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Making 'The Daily Me':

Technology, economics and habit in the mainstream assimilation of personalized news

Abstract:

The mechanisms of personalization deployed by news websites are resulting in an increasing number of editorial decisions being taken by computer algorithms—many of which are under the control of external companies—and by end users. Despite its prevalence, personalization has yet to be addressed fully by the journalism studies literature (Zelizer, 2009). This study defines personalization as a distinct form of interactivity and classifies its explicit and implicit forms. Using this taxonomy, it surveys the use of personalization at eleven national news websites in the UK and US. Research interviews bring a qualitative dimension to the analysis, acknowledging the influence that institutional contexts and journalists' attitudes have on the adoption of technology. The study shows how: personalization informs debates on news consumption, content diversity, and the economic context for journalism; and challenges the continuing relevance of established theories of journalistic gate-keeping.

Keywords: customization, gate-keeping, individuation, online news, online journalism, personalization

Introduction

Networked, digital media make it possible for publishers to give audiences a high degree of control over what information they consume, and how that information is delivered and presented. Digital news and information products that have granted such control predate the World Wide Web by more than a decade: Warner Communications' interactive cable television system, QUBE, which was launched in the 1970s, was one example (Neuman, 1991: 110); another, in the decade that followed, was Viewtron, a proprietary videotex service that offered access to news via keyword search and hypertext navigation (Boczkowski, 2004: 25).

The personal computing revolution and the development of the web, with its open architecture, dramatically increased the provision and use of interactive news services. Initially, the user control they allowed was predominantly via "navigational interactivity" (Deuze, 2003), though in recent years, "conversational interactivity" (Jensen, 1998), which allows the user to interact with journalists and other users (Deuze, 2003), has been gaining ground.

Personalization constitutes a third form of interactivity. An early advocate was Nicholas Negroponte, who suggested that digitization would result in the user playing a bigger role in news selection, and who popularized the idea of "The Daily Me": a personalized electronic newspaper "printed in an edition of one" (Negroponte, 1995: 153). Despite some noteworthy implementations in the news arena, personalization has been overshadowed by other forms of interactivity. Nevertheless, its prevalence is significant and may be increasing. In June 2009, Yahoo announced it would roll out a new homepage that users could configure "any way" they wanted (Perez, 2009). Google's news aggregator, Fast Flip, which launched in September 2009, offers readers articles that "reflect their personal preference" (Shiels, 2009).

Contemporary examples of personalization have not been restricted to pure-play media companies such as Google and Yahoo. Despite their conservative tendencies (Mitchelstein and Boczkowski, 2009), traditional news providers have also promised to develop user-centred approaches to news selection, delivery, and presentation. Examples include the BBC's £15 million project—"My News Now" (Thompson, 2005)—which was designed to address what the Corporation's director of news called audiences' expectations for "a high level of personalization" (Boaden, 2007).

Given the long history and continuing presence of personalization, the lack of attention it has received from journalism scholars is surprising. Barbie Zelizer (2009: 36) writes that "work has yet to address fully the more contemporary trends towards … personalization". This study aims to help address that gap by:

- developing a taxonomy of news personalization features;
- surveying the adoption of those features at eleven national news websites in the US and UK;
- gathering qualitative data on professional attitudes to and institutional experience of personalization via interviews with senior editors at the sites surveyed; and
- analysing the data with reference to relevant debates in journalism studies.

Literature review

Although personalization[1] is often mentioned in passing as a characteristic of digital networked media, attempts to operationalize it are frequently rudimentary, with limited examples given in the literature (see, for instance: Deuze, 2003: 214; Gunter, 2003: 68; Meikle, 2009: 178; Singer, 2003: 147). Where it has been studied, personalization tends to be considered as part of surveys of 'interactivity'. The features—including "moving images", "audio", and "hyperlinks" (Gerpott and Wanke, 2004; Spyridou and Veglis, 2008)—that many such surveys consider to be 'interactive' are a long way from the "adaptive" (Deuze, 2003) or "registrational interactivity" (Jensen, 1998) this study addresses.

Building on the work of Bucy (2004), Deuze (2003), Jensen (1998) and Stromer-Galley (2004), this study defines personalization as:

> A form of user-to-system interactivity that uses a set of technological features to adapt the content, delivery, and arrangement of a communication to individual users' explicitly registered and / or implicitly determined preferences.

This definition excludes Stromer-Galley (2004) and Bucy's (2004) concept of interactivity between people[2]—for example, chat room discussions, message boards and blogs—which has been thoroughly studied in a news context (see, for example: Thurman and Hermida, 2009). It also excludes, because of its contemporary ubiquity, what Deuze (2003) calls "navigational interactivity", where "the user is allowed to navigate in a more or less structured way through the site's content".

Other studies provided very limited guidance on what sort of content and functionality might be included in a survey of personalization at news websites. Categories like "customized topics on news", used by Chung and Yoo (2008), do not reflect the variety of personalization options at modern news sites, and it is not enough—as Spyridou and Veglis (2008) do—to simply record whether a site gives the user the ability to register for email newsletters: it is necessary to go deeper into the mechanics of such features to measure the degree of control provided to users.

The taxonomy developed for this study divides personalization into two forms based on how users' preferences are determined. Explicit personalization uses direct user inputs; implicit personalization infers preferences from data collected, for example, via a registration process or via the use of software that monitors user activity (Gauch, Speretta et al. 2007). Tables 1 and 2 set out the categories defined by this study, Tables 3 and 4 record the adoption of these categories at the eleven mainstream news sites studied.

Table 1: Taxonomy of explicit personalization functionality at news websites

CATEGORY	DEFINITION
'Email Newsletters'	Registration of individual users' email newsletter preferences. Variables include: format (HTML / plain text); delivery schedule (daily, weekly, event-triggered, etc); and choice of predetermined content categories and / or key-word / stock-symbol triggers.
'One-to-one Collaborative Filtering'	Registration of preferences for content recommendations from individual journalists or other users.
'Homepage Customization'	Registration of content and / or layout preferences on the homepage. Differs from 'Homepage Editions' in the complexity of preferences that can be registered.
'Homepage Editions'	Registration of preference for an alternative version of site's homepage. The choice is usually binary. For example, between a national and regional edition.
'Mobile Editions'	Preference registration on sites' mobile editions. Variables include: availability of external RSS feeds; customization by user-determined location and / or keywords or stock symbols; number of internal content modules offered; implicit preference registration & adaptation; and possibility to save stories for repeated reading.
'My Page'	Registration of content preferences for a personalized page (other than the homepage). Variables include: number of internal content modules and / or stock portfolios offered; layout customization; and inclusion of external content / RSS feeds.
'My Stories'	Ability to save stories to a personalized 'clippings' page for repeated viewing.
'Non-linear Interactives'	Embedded applications that immediately adapt their content and presentation to users' input at a level deeper than navigational control. Usually associated with, or relevant to, a specific news event, and authored using Adobe Flash. Audio-visual slide shows and other forms of non-linear information presentation that only provide temporal and / or navigational control are excluded.
'Other Explicit'	System adaptation—for individual users—of content, its delivery or arrangement, based on explicitly registered preferences, not recorded elsewhere in this table.
'RSS Feeds' *	RSS-feed availability. Variables include: number offered; format (text, video / audio); length restrictions (full and / or limited to headline and standfirst); and customization (based on user-defined keywords or combinations of predetermined categories).
'SMS Alerts'	Registration of individual users' preference of content category and / or keyword trigger for text message delivery.
'Widgets'	Applications for users' desktops or for third-party sites. Examples range from the provision of specific content feeds (e.g. personalized sports results) to truly adaptive applications that allow users to locate an apartment for rent using a number of variables.†

* RSS feeds are included as a technology that enables users to register to receive specific content in their personal RSS reader.
† Only 'official' widgets published by the news sites surveyed have been included.

Table 2: Taxonomy of implicit personalization functionality at news websites

CATEGORY	DEFINITION
'Contextual Recommendations'	Links to contextually-related content (including textual stories / blogs, videos, and photo galleries). Links may be to internal or external content. Recommendations—and aggregated 'topic pages' those recommendations may lead to—may be generated by software written, owned, and hosted by other organizations.
'Geo-targeted Editions'	Content adaptation, most commonly on the homepage and key index pages, based on the geo-location of the user, determined by IP address or other means.
'Aggregated Collaborative Filtering'	Selections of news stories or other content (such as readers' comments) automatically filtered by popularity. Variables include most: read / watched / searched / emailed. Selections may be further refined by content category (e.g. 'Politics'), user location (e.g. 'South America'), or time (e.g. 'Last 24 hours').
'Profile-based recommendations'	Content recommendations that use implicitly determined preferences based on user profiles. Profiles may be generated internally from registration data and / or records of user behaviour; or imported from other organizations, such as social networking sites.

In attempting to move beyond questions of definition, this study found that the journalism studies literature provided little in the way of an explicit framework for studying news personalization. The concept does, however, impact on a number of debates within the field, in particular those on: news consumption; content diversity; the institutional and economic context for journalism; and journalists' roles and gate-keeping effects.

News consumption and content diversity

In its explicit form, personalization demands time and effort from users. Audience research has, since the 1950s, increasingly credited audiences with the ability to exercise "symbolic power" (Meikle, 2009: 135), to the extent that some—the 'active audience theorists'—emphasise "the power of the audience" (Williams, 2003: 201). However, much of the evidence for this 'power' comes from observations of how audiences actively interpret mass media messages (Morley, 1993) rather than how they interact directly with the communications channel. The frequent references to the audience's ability to make "decisions about how and when to access news content" (Meikle, 2009), and to power shifting "away from the professional and towards the layperson" (Singer, 2003), have not dispelled doubts about the extent to which established "passive" (Neuman, 1991: 42) patterns of media consumption are changing.

A 2008 Pew survey revealed that: 15 percent of Americans reported receiving news via email; 7 percent via an RSS reader; and 22 percent via a customizable web page. These forms of personalization were, however, relatively infrequently used, with more than half of respondents going online for news less than two days a week (Pew, 2008). Such figures seem to confirm the view that the acquisition of news is "still by and large a passive affair", with the audience able to bear only "minimal and easy-to-use levels of interactivity" (Harrison, 2006).

Much of the technical computer science literature on personalization also assumes audience passivity. Gauch (2007) maintains that personalization systems that implicitly determine user preferences are "more likely to be used and, in practice, perform as well or better than those that require … explicit feedback to be collected". Explicit systems, according to Gauch (2007), are held back by the time required to use them, by inaccurate reporting of interests, and by profiles remaining static despite users' interests often changing over time.

There is widespread agreement that the mass news media are relatively homogeneous in their output (McNair, 2009: 46). The mechanisms of personalization may increase content diversity in online news by taking away some of the control journalists have had over news selection. However, if audiences are, as Neuman (1991) suggests, "passive", and "remarkably homogeneous" in their tastes, it may be more likely that it is implicit rather than explicit personalization that effects such a change.

Institutional and economic context

Traditionally, it has been argued that "economics of scale push in the direction of common-denominator, one-way mass communications" (Neuman, 1991: 42), particularly, as is the case with most online news, where advertising provides the primary means of support (Neuman, 1991: 162). An additional potential constraint on the adoption of personalization relates to how, according to Becker and Vlad (2009: 66), news providers in commercial systems develop brands for their products using a 'news philosophy' that shapes the type and mix of stories covered. Brand characteristics are usually tightly controlled and, as a result, personalization may be seen as: lessening news organizations' control over their brand or as promoting rivals.

On the other hand, Boczkowski (2004: 174) argues that there have been remarkable cumulative changes as print newspapers have developed non-print products and services in their attempts to defend against new entrants into the digital media arena (Mitchelstein and Boczkowski, 2009). Although only mentioning it in passing, Boczkowski (2004: 54) does include "customization" as one of the information practices that have contributed to these changes. As he points out, there are commercial advantages to customization: it can provide rich data on audience interests and demographics, enabling more precise targeting of advertising.

These opposing forces are likely to be experienced to differing degrees depending on "organizational and institutional contexts" (Mitchelstein and Boczkowski, 2009) meaning, at a micro level, the occurrence of personalization could vary considerably between the individual sites studied.

Journalists' roles and gate-keeping effects

The role of journalists as "human information filters" is at the heart of the substantial body of work within journalism studies on gate-keeping (Barzilai-Nahon, 2009). Gate-keeping studies attempt to reveal the gates through which information has to pass to reach the audience, who controls those gates and how, and the effects of gate-keeping decisions on audiences' understanding of what the world is like. Although there is recognition that gate-keeping has been "explicitly affected by technological developments" (Quandt and Singer, 2009), much of the recent work has tended to concentrate on "users as content

producers" (Mitchelstein and Boczkowski, 2009) and how their presence may be shifting news work from traditional gate-keeping tasks towards 'gate opening' (Boczkowski, 2004), where news workers foster user participation.

Many of the forms of personalization described in this study have gate-keeping effects, but largely function independently of both users as content producers and journalists as filters. The complex interactions between: computer algorithms and those behind their logic; data about individual and aggregated user behaviour; decisions on classification and indexing; explicit user choices; editorial and journalistic decisions; and user profiles, demographics, and location are barely addressed by the journalism studies literature, which "treats the process of gate-keeping predominantly as a selection mechanism" (Barzilai-Nahon, 2008: 1496). Recent work by Barzilai-Nahon (2008) has tried to better formulate gate-keeping in a networked environment, emphasizing "user interaction", "localization" and "customization", but, as she says, there has been very little empirical observation of these gate-keeping mechanisms.

Methodology

This study used a combination of qualitative research interviews with senior editors and time-separated content surveys of the sites those editors represented. The first survey was conducted—as part of the preparation for the semi-structured interview guides—in June and July 2007. The second took place between September and December 2009 in order to track changes that had taken place in sites' deployment of personalization in the intervening period.

The interview participants are listed here in order to make it easier for the reader to recognize the original interview material as it appears. The interviews were conducted, face-to-face, between June 2007 and April 2008. Participants' job titles are as at the time of interview and those no longer in post are indicated with an asterisk:

- Steve Bennedik—Editor, Sky News Networked Media
- Jim Brady—Vice President / Executive Editor, WashingtonPost.com*
- Pete Clifton—Head of BBC News Interactive*
- Steve Herrmann—Editor, BBC News Interactive
- Almar Latour—Managing Editor, WallStreetJournal.com
- Neil McIntosh—Head of Editorial Development, Guardian Unlimited*
- Rich Meislin—Associate Managing Editor/Internet Publishing, The New York Times*
- James Montgomery—Editor, FT.com*
- Steve Purcell—Editor, Mirror.co.uk
- Ed Roussel—Digital Editor, Telegraph Media Group
- Anne Spackman—Editor, Timesonline.co.uk*
- Marc Webber—Assistant Editor, News, The Sun Online*

Interviewees were selected on the basis of their position and availability and are not strictly representative in a statistical sense. However, because the sampling frame constitutes a large proportion of the population under study, the author has confidence that the qualitative research interviews provide the basis for a useful initial exploration of

the topic and for the development of hypotheses for further research. The interviews were transcribed verbatim from recordings made on location. Weiss' (1994) issue-focused methodology was used as the basis for the interview analysis.

Content analysis

As with any content analysis, achieving an operational definition of 'personalization' and defining the relevant categories and subcategories of content was crucial. This process is discussed in the literature review. Because the 'content' to be sampled was relatively static—involving website functionality rather than the material carried—it was not necessary to undertake probalistic sampling. Instead, each website was repeatedly examined, section-by-section, and the presence of the features under investigation recorded on coding sheets. Some of the categories relating to implicit personalization were, by definition, hard to measure using content analysis alone. To counter this problem, representatives of the news organizations under study were asked whether and how their websites adapted content—and its delivery or arrangement—to individual users based on implicitly determined preferences.

Results I: Content analysis

Tables 3 and 4 present the full results of the 2009 content analysis. The following section provides a narrative account of those results with the categories of personalization presented in order of frequency found. Changes since the first survey are also described.

Along with 'RSS Feeds', '**Aggregated Collaborative Filtering**' was the most commonly implemented form of personalization, recorded at all eleven sites. In addition to the ubiquitous 'Most Read', eight sites offered a selection of stories based on social use—such as 'Most Emailed'. Selections could be further refined by time ('Most popular today', 'yesterday' etc) at six sites and by content category ('Politics', 'Business' etc) at five. Changes since the first survey were negligible.

Although '**RSS Feeds**' were omnipresent, their range and utility varied greatly. Guardian.co.uk stood out, not only for the almost infinite number offered—thousands of predetermined feeds plus custom feeds based on combinations of subjects and / or contributors—but also because it offered full text feeds rather than just headlines and standfirsts. Custom feeds were also offered by the BBC News website and NYTimes.com. Most of the other sites offered a median range: between 70 and 285. As RSS is a relatively established technology, changes in adoption between surveys were generally small. The greatest change was at Guardian.co.uk, which had just 37 feeds at the time of the first survey. Telegraph.co.uk and theSun.co.uk also increased the number of feeds they offered significantly.

'**Email Newsletters**' were the third most frequently found form of personalization. Numbers offered varied considerably from four to over 200, with two sites—FT.com and NYTimes.com—allowing users to register for email alerts based on any keyword(s). FT.com offered the most flexibility, with users also able to personalize format and delivery schedule. Modest increases in provision were recorded in the second survey.

Table 3
Implicit personalization mechanisms at a selection of news websites, Sept-Dec 2009

WEBSITES	GEO-TARGETED EDITIONS[1]	PROFILE-BASED RECOMMENDATIONS	CONTEXTUAL RECOMMENDATIONS[2]	External provider / content aggregator	Links to external content	Contextual	Most read	Content category	User location	How found	Media type	Social use	Time accessed
FT.com	Y						Y						
Guardian.co.uk			Y[3]	Daylife			Y	Y				Y	Y
Mirror.co.uk			Y[4]				Y			Y	Y	Y	
News.bbc.co.uk	Y		Y[5]	Moreover, Autonomy	Y		Y	Y	Y		Y	Y	Y
News.sky.com			Y[6]	Daylife	Y		Y				Y		
NYTimes.com		Y[7]	Y[8]	Blogrunner	Y		Y				Y	Y	Y
Telegraph.co.uk			Y[9]	Daylife, Autonomy, Digg	Y		Y	Y					Y
theSun.co.uk							Y					Y	Y
TimesOnline.co.uk			Y[10]	Evri	Y		Y					Y	
WallStreetJournal.com	Y	Y		Loomia[11] and OneSpot[12]	Y	Y[11]	Y	Y			Y	Y	Y
WashingtonPost.com			Y[13]	Evri, Daylife, and Aggregate Knowledge.	Y	Y	Y	Y			Y	Y	

Note: Under AGGREGATED COLLABORATIVE FILTERING, the columns Content category, User location, How found, Media type, Social use and Time accessed are "Sortable by:".

Notes to Table 3

1. Determined by users' location, based on IP address or other techniques.
2. Only contextual recommendations known to be algorithmically generated were included. Manually-made contextual recommendations are considered to be part of the journalistic process and do not challenge journalists' gate-keeping and agenda-setting roles.
3. Aggregated news pages about English Premier League teams, US Presidential candidates, and other events (such as 2008 Olympics) are powered by technology from US-based Daylife. In addition, the contextual recommendations (called 'Related information') that appear at the bottom of most stories are generated automatically, using software built "almost entirely in-house" (Bobbie Johnson, Technology correspondent, The Guardian, personal communication, 4 November 2009).
4. Contextual recommendations are automatically generated to match tags journalists enter about each story. Mirror.co.uk is "looking at more sophisticated and automated technologies - for example, Grapeshot - which may or may not remove the need for journalists to complete the tag data" (Chris Bunyan, Digital Director, Trinity Mirror plc, personal communication, 7 December 2009).
5. The BBC News website's 'Newstracker' uses technology from Autonomy to create contextual links from BBC stories to external links provided by Moreover (Steve Herrmann, personal communication, 3 December 2009).
6. Contextual recommendations linked to 'topic pages' driven by technology from Daylife. Topic pages include links to external sites, including News.Sky.com's competitors such as the *Daily Mail* website and Huffington Post.
7. Personalized headlines based on readers' LinkedIn.com profiles. Although this service is 'opt-in', it is included in this table because, once running, recommendations are made and updated automatically.
8. 'Times Extra' provides additional headlines associated with stories on the site's front page. These headlines are generated by the New York Times Company's 'Blogrunner' news-aggregating service. In November 2009, it was announced that this service would be discontinued on 1 December 2009.
9. Topic pages on environmental stories (e.g. 'Global Warming', 'Fish Stocks') are generated by technology from Daylife. Topic pages aggregate news items from external sites, including Telegraph.co.uk's competitors such as the *Daily Express* website and BBC News website. In addition, 'Related Articles' on most textual articles are served "automatically by software provided by Autonomy" (Marcus Warren, Editor, Telegraph.co.uk, personal communication, 6 November 2009). Some contextual recommendations are also provided by Digg (including links to external sites).
10. Context-related links to internal TimesOnline content and external content, including TimesOnline's competitors, provided in a box on selected articles. Content recommendations powered by Evri, based in Seattle, USA. TimesOnline.co.uk has plans to do more "implicit recommendation of content and commerce in the near future" (Hector Arthur, Head of Digital Development, TimesOnline, personal communication, 21 December 2009).
11. Collaborative filtering is used to provide contextual recommendations (called 'People Who Viewed This Also Viewed'). Users may choose to receive recommendations based on the behaviour of other WSJ.com users or of 'friends' in their Facebook network, using a widget provided by Loomia. Although the widget is 'opt-in', it is included in this table because, once running, recommendations are made and updated automatically.
12. WSJ.com's Technology, Health, Politics, Personal Finance and Business sections include contextual recommendations to stories on external websites generated semi-automatically by software provided by OneSpot, based in Austin, Texas.
13. 'People who read this also read' headlines are provided at the bottom of some stories, powered by Aggregate Knowledge. Contextual headlines provided by Evri. In addition, aggregated news pages about NFL teams, and events such as the 2008 Olympics and 2008 US presidential election, are powered by technology from Daylife. Daylife-powered pages include links to external sites, including Washingtonpost.com's competitors such as the *Dallas Morning News* website.

Table 4
Explicit personalization mechanisms at a selection of news websites, Sept-Dec 2009

WEBSITES	Homepage Editions: Geographical	Homepage Editions: Other	RSS: Custom	RSS: Full text	RSS: Text	RSS: Video/Podcast	One-to-One Collaborative Filtering	SMS Alerts	My Stories/Clippings	Widgets	Non-linear Interactives	Email: Number	Email: Format	Customizable by: Delivery schedule	Customizable by: Keyword/stock symbol	Customizable by: Event trigger	Mobile: Internal modules	Mobile: User location	Mobile: External feeds	Mobile: Keywords	Mobile: Stocks	Mobile: Saved stories	Mobile: User reading habits[1]	Homepage Customization	My Page: Modules	My Page: External content	My Page: Custom layout	My Page: Stock portfolio	Other Explicit
FT.com					264	4			Y		Y[2]	50+	Y	Y	Y	Y					Y		Y	Y[3]				Y	
Guardian.co.uk			Y	Y	∞	Y		4	Y	Y[4]	Y[5]	15					Y[6]					Y							
Mirror.co.uk					261	2						4					23												
News.bbc.co.uk			Y		27	8		1		Y[7]	Y[8]	97	Y	Y										Y[9]					
News.sky.com					9			4			Y[10]													Y[11]					
NYTimes.com	Y	Y	Y		10,000+	14	Y		∞	Y[12]	Y[13]	38+	Y		Y	Y								Y[14]	100's[15]	Y	Y	Y	Y[16]
Telegraph.co.uk					2,377+	45				Y[17]	Y[18]	20						Y											
theSun.co.uk					13	57		7		Y[19]		62				Y													
TimesOnline.co.uk					100	9					Y[20]	15				Y	10		Y										
WallStreetJournal.com					237	47			Y	Y[21]	Y[22]	74+	Y	Y			Y		Y	Y	Y	Y		Y	46[23]			Y	Y[24]
WashingtonPost.com	Y				150+	1		5	Y		Y[25]	200+		Y					Y										Y[26]

∞ = Too many to count

Notes to Table 4

1. This implicit form of personalization is grouped under 'Explicit Personalization > Mobile Editions' in order to record mobile personalization in one place.
2. 'Interactive charting' provides financial charts customizable using multiple variables. FT.com also publishes occasional one-off interactive features related to topical stories. For example, 'Exposure to Negative Equity in the UK'.
3. Certain content blocks can be minimized.
4. Includes a 'build your own widget' containing personalized job listings.
5. Occasional truly adaptive interactive applications such as 'The Guardian's quick carbon calculator', which allows users to calculate the impact of their travel, home, and shopping habits.
6. Guardian.co.uk's iPhone application allows users to select the sections to be displayed on the front page.
7. The 'BBC Alerts' widget provides desktop alerts and a news ticker, with users able to select from 76 news categories as well as sports stories and results.
8. Called 'Interactive Guides'. Examples include: 'UK fatalities in Afghanistan and Iraq', which allows users to select a date range between 2001–2009 to see total number of British soldiers killed in action, where and how, as well as demographic data.
9. On the UK index page, users can add local news, weather, and sport by entering their postcode. Up to four selections, any combination of news, sport and weather. Selections are made from geographical areas, or types of sport, sports leagues or sports teams. Only UK content offered.
10. Occasional truly adaptive interactive applications such as 'Poll Tracker', which allows users to interrogate UK political party polling data between 1983–2009.
11. Users can choose a default location for weather (locations worldwide). In addition, 'Choose your news' allows users to filter stories and videos by selecting from 11 category options. This adds a sidebar of 10 corresponding stories to the homepage and some subsequent pages.
12. Users can 'Build Your Times Widget' by selecting up to 30 headlines, organized in up to three tabs, from 23 NYTimes.com sections and / or 10,000+ RSS feeds.
13. Called 'Interactive Features', these applications allow users to explore issues of topical interest in an interactive way, for example the 'College Cost Calculator'.
14. Users can add 'My Headlines' in a module on the homepage. Each of up to three tabs can contain a maximum of 10 headlines (with optional summaries and thumbnail illustrations). Content can be chosen from 10,000 NYTimes.com feeds or 23 pre-defined categories.
15. In addition to My.NYTimes.com, separate 'My Page' functionality is provided as part of NYTimes.com's 'Times Wire' service. A 'My News' tab allows users to register to see the latest headlines from their choice of 22 pre-defined sections.
16. Weather can be personalized for hundreds of cities, including those outside the US.
17. A number of widgets are offered that allow sub-sets of Telegraph.co.uk content to be read on third-party sites including Facebook, Friendster, and MySpace. The 'Premier league news and results widget' allows users to personalize soccer news to their team of choice and view relevant news on their desktop.
18. Occasional interactive features. For example, 'MPs' Expenses Data Tool' allows users to investigate MPs' expenses via a data visualization tool.
19. Users can subscribe to: 15 Netvibes channels, six Facebook apps, and two MySpace feeds.
20. Occasional truly adaptive interactive applications such as 'Find Your Resort'.
21. Includes 'WSJMarkets Widget' in which users can customize fonts, colours, labels, dimension, and content.
22. The 'Market Data Centre' has a series of interactive charts that allow users to change multiple variables to graph data. There are also 'Interactives' covering more general news.
23. On their 'My Journal' page, users can choose headlines on up to: 10 companies; 10 industries; 10 WSJ sections; five top news categories; 10 columnists; and editors' picks.
24. Up to 50 portfolios. Each can provide customized data. 50 stocks per portfolio.
25. A wide range is available. For example, 'Votes Database', 'Local Explorer', and the 'Budget Game'.
26. Users can create a watch list of stocks they want to track. The system remembers users' choices and displays them at the top of the Personal Finance page.

'**Contextual recommendations**', a form of implicit personalization, were also used by ten of the sites surveyed. Sites used a mixture of internally developed and externally provided technology to automatically generate contextually-related links from individual stories to other content. External companies involved included: Daylife (used by four sites); Evri and Autonomy (used by two); and Aggregate Knowledge, Blogrunner, Digg, Loomia, Moreover, and OneSpot (used by one site each). These external companies generated both contextual links and, in some cases, full 'topic' pages of aggregated content on subjects such as sport teams and events, global warming, politicians, and elections. 'Contextual recommendations' grew considerably between surveys, rolled-out at sites including Sky News, Guardian.co.uk, Telegraph.co.uk and WashingtonPost.com.

Data-rich '**Non-linear Interactives**' were offered by nine sites. Washingtonpost.com, NYTimes.com, FT.com, and the BBC News website all offered a particularly impressive set of these adaptive interactive applications, which often related to financial and political news topics. Some sites with more modest provision— Guardian.co.uk, Sky News and Telegraph.co.uk—had not offered 'Non-linear Interactives' at all at the time of the first survey.

Seven sites offered personalizable '**Mobile Editions**'. WallStreetJournal.com's iPhone application offered the greatest number of options, allowing users to: include feeds from external content providers; save stories for repeated reading; and add news from a selection of WallStreetJournal.com sections and about specific keywords and stocks. Two sites—Telegraph.co.uk and Washingtonpost.com—allowed users to receive location-specific information, using the GPS capabilities of their mobile device. Since the first survey there has been a significant growth of personalizable mobile editions, many using the iPhone platform.

Personalizable '**Widgets**', applications for users' desktops or for third-party sites, were also offered by seven sites. Examples ranged from the provision of customizable content feeds to truly adaptive applications, such as one that allowed Washingtonpost.com readers to locate an apartment for rent using a number of variables. NYTimes.com allowed users to 'Build Your Times Widget' by selecting up to 30 headlines—organized in up to three tabs—from 23 *Times* sections and over 10,000 RSS feeds. The resulting widget could be embedded on any site or blog. Between the two surveys, four sites—Guardian.co.uk, Sky.news.com, Telegraph.co.uk and FT.com— dropped their desktop alerts widgets that had been provided by third-party Skinkers Limited. The BBC News website retained its Skinkers-powered desktop alerts widget.

'**SMS Alerts**' were offered by six sites, with NYTimes.com offering, by a large margin, the greatest range of options. Users were able to receive alerts about new content from every *Times* section and columnist as well as real estate information, breaking news alerts, and weather reports for any zip code. Modest increases in provision were recorded in the second survey.

Although '**Homepage Customization**' was offered by just five sites, the growth of this category has been significant since the first survey when it was only found at the BBC News website. In 2009, the offerings from the BBC and NYTimes.com were the most sophisticated, allowing users to add a dozen or more personalized headlines chosen from their extensive internal databases of content.

The '**My Page**' category takes 'Homepage Customization' a stage further, increasing the options available and allowing the user to create a personalized page rather than just to customize a small part of the homepage. WallStreetJournal.com and NYTimes.com both offered extensive 'My Page' functionality, allowing users to add scores of modules and stock portfolios from their internal databases of content, as well as control page layout. NYTimes.com also allowed users to add RSS Feeds and applications from external sites, such as Flickr and MSNBC.com. Although one of *The New York Times*' 'My Pages'—My.NYTimes.com—was still available at the time of the second survey, its future is in doubt. From 15 December 2008, NYTimes.com said it would "no longer market the product" (New York Times, 2009). Between the first and second surveys, 'My Page' functionality was removed from WashingtonPost.com, theSun.co.uk and Telegraph.co.uk;[3] and, although WallStreetJournal.com's 'My Page' remains available, between July 2007 and October 2009 their 'WSJ Newsreader' was retired, with the result that users can no longer add external content to a WallStreetJournal.com 'My Page'.

 '**Geo-targeted editions**', where sites automatically adapt content—most commonly on the homepage and key index pages—based on the geo-location of the user, were relatively uncommon, found at just three of the eleven sites studied. Changes since the first survey were negligible.

'**My Stories / Clippings**', where users can save stories to a personalized 'clippings' page for repeated viewing, were offered by three sites. Two—FT.com and Guardian.co.uk—launched their services between the two surveys. WallStreetJournal.com offered the most sophisticated functionality, with users able to organize articles into 'Collections' and display them by type (Articles, Videos, Slideshows etc).

'**Homepage editions**', where users can register preferences for alternative versions of a site's homepage, were only offered by WashingtonPost.com and NYTimes.com. Both offered two distinct regional editions, and NYTimes.com also offered 'Times Extra', which provided 'additional headlines from selected sites across the web'.[4] Changes since the first survey were negligible.

'**Profile-based recommendations**'. This form of implicit personalization—not recorded in the first survey—was used by just one site—NYTimes.com—which provided personalized headlines in its 'Business and Technology' pages based on readers' LinkedIn.com profiles.

'**One-to-one Collaborative Filtering**'—also not recorded in the first survey—was only offered by NYTimes.com via its 'TimesPeople' service, which allows users to choose to receive content recommendations from individual journalists or other users.

Results II: Qualitative interviews

The overwhelming majority of editors (Bennedik, Brady, Clifton, Herrmann, Latour, Meislin, Montgomery, Purcell, Roussel, Webber) expressed positive attitudes towards providing users with a degree of personalization. Some called it extremely important (Bennedik, Latour) and one predicted it would become "as big as blogging" (Roussel). However, such positive attitudes as existed were tempered by feelings that personalization should be limited in scope, simple to set up, and not replace the status quo. Concerns centred around personalization's impact on journalists' professional

identities and the value journalists add; and readers' demand for, and ability to make use of, personalized news.

Trust and the value of editing

A common theme in the interviews was trust. Editors felt theirs were trusted brands users came to for accurate and reliable stories that gave them "the big-picture, wide-angle view of the world" (Montgomery). The belief that personalization could conflict with the editing function provided by news sites was strongly in evidence. McIntosh believed that readers "want someone to do some of the filtering work for them". The competition between newspapers in the UK showed, he believed, that there was "a huge appetite for [generic] packages that filter in a slightly different way". Many editors thought that this "packaging … contextualization and … news prioritization" (Montgomery) required professional journalists—what Marc Webber called "editorial people". The fear that personalization might reduce the editorial role struck at the core of some journalists' sense of professional identity: "if there's anything we have it is our judgement about what people are interested in", said the editor of TimesOnline.co.uk, Anne Spackman.

Although editors were strongly of the view that audiences had an appetite for professional editing, many were willing to accept readers' involvement in the editing process via 'collaborative filtering', a service that had "gone down well" at Guardian.co.uk (McIntosh).

Editors stressed the serendipitous nature of a good news story and believed this characteristic could be lost through the widespread personalization of news. Serendipity was a "pleasure", according to FT.com's James Montgomery, who worried that "really good" articles might not be discovered if they lay outside readers' "personalized preferences". Only Almar Latour explicitly disagreed, saying that "you can build things so that you allow people to personalize for serendipity".

User demand and aptitude

A majority of participants expressed doubts about the extent of demand for personalization from readers. TimesOnline's Anne Spackman said that readers' "interests are probably not as narrow as we imagine [they] are". Steve Herrmann thought that the "time and effort to personalize something" would put off all but a "relatively small number of people". His colleague, Pete Clifton, went further, predicting hostility if the BBC were to allow users to fully customize the homepage. Surveys of readers had produced mixed results. Some had revealed very little demand (McIntosh, Meislin), whilst others had revealed more (Brady). However, empirical—albeit anecdotal—evidence was presented suggesting that when personalization was made available the actual uptake was low. Neil McIntosh reported that at Guardian.co.uk they were "finding single digit take-up". The Telegraph.co.uk's Ed Roussel found it hard to "quantify" uptake of tools that allowed readers to "select their news sources and build their news pages". WashingtonPost.com's executive editor said that a maximum of "10 percent" of users who said they would use such functionality would actually do so, saying that "anytime we've done anything that is not passive we've got very, very little uptake" (Brady). Rich Meislin reported personalization was only used by a "relatively

small number of users". Marc Webber suggested that "MySun is definitely being used more as a blogging tool … not to spread RSS feeds from our content".

Doubts were also expressed about whether users actually knew what they wanted and, by implication, how well they could personalize news. Rich Meislin thought that "if you determine in advance who 'The Daily Me' is … then you may well miss some of the important things that you didn't know you were". James Montgomery said that "people think they want it but perhaps don't know themselves as well as they think they do".

Although doubts were expressed about the extent of demand for personalized news, some of the initiatives launched were considered successful. The BBC News website's 'Homepage Customization' service was described as "very popular, probably the most popular thing we've launched over the last year or so in terms of user feedback" (Clifton). WallStreetJournal.com's personalization features were also described as being "popular with a significant number of our readers" (Latour).

The BBC's rationale for implementing their limited 'Homepage Customization' service was partly user-focussed, but there was another motivation: to showcase underused content. Steve Herrmann explained: "one of our ambitions was to allow people to bring our good local content to the top of the site". The BBC's local and regional newsrooms provide them with the range and depth of content that a personalization service demands. Indeed, one of their competitors believed the BBC's local base was "the reason" their 'Homepage Customization' could work and why national newspapers would struggle to match it: "Where do we have the local base to do this from? You can't ever build anything from scratch on the web" (Spackman).

Content aggregation

As the 2009 survey shows, personalization mechanisms found at a majority of the sites studied incorporated content from, or links to, external content providers. However, the idea that online news publishers should provide access to content from other websites in this way did not find favour with some of the commercial providers interviewed for this study. Although the editor of Mirror.co.uk expressed agreement with the idea as a means of retaining readers—"you're far more likely to go somewhere you can branch out and find other things"—in the end he came out against, asking: "Why would a person who is interested in, say, film, fishing, football and the airline industry go to one place to get it?" (Purcell).

There were also anxieties about protecting their brands' reputations:

> I don't see it like barbarians at the gate, but it does cause me some concerns …. There is a brand … that's really important … we want to offer choice and diversity on the site but it's got to be done in a way that we can control, to some degree, in terms of quality (Bennedik).

Some participants also expressed worries about promoting rivals:

> We are the place where you can share what you think is important from *The Sun*'s content, not from anybody else's. I can't see a position where we are going to give free advertising to the BBC or Sky News (Webber).

Webber's concerns were not, however, universally shared. Rich Meislin talked about "the considerable value in showing people other useful, interesting things elsewhere on the web", a sentiment echoed by Jim Brady, James Montgomery, and Ed Roussel.

Implicit personalization

Perhaps because of worries about users' ability and willingness to register explicit preferences, some editors were keen to explore implicit personalization. FT.com's editor, James Montgomery, thought this was "quite an intriguing opportunity because it definitely would deepen the engagement of the user", and said "we have to have some element of that on the new site". The BBC's Pete Clifton agreed: "We need to change the way our Content Production System works … and be much more intelligent about what people are looking at and make some suggestions about other things they might like to know". Jim Brady and Rich Meislin reported that WashingtonPost.com and NYTimes.com wanted to move to more "passive personalization". Not all editors, however, were enthusiastic. Neil McIntosh worried that "the *Guardian* audience are probably temperamentally less inclined to accept that kind of thing."

Non-linear Interactives

The "enormous popularity" of these applications at the BBC News website "surprised" its editor, who commented that "it taught us that when there is a significant theme in the news, and people can engage with it by testing out their own circumstances, they like to do it". Herrmann's enthusiasm was shared by Steve Bennedik and Neil McIntosh who said "it's an area I'd like to see us prioritize".

Some editors' ambitions to do more were frustrated by a lack of "the right skills and ability" in their staff (McIntosh). In addition, the fact that such applications were "very labour-intensive" to produce meant that news providers, for example the BBC and FT.com, would only consider producing one if it could be "used repeatedly" (Herrmann, Montgomery).

RSS feeds

Although all the sites studied offered RSS feeds, their quality was questioned and they were reported to be driving little traffic (Bennedik, McIntosh, Meislin, Montgomery, Purcell). The BBC put a figure of "3 percent" on the level of traffic being driven by RSS feeds (Clifton). Jim Brady estimated "8 percent", calling it "pretty small". Neil McIntosh thought that most ordinary consumers did not need the sort of service RSS provides: "The heat and light has been created by consumers of vast amounts of information who want to keep track of 250 sites a day … levels of consumption among normal people are completely different." Ed Roussel suggested that part of the reason for the low take-up of RSS feeds was their "very poor" quality worldwide. He admitted that Telegraph.co.uk were "not happy with the state of [their] RSS feeds" and wanted their competitors "to get a lot better at it", citing "lumpy" feeds, problems with the accuracy of publication times, and the fact that some just didn't work.

Discussion

Personalization is nothing new. 'The Daily Me', in effect, has been in existence for as long as papers have been printed and people have had personalities—readers habitually consume certain sections and ignore others. Nevertheless, in contemporary online journalism, the forms and frequency of personalization constitute an important departure. This study found significant cumulative changes towards user control, with the news providers studied each offering between five and 13 different forms of personalization. A perception of user demand for choice (Purcell) and specialization (Roussel); a wish to exploit underused content (Herrmann); and a desire to align with "web culture" (Brady) were the catalysts for change mentioned by the interviewees. There was also evidence that the—in some cases "surprising" (Herrmann)—popularity of particular forms of personalization positively reinforced innovation.

Although not explicitly referred to in the interviews, commercial factors are also a driver. Firstly, 'Collaborative filtering', 'Geo-targeted editions', 'Profile-based recommendations', and 'Contextual recommendations' all automate editorial processes, allowing news sites to reduce labour costs or do more without increasing staff overheads. This point is made by Daylife, the provider of 'Contextual recommendations' to four of the sites studied, who sell their service as providing "unlimited, high-quality, and advertiser-friendly news and content for your website . . . all with little or no staffing" (Daylife, n.d.). An algorithm is cheaper than an editor. Secondly, the explicitly expressed and implicitly determined preferences captured by the processes of personalization provide the means to target advertising very precisely. The link between content personalization and advertising is made by at least two of the nine external companies that this survey found to be involved in personalizing content. On their website, Aggregate Knowledge promise to deliver "the best campaign . . . and the most relevant content individualized to the tastes and needs of every consumer" (Aggregate Knowledge, n.d.).

Although the involvement of companies such as Daylife and Aggregate Knowledge has a strong commercial component, the services they provide may be increasing content diversity at the sites studied: the 'Contextual Recommendations' they make include links to alternative, independent news sources such as Grist, a not-for-profit online environmental magazine, the liberal blog, Crooks and Liars, and to the citizen journalism sites, Newsvine and Ground Report. Further content analysis is required in order to determine whether such personalization features are increasing media diversity in the mainstream or are, in Boczkowski's (2004: 19) terms, "exploratory endeavors" that may be discontinued as sites "settle" on a narrower range of practices.[4]

The deployment of personalization mechanisms recorded in this study is not, necessarily, inconsistent with editors' concerns about personalization, in particular their perceptions of:
- users' aversion to choice-making, change and excessive complexity;
- loss of opportunities for serendipitous discovery;
- users' inability to accurately predict their content preferences;
- personalization's potential to erode one of journalists' core professional functions—news judgment; and
- the value audiences place in editorial decisions made on their behalf.

Personalization has, to a large extent, been adopted in ways that provide a high degree of continuity with existing editorial practices. Users are never forced to choose, and changes are subtle and carefully introduced. Although opportunities to personalize are numerous, and have been increasing, the sites studied still predominantly offered edited selections of material with multiple opportunities for serendipitous discovery and for journalists to demonstrate the 'value' their core editorial function provides.

Participants raised the issue of audience demand primarily in terms of the uptake of explicit personalization features. That uptake was reported as being, in the main, low. The withdrawal or abandonment of a number of high-profile 'My Page' features between the two surveys seems to confirm both these anecdotal reports and the existing literature on habitual patterns of audience passivity. Further research is required to determine, more precisely, the degree to which audiences use such interactive features and whether, as the reported popularity of personalization at WallStreetJournal.com suggests (Latour), a higher demand exists in goal-orientated work contexts.

While this study's findings demonstrate a high degree of continuity within change—what Boczkowski (2004) calls "mimetic originality"—personalization's gate-keeping effects offer genuine discontinuity with the processes of news selection, presentation, and distribution that they partially replace. Although the gate-keeping literature has begun to recognize the ways in which user-generated content is changing journalists' information-filtering role (Mitchelstein and Boczkowski, 2009), the editorial role that users are playing via processes of personalization is barely documented, and any consequent agenda-setting effects even less so.

This study shows, in the news context, the development of user-controlled gate-keeping mechanisms and proposes a taxonomy of those mechanisms. It has also attempted to highlight the gate-keeping effects of the processes of implicit personalization. These mechanisms are difficult to detect and describe because they operate without user involvement and use closely-guarded proprietary algorithms, often outside the direct control of the news sites that host the services they provide. The processes of implicit personalization are particularly deserving of further study, not only because they are poorly documented but also because of news sites' (Arthur, Brady, Bunyan, Clifton, Meislin, Montgomery) interest in developing this form of personalization.

Robin Skelton (1991) described Procrustes, the bandit of Greek myth who racked or amputated guests so they would fit his iron bed, as an "editor". Although, in journalism's past, it has been editors and sub-editors who have had primary responsibility for hammering news artifacts into shape—determining "what shall be shown, in what order, at what length, and with what stresses" (Hoggart, 1976)—in online news such filtering mechanisms are not just "in the blood" (ibid) of journalists but, increasingly, embodied elsewhere. A more appropriate ancient analogy for editorial processes at many news websites is Cerberus, Hades' three-headed hound, the editor, the reader, and the algorithm making up the three heads, collectively filtering news output. In most literary tellings, Cerberus's heads represent the past, the present, and the future. Today, editors share gate-keeping functions with readers in ways unimagined in the past. The place of the algorithm in the future of news filtering is assured; what forms it will take we are only just beginning to glimpse.

Notes

1. There is no universally-agreed name for the phenomenon under investigation. 'Personalization' is preferred here because relatively frequent use in the context of news has given it a degree of familiarity. Synonyms such as 'customization' or 'individuation' may more accurately describe the processes involved.
2. Although two categories defined in the content analysis—'One-to-one Collaborative Filtering' and 'Aggregated Collaborative Filtering'—could be considered a form of user-to-user interactivity, they are included because the content recommendations they enable replace editorial decisions traditionally made by journalists, and the communication is one-way.
3. Although, as of 9 November 2009, Telegraph.co.uk were "working on the follow up to My Telegraph" (Marcus Warren, Editor, Telegraph.co.uk, personal communication, 9 November 2009).
4. In November 2009, NYTimes.com announced that 'TimesExtra' would be discontinued on 1 December 2009.

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