Digital Inequalities

Differentiated Internet Use and Social Implications

Thesis (cumulative thesis)
presented to the Faculty of Arts and Social Sciences
of the University of Zurich
for the degree of Doctor of Philosophy

by Moritz Büchi

Accepted in the fall semester 2016
on the recommendation of the doctoral committee:

Prof. Dr. Michael Latzer (main supervisor)
Prof. Dr. Elad Segev

Zurich, 2017

Abstract

Effective use of the Internet as a crucial information and communication network is increasingly necessary to participate in society. This thesis analyzes differences in everyday Internet use and discusses their social implications. A sociological digital inequality perspective based on the knowledge gap hypothesis forms the main theoretical framework. It assumes that Internet use depends on and contributes to social position. Quantitative international surveys were analyzed using structural equation modeling. Network and automated content analysis were additionally used on web data. Results show that general Internet uses can be grouped into four core purposes (information seeking, social interaction, entertainment, and commercial transaction). For valid cross-country comparisons of usage types, measurement invariance testing was found critical. There are pronounced second-level digital divides with consistent age, education, and experience effects. Differences in specific online activities—privacy protection, political participation, and science participation—are mainly explained by interests and Internet skills, and these in turn depend on social position. Overall, Internet use tends to reinforce social inequalities but policies aimed at enhancing Internet skills may counter this. The consequences for individuals' subjective well-being is identified as a future avenue for empirical digital inequality research.

Zusammenfassung

Eine Effektive Nutzung des Internet als zentrales Informations- und Kommunikationsnetzwerk ist zunehmend notwendig für gesellschaftliche Teilhabe. In dieser Dissertation werden Internetnutzungsunterschiede im Alltag analysiert und deren sozialen Implikationen diskutiert. Dabei wird davon ausgegangen, dass die Internetnutzung von der sozialen Position abhängt und diese auch beeinflusst. Quantitative internationale Befragungsdaten wurden mit Strukturgleichungsmodellen analysiert. Netzwerk- und automatisierte Inhaltsanalyse wurden zudem auf Webdaten angewendet. Allgemeine Internetnutzung konnte in die vier Grundtypen Informationssuche, soziale Interaktion, Unterhaltung und kommerzielle Transaktion unterteilt werden. Entscheidend für valide Ländervergleiche dieser Nutzungsarten sind Messinvarianztests. Es zeigten sich erhebliche Second-Level Digital Divides mit beständigen Alters-, Bildungs- und Erfahrungseffekten. Unterschiede bei den spezifischen Onlineaktivitäten Privacy-Selbstschutz, politische Beteiligung und Wissenschaftspartizipation sind primär durch Interessen und Internetfähigkeiten zu erklären; diese wiederum werden von der sozialen Position mitbestimmt. Insgesamt verstärkt die Internetnutzung soziale Ungleichheiten eher, jedoch könnte die Förderung von Internetfähigkeiten dem entgegenwirken. Für zukünftige digitale Ungleichheitsforschung bietet sich die empirische Erfassung von Auswirkungen auf subjektives Wohlbefinden an.

Digital Inequalities

Differentiated Internet Use and Social Implications

Moritz Büchi

Author: Moritz Büchi
Title: Digital Inequalities: Differentiated Internet Use and Social Implications
Type: Doctoral dissertation
Doctoral committee: Michael Latzer (main supervisor), Elad Segev
Examination: Zurich, December 2016
Publication: Zurich, January 2017
Pages: 219
Research conducted at:
University of Zurich
Institute of Mass Communication and Media Research (IPMZ)
Andreasstrasse 15, 8050 Zurich, Switzerland

moritzbuchi.com

Contents

Synopsis

Articles

Appendix

List of Figures

List of Tables

Preamble

This doctoral thesis comprises four articles published in refereed scholarly journals, one article currently under review, and a synopsis. Article I (Büchi, 2016b) details and applies the concept of measurement invariance to Internet usage within a cross-nationally comparative context. Article II (Büchi, Just, & Latzer, 2016b) models inequalities in Internet use with nationally representative survey data for five countries with narrowing access divides. Article III (Büchi, Just, & Latzer, 2016a) explains Internet users' self-help activities in protecting their privacy online by considering Internet skills as well as privacy breaches and attitudes. Article IV (Büchi & Vogler, 2016) analyzes the role of political interest and Internet expertise for the social structuration of online political participation. Article V (Büchi, 2016c) explores the online communication of science topics on the microblogging platform Twitter and the asymmetries of the resultant reference network. The present synopsis (Büchi, 2016a), finally, highlights the context and relevance of digital inequalities, presents the overarching research question along with the theoretical perspectives and methods employed, illustrates the contributions of and connections among the individual articles, synthesizes overall conclusions drawn from the empirical studies, and identifies avenues for future research.

Synopsis

1. Introduction

Not long after a sizable portion of the population began using email and the Web in their daily lives towards the end of the 1990s (at least in the United States; see Pew Research Center, 2014), social science research recognized the inequalities developing in Internet use. Although early research on the digital divide relied on its definition as «the divide between those with access to new technologies and those without» (NTIA, 1999, p. xiii), scholars quickly also asked how individuals used the Internet in terms of activities and abilities once they had access (e.g., Nie & Erbring, 2000; Hargittai, 2002). Today, this line of social scientific communication research generally relies on the term digital inequality. Since they influence usage practices, Internet access and access quality still remain relevant issues, even in high-diffusion countries. This is reflected, for instance, in the United States Federal Communications Commission's vote to treat fixed and mobile Internet as an essential utility rather than a luxury, with the corresponding regulatory attention (see Kang, 2016).

Early scholarship on Internet use found detrimental effects on social relationships (Kraut, Patterson, Lundmark, Kiesler, Mukophadhyay, & Scherlis, 1998) and other psychological research has also analyzed «problematic Internet use» (see Caplan, 2003, 2010). In general however, the digital divide and digital inequality literature has largely assumed an in principle positive impact of the Internet on the lives of users and considers Internet use a valuable resource. Early seminal studies with more than one thousand Google Scholar citations in this sociological tradition include DiMaggio, Hargittai, Neuman, & Robinson (2001), Norris (2001), Warschauer (2004), and van Dijk (2005). Digital inequality is a new form of social inequality in the information society that shapes life chances: «Those who function better in the digital realm and participate more fully in digitally

mediated social life enjoy advantages» (Robinson et al., 2015, p. 570).

The overarching research question of this dissertation is formulated as «what are the inequalities in Internet use and their social implications?» The first part of this research question, the characterization and explanation of digital inequalities, means showing differences in the ways the Internet is used and identifying the most important predictors of different usage types. The focus is on countries that have high levels of Internet adoption. The second part, that of implications, deals with the social consequences that differentiated Internet use can have and discusses its policy implications in high-diffusion information societies.

To illustrate the empirical approach that this thesis applies, consider the following case. In many countries more than eight in ten adults have *access* to the Internet (see Figure 1). Some of these individuals use it extensively in their everyday lives for information seeking, checking facts, and looking up things of interest while others do not, or do so less. This *usage* divide within the connected majority of society may be explained in part by different levels of educational attainment. The strength of the relationship between education and use of the Internet for informational purposes can be tested while checking for other potential explanatory variables such as employment, skills, or interests; and it can be compared across different populations and cultures. With regards to the second part of the research question, the social implications of differentiated Internet use, the synopsis and articles below develop several propositions based on the empirical findings of the first part in conjunction with the theoretical framework.

The five articles that form the basis of the dissertation contribute different specific elements to this general research interest. The articles deal with current and sometimes very specific Internet usage patterns. However, these empirical contributions draw their significance from much broader sociotechnical developments. The Internet is an information and communication technology (ICT) that has spread in the previous decades and needs to be seen as part of the megatrend of globalization and computerization in postindustrial

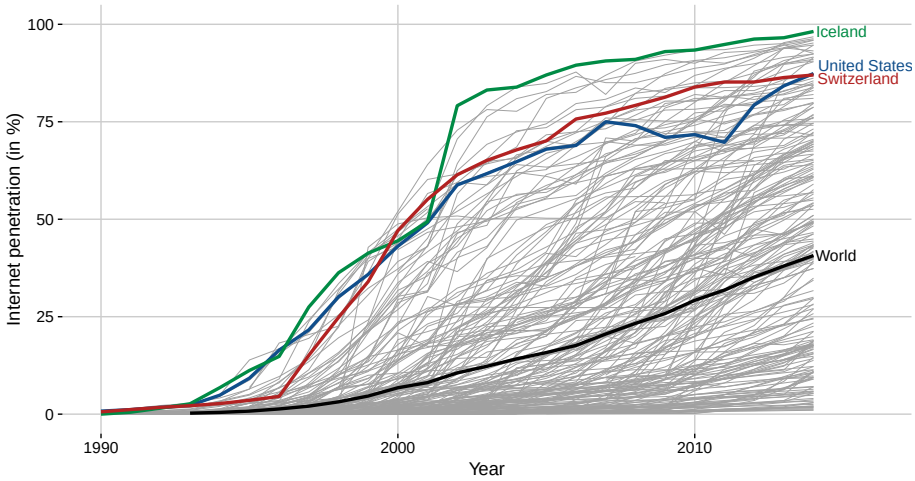

Figure 1: Internet diffusion worldwide 1990–2014. Highlighted countries include Iceland as the most connected country in 2014 (98%), the United States (87%) as the most researched country, Switzerland (87%) as the main focus of this thesis, and the world average (41%). The figure is based on World Bank data and adapted from Kovic (2016).

society (see Duff, 2011). Important milestones in the technical and commercial history of the Internet were J. C. R. Licklider's call for a global network in 1960, the development of TCP/IP and an email system on ARPANET in the 1970s, public access to the World Wide Web in 1991, the founding of Google (1998), the launches of Wikipedia (2001), Facebook (2004), YouTube (2005), and Twitter (2006), and the popularizing of mobile applications starting 2007 (see Graham & Dutton, 2014; Leiner et al., 2012).

This thesis makes several contributions at the intersections of Internet studies[1] with media adoption and use, media effects, media sociology, and comparative methods. It relies on a broad definition

[1] Following Dutton (2013), the field of Internet studies is broad in scope and difficult to define given rapid technological change and its interdisciplinary nature. Still, there is common ground in the objects of study, that is, what Internet studies seek to explain: technological design and development, patterns of use and non-use in various contexts, and policies in areas such as privacy and Internet governance. Key journals in this field are *New Media & Society* and *Information, Communication & Society* (see Dutton, 2013).

of the Internet as a communication infrastructure of related social and technical innovations (Sandvig, 2013) and derives conclusions beyond currently popular devices or services. The articles below are part of the third age of Internet studies, which theorizes and empirically analyzes the links between society and the Internet, going beyond the dataless euphoria of the first and the merely descriptive documentation of the second age (Wellman, 2004).

2. Theoretical Perspectives for Digital Inequality Research

This chapter introduces the central theoretical concepts and perspectives of this thesis. Although the individual articles introduce their theoretical frameworks separately, a broader perspective and overview is offered here. The work overall is positioned in the tradition of communication science as an international social science field of study that integrates mass and interpersonal communication with an emphasis on quantitative methods (see Rogers, 2001).

2.1. Digital Divides and Inequality

Social inequalities are differences in valuable goods at one's disposal. The definition of what is valuable and how individuals achieve positions that are connected to valuable assets is a social process of stratification. Social inequality concerns the systematic distribution of valued and scarce goods across social positions; it does *not* directly concern personal, random, natural, or momentary differences. Grusky (2007) compiles several asset groups, such as economic, power, cultural, social, civil, and health, each of which has different subtypes. For example, a cultural asset type is knowledge, unequally distributed between the highly educated and the less-well educated or uneducated. The right to work is a type of civil asset; the advantaged are citizens, the disadvantaged illegal immigrants (Grusky, 2007). Valuable assets can also be described as capital, and Bourdieu (1986) prominently broadened the use of this term beyond its economic definition as assets directly convertible into money to also include social and cultural forms. Cultural capital may be institutionalized in the form of educational attainment and social capital essentially consists of connections to others (Bourdieu, 1986, p. 47).

These forms of capital define an individual's social position.

The critical connection between social inequality and the digital divide is that social inequalities are the cause of skills and usage differentials, and Internet use influences the attainment of the above asset types, or forms of capital, that determine social position (see Ragnedda & Muschert, 2015; Stern, 2010). A lack of resources in a societal field (e.g., economic or cultural) likely leads to disadvantages in the corresponding digital field (Helsper, 2012). However, mediators between the two spheres—for example, skills for the offline-to-digital link or the relevance of online experiences for the digital-to-offline link—mean that reinforcement of social inequality is not inevitable (Helsper, 2012). The social scientific relevance of technology diffusion more generally lies in the fact that technology is always socially constructed in terms of its adoption as an act of «domestication» (see Haddon, 2007) and in its invention and development by humans in social systems. And crucially, technology also influences society as it impacts «the terms in which social, political and economic relations are played out» (Wajcman, 2002, p. 360). Focusing more specifically on the convergence processes in telecommunications, Latzer (2013) proposes a co-evolutionary perspective to resolve the contradictions of social and technological determinism. Technologies such as the Internet are therefore drivers and simultaneously the output of societal change (Latzer, 2013; Quan-Haase, 2016).

Following Hargittai & Hsieh (2013), further Internet diffusion has two possible long-term effects for change in social inequality. Inequality would be reduced if people of lower social status used the Internet more in beneficial ways than those of higher status. If, on the other hand, those already in higher social positions use the Internet more in beneficial ways, then inequality increases (Hargittai & Hsieh, 2013). Social inequality is a constitutive object of study for sociology as a discipline (Bornschier, 2008) and since the particular case of digital inequality centrally concerns the use of ICTs, the combination with a communication science perspective is fitting and fruitful (see Rice & Fuller, 2013).

This thesis employs the term digital divide along with digital

inequality despite the former's evident shortcomings. It has been rightly pointed out that «divide» implies a false dichotomy, focuses mainly on access, and promotes a technologically deterministic perspective (e.g., Warschauer, 2004; van Dijk, 2005; DiMaggio & Hargittai, 2001). Nevertheless, the term has persistently proven popular and «digital divide» now refers to a field of research that analyzes the inequalities in access to the Internet, but also its uses and effects (also see *Introduction*). As a consequence, digital divide studies need to clearly states which working definition of the term is used. For example, in Article II, the term is qualified with the addition of «second-level» and thus concerns Internet uses. Furthermore, «divide» is here interpreted as gradual differences which acknowledges that access, uses, or effects exist on a continuum.

The introduction presented the example of a divide in online information seeking and its dependence on education. This is essentially a variant of the seminal knowledge gap hypothesis. Tichenor, Donohue, & Olien (1970) hypothesized that higher socioeconomic status as marked most prominently by education is positively associated with the ability to absorb the increasing flow of information from mass media. As a consequence, in social systems where the amount of information is rapidly expanding, the *relative* differences in knowledge among socioeconomic groups tend to increase. The implication for the information age is clear: The rise of the Internet and the communicative spaces it enables, most prominently the Web, provide an abundance of digital, hyperlinked, public content that, as an unintended consequence, appears to be increasing inequality and social exclusion (see Castells, 1997).

Empirical work on Internet use from this perspective has revealed inequalities in access, usage, and skills based on education (for early results on differentiated Internet use in Switzerland, see Bonfadelli, 2002). Compared to the dominant media at the time the knowledge gap hypothesis was developed, the Internet as a technically open and multi-purpose infrastructure requires a more active user who selects from the nearly endless variety of possible online activities. This property of the Internet means that knowledge gaps

may further increase because informational use of the Internet is even more strongly dependent on socioeconomic status than mere access (Wei & Hindman, 2011). Furthermore, given the nature of technological development, mastering digital skills is a moving target. What was once considered an advanced skill may now be a matter of course or obsolete. Building up digital expertise is an experiential process involving formal and informal learning, so the new and unskilled Internet user is unlikely to «catch up». If traditional socioeconomic disadvantages kept an individual from going online early on (first level) and the additional skills gap leads to ineffective use (second level), then the inequality of benefits in the form of positive online and offline outcomes of use (third level) is compounded and exacerbated.

The core mechanism of digital inequality can be expressed as follows. With relative immobility, individuals occupy different social positions that are matched to unequal valuable resources (Grusky, 2007). Attaining high-quality Internet access, autonomy of use, or support in developing digital skills depend on existing resources (see DiMaggio, Hargittai, Celeste, & Shafer, 2004). The initial differential circumstances produce unequal returns, and consequently, the types of uses that are achievable along with their beneficial outcomes lead to inequalities in life chances (Hargittai, 2008).

2.2. The Internet in Everyday Life

Why is the socioeconomic stratification of Internet use a relevant issue for social science research? The Internet is an important means to access the primary resource in the information or network society, that is, information. Societal participation and inclusion therefore necessitate Internet access, skills, and use (Witte & Mannon, 2010). The greater relevance of this thesis is thus derived from the circumstance that exclusion violates social justice norms by producing unequal opportunity and hindering effective political participation (Barry, 1998). Even if access were universal, the latter two requirements, skills and use, remain. And particularly in countries where

diffusion is approaching saturation, social communication processes are increasingly mediated by the Internet. The Internet has become an essential part of everyday life. In fact, this exact statement is the example sentence that the Linguee online dictionary returns when querying «everyday life».[1] On a general level, ICTs have had a tethering effect by connecting individuals to devices, to others, and to usage time; and simultaneously un-tethering users from face-to-face communication and place (Schroeder, 2007; Schroeder & Ling, 2014). Schroeder & Ling (2014) draw from the sociology of Emile Durkheim to reach the conclusion that the social expectation that everyone owns and effectively uses new media technologies is increasingly universal and embedded into everyday life, leaving the digitally disengaged without viable alternatives for participation. Internet diffusion has produced network externalities—the usefulness of Internet use has increased with each new adopter to the point where it has become not just useful but necessary. The number of people excluded on the level of basic access is continually decreasing, but the remaining offline population is at an increasing disadvantage (also see Helsper & Reisdorf, 2016).

Some information is exclusively available online and certain activities are now done much more efficiently online. Virtually all domains of everyday life are affected; whether it concerns seeking political information, paying bills, buying clothes, consuming music and movies, talking to friends, or on-the-job communication, those without Internet expertise are at least partially excluded. Given that key functions of society are increasingly organized around the Internet, reduction of inequality depends crucially on skills and effective use (see Castells, 2002). Altogether, this shows how Internet use has become pervasive and crucial in modern societies. And while this routinization means that the specific affordances and constraints of this technology will be increasingly taken for granted by users, the structuring effect remains. According to van Dijk (2013a), contemporary *information* societies not only depend on information as their

[1] http://www.linguee.com/english-german/search?query=everyday+life

central substance but are additionally characterized by the social and media networks that shape its vital structures. The increasing merging of social networks and media networks can create structural inequality (van Dijk, 2013a). Exclusion from and a lack of connectivity on the Internet means fewer connections in social networks and vice versa. Both of these networks provide access to valuable resources that increase life chances (also see Wellman, 2001). Van Alstyne & Brynjolfsson (1995) offer an economic explanation for this reinforcement mechanism. Information as a non-rival good can be shared without loss, which would support equalizing effects. However, individuals cannot communicate with everyone at once, have different pre-existing private information, and can create new information in proportion to how much they already know. Under these assumptions, individuals will try to focus their limited attention on those that have valuable information, but these target nodes will only accept connections with those offering different valuable information in exchange. Over time, mainly because not all information is public even if everyone has access to the network, this produces an information elite (van Alstyne & Brynjolfsson, 1995).

2.3. Internet Use and Social Position

Taking a relational view that recognizes both individuals' capacity to make choices as well as the importance of social structure, Pierre Bourdieu in particular offers a useful lens to analyze Internet use. Social theory of this kind aims to explain why and how people act by considering their social position and the connected opportunities and constraints. Internet use as a form of action is therefore also explainable by social position. Social structure is internalized through socialization and constitutes a set of relatively stable dispositions for actions. While this *habitus* does not exact one specific action in any given situation, it does determine how individuals interpret situations and «grasp» their reality. Because individual actions affect others, the habitus is not only an internalization of structure but also produces it.

For the purposes of this thesis, the concept of habitus helps in understanding how even highly individualized attributes such as tastes and preferences relate to the social structure and conditions in which Internet users were socialized and live their everyday lives.[2] This perspective counters the «individual-blame bias» (Rogers, 2003, p. 118) inherent to diffusion research where the change agencies that promote innovations, rather than the potential adopters, define the social problem. Digital divide studies, as well as close adherents to the uses and gratifications paradigm, have shown a tendency to attribute the lack of online participation or other generally beneficial uses mainly to a lack of individual motivation rather than system-level deficits (see Duff, 2011; Viswanath & Finnegan, 1996). For instance, voicing one's opinion on a political issue in a Facebook group may require certain Internet skills and an interest in politics. Individuals with higher levels of skills and interest are thus more likely to contribute to this Facebook group. But Bourdieu's analytical framework also points to the circumstance that participating in online political discussion may not even be part of the habitus as a typical shared reality of low-skill users, for example poorly educated older adults, to participate in online political discussion. It is not so much a lack of skills or interest *per se* that prevents participation but a social reality that does not produce a materializing need

[2] Interpreted in this way, the concept of habitus is made useful for digital inequality research. Bourdieu's definition of the central concept in his social theory is, however, rather difficult to disentangle:

> The structures constitutive of a particular type of environment (e.g., the material conditions of existence characteristic of a class condition) produce habitus, systems of durable, transposable dispositions, structured structures predisposed to function as structuring structures, that is, as principles of the generation and structuring of practices and representations which can be objectively 'regulated' and 'regular' without in any way being the product of obedience to rules, objectively adapted to their goals without presupposing a conscious aiming at ends or an express mastery of the operations necessary to attain them and, being all this, collectively orchestrated without being the product of the orchestrating action of a conductor (Bourdieu, 1977, 72).

to participate. This perspective therefore highlights that although individual-level variables such as skills or interest are key, they are influenced by the social structure, that is, the arrangement of social positions. Status differentials connected to the social positions are attained (education, occupation, or income) as well as ascribed (gender, age, or nationality); and primarily inherited (Falcon, 2013).

The intricate relationship between structure and agency outlined above shows that explanations of the mechanisms that exacerbate digital inequality need to take into account both—structural conditions and individual choice. For example, social status constrains and permits action; individual actions are the constituents of structure, yet they cannot be aggregated in a merely additive way. Structure has emergent properties and from the perspective of the individual at any certain time point, these are relatively fixed. However, individuals with very similar backgrounds and living conditions may still vary widely in their practical use of the Internet; *choice* based on personal motivations and interests comes into play. The degree to which even these personal variables should also be treated as a result of social structure is an ongoing meta-debate in the social sciences. Markers of social status such as income and education have been widely shown to affect Internet adoption and use. Those of higher social status are more likely to have access to and effectively use the Internet (see Robinson et al., 2015; Witte & Mannon, 2010).

Digital inequality is a property of the social system, the macro level, yet its explication as an emergent outcome of individual usage patterns requires theoretical and empirical analysis at the micro level. Consequently, Internet diffusion as another macro property does not directly lead to digital inequalities; individual's actions need to be accounted for and aggregated (see Zillien, 2009). This explanatory sociological approach (Coleman, 1990) proposes that existing factors like education, interests, or social ties determine how individuals construe new technologies like the Internet (Zillien, 2009) and how they integrate them into their everyday lives. This situational mechanism reflects the opportunities and constraints for the individual as imposed by the social structure. Based on the interpre-

tation of the situation, individuals then select particular actions.[3] As Article II, Article III, and Article IV explicitly indicate, the way the Internet is interpreted and subsequently used depends on socioeconomic resources. The theory of action assumed in this thesis is based on the uses and gratifications paradigm (see Article II in particular; Katz, Blumler, & Gurevitch, 1973a), but also questions the active and rational role of the user that this approach implies (see Ruggiero, 2000).

[3] This action formation mechanism of *how* individuals select actions, the micro–micro link, has been fiercely debated—perhaps the most prominent theory of action is *rational choice*. However, as Esser (1992) notes, for sociological analysis the psychological process of action selection is of only secondary importance because the theoretical interest lies more in the logic of aggregation.

3. World Internet Project – Preliminary Empirical Analysis

Article II, Article III, and Article IV employ survey data from the World Internet Project (WIP) to address their research questions[1] (see Table 1). This chapter contextualizes these articles with descriptive analyses and a general overview of Internet use in Switzerland.

The WIP is an international, collaborative research project that originated in 1999 at the University of California, Los Angeles and today consists of a network of more than 30 country partners who investigate the social, political, and economic impact of the Internet and related technologies (WIP, 2016). The empirical basis of the project's activities are national surveys on Internet use and attitudes, independently conducted by the partners. At their core, these surveys have a set of common questions that are agreed upon at annual WIP conferences.

The Media Change & Innovation Division at the Institute of Mass Communication and Media Research, University of Zurich is the Swiss country partner in the WIP (WIP–CH) and has conducted three nationally representative surveys—in 2011 (see Latzer, Just, Metreveli, & Saurwein, 2012), 2013 (see Latzer, Just, Metreveli, & Saurwein, 2013), and 2015 (see Latzer, Büchi, & Just, 2015c). The surveys used computer-assisted telephone Interviews, which also made it possible to interview non-users about their attitudes towards the Internet. Sampling quota were constructed based on age, gender, region, and employment status, to achieve nationally representative samples.

In 2015, the sampling procedure was improved to include mobile phones because the number of households without landline phones

[1] Article I also relies on World Internet Project data for illustrative purposes, but the focus is more methodological than substantive.

is increasing (see Arcos, del Mar Rueda, Trujillo, & Molina, 2014; Hunsicker & Schroth, 2014). With sample sizes of approximately 1100 in each of the three years, the maximum confidence interval was ±2.95% at the 95% confidence level. A survey research institute conducted the interviews in all three major Swiss languages, German, French, and Italian. Between 2011 and 2015, the percentage of people using the Internet in Switzerland increased from 77% to 88% (see Appendix A for an overview of the WIP–CH questionnaire).[2]

One of the major trends has been the rapid diffusion of *mobile* Internet use. While general access in Switzerland is approaching saturation (see Figure 1), according to the WIP–CH data the Internet was used «on the go»[3] by 20% in 2011, 39% in 2013, and 63% in 2015. Within five years the figure had thus tripled—the diffusion of mobile Internet is in a phase where the cumulative distribution function is steeply sloping and the majority is adopting this technology, akin to fixed Internet around the year 2000. This means that the Internet is even more enmeshed in the daily lives of users. As anytime/anywhere use is becoming the norm, information and communication are constantly at one's fingertips.

The WIP–CH 2015 shows that Switzerland is among the most highly connected countries—but Internet penetration of 88% also means that 12% are offline. Among adults aged 70 or over, one in two does not use the Internet, while 40% of non-users have asked others to do something like look up information or make a reservation for them online (Latzer et al., 2015c). There remain several first-level digital divides, that is, social stratification in access: women are nine points behind men, and low income, unemployment, and lower edu-

[2] This definition of «access» goes beyond the mere opportunity to go online; respondents were asked if they currently used the Internet in any form. The World Bank Data in Figure 1 indicates 87% Swiss Internet users in 2014, confirming the WIP–CH figures of 85% in 2013 and 88% in 2015.

[3] The German survey question that measured mobile Internet use was «*Nutzen Sie das Internet auch unterwegs über mobile Geräte, zum Beispiel einem Mobiltelefon?*», which was deliberately not constrained to a single device or a mobile data plan but covered all types of en route use while excluding home-only use of a mobile device.

cation are still associated with lower levels of access (Latzer et al., 2015c). Accordingly, many do not even have the basic opportunity to participate in various online activities. The WIP–CH 2015 also revealed that among the offline population, 20% felt they were missing out and 16% would like to use the Internet. Half of non-users, compared to only 12% of users, indicated that they did not feel included in the information society (Latzer et al., 2015c).

These data on Swiss Internet users also appear to confirm the privacy paradox (see Article III; Kokolakis, 2015). The concerns about companies and government violating one's privacy showed zero correlation with personal online privacy protection (see Latzer, Büchi, & Just, 2015d). Self-help protection, for example by requesting the erasure of personal information, has risen since 2011 while the statement that the government should increase Internet regulation was only supported by 24% (Latzer et al., 2015d). Latzer, Büchi, & Just (2015b) further analyzed the connections between the Internet and politics. Seeking political information online has increased since 2011 and 42% agreed that the Internet can help them better understand political processes. Statements on other forms of digital democratization, for example that the Internet increases users' participatory power, were less supported.

In terms of time spent online, there has been a considerable increase. Although self-reported time estimates are prone to biases, the trend is clear: since 2011 time spent using the Internet has doubled and reached 22.3 hours per week in 2015. Among Internet users, email communication is used by virtually everyone (98%), followed by information seeking activities like using search engines (98%), visiting online encyclopedias (86%), looking up word definitions (86%), or searching for news (85%) (Latzer, Büchi, & Just, 2015a). These most-used functions highlight the indispensability of the Internet for basic access to communication and information. In fact, the importance of the Internet for overall information acquisition has surpassed traditional newspapers, radio, and television in Switzerland (Latzer et al., 2015d).

The activities within the WIP, the descriptive analyses of the

WIP–CH data, and the theoretical work on the social antecedents and effects of Internet use lead to research questions regarding digital inequalities that were addressed in the articles in this thesis and are further described in the following chapters. The common point of departure of these articles is a society where the vast majority of the population can be considered Internet users in at least a basic form. While continued research on offline populations remains important (see e.g., Helsper & Reisdorf, 2016), the principal question of this thesis is thus not if but *how* individuals use the Internet—and ultimately with what effects.

4. A Note on Methods

Overall, this thesis takes a quantitative empirical approach as it considers large-scale survey data with standardized measures and, in the case of Article V, thousands of text documents and network nodes. Article I, Article II, Article III, and Article IV rely on structural equation modeling (SEM) statistical techniques (see Jöreskog, 1969). This method is computationally relatively demanding and consequently its applied uses in social research are comparably recent. The exact model specifications on the level of equations and the details of the parameter estimations through fitting an empirical covariance matrix to the model-implied structure may be complex. However, the basic translation of a theoretical model in the sense of hypotheses about how different variables relate to each other is fairly straightforward in SEM.

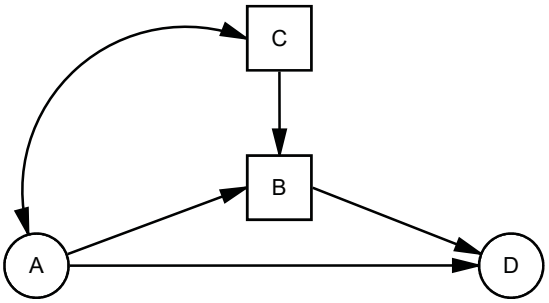

Figure 2: Example structural equation model. A and D are latent variables measured by manifest indicator variables (not shown); C and B are manifest (observed) variables. A and C are exogenous variables; B and D are endogenous variables. This is an example of a partial mediation model with the addition of C as a predictor for B.

Suppose it is hypothesized that A predicts B and D, B predicts D, C predicts B, and A and C are correlated (see Figure 2). These are assumptions about a network of variables and the nature of their

links that can be translated into a single statistically testable model, even if some or all variables are latent. SEM combines confirmatory factor analysis, regression analysis, path modeling, and multi-group analysis (see Article I) into a single framework (and can also include multi-level and growth curve models, but these were not employed in this thesis).

Without SEM, the testing of the theoretical model in Figure 2 would for example entail (a) the evaluation of the internal consistency of A and D through Cronbach's α (for a critique of this measure, see Sijtsma, 2009), (b) the calculation of mean scores for A and D which does not account for the effects of item measurement errors on structural relationships, and (c) running a sequence of regressions ($B = \beta_0 + \beta_1 A + \beta_2 C + \epsilon$ and $D = \beta_0 + \beta_1 A + \beta_2 B + \epsilon$) that does not control for all dependencies. SEM provides a generalized regression-based framework with solutions to these statistical issues by making it possible to *simultaneously* estimate multiple direct and indirect effects, test and include latent variables, and explicitly model measurement errors (see Brown, 2015; Kline, 2015). In the syntax of the lavaan package (Rosseel, 2012) for the R software environment, the generic model in Figure 2 would be specified as:

```
model <- '
    A =~ x1 + x2 + x3
    D =~ x4 + x5 + x6
    B ~ A + C
    D ~ A + B
    A ~~ C
'
```

The above code assumes a three-item measurement for A and D. Paths that are not specified, such as between C and D, are implied to be zero. The model can then be fit, where options such as the estimator (e.g., maximum likelihood) are defined.

As Steinmetz (2015) argues, there has been a trend towards overcautiousness in causally interpreting structural equation models. However, the theoretical basis of SEM is causal, and accordingly,

good global fit measures (see Schermelleh-Engel, Moosbrugger, & Müller, 2003) and significant coefficients in the expected directions support the specified causal model (even if they cannot *prove* causality). Importantly, «[d]irection in the directed network models of SEM arises from presumed cause–effect assumptions made about reality» (Westland, 2015, p. 2). As such, this flexible and powerful statistical technique was chosen to address the multiple relationships between Internet uses and its predictors.

Article V relies on text mining (see Grimmer & Stewart, 2013) and network analysis (see Easley & Kleinberg, 2010). While the algorithms at the heart of these techniques, for example latent Dirichlet allocation or centrality calculation, are computational processes that use large data sets, much of the interpretation is in fact of a qualitative nature. This is due to the generative and exploratory approach (whereas SEM is mainly confirmatory), meaning that context information is crucial to make sense of the results. For instance, topic modeling discovers the latent topics in a collection of text documents, usually with a high level of interpretability (DiMaggio, Nag, & Blei, 2013), that need to be connected to the context of the texts' creation—Article V refers to this as domain knowledge. Similarly, network analysis can reveal the central nodes, but it is still the researcher's task to characterize the actors (e.g., in Article V as institutional vs. individual) and to describe why a given node is in its particular position.

The application of methods such as text mining and network analysis can be seen as part of a larger development in communication research and related fields where computing intersects with other disciplines (the most notable example being digital humanities [see Berry, 2011]). Neither content analysis nor social network analysis are new, but the Internet, in particular search engines and social media, has made vast amounts of previously unavailable or unrecorded data in principle accessible to social researchers: «The era of Big Data is underway» (boyd & Crawford, 2012, p. 663). Big data has, however, created a new data divide. boyd & Crawford (2012) note that full access is reserved for the platform owners like Facebook

and Twitter. Their terms and conditions restrict content collection and transactional data is rarely shared. Aside from the ethical challenges of social data collection, this also means that there is a bias in the kinds of questions that are asked because few have the skills to analyze big data (boyd & Crawford, 2012).

The Internet not only produces data because users leave traces, it also offers an infrastructure that is harnessed for survey research (see Fricker, Galesic, Tourangeau, & Yan, 2005). Web-based surveys, however, are also affected by digital inequalities. The key challenge is representativeness: differences in broadband connectivity, skills, and social media use are associated with participation rates (Robinson et al., 2015). Particularly country-level surveys benefit from the established and sophisticated sampling procedures in computer-assisted telephone interviewing (see *World Internet Project – Preliminary Empirical Analysis*). Traditional survey-based analysis remains fundamental for digital inequality research and new digital methods face myriad challenges, but they nonetheless promise valuable complementary insights and are likely to be used more frequently in future studies.

5. Comparing Second-Level Digital Divides[1]

The first focus of the articles in this thesis is on general Internet use inequalities (Article I and Article II). How is Internet use structured along socioeconomic and demographic indicators and what are appropriate methods to analyze second-level digital divides? How can «use» be conceptualized and subsequently measured? How can such models be used in cross-country research?

The diffusion of the Internet in different countries (see Figure 1) shows large differences by wealth (e.g., Andrés, Cuberes, Diouf, & Serebrisky, 2010), but sociocultural resources like generalized trust also influence its adoption (Bornschier, 2001). Such differences in diffusion rates across countries or regions, either descriptive or explained by other macro-level variables, are *global* digital divides. Differences within societies accordingly describe *social* digital divides. In low-diffusion countries, Internet users are usually a socioeconomic elite; for countries with very high diffusion the Internet user base is converging with the population as a whole, but the question then is what kinds of social divides still persist (see Chen & Wellman, 2004)—mainly on the second and third level of digital inequality.

Article I makes a methodological contribution towards bridging research on global divides and social divides (see Table 1). The within-country social structuration of use is key, but at the same time digital inequality research is interested in drawing comparisons with other countries and in explaining the resulting similarities and differences. To this end, Article I adapts the general multi-group SEM framework

[1] Key literature in Article I: Steenkamp & Baumgartner (1998); Helsper & Gerber (2012); Davidov, Meuleman, Cieciuch, Schmidt, & Billiet (2014); Hasebrink (2012).
Key literature in Article II: van Deursen & van Dijk (2014); Katz, Haas, & Gurevitch (1973b); Helsper & Gerber (2012); Witte & Mannon (2010); Zillien & Hargittai (2009).

to Internet use research. Basically, second-level digital divide studies link socioeconomic characteristics with Internet use variables. If the effect of the former on the latter is to be meaningfully compared across countries, it is crucial that the measures are equivalent. This requirements is statistically assessed through measurement invariance testing.

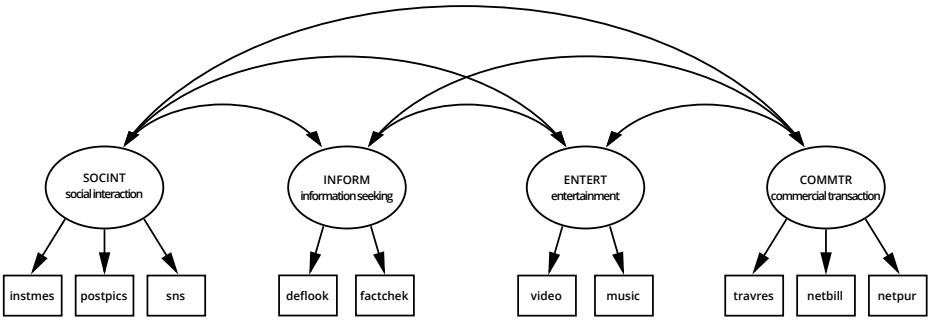

Figure 3: Measurement model of four core Internet usage types. Adapted from Büchi et al. (2016b) and Büchi (2016b). See Büchi et al. (2016b, p. 2711) for item descriptions.

Dimensions of Internet use such as types of use, skills, or privacy behavior are best measured by multiple indicators. The concept is that each indicator reflects an underlying latent factor. For example, looking up a definition on the Internet is one manifestation of the information-seeking usage type; checking a fact online is another (see Figure 3). This a priori proposition, that is, that these activities are valid indicators of informational use, needs to be empirically confirmed by salient factor loadings (Brown, 2015). Once the predictors for information seeking are added to the model, comparing their effects cross-nationally implies that information seeking does in fact mean the same in the compared countries.[2] Each indicator's loading therefore needs to be statistically invariant across countries for the meaningful comparison of structural relationships (Steenkamp & Baumgartner, 1998).

[2] Essentially, the country variable acts as a categorical moderator on the hypothesized relationships specified in the structural model. The concept of measurement invariance can be applied to comparative research with any other meaningful grouping variable.

After detailing the concept of measurement invariance, Article I applies this to a second-level digital divide model where Internet experience and age predict four Internet usage types using WIP survey data from Switzerland, Sweden, the United States, the United Kingdom, and New Zealand. Equivalence of factor loadings is supported only for a subset of these countries. In three of the five countries the latent variables to be explained (usage types) indicate invariant measurement, so the age and experience effects are comparable. Age has strong negative effects, for example on social interaction use, indicating that younger Internet users engage in communicative online activities more frequently. Years of Internet experience, a direct consequence of first-level divides, are positively associated with use of the Internet for information seeking and transactional purposes in particular. This is the general pattern across the three countries considered in the structural model. The mere fact that there is a general pattern strengthens the finding of digital inequalities according to age and experience. Essentially, each additional country sample can be considered a replication study. At the same time, however, the model can also reveal and statistically test the significance of effect differences. For instance, the effect of age on information seeking is significant and negative in both the United States and the United Kingdom, but significantly less strong in the United Kingdom which is also shown in Article II. Findings of this sort could then lead to wider conclusions regarding second-level digital divides. In countries where the amount of variance in Internet use that is explained by socioeconomic variables is comparably low, digital inequalities are less pronounced.

Together with the findings of Article II this conceptual and methodological approach could be extended to a larger number of countries or points in time. This would entail considerable variance in the Internet diffusion rate and thus statements about the dynamics between the first-level and second-level digital divide could be made. However, such a comprehensive research design would also decrease the likelihood of satisfying equivalence requirements (see Helsper & Gerber, 2012).

Article II is a substantive study on the second-level digital divides in the above-mentioned countries and relies on the statistical methods of Article I to map out sociodemographic differences in Internet use (see Table 1). A vital step here is the operationalization of Internet use. For what purposes do people actually use the Internet in their daily lives? At the level of individual applications or services, the variety is nearly endless. However, as Article II argues on the basis of the uses and gratifications theory, these activities reflect an underlying purpose or type of use. The core usage types developed are social interaction, information seeking, entertainment, and commercial transaction (see Figure 3). These general purposes remain stable relative to the constantly evolving individual activities, making cross-country and repeated cross-sectional analysis possible.

Studies of Internet usage divides in high-diffusion countries have shown that demographic and socioeconomic variables significantly influence for what purposes and how intensively the Internet is used (e.g., Brandtzæg, Heim, & Karahasanović, 2011; van Deursen & van Dijk, 2014). One of the main results of Article II is the strong negative effect of age across all five countries. This does not mean that older adults do not use the core functionalities of the Internet (Quan-Haase, Martin, & Schreurs, 2016), but younger age is associated in particular with higher intensity of use of social interaction and entertainment. Information seeking also depends on age, and additionally on higher education and Internet experience. Commercial transaction is comparably less strongly predicted by age. It is plausible that the effect is not linear: Such advanced uses may increase slightly with age at first and then quickly decrease, producing a moderate negative linear regression coefficient. Education, and particularly Internet experience, are the key promoters of commercial transaction use. Sociodemographic variables alone explain about one third of the variation in the four usage types, which suggests pronounced structural digital inequalities and not just user differentiation according to their preferences.

The comparative perspective shows that patterns of digital inequality are similar but not the same in the five high-diffusion coun-

tries considered. From this limited sample of five countries—only three of which then demonstrated equivalence of factor loadings—it can be speculated that a smaller first-level divide, that is, a shrinking percentage of non-users, corresponds with larger second-level digital divides. On the relationship between the two predictors age and experience, Article II notes that «[t]he direct effects of experience are interesting since older people generally use the Internet less, yet experienced users do so more. Age and Internet experience are in turn positively correlated, as only older users could have gained a lot of Internet experience» (Büchi et al., 2016b, p. 2716). This opposing trend appears again in Article IV and hints at the link between the first-level and the second-level digital divide. Even if the effect of experience levels off as Internet use becomes even more enmeshed in everyday life, Internet skills will likely take its place in determining advanced uses, and the contribution of education to skills appears to be relatively stable.

Article II developed a four-factor model of Internet use general enough to be applicable across countries and time, but specific enough to analyze different types that cover the core purposes of Internet use. Further research can build on this model to test second-level digital divides in other regions with different Internet diffusion trajectories (e.g., Dodel, Büchi, & Menese, 2016). Article I and Article II have stressed the importance of measurement invariance testing even for research projects such as the WIP where a comparative aim was implemented from the beginning.

This work on the general second-level digital divide has also raised the question of what other factors, besides sociodemographic variables and Internet experience, determine usage patterns. In cross-country research, macro-level variables like cultural value orientations (Gong, Li, & Stump, 2007), economic inequality and performance (Zhang, 2013), broadband infrastructure, or media system characteristics may prove relevant. For example, is informational Internet use in a country with a strong public service broadcaster lower (suppression mechanism) or higher (stimulation mechanism) than in one dominated by private broadcasters? Inclusion of further

macro-level variables could lead to valuable results in studies with a larger number of countries using statistical multilevel models. It also remains to be empirically tested whether the hypothesis of increasing second-level digital divides developed in Article II holds. And most importantly, the consequences of the detected usage differences for social integration, life chances, and well-being need to be explored. Social differentials in the general core usage types are indicative of divides in individuals' everyday online activities, yet there are many more specific online behaviors potentially affected by digital inequalities.

Table 1: Article contributions.

Article	Focus	Research Question	Main Contributions
I	Comparing second-level digital divides: Methodology	How can different Internet uses be measured and meaningfully compared across countries?	Detailing of statistical procedures for ex post multi-group invariance testing; adaptation of these general procedures to applied cross-country Internet use research; development of recommendations for valid cross-country Internet use research
II	Comparing second-level digital divides: Concept and results	How are different uses of the Internet structured according to sociodemographic attributes in countries with high Internet penetration?	Adaptation and validation of an Internet uses typology; new multi-country evidence for distinct second-level digital divides according to age, education, and experience; support for the metric equivalence of the digital divide model for three English-speaking countries
III	Specific divides and their implications: Self-help privacy protection	What explains Internet users' varying levels of self-help privacy protection?	Generalized model for self-help privacy protection with regard to data and measures; attitudes on personal data are not strongly related to actual behavior; general Internet skills are key in enabling users to protect their privacy and benefit from their use
IV	Specific divides and their implications: Online political participation	How is online political participation structured according to socio-demographic attributes and Internet expertise?	Modeling political interest and Internet skills as mediators; general Internet skills and experience contribute significantly to explaining online political participation; support for reinforcement of democratic divides rather than mobilization
V	Specific divides and their implications: Microblogging science news	Does the microblogging platform Twitter activate new participants and perspectives in the public communication of science?	Novel methods to link old and new media and detect topic contextualizations; Twitter has a recommender role that functions "on top" of traditional sources; the network is dominated by traditional sources with conversational/community clusters at the periphery

6. Specific Divides and Their Implications

The previous chapter focused on rather general aspects of Internet use and a comparative perspective on its social structuration. This chapter examines three specific domains where digital divides can be found: privacy protection, political participation, and science communication (see Table 1).

6.1. Self-Help Privacy Protection[1]

«Protecting our privacy and managing our online presentations of self are the kind of competencies that are becoming critical in the information age» (Witte & Mannon, 2010, p. 152). It is clear that privacy breaches can have manifold negative consequences and the risks of experiencing privacy violations are not equally distributed. This type of inequality has been somewhat neglected in digital divide research. In recent years, however, there have been studies that explicitly connect online privacy with digital inequality, most notably by Yong Jin Park (Park, 2013, 2015; Park & Jang, 2015).

Within the framework of this thesis, online privacy behavior is part of the second level of usage. However, as shown in Article III, privacy protection is also a consequence of other second-level digital divides, because Internet skills determine protective actions. Self-help privacy protection measures are much more likely to be adopted by experienced and skilled users. «Not being able to put the Internet to effective and beneficial use may further the digital exclusion of certain social groups» (Büchi et al., 2016a, p. 3). Some of the barriers to effective use are related to privacy: Individuals who are very concerned about privacy may abstain from Internet use altogether, and

[1] Key literature in Article III: Park (2013); Acquisti, Brandimarte, & Loewenstein (2015); Dienlin & Trepte (2015); Litt & Hargittai (2014).

those who lack the skills to counter privacy threats through self-help by blocking certain features or using fake data may not achieve beneficial outcomes and become increasingly disengaged. Unknowingly and voluntarily disclosed personal data can be used for discriminatory and surveillance practices by other users, businesses, and states, leading to personal disadvantages. Still, there is variation in the degree to which users even care who has access to their personal information (Büchi et al., 2016a, p. 10).

The idea of enabling individuals to control and selectively reveal personal information is certainly not new but its significance is growing in the information age. Since free online services are «paid for with data», and if public policies cannot ensure privacy, it is likely that some users will increasingly pay actual money for greater control over their online privacy (Rainie & Anderson, 2014). Expectations of privacy are, however, highly context-dependent and are based more on the social situation rather than the distinction between offline and online (see Nissenbaum, 2011). Savage & Waldman (2013) employ an experimental design to estimate the monetary value of online privacy in mobile app usage and find that the average consumer was willing to spend $11 to conceal their browsing history, contacts, location, and text message contents, with more experienced users' valuation being higher. Given that users have little information about when and for what purposes their data is collected, rational decisions regarding privacy-related behavior are difficult to make (Acquisti, Taylor, & Wagman, 2016). An actual market for privacy would turn privacy into a luxury good rather than a basic right, sidelining structural explanations for low self-protection. Many social groups with higher privacy needs due to higher risks of discrimination would be further disadvantaged (Matzner, Masur, Ochs, & von Pape, 2016).

This background and the tendency to transfer responsibility for privacy protection to the user (see Matzner et al., 2016) creates a need to understand the individual factors that promote users to increase self-protective actions. The literature on the privacy paradox questions the link between privacy concerns and behavior, and the WIP–CH 2015 does in fact show that agreement with the statements

«I am concerned that governments [companies] are violating my privacy online» and «I am very vigilant about protecting my privacy online» are uncorrelated ($r = .01$ [.03], $p = .66$ [.39]).

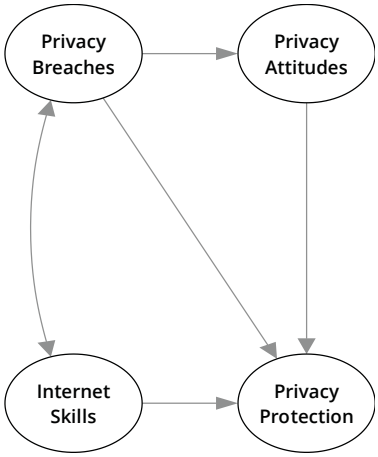

Figure 4: Online privacy model. Adapted from Büchi et al. (2016a).

Article III translates general social psychological predictors of human behavior—abilities, experiences, and attitudes—to the issue of online privacy protection. The theoretical model proposes that self-protective measures are most frequently employed by users who are highly skilled in overall Internet use, have experienced privacy violations first-hand, and place great importance on control over their personal information (see Figure 4). The study operationalizes *protection* as a multi-item factor with concrete activities as indicators, which is less prone to social desirability response bias than the protection statement above. The dimension of privacy concerned with users' personal views focuses on *attitudes* towards personal information such as browsing history or contacts rather than on concerns. Having experienced privacy *breaches* functions as a predictor for both attitudes and protection. General Internet skills (van Deursen, Helsper, & Eynon, 2015) are added as a key variable of digital inequality research. It is assumed that the initial social position leads to skills differentials, and that these in turn structure online activities—self-help privacy protection being one important aspect that determines the benefits than can be achieved online.

The main contribution of Article III lies in the novel combination of privacy attitudes, breaches, and protection with skills. It also increases the generalizability of previous research that has found a link between specific skills and protection as well as disclosure behaviors on Facebook by extending its scope to Internet use more generally and by analyzing representative data for a country other than the United States. There are three key findings. First, privacy attitudes are not the primary explanation for protective behavior. The effect, however, is still significant and positive. Second, there is a «learning the hard way» mechanism, meaning that experiencing privacy breaches promotes increased self-protection, also indirectly through attitudes. Third, general Internet skills are the strongest predictor of users' privacy protection measures. If age is included in this privacy model, it is revealed that older Internet users are less skilled and engage less in protective actions, making them particularly vulnerable. Given the essential role of Internet-based communication in everyday life, withdrawal from Internet use is not a viable alternative for most, making Internet skills a central asset in enabling users to mitigate the ubiquitous risk of privacy violations online and to selectively reveal and control personal information. In order to be effective, users' self-help efforts rely on accompanying collective and political efforts such as the strengthening of users' rights that take skills differentials into account (Büchi et al., 2016a; Matzner et al., 2016).

6.2. Online Political Participation[2]

Feedback on Article II indicated that an important group of online activities—participatory use—was not explicitly covered in the four factors developed (social interaction, information seeking, entertainment, and commercial transaction). Research has shown that online participation in various forms is also affected by digital inequalities (e.g., Hoffmann, Lutz, & Meckel, 2015; Brake, 2014). Consequently,

[2] Key literature in Article IV: Min (2010); De Marco, Robles, & Antino (2014); Theocharis, Van Deth, Obert, & Císař (2016); Krueger (2002).

Article IV addresses online political participation as the prime example of this type of advanced use (see De Marco et al., 2014). If general Internet use can have a social integration function, then digital democratic participation as an evident way of taking part in the shaping of the political conditions has an even greater normative basis for equity of access and use (see Lievrouw & Farb, 2005; Duff, 2011). Exercising basic citizen's rights will increasingly depend on information and organization by digital means (Sparks, 2013). Internet access, usage, and skills divides thus pose a threat to the democratic principle of equal opportunity to participate in political life.

The Internet, like other emerging ICTs in history, has continuously stirred up hopes for the flourishing of democracy. From the beginning, this has accordingly also been an important line of inquiry in digital divide research (Sassi, 2005). The basic question here is how online participation in public life and political processes is socially structured. Is the Internet a means for the disempowered to circumvent traditional barriers to participation, or do pre-existing resource differentials mean that actual use of the new communication tools will, as Pippa Norris (2001) puts it, «serve to reinforce the activism of the activists» (p. 238)? This tension between the mobilization hypothesis and the reinforcement hypothesis has dominated research on ICT effects and participatory divides. The literature review in Article IV reveals that there is empirical support for both in different contexts. According to the knowledge gap hypothesis (Tichenor et al., 1970), the role of education is key because it fosters literacy, communication skills, knowledge, and exposure to public affairs topics. These are essential resources for informed decision-making and political engagement, that is, fulfilling the normative role of democratic citizenship. Wei & Hindman (2011) assume a critical role of political knowledge for social power and inclusion, and find that differential Internet use is in fact more status-dependent than traditional media use. The social consequence is an increase in political knowledge gaps.

Article IV tests the existence and properties of socially structured

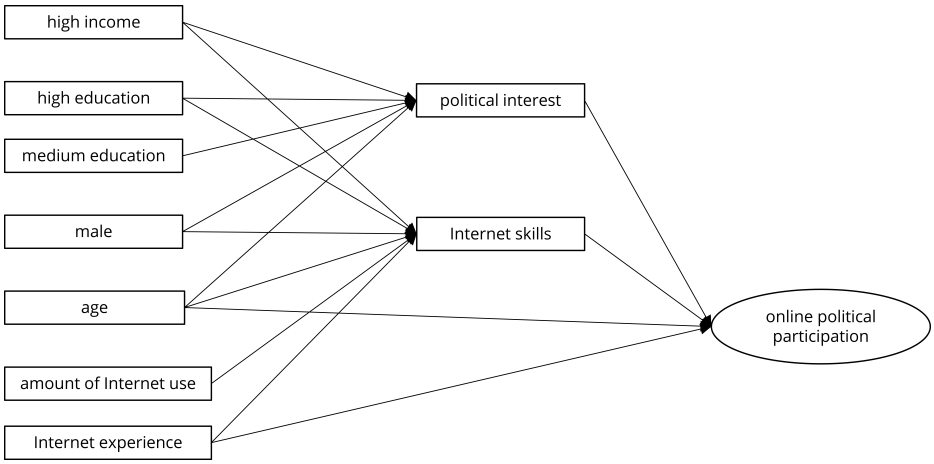

Figure 5: Explaining online political participation. Adapted from Büchi & Vogler (2016).

political participation differentials, or the «democratic divide» (Min, 2010). Its research design is unique in that it employs both political interest and Internet skills as mediators between social position and online political participation (see Figure 5). Following the theoretical perspective developed above (see *Internet Use and Social Position*), it thus assumes that while specific Internet uses can indeed be explained by users' interests and skills, these are themselves unequally distributed in ways that are better explained by social structure than individual choice.

In line with previous findings, Article IV first shows that only a small percentage of Swiss Internet users are digital political participants. Results of a cluster analysis reveal that those who do engage online by seeking political information, participating in discussions, protesting, or producing content are highly interested, have higher levels of education and income, possess high Internet skills, and are more likely to be older and male. SEM further tested the role of social position, Internet expertise variables, and political interest for online political participation across two waves of the WIP–CH survey (2011 and 2013). This repeated cross-sectional model was also subjected to invariance tests as developed in Article I: instead of grouping by country, metric invariance—and thus comparability of effects—was

supported for the two points in time.

The model shows that the variation in online political participation is to a great extent explained by political interest, Internet skills, and Internet experience (R^2 = 43%; Büchi & Vogler [2016, p. 17]). The social position variables do not directly influence participation but explain the mediators, interest and skills. The strongest effects are found for education and age, with more highly educated and older users being more politically interested. Internet skills are higher for younger and more experienced users. The effect of higher education on skills is significant and positive but not very strong. In political science, a robust finding is that older adults participate more than younger people; Internet use research consistently finds that younger users are much more active online (e.g., Article II). Age thus plays an interesting role and the mechanism of its influence may be applicable to other second-level digital divide models. Younger Internet users are more skilled, but less interested, resulting in a marginal direct effect on online political participation.

In a different national context and ten years later, this study confirms the substantive findings of Min (2010), that is, the existence of a democratic divide where online political participation is associated with high political interest and Internet skills. It models and interprets the results from a digital inequality perspective and therefore further finds that social position influences political interest and Internet skills. Article IV argues that there may also be a feedback mechanism, as online political participation is likely to stimulate knowledge and interest, reinforcing the engagement of the engaged.

In conclusion, beneficial outcomes of political Internet use for society's least advantaged members will depend on education and skills development. Following Duff (2011), institutional reforms that address the real issue of unequal representation that go beyond specific fixes would need to address inequalities of information as the key resource for participation. Importantly, the «referent of distributive justice in postindustrial society» (Duff, 2011, p. 608) is not access to the infrastructure or the devices, but information itself— information that is increasingly created on and disseminated through the

Internet, making Internet skills indispensable for social and political participation.

6.3. Microblogging Science News[3]

Article IV notes that «[t]he once clearly defined roles of elite senders—political actors and journalists—and the mass audience as receivers of political messages were challenged by the fundamental openness of the web» (Büchi & Vogler, 2016, p. 3). The results show a clear democratic divide: online political participation depends on interest and skills, which were in turn socially structured. Analogously, in the domain of science communication, and this is the starting point for Article V, traditional news sources and scientists themselves are confronted with the inputs of expert enthusiasts and the reactions of interested laypersons on social media platforms that are in principle open to anyone.

Microblogging on Twitter is one of many online modes of communication. «Tweets» are restricted to 140 characters per post and the service is used by a substantial but still small proportion of the population. In Switzerland, 17% of Internet users either read or write tweets (Latzer et al., 2015a). These are more skilled than the average user: using WIP–CH 2015 data, a logistic regression predicting the use of Twitter shows that controlling for sex, age, and education, a one-unit increase in skills (scaled 1 to 5) increases the odds of using Twitter by a factor of 1.70 ($p \leq .001$) (see p. 206). Within these limitations of short text communication and a skewed user base, however, it does «generate an additional layer of science communication with new sources, voices, and interpretations» (Büchi, 2016c, p. 12) as compared to traditional news media.

The background for Article V are the larger structural changes in the way modern societies produce knowledge (see Weinberger, 2012). The Internet provides science communication with opportunities to depart from the unidirectional traditional broadcast model,

[3] Key literature in Article V: Blei (2012); van Dijck (2011); Veltri & Atanasova (2015); Smith, Rainie, Shneiderman, & Himelboim (2014)

to include two-way, one-to-many, and many-to-many communication (van Dijck, 2013, p. 337). Twitter has evolved from its early role as a social network site for small-group interaction to a global news and information following tool (van Dijck, 2011). The study aims to understand the role of Twitter, as one representative of new media, in public engagement with science. Are traditional news outlets' science topic selection and framing simply reproduced or do different sources get a voice? This is achieved by first collecting and comparing the communication content and then extracting and analyzing the topology of the network produced by users mentioning each other in the course of engaging with science topics. The study develops a novel method to collect a corpus of news articles and tweets on current science topics by dynamically linking the two sources. Science topics were extracted from news sources «on the fly» using topic modeling and automatically supplied to the Twitter API as search terms, resulting in corresponding tweets.

Similar to Article IV, Article V finds that participation and information sharing is driven by those already interested and engaged, but not exclusively, which has been confirmed for the specific case of climate change communication (Taddicken & Reif, 2016). In Article V, climate change emerged as a dominant topic, featuring prominently in both traditional news outlets as well as on Twitter. Related research shows that those convinced of anthropogenic climate change used Twitter predominantly for information sharing, that is, the redistribution of existing content (Holmberg & Hellsten, 2016). This confirms the finding of Article V that actual debate and discussion are a peripheral phenomenon.

Article V concludes that Twitter extends existing public science communication through mass media by connecting the individuals formerly known as the audience with each other and with web resources, and by producing additional interpretations of current issues. This extension of science coverage is occurring mainly in a vertical dimension, meaning that those who have the skills to participate and an interest in these issues have additional options. Twitter as a special case of an Internet-enabled social media and informa-

tion platform does not appear to contribute much to a horizontal extension of science communication in the sense of broader participation. Despite its technically low threshold for participation, Twitter mainly features asymmetric leader–follower relationships that «are only functional where conventional institutions and media have already created a space of highly specific shared meanings, mutual understandings and structured expectations» (Geser, 2010, p. 15). Alongside a democratic divide there is thus also a science divide, illustrating another case where a technodeterministic view of ICTs as initiators of egalitarian society would produce false expectations (see Tsatsou, 2011).

As indicated, for users to participate and the technological affordances to have an equalizing and inclusive effect, certain capabilities are required. Article V found that that the most active hubs in the Twitter science news network were organizations and celebrities, meaning that the mobilizing effect with regards to science participation was low. The basic mechanism of digital inequality can thus also be found at the organizational level. Here, the key competence is not general Internet skills but more of a strategic nature—The New York Times has the skills to preserve and perhaps reinforce its authoritative position. In a situation of information overload, established institutions can function as anchors and further strengthen their status. Importantly, these skills are again not randomly distributed but are to a large degree derived from the pre-existing status, that is, initial resource differentials are reproduced or even intensified on the Internet.

7. Conclusion

The concluding chapter of this thesis discusses the main results and contributions. Policy implications, directions for future research, and limitations are addressed.

7.1. Discussion and Implications

This thesis set out to explain inequalities in Internet use and describe their social consequences. Using a theoretical framework that linked social position to Internet use, chapters 5 and 6 revealed empirical usage differences and their social implications in different domains. The main contributions of the individual articles are summarized in Table 1. The most important contributions for the research on general divides include a method to bridge research on within-country and across-country usage differences as well as the development of a typology for fine-grained comparative research that covers the core purposes of Internet usage. Concerning specific divides, the key contributions lie in connecting online privacy with digital inequality, highlighting a reinforcement mechanism in online participation, and demonstrating the transfer of offline status to the online realm.

In summary and with regard to the first part of the overarching research question in this thesis—the characterization and explanation of digital inequalities—a general pattern has emerged. Broadly speaking, social status determines interest and skills, and these in turn influence online usage behavior. Article II, Article III, and Article IV, which empirically operate at the user level, provide direct evidence of this pattern. For instance, higher education is positively associated with Internet experience and with use of the Internet for informational and transactional purposes. Active personal privacy protection is highly dependent on general Internet skills. And online

political participation is predicted by political interest and Internet expertise. To varying degrees in different contexts, skills and interests as the ability and motivation for Internet use, are themselves determined by markers of social status such as gender, education, or age. The most salient finding in the articles that pertains to the second part of the research question—the social implications of digital inequalities—is that certain social groups are likely to become increasingly disconnected from the benefits attainable through Internet use. The results generally suggest reinforcement rather than equalizing effects on a societal level. The Internet as a technological innovation does not *per se* predetermine its users or uses[1]—it does not favor the privileged over the disadvantaged or vice versa—but nonetheless, through its social construction and adoption, it contributes to the reinforcement of social inequalities and the production of distinctively digital inequalities (also see Robinson et al., 2015; Witte & Mannon, 2010; Castells, 2002). Policy directions and consequences on a societal level in light of the insights gained from the individual articles on differentiated Internet use are discussed below.

Combined with the theoretical perspectives outlined above, it becomes clear that individuals in high-diffusion countries increasingly depend on their ability to access and effectively use the Internet in their everyday activities and relationships. These mediated forms of communication crucially depend on corporations that offer services on the content/applications layer and on the physical/logical layer, with potential for vertical integration (Bauer, 2007). Accordingly, the online communication environment is to a large degree dictated by commercial actors who by definition strive to maximize profits. Companies like Google and Facebook dominate some of the most prevalent uses of the Internet and are taking the further development of the telecommunications infrastructure they so vitally depend on into

[1] Some of the pioneers involved in the development of the Internet note that «[t]he Internet is at once a world-wide broadcasting capability, a mechanism for information dissemination, and a medium for collaboration and interaction between individuals and their computers without regard for geographic location» (Leiner et al., 2012, p. 1).

their own hands, for example, by building undersea cables on which they self-allocate dedicated capacity (Finley, 2016; see Wu [2003] for the issue of network neutrality). So alongside Internet usage divides, other threats to the fair social distribution of information such as network neutrality, big data, and algorithms will also continue to challenge communication governance and regulatory regimes (e.g., Couldry et al., 2016; Saurwein, Just, & Latzer, 2015).

Article III, for example, concludes that public policy concerned with digital inclusion—in this case in the form of being able to maintain personal privacy online—needs to ensure the development of digital skills. In conjunction with the findings of Article II that education and experience influence types of uses, it seems clear that formal education provides a promising setting to improve digital skills (see van Deursen, van Dijk, & Peters, 2011). At the same time it must be acknowledged that even successful policies at this level would likely have limited effects on inequality at large; they may well ameliorate some initial divides in Internet use but a more «radical programme of economic democracy and social justice» (Sparks, 2013, p. 39) that would affect the mechanisms of inequality reproduction described in *Theoretical Perspectives* is very unlikely (also see Duff, 2011; Rogers, 2003; Eynon & Geniets, 2015; van Dijk, 2005). Furthermore, the increasing public framing of digital inequality in terms of skills and the turn away from access divides, while adequate from a purely scholarly viewpoint, runs the risk of absolving governments of their responsibility and thereby unintentionally overburdening individuals as well as educational institutions (Epstein, Nisbet, & Gillespie, 2011).

As a technical innovation, the development of the Internet was shaped by early adopters, resulting in the dominance of English and one size fits all designs and content (see Gajos, 2016). This is one area for promising policy instruments that target skills and usage divides by investing in special content for cultural minorities or otherwise disadvantaged social groups (van Dijk, 2005). The target then is not the durable offline or digital fields of exclusion, for example, low education or low online participation, but Internet skills or rele-

vance of content as mediators between the two fields (Helsper, 2012). So although the the digital divide cannot just be «closed», policies that counter information injustice are possible (Duff, 2011; van Dijk, 2005).

7.2. Limitations and Future Research

After having outlined the contributions of the five articles in this thesis, many new possibilities for further research arise. On the one hand, specific relationships such as the link between age and types of use may be researched in more depth. On the other hand, the methods and models developed here can be tested for additional online activities, such as seeking information on health, or applied in other countries. With respect to the first focus on comparing second-level digital divides (Article I and Article II), it needs to be acknowledged that «culture» as a catch-all phrase for post hoc explanations of national differences is of limited theoretical value. Further research into second-level and third-level digital divides therefore needs to account for the trajectory of Internet diffusion, relevant regulatory regimes, the dominant Internet companies, etc., in addition to traditional cultural factors. These variables need to inform the country selection along with more practical considerations such as data availability and language skills. For example, finding equivalent measures to compare specific uses and effects of social media in South Korea and China would be challenging because dominant applications in South Korea such as Kakao Story, Twitter, and Facebook are blocked in China. Furthermore, differences in smartphone penetration rates and types of data plans mean that even access type is very different in the two populations.

Having Internet access means being able to step onto the digital playing field—but the field is not level. The burden of the access divide revealed as lack of experience and the social status of older adults and the less educated lead to lower engagement in uses such as social interaction or information seeking that are connected to social, cultural, and economic capital (see Article II). While building

knowledge and maintaining social connections can directly influence life chances, some have argued that entertainment is not a capital-enhancing use of the Internet. However, such a generalization may be problematic, because entertainment could, for example, foster social cohesion through shared cultural knowledge. In the same manner, while it is clear that gaming is not equally beneficial as finding a job online, informational or transactional use are not capital-enhancing under all circumstances either. «[T]hose who do have access but decide to use it for entertainment rather than self-improvement, can only properly be understood if they are studied as authentic human cultures rather than simply as problems to be targeted for correction» (Sparks, 2013, p. 32). This is an area where qualitative research can uncover users' integration of the Internet into their everyday lives and how they judge the utility of their specific uses.

The articles in this thesis consistently treated Internet use as a dependent variable, meaning that different online behaviors were explained by factors like socioeconomic and demographic variables, Internet skills and experience, or attitudes and interests. The further advancement of digital inequality research will require Internet use to also be treated as an independent variable (see Dodel, 2015). The sociopolitical relevance of differentiated Internet use lies in its presumed effects on its users' life chances and well-being. Accordingly, the next wave of digital inequality research is likely to focus increasingly on this third level.

Recent studies have begun to analyze, for example, tangible outcomes of Internet use (van Deursen & Helsper, 2015) or the impacts on health and social connectedness in different populations (see e.g., Yost, Winstead, Berkowsky, & Cotten, 2016; Coleman, Hale, Cotten, & Gibson, 2015). In essence, this line of research asks whether the Internet makes people happier or better off—and the answers from the still relatively small body of literature that addresses this question have primarily focused on psychological conceptions of life satisfaction (e.g., Pénard, Poussing, & Suire, 2013; Valkenburg & Peter, 2007; Trepte, Dienlin, & Reinecke, 2014). Turning to more sociologically oriented studies, Ihm & Hsieh (2015) analyzed the ef-

fects of older adults' ICT use on their level of offline social activity and there is ample research on Internet use and social capital (e.g., Wellman, Quan-Haase, Witte, & Hampton, 2001; Ellison, Steinfield, & Lampe, 2007). There is, however, a research gap in assessing the contribution of Internet use to social well-being defined not as concrete activities or context-specific social resources but as a generalized achievement over the life course: feelings of inclusion, a sense of being part of and contributing to society, trusting other people, a belief in social progress, and an understanding of one's social environment (see Keyes, 1998; Contarello & Sarrica, 2007).

Altogether, the connection between Internet use and well-being, with great variety in either variable's operationalization, along with potential moderators like digital skills or age is a promising avenue for future research. At the macro level, Internet use can also be treated as an independent variable. While research has shown that income inequality predicts Internet diffusion negatively and economic performance is positively associated with adoption rates (Zhang, 2013), there is also a need for further research on the feedback of Internet use on the distribution of income and other valuable resources. Bauer (2016) notes that globally increasing connectivity has positive and negative effects on inequality under the influence of many economic forces and concludes that «in high-income countries ICT has contributed to increasing income inequality at stagnant median incomes» (p. 32).

The value of large-scale nationally representative data sets is undisputed, and as argued for example in Article III, indispensable when the goal is generalizability to an entire country. The quality and scope of the WIP data are thus a strength of this thesis. Useful insights in Internet use research can, however, also be obtained from the analysis of smaller and very specific populations. For instance, Robinson (2009) explored the informational habitus of economically disadvantaged youths in rural California and gained a rich understanding of usage patterns between a task-oriented, constrained stance and an exploratory, positive approach. In this vein, future research, in particular on the effects of Internet use in terms of life

chances, may draw on marginalized groups to investigate the mechanisms that lead to digital exclusion in more depth.

Articles

Article I

Measurement Invariance in Comparative Internet Use Research

Abstract

Comparative studies in communication and Internet research call for equivalent measures of key constructs that are comparable across populations. This article details and applies the concept of measurement invariance within a cross-nationally comparative context. Multi-group confirmatory factor analysis is used to test configural, metric, and scalar invariance in an empirical example and structural equation modeling introduces exogenous predictors of Internet use types. Results support metric invariance for a four-factor Internet usage model in three English-speaking countries. The significance of measurement invariance testing for unbiased comparative research is discussed.

Büchi, M. (2016). Measurement invariance in comparative Internet use research. *Studies in Communication Sciences, 16*(1), 61–69. doi:10.1016/j.scoms.2016.03.003

Article II

Modeling the Second-Level Digital Divide: A Five-Country Study of Social Differences in Internet Use

Abstract

Based on representative surveys on Internet use, this article advances comparative research on the second-level digital divide by modeling Internet usage disparities for five countries with narrowing access gaps. Four core Internet usage types are constructed and predicted by sociodemographic variables in a structural model. Overall, the findings confirm the recently identified shift in the digital divide from access to usage in five further countries. Results show that sociodemographics alone account for up to half of the variance in usage in these high-penetration countries, with age being the strongest predictor. Measurement invariance tests indicate that a direct comparison is only valid between three of the five countries explored. Methodologically, this points to the indispensability of such tests for unbiased comparative research.

Büchi, M., Just, N., & Latzer, M. (2016). Modeling the second-level digital divide: A five-country study of social differences in Internet use. *New Media & Society, 18*(11), 2703–2722. doi:10.1177/1461444815604154

Article III

Caring is not Enough: The Importance of Internet Skills for Online Privacy Protection

Abstract

This article explains Internet users' self-help activities in protecting their privacy online using structural equation modeling. Based on a representative survey of Swiss Internet users, it reveals past experiences with privacy breaches as a strong predictor of current protective behavior. Further, in line with the «privacy paradox» argument, caring about privacy (privacy attitudes) alone does not necessarily result in substantial self-protection. Most strikingly, however, general Internet skills are key in explaining users' privacy behavior. These skills enable users to reduce risks of privacy loss while obtaining the benefits from online activities that increasingly depend on the revelation of personal data. Consequently, Internet skills are an essential starting point for public policies regarding users' self-help in privacy protection.

Büchi, M., Just, N., & Latzer, M. (2016). Caring is not enough: The importance of Internet skills for online privacy protection. *Information, Communication & Society*. Advance online publication. doi:10.1080/1369118X.2016.1229001

Article IV

Engaging the Engaged: Reinforcement Mechanisms in Online Political Participation

Abstract

Research on the effects of the Internet on democracy has produced mixed results. The present study takes a digital inequality perspective and analyzes the role of political interest and Internet expertise for the social structuration of online political participation. Analyses are based on two-wave nationally representative survey data from Switzerland and use structural equation modeling. Results show that Internet users can be grouped into distinct categories of political and nonpolitical users. Online political participation is promoted by high political interest as well as Internet skills, and these predictors increasingly depend on social position. Implications for digital information policies are discussed.

Büchi, M., & Vogler, F. (2016). *Engaging the engaged: Reinforcement mechanisms in online political participation*. Manuscript submitted for publication.

Article V

Microblogging as an Extension of Science Reporting

Abstract

Mass media have long provided general publics with science news. New media like Twitter have entered this system and provide an additional platform for the dissemination of science information. Based on automated collection and analysis of more than 900 news articles and 70,000 tweets, this study explores the online communication of current science news. Topic modeling (latent Dirichlet allocation) was used to extract five broad themes of science reporting: space missions, the US government shutdown, cancer research, Nobel Prizes and climate change. Using content and network analysis, Twitter was found to extend public science communication by providing additional voices and contextualizations of science issues. It serves a recommender role by linking to web resources, by connecting users, and by directing users' attention. The paper suggests that microblogging adds a new and relevant layer to the public communication of science.

Büchi, M. (2016). Microblogging as an extension of science reporting. *Public Understanding of Science*. Advance online publication. doi:10.1177/0963662516657794

Bibliography

Bibliography

Acquisti, A., Brandimarte, L., & Loewenstein, G. (2015). Privacy and human behavior in the age of information. *Science*, *347*(6221), 509–514. doi:10.1126/science.aaa1465

Acquisti, A., Taylor, C. R., & Wagman, L. (2016). The economics of privacy. *SSRN Electronic Journal*. doi:10.2139/ssrn.2580411

Aitamurto, T., & Lewis, S. C. (2012). Open innovation in digital journalism: Examining the impact of open APIs at four news organizations. *New Media & Society*, *15*(2), 314–331. doi:10.1177/1461444812450682

Amichai-Hamburger, Y., & Hayat, Z. (2011). The impact of the Internet on the social lives of users: A representative sample from 13 countries. *Computers in Human Behavior*, *27*(1), 585–589. doi:10.1016/j.chb.2010.10.009

Anderson, J., & Rainie, L. (2014). Digital life in 2025. Report, Pew Research Center, Washington, DC. http://www.pewinternet.org/2014/03/11/digital-life-in-2025/

Andrés, L., Cuberes, D., Diouf, M., & Serebrisky, T. (2010). The diffusion of the Internet: A cross-country analysis. *Telecommunications Policy*, *34*(5-6), 323–340. doi:10.1016/j.telpol.2010.01.003

Anduiza, E., Gallego, A., & Cantijoch, M. (2010). Online political participation in Spain: The impact of traditional and Internet resources. *Journal of Information Technology & Politics*, *7*(4), 356–368. doi:10.1080/19331681003791891

Arbuckle, J. L. (2012). *IBM SPSS Amos 21 user's guide*. ftp://public.dhe.ibm.com/software/analytics/spss/documentation/amos/21.0/en/Manuals/IBM_SPSS_Amos_Users_Guide.pdf

Arceneaux, N., & Weiss, A. S. (2010). Seems stupid until you try it: press coverage of Twitter, 2006–9. *New Media & Society*, *12*(8), 1262–1279. doi:10.1177/1461444809360773

Arcos, A., del Mar Rueda, M., Trujillo, M., & Molina, D. (2014). Review of estimation methods for landline and cell phone surveys. *Sociological Methods & Research*, *44*(3), 458–485. doi:10.1177/0049124114546904

Ashwell, D. J. (2014). The challenges of science journalism: The perspectives of scientists, science communication advisors and journalists from New Zealand. *Public Understanding of Science*, *25*(3), 379–393. doi:10.1177/0963662514556144

Atton, C., & Wickenden, E. (2005). Sourcing routines and representation in alternative journalism: a case study approach. *Journalism Studies*, *6*(3), 347–359. doi:10.1080/14616700500132008

Baron, N. S. (2010). Introduction to special section: mobile phones in cross-cultural

context: Sweden, Estonia, the USA and Japan. *New Media & Society*, *12*(1), 3–11. doi:10.1177/1461444809355109

Barry, B. (1998). *Social exclusion, social isolation and the distribution of income*. London, UK: Centre for Analysis of Social Exclusion, London School of Economics.

Bastos, M. T., & Zago, G. (2013). Tweeting news articles: Readership and news sections in Europe and the Americas. *Sage Open*, *3*(3). doi:10.1177/2158244013502496

Batts, S. A., Anthis, N. J., & Smith, T. C. (2008). Advancing science through conversations: Bridging the gap between blogs and the academy. *PLoS Biology*, *6*(9), e240. doi:10.1371/journal.pbio.0060240

Bauer, J. M. (2007). Dynamic effects of network neutrality. *International Journal of Communication*, *1*, 531–547. http://ijoc.org/index.php/ijoc/article/view/156/79

Bauer, J. M. (2016). Inequality in the information society. Working paper, Quello Center, Michigan State University, East Lansing, MI. doi:10.2139/ssrn.2813671

Benkler, Y. (2006). *The wealth of networks: How social production transforms markets and freedom*. New Haven, CT: Yale University Press.

Bennett, C. J., & Parsons, C. (2013). Privacy and surveillance: The multidisciplinary literature on the capture, use, and disclosure of personal information in cyberspace. In W. H. Dutton (Ed.) *The Oxford handbook of Internet studies*, (pp. 486–508). Oxford, UK: Oxford University Press. doi:10.1093/oxfordhb/9780199589074.013.0023

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*(2), 238–246. doi:10.1037/0033-2909.107.2.238

Berry, D. M. (2011). The computational turn: Thinking about the digital humanities. *Culture Machine*, *12*. http://culturemachine.net/index.php/cm/article/viewDownloadInterstitial/440/470

Berry, J. W., Poortinga, Y. H., Breugelmans, S. M., Chasiotis, A., & Sam, D. L. (Eds.) (2011). *Cross-cultural psychology*. Cambridge, UK: Cambridge University Press. doi:10.1017/cbo9780511974274

Bik, H. M., & Goldstein, M. C. (2013). An introduction to social media for scientists. *PLoS Biology*, *11*(4), e1001535. doi:10.1371/journal.pbio.1001535

Billiet, J. (2003). Cross-cultural equivalence with structural equation modeling. In J. A. Harkness, F. J. van de Vijver, & P. P. Mohler (Eds.) *Cross-cultural survey methods*, (pp. 257–265). Hoboken, NJ: John Wiley & Sons.

Blank, G. (2013). Who creates content? Stratification and content creation on the Internet. *Information, Communication & Society*, *16*(4), 590–612. doi:10.1080/1369118x.2013.777758

Blank, G., & Groselj, D. (2014). Dimensions of Internet use: amount, variety, and types. *Information, Communication & Society*, *17*(4), 417–435. doi:10.1080/1369118x.2014.889189

Blei, D. M. (2012). Probabilistic topic models. *Communications of the ACM*, *55*(4), 77. doi:10.1145/2133806.2133826

Blei, D. M., Ng, A. Y., & Jordan, M. I. (2003). Latent Dirichlet allocation. *Journal of Machine Learning Research*, *3*, 993–1022.

Boix, C., & Stokes, S. C. (Eds.) (2009). *The Oxford handbook of comparative politics*. Oxford, UK: Oxford University Press. doi:10.1093/oxfordhb/9780199566020.001.0001

Bonfadelli, H. (2002). The Internet and knowledge gaps: A theoretical and empirical investigation. *European Journal of Communication*, *17*(1), 65–84. doi:10.1177/0267323102017001607

Borge, R., & Cardenal, A. S. (2011). Surfing the net: A pathway to participation for the politically uninterested? *Policy & Internet*, *3*(1), 34–62. doi:10.2202/1944-2866.1099

Bornschier, V. (2001). Generalisiertes Vertrauen und die frühe Verbreitung der Internetnutzung im Gesellschaftsvergleich [Generalized trust and the early diffusion of the Internet compared cross-nationally]. *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, *53*(2), 233–257.

Bornschier, V. (2008). Zur Entwicklung der sozialen Ungleichheit im Weltsystem: Fakten, offene Fragen und erste Antworten [The development of social inequality in the global system: Facts, open questions, and first answers]. In M. Bayer, G. Mordt, S. Terpe, & M. Winter (Eds.) *Transnationale Ungleichheitsforschung. Eine neue Herausforderung für die Soziologie*, (pp. 97–134). Frankfurt a.M., Germany: Campus.

Boulianne, S. (2009). Does Internet use affect engagement? a meta-analysis of research. *Political Communication*, *26*(2), 193–211. doi:10.1080/10584600902854363

Boulianne, S. (2011). Stimulating or reinforcing political interest: Using panel data to examine reciprocal effects between news media and political interest. *Political Communication*, *28*(2), 147–162. doi:10.1080/10584609.2010.540305

Bourdieu, P. (1977). *Outline of a theory of practice*. Cambridge, UK: Cambridge University Press.

Bourdieu, P. (1986). The forms of capital. In J. Richardson (Ed.) *Handbook of theory and research for the sociology of education*. New York, NY: Greenwood.

boyd, d., & Crawford, K. (2012). Crititcal questions for big data: Provocations for a cultural, technological, and scholarly phenomenon. *Information, Communication & Society*, *15*(5), 662–679. doi:10.1080/1369118x.2012.678878

Brake, D. R. (2014). Are we all online content creators now? Web 2.0 and digital divides. *Journal of Computer-Mediated Communication*, *19*(3), 591–609. doi:10.1111/jcc4.12042

Brandtzæg, P. B., Heim, J., & Karahasanović, A. (2011). Understanding the new digital divide—a typology of Internet users in Europe. *International Journal of Human-Computer Studies*, *69*(3), 123–138. doi:10.1016/j.ijhcs.2010.11.004

Brossard, D. (2013). New media landscapes and the science information consumer. *Proceedings of the National Academy of Sciences*, *110*(Supplement 3), 14096–14101.

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York, NY: Guilford Press.

Brown, T. A. (2015). *Confirmatory factor analysis for applied research*. New York, NY: Guilford Press, 2nd ed.

Bucchi, M. (1998). *Science and the media: Alternative routes in scientific communication*. London, UK: Sage.

Bucchi, M. (2004). Can genetics help us rethink communication? public communication of science as a 'double helix'. *New Genetics and Society*, *23*(3), 269–283. doi:10.1080/1463677042000305048

Bucchi, M. (2013). Style in science communication. *Public Understanding of Science*, *22*(8), 904–915. doi:10.1177/0963662513498202

Büchi, M. (2016a). *Digital inequalities: Differentiated Internet use and social implications*. Synopsis of the doctoral dissertation, University of Zurich, Zurich, Switzerland.

Büchi, M. (2016b). Measurement invariance in comparative Internet use research. *Studies in Communication Sciences*, *16*(1), 61–69. doi:10.1016/j.scoms.2016.03.003

Büchi, M. (2016c). Microblogging as an extension of science reporting. *Public Understanding of Science*. Advance online publication. doi:10.1177/0963662516657794

Büchi, M., Just, N., & Latzer, M. (2016a). Caring is not enough: The importance of Internet skills for online privacy protection. *Information, Communication & Society*. Advance online publication. doi:10.1080/1369118X.2016.1229001

Büchi, M., Just, N., & Latzer, M. (2016b). Modeling the second-level digital divide: A five-country study of social differences in Internet use. *New Media & Society*, *18*(11), 2703–2722. doi:10.1177/1461444815604154

Büchi, M., & Vogler, F. (2016). *Engaging the engaged: Reinforcement mechanisms in online political participation*. Manuscript submitted for publication.

Byrne, B. M. (2004). Testing for multigroup invariance using AMOS graphics: A road less traveled. *Structural Equation Modeling*, *11*(2), 272–300. doi:10.1207/s15328007sem1102_8

Byrne, B. M. (2010). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*. London, UK: Routledge.

Byrne, B. M., Shavelson, R. J., & Muthén, B. (1989). Testing for the equivalence of factor covariance and mean structures: The issue of partial measurement invariance. *Psychological Bulletin*, *105*(3), 456–466. doi:10.1037/0033-2909.105.3.456

Caplan, S. E. (2003). Preference for online social interaction: A theory of problematic Internet use and psychosocial well-being. *Communication Research*, *30*(6), 625–648. doi:10.1177/0093650203257842

Caplan, S. E. (2010). Theory and measurement of generalized problematic Internet use: A two-step approach. *Computers in Human Behavior*, *26*(5), 1089–1097. doi:10.1016/j.chb.2010.03.012

Cardozo, G., Liang, G., & Lapa, T. (2013). Cross-national comparative perspectives from the World Internet Project. In W. H. Dutton (Ed.) *The Oxford handbook of Internet studies*, (pp. 216–236). Oxford, UK: Oxford University Press. doi:10.1093/oxfordhb/9780199589074.013.0011

Castells, M. (1997). An introduction to the information age. *City*, *2*(7), 6–16. doi:10.1080/13604819708900050

Castells, M. (2002). *The Internet galaxy*. Oxford, UK: Oxford University Press.

Cha, M., Haddadi, H., Benevenuto, F., & Gummadi, P. K. (2010). Measuring user influence in Twitter: The million follower fallacy. In *Proceedings of the 4th international AAAI conference on weblogs and social media*, (pp. 10–17). Menlo Park, CA: The AAAI Press. http://www.aaai.org/ocs/index.php/ICWSM/ICWSM10/paper/viewFile/1538/1826,2011

Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling*, *14*(3), 464–504. doi:10.1080/10705510701301834

Chen, F. F. (2008). What happens if we compare chopsticks with forks? the impact of making inappropriate comparisons in cross-cultural research. *Journal of Personality and Social Psychology*, *95*(5), 1005–1018. doi:10.1037/a0013193

Chen, H.-T., & Chen, W. (2015). Couldn't or wouldn't? The influence of privacy concerns and self-efficacy in privacy management on privacy protection. *Cyberpsychology, Behavior, and Social Networking*, *18*(1), 13–19. doi:10.1089/cyber.2014.0456

Chen, W., & Wellman, B. (2004). The global digital divide – within and between countries. *IT & Society*, *1*(7), 18–25.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling*, *9*(2), 233–255. doi:10.1207/s15328007sem0902_5

Church, A. T. (2010). Measurement issues in cross-cultural research. In G. Walford, E. Tucker, & M. Viswanathan (Eds.) *The Sage handbook of measurement*, (pp. 151–176). Thousand Oaks, CA: Sage. doi:10.4135/9781446268230.n9

Cole, J. I., Suman, M., Schramm, P., Zhou, L., Reyes-Sepulveda, E., & Lebo, H. (2013a). World Internet Project: International report (5th edition). Report, University of Southern California, Los Angeles, CA. http://www.digitalcenter.org/wp-content/uploads/2013/12/2013worldinternetreport.pdf

Cole, J. I., Suman, M., Schramm, P., Zhou, L., Salvador, A., & Lebo, H. (2013b). The Digital Future Project 2013: Surveying the digital future. Report, University of Southern California, Los Angeles, CA. http://www.digitalcenter.org/wp-content/uploads/2013/06/2013-Report.pdf

Coleman, J. S. (1990). *Foundations of social theory*. Cambridge, MA: Harvard University Press.

Coleman, L. O., Hale, T. M., Cotten, S. R., & Gibson, P. (2015). The impact of information and communication technology (ICT) usage on psychological well-being among urban youth. *Sociological Studies of Children and Youth*, *19*, 267–291. doi:10.1108/s1537-466120150000019008

Coleman, S., & Blumler, J. G. (2009). *The Internet and democratic citizenship: Theory, practice and policy*. Cambridge, UK: Cambridge University Press.

Contarello, A., & Sarrica, M. (2007). ICTs, social thinking and subjective well-being – the Internet and its representations in everyday life. *Computers in Human Behavior*, *23*(2), 1016–1032. doi:10.1016/j.chb.2005.08.013

Conway, M. M. (2000). *Political participation in the United States*. Washington, DC: CQ Press, 3rd ed.

Copeland, L., & Bimber, B. (2014). Variation in the relationship between digital media use and political participation in U.S. elections over time, 1996–2012: Does Obama's reelection change the picture? *Journal of Information Technology & Politics*, *12*(1), 74–87. doi:10.1080/19331681.2014.975391

Costa, P. T., & MacCrae, R. R. (1992). *Revised NEO personality inventory (NEO PI-R) and NEO five-factor inventory (NEO FFI): Professional manual*. Lutz, FL: Psychological Assessment Resources.

Couldry, N., Rodriguez, C., Bolin, G., Cohen, J., Goggin, G., Kraidy, M., et al. (2016). Media and communications. In *International Panel on Social Progress: Rethinking society for the 21st century*. Paris, France: International Panel on Social Progress. https://comment.ipsp.org/chapter/chapter-13-media-and-communications

Dahlgren, P. (2000). The Internet and the democratization of civic culture. *Political Communication*, *17*(4), 335–340. doi:10.1080/10584600050178933

Davidov, E., Meuleman, B., Cieciuch, J., Schmidt, P., & Billiet, J. (2014). Measurement equivalence in cross-national research. *Annual Review of Sociology*, *40*(1), 55–75. doi:10.1146/annurev-soc-071913-043137

Davidson, A. R., Jaccard, J. J., Triandis, H. C., Morales, M. L., & Diaz-Guerrero, R. (1976). Cross-cultural model testing: Toward a solution of the etic-emic dilemma. *International Journal of Psychology*, *11*(1), 1–13. doi:10.1080/00207597608247343

De Marco, S., Robles, J. M., & Antino, M. (2014). Digital skills as a conditioning factor for digital political participation. *Communications*, *39*(1). doi:10.1515/commun-2014-0004

de Vreese, C. H. (2007). Digital renaissance: Young consumer and citizen? *The ANNALS of the American Academy of Political and Social Science*, *611*(1), 207–216. doi:10.1177/0002716206298521

Debatin, B., Lovejoy, J. P., Horn, A.-K., & Hughes, B. N. (2009). Facebook and online privacy: Attitudes, behaviors, and unintended consequences. *Jour-*

nal of Computer-Mediated Communication, *15*(1), 83–108. doi:10.1111/j.1083-6101.2009.01494.x

di Gennaro, C., & Dutton, W. (2006). The Internet and the public: Online and offline political participation in the United Kingdom. *Parliamentary Affairs*, *59*(2), 299–313. doi:10.1093/pa/gsl004

Dienlin, T., & Trepte, S. (2015). Is the privacy paradox a relic of the past? An in-depth analysis of privacy attitudes and privacy behaviors. *European Journal of Social Psychology*, *45*(3), 285–297. doi:10.1002/ejsp.2049

DiMaggio, P., & Garip, F. (2012). Network effects and social inequality. *Annual Review of Sociology*, *38*(1), 93–118. doi:10.1146/annurev.soc.012809.102545

DiMaggio, P., & Hargittai, E. (2001). From the 'digital divide' to 'digital inequality': Studying Internet use as penetration increases. Working paper, Princeton University, Princeton, NJ. https://www.princeton.edu/~artspol/workpap15.html

DiMaggio, P., Hargittai, E., Celeste, C., & Shafer, S. (2004). From unequal access to differentiated use: A literature review and agenda for research on digital inequality. In K. M. Neckerman (Ed.) *Social Inequality*, (pp. 355–400). New York, NY: Russell Sage Foundation.

DiMaggio, P., Hargittai, E., Neuman, W. R., & Robinson, J. P. (2001). Social implications of the Internet. *Annual Review of Sociology*, *27*, 307–336. doi:10.1146/annurev.soc.27.1.307

DiMaggio, P., Nag, M., & Blei, D. (2013). Exploiting affinities between topic modeling and the sociological perspective on culture: Application to newspaper coverage of U.S. government arts funding. *Poetics*, *41*(6), 570–606. doi:10.1016/j.poetic.2013.08.004

Directive 2002/58/EC (2002, July 31). Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications. OJ L 201.

Directive (EU) 2016/680 (2016, May 4). Directive (EU) 2016/680 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data by competent authorities for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and on the free movement of such data, and repealing Council Framework Decision 2008/977/JHA. OJ L 119.

Dodel, M. (2015). An analytical framework to incorporate ICT as an independent variable. In A. Chib, J. May, & R. Barrantes (Eds.) *Impact of information society research in the global south*, (pp. 125–144). Berlin, Germany: Springer. doi:10.1007/978-981-287-381-1_7

Dodel, M., Büchi, M., & Menese, P. (2016). Modeling Latin America's second digital divide: Online inequalities in the world's most unequal region. Unpublished working paper.

Drori, G. S. (2010). Globalization and technology divides: Bifurcation of policy between the "digital divide" and the "innovation divide". *Sociological Inquiry*, *80*(1), 63–91. doi:10.1111/j.1475-682X.2009.00316.x

Duff, A. S. (2011). The Rawls-Tawney theorem and the digital divide in postindustrial society. *Journal of the American Society for Information Science and Technology*, *62*(3), 604–612. doi:10.1002/asi.21470

Duggan, M., Ellison, N. B., Lampe, C., Lenhart, A., & Madden, M. (2015). Social media update 2014. Report, Pew Research Center, Washington, DC. http://www.pewinternet.org/2015/01/09/social-media-update-2014/

Dutton, W. H. (2013). Internet studies: The foundations of a transformative field. In W. H. Dutton (Ed.) *The Oxford handbook of Internet studies*, (pp. 1–23). Oxford, UK: Oxford University Press. doi:10.1093/oxfordhb/9780199589074.013.0005

Dutton, W. H., & Blank, G. (2013). Cultures of the Internet: The Internet in Britain. Report, Oxford Internet Institute, Oxford, UK. http://oxis.oii.ox.ac.uk/wp-content/uploads/sites/43/2014/11/OxIS-2013.pdf

Easley, D., & Kleinberg, J. (2010). *Networks, crowds, and markets: Reasoning about a highly connected world*. Cambridge, UK: Cambridge University Press.

Eastin, M. S., & LaRose, R. (2000). Internet self-efficacy and the psychology of the digital divide. *Journal of Computer-Mediated Communication*, *6*(1). doi:10.1111/j.1083-6101.2000.tb00110.x

Edwards, J. R. (2010). The fallacy of formative measurement. *Organizational Research Methods*, *14*(2), 370–388. doi:10.1177/1094428110378369

Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook 'friends:' social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication*, *12*(4), 1143–1168. doi:10.1111/j.1083-6101.2007.00367.x

Epstein, D., Nisbet, E. C., & Gillespie, T. (2011). Who's responsible for the digital divide? Public perceptions and policy implications. *The Information Society*, *27*(2), 92–104. doi:10.1080/01972243.2011.548695

Esser, F., & Hanitzsch, T. (Eds.) (2013). *The handbook of comparative communication research*. New York, NY: Routledge.

Esser, H. (1992). 'Foundations of social theory' oder 'foundations of sociology'? ['Foundations of social theory' or 'foundations of sociology'?]. *Analyse & Kritik*, *14*(2), 129–142.

Ettema, J. S., & Kline, F. G. (1977). Deficits, differences, and ceilings: Contingent conditions for understanding the knowledge gap. *Communication Research*, *4*(2), 179–202. doi:10.1177/009365027700400204

European Commission (2011). Special Eurobarometer 359: Attitudes on data protection and electronic identity in the European Union. http://ec.europa.eu/public_opinion/archives/ebs/ebs_359_en.pdf

Eveland, W. P., & Dunwoody, S. (1998). Users and navigation patterns of a science World Wide Web site for the public. *Public Understanding of Science*, *7*(4), 285–311. doi:10.1088/0963-6625/7/4/003

Eveland, W. P. J., & Scheufele, D. A. (2000). Connecting news media use with gaps in knowledge and participation. *Political Communication*, *17*(3), 215–237. doi:10.1080/105846000414250

Eynon, R., & Geniets, A. (2015). The digital skills paradox: How do digitally excluded youth develop skills to use the Internet? *Learning, Media and Technology*, *41*(3), 463–479. doi:10.1080/17439884.2014.1002845

Fahy, D., & Nisbet, M. C. (2011). The science journalist online: Shifting roles and emerging practices. *Journalism*, *12*(7), 778–793. doi:10.1177/1464884911412697

Falcon, J. (2013). *Social mobility in 20th Century Switzerland*. Doctoral dissertation, University of Lausanne. https://serval.unil.ch/resource/serval:BIB_185BC090FAB6.P001/REF

Feezell, J. T., Conroy, M., & Guerrero, M. (2016). Internet use and political participation: Engaging citizenship norms through online activities. *Journal of Information Technology & Politics*, *13*(2), 95–107. doi:10.1080/19331681.2016.1166994

Feinerer, I., Hornik, K., & Meyer, D. (2008). Text mining infrastructure in R. *Journal of Statistical Software*, *25*(5). doi:10.18637/jss.v025.i05

Feng, Y., & Xie, W. (2014). Teens' concern for privacy when using social networking sites: An analysis of socialization agents and relationships with privacy-protecting behaviors. *Computers in Human Behavior*, *33*, 153–162. doi:10.1016/j.chb.2014.01.009

Findahl, O. (2013). Swedes and the Internet. Report, .SE, Stockholm, Sweden. http://www.worldinternetproject.net/_files/_Published/_oldis/403_swedes_and_the_internet_2013.pdf

Finley, K. (2016). Facebook and Google will stretch Internet cable from LA to Hong Kong. Wired (October 12, 2016). https://www.wired.com/2016/10/facebook-google-wil-stretch-internet-cable-la-hong-kong

Flanagin, A. J., & Metzger, M. J. (2006). Internet use in the contemporary media environment. *Human Communication Research*, *27*(1), 153–181. doi:10.1111/j.1468-2958.2001.tb00779.x

Fogg, B. J. (2009). A behavior model for persuasive design. In *Proceedings of the 4th International Conference on Persuasive Technology – Persuasive '09*. New York, NY: Association for Computing Machinery (ACM). doi:10.1145/1541948.1541999

Fontaine, J. R. J. (2005). Equivalence. In K. Kempf-Leonard (Ed.) *Encyclopedia of social measurement*, vol. 1. Amsterdam, Netherlands: Elsevier.

Fricker, S., Galesic, M., Tourangeau, R., & Yan, T. (2005). An experimental

comparison of web and telephone surveys. *Public Opinion Quarterly*, *69*(3), 370–392. doi:10.1093/poq/nfi027

Friemel, T. N. (2014). The digital divide has grown old: Determinants of a digital divide among seniors. *New Media & Society*, *18*(2), 313–331. doi:10.1177/1461444814538648

Gajos, K. (2016). Design and discrimination. Harvard University Science Research Public Lectures. http://media.physics.harvard.edu/video/mp4/ScienceLecture_GAJOS_030916.mp4

Gallego, A. (2014). *Unequal political participation worldwide*. Cambridge, UK: Cambridge University Press.

Galtung, J., & Ruge, M. H. (1965). The structure of foreign news: The presentation of the Congo, Cuba and Cyprus crises in four norwegian newspapers. *Journal of Peace Research*, *2*(1), 64–90. doi:10.1177/002234336500200104

General Social Survey (2004). General Social Survey (GSS) 2004 questionnaire version 6. http://gss.norc.org/documents/quex/2004%20GSS%20V6.pdf

Geradin, D., & Kuschewsky, M. (2013). Competition law and personal data: Preliminary thoughts on a complex issue. http://ssrn.com/abstract=2216088

Gerhards, J., & Schäfer, M. S. (2010). Is the Internet a better public sphere? Comparing old and new media in the US and Germany. *New Media & Society*. doi:10.1177/1461444809341444

Gerlitz, C., & Rieder, B. (2013). Mining one percent of Twitter: Collections, baselines, sampling. *M/C Journal*, *16*(2). http://journal.media-culture.org.au/index.php/mcjournal/article/viewArticle/620

Geser, H. (2010). Tweeted thoughts and twittered relationships: Some sociological remarks on the promises and limits of molecular online communications. *Revista de Informatica Sociala*, *13*, 5–18. doi:10.5167/uzh-42416

Gibson, A., Miller, M., Smith, P., Bell, A., & Crothers, C. (2013). The Internet in New Zealand 2013. Report, Institute of Culture, Discourse & Communication, AUT University, Auckland, New Zealand. https://www.aut.ac.nz/__data/assets/pdf_file/0007/424816/wipnz2013final.pdf

Gil de Zúñiga, H., Veenstra, A., Vraga, E., & Shah, D. (2010). Digital democracy: Reimagining pathways to political participation. *Journal of Information Technology & Politics*, *7*(1), 36–51. doi:10.1080/19331680903316742

Gong, W., Li, Z. G., & Stump, R. L. (2007). Global Internet use and access: Cultural considerations. *Asia Pacific Journal of Marketing and Logistics*, *19*(1), 57–74. doi:10.1108/13555850710720902

Graham, J. W. (2009). Missing data analysis: Making it work in the real world. *Annual Review of Psychology*, *60*(1), 549–576. doi:10.1146/annurev.psych.58.110405.085530

Graham, M., & Dutton, W. H. (Eds.) (2014). *Society and the Internet: How networks of information and communication are changing our lives*. Oxford, UK: Oxford University Press.

Grimmer, J., & Stewart, B. M. (2013). Text as data: The promise and pitfalls of automatic content analysis methods for political texts. *Political Analysis*, *21*, 267–297. doi:10.1093/pan/mps028

Grubbs Hoy, M., & Milne, G. (2010). Gender differences in privacy-related measures for young adult Facebook users. *Journal of Interactive Advertising*, *10*(2), 28–45. doi:10.1080/15252019.2010.10722168

Grusky, D. B. (2007). Theories of stratfication and inequality. In G. Ritzer (Ed.) *The Blackwell Encyclopedia of Sociology*, (pp. 4809–4818). Oxford, UK: Blackwell.

Gurstein, M. (2015). Why I'm giving up on the digital divide. *The Journal of Community Informatics*. http://ci-journal.net/index.php/ciej/article/view/1210/113

Haddon, L. (2007). Roger Silverstone's legacies: Domestication. *New Media & Society*, *9*(1), 25–32. doi:10.1177/1461444807075201

Han, S. (2010). Theorizing new media: Reflexivity, knowledge, and the web 2.0. *Sociological Inquiry*, *80*(2), 200–213. doi:10.1111/j.1475-682X.2010.00327.x

Hansen, A. (1994). Journalistic practices and science reporting in the British press. *Public Understanding of Science*, *3*(2), 111–134. doi:10.1088/0963-6625/3/2/001

Hargittai, E. (2002). Second-level digital divide: Differences in people's online skills. *First Monday*, *7*(4). doi:10.5210/fm.v7i4.942

Hargittai, E. (2005). Survey measures of web-oriented digital literacy. *Social Science Computer Review*, *23*(3), 371–379. doi:10.1177/0894439305275911

Hargittai, E. (2008). The digital reproduction of inequality. In D. Grusky (Ed.) *Social stratification*, (pp. 936–944). Boulder, CO: Westview Press, 3rd ed. http://webuse.org/pdf/Hargittai-DigitalReproduction2008.pdf

Hargittai, E. (2010). Digital na(t)ives? Variation in Internet skills and uses among members of the 'net generation'. *Sociological Inquiry*, *80*(1), 92–113. doi:10.1111/j.1475-682x.2009.00317.x

Hargittai, E., & Hinnant, A. (2008). Digital inequality: Differences in young adults' use of the Internet. *Communication Research*, *35*(5), 602–621. doi:10.1177/0093650208321782

Hargittai, E., & Hsieh, Y. P. (2013). Digital inequality. In W. H. Dutton (Ed.) *The Oxford handbook of Internet studies*, (pp. 129–150). Oxford, UK: Oxford University Press. doi:10.1093/oxfordhb/9780199589074.013.0007

Hargittai, E., & Shafer, S. (2006). Differences in actual and perceived online skills: The role of gender. *Social Science Quarterly*, *87*(2), 432–448. doi:10.1111/j.1540-6237.2006.00389.x

Hasebrink, U. (2012). Comparing media use and reception. In F. Esser, & T. Hanitzsch (Eds.) *The handbook of comparative communication research*, (pp. 382–399). New York, NY: Routledge.

Hasebrink, U., Olafsson, K., & Stetka, V. (2010). Commonalities and differences: How to learn from international comparisons of children's online

behaviour. *International Journal of Media & Cultural Politics*, *6*(1), 9–24. doi:10.1386/macp.6.1.9/1

Helmond, A. (2015). The platformization of the web: Making web data platform ready. *Social Media + Society*, *1*(2). doi:10.1177/2056305115603080

Helsper, E., & Gerber, M. M. (2012). The plausibility of cross-national comparisons of internet use types. *The Information Society*, *28*(2), 83–98. doi:10.1080/01972243.2011.650294

Helsper, E. J. (2012). A corresponding fields model for the links between social and digital exclusion. *Communication Theory*, *22*(4), 403–426. doi:10.1111/j.1468-2885.2012.01416.x

Helsper, E. J., & Reisdorf, B. C. (2016). The emergence of a "digital underclass" in Great Britain and Sweden: Changing reasons for digital exclusion. *New Media & Society*. doi:10.1177/1461444816634676

Hermida, A. (2014). Twitter as an ambient news network. In K. Weller, A. Bruns, J. Burgess, M. Mahrt, & C. Puschmann (Eds.) *Twitter and society*, (pp. 359–372). New York, NY: Peter Lang.

Hilbert, M. (2011). The end justifies the definition: The manifold outlooks on the digital divide and their practical usefulness for policy-making. *Telecommunications Policy*, *35*(8), 715–736. doi:10.1016/j.telpol.2011.06.012

Hilgartner, S. (1990). The dominant view of popularization: Conceptual problems, political uses. *Social studies of science*, *20*(3), 519–539. doi:10.1177/030631290020003006

Hindman, M. (2009). *The myth of digital democracy*. Princeton, NJ: Princeton University Press.

Hirzalla, F., Van Zoonen, L., & De Ridder, J. (2010). Internet use and political participation: Reflections on the mobilization/normalization controversy. *The Information Society*, *27*(1), 1–15. doi:10.1080/01972243.2011.534360

Hoffman, D. L., Novak, T. P., & Venkatesh, A. (2004). Has the Internet become indispensable? *Communications of the ACM*, *47*(7), 37–42. http://dl.acm.org/citation.cfm?id=1005818

Hoffmann, C. P., Lutz, C., & Meckel, M. (2015). Content creation on the Internet: A social cognitive perspective on the participation divide. *Information, Communication & Society*, *18*(6), 696–716. doi:10.1080/1369118x.2014.991343

Hoffmeyer-Zlotnik, J. H. P., & Harkness, J. A. (Eds.) (2005). *Methodological aspects in cross-national research*. Mannheim, Germany: ZUMA. http://www.gesis.org/fileadmin/upload/forschung/publikationen/zeitschriften/zuma_nachrichten_spezial/znspezial11.pdf

Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions and organizations across nations*. Thousand Oaks, CA: Sage.

Holmberg, K., & Hellsten, I. (2016). Integrating and differentiating meanings in tweeting about the fifth Intergovernmental Panel on Climate Change (IPCC) report. *First Monday*, *21*(9). doi:10.5210/fm.v21i9.6603

Hong, S. (2012). Online news on Twitter: Newspapers' social media adoption and their online readership. *Information Economics and Policy*, *24*(1), 69–74.

Horn, J. L., & Mcardle, J. J. (1992). A practical and theoretical guide to measurement invariance in aging research. *Experimental Aging Research*, *18*(3), 117–144. doi:10.1080/03610739208253916

Horrigan, J. B. (2006). The Internet as a resource for news and information about science. Report, Pew Research Center, Washington, DC. http://www.pewinternet.org/2006/11/20/the-internet-as-a-resource-for-news-and-information-about-science/

Hu, L.-T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55. doi:10.1080/10705519909540118

Hunsicker, S., & Schroth, Y. (2014). Dual-Frame-Ansatz in politischen Umfragen [Dual-frame approach in political surveys]. Working paper, Forschungsgruppe Wahlen e.V., Mannheim, Germany. http://www.forschungsgruppe.de/Publikationen/dual_frame_A2_2014.pdf

Ihm, J., & Hsieh, Y. P. (2015). The implications of information and communication technology use for the social well-being of older adults. *Information, Communication & Society*, *18*(10), 1123–1138. doi:10.1080/1369118x.2015.1019912

Inglehart, R., & Baker, W. E. (2000). Modernization, cultural change, and the persistence of traditional values. *American Sociological Review*, *65*(1), 19–51. http://www.jstor.org/stable/2657288

International Telecommunications Union (2015). ICT facts and figures. https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2015.pdf

Jackman, S. (2006). Data from the web into R. *The Political Methodologist*, *14*(2), 11–15. http://www.nyu.edu/projects/spirling/documents/tpm.pdf

Jöreskog, K. G. (1969). A general approach to confirmatory maximum likelihood factor analysis. *Psychometrika*, *34*(2), 183–202. doi:10.1007/bf02289343

Jöreskog, K. G. (1971). Simultaneous factor analysis in several populations. *Psychometrika*, *36*(4), 409–426. doi:10.1007/bf02291366

Just, N., Latzer, M., Metreveli, S., & Saurwein, F. (2013). Switzerland on the Internet: An overview of diffusion, usage, concerns and democratic implications. *Studies in Communication Sciences*, *13*(2), 148–155. doi:10.1016/j.scoms.2013.11.002

Kang, C. (2016). Court backs rules treating Internet as utility, not luxury. The New York Times (14 June, 2016). http://www.nytimes.com/2016/06/15/technology/net-neutrality-fcc-appeals-court-ruling.html

Karnowski, V. (2011). *Diffusionstheorien [Theories of diffusion]*. Baden-Baden, Germany: Nomos.

Katz, E., Blumler, J. G., & Gurevitch, M. (1973a). Uses and gratifications research. *Public Opinion Quarterly*, *37*(4), 509. doi:10.1086/268109

Katz, E., Haas, H., & Gurevitch, M. (1973b). On the use of the mass media for important things. *American Sociological Review*, *38*(2), 164–181. http://www.jstor.org/stable/2094393

Katz, E., & Lazarsfeld, P. F. (1955). *Personal influence: The part played by people in the flow of mass communications*. New York, NY: The Free Press.

Keyes, C. L. M. (1998). Social well-being. *Social Psychology Quarterly*, *61*(2), 121–140. http://www.jstor.org/stable/2787065

Kiiski, S., & Pohjola, M. (2002). Cross-country diffusion of the Internet. *Information Economics and Policy*, *14*(2), 297–310. doi:10.1016/s0167-6245(01)00071-3

Kleinberg, J., & Lawrence, S. (2001). The structure of the web. *Science*, *294*(5548), 1849–1850. doi:10.1126/science.1067014

Kline, R. B. (2011). *Principles and practice of structural equation modeling*. New York, NY: Guilford Press, 3rd ed.

Kline, R. B. (2015). *Principles and practice of structural equation modeling*. New York, NY: Guilford Press, 4th ed.

Kohn, M. L. (1987). Cross-national research as an analytic strategy: American sociological association, 1987 presidential address. *American Sociological Review*, *52*(6), 713–731. http://www.jstor.org/stable/2095831

Kokolakis, S. (2015). Privacy attitudes and privacy behaviour: A review of current research on the privacy paradox phenomenon. *Computers & Security*. Advance online publication. doi:10.1016/j.cose.2015.07.002

Kovic, M. (2016). ChartOfTheWeek: The world is getting online. https://www.zipar.org/chartoftheweek/chartoftheweek-the-world-is-getting-online/

Kraut, R., Patterson, M., Lundmark, V., Kiesler, S., Mukophadhyay, T., & Scherlis, W. (1998). Internet paradox: A social technology that reduces social involvement and psychological well-being? *American Psychologist*, *53*(9), 1017–1031. doi:10.1037/0003-066x.53.9.1017

Krueger, B. S. (2002). Assessing the potential of Internet political participation in the United States: A resource approach. *American Politics Research*, *30*(5), 476–498. doi:10.1177/1532673x02030005002

Kruikemeier, S., van Noort, G., Vliegenthart, R., & de Vreese, C. H. (2013). Unraveling the effects of active and passive forms of political Internet use: Does it affect citizens' political involvement? *New Media & Society*, *16*(6), 903–920. doi:10.1177/1461444813495163

Kua, E., Reder, M., & Grossel, M. J. (2004). Science in the news: A study of reporting genomics. *Public Understanding of Science*, *13*(3), 309–322. doi:10.1177/0963662504045539

Kühne, R. (2013). Testing measurement invariance in media psychological research. *Journal of Media Psychology*, *25*(4), 153–159. doi:10.1027/1864-1105/a000096

Kwak, H., Lee, C., Park, H., & Moon, S. (2010). What is Twitter, a social network or a news media? In *Proceedings of the 19th international conference on World*

wide web, (pp. 591–600). New York, NY: ACM. http://dl.acm.org/citation.cfm?id=1772751

LaRose, R., & Eastin, M. S. (2004). A social cognitive theory of Internet uses and gratifications: Toward a new model of media attendance. *Journal of Broadcasting & Electronic Media*, *48*(3), 358–377. doi:10.1207/s15506878jobem4803_2

Latzer, M. (2013). Medienwandel durch Innovation, Ko-Evolution und Komplexität [Media change through innovation, co-evolution and complexity]. *Medien- & Kommunikationswissenschaft*, *61*(2), 235–252. doi:10.5771/1615-634x-2013-2-235

Latzer, M., Büchi, M., & Just, N. (2015a). Internet-Anwendungen und deren Nutzung in der Schweiz [Internet applications and use in Switzerland]. World Internet Project – Switzerland 2015 Report, University of Zurich, Zurich, Switzerland. http://mediachange.ch/media//pdf/publications/Anwendungen_Nutzung_2015.pdf

Latzer, M., Büchi, M., & Just, N. (2015b). Internet und Politik in der Schweiz [Internet and politics in Switzerland]. World Internet Project – Switzerland 2015 Report, University of Zurich, Zurich, Switzerland. http://mediachange.ch/media//pdf/publications/Internet_und_Politik_2015.pdf

Latzer, M., Büchi, M., & Just, N. (2015c). Internetverbreitung und digitale Bruchlinien in der Schweiz [Internet diffusion and digital divides in Switzerland]. World Internet Project – Switzerland 2015 Report, University of Zurich, Zurich, Switzerland. http://mediachange.ch/media//pdf/publications/Verbreitung_und_Bruchlinien_2015.pdf

Latzer, M., Büchi, M., & Just, N. (2015d). Vertrauen und Sorgen bei der Internetnutzung in der Schweiz [Trust and concerns of Internet users in Switzerland]. World Internet Project – Switzerland 2015 Report, University of Zurich, Zurich, Switzerland. http://mediachange.ch/media//pdf/publications/Vertrauen_Sorgen_2015.pdf

Latzer, M., Hollnbuchner, K., Just, N., & Saurwein, F. (2014). The economics of algorithmic selection on the Internet. Working paper, University of Zurich, Zurich, Switzerland. http://mediachange.ch/media//pdf/publications/Economics_of_algorithmic_selection_WP.pdf

Latzer, M., Just, N., Metreveli, S., & Saurwein, F. (2012). Internetverbreitung und digitale Bruchlinien in der Schweiz [Internet diffusion and digital divides in Switzerland]. World Internet Project – Switzerland 2011 Report, University of Zurich, Zurich, Switzerland. http://mediachange.ch/media//pdf/publications/Verbreitung_und_Bruchlinien_.pdf

Latzer, M., Just, N., Metreveli, S., & Saurwein, F. (2013). Internetverbreitung und digitale Bruchlinien in der Schweiz [Internet diffusion and digital divides in Switzerland]. World Internet Project – Switzerland 2013 Report, University of Zurich, Zurich, Switzerland. http://www.mediachange.ch/media//pdf/publications/Verbreitung_und_Bruchlinien_2013.pdf

Latzer, M., Just, N., Saurwein, F., & Slominski, P. (2003). Regulation remixed:

Institutional change through self and co-regulation in the mediamatics sector. *Communications & Strategies*, *50*(2), 127–157.

Latzer, M., Price, M. E., Saurwein, F., & Verhulst, S. G. (2007). Comparative analysis of international co- and self-regulation. Research report, Institute of Technology Assessment of the Austrian Academy of Sciences, Vienna, Austria.

Leiner, B. M., Cerf, V. G., Clark, D. D., Kahn, R. E., Kleinrock, L., Lynch, D. C., et al. (2012). Brief history of the Internet. Report, Internet Society, Geneva, Switzerland. http://www.internetsociety.org/brief-history-internet

Lengsfeld, J. H. (2011). An econometric analysis of the sociodemographic topology of the digital divide in europe. *The Information Society*, *27*(3), 141–157. doi:10.1080/01972243.2011.566745

Leshin, L., Mahaffy, P., Webster, C., Cabane, M., Coll, P., Conrad, P., et al. (2013). Volatile, isotope, and organic analysis of martian fines with the Mars Curiosity rover. *Science*, *341*(6153), 1238937. doi:10.1126/science.1238937

Levine, T. R., Park, H. S., & Kim, R. K. (2007). Some conceptual and theoretical challenges for cross-cultural communication research in the 21st century. *Journal of Intercultural Communication Research*, *36*(3), 205–221. doi:10.1080/17475750701737140

Lewenstein, B. V. (1995). Science and the media. In S. Jasanoff, G. Markle, J. Petersen, & T. Pinch (Eds.) *Handbook of science and technology studies*, (pp. 343–360). Thousand Oaks, CA: Sage. doi:10.4135/9781412990127.n16

Lievrouw, L. A., & Farb, S. E. (2005). Information and equity. *Annual Review of Information Science and Technology*, *37*(1), 499–540. doi:10.1002/aris.1440370112

Litt, E. (2013a). Measuring users' Internet skills: A review of past assessments and a look toward the future. *New Media & Society*, *15*(4), 612–630. doi:10.1177/1461444813475424

Litt, E. (2013b). Understanding social network site users' privacy tool use. *Computers in Human Behavior*, *29*(4), 1649–1656. doi:10.1016/j.chb.2013.01.049

Litt, E., & Hargittai, E. (2014). A bumpy ride on the information superhighway: Exploring turbulence online. *Computers in Human Behavior*, *36*, 520–529. doi:10.1016/j.chb.2014.04.027

Liu, Y., Kliman-Silver, C., & Mislove, A. (2014). The tweets they are a-changin: Evolution of Twitter users and behavior. In *Proceedings of the 4th international AAAI conference on weblogs and social media*, vol. 30, (pp. 305–314). Menlo Park, CA: The AAAI Press.

Lüders, M., & Brandtzæg, P. B. (2014). "My children tell me it's so simple": A mixed-methods approach to understand older non-users' perceptions of social networking sites. *New Media & Society*. Advance online publication. doi:10.1177/1461444814554064

Lutz, C. (2015). *Online but still not taking part? Investigating online participation divides in Germany*. Doctoral dissertation, University of St. Gallen. https://www.alexandria.unisg.ch/246247

Manovich, L. (2011). Trending: The promises and the challenges of big social data. In M. K. Gold (Ed.) *Debates in the digital humanities*, (pp. 460–475). Minneapolis, MN: University of Minnesota Press.

Margetts, H. (2013). The Internet and democracy. In W. H. Dutton (Ed.) *The Oxford handbook of Internet studies*, (pp. 421–437). Oxford, UK: Oxford University Press.

Margolis, M., & Resnick, D. (2000). *Politics as usual: The cyberspace 'revolution'*, vol. 6. New York, NY: Sage.

Maron, D. (2013). The government shutdown is (almost) over, but the damage to science will last. Scientific American (16 October, 2013). http://www.scientificamerican.com/article/the-government-shutdown

Matzner, T., Masur, P. K., Ochs, C., & von Pape, T. (2016). Do-it-yourself data protection—empowerment or burden? In S. Gutwirth, R. Leenes, & P. De Hert (Eds.) *Data protection on the move*, (pp. 277–305). Dordrecht, Netherlands: Springer. doi:10.1007/978-94-017-7376-8_11

McAfee, A., & Brynjolfsson, E. (2012). Big data: The management revolution. *Harvard Business Review*, *90*(10), 61–67.

Meyer, E. T., & Schroeder, R. (2009). The world wide web of research and access to knowledge. *Knowledge Management Research & Practice*, *7*(3), 218–233.

Milkman, K. L., & Berger, J. (2014). The science of sharing and the sharing of science. *Proceedings of the National Academy of Sciences*, *111*(Supplement 4), 13642–13649. doi:10.1073/pnas.1317511111

Mimno, D. (2015). Package "mallet": A wrapper around the java machine learning tool MALLET. http://cran.r-project.org/web/packages/mallet/mallet.pdf

Min, S.-J. (2010). From the digital divide to the democratic divide: Internet skills, political interest, and the second-level digital divide in political Internet use. *Journal of Information Technology & Politics*, *7*(1), 22–35. doi:10.1080/19331680903109402

Mohr, J. W., & Bogdanov, P. (2013). Introduction—topic models: What they are and why they matter. *Poetics*, *41*(6), 545–569. doi:10.1016/j.poetic.2013.10.001

Mossberger, K., Tolbert, C. J., & McNeal, R. S. (2008). *Digital citizenship: The Internet, society, and participation*. Cambridge, MA: MIT Press.

Mossberger, K., Tolbert, C. J., & Stansbury, M. (2003). *Virtual inequality: Beyond the digital divide*. Washington, DC: Georgetown University Press.

Murthy, D. (2012). Towards a sociological understanding of social media: Theorizing Twitter. *Sociology*, *46*(6), 1059–1073. doi:10.1177/0038038511422553

Muthén, L. K., & Muthén, B. O. (2015). *MPlus user's guide*. Los Angeles, CA. https://www.statmodel.com/download/usersguide/MplusUserGuideVer_7.pdf

Myers, S. A., Sharma, A., Gupta, P., & Lin, J. (2014). Information network or social network? The structure of the Twitter follow graph. In *Proceedings of the 23rd International Conference on World Wide Web*, (pp. 493–498). New York, NY: ACM. http://dl.acm.org/citation.cfm?id=2576939

National Science Board (2014). *Science and engineering indicators 2014*. Arlington, VA: National Science Foundation. https://www.nsf.gov/statistics/seind14/

Neuberger, C. (2014). Social Media in der Wissenschaftsöffentlichkeit [Social media in the science public]. In P. Weingart, & P. Schulz (Eds.) *Wissen–Nachricht–Sensation*, (pp. 315–368). Weilerswist, Germany: Velbrück Wissenschaft. doi:10.1111/jcom.12088

Neuman, W. R., Guggenheim, L., Mo Jang, S., & Bae, S. Y. (2014). The dynamics of public attention: Agenda-setting theory meets big data. *Journal of Communication*, *64*(2), 193–214.

Nie, N. H., & Erbring, L. (2000). Internet and society: A preliminary report. Report, Standord Institure for the Quantitative Study of Society, Stanford, CA. http://www2.uca.es/HEURESIS/documentos/Preliminary_Report.pdf

Nisbet, M. C., & Scheufele, D. A. (2009). What's next for science communication? Promising directions and lingering distractions. *American Journal of Botany*, *96*(10), 1767–1778. doi:10.3732/ajb.0900041

Nissenbaum, H. (2011). A contextual approach to privacy online. *Daedalus*, *140*(4), 32–48.

Norberg, P. A., Horne, D. R., & A, H. D. (2007). The privacy paradox: Personal information disclosure intentions versus behaviors. *Journal of Consumer Affairs*, *41*(1), 100–126. doi:10.1111/j.1745-6606.2006.00070.x

Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the Internet worldwide*. Cambridge, UK: Cambridge University Press.

NTIA [National Telecommunications & Information Administration] (1999). Falling through the net: Defining the digital divide. https://www.ntia.doc.gov/legacy/ntiahome/fttn99/FTTN.pdf

Odağ, Ö., Hofer, M., Schneider, F. M., & Knop, K. (2016). Testing measurement equivalence of eudaimonic and hedonic entertainment motivations in a cross-cultural comparison. *Journal of Intercultural Communication Research*, *45*(2), 108–125. doi:10.1080/17475759.2015.1108216

OECD (2013). Exploring data-driven innovation as a new source of growth: Mapping the policy issues raised by "big data". http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DSTI/ICCP(2012)9/FINAL&docLanguage=En

Ortega Egea, J. M., Menéndez, M. R., & González, M. V. R. (2007). Diffusion and usage patterns of Internet services in the European Union. *Information Research*, *12*(2), 15. http://www.informationr.net/ir/12-2/paper302.html

Papacharissi, Z., & Rubin, A. M. (2000). Predictors of internet use. *Journal of Broadcasting & Electronic Media*, *44*(2), 175–196. doi:10.1207/s15506878jobem4402_2

Park, Y. J. (2013). Digital literacy and privacy behavior online. *Communication Research*, *40*(2), 215–236. doi:10.1177/0093650211418338

Park, Y. J. (2015). Do men and women differ in privacy? Gendered privacy and (in)equality in the Internet. *Computers in Human Behavior*, *50*, 252–258. doi:10.1016/j.chb.2015.04.011

Park, Y. J., Campbell, S. W., & Kwak, N. (2012). Affect, cognition and reward: Predictors of privacy protection online. *Computers in Human Behavior*, *28*(3), 1019–1027. doi:10.1016/j.chb.2012.01.004

Park, Y. J., & Jang, S. M. (2015). African American Internet use for information search and privacy protection tasks. *Social Science Computer Review*, *34*(5), 618–630. doi:10.1177/0894439315597429

Pearce, W., Holmberg, K., Hellsten, I., & Nerlich, B. (2014). Climate change on Twitter: Topics, communities and conversations about the 2013 IPCC Working Group 1 report. *PloS ONE*, *9*(4), e94785. doi:10.1371/journal.pone.0094785

Pellechia, M. G. (1997). Trends in science coverage: a content analysis of three US newspapers. *Public Understanding of Science*, *6*(1), 49–68. doi:10.1088/0963-6625/6/1/004

Pénard, T., Poussing, N., & Suire, R. (2013). Does the Internet make people happier? *The Journal of Socio-Economics*, *46*, 105–116. doi:10.1016/j.socec.2013.08.004

Peter, J., & Valkenburg, P. M. (2006). Adolescents' Internet use: Testing the "disappearing digital divide" versus the "emerging digital differentiation" approach. *Poetics*, *34*(4-5), 293–305. doi:10.1016/j.poetic.2006.05.005

Peters, H. P., Brossard, D., De Cheveigné, S., Dunwoody, S., Kallfass, M., Miller, S., et al. (2008). Science-media interface: It's time to reconsider. *Science Communication*, *30*(2), 266–276. doi:10.1177/1075547008324809

Pew Research Center (2014). World Wide Web timeline. http://www.pewinternet.org/2014/03/11/world-wide-web-timeline

Phillips, D. L., & Clancy, K. J. (1972). Some effects of "social desirability" in survey studies. *American Journal of Sociology*, *77*(5), 921–940. doi:10.1086/225231

Piurko, Y., Schwartz, S. H., & Davidov, E. (2011). Basic personal values and the meaning of left-right political orientations in 20 countries. *Political Psychology*, *32*(4), 537–561. doi:10.1111/j.1467-9221.2011.00828.x

Poortinga, Y. H., Van De Vijver, F. J. R., & Van Hemert, D. A. (2002). Cross-cultural equivalence of the big five. In R. R. McCrae, & J. Allik (Eds.) *The Five-Factor Model of Personality Across Cultures*, (pp. 281–302). Boston, MA: Springer. doi:10.1007/978-1-4615-0763-5_14

Prior, M. (2010). You've either got it or you don't? The stability of political interest over the life cycle. *The Journal of Politics*, *72*(3), 747–766. doi:10.1017/s0022381610000149

Puschmann, C. (2014). (Micro)blogging science? Notes on potentials and constraints of new forms of scholarly communication. In S. Friesike, & S. Bartling (Eds.) *Opening science*, (pp. 89–106). New York, NY: Springer. doi:10.1007/978-3-319-00026-8_6

Quan-Haase, A. (2016). *Technology and society: Social Networks, power, and inequality*. Oxford, UK: Oxford University Press, 2nd ed.

Quan-Haase, A., Martin, K., & Schreurs, K. (2016). Interviews with digital seniors: ICT use in the context of everyday life. *Information, Communication & Society*, *19*(5), 691–707. doi:10.1080/1369118x.2016.1140217

Radmacher, K., & Azmitia, M. (2006). Are there gendered pathways to intimacy in early adolescents' and emerging adults' friendships? *Journal of Adolescent Research*, *21*(4), 415–448. doi:10.1177/0743558406287402

Ragnedda, M., & Muschert, G. W. (Eds.) (2013). *The digital divide. The Internet and social inequality in international perspective*. London, UK: Routledge. doi:10.4324/9780203069769

Ragnedda, M., & Muschert, G. W. (2015). Max Weber and digital divide studies. *International Journal of Communication*, *9*, 2757–2762. http://ijoc.org/index.php/ijoc/article/view/4424

Rainie, L., & Anderson, J. (2014). The future of privacy. Report, Pew Research Center, Washington, DC. http://www.pewinternet.org/2014/12/18/future-of-privacy/

Rainie, L., Kiesler, S., Kang, R., & Madden, M. (2013). Anonymity, privacy, and security online. Report, Pew Research Center, Washington, DC. http://www.pewinternet.org/2013/09/05/anonymity-privacy-and-security-online/

Rainie, L., & Wellman, B. (2012). *Networked: The new social operating system*. Cambridge, MA: MIT Press.

Ranger, M., & Bultitude, K. (2014). 'The kind of mildly curious sort of science interested person like me': Science bloggers' practices relating to audience recruitment. *Public Understanding of Science*. Advance online publication. doi:10.1177/0963662514555054

Raynes-Goldie, K. (2010). Aliases, creeping, and wall cleaning: Understanding privacy in the age of Facebook. *First Monday*, *15*. doi:10.5210/fm.v15i1.2775

Razavi, A. H., Inkpen, D., Brusilovsky, D., & Bogouslavski, L. (2013). General topic annotation in social networks: A latent Dirichlet allocation approach. In O. Zaiane, & S. Zilles (Eds.) *Advances in artificial intelligence*, (pp. 293–300). Berlin, Germany: Springer. doi:10.1007/978-3-642-38457-8_29

Regulation (EU) 2016/679 (2016, April 27). Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). OJ L 119.

Retzbach, A., & Maier, M. (2014). Communicating scientific uncertainty: Media effects on public engagement with science. *Communication Research*, *42*(3), 429–456. doi:10.1177/0093650214534967

Rice, R. E., & Fuller, R. P. (2013). Theoretical perspectives in the study of communication and the Internet. In W. H. Dutton (Ed.) *The Oxford handbook of Internet studies*, (pp. 354–377). Oxford, UK: Oxford University Press.

Robinson, E. J. (1963). Analyzing the impact of science reporting. *Journalism & Mass Communication Quarterly*, *40*(3), 306–314. doi:10.1177/107769906304000304

Robinson, L. (2009). A taste for the necessary: A Bourdieuian approach to digital inequality. *Information, Communication & Society*, *12*(4), 488–507. doi:10.1080/13691180902857678

Robinson, L., Cotten, S. R., Ono, H., Quan-Haase, A., Mesch, G., Chen, W., et al. (2015). Digital inequalities and why they matter. *Information, Communication & Society*, *18*(5), 569–582. doi:10.1080/1369118x.2015.1012532

Rogers, E. M. (2001). The department of communication at Michigan state university as a seed institution for communication study. *Communication Studies*, *52*(3), 234–248. doi:10.1080/10510970109388556

Rogers, E. M. (2003). *Diffusion of Innovations*. New York, NY: Free Press, 5th ed.

Rogstad, I. (2016). Is Twitter just rehashing? Intermedia agenda setting between Twitter and mainstream media. *Journal of Information Technology & Politics*, *13*(2), 142–158. doi:10.1080/19331681.2016.1160263

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*(2), 1–36. https://www.jstatsoft.org/article/view/v048i02

Rosseel, Y. (2016). The lavaan tutorial. http://lavaan.ugent.be/tutorial/tutorial.pdf

Ruggiero, T. E. (2000). Uses and gratifications theory in the 21st century. *Mass Communication and Society*, *3*(1), 3–37. doi:10.1207/s15327825mcs0301_02

Rzepa, H. S. (2011). The past, present and future of scientific discourse. *Journal of Cheminformatics*, *3*(46). doi:10.1186/1758-2946-3-46

Sandvig, C. (2013). The Internet as infrastructure. In W. H. Dutton (Ed.) *The Oxford handbook of Internet studies*, (pp. 86–106). Oxford, UK: Oxford University Press. doi:10.1093/oxfordhb/9780199589074.013.0005

Sassi, S. (2005). Cultural differentiation or social segregation? Four approaches to the digital divide. *New Media & Society*, *7*(5), 684–700. doi:10.1177/1461444805056012

Saurwein, F., Just, N., & Latzer, M. (2015). Governance of algorithms: options and limitations. *info*, *17*(6), 35–49. doi:10.1108/info-05-2015-0025

Savage, S., & Waldman, D. M. (2013). The value of online privacy. *SSRN Electronic Journal*. doi:10.2139/ssrn.2341311

Schäfer, M. S. (2008). *Wissenschaft in den Medien [Science in the media]*. Wiesbaden, Germany: VS Verlag für Sozialwissenschaften.

Schäfer, M. S. (2009). From public understanding to public engagement: An empirical assessment of changes in science coverage. *Science Communication*, *30*(4), 475–505. doi:10.1177/1075547008326943

Schäfer, M. S. (2011). Sources, characteristics and effects of mass media communication on science: a review of the literature, current trends and areas

for future research. *Sociology Compass*, *5*(6), 399–412. doi:10.1111/j.1751-9020.2011.00373.x

Schäfer, M. S. (2014). The media in the labs, and the labs in the media: What we know about the mediatization of science. In K. Lundby (Ed.) *Mediatization of communication*, (pp. 571–591). Berlin, Germany: De Gruyter Mouton.

Scharkow, M. (2012). *Automatische Inhaltsanalyse und maschinelles Lernen [Automated content analysis and machine learning]*. Berlin, Germany: Epubli.

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*, *8*(2), 23–74. http://www.dgps.de/fachgruppen/methoden/mpr-online/issue20/art2/mpr130_13.pdf

Schroeder, R. (2007). *Rethinking science, technology, and social change*. Redwood City, CA: Stanford University Press.

Schroeder, R., & Ling, R. (2014). Durkheim and Weber on the social implications of new information and communication technologies. *New Media & Society*, *16*(5), 789–805. doi:10.1177/1461444813495157

Segev, E., & Sharon, A. J. (2016). Temporal patterns of scientific information-seeking on Google and Wikipedia. *Public Understanding of Science*. Advance online publication. doi:10.1177/0963662516648565

Selwyn, N. (2006). Digital division or digital decision? A study of non-users and low-users of computers. *Poetics*, *34*(4-5), 273–292. doi:10.1016/j.poetic.2006.05.003

Shah, D. V., Cho, J., Eveland, W. P., Jr., & Kwak, N. (2005). Information and expression in a digital age: Modeling Internet effects on civic participation. *Communication Research*, *32*(5), 531–565. doi:10.1177/0093650205279209

Shan, L., Regan, Á., De Brún, A., Barnett, J., van der Sanden, M. C., Wall, P., et al. (2013). Food crisis coverage by social and traditional media: A case study of the 2008 Irish dioxin crisis. *Public Understanding of Science*, *23*(8), 911–928. doi:10.1177/0963662512472315

Sijtsma, K. (2009). On the use, the misuse, and the very limited usefulness of Cronbach's alpha. *Psychometrika*, *74*(1), 107–120. doi:10.1007/s11336-008-9101-0

Silvertown, J. (2009). A new dawn for citizen science. *Trends in Ecology & Evolution*, *24*(9), 467–471. doi:10.1016/j.tree.2009.03.017

Smith, J., Hewitt, B., & Skrbiš, Z. (2015). Digital socialization: Young people's changing value orientations towards Internet use between adolescence and early adulthood. *Information, Communication & Society*, *18*(9), 1022–1038. doi:10.1080/1369118x.2015.1007074

Smith, M. A., Rainie, L., Shneiderman, B., & Himelboim, I. (2014). Mapping Twitter topic networks: From polarized crowds to community clusters. Report, Pew Research Center, Washington, DC. http://www.pewinternet.org/files/2014/02/PIP_Mapping-Twitter-networks_022014.pdf

Sparks, C. (2013). What is the “digital divide" and why is it important? *Javnost – The Public*, *20*(2), 27–46. doi:10.1080/13183222.2013.11009113

Steenkamp, J.-B. E. M., & Baumgartner, H. (1998). Assessing measurement invariance in cross-national consumer research. *Journal of Consumer Research*, *25*(1), 78–107. doi:10.1086/209528

Stegmueller, D. (2011). Apples and oranges? The problem of equivalence in comparative research. *Political Analysis*, *19*(4), 471–487. doi:10.1093/pan/mpr028

Steinmetz, H. (2011). Estimation and comparison of latent means across cultures. In E. Davidov, P. Schmidt, & J. Billiet (Eds.) *Cross-cultural analysis: Methods and applications*, (pp. 85–116). New York, NY: Routledge.

Steinmetz, H. (2015). *Lineare Strukturgleichungsmodelle: Eine Einführung mit R [Linear structural equation models: An introduction with R]*. Mering, Germany: Rainer Hampp Verlag.

Stern, M. J. (2010). Inequality in the Internet age: A twenty-first century dilemma. *Sociological Inquiry*, *80*(1), 28–33. doi:10.1111/j.1475-682x.2009.00314.x

Straubhaar, J. D. (1991). Beyond media imperialism: Assymetrical interdependence and cultural proximity. *Critical Studies in Mass Communication*, *8*(1), 39–59. doi:10.1080/15295039109366779

Stutzman, F., Gross, R., & Acquisti, A. (2012). Silent listeners: The evolution of privacy and disclosure on Facebook. *Journal of Privacy and Confidentiality*, *4*(2), 7–41.

Subašić, I., & Berendt, B. (2011). Peddling or creating? Investigating the role of Twitter in news reporting. In P. Clough, C. Foley, C. Gurrin, G. Jones, W. Kraaij, H. Lee, & V. Mudoch (Eds.) *Advances in information retrieval*, (pp. 207–213). Berlin, Germany: Springer. doi:10.1007/978-3-642-20161-5_21

Sundar, S. S., & Limperos, A. M. (2013). Uses and grats 2.0: New gratifications for new media. *Journal of Broadcasting & Electronic Media*, *57*(4), 504–525. doi:10.1080/08838151.2013.845827

Taddei, S., & Contena, B. (2013). Privacy, trust and control: Which relationships with online self-disclosure? *Computers in Human Behavior*, *29*(3), 821–826. doi:10.1016/j.chb.2012.11.022

Taddicken, M. (2014). The ‘privacy paradox’ in the social web: The impact of privacy concerns, individual characteristics, and the perceived social relevance on different forms of self-disclosure. *Journal of Computer-Mediated Communication*, *19*(2), 248–273. doi:10.1111/jcc4.12052

Taddicken, M., & Reif, A. (2016). Who participates in the climate change online discourse? A typology of Germans’ online engagement. *Communications*, *41*(3), 315–337. doi:10.1515/commun-2016-0012

Tan, W.-K., & Yang, C.-Y. (2014). Internet applications use and personality. *Telematics and Informatics*, *31*(1), 27–38. doi:10.1016/j.tele.2013.02.006

Teo, T. S. (2001). Demographic and motivation variables associated

with Internet usage activities. *Internet Research*, *11*(2), 125–137. doi:10.1108/10662240110695089

Theocharis, Y., Van Deth, J. W., Obert, P., & Císař, O. (2016). 'We came unequal into this digital world, and unequal shall we go out of it?' Digital media and participatory inequality in Europe. In *SMaPP Global Conference*. Florence, Italy.

Thurman, J., & Gasser, U. (2009). Three case studies from Switzerland: Smartvote. Report, The Berkman Center for Internet & Society, Cambridge, MA. http://cyber.law.harvard.edu/sites/cyber.law.harvard.edu/files/Thurman-Gasser_SwissCases_Smartvote.pdf

Tichenor, P. J., Donohue, G. A., & Olien, C. N. (1970). Mass media flow and differential growth in knowledge. *Public Opinion Quarterly*, *34*(2), 159. doi:10.1086/267786

Tolbert, C. J., & McNeal, R. S. (2003). Unraveling the effects of the Internet on political participation? *Political Research Quarterly*, *56*(2), 175–185. doi:10.1177/106591290305600206

Trench, B. (2007). How the Internet changed science journalism. In M. W. Bauer, & M. Bucchi (Eds.) *Journalism, science and society*, (pp. 133–141). New York, NY: Routledge.

Trepte, S., Dienlin, T., & Reinecke, L. (2014). Influence of social support received in online and offline contexts on satisfaction with social support and satisfaction with life: A longitudinal study. *Media Psychology*, *18*(1), 74–105. doi:10.1080/15213269.2013.838904

Tsatsou, P. (2011). Digital divides revisited: What is new about divides and their research? *Media, Culture & Society*, *33*(2), 317–331. doi:10.1177/0163443710393865

Tufekci, Z. (2007). Can you see me now? Audience and disclosure regulation in online social network sites. *Bulletin of Science, Technology & Society*, *28*(1), 20–36. doi:10.1177/0270467607311484

Utz, S. (2015). The function of self-disclosure on social network sites: Not only intimate, but also positive and entertaining self-disclosures increase the feeling of connection. *Computers in Human Behavior*, *45*, 1–10. doi:10.1016/j.chb.2014.11.076

Valkenburg, P. M., & Peter, J. (2007). Online communication and adolescent well-being: Testing the stimulation versus the displacement hypothesis. *Journal of Computer-Mediated Communication*, *12*(4), 1169–1182. doi:10.1111/j.1083-6101.2007.00368.x

van Alstyne, M., & Brynjolfsson, E. (1995). Communication networks and the rise of an information elite: Do computers help the rich get richer? *ICIS 1995 Proceedings*, (pp. 93–96). Paper 9. http://aisel.aisnet.org/icis1995/9

van de Vijver, F., & Tanzer, N. K. (2004). Bias and equivalence in cross-cultural assessment: An overview. *Revue Européenne de Psychologie Appliquée / European Review of Applied Psychology*, *54*(2), 119–135. doi:10.1016/j.erap.2003.12.004

van den Broeck, E., Poels, K., & Walrave, M. (2015). Older and wiser? Facebook use, privacy concern, and privacy protection in the life stages of emerging, young, and middle adulthood. *Social Media + Society*, *1*(2). doi:10.1177/2056305115616149

van Deth, J. W. (1998). *Comparative Politics: The problem of equivalence*. London, UK: Routledge.

van Deursen, A. J. A. M., & Helsper, E. J. (2015). The third-level digital divide: Who benefits most from being online? In L. Robinson, S. R. Cotten, J. Schulz, T. M. Hale, & A. Williams (Eds.) *Communication and Information Technologies Annual*, (pp. 29–52). Bingley, UK: Emerald. doi:10.1108/s2050-206020150000010002

van Deursen, A. J. A. M., Helsper, E. J., & Eynon, R. (2014). Measuring digital skills: From digital skills to tangible outcomes project report. https://www.oii.ox.ac.uk/archive/downloads/publications/Measuring_Digital_Skills.pdf

van Deursen, A. J. A. M., Helsper, E. J., & Eynon, R. (2015). Development and validation of the internet skills scale (ISS). *Information, Communication & Society*, *19*(6), 804–823. doi:10.1080/1369118x.2015.1078834

van Deursen, A. J. A. M., & van Dijk, J. A. G. M. (2011). Internet skills and the digital divide. *New Media & Society*, *13*(6), 893–911. doi:10.1177/1461444810386774

van Deursen, A. J. A. M., & van Dijk, J. A. G. M. (2014). The digital divide shifts to differences in usage. *New Media & Society*, *16*(3), 507–526. doi:10.1177/1461444813487959

van Deursen, A. J. A. M., van Dijk, J. A. G. M., & Peters, O. (2011). Rethinking Internet skills: The contribution of gender, age, education, Internet experience, and hours online to medium- and content-related Internet skills. *Poetics*, *39*(2), 125–144. doi:10.1016/j.poetic.2011.02.001

van Dijck, J. (2011). Tracing Twitter: The rise of a microblogging platform. *International Journal of Media & Cultural Politics*, *7*(3), 333–348. doi:10.1386/macp.7.3.333_1

van Dijck, J. (2013). *The culture of connectivity: A critical history of social media*. Oxford, UK: Oxford University Press.

van Dijk, J. A. G. M. (2005). *The deepening divide: Inequality in the information society*. Thousand Oaks, CA: Sage.

van Dijk, J. A. G. M. (2013a). Inequalities in the network society. In K. Orton-Johnson, & N. Prior (Eds.) *Digital Sociology*, (pp. 105–124). London, UK: Palgrave Macmillan.

van Dijk, J. A. G. M. (2013b). A theory of the digital divide. In M. Ragnedda, & G. W. Muschert (Eds.) *The digital divide: The Internet and social inequality in international perspective*, (pp. 29–51). London, UK: Routledge.

Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations

for organizational research. *Organizational Research Methods*, *3*(1), 4–70. doi:10.1177/109442810031002

Veltri, G. A. (2013). Microblogging and nanotweets: Nanotechnology on Twitter. *Public Understanding of Science*, *22*(7), 832–849. doi:10.1177/0963662512463510

Veltri, G. A., & Atanasova, D. (2015). Climate change on Twitter: Content, media ecology and information sharing behaviour. *Public Understanding of Science*. Advance online publication. doi:10.1177/0963662515613702

Viswanath, K., & Finnegan, J. R., Jr. (1996). The knowledge gap hypothesis: Twenty-five years later. In *Communication Yearbook 19*, vol. 19, (pp. 187–228). New York, NY: Routledge.

Vonbun, R., & Schönbach, K. (2014). Wer ist politisch aktiv im Social Web? Eine Studie zur politischen Online-Kommunikation in Österreich [Who is politically active in the social web? A study on political online communication in Austria]. *Publizistik*, *59*(2), 199–212. doi:10.1007/s11616-014-0200-x

Wade, S., & Schramm, W. (1969). The mass media as sources of public affairs, science, and health knowledge. *Public Opinion Quarterly*, *33*(2), 197–209. doi:10.1086/267691

Wajcman, J. (2002). Addressing technological change: The challenge to social theory. *Current Sociology*, *50*(3), 347–363.

Warschauer, M. (2004). *Technology and social inclusion: Rethinking the digital divide*. Cambridge, MA: MIT Press.

Wasserman, I. M., & Richmond-Abbott, M. (2005). Gender and the Internet: Causes of variation in access, level, and scope of use. *Social Science Quarterly*, *86*(1), 252–270. doi:10.1111/j.0038-4941.2005.00301.x

Weare, C., & Lin, W.-Y. (2000). Content analysis of the World Wide Web: Opportunities and challenges. *Social Science Computer Review*, *18*(3), 272–292. doi:10.1177/089443930001800304

Weber, M. S., & Monge, P. (2011). The flow of digital news in a network of sources, authorities, and hubs. *Journal of Communication*, *61*(6), 1062–1081. doi:10.1111/j.1460-2466.2011.01596.x

Wei, L. (2012). Number matters: The multimodality of Internet use as an indicator of the digital inequalities. *Journal of Computer-Mediated Communication*, *17*(3), 303–318. doi:10.1111/j.1083-6101.2012.01578.x

Wei, L., & Hindman, D. B. (2011). Does the digital divide matter more? Comparing the effects of new media and old media use on the education-based knowledge gap. *Mass Communication and Society*, *14*(2), 216–235. doi:10.1080/15205431003642707

Weinberger, D. (2012). *Too big to know*. New York, NY: Basic Books.

Wellman, B. (2001). Computer networks as social networks. *Science*, *293*(5537), 2031–2034. doi:10.1126/science.1065547

Wellman, B. (2004). The three ages of Internet studies: Ten, five and zero years ago. *New Media & Society*, *6*(1), 123–129. doi:10.1177/1461444804040633

Wellman, B., Quan-Haase, A., Witte, J., & Hampton, K. (2001). Does the Internet increase, decrease, or supplement social capital? Social networks, participation, and community commitment. *American Behavioral Scientist*, *45*(3), 436–455. doi:10.1177/00027640121957286

Weng, J., Lim, E.-P., Jiang, J., & He, Q. (2010). Twitterrank: Finding topic-sensitive influential twitterers. In *Proceedings of the 3rd ACM international conference on Web search and data mining*, (pp. 261–270). New York, NY: ACM. http://dl.acm.org/citation.cfm?id=1718520

Westland, J. C. (2015). *Structural equation models: From paths to networks*. New York, NY: Springer. doi:10.1007/978-3-319-16507-3

Willis, S., & Tranter, B. (2006). Beyond the 'digital divide': Internet diffusion and inequality in Australia. *Journal of Sociology*, *42*(1), 43–59. doi:10.1177/1440783306061352

WIP (2014). World Internet Project. http://www.worldinternetproject.net

WIP (2016). World Internet Project. http://www.worldinternetproject.net

Wirth, W., & Kolb, S. (2004). Designs and methods of comparative political communication research. In F. Esser, & B. Pfetsch (Eds.) *Comparing political communication: Theories, cases, and challenges*, (pp. 87–111). Cambridge, UK: Cambridge University Press.

Wirth, W., & Kolb, S. (2012). Securing equivalence. In F. Esser, & T. Hanitzsch (Eds.) *Handbook of comparative communication research*, (pp. 469–485). New York, NY: Routledge.

Witte, J. C., & Mannon, S. E. (2010). *The Internet and social inequalities*. New York, NY: Routledge.

World Economic Forum (2012). Big data, big impact: New possibilities for international development. https://www.weforum.org/reports/big-data-big-impact-new-possibilities-international-development

Wu, T. (2003). Network neutrality, broadband discrimination. *Journal of Telecommunications and High Technology Law*, *2*, 141–179. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=388863

Wunnava, P. V., & Leiter, D. B. (2009). Determinants of intercountry Internet diffusion rates. *American Journal of Economics and Sociology*, *68*(2), 413–426. doi:10.1111/j.1536-7150.2009.00634.x

Xenos, M., & Moy, P. (2007). Direct and differential effects of the Internet on political and civic engagement. *Journal of Communication*, *57*(4), 704–718. doi:10.1111/j.1460-2466.2007.00364.x

Yost, E., Winstead, V., Berkowsky, R. W., & Cotten, S. R. (2016). Googling grannies: How technology use can improve health and well-being in aging populations. In P. G. Nixon, R. Rawal, & A. Funk (Eds.) *Digital media usage across the life course*, (pp. 146–159). London, UK: Routledge.

Young, A. L., & Quan-Haase, A. (2013). Privacy protection strategies on Facebook. *Information, Communication & Society*, *16*(4), 479–500. doi:10.1080/1369118x.2013.777757

Zhang, X. (2013). Income disparity and digital divide: The Internet consumption model and cross-country empirical research. *Telecommunications Policy*, *37*(6-7), 515–529. doi:10.1016/j.telpol.2012.12.011

Zillien, N. (2009). *Digitale Ungleichheit: Neue Technologien und alte Ungleichheiten in der Informations-und Wissensgesellschaft [Digital inequality: new technologies and old inequalities in the information and knowledge society]*. Wiesbaden, Germany: Springer, 2nd ed.

Zillien, N., & Hargittai, E. (2009). Digital distinction: Status-specific types of Internet usage. *Social Science Quarterly*, *90*(2), 274–291. doi:10.1111/j.1540-6237.2009.00617.x

Zimmer, M. (2010). Privacy protection in the next digital decade: "Trading up" or a "race to the bottom". In B. Szoka, & A. Marcus (Eds.) *The next digital decade: Essays on the future of the Internet*, (pp. 477–483). Washington, DC: TechFreedom.