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Between Old Broadcast Media and New Networked Media:
Materiality and Media Consumption Practices

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Past tensions between content and materiality have prevented communication researchers from forming a deeper conceptualization of the role played by the material character of communication technologies in shaping social arrangements and cultural forms of expression. Drawing on the findings of a comparative research project on European audiences, we examine the interrelation between material facets of media technologies and the practices they afford on the audience side. Relations between "old" mass media, such as television, and "new" networked and individualized media, such as the Internet, are discussed, focusing on the transitions between different media technologies and the processes of substitution or supplementation occurring in these transitions.

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Introduction

When studying communication and media technologies, one can take several approaches that will ultimately not only frame the research endeavor we are pursuing but define the reach of our findings. The role played by the material facet of media technologies in the ever greater influence that these technologies have on our daily life is the focus of one such approach. Materiality corresponds to the physical character and existence of artifacts that makes them useful and usable for certain purposes. But materiality goes beyond *things*, with the materiality of the devices of communication technologies pointing to the dynamic relation between artifacts, actions, and social arrangements that shapes the mediation processes of contemporary audiences (Lievrouw, 2014).

Wishing to move beyond deterministic approaches, communication studies have often neglected the relevance of media's material components in favor of more discursive or socially oriented approaches. As complex constructs that exhibit multiple features, media technologies are intimately linked to the individuals who use them and consume the content they symbolically provide—the people we have gotten used to calling "the audiences." Transformations in the understanding of these audiences—specifically their conceptualization as "active" users (Livingstone, 1999)—have played a decisive role in the way we regard media technologies, and they have framed much of the content-oriented research in the field of communication throughout the past decades. Constructivist views (MacKenzie & Wajcman, 1999) framed what became known as the social shaping of technology approach (Williams & Edge, 1996), a theoretical framework that leaves little room for a consideration of the role played by the embedded material features of media technologies in shaping audience behaviors. A middle road between strong technical determinism and social determinism has been proposed by domestication theory (Silverstone, 2005), a view that favors a more heterogeneous approach whereby technology and individual actions are mutually shaped.

Tension between content and materiality has often prevented media scholars from fully acknowledging the role played by artifacts in the communication process, and has created a gap in research between the consumption/content side and the material side of communication technologies (Boczkowski & Siles, 2014). One of the manifestations of this gap is the fact that much of the cited audiences research is oriented solely toward reception processes and associated social constructs and seldom looks at the role of artifacts in this context. Medium theory and diffusion-of-innovation approaches are among the few attempts in communication research at understanding the significance of technological features for communication processes. Critical to understanding these processes is inquiring into how individuals generate and organize their media use and consumption practices as a function of available artifacts and affordances (Gibson, 1982), including different contexts of use such as private versus public spheres.

The starting point for this article are the results of a collaborative and comparative research effort focused on understanding transformations of European audiences in the context of a constantly changing media landscape. We will particularly look at broadcast mass media (radio and TV) and networked media (Internet and social network sites) and the dynamic relations between the artifacts supporting such

technologies and the production and consumption practices they entail on the audience side. Past approaches have highlighted either the conflictual nature of this relation, with new networked media constituting themselves as substitutes for older broadcast media, or the supplemental nature of these technologies (Althaus & Tewksbury, 2010). Many of these approaches have focused on messages (Dutta-Bergman, 2004) and less on how the materiality of the media has defined the interactions between artifacts and practices (Lievrouw, 2014). It is such materiality that makes media artifacts useful and usable for a certain period under particular conditions, a definition of materiality that has impelled Bruno Latour (1991) to affirm that technology is society made durable.

Our main goal is to discuss the relationship between "old" mass media and the "new" networked and individualized media, focusing on the complementarities, dissimilarities, and replacement processes that occur between them, specifically when the material character of technology is considered and related to cultural and social contexts. Our perspective relates the material dimension of these different media (which is manifested in distinctive practices of use) with the patterns of consumption associated with those same media. We intend to explore whether we are confronted with a specific *momentum* in media evolution and transformation processes (Hughes, 1994) whereby mass media consumption processes are being replaced or supplemented by individualized networked media practices of use, propelled by this second type of material specificities.

Problems and Questions: Technology and Practices

Three central problems are to be discussed, all dealing with the interplay between *technology*: the artifacts; the *actions* (audiences' behaviors); and *social formations* (cultural variances). We will first address the consumption of mass and individual networked media—old and new media; broadcast and networked media—in Europe and establish whether variations in consumption practices occur following geographic, demographic, and cultural differences. In doing so, we will look at the relation between the artifacts (e.g., radio) and the actions performed via them, as manifestations of practices pointing to specific social arrangements that correspond to the expression of specific patterns of mediation (Lievrouw, 2014). Later, we will consider whether it is possible to generate profiles based on users' media practices that correspond to different configurations of the mediation process across the European media landscape. Second, we want to discuss whether we are facing processes of complementarity or substitution between broadcast and networked media, and we want to relate this to the notion of materiality, especially when it comes to evaluating whether perceptions of innovation in material features act as a driver of adoption and later appropriation. Third, we want to describe those processes, confronting the material and social dimensions of media technologies, and explore whether different attitudes and user behaviors correlate with different or complementary appropriation processes that might result in a specific current historical *momentum* of media evolution.

The motivations and attitudes expressed by the empirically studied population—media audiences in several European countries—inform our hypotheses around the core theme of the relation between media consumption and technological materiality. We do not assume that users' actions are entirely shaped by the material characteristics of the different media, but we postulate that materiality has a clear role in shaping consumption processes—while also being shaped by them—with the diffusion of new material entities

generating new practices while also supplementing existing ones.

- Our core hypothesis (H1) is that the material nature of specific media technologies influences the activities users' carry on through them, with distinct practices resulting from that materiality.

- Following from this, we hypothesize H2: that the articulation between artifacts and practices reflects distinct characteristics in accordance with cultural, demographic, and economic differences that have as their consequence either the substitution or the supplementation of existing media technologies by newer ones, which further depends on the affordances of those technologies as perceived by the individuals who appropriate them.

- Following H2, we also postulate H3: that the articulation between artifacts and practices exhibits distinct characteristics that result in diverse social arrangements.

- Our final hypothesis (H4) affirms that the so-called new media mostly supplement older media, because they hold the same affordances and supplement these with extra possibilities for social interaction that are variably appropriated by audiences according to the social arrangements they are involved in.

Framing the Problem:
The Social Construction of Technology
Versus Technological Determinism

The e-audiences project focused on audiences' consumption and production practices in their communicative actions by probing the interactions, expressions, and cultural works that individuals are involved in. The material, observable character of media technologies was included by taking the relation between the artifacts (e.g., radio) and the activity performed (e.g., news consumption) as key to the analysis. We consider this practice-based approach as a way of transcending older tensions between social or technological forms of determinism, allowing us to focus on consumption and materiality as aspects of one single process.

One core contribution to this approach was put forward by Lievrouw (2014) in her formulation of the mediation framework depicted in Figure 1. This framework seeks to articulate artifacts, practices, and social arrangements with reference to three modes of change labeled as *reconfiguration*—the transformation of material artifacts through people's communicative actions; *remediation*—the transformation of individuals' practices as a consequence of communicative engagement; and *reformation*—a process in which social patterns emerge from the relation between artifacts and practices. This dynamic structure allows us to understand how content and materiality shape each other in specific contexts and, more particularly, how different social arrangements arise from the process in accordance with the form of mediation that a specific cultural context allows. To clarify this process, we introduce the concept of *affordances* (Hutchby, 2001) as opportunities to act that things (material media objects) present to people (audiences). Distinctive cultural

contexts may promote different affordances that will, for similar types of materiality, result in different social arrangements or practices.
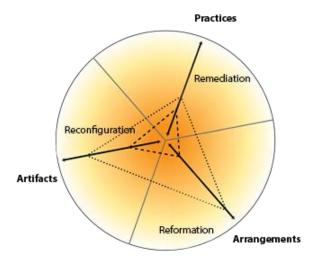

Figure 1. Mediation framework (from Lievrouw, 2014).

Research in the field of media and communication studies has approached the study of broadcast and networked media mainly as two separate enterprises. Few studies have addressed the interconnectedness between broadcast and networked individual media by departing from a point of view that frames them as integrated media forms that vary in material terms, but which are constructed in similar cultural and social processes.

Technological determinism, focusing on media as artifacts or institutions, has been replaced by approaches that are more concerned with analyzing communicative practices and the ways that different flows of communication intersect through different categories of media and across the online/off-line divide (Jensen, 2013; Jensen & Helles, 2011). This perspective implies a shift away from questions of transmission, effects, and access to questions foregrounding cultural practices, collaborative or individual activities via the media, and, in particular, processes of the social construction of technologies where the focus is on the users and on the activities performed, and not so much on the specificity of the media as technological determinants. These approaches, in turn, have often fallen into a type of social determinism that oversimplifies the relevance of the material dimensions of media and the influence they exert upon individuals' uses and appropriation processes. The issue of media interconnectedness (Livingstone, 1999) and of the relationship of media with other social and cultural institutions—that is, technical systems—

emerges here as fundamental. The notion of materiality, as presented here, eases the tension and introduces the notion of *practice* as an integrative term.

The initial view of the relationship between networked media and broadcast media predicted a substitution of the former by the latter. Media substitution assumes that users analyze and select the media that best suit their needs and goals in a particular mediated activity or action, substituting one media for another in accordance with their needs (Lin, 2001). According to this theory, the arrival of the Internet would imply that people would watch less television, listen less to the radio, or spend less time reading newspapers (Wurff, 2011).

However, little empirical evidence has confirmed the idea that Internet use displaces other media usage. Instead, some studies even indicate otherwise, noting a symbiotic relationship among media as part of our social and cultural environment (Althaus & Tewksbury, 2000) and particularly noting the fact that Internet use does not displace reading print media or the use of broadcasting (van Dijk, 2006). Accordingly, theories of media complementarity suggest that people consuming one particular medium to gather information in one particular area are likely to also consume other media that contain information in that specific area (Dutta-Bergman, 2004).

The amount of time spent with different media types, on the other hand, constitutes the emphasis of displacement theory. Based on the argument that people have a limited amount of time to spend on the consumption of different media, displacement theorists argue that the consumption of different media is driven by a zero-sum game in the competition for audiences and revenue resources (Dutta-Bergman, 2004).

Competition is also documented in the realm of displacement theory, suggesting that the time spent on new media reduces the time spent on traditional media (Kayany & Yelsma, 2000). Central to these competition-based theories is the monolithic treatment of media types as homogeneous entities with different audience members having the same experiences with the consumption of one particular medium, irrespective of content types and audience characteristics. Such aggregate-level comparison does not capture the differences in media effects that follow from the content of the media used. After all, different users use different mass media contents for different functions and to fulfill different goals (Kayany & Yelsma, 2000).

The relationship between two media forms can be understood in terms of the gratification opportunities that they offer each offer (Wurff, 2011). When media forms overlap, competition occurs. A lower level of overlap, however, indicates that the media may serve different needs, leading to a state of complementarity. Whereas the focus of media displacement theory is the relationship between the hours spent on different media, the focus of media complementarity theory is the comparison of use and nonuse of different media types by content areas.

People may be motivated to use the Internet for the same reasons that they turn on television. Studies that have examined motives for Web use in general find that, like television, the Internet tends to satisfy entertainment, escape, and social interaction needs (D'Ambra & Rice, 2001). As a consequence, the overlap between the gratifications and gratification opportunities offered by online and traditional news is likely to be low, leading to greater opportunities for media complementarity between networked and

broadcast media (Chyi & Lee, 2013). This complementarity will be even greater the more these gratifications are preceded by affordances that present themselves clearly to individual users.

The Internet involves multiple communication modes that operate simultaneously and exhibit different affordances. It also allows for interpersonal interactivity. Complementarity is reinforced by the emergence of digital and social media that create the need to go beyond simple models and move to more complex ecosystems of producing and distributing information (Newman, Dutton, & Blank, 2012). Digital technologies in general, and the Internet in particular, integrating one-to-one, one-to-many, and many-to-may forms of communication, invite researchers to clarify the relationship between technology and practices: "one material medium may support several communicative practices; some communicative practices travel well between media; and certain familiar practices come back in style when new platforms become available" (Jensen, 2011, p. 13).

Method

All data and results described in this article are drawn from a cross-cultural European research project that was conducted in 2013 in nine European countries. The project consisted of an online survey of a sample of more than 10,000 respondents. With participants from Belgium, Croatia, Denmark, Germany, Hungary, Israel, Italy, Poland, and Portugal, the geographical spectrum of the project covered a wide variety of European cultural and geographical regions.

The survey focused, among other aspects, on the ways in which people use and consume different media in different European countries. The final instrument included 28 questions divided into subsections of media use, locale of media use, media in daily life, and demographics.

Due to the breadth of the survey, it is not our intention to explore the whole inquiry here, but to examine specific questions related to the problems raised and hypotheses put forward above. Therefore, the results will focus on an inferential exploration of selected questions and a more exploratory multivariate analysis to outline media consumption profiles as a function of distinct media practices.

All data were analyzed with the help of SPSS software (v.20). Nonparametric tests were chosen due to the asymmetric character of the sample distribution and the fact that the variables did not represent either a normal distribution or homogeneous variances. Mann-Whitney and Kruskal-Wallis tests were used. A cluster analysis was also performed based on dissimilarity measures of Euclidian distance and using two-step clustering (Maroco, 2007).

Results

Media Use and Consumption Profiles

To analyze how different media materialities and communicative practices relate to one another, whether new media are replacing old media, and what is the relationship between old and new as well as broadcast and networked media in the context of consumption practices, two key questions from the survey

were selected. An exploratory analysis was also conducted through a cluster model that was designed to include these variables along with demographic variables and other questions considered relevant for this analysis. The two specific questions were chosen because, on the one hand, they addressed the *artifact* (time spent on using a specific media artifact) along with the *practice* (time used to perform a certain activity), and, on the other hand, they allowed us to relate practices with material systems (both older mass media and newer networked media). Thus, the analysis leads to a discussion of issues regarding substitution and supplementation and their relation to materiality and consumption practices.

Regarding the first question, about time spent on different media technologies for conducting different practices, Table 1 presents the results obtained for this question.

Table 1. How Much Time Did You Spend on the Following Media Yesterday? (in minutes)

	Minimum	Maximum	Mean	Std. Deviation
Watched television on a TV set	0	1250	125.69	112.129
Watched television on a computer	0	1440	27.35	79.924
Watched television on a mobile phone	0	1000	4.35	34.751
Listened to radio on a radio set	0	4238	76.53	144.654
Listened to radio on computer	0	1000	21.61	77.211
Listened to radio on mobile phone	0	800	5.73	29.705
Read newspapers or magazines in the printed version	0	960	18.35	32.691
Read newspapers or magazines on the internet	0	1000	24.79	41.974
Read books in the printed version	0	1020	25.60	54.789
Read books in the electronic version	0	1080	5.89	29.819
Listened to audio books	0	1440	1.76	20.554

Traditional media practices predominate when compared with online or mobile practices, except for reading newspapers and magazines. The results suggest that people still prefer to use media in traditional ways, perceiving an equivalence between the material conditions of a medium and its affordances: We watch TV on a TV set, listen to radio on a radio set, and read printed books. Although networked media are clearly also used, it is still much more common to use the traditional device to perform the practice associated with

the affordances of the original medium than to do so via the Internet on a computer or mobile device. This finding confirms H1: the material nature of specific media technologies influences its associated practices.

To examine how media use varies by age, gender, and education, a separate inferential analysis including these variables was performed. Given that the assumptions for a parametric test were not met, nonparametric tests were chosen to perform this analysis. A Mann-Whitney test was used for gender, and a Kruskal-Wallis test was used for age and education variables, after confirming their assumptions.

Regarding gender, statistically significant differences were found for the following variables (for differences between the groups, please see Table 2):

- Watch television on a computer (U = 13941930.500; p < .001). Results indicate that women are more likely to perform this activity.

- Watch television on a mobile phone (U = 14230216.000; p = .010). Results indicate that men are more likely to perform this activity.

- Listen to radio on a radio set (U = 13956674.500; p = .003). Results indicate that men are more likely to perform this activity.

- Listen to radio on a computer (U = 13910333.000; p < .001). Results indicate that men are more likely to perform this activity.

- Read newspapers and magazines in the printed version (U = 14035930.000, p = .011). Results indicate that men are more likely to perform this activity.

- Read newspapers and magazines online (U = 12852903.000; p < .001). Results indicate that men are more likely to perform this activity.

- Read books in the electronic version (U = 12190485.500; p < .001). Results indicate that men are more likely to perform this activity.

Table 2 presents results on gender and time spent on different media.

Table 2. Gender and Time Spent on Media Use Yesterday (means, in minutes).

	Gender		
	Male	**Female**	
	MR	**MR**	**U**
Watch television on a television set	5348.88	5394.78	14297628.000
Watch television on a computer	5459.41	5281.03	13941930.500***
Watch television on a mobile phone	5406.49	5335.49	14230216.000**
Listen to radio on a radio set	5456.70	5283.82	13956674.500*
Listen to radio on a computer	5465.21	5275.07	13910333.000***
Listened to radio on mobile phone	5393.41	5348.95	14301493.500
Read newspapers and magazines in the printed version	5442.15	5298.79	14035930.000**
Read newspapers and magazines online	5659.30	5075.32	12852903.000***
Read books in the printed version	4962.11	5792.80	12190485.500
Read book in the electronic version	5391.56	5350.86	12190485.500***
Listened to audio books	5383.48	5359.17	14355587.000

Note. MR = Mean Rank; U = *Mann-Whitney test statistic.*
* Significant differences for alpha=0.05
** Significant differences for alpha=0.01
***Significant differences for alpha<0.001

Regarding age, this variable was divided into four categories: (1) 14–30 years, (2) 31–50 years, (3) 51–70 years, and (4) 71–90 years old. The analysis was performed using a Kruskal-Wallis test. Multiple comparisons were performed with pairwise comparison data. Statistically significant differences were found for all variables ($p < .05$) (see Table 3 for additional data):

- Watch television on a TV set ($\chi^2_{kw}(3) = 589.455$; $p < .01$). Significant differences were found between all groups ($p < .01$ for all group comparisons). Results indicate that older people are more likely to perform this activity.

- Watch television on a computer ($\chi^2_{kw}(3) = 257.040$; $p < .01$). Significant differences were found between groups 4 and 1, 3 and 2, 3 and 1, and 2 and 1 ($p < .01$ for these group comparisons). Results indicate that younger people are more likely to perform this activity.

- Watch television on a mobile phone ($\chi^2_{kw}(3)$ = 119.302; p < .01). Significant differences were found between groups 3 and 2, 3 and 1, and 2 and 1. Results indicate that younger people are more likely to perform this activity (p < .01 for these group comparisons).

- Listen to radio on a radio set ($\chi^2_{kw}(3)$ = 469.453; p < .01). Significant differences were found between all groups (p < .01 for all group comparisons). Results indicate that older people are more likely to perform this activity.

- Listen to radio on a computer ($\chi^2_{kw}(3)$ = 73.457; p < .01). Significant differences were found between all groups, except between groups 3 and 4 (p < .05 for these group comparisons). Results indicate that people between 14 and 50 years old are more likely to perform this activity.

- Listen to radio on a mobile phone ($\chi^2_{kw}(3)$ = 105.530; p < .01). Significant differences were found between groups 1 and 4, 1 and 3, 1 and 2, and 2 and 3 (p < .01 for these group comparisons). Results indicate that older people are less likely to perform this activity.

- Read newspapers and magazines in the printed version ($\chi^2_{kw}(3)$ = 531.625; p < .01). Significant differences were found between all groups (p < .01). Results indicate that older people are more likely to perform this activity.

- Read newspapers and magazines online ($\chi^2_{kw}(3)$ = 9.7782; p = .021). Significant differences were found between groups 1 and 2 (p = .026). Results indicate that people age 31 to 50 are more likely to perform activity.

- Read books in the printed version ($\chi^2_{kw}(3)$ = 51.092, p < .01). Significant differences were found between groups 1 and 3 and between groups 2 and 3 (p < .01). Results indicate that people age 51 to 70 are more likely to perform this activity.

- Read electronic books ($\chi^2_{kw}(3)$ = 57.570; p < .01). Significant differences were found between all groups except between groups 3 and 4 (p < .05 for these group comparisons). Results indicate that younger people are more likely to perform this activity.

- Listen to audio books ($\chi^2_{kw}(3)$ = 16.747; p = .01). Significant differences were found between groups 2 and 3 and between groups 1 and 3 (p < .01). Results indicate that younger people are more likely to perform this activity

Table 3. Age and Time Spent on Media Use Yesterday (means, in minutes).

	Age				χ^2_{kw}
	14–30 years	31–50 years	51–70 years	71–90 years	
	MR	MR	MR	MR	
Watch television on a television set	4508.48	5474.12	6326.62	7498.32	589.455***
Watch television on a computer	5866.03	5217.85	4955.22	4947.75	257.04***
Watch television on a mobile phone	5555.75	5348.35	5152.99	5245.3	119.302***
Listen to radio on a radio set	4569.62	5561.2	6106.64	6984.39	469.453***
Listen to radio on a computer	5539.95	5396.92	5109.23	4829.49	73.457***
Listened to radio on mobile phone	5546.12	5380.68	5119.42	5030.05	105.53***
Read newspapers/magazines in the printed version	4707.49	5330.3	6275.81	7947.91	531.625***
Read newspapers and magazines online	5257.76	5447.87	5412.21	5092.91	9.778*
Read books in the printed version	5263.51	5267.46	5697.09	5748.91	51.092***
Read book in the electronic version	5497.15	5374.72	5204.48	4965.52	57.57***
Listened to audio books	5400.59	5385.34	5306.46	5329.11	16.747***

Note: MR= Mean rank ; χ^2_{kw} = Kruskal-Wallis Test Statistic
* Significant differences for alpha=0,05
** Significant differences for alpha=0,01
***Significant differences for alpha<0,001

Regarding education, this variable was divided according to the International Standard Classification of Education classification: (a) no formal education, (b) infant/junior school/basic adult literacy, (c) lower secondary school age younger than 14, (d) upper secondary school, (e) higher education access courses, (f) undergraduate degree/master degree, and (g) doctorate. The analysis was performed using a Kruskal-Wallis test. Multiple comparisons were conducted with pairwise comparison analysis. Statistically significant differences were found for all variables, except for listening to radio on a radio set and listening to audio books (see Table 4 for additional data):

- Watch television on a TV set ($\chi^2_{kw}(6)$ = 98.757; $p < .01$). Differences were found between groups g and d, g and b, f and d, and f and c ($p < .01$). Results indicate that groups b, c, and d are more likely to perform this activity.

- Watch television on a computer ($\chi^2_{kw}(6)$ = 38.350; p < .01). Differences were found between groups a and e, a and g, d and e, and e and f. Results indicate that groups e, f, and g are more likely to perform this activity.

- Watch television on a mobile phone ($\chi^2_{kw}(6)$ = 34.455; p < .01). Differences were found between groups a and e, d and e, and f and e. Results indicate that people with higher levels of education are more likely to perform this activity.

- Listen to radio on a computer ($\chi^2_{kw}(6)$ = 34.470; p < .01). Differences were found between groups c and d, c and e, and c and f. Results indicate that people with education levels higher than lower secondary school are more likely to perform this activity.

- Listen to radio on a mobile phone ($\chi^2_{kw}(6)$ = 14.375; p = .026). Differences were found between groups c and e. Results indicate that people with higher education levels are more likely to perform this activity.

- Read newspapers and magazine in the printed version ($\chi^2_{kw}(6)$ = 19.806; p = .003). Differences were found between groups c and f and between groups d and f. Results indicate that people with lower education levels are more likely to perform this activity.

- Read newspapers and magazines online ($\chi^2_{kw}(6)$ = 216.153; p < .01). Differences were found between groups a and e, a and f, c and d, c and e, c and f, c and g, d and e, d and f, d and g, and e and g. Results indicate that people with higher education levels are more likely to perform this activity.

- Read books in the printed version ($\chi^2_{kw}(6)$ = 187.669, p < .01). Differences were found between groups a and d, a and e, a and f, a and g, c and d, c and e, c and f, c and g, d and e, d and f, d and g, and e and g. Results indicate that people with higher education levels are more likely to perform this activity.

- Read electronic books ($\chi^2_{kw}(6)$ = 65.006; p < .01). Differences were found between groups a and g, c and f, and c and g. Results indicate that people with higher education levels are more likely to perform this activity.

Table 4. Education and Time Spent on Media Use Yesterday (means, in minutes).

	Education							
	a)No formal education	b)Infant/junior school/ basic adult literacy	c)Lower secondary	d)Upper secondary school	e)Higher Education	f)Undergrad Master degree	G)Doctorate	$\chi^2{}_{kw}$
	MR	MR	MR	MR	MR	MR	MR	
Watch television on a television set	3412.04	5612.69	5950.08	5470.77	5198.13	5063.49	4781.59	98.757***
Watch television on a computer	5655.15	4806.8	5325.95	5245.07	5655.31	5305.84	681.92	38.350***
Watch television on a mobile phone	6113.27	5105.89	5368.62	5278.62	5511.33	5298.59	5453.81	34.455***
Listen to radio on a radio set	3721.35	5363.31	5176.36	5261.65	5328.89	5421.31	5259.88	12.840
Listen to radio on a computer	4732.46	4973.05	5028.76	5313.63	5434.05	5379.23	5478.5	34.470***
Listened to radio on mobile phone	5162.27	5108.05	5188.03	5342	5419.17	5314.41	5346.47	14.375*
Read printed newspapers	4720.15	5083.89	5112.24	5238.99	5365.27	5438.63	5619.46	19.806**
Read newspapers online	4496.12	4432.17	4435.27	5122.65	5434.7	5706.17	6176.32	216.153***
Read books in the printed version	4446.38	4257.48	4634.99	5166.29	5342.75	5640.63	6181.77	187.669***
Read book in the electronic version	5208.58	5096.57	5178.82	5283.53	5327.86	5360.27	6073.02	65.006***
Listened to audio books	5561.73	5301.7	5333.89	5301.09	5386.16	5315.44	5394.35	9.662

Note: MR = Mean rank; χ 2kw = Kruskal-Wallis test statistic

* Significant differences for alpha=0,05

** Significant differences for alpha=0,01

***Significant differences for alpha<0,001

In sum, the results shown in Tables 2, 3, and 4 confirm H2: We find significant differences in terms of respondents' media consumption practices for the same material artifact when different demographic characteristics are considered. The results also allow us to speculate that different demographic segments will perceive media affordances differently, which may generate distinctive processes of substitution or supplementation.

To further explore the relationship between the materiality of different media and the associated processes of complementarity or substitution when it comes to variations in media consumption across different demographic and cultural variables, responses to a second question were also analyzed in detail: "How much time did you spend on the following online tasks?" The question referred to tasks such as reading

the news, reading and writing e-mails, downloading music, playing games online, and using social network sites, chats, websites, forums, blogs, bank services, or booking services. Table 5 presents the descriptive results for this question.

Table 5. Practices Performed Online (in Minutes; N = 10,742)

	M	*SD*
Getting news	22.23	36.175
Writing and reading e-mails	31.85	54.976
Downloading music, films, or podcasts	7.39	39.762
Playing computer games online	19.40	54.912
Using social network sites	39.42	78.504
Using chat programs	9.59	44.975
Reading entries at debate sites, blogs	8.81	30.086
Writing entries at debate sites, blogs	3.10	19.799
Online shopping, banking, travel reservations, etc.	5.63	16.175
Using websites concerning my interests or hobbies	21.78	46.860
Other; please specify	5.58	34.737

The most common online practices were using social network sites, writing and reading e-mails, and getting news or searching websites concerning particular interests or hobbies. Writing entries on debate sites or blogs as well as online shopping, banking, or travel booking were less common online practices.

To examine how online practices vary with age, gender, and education, another inferential analysis was performed. Again, Mann-Whitney and Kruskal-Wallis tests were used. Regarding gender, statistically significant differences were found for the following variables (see Table 6 for means):

- Getting the news (U = 12437750; p < .01). Results indicate that men are more likely to perform this activity.

- Downloading music, films, or podcasts (U = 13699553.5; p < .01). Results indicate that men are more likely to perform this activity.

- Using social network sites (U = 12475935.5; p < .01). Results indicate that women are more likely to perform this activity.

- Using chat programs (U = 14016299; p < .01). Results indicate that men are more likely to perform this activity.

- Reading entries at debate sites/blogs (U = 13652770.5; p < .01). Results indicate that men are more likely to perform this activity.

- Writing entries at debate sites/blogs (U = 13976936; p < .01). Results indicate that men are more likely to perform this activity.

- Using websites concerning interests and hobbies (U = 12754920.5; p < .01). Results indicate that men are more likely to perform this activity.

Table 6. Gender and Online practices (means, in minutes).

Gender			
	Male	**Female**	
	MR	**MR**	**U**
Getting the news	5735.51	4996.9	12437750***
Writing and reading e-mails	5314.98	5429.66	14112936
Downloading music, films or podcasts	5503.9	5235.25	13699553.5***
Playing computer games online	5353.21	5390.32	14321216.5
Using social network sites	5014.5	5738.88	12475935.5***
Using chat programs	5445.76	5295.08	14016299***
Reading entries at debate sites, blogs	5512.48	5226.41	13652770.5***
Writing entries at sites, blogs	5452.98	5287.65	13976936***
Online shopping, banking, travel reservation etc	5387.63	5354.91	14333005.5
Using website concerning my hobbies/ interests	5677.29	5056.82	12754920.5***

Note: MR= Mean rank; U= Mann-Whitney test statistic
* Significant differences for alpha=0,05
** Significant differences for alpha=0,01
***Significant differences for alpha<0,001

Regarding age, this variable was again divided into four categories: (1) 14–30 years old, (2) 31–50 years, (3) 51–70 years, and (4) 71–90 years. Statistically significant differences were found for the following variables (see Table 7 for additional data):

- Getting the news ($\chi^2_{kw}(3)$ = 30.205; $p < .01$). Differences were found between groups 1 and 2 and between groups 1 and 3. Results indicate that people age 31 to 70 are more likely to perform this activity.

- Writing and reading e-mails ($\chi^2_{kw}(3)$ = 267.39; $p < .01$). Differences were found between groups 1 and 2, 1 and 3, 1 and 4, and 2 and 3. Results indicate that older people are more likely to perform this activity.

- Downloading music, films, and podcasts ($\chi^2_{kw}(3)$ = 344.692; $p < .01$). Differences were found between groups 4 and 1, 3 and 2, 3 and 1, and 2 and 1. Results indicate that younger people are more likely to perform this activity.

- Using social network sites ($\chi^2_{kw}(3)$ = 717.93; $p < .01$). Differences were found between all groups. Results indicate that younger people are more likely to perform this activity.

- Using chat programs ($\chi^2_{kw}(3)$ = 190.583; $p < .01$). Differences were found between groups 4 and 1, 3 and 2, 3 and 1, and 2 and 1. Results indicate that younger people are more likely to perform this activity.

- Reading entries at debate sites/blogs ($\chi^2_{kw}(3)$ = 26.980; $p < .01$). Differences were found between groups 4 and 1, 3 and 1, and 2 and 1. Results indicate that younger people are more likely to perform this activity.

- Writing entries at debate sites / blogs ($\chi^2_{kw}(3)$ = 16.023; $p = .01$). Differences were found between groups 3 and 1. Results indicate that younger people are more likely to perform this activity.

- Online shopping, banking, travel reservations, etc. ($\chi^2_{kw}(3)$ = 19.944; $p < .01$). Differences were found between groups 1 and 3, 1 and 4, 2 and 4, and 3 and 4. Results indicate that older people are more likely to perform this activity.

Table 7. Age and Online Practices (means, in minutes).

	Age				
	14-30 years	31-50 years	51-70 years	71-90 years	
	MR	MR	MR	MR	χ^2_{kw}
Getting the news	5160.57	5437.81	5564.85	5217.5	30.205***
Writing and reading e-mails	4702.45	5621.2	5859.91	5924.93	267.392***
Downloading music, films or podcasts	5797.22	5260.92	4979.71	4892.21	344.692***
Playing computer games online	5436.78	5311.67	5388.51	5309.85	5.605
Using social network sites	6388.98	5111.8	4462.24	3537.08	717.933***
Using chat programs	5728.84	5267.07	5069.76	4850.96	190.583***
Reading entries at debate sites, blogs	5518.85	5330.61	5261.44	4800.75	26.98***
Writing entries at sites, blogs	5444.86	5363.22	5290.44	5172.72	16.023**
Online shopping, banking, travel reservation etc	5288.41	5367.98	5458.31	6148.79	19.944***
Using website concerning my hobbies/ interests	5425.37	5385.43	5290.16	4944.11	6.182

Note: MR= Mean rank; χ^2_{kw} = Kruskal-Wallis test statistic
* Significant differences for alpha=0,05
** Significant differences for alpha=0,01
***Significant differences for alpha<0,001

Regarding education, this variable was again divided according to the International Standard Classification of Education classification: (a) no formal education, (b) infant/junior school/basic adult literacy, (c) lower secondary school-age younger than 14, (d) upper secondary school, (e) higher education access courses, (f) undergraduate degree/master degree, and (g) doctorate. Statistically significant differences were found for the following variables (see Table 8):

- Getting the news ($\chi^2_{kw}(6) = 241.263$; $p < .01$). Differences were found between groups b and d, b and e, b and f, b and g, c and d, c and e, c and f, c and g, d and e, and d and f. Results indicate that people with higher education levels are more likely to perform his activity.

- Writing and reading e-mails ($\chi^2_{kw}(6)$ = 201.368; p < .01). Differences were found between groups a and e, a and f, a and g, b and e, b and f, b and g, c and d, c and e, c and f, c and g, d and e, d and f, and d and g. Results indicate that people with higher education levels are more likely to perform his activity.

- Playing computer games online ($\chi^2_{kw}(6)$ = 68.607; p < .01). Differences were found between groups f and d and between groups f and c. Results indicate that people with lower secondary school, upper secondary school, and higher education are more likely to perform this activity.

- Using social network sites ($\chi^2_{kw}(6)$ = 17.212; p = .009). Differences were found between groups f and d. Results indicate that people with lower secondary school, upper secondary school, and higher education are more likely to perform this activity.

- Using chat programs ($\chi^2_{kw}(6)$ = 33.852; p < .01). Differences were found between groups c and e, d and f, and d and e. Results indicate that people with higher education levels are more likely to perform this activity.

- Reading entries at debate sites ($\chi^2_{kw}(6)$ = 57.210; p < .01). Differences were found between groups b and f, b and e, b and g, c and d, c and f, c and e, and c and g. Results indicate that people with higher education levels are more likely to perform this activity.

- Writing entries at debate sites ($^2_{kw}(6)$ = 23.758; p = .001). Differences were found between groups b and f, b and e, b and g, c and d, c and f, c and e, and c and g. Results indicate that people with higher education levels are more likely to perform this activity.

- Online shopping, banking, travel reservations, etc. ($\chi^2_{kw}(6)$ = 55.771; p < .01). Differences were found between groups c and e, c and f, d and e, and d and f. Results indicate that people with higher education levels are more likely to perform this activity.

- Using websites concerning interests and hobbies ($\chi^2_{kw}(6)$ = 75.167; p < .01). Differences were found between groups b and d, b and e, b and f, b and g, c and d, c and e, c and f, c and g, d and f, and d and e.

Table 8. Education and Online Practices (means, in minutes).

	Education							
	a)No formal education	b)Infant/jr. school/ basic adult literacy	c)Lower secondary	d)Upper secondary school	e)Higher Education	f)Undergrad Master degree	G)Doctor ate	χ^2_{kw}
	MR	**MR**	**MR**	**MR**	**MR**	**MR**	**MR**	
Getting the news	3914.96	4316.06	4339.91	5119.27	5493.73	5743.16	5835.41	41.263***
Writing and reading e-mails	2888.69	4529.49	4643.05	5016.4	5601.78	5739.79	754.39	201.368***
Downloading music, films or podcasts	5457.42	5246.31	5234.64	5353.37	5445.15	5276.9	5375.27	12.041
Playing computer games online	4871	5340.51	5625.65	5465.66	5348.89	5101.94	5092.56	68.607***
Using social network sites	4209.46	5036.14	5237.06	5440.32	5419.11	5210.04	5326.54	17.212**
Using chat programs	5608.88	5129.92	5213.19	5226.02	5531.99	5378.66	5606.83	33.852***
Reading entries at debate sites, blogs	4986.27	4722.68	4906.55	5285.13	5492.9	5429.57	5527.48	57.21***
Writing entries at sites, blogs	5181.77	5162.46	5152.88	5319.29	5422.92	5329.72	5576.09	23.758**
Online shopping, banking, travel reservation etc	4532.15	5102.44	5106.64	5160.72	5433.72	5499.7	5637.16	55.771***
Using website concerning my hobbies	4048.62	4510.73	4811.51	5254.56	5578.54	5456.37	5840.24	75.167***

Note: MR= Mean Rank; χ^2_{kw} = Kruskal-Wallis test statistic

* Significant differences for alpha=0,05

** Significant differences for alpha=0,01

***Significant differences for alpha<0,001

These results partially support H2: Significant differences in online practices were found across the different demographic variables.

Current practices of media consumption in Europe are clearly aligned with the material nature of the specific artifact or communication device and with the affordances it represents. Thus, watching TV on a TV set or listening to radio on a radio set remain the more common practices, except for reading

newspapers or magazines, where the online practice supersedes the traditional practice. This first set of results confirms H1.

Traditional practices of media consumption are more prevalent among older people (ages 31 to 90 years), in the lower and medium education levels, and for both men and women. Using media online, such as watching TV, listening to radio, or reading newspapers via a computer, is more common among people with higher education levels, the younger and medium age groups (14–50 years) and among men (except for reading electronic books, which is more common among women). Such age-related results suggest that a slow substitution process in practices of media use may be under way. Online mobile media practices are considerably less common than either traditional or online media use via a computer, and are more likely to be performed by the youngest age group (14–30 years) (with no differences in terms of educational level or gender). These results confirm H2.

The activities that users most often engage in online involve using social network sites, writing and reading e-mails, getting news, and using websites concerning interests or hobbies. Men are more likely to access news, download music, films, or podcasts; play computer games; and use websites. Women are more likely to read and write e-mails; use social network sites; and do online shopping, banking, booking, or use other types of online services. Younger people are more likely to download music, films, or podcasts; play computer games; use social network sites; and use chat programs. People between ages 31 and 70 are more likely to use e-mail applications, social network sites, play games, and consult websites. Older people are more likely to read e-mail and read news online. Finally, people with higher education levels are more likely to read news, write and read e-mails, read and write entries at debate sites or blogs, and consult websites on interests and hobbies. People with medium education levels are more likely to play computer games, use social network sites, and use chat programs. Whereas traditional media use practices are more prevalent among older people, in the lower and medium education levels, and for both men and women, practices of new media use are more prevalent among younger people and in people with higher education. As mentioned, this suggests a slow shift from old to new media in terms of audience uses of specific media artifacts, while content-specific activities seem to maintain their profile independently of such a process.

Media Profiles and User Profiles

To determine whether a process of a supplementation rather than substitution is underway, as a last step in the analysis of Europeans' consumption of media—mass and individual, old and new, broadcast and networked—an effort was made to generate profiles of media usage based on users' different practices through an exploratory multivariate cluster analysis with SPSS software (v.20). Hierarchical methods were first used as an exploratory technique to help define the number of clusters for a good quality model. Results suggested three clusters, which explain 60% of the total variance. Variables below 0.5 predictor importance were excluded from the model.

Nearest neighbor methods and measures of dissimilarity were used for this analysis—that is, Euclidian distance (Johnson & Winchern, 2002). The smaller the Euclidian distance, the smaller the dissimilarity and the closer the variables are. A two-step method was also used to explore and confirm the data.

After this first exploratory analysis, a two-step cluster analysis was performed to group variables. Variables were standardized during this operation, so that all variables contributed equally to the analysis. The resulting model was then analyzed regarding its significance and quality through a linear regression analysis. Results indicate that this model is highly significant ($F = 828.865$; $p < .01$) and explains 60% of total variance ($R^2_a = 0.60$). All variables included in the analysis significantly affect the model ($p < .01$). Results also identify watching television on a computer ($\beta = .214$), using social network sites ($\beta = .188$), and using websites concerning particular interests/hobbies ($\beta = .177$) as the variables that contribute most to explaining the model. See Table 9 for the three clusters obtained and the values for the variables included in the model.

Table 9. Cluster Variables (means, in minutes).

Variables	Cluster 1	Cluster 2	Cluster 3	Predictor Importance	B Standardized coefficents
Using social network sites	25.47	64.8	179.84	1	0.177
Using chat programs	4.31	11.03	93.62	1	0.122
Using websites concerning interests/hobbies	12.66	41.08	76.41	0.87	0.178
Reading newspapers on the internet	16.83	44.93	66.26	0.84	0.121
Getting news	15.32	37.92	65.75	0.8	0.095
Playing computer games online	8.44	32.98	87.7	0.79	0.214
Watching television on a computer	11.35	57.56	102.98	0.7	0.149
Writing and reading e-mails	21.39	53.1	87.45	0.63	0.178
Reading entries at debate sites, blogs	4.4	16.41	43.58	0.58	0.107
Reading books in an electronic version	1.64	10.97	41.26	0.57	0.122
Downloading music, film or podcasts	1.77	16.14	50.12	0.52	0.144
Mobile messages	9.93	19.99	73.55	0.5	0.188

As shown in Table 9, cluster 1 presents the lowest scores for all variables, cluster 2 presents medium scores for the vast majority of the variables, and cluster 3 presents the highest scores for the vast majority of the variables. This means that respondents in cluster 1 are less likely to perform the media use practices included in the analysis; in contrast, respondents in cluster 3 are more likely to perform media

use practices online and via a mobile phone. With reference to Rogers' theory of diffusion (1995), one could name cluster 3 as "innovators and early majority," cluster two as the "large majority," and cluster 1 "the laggards."

With reference to the previous inferential analysis, the clusters can also be associated with demographic variables. Men are more likely to watch TV via a mobile device, listen to radio on all devices, read news on all the devices analyzed (print, computer, or mobile); download films, videos, or podcasts; and use chat programs. On the other hand, women are more likely to use social network sites, do online shopping, and read books through all media forms. Regarding age, younger people are more likely to use online technologies when compared with traditional media use practices, such as watching TV or listening to radio on a computer or on a mobile device, listening to audio books and reading electronic books, using social network sites and chat programs, reading and writing entries at debate sites or blogs, and downloading music or videos. Older people are more likely to perform more traditional media practices, such as watching TV on a TV set, listening to radio on a radio set, and reading newspapers and books in the printed version, though they are also more likely to write and read e-mails and to shop online.

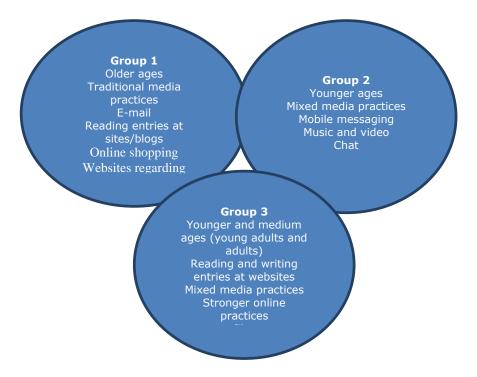These findings can be combined as shown in Figure 2.

Figure 2. Profiles of media consumption and use practices.

These patterns of media consumption suggest a distinctive set of interrelations between media artifacts, use practices, and audience characteristics, which correspond to the modes of change outlined in Figure 1, thus supporting H3. The intersection of the materiality of media and the users' practices of consumption emerges in specific social arrangements that reveal ongoing processes of reconfiguration, remediation, and reformation. The results also partially confirm H4: Supplementation seems to be the norm, depending on users' perceptions of the various media's affordances as part of different social arrangements. Thus, for instance, younger media users who have had less contact with a specific media artifact in the past (television) may resort to a material form they know (the mobile phone), provided it presents the necessary affordances to fulfill the gratifications they are looking for (watching a film). Figure 2 illustrates the three profiles (clusters) as they relate to different use practices and patterns of media consumption.

Conclusions

The present analysis has interrogated the line between materiality and consumption in a discussion of how audiences relate to media technologies. Several hypotheses were presented and partially confirmed, departing from the mediation framework of Lievrouw (2014), which proved instrumental in accounting for the interrelations between media artifacts, use practices, and social arrangements.

We have tried to balance a focus on practices of media consumption in the European context with a study of materiality as a core feature of communication technologies. This framework has allowed us to probe parts of the results of the European audiences survey and, by applying some of the theoretical categories defined at the outset, to identify different clusters of users that correspond to specific social arrangements emerging in a dynamic interplay between materiality and consumption. We introduced the notion of audience practices as a way of approaching communicative actions as they relate to the materiality of media, and the notion of affordances as a way of understanding processes of substitution or supplementation as new media are appropriated by individuals, groups, and societies. Our core argument is that one cannot understand contemporary media audiences' attitudes and behaviors without considering the materiality of the technological devices and the processes in which this materiality is manifested. By attending to the interrelations between artifacts, practices, and cultural variables, we have found that the significance and meaning of media technologies for their audiences derives, at least partially, from their materiality.

Our main conclusion is that the adoption and appropriation of new media technologies by users represents an interplay and mutual shaping of technological tools, human actions, and social formations. In this process, the complementarity and supplementation of old and new media follow, in part, from the materiality of these same media. Complementarity and supplementation between media, rather than substitution, is manifest in the present results. A more complex question has to do with the reasons for this state of affairs, and with the processes in which individuals articulate their media diet. We consider an approach combining a material perspective with a social perspective that helps us arrive at a better understanding of how media evolve and transform not only themselves but the societies in which they are used.

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