quality title DS.

Thus, when looking at the totality of our vast data set, content actually grew slightly more diverse over time. While this is a positive finding, we do signal two alarming trends. First, the broadsheet title DS saw steady rises in its recycled news content between 2018 and 2021, signifying a decrease in content diversity in a quality news outlet. Second, both DS and popular title HN had less internal diversity as more content was exchanged across platforms over time. More worrying is that we reached nearly identical conclusions upon carrying out a similar automated news content analysis at different popular and quality news brands owned by Mediahuis' main corporate rival DPG Media, which also resulted only recently following an infamous, large-scale merger in the small Flemish media market (Authors). There too, predominantly the quality outlet suffered from increased content recycling both externally and internally. Both these studies are confined to the media market from Flanders, but with both companies present in several different European nations and actively expanding their brand portfolios, it is to be expected that similar negative ramifications for notably quality outlets and their news content diversity will ensue.

Conceptually, we used democratic theory and the concept of news diversity to position and contextualise our study. There is a vast body of literature available that connects media pluralism and diversity with media ownership and policy (Baker 2007; Helberger 2019; Papandrea 2006; Tomaz and Trappel 2022), although it is important to note that these are in most cases normative ideas and ideals which have frequently not been rigorously tested and/or empirically proven (Hendrickx, Ballon, and Ranaivoson 2020; Karpinen 2013). We hence urge fellow scholars to reassess this intricate relationship in the light of increasingly concentrated, digitised and globalised media markets and systems. We thereby invite them to further explore news diversity theory as a useful means to encapsulate various evolutions within the media industry pertaining to journalism and the way it is produced, disseminated and consumed. Through a combination of ethnographic field studies carried out inside Mediahuis-owned newspapers (Hendrickx and

Picone 2020) and content homogeneity analysis as in the study at hand, scholars are able to paint a comprehensive overview of how enhanced media consolidation can lead to cost-cutting measures and an increased focus on synergies in newsrooms belonging to the same corporation, which in turn culminates in the frequent exchange of sources and content, making it more homogenous. Going back to democratic theory, this could be harmful for citizens as news consumers who have access to fewer diverse sets of opinions and/or viewpoints in reporting. Further developing the concept of news diversity within this normative framework can aid future scholarship in better grasping the constraints and consequences of media concentration on news diversity within democratic societies. In that sense, content diversity is directly affected by changes to media systems and ownership structures as well as to everyday content production (Hendrickx, Ballon, and Ranaivoson 2020; Joris et al. 2020; Sjøvaag 2016). While the number of print articles published decreased steadily throughout the past decades along with circulation figures (Beckers et al. 2017), it is relevant that the total number of professional journalists too decreased. According to the 2021 annual report of the Flemish journalism council, this number dropped from 2,721 to 2,537 between 2011 and 2020 (Deltour 2020, 8). Together, Mediahuis and DPG Media both laid off over 100 employees in Flanders alone since 2019, while continuing to buy up additional news and other media brands abroad (Bouwen 2020). Finally, as previously noted in scholarship, while Het Nieuwsblad (HN) saw a rise in its workforce, the total number of journalists working in Mediahuis' various newsrooms decreased between 2014 and 2018, as a direct consequence of the approved merger of Corelio and Concentra in 2013 (Hendrickx and Ranaivoson 2019). While we were not allowed access to similar figures up until 2021, we venture that this move was the initiation of what we see today as a prime example of various dimensions of news diversity affecting each other: differences to ownership diversity (the merger) led to firings of staff members, affecting production, which made the quality news brand more vulnerable and prone to recycling news content.

Ultimately, we also assumed a similar causal relationship between overall news diversity, as described above, newspaper ownership and media policy (Karppinen 2013), which has been a topic for debate in Europe and the United States since the 1930s (Guardino and Snyder 2012). In constantly walking the tightrope between commerce and offering quality, synergy operations in newsrooms lead to sharing infrastructure, software and eventually news sources and content, which can negatively affect the diversity in viewpoints and opinions reflected in the total body of news content created to inform citizens (Baker 2007; Sjøvaag 2016). We used the decision of the Belgian Competition Authority and its stipulations as a relevant case study to incorporate media policy decisions in shaping newspaper ownership and news diversity and find that it has, to some extent, worked, as overall content grew slightly more heterogeneous in the years after its diversity stipulations had expired. However, we suggest for media policy makers in Flanders and beyond to incorporate the societal need for diverse news content in deciding on takeovers and take into account how this need can be jeopardised by merging media corporations, newsrooms and content production processes. In this regard, we welcome initiatives such as the European Democracy Action Plan, as introduced by the European Commission in 2020, in which the necessity of media diversity and pluralism is explicitly recognised and hope individual governments in Europe and elsewhere will follow suit.

The Crowding Out Hypothesis

Two of the key findings of our computational news content homogeneity study painted a grim picture for quality news outlets: while the total number of articles published decreased over time, there was a steady rise in the shares of recycled news content across titles and platforms, including their own. We locate this finding within the “crowding out” concept, that has thus far been mostly used for the allegation that dominant, usually ad-free public service media news is harmful for the (financial) viability of commercial news (Sehl, Fletcher, and Picard 2020), but also for indicating that commercial content can crowd out “other news potentially more important to the functioning of democracy” (Wood et al. 2004, 810). We extend this concept by transferring its applicability to popular and quality news outlets belonging to the same corporation, particularly as we observe a worrying trend which is recurrent at least within the Flemish media landscape. In our previous study, which also constituted a computational quantitative analysis of a tabloid and broadsheet title’s print and online content but from a rival firm, we also concluded that the quality brand’s share in total output steadily decreased over time while its similarity rose (Hendrickx and Van Remoortere 2021).

We position this alternative vision on the “crowding out” concept within a notable shift to more audience-centred journalism where attention is the prime commodity as legacy organisations are highly dependent on search engines and social media platforms to gather online traffic (Chen and Pain 2021). This shift in news production, diffusion and consumption has an overt “the winner takes it all” mentality as corporations tend to focus on their main brand at the expense of others. For news media specifically, this forms a potential grave risk to quality news outlets owned by vast corporations also owning larger, more popular brands, as is the case for newspapers HN and DS and the corporation Mediahuis, as studied in this paper. As the former title garners more attention (e.g., readership, advertisement revenues and subscriptions) and profit, it will receive more attention from corporations too, while this will likely be less frequently the case for highbrow titles which only reach sections of audiences—the staffing figures of Mediahuis as presented earlier (Hendrickx and Ranaivoson 2019) already confirm this trend. When discussing and analysing hard news content, often focussing on the essential information for citizens to make well-informed decisions in elections, the weakening of quality news outlets and their contribution to news diversity and pluralism is a particularly worrying tendency that we believe ought to receive additional scholarly and regulatory scrutiny alike.

On a final note, we admit two main shortcomings to our study design. First, in spite of working with a vast data set and being able to computationally distinguish hard from soft news articles, we were unable to look at article types or topics specifically. Second, we acknowledge that no real correlation can be established between our content analysis of two Mediahuis-owned newspapers and the expiring of the diversity stipulations of the Belgian Competition Authority. Notwithstanding this, we believe our study constitutes a viable contribution to relevant scholarship due to its automated approach, the relevance of the case study for international scholarship due to Mediahuis’ expanding presence abroad and the analytical framework linking news diversity with newspaper ownership and media policy. We also explicitly build on previous research (Baker 2007; Beckers et al. 2017; Hendrickx and Ranaivoson 2019) which helps to contextualise and

endorse many of our tendencies, projections and hypotheses on the important role of investigating and maintaining news diversity for the well-being of democratic societies. We invite fellow scholars to continue probing this relationship, keeping in mind the unique characteristics and constraints of individual media markets while recognising and incorporating similar traits such as ownership structures and (a lack of) policy measures for newspaper ownership to best safeguard news diversity.

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References

- Badr, Z. 2021. "More or More of the Same: Ownership Concentration and Media Diversity in Egypt." *The International Journal of Press/Politics*. doi:10.1177/19401612211025164.
- Baker, C. E. 2007. *Media Concentration and Democracy: Why Ownership Matters*. Cambridge: Cambridge University Press.
- Baum, M. A., and Y. M. Zhukov. 2019. "Media Ownership and News Coverage of International Conflict." *Political Communication* 36 (1): 36–63. doi:10.1080/10584609.2018.1483606.
- Beckers, K., A. Masini, J. Sevenans, M. van der Burg, J. De Smedt, H. Van den Bulck, and S. Walgrave. 2017. "Are Newspapers' News Stories Becoming More Alike? Media Content Diversity in Belgium, 1983–2013." *Journalism: Theory, Practice & Criticism*, 1665–1683. doi:10.1177/1464884917706860.
- Belgian Competition Authority. 2013. *Zaak nr. MEDE – C/C – 13/0020. De oprichting van het Mediahuis door Corelio NV en Concentra NV*, 1–116. Belgian Competition Authority. https://www.bma-abc.be/sites/default/files/content/download/files/2013CC03-BMA_pub.pdf.
- Bouwen, D. 2020, February 10. "Vakbond redt banen bij Mediahuis en DPG Media." *Puls Magazine*. <https://www.pulsmagazine.be/2020/02/10/vakbond-redt-banen-bij-mediahuis-en-dpg-media/>.
- Brüggemann, M., S. Engesser, F. Büchel, E. Humprecht, and L. Castro. 2014. "Hallin and Mancini Revisited: Four Empirical Types of Western Media Systems: Hallin and Mancini Revisited." *Journal of Communication* 64 (6): 1037–1065. doi:10.1111/jcom.12127.
- Chen, V. Y., and P. Pain. 2021. "News on Facebook: How Facebook and Newspapers Build Mutual Brand Loyalty Through Audience Engagement." *Journalism & Mass Communication Quarterly* 98 (2): 366–386. doi:10.1177/1077699019876634.
- cim.be. (2020). "Brand Reports." *Centrum voor Informatie over de Media*. <https://www.cim.be/nl/pers/brand-reports>
- Dahlgren, P. 2000. "The Transformation of Democracy?" In *New Media and Politics*, edited by B. Axford, and R. Huggins, 63–87. London: SAGE.
- de Vries, E., R. Vliegthart, and S. Walgrave. 2022. "Telling a Different Story: A Longitudinal Investigation of News Diversity in Four Countries." *Journalism Studies* 0 (0): 1–19. doi:10.1080/1461670X.2022.2111323.
- Deltour, P. 2020. "Een maand coronacrisis: De impact op de (Vlaamse) journalistiek." *Vlaamse Vereniging van Journalisten*. <https://journalist.be/2020/04/een-maand-coronacrisis-de-impact-op-de-vlaamse-journalistiek>.

- D'Heer, J., S. De Vuyst, and S. Van Leuven. 2021. "Gendering in the Electoral run: A Media Monitoring Study of Women Politicians' Representation in Belgian News." *Journalism*. doi:10.1177/14648849211032427.
- Geitzkow, M., and J. M. Shapiro. 2008. "Competition and Truth in the Market for News." *The Journal of Economic Perspectives* 22 (2): 133–154. doi:10.1257/jep.22.2.133.
- George, C. 2013. "Diversity Around a Democratic Core: The Universal and the Particular in Journalism." *Journalism* 14 (4): 490–503. doi:10.1177/1464884912464169.
- Guardino, M., and D. Snyder. 2012. "The Tea Party and the Crisis of Neoliberalism: Mainstreaming New Right Populism in the Corporate News Media." *New Political Science* 34 (4): 527–548. doi:10.1080/07393148.2012.729741.
- Helberger, N. 2019. "On the Democratic Role of News Recommenders." *Digital Journalism* 7 (8): 993–1012. doi:10.1080/21670811.2019.1623700.
- Hendrickx, J. 2020. "Trying to Survive While Eroding News Diversity: Legacy News Media's Catch-22." *Journalism Studies* 21 (5): 598–614. doi:10.1080/1461670X.2019.1694430.
- Hendrickx, J., P. Ballon, and H. Ranaivoson. 2020. "Dissecting News Diversity: An Integrated Conceptual Framework." *Journalism*, doi:10.1177/1464884920966881.
- Hendrickx, J., and I. Picone. 2020. "Innovation Beyond the Buzzwords: The Rocky Road Towards a Digital First-Based Newsroom." *Journalism Studies* 21 (14): 2025–2041. doi:10.1080/1461670X.2020.1809494.
- Hendrickx, J., and H. Ranaivoson. 2019. "Why and how Higher Media Concentration Equals Lower News Diversity – The Mediahuis Case." *Journalism* 22 (11): 2800–2815. doi:10.1177/1464884919894138.
- Hendrickx, J., and A. Van Remoortere. 2021. "Assessing News Content Diversity in Flanders: An Empirical Study at DPG Media." *Journalism Studies* 22 (16): 2139–2154. doi:10.1080/1461670X.2021.1987299.
- Joris, G., F. De Grove, K. Van Damme, and L. De Marez. 2020. "News Diversity Reconsidered: A Systematic Literature Review Unraveling the Diversity in Conceptualizations." *Journalism Studies* 21 (13): 1893–1912. doi:10.1080/1461670X.2020.1797527.
- Karppinen, K. 2013. *Rethinking Media Pluralism*. 1st ed. New York: Fordham University Press.
- Lamot, K. 2021. "What the Metrics Say. The Softening of News on the Facebook Pages of Mainstream Media Outlets." *Digital Journalism* 0 (0): 1–20. doi:10.1080/21670811.2021.1974917.
- Loeberbach, F., J. Moeller, D. Trilling, and W. van Atteveldt. 2020. "The Unified Framework of Media Diversity: A Systematic Literature Review." *Digital Journalism* 8 (5): 605–642. doi:10.1080/21670811.2020.1764374.
- McQuail, D. 1992. *Media Performance: Mass Communication and the Public Interest*. London: Sage Publications.
- Meese, J., and E. Hurcombe. 2021. "Facebook, News Media and Platform Dependency: The Institutional Impacts of News Distribution on Social Platforms." *New Media & Society* 23 (8): 2367–2384. doi:10.1177/1461444820926472.
- Moe, H., J. F. Hovden, and K. Karppinen. 2021. "Operationalizing Exposure Diversity." *European Journal of Communication* 36 (2): 148–167. doi:10.1177/0267323120966849.
- Napoli, P. M. 1999. "Deconstructing the Diversity Principle." *Journal of Communication* 49 (4): 7–34. doi:10.1111/j.1460-2466.1999.tb02815.x.
- Newman, N., R. Fletcher, C. T. Robertson, K. Eddy, and R. Kleis Nielsen. 2022. *Reuters Institute Digital News Report 2022*. University of Oxford. https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2022-06/Digital_News-Report_2022.pdf.
- Newman, N., R. Fletcher, A. Schulz, S. Andi, C. T. Robertson, and R. Kleis Nielsen. 2021. *Reuters Institute Digital News Report 2021*. University of Oxford. https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2021-06/Digital_News_Report_2021_FINAL.pdf.
- Papandrea, F. 2006. "Media Diversity and Cross Media Regulation." *Prometheus* 24 (3): 301–322. doi:10.1080/08109020600877675.
- Reinemann, C., J. Stanyer, S. Scherr, and G. Legnante. 2012. "Hard and Soft News: A Review of Concepts, Operationalizations and key Findings." *Journalism* 13 (2): 221–239. doi:10.1177/1464884911427803.

- Roessler, P. 2007. "Media Content Diversity: Conceptual Issues and Future Directions for Communication Research." *Annals of the International Communication Association* 31 (1): 464–520. doi:10.1080/23808985.2007.11679073.
- Santema, P. A. 2020. "De Belgen komen: Hoe veroverden DPG en Mediahuis de Nederlandse krantenmarkt?" *Leeuwarder Courant*. https://www.lc.nl/cultuur/media/De-Belgen-komen-hoe-veroverden-DPG-en-Mediahuis-de-Nederlandse-krantenmarkt-26023036.html?harvest_referrer=https%3A%2F%2Ft.co%2F.
- SARC. 2002. "Mediaconcentratie en pluralisme/diversiteit. Een analyse van de mediasituatie in Vlaanderen." *Strategische AdviesRaad voor Cultuur, Jeugd, Sport en Media*. <https://cjsm.be/sarc/historiek/mediaraad/adviezen/2002/MR02-005.pdf>.
- Sehl, A., R. Fletcher, and R. G. Picard. 2020. "Crowding out: Is There Evidence That Public Service Media Harm Markets? A Cross-National Comparative Analysis of Commercial Television and Online News Providers." *European Journal of Communication* 35 (4): 389–409. doi:10.1177/0267323120903688.
- Servaes, J. 1989. "Concentration of Ownership in the Belgian Daily Press." *Journalism Quarterly* 66 (2): 367–457. doi:10.1177/107769908906600214.
- Sjøvaag, H. 2014. "Homogenisation or Differentiation?: The Effects of Consolidation in the Regional Newspaper Market." *Journalism Studies* 15 (5): 511–521. doi:10.1080/1461670X.2014.885275.
- Sjøvaag, H. 2016. "Media Diversity and the Global Superplayers: Operationalising Pluralism for a Digital Media Market." *Journal of Media Business Studies* 13 (3): 170–186. doi:10.1080/16522354.2016.1210435.
- Skärlund, S. 2020. "The Recycling of News in Swedish Newspapers: Reused Quotations and Reports in Articles About the Crisis in the Swedish Academy in 2018." *Nordicom Review* 41 (1): 69–84. doi:10.2478/nor-2020-0005.
- Tomaz, T., and J. Trappel. 2022. *Chapter 1. Democracy at Stake: On the Need of News Media Monitoring*, 11–31. Nordicom: University of Gothenburg. <http://urn.kb.se/resolve?urn=urn:nbn:se:norden.org:diva-12327>.
- Trappel, J., and W. A. Meier. 2022. *Chapter 7. Soaring Media Ownership Concentration: Comparing the Effects of Digitalisation on Media Pluralism and Diversity*, 147–164. Nordicom, University of Gothenburg. <http://urn.kb.se/resolve?urn=urn:nbn:se:norden.org:diva-12333>.
- Van Cuilenburg, J. 1999. "On Competition, Access and Diversity in Media, Old and New: Some Remarks for Communications Policy in the Information Age." *New Media & Society* 1 (2): 183–207. doi:10.1177/14614449922225555.
- van Drunen, M. Z., and D. Fechner. 2022. "Safeguarding Editorial Independence in an Automated Media System: The Relationship Between Law and Journalistic Perspectives." *Digital Journalism* 0 (0): 1–28. doi:10.1080/21670811.2022.2108868.
- Vlaamse Regulator voor de Media. 2021. *Mediaconcentratie in Vlaanderen. Rapport 2021*. Vlaamse Regulator voor de Media. <https://www.vlaamseregulatormedia.be/nl/file/13186/download?token=nR6knMew>.
- Vogler, D., L. Udris, and M. Eisenegger. 2020. "Measuring Media Content Concentration at a Large Scale Using Automated Text Comparisons." *Journalism Studies* 21 (11): 1459–1478. doi:10.1080/1461670X.2020.1761865.
- Welbers, K., W. van Atteveldt, J. Kleinnijenhuis, and N. Ruigrok. 2018. "A Gatekeeper among Gatekeepers: News Agency Influence in Print and Online Newspapers in the Netherlands." *Journalism Studies* 19 (3): 315–333. doi:10.1080/1461670X.2016.1190663.
- Wood, M. L. M., M. R. Nelson, J. Cho, and R. A. Yaros. 2004. "Tonight's Top Story: Commercial Content in Television News." *Journalism & Mass Communication Quarterly* 81 (4): 807–822. doi:10.1177/107769900408100406.