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INTRODUCTION TO THE SPECIAL ISSUE

Measuring Media Exposure in a Changing Communications Environment

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ABSTRACT

The measurement of how people are “exposed” to media content, which is crucial for the understanding of media use and effects, has been a challenge for a long time. Today’s media landscape, in which individuals are exposed to a diversity of messages anytime, anywhere, and from a great variety of sources on an increasing number of different media platforms, has complicated the measurement of media exposure even more. However, today’s digital media landscape also offers new possibilities to map media exposure by means of passive measurement. In this Introduction article to the special issue, we give an overview of the different ways in which media exposure is measured and the various issues associated with their applications. We conclude with a research agenda for issues that need to be tackled in future research and also introduce a research tool for media exposure measurement.

Introduction

The measurement of media exposure is crucial for studies on uses and effects of media in communication science, political science, sociology, psychology, and economics. The reach, composition, and activities of media audiences are measured in a great variety of content contexts ranging from news, political comedy, advertising, health and entertainment, to platforms as newspapers, television, billboards, videos, games, and social network sites. Media exposure may play different theoretical roles, for example, as *dependent* variable in theories and studies on media use. Or as *mediator* in selective exposure theories that specify that persons with certain characteristics seek out specific media that subsequently impact them. Media exposure is an *independent* variable in media effects theories, and a *moderator* in theories suggesting that exposure interacts with individual level and contextual factors. Media exposure data such as circulation, ratings, and reach are important for the industry, as they are a currency for advertising buying and selling and for media programming decisions.

We are not the first to highlight the crucial role of media exposure for research and the media industry. For example, in a special issue from 2008, the temporary Annenberg Media Exposure Research group reported on an analysis of published research from 1976 to 2006 (Fishbein & Hornik, 2008) to the significance of this concept for communication science research. To put the claim of the centrality of exposure measures in a contemporary perspective, we analysed two of the field’s leading journals (*Journal of Communication* and *Communication Research*) from 2004–2014 to chart the discipline’s use of exposure measures in published research.¹

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¹We searched all published articles in the period in the two journals and included all articles using exposure measures for further analysis.

We identified 204 published articles with explicit reference to and use of exposure measures (divided almost equally between the two journals). The exposure measures referred to different media (newspapers 35%, television 22%, internet 11%, and magazines 6%, or combinations (26%). The measures were used to identify exposure to in particular news (almost half of the cases), entertainment (19%) and specific content such as politics, sex, advertising, violence, or health messages. The vast majority of studies (68%) stem from US based research. Almost all research (94%) relied on self-reported measures with only a number of more recent studies using tracking measures.

We consider this brief overview an indicative summary of the current state of affairs, albeit only based on two journals. We also consider it a confirmation of the fundamental role of media exposure in theories and studies of media audiences. However, despite more than two hundred published studies, in two leading journals, in the past decade, we still conclude there is no *generally* accepted conceptualization and operationalization of this concept (Prior, 2009a; Slater, 2004; Valkenburg & Peter, 2013). Changes in the media landscape have amplified this issue. Today's media landscape is fragmented and diverse as a consequence of the enormous increase in old and new media and the amount of messages communicated, which are distributed on an increasingly number of media devices such as paper, TV, radio, mobile phone, laptop, and tablets by professional and non-professional communicators. People are exposed to information, entertainment, and messages almost any time anywhere (Napoli, 2011; Taneja & Mamoria, 2012; Webster & Ksiazek, 2012). These developments go hand in hand with potentially more superficial attention to individual messages because media users engage in media multitasking (Foehr, 2006; Pilotta & Schultz, 2005; Pilotta, Schultz, Drenik, & Rist, 2004).

On the one hand, these developments complicate the measurement of media exposure. The sheer number of media outlets and messages confounds the measurement of media exposure in surveys because of the demands on the questionnaire; the variety of media outlets raises the issue how the metrics of audience exposure to these different platforms can be compared (Taneja & Mamoria, 2012), and the superficiality of much media use creates conceptual as well as operationalization issues. There is a clear need for rethinking the quality and utility of the measures.

On the other hand, the new digital media give new possibilities to measure media exposure by means of passive registration. In this article, we discuss conceptualizations, operationalizations, and measures of exposure and indicate possible advantages and pitfalls. We conclude with a research agenda for issues that need to be tackled in future research and also introduce a research tool for media exposure measurement.

Conceptualization of media exposure

Media exposure may be defined as “the extent to which audience members have encountered specific messages or classes of messages/media content” (Slater, 2004, p. 168). This is a simple and straightforward definition, but even then, the definition of “encountered” poses conceptual and measurement challenges.

A minimal, but intuitive conceptualization is “open eyes/ears in front of medium content.” A disadvantage of this measure is, however, that it may include a wide range of attention of the media user for the medium content, varying from no attention at all to intensive engagement (Chaffee & Schleuder, 1986). Attention levels may vary from pre-attention (scanning the medium in a subconscious way), focal attention (enough attention to determine what the content is about), comprehension (assigning meaning), and elaboration (generating personal connections and imagery) (see, for example, Greenwald & Leavitt, 1984; Smit, Neijens, & Heath, 2013).

Slater (2004) addresses the dilemma of which level of conceptualization to choose. The definition above suggests that “exposure refers to a person's merely encountering the messages, whether or not they are noticed enough to be remembered. After all, noticing the relevant messages in the communication environment is almost certainly confounded with variables that may predict attention to the

content of that message, such as prior knowledge or involvement with the topic. It is also quite possible that exposure may leave an affective if not a cognitive impression of some kind, even if the messages have not been attended too well enough to be remembered. However, if messages are not processed thoroughly enough to be recalled, how can exposure be self reported?" (Slater, 2004, pp. 168–169). In other words: on the one hand is it not possible to measure levels of exposure that have not been attended too well enough to be remembered, and on the other, levels of exposure that are remembered are most probably related to interest and involvement with the topic, making the relationship between media exposure and media effects partly spurious because it is confounded with the effect of interest. This dilemma is apparent in most types of media exposure measures.

Characteristics of media exposure measures and their pitfalls

We distinguish between two broad types of media exposure measures: self-reports and passive measurement (automatic registration).² Below we discuss characteristics and pitfalls of measures of each of these.

Self-reports

Types of self-reports

Self-report questions about media exposure are the most frequently used approach to measuring exposure. Self-reports typically rely on “respondents’ ability to recognize or recall some level of detail of a message or campaign to assess exposure’ (Niederdeppe, 2014, p. 142). Archetypical examples of self-report measures are shown in Table 1. The advantages of self-report measures are obvious: they are easy to include in a questionnaire or diary in which also other questions can be inserted that make it possible to correlate media exposure with individual characteristics, characteristics of the situation, and reported attitudes, opinions, or behavior such as political participation, product buying, health behaviour, or aggression.

Table 1. Typical examples of self-report media exposure measures.

<u>Unaided recall</u>
How many days in a typical/average/usual/last/past week/week day/weekend day do you watch the news on TV/do you read a daily newspaper?
How often do you watch television programs that contain violence?
And on the days that you watch television programs that contain violence, how much time do you spend on this per day?
Have you seen any anti-smoking ad in the last week?
<u>Aided recall/list method</u>
Have you seen an ad for Apple that showed ...
Which of the following programs do you watch regularly on television? Please check any that you watch at least once a month. Select all answers that apply.
How often do you play the game ...?
<u>Proven recall</u>
What was the ad/program/game about?
<u>Recognition</u>
(Show cover/masthead of newspaper/magazine/ad/article in newspapers): Have you seen this?
<u>Attention</u>
How much attention do you pay to news on TV/newspaper articles about national politics?
<u>Engagement</u>
Measurement of liking, sharing, forwarding, and discussions about the medium content
<u>Linking survey data and content analysis</u>
Combination of the frequency of respondent’s media outlet use, on the one hand, and the content characteristics of each used outlet, on the other.

²A third option is “observation” which will not be discussed in the article as we focus on large-scale applications.

Table 2. Characteristics of self-reports.

Aspect	Options
Type of recall	Free, aided, proven recall; recognition
Timeframe	At this moment, today, yesterday/average day, last/average week, last/ average month, etc.
Unit of observation	Medium, genre, vehicle, program, message, campaign
Conceptualization	Open eyes, remembering, attention, engagement (self-expression), importance, how often relied, social sharing (discussions, sharing, liking, forwarding)
Location	At home, while traveling, at work
Data collection	Survey (home, mobile), experiment, ...
Questionnaire formulation	Introduction, aid, number of answer categories
Answer scales	Verbal, numbered, dichotomy, ordered, ratio

Self-reports can be characterized on several dimensions (see [Table 2](#)). First, the type of recall: we distinguish between free recall, aided or cued recall (in which a respondent is provided with a cue), recognition (where the cue consists of a picture or movie of the media content), and proven or confirmed recall (where the respondent has to prove that (s)he has seen a program or an ad) (see wording examples in the top four rows of [Table 1](#)).

Second, timeframe: does the self-report question refer to this moment, yesterday, last week, last month, or a typical, average or usual week? (Chang & Krosnick, 2003; Price, 1993). Althaus and Tewksbury (2007) concluded in their pilot study of exposure measures for the American National Election study that questions should preferably be asked per medium and with reference to a “typical week.”

Third, unit of observation: does the self-report ask for media exposure to a medium type (television, newspapers, radio, Internet), a specific unit (front page, back page), a specific genre (e.g. news, soap operas, ads), a specific vehicle (the New York Times, the 10 O’Clock News, Newsweek), or a specific issue of a newspaper, magazine or program? (see Andersen et al., 2016 (in this issue); (Dilliplane, Goldman, & Mutz, 2012; Greenberg, Dervin, Dominick, 1968), and are such outlet specific measures additionally enriched with content analyses of the outlets (e.g., De Vreese & Semetko, 2004; Schuck, Vliegthart, & De Vreese, 2016; Van Spanje & De Vreese, 2014).

Fourth, the conceptualization of exposure. An important issue for TV researchers, for example, is what behavior actually counts as “exposure.” Is it being present in the room, facing a television set, looking at the screen, watching the whole program with attention, or recall of media content (Belson, 1981; Kent, 1994)? Some authors focus on frequency or time spent, others on attention (Chaffee & Schleuder, 1986) or social diffusion (Van Den Putte, Yzer, & Southwell, 2011).

Fifth, exposure can refer to different situations or locations and they can be tapped using different survey platforms. Finally, variation is possible in the way the question is formulated as well as the answer categories and scales offered. All of these dimensions of tapping exposure are important when considering the advantages and pitfalls of different measures.

Validity and reliability of self-reports

The potential problems with self-reports are much like problems when answering survey questions about the frequency of past behavior in general (Prior, 2009a; Schwarz & Oyserman, 2001). According to survey answering models, respondents have to (1) understand the question, (2) recall the relevant behavior, (3) estimate the frequency of the relevant behavior, (4) map the frequency onto the response alternatives, and (5) report either their candid answer or a socially desirable answer (see [Table 2](#)).

Problems may arise during each of these activities. First, people must understand what the researcher means with for example violence and which programs contain (sufficient) violence to justify inclusion. Second, respondents must recall—and third, approximate—the actual behaviour. This poses a challenge: “[R]espondents may not recall all episodes of the behavior or incorrectly

recall them as having occurred during the reference period (an error called “telescoping”). . . . When respondents believe that they recalled some, but not all episodes of the behavior, they estimate its frequency” (Prior, 2009a, p. 895). This estimation can be based in heuristics and inference rules that lead to the wrong estimates. For example, it is shown that frequent behavior is often overestimated leading to higher self-reports (Brown & Sinclair, 1999; Burton & Blair, 1991; Prior, 2009a).

A fourth challenge arises if the answer categories of the self-report questions are vague, for example when researchers use the categories “seldom,” “regularly,” or “often.” Fifth and finally, it is a problem when respondents do not want to report media exposure to specific media content such as low prestige publications, violence, or pornography (Althaus & Tewksbury, 2007; Clancy, Ostlund, & Wyner, 1979; Prior, 2009a).

Other motivational problems arise when people are not willing to think hard to arrive at the correct answer. In media exposure research this maybe a problem as respondents can get exhausted or annoyed with answering long questionnaires about the many media outlets that a person possibly is exposed to and therefore have a tendency to underreport their media behavior, a phenomenon known as “satisficing” (Krosnick, 1991).

The severity of the different problems is disputed. Prior (2009b), for example, showed that self-reports vastly overstated Nielsen TV data in the U.S. He concluded that imperfect recall (stage 2) coupled with the use of flawed inference rules, cause inflated self-reports of media exposure, the extent of which differs across respondents (Prior, 2009a, p. 893). LaCour and Vavreck (2014, p. 408) concluded that their “results add nuance to previous findings showing respondents’ propensity to overreport exposure to news, and also demonstrate that on average, self-reported measures reflect relative levels of exposure quite well.”

Discussions of the validity of different types of recall and recognition measures have been extensive (e.g. Appel, Weinstein, & Weinstein, 1979; Biener, Wakefield, Shiner, & Siegel, 2008; Du Plessis, 1994; Gibson, 1983; Krugman, 1971, 1977; Mehta & Purvis, 2006; Niederdeppe, 2005; Stapel, 1998; Wells, 1964; Zielske, 1982). These studies show that recall accuracy is different for weeklies, biweeklies, and monthlies; long and short time spans; visual vs. non-visual stimuli; high and low involvement media; occasional readers versus subscribers; high and low prestige outlets; the answer scale used; and show primacy and recency effects (see for a summary Smit & Neijens, 2011).

Passive measurement methods

A second type of exposure measures takes the starting point in passive registration systems. The digital revolution has extended the possibilities for passive systems a great deal. “All manner of consumption on digital platforms leaves traces, which potentially can provide census like information on audience behavior” (Taneja & Mamoria, 2012, p. 124). Furthermore, many digital media outlets make it possible to measure not only exposure, but also users’ engagement with medium content, through expressions of “liked” or “shared.”³

Webster, Phalen and Lichty (2014, pp. 68–76) distinguish four types of passive systems. First, the household meter that records when the TV set is on and the “device” (channel, on-demand video, DVDs, video games, content from the Internet) to which it is tuned. Second, the people meter: in addition to the automatic monitoring of channel activity by the household meter, viewers have to indicate if they are watching/using the TV set, and when. Third, the computer meter that monitors online computer use in a panel of respondents through software on their computers. Fourth, servers that record website visits and how users navigate within a particular website. In addition, unobtrusive measurements of mobile behaviour are now gaining momentum.

Server data are an example of what is called “site-centric” data—also server-centric or census data—as opposed to the data from the first three systems which are examples of user-centric data, measured in a panel of users. Site-centric data are attractive in the fragmented media landscape

³We do not include lab methods such as eye tracking in this overview.

where sample sizes of surveys restrict the measurement of media outlets with small audiences. Site-centric data, however, are often “data in vacuum” and lack background information about the user, so that in addition samples are used to survey respondents about the variables of interest next to the recorded user-centric media data.

Audio registration is another form of passive media exposure measurement. Systems like Arbitron’s Portable Peoplometer (PPM) or the Eurisko Media Monitor (EMM) “hears” an inaudible code that is embedded in the audio stream of audio and video programming, including broadcast TV, cable TV, radio, and audio/video content in stores, as well as audio-based commercials broadcast on these platforms (Fitzgerald, 2004; LaCour & Vavreck, 2014; Smit & Neijens, 2011; Taneja & Mamoria, 2012). The advantages of this type of systems are clear: passive, “single source” (within the same respondent) measurement of a great number of media, and also out of home viewing and hearing is included.

Passive measurement of print media exposure is possible using RFID technology that is able “to detect the openings and closings of printed magazines and the turning of pages within them” (Mattlin & Gagen, 2013, p. 1). Reading behavior of digital newspapers and magazines on tablets can be app-centric or panel-centric (Kilger & Romer, 2013; Mattlin & Gagen, 2013). App-centric measurement makes use of an electronic code within the app that records and transmits usage (e.g., opening of individual pages, use of interactive features), panel-centric apps are “measurement apps which, when installed on tablets or mobile phones, record and transmit data on usage of all of the apps on those devices to the research company.” (Mattlin & Gagen, 2013, p. 1).

Passive registration of media exposure also comes with pitfalls. First, it is not clear what level of exposure is measured by, for example, page openings or audio records, and how that differs across audience members and occasions. Another example, it is not clear what “liking” a message means (Boyd & Crawford, 2012). Second, compliance is a problem; it is not particular passive to wear a meter, and research has shown that compliance differ across respondents. Also, privacy concerns may prevent respondents to (fully) participate. Third, there are technical issues such as that clicking on a page does not necessarily mean that the user has viewed all information on that page. On laptop and tablet screens scrolling is necessary as the screen size is too small for showing a whole page. It is not clear from the data to what extent the users have done that (De Jager & Overell, 2013). Another problem is that the RFID method is not always accurate (Mattlin, Galin, & McLaren, 2007). Site centric data may be manipulated by automated web robots “visiting” websites in order to artificially raise the number of visitors. Finally, costs prevent large-scale applications of passive media measurement, especially for smaller media.

Cross media exposure

Industry audience ratings—initiated by channels, publishers, and other media owners—traditionally have focused on the measurement of exposure to a single medium, e.g., radio, TV, newspaper, and magazine. The data include the number and characteristics of people exposed to a particular title, channel, program or commercial. In recent years, however, advertisers and other campaigners insist on single source data on media consumption of individual customers, that include all media for their decisions which (combinations of) media to use in their campaigns.

This demand for cross-media data brings—at least—two questions that have to be solved: How to collect single-source data on exposure to different media; and How to compare and combine these data? Data fusion—linking the data collected for the individual media (television, newspapers, etc.)—is an option for the first issue that has been tested and applied. Another option is collecting single-source data on all media which is a challenge, if not impossible, with self-report methods, because of the burden it would imply for the respondent (Smit & Neijens, 2011). Hybrid methods that combine self-report and passive measurement might be a (partial) solution here. The second issue is the question how the exposure to different media can be compared, which require, for example, an answer to the question whether one incident of exposure to a television commercial is comparable to a single exposure of a newspaper ad.

Toward improved practices of media exposure measurement

The above summary of practices of media exposure measurement shows a proliferation in how exposure is tapped and a lack of standardization which hinders interpretation of study results and accumulation in scientific knowledge. No measure is undisputed. We believe there are several fundamental research questions on the table that can contribute to the improvement of media exposure measures. Below we address 11 of these which is by no means an exhaustive account.

Collecting and systematically accessing current practices: A research tool

We have developed a website that allow researchers to search for extant media exposure measures, obtain available information about the quality and application of these measures in previous research, and to also add new measures to this overview resource.⁴ We hope that this publicly and freely available resource (www.mediaexposuremeasures.org) will prevent scholars from reinventing the wheel when addressing these questions. It is meant as a simple, practical, and shared tool as researchers try to assess what kinds of measures are most suited to their research interests.

More attention to validation of exposure measures

As in many articles measures of exposure are used without paying attention to their measurement qualities, we would like to make a plea for more attention to the measurement qualities such as validity and reliability of exposure measures (see also Dilliplane et al., 2012; Niederdeppe, 2014).

(Re)conceptualizing the “encounter” in exposure

As we outlined above, “encountering” is a central notion of being exposed. We believe it would be beneficial to ask different recall questions (free, aided, proven) as they may tap different levels of encountering. We also suggest asking additional questions about the level of attention (see also Chaffee & Schleuder, 1986), involvement or engagement (Calder & Malthouse, 2008; Van Den Putte et al., 2011) with the content in the ‘encounter’ and trying to apply a definition that is “sensitive to individual differences in states of exposure, memory traces and/or processing tendencies” (Niederdeppe, 2014, p. 154).

Further refining self-reports

It is a truism that self-reports are flawed for several of the reasons outlined above. It is also a reality that most scholars—by necessity or choice—rely on self-reports. We therefore believe that a further continuation of refinement in measurement continues to be important (see Andersen et al., 2016, in this special issue). This may both include improvements in question wording and answer categories.

Offering help

To overcome memory limitations, researchers could offer help to respondents in their self-reports. For example, respondents can be provided with cues or a meaningful context for respondents’ memory search, for example, an event history calendar (Belli, 1998) or an anchor that specify population averages for the behavior in question (Burton & Blair, 1991; Prior, 2009a; Schwarz & Oyserman, 2001).

⁴The initiative is taken by the Research Priority Area Communication and the Amsterdam School of Communication Research ASCoR, at the University of Amsterdam, and is led by Peter Neijens and Claes de Vreese.

Combining big data and micro data

Future research would be well served by designing studies that both rely on large scale data about audiences and their patterns of exposure as well as micro-level studies, that advance the level of granularity. For example, aggregate audience measures might help to define the most popular sources of say news and current affairs in a country or media market. These sources might be included in automated content analyses that are then linked to measures of media exposure (self-reported or registration). The combination of exposure measures and content features—often referred to as “linkage analysis” (see also Slater, 2016, in this issue) will enhance the theoretical relevance and precision of exposure measures when relating these “weighted” exposure measures to relevant outcome variables (De Vreese, 2014; Schuck et al., 2016).

Hybrid data collection methods

It is simply too costly to include all media in national audience research, and it would be impossible in practice. McDonald (2008, p. 317) believes that the solution lies in adopting “hybrid systems [that] will continue to use random probability sampling to measure the bigger media events in the head of the Long Tail (e.g., the biggest television programs, the largest magazines), but will use (nonsample-based) measures for the niche media events in the Long Tail.”

Combining self-reports and registration

Combinations of self-reports and registration may also be interesting avenues for future audience research. For example, the Eurisko Media Monitor (EMM) captures exposure to multiple media using a combination of self-reports (survey) and passive measurement (meter). The electronic meter with sound-matching technology captures audio signals from media like TV and radio. Other media are recorded through recall surveys sent electronically via GPRS to the meter (Taneja & Mamoria, 2012, p. 128). Such combinations may also give more leverage in closing the gap between aggregate and individual level studies.

Interactive metrics

Recent changes in media offerings advance the development of new “interactive” metrics such as Twittering about TV programs, “liking,” “sharing,” and “click through” (Araujo, Neijens, & Vliegthart, 2015). Davis and Sajtos (2008), for example, proposed the Active Audience Dialogue, a metric that studies the number of unique audience viewers who become actively interactive—a particularly useful tool for advertising campaigns that encourage audiences to interact with the brand by sending an SMS, MMS, or VMS message response (Smit & Neijens, 2011, p. 132). The meaning and value of these new metrics for audience research need further investigation.

Implicit measures

With the proliferation of mixtures of editorial content and advertising (Smit, Van Reijmersdal, & Neijens, 2009) and the increased blur between message types, new processing modes also become center place. These processes call for implicit measures of media reach and processing, in addition to the traditional explicit measures. There is therefore a vital need to develop, use, and extend a broad spectrum of implicit measures, including eye movement tracking, association tests, and implicit-thought listing methods, and fMRI (Vandeberg, Smit, & Murre, 2015). Marci (2006), for example, developed a biologically based measure of audience engagement that uses four biomeasures: skin conductance, heart rate, respiratory rate, and motion. Siefert et al. (2009) developed another biologically based measure of audience engagement, combining attention and

emotional impact. This measure of audience engagement was recorded using a smart-garment that could be worn unobtrusively under regular clothing (Smit & Neijens, 2011).

New data collection methods

New platforms and technologies can help tapping exposure. One important avenue is the use of mobile survey technologies, such as mobile phones with devices such as camera, microphone, GPS and scanner which facilitate multimode data collection and capturing data in-the-moment (see Link et al., 2014). IPA Touchpoints in the UK, for example, “prompts respondents every ½ hr to enter their location, who they are with, and what media they are using” (Taneja & Mamoria, 2012, p. 129). For another application of mobile phones for measuring media exposure, see Ohme et al. (2016) in this issue.

Current advances

In this Special Issue, the articles all address one or more of the outlined challenges. The first article contributes to the ongoing discussion of improvements to self-reported measures (Andersen et al., 2016). It suggests that offering a frequency score when listing exposure to different outlet improves the utility and explanatory power of self-reported measures. The second article uses an experimental method for testing the performance of exposure self-reports against manipulated baseline exposure. It also investigate whether variation in question wording improves the accuracy of self-reported exposure measures (Jerit et al., 2016). The third article systematically reviews the studies which utilize exogenous or hybrid exposure measures for examining the effects of media exposure on tobacco-related outcomes. The authors discuss the strengths and weaknesses, and current developments in this class of measurement, drawing some implications for its appropriate utilization (Liu & Hornik, 2016). In the last two articles, more recent techniques are explored: first, the benefits and pitfalls of a smartphone and app-based measurement of media exposure to political information is investigated (Ohme et al., 2016), and second, unobtrusive measures of exposure such as eye-tracking is used to explore accuracy of self-reports of Facebook contents (Vraga et al., 2016)

At the end of the special issue, we have invited eminent scholars who have worked on this topic in the past and offered the opportunity to reflect on the current state of affairs as well as future developments. The contributions by Boase (2016), Hornik (2016), Niederdeppe (2016), Slater (2016), Taneja (2016), and Webster (2016) also tackle one or more of the outlined challenges, such as the use of unobtrusive registration, the linking of data sources, or the use of industry data. In sum, the Special Issue, with the Introduction delineating the field and offering a set of challenges on the future research agenda, as well as a public access tool (www.mediaexposuremeasures.org), five new and original research articles, and six insightful discussion contributions, provides what we hope is an impetus for a new generation of research and theorizing on measuring media exposure.

References

- Slater. (2016). Combining content analysis and assessment of exposure through self-report, spatial, or temporal variation in media effects research. *Communication Methods and Measures*, 10(2–3), 173–175.
- Althaus, S. L., & Tewksbury, D. H. (2007). *Toward a new generation of media use measures for the ANES* (Report No. nes011903). Retrieved from American National Election Studies: <http://www.electionstudies.org/resources/papers/Pilot2006/nes011903.pdf>
- Andersen, K., Albaek, E., & de Vreese, C. H. (2016). Measuring media diet in a high-choice environment: Testing the list-frequency technique. *Communication Methods and Measures*, 10(2–3), 81–98.
- Appel, V., Weinstein, S., & Weinstein, C. (1979). Brain activity and recall of TV advertising. *Journal of Advertising Research*, 19(4), 7–18.

- Araujo, T., Neijens, P. C., & Vliegthart, R. (2015). What motivates consumers to re-tweet brand content? The impact of information, emotion, and traceability on pass-along behavior. *Journal of Advertising Research*, 55(3), 284–295. doi:10.2501/JAR-2015-009
- Belli, R. (1998). The structure of autobiographical memory and the event history calendar: Potential improvements in the quality of retrospective reports in surveys. *Memory*, 6(4), 383–406. doi:10.1080/741942610
- Belson, W. A. (1981). *The design and understanding of survey questions*. Aldershot, UK: Gower.
- Biener, L., Wakefield, M., Shiner, C. M., & Siegel, M. (2008). How broadcast volume and emotional content affect youth recall of anti-tobacco advertising. *American Journal of Preventive Medicine*, 35(1), 14–19. doi:10.1016/j.amepre.2008.03.018
- Boase, J. (2016). Augmenting survey and experimental designs with digital trace data. *Communication Methods and Measures*, 10(2–3), 165–166.
- Boyd, D., & Crawford, K. (2012). Critical 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
- Brown, N. R., & Sinclair, R. C. (1999). Estimating number of lifetime sexual partners: Men and women do it differently. *Journal of Sex Research*, 36(3), 292–297. doi:10.1080/00224499909551999
- Burton, S., & Blair, E. (1991). Task conditions, response formulation processes, and response accuracy for behavioral frequency questions in surveys. *Public Opinion Quarterly*, 55(1), 50–79. doi:10.1086/269241
- Calder, B. J., & Malthouse, E. C. (2008). Media engagement and advertising effectiveness. In B. J. Calder (Ed.), *Kellogg on advertising & media* (pp. 1–36). Hoboken, NJ: Wiley.
- Chaffee, S. H., & Schleuder, J. (1986). Measurement and effects of attention to media news. *Human Communication Research*, 13(1), 76–107. doi:10.1111/hcre.1986.13.issue-1
- Chang, L., & Krosnick, J. A. (2003). Measuring the frequency of regular behaviors: Comparing the ‘typical week’ to the ‘past week’. *Sociological Methodology*, 33(1), 55–80. doi:10.1111/some.2003.33.issue-1
- Clancy, K. J., Ostlund, L. E., & Wyner, G. A. (1979). False reporting of magazine readership. *Journal of Advertising Research*, 19(5), 23–30.
- Davis, R., & Sajtos, L. (2008). Measuring consumer interactivity in response to campaigns coupling mobile and television media. *Journal of Advertising Research*, 48(3), 375–391. doi:10.2501/S0021849908080409
- De Jager, D., & Overell, S. (2013). *Two ways to measure display ad viewability*. Paper presented at the Print and Digital Research Forum, Nice.
- De Vreese, C. H. (2014). Kombination af indholdsanalyse og spørgeskemadata. [Combining content analysis and survey data]. In D. N. Hopmann, & M. Skovsgaard (Eds.), *Forskningsmetoder i journalistik og politisk kommunikation* (pp. 339–356). Copenhagen, Denmark: Hans Reitzels Forlag.
- De Vreese, C. H., & Semetko, H. A. (2004). News matters: Influences on the vote in the Danish 2000 euro referendum campaign. *European Journal of Political Research*, 43(5), 699–722. doi:10.1111/j.0304-4130.2004.00171.x
- Dilliplane, S., Goldman, S. K., & Mutz, D. C. (2012). Televised exposure to politics: New measures for a fragmented media environment. *American Journal of Political Science*, 57(1), 236–248. doi:10.1111/j.1540-5907.2012.00600.x
- Du Plessis, E. E. (1994). Recognition versus recall. *Journal of Advertisement Research*, 34(4), 75–91.
- Fishbein, M., & Hornik, R. (2008). Measuring media exposure: An introduction to the special issue. *Communication Methods and Measures*, 2(1–2), 1–5. doi:10.1080/19312450802095943
- Fitzgerald, J. (2004). Evaluating return on investment of multimedia advertising with a single-source panel: A retail case study. *Journal of Advertising Research*, 44(3), 262–270. doi:10.1017/S0021849904040309
- Foehr, U. G. (2006). *Media multitasking among American youth: Prevalence, predictors, and parings*. Menlo Park, CA: The Hendry J. Kaiser Family Foundation.
- Gibson, L. D. (1983). Not recall. *Journal of Advertising Research*, 23(1), 39–46.
- Greenberg, B. S., Dervin, B., & Dominick, J. (1968). Do people watch “television” or “programs”? A measurement problem. *Journal of Broadcasting*, 12(4), 367–376. doi:10.1080/08838156809386266
- Greenwald, A. G., & Leavitt, C. (1984). Audience involvement in advertising: Four levels. *Journal of Consumer Research*, 11(1), 581–592. doi:10.1086/jcr.1984.11.issue-1
- Hornik, R. (2016). Measuring campaign message exposure and public communication environment exposure: Some implications of the distinction in the context of social media. *Communication Methods and Measures*, 10(2–3), 167–169.
- Jerit, J., Barabas, J., Pollock, W., Banducci, S., Schoonvelde, M., & Stevens, D. (2016). Manipulated vs. measured: Using an experimental benchmark to investigate the performance of self-reported media exposure. *Communication Methods and Measures*, 10(2–3), 99–114.
- Kent, R. (1994). Measuring media audiences. An overview. In R. Kent (Ed.), *Measuring media audiences*. New York, NY: Routledge.
- Kilger, M., & Romer, E. (2013). *Using passive measurement to describe reading app behaviors in a rich media mobile environment*. Paper presented at the Print and Digital Research Forum, Nice.
- Krosnick, J. A. (1991). Response strategies for coping with the cognitive demands of attitude measures in surveys. *Applied Cognitive Psychology*, 5(3), 213–236. doi:10.1002/(ISSN)1099-0720
- Krugman, H. E. E. (1971). Brain wave measures of media involvement. *Journal of Advertising Research*, 11(1), 3–9.

- Krugman, H. E. E. (1977). Memory without recall, exposure without perception. *Journal of Advertising Research*, 17(4), 7–12.
- LaCour, M. J., & Vavreck, L. (2014). Improving media measurement: Evidence from the field. *Political Communication*, 31(3), 408–420. doi:10.1080/10584609.2014.921258
- Link, M. W., Murphy, J., Schober, M. F., Buskirk, T. D., Childs, J. H., Tesfaye, C. L., & Pasek, J. (2014). *Mobile technologies for conducting, augmenting and potentially replacing surveys: Report of the AAPOR task force on emerging technologies in public opinion research*. Deerfield, IL: AAPOR.
- Liu, J., & Hornik, R. (2016). Measuring exposure opportunities: Using exogenous measures in assessing effects of media exposure on smoking outcomes. *Communication Methods and Measures*, 10(2–3), 115–134.
- Marci, C. D. (2006). A biologically based measure of emotional engagement: Context matters. *Journal of Advertising Research*, 46(4), 381–387. doi:10.2501/S0021849906060466
- Mattlin, J. A., & Gagen, J. (2013). *Passive measurement of print revisited: The case of digital magazines*. Paper presented at the Print and Digital Research Forum, Nice.
- Mattlin, J. A., Galin, M., & McLaren, M. (2007). *Initial experiments with RFID technology*. Paper presented at the Worldwide Readership Research Symposium, Vienna.
- McDonald, S. (2008). The long tail and its implications for media audience measurement. *Journal of Advertising Research*, 48(3), 313–319. doi:10.2501/S0021849908080379
- Mehta, A., & Purvis, S. C. (2006). Reconsidering recall and emotion in advertising. *Journal of Advertising Research*, 46(1), 49–56. doi:10.2501/S0021849906060065
- Napoli, P. (2011). *Audience evolution: New technologies and the transformation of media audiences*. New York, NY: Columbia University Press.
- Niederdeppe, J. (2005). Assessing the validity of confirmed ad recall measures for public health communication campaign evaluation. *Journal of Health Communication*, 10(7), 635–650. doi:10.1080/10810730500267662
- Niederdeppe, J. (2014). Conceptual, empirical, and practical issues in developing valid measures of public communication campaign exposure. *Communication Methods and Measures*, 8(2), 138–161. doi:10.1080/19312458.2014.903391
- Niederdeppe, J. (2016). Meeting the challenge of measuring communication exposure in the digital age. *Communication Methods and Measures*, 10(2–3), 170–172.
- Ohme, J., de Vreese, C.H., & Albaek, E. (2016). Exposure research going mobile: A smartphone-based measurement of media exposure to political information in a convergent media environment. *Communication Methods and Measures*, 10(2–3), 135–148.
- Pilotta, J. J., & Schultz, D. E. (2005). Simultaneous media experience and synesthesia. *Journal of Advertising Research*, 45(1), 19–26. doi:10.1017/S0021849905050087
- Pilotta, J. J., Schultz, D. E., Drenik, G., & Rist, P. (2004). Simultaneous media usage: A critical consumer orientation to media planning. *Journal of Consumer Behaviour*, 3(3), 285–292. doi:10.1002/(ISSN)1479-1838
- Price, V. (1993). The impact of varying reference periods in survey questions about media use. *Journalism & Mass Communication Quarterly*, 70(3), 615–627. doi:10.1177/107769909307000312
- Prior, M. (2009a). Improving media effects research through better measurement of news exposure. *The Journal of Politics*, 71(3), 893–908. doi:10.1017/S0022381609090781
- Prior, M. (2009b). The immensely inflated news audience: Assessing bias in self-reported news exposure. *Public Opinion Quarterly*, 73(1), 130–143. doi:10.1093/poq/nfp002
- Schuck, A. R. T., Vliegenthart, R., & De Vreese, C. H. (2016). Matching theory and data: Why combining media content with survey data matters. *British Journal of Political Science*, 46(1), 205–213. doi:10.1017/S0007123415000228
- Schwarz, N., & Oyserman, D. (2001). Asking questions about behavior: Cognition, communication and questionnaire construction. *American Journal of Evaluation*, 22(2), 127–160. doi:10.1177/109821400102200202
- Siefert, C. J., Kothuri, R., Jacobs, D. B., Levine, B., Plummer, J., & Marci, C. D. (2009). Winning the super ‘buzz’ bowl. *Journal of Advertising Research*, 49(3), 293–303. doi:10.2501/S0021849909090424
- Slater, M. D. (2004). Operationalizing and analyzing exposure: The foundation of media effects research. *Journalism & Mass Communication Quarterly*, 81(1), 168–183. doi:10.1177/107769900408100112
- Smit, E. G., & Neijens, P. C. (2011). The march to reliable metrics. A half-century of coming closer to the truth. *Journal of Advertising Research*, 51(supplement), 124–135. doi:10.2501/JAR-51-1-124-135
- Smit, E. G., Neijens, P. C., & Heath, R. (2013). The differential effects of position, ad and reader Characteristics on readers’ processing of newspaper ads. *International Journal of Advertising*, 32(1), 65–84. doi:10.2501/IJA-32-1-065-084
- Smit, E. G., Van Reijmersdal, E., & Neijens, P. C. (2009). Today’s practice of brand placement and the industry behind it. *International Journal of Advertising*, 28(5), 761–782. doi:10.2501/S0265048709200898
- Stapel, J. (1998). Recall and recognition: A very close relationship. *Journal of Advertising Research*, 38(4), 41–45.
- Taneja, H. (2016). Using commercial audience measurement data in academic research. *Communication Methods and Measures*, 10(2–3), 176–178.
- Taneja, H., & Mamoria, U. (2012). Measuring media use across platforms: Evolving audience information systems. *The International Journal on Media Management*, 14(2), 121–140. doi:10.1080/14241277.2011.648468
- Valkenburg, P. M., & Peter, J. (2013). Five challenges for the future of media-effects research. *International Journal of Communication*, 7, 197–215.

- Van den Putte, B., Yzer, M., & Southwell, B. G. (2011). Interpersonal communication as an indirect pathway for the effect of antismoking media content on smoking cessation. *Journal of Health Communication, 16*(5), 470–485. doi:[10.1080/10810730.2010.546487](https://doi.org/10.1080/10810730.2010.546487)
- Van Spanje, J., & De Vreese, C. H. (2014). Europhile media and eurosceptic voting: Effects of news media coverage on Eurosceptic voting in the 2009 European Parliamentary elections. *Political Communication, 31*(2), 325–354. doi:[10.1080/10584609.2013.828137](https://doi.org/10.1080/10584609.2013.828137)
- Vandeberg, L., Smit, E. G., & Murre, J. M. J. (2015). Implicit measurement. In P. Moy (Ed.), *Oxford bibliographies in communication*. New York, NY: Oxford University Press.
- Vraga, E., Bode, L., & Troller-Renfree, S. (2016). Beyond self-reports: Using eye tracking to measure topic and style differences in attention to social media content. *Communication Methods and Measures, 10*(2–3), 149–164.
- Webster, J. (2016). Why study measures of exposure? From exposure to attention. *Communication Methods and Measures, 10*(2–3), 179–180.
- Webster, J. G., & Ksiazek, T. B. (2012). The dynamics of audience fragmentation: Public attention in an age of digital media. *Journal of Communication, 62*(1), 39–56. doi:[10.1111/jcom.2012.62.issue-1](https://doi.org/10.1111/jcom.2012.62.issue-1)
- Webster, J. G., Phalen, P. F., & Lichty, L. W. (2014). *Ratings analysis: Audience measurement and analytics*. New York, NY: Routledge.
- Wells, W. D. (1964). Recognition, recall, and rating scales. *Journal of Advertising Research, 4*(3), 2–8.
- Zielske, H. A. (1982). Does day-after recall penalize “feeling” ads? *Journal of Advertising Research, 22*(1), 19–22.