The Effects of Digital Media Images on Political Participation Online: Results of an Eye-Tracking Experiment Integrating Individual Perceptions of “Photo News Factors”

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Research in communication and political science has underlined the relevance of participation offline and online for the performance and stability of democratic societies, and shown that media has a substantial impact on people’s willingness to participate in political discourses. However, the impact of visual message features, prevalent in contemporary online environments, on political participation online remains unclear and needs further research. This article examines two research questions: How and under what conditions do digital news media images trigger political online participation? Which roles do specific image features ("photo news factors" such as negativity, emotionality, visual attraction, or saliency) play in this respect? Based on an experimental study integrating eye-tracking measurement, our empirical analysis reveals that individuals are more willing to politically participate online, if they perceive news media images with specific “photo news factors”: press photography individuals acknowledge as surprising, emotional, attractive, newsworthy, that is geographically proximal, controversial, relevant, or salient. We also find that the sensory perception of news media images can cause a positive and significant impact. If the media image is regarded as being newsworthy or as negative by individual recipients, they are more likely to then engage in online participation.

KEY WORDS: online media, digital media images, political participation, online participation, traditional participation, eye-tracking, experimental research, visual communication

传播和政治学方面的研究强调了线下和线上政治参与对民主社会的表现与稳定的相关性，并表明，媒体对人们参与政治话语的意愿度发挥了巨大影响。然而，当代网络环境中盛行的视觉信息特征，对线上政治参与产生的影响依然不够清晰，需要进一步研究。本文检验了两个研究问题：数字新闻媒体图片如何，以及在什么条件下能触发线上政治参与?特定图片特征(“图片新闻因素”例如消极性、情感性、视觉吸引或突出性)在这方面发挥了什么作用?基于一项整合眼动追踪测量的实验研究，我们的实证分析显示，个人更愿意参与线上政治，如果其感知的新闻媒体图片带有特定图片特征：新闻摄影被认为是出乎意料的、感性的、有吸引力的、具有报道价值的，且新闻摄影具备地方性、争议性、相关性或突出性。我们还发现，对新闻媒体图片的感知能造成积极且显著的影响。如果媒体图片被个人视为具有报道价值或消极性，他们则更有可能参与线上政治。

关键词：网络媒体，数字媒体图片，政治参与，网络参与，传统参与，眼动追踪，实验研究，视觉传达
La investigación en comunicación y ciencias políticas ha subrayado la relevancia de la participación fuera de línea y en línea para el desempeño y la estabilidad de las sociedades democráticas y ha demostrado que los medios de comunicación tienen un impacto sustancial en la disposición de las personas a participar en discursos políticos. Sin embargo, el impacto de las características del mensaje visual, frecuente en los entornos en línea contemporáneos, sobre la participación política en línea sigue sin estar claro y necesita más investigación. Este artículo examina dos preguntas de investigación: ¿Cómo y bajo qué condiciones las imágenes de los medios digitales de noticias desencadenan la participación política en línea? ¿Qué roles desempeñan las características específicas de la imagen (“factores de noticias fotográficas” como la negatividad, la emocionalidad, la atracción visual o la prominencia) a este respecto? Basado en un estudio experimental que integra la medición de seguimiento ocular, nuestro análisis empírico revela que las personas están más dispuestas a participar políticamente en línea, si perciben imágenes de los medios de comunicación con características de imagen específicas: fotografía de prensa que reconocen como sorprendente, emocional, atractiva, de interés periodístico, eso es geográficamente proximal, controvertido, relevante o irrelevante. También encontramos que la percepción sensorial de las imágenes de los medios de comunicación puede causar un impacto positivo y significativo. Si un destinatario individual considera que la imagen de los medios es de interés periodístico o negativa, es más probable que participe en la participación en línea.

PALABRAS CLAVE: medios en línea, imágenes de medios digitales, participación política, participación en línea, participación tradicional, seguimiento visual, investigación experimental, comunicación visual

Introduction

For a long time research in communication and political science has underlined the relevance of participation offline and online for the performance and stability of democratic societies, and shown that media has a substantial impact on people’s willingness to participate in political discourses (Gibson & Cantijoch, 2013; Strömbäck, Falasca, & Kruikemeier, 2018; Taylor-Smith & Smith, 2018). Although political participation can no longer be narrowed down to high-effort, offline actions, but must integrate the use of digital technologies (Lilleker & Koc-Michalska, 2017, p. 21), not all scholars agree on a definition which includes “thin” forms of political engagement such as collecting, commenting on, or sharing online information (Halupka, 2014, p. 119). Accordingly, as a multifaceted and highly contested concept, different ideas of political participation have been discussed. While traditional and elitist definitions of political participation suggest that the participation of citizens is limited to “voting their leaders out of office” (Teorell, 2006, p. 788), political participation does also take place outside the bounds of voting behavior, when groups of citizens try to influence their governments regarding policy issues which concern them (Verba, Nie, & Kim, 1987, p. 46). Several concepts of political participation thus emphasize the mobilization of citizens in both institutional and extra-parliamentary activities such as participating in protest movements (Koopmans, 1996). In contrast to these “thick” concepts of political participation, in deliberative theories of democracy the threshold for citizens’ engagement is considered to be much lower. Deliberative approaches understand political participation as discursive processes of political activity, highlighting the willingness and ability of informed citizens to engage in
public debates about an issue by which they are affected or concerned (Friess & Eilders, 2015, p. 319). According to Arnstein’s often cited “ladder of participation” (1969), participation is not conceptualized as an either/or category, but as a successive development in which preliminary, low-level stages of participation—such as collecting and sharing information about political issues—are realized before highly-involving participatory actions take place (Arnstein, 1969). In an ideal situation of deliberation, informed people talk in public with other citizens in an exchange that “provides the opportunity for individuals to develop and express their views, learn the positions of others, identify shared concerns and preferences, and come to understand and reach judgments about matters of public concern” (Carpini, Cook, & Jacobs, 2004, p. 319). While in political sciences the use of information and interpersonal communication are thus regarded as preconditions (Milbrath, 1965) or mediators of participation (Tian, 2011), from the perspective of communication science, participation can be abundantly realized via and through communication (Bucy & Gregson, 2001; Emmer, Wolling, & Vowe, 2012). Citizens can, for example, articulate their opinions, ideas, and expectations through direct or mediated discussions with political actors or acquire specific information in interpersonal exchanges with peers. Whilst Arnstein’s “ladder of participation” has been criticized due to its strong hierarchization of participatory categories and their normative character (Kersting, 2008), low-level stages of participation (such as information-seeking) can be appreciated before highly-involving participatory actions are realized—but are not seen as unavoidably requirement. The different types of participation rather stand side by side, sometimes involving each other, but fulfilling different functions, and finally can only be weighted differently in the specific political context depending on the task at hand. Following this view, we understand political participation as a multi-layered concept that comprises very different actions ranging from low-threshold (e.g., getting political information) to highly-involving actions that citizens can perform offline (e.g., participation in elections) and online (e.g., posting political comments (Anduiza, Perea, Jensen, & Jorba, 2012)).

Accommodating the rise of social media, research has addressed the question how political participation online works in deliberative settings (Albrecht, 2006; Friess & Eilders, 2015; Janssen & Kies, 2005). Focusing on “new” forms of online engagement, scholars have shown that the repertoire of participatory actions has expanded considerably (Lilleker & Koc-Michalska, 2017; Ziegele, Breiner, & Quiring, 2014; Ziegele, Weber, Quiring, & Breiner, 2018). Next to forms of participation that exist online and offline (e.g., petitions), the Internet has also produced completely new opportunities for “media participation” (Bucy & Gregson, 2001), such as the publicly visible dissemination, evaluation and commenting of political information via social networks and the resulting processes of deliberative group formation and political discussion (Anduiza et al., 2012; Emmer et al., 2012).

While media effect research in this context has concentrated on the influence of textual online media use on political participation in general (e.g., Bimber & Copeland, 2013; Boulianne, 2009; de Zúñiga, Copeland, & Bimber, 2014; Holt, Shehata, Strömbäck, & Ljungberg, 2013) some studies have also focused on effects
of specific messages and their characteristics such as presentation style, emotionality or negativity (e.g., Brader, 2005; Parker & Isbell, 2010; Valentino, Brader, Groenendyk, Gregorowicz, & Hutchings, 2011; Ziegele & Reinecke, 2017). Such characteristics have also been addressed as “news factors”—that is, message features that determine the chances of news information appearing in media (Galtung & Ruge, 1965) and of being selected by audiences (Eilders, 2006) as well as determining the chances of follow-up participation in online debates (Ziegele, Quiring, Esau, & Friess, 2018). Yet, the impact of visual message features, prevalent in contemporary online environments, on political participation online remains unclear and needs further research (Fahlenbrach, 2013; Mattoni & Teune, 2014). In short, can still images in digital media “move” people?

Exploring effects of digital media images on political participation online seems a logical step in acknowledging the reality of today’s deliberative public sphere online that is increasingly visualized (Halpern & Gibbs, 2013; Janssen & Kies, 2005). Digital photography and online publishing, together with aesthetic demands by editors and readers alike, have supported an unprecedented shift toward visualization in online media (Fahmy, Bock, & Wanta, 2014). Since news media images have become an integral part of political communication and political news coverage (Harcup & O’Neill, 2017; Schill, 2012), consumers of digital media are exposed to many visual representations of war and terrorism, environmental deterioration or social inequality embedded in their daily media diet. Such news photographs hold strong potential to condense information, to encourage further reading and information seeking, to inspire the reader, generate emotions, and activate follow-up actions relevant to participatory civic engagement (Rafter, Novelli, & Holtz-Bacha, 2016). However, although a number of studies originating from communication and political science as well as media psychology have shown that visuals are an important information source, that they provide eye-catching cues for selection, and reduce selective exposure and enhance information processing (Graber, 1990, 1996; Zillmann, Knobloch, & Yu, 2001), these findings have not yet been transferred to research examining political participation online. This article, therefore, focuses on the following research questions:

1. How and under what conditions do digital news media images trigger political online participation?
2. Which roles do specific image features (so called “photo news factors” such as negativity, emotionality, visual attraction, or saliency) play in this respect?

In order to answer these x-centered research questions, the next section introduces the theoretical framework bringing together literature from media psychology, communication studies, and political science. We then put the derived hypotheses to an empirical test. To this end, we discuss the operationalization of the independent variables (IVs) and the dependent variables (DVs) and map differences to which individuals are inclined to engage in online participation after being exposed to a media image based on data that we gathered during an eye-tracking experiment with a presurvey and postsurvey. In order to examine whether and how specific image features, namely “photo news factors” such as controversy,
unexpectedness, emotionality, or visual attraction, increase the probability of individuals participating politically in online environments, we then apply a multi-level analysis.

Our empirical analysis reveals that the reception time of digital news media images \textit{as such} does \textit{not} significantly increase the willingness for political participation online. However, individuals are more willing to politically participate online, if they perceive news media images with specific image features. Individual willingness to engage in political participation online is particularly supported if the recipient perceives press photography as surprising, emotional, attractive, newsworthy, geographically proximal, controversial, relevant, or salient. In addition, cross-level interaction effects indicate that the sensory perception of news media images also can cause a positive and significant impact: If the media image is regarded as being newsworthy or as negative by an individual recipient, he/she is more likely to engage in online participation afterwards.

The contributions of this article are threefold. Our empirical data indicates media effects on political participation online that are not induced by the sensory perception of \textit{textual} content, but by the accompanying \textit{news media visuals}. Examining the impact of specific image-inherent features, hereby making use of the concept of “\textit{photo news factors},” our results contribute to the understanding of perceptual mechanisms that might make images with specific visual qualities more effective at mobilizing citizens. Testing our assumptions using observational and survey data from experimental design, we also make an example of integrating innovative eyetracking technology into the study of political communication and media effect research.

\textbf{The Relevance of Political Participation Online}

Deliberative as well as participatory perspectives on democracies (Gutmann & Thompson, 2009; Pateman, 2012) share the idea that political participation has a central role in the policymaking process, assuming that it is not only valuable for the political integration of the individual citizen, but also for democracy as such (Frieß & Porten-Cheé, 2018).

The rise of social and digital media has changed the structure of the public sphere (Dahlgren, 2005; Papacharissi, 2002). Media consumption is not only increasingly shaped by large platform companies providing individualized search services and social media applications; recipients also have greater choice to engage interactively as they search for and select content they are interested in, and they are able to “like,” “share,” or comment on it after it is published (Ziegele et al., 2014; Ziegele, Weber et al., 2018). While such recipient interactions, even in weak-tie social media networks, increase the circulation of political information, they also increase the likeliness that uninvolved people are exposed to diverse political messages—which might be, as Gil De Zúñiga, Valenzuela (2011) have argued, the first step toward further political engagement. Furthermore, since blogging sites and social media platforms such as Facebook, YouTube, Twitter, and Instagram have turned into frequently used channels of political communication, the
threshold to participate in public discourses online has become significantly lower (Coleman & Blumler, 2009).

While advocates of deliberative democracy endorsed new media as encouraging forms of political participation online, hopes for an equalizing “e-democracy” soon diminished (Dahlberg, 2007). Accordingly, more recent research has painted a more nuanced picture: On the one hand, the Internet offers an easy entrance to political participation online, provides various opportunities for political communication and engagement, including platforms for marginalized actors (Stroud, 2011), and thus expands the public sphere (Rasmussen, 2014). On the other hand, especially controversial, “non-mainstream” political information is at risk of becoming limited by state authorities, cyber activists, or transnational companies who intend to delegitimize rebellious voices (McCosker, 2015). Recent phenomena such as “echo chambers,” “shit storms,” “cyberbullying,” and “trolling” (Weber, Ziegele, & Schnauber, 2013) illustrate that digital and social media are not only a sphere of communication where rational arguments are deliberatively exchanged in a discourse free from domination (Beyme, 2018), but also incorporate a “dark side” (Lutz & Hoffmann, 2017), eventually fostering exclusion and radicalization (Dahlberg, 2007). In addition, as articulating opinions via social media professionally is tied to digital media competencies (Albrecht, 2006) particularly well-informed and technically skilled citizens engage online, while older people with lesser technical affinity are at risk of being left behind (Boulianne & Theocharis, 2018; Holt et al., 2013; Norris, 2003). Furthermore, the use of political online content is not independent of political interest and of political involvement: While some studies have shown that recipients with higher political interest and engagement are more active online (Bimber, 2003; Boulianne, 2009), others have found indications of “stimulation effects” elicited by online media consumption, particularly among users with low political interest (Bimber, Cunill, Copeland, & Gibson, 2014; Boulianne, 2011).

Given these potentials, scholars have put the focus on examining whether and how opportunities provided by online media support individual willingness to participate politically in digital environments and beyond (Elliott & Earl, 2016). Aiming to explain potential media effects on online participation and their variation, we now draw on theories from different strands of political participation literature, integrating findings from political and communicational science, including news reception studies.

The Impact of Digital Media Usage on Online Participation

Studies based on deliberative and participatory theory—which assumes that political engagement has democratically valuable effects on participants and societies (Fishkin, 2009; Pateman, 2012)—have focused in particular on the question whether and how digital media usage impacts political participation in general, especially compared to offline forms of participation (Bakker & Vreese, 2011; Gil De Zúñiga, Puig-I-Abril, & Rojas, 2009). Building on the “new media use as political participation” argument (Bucy & Gregson, 2001), some authors have suggested a
broader angle on forms of discursive participation, embracing digital media usage per se as a specific form of citizen involvement in the democratic process (Theocharis, Lowe, van Deth, & García-Albacete, 2015; Zúñiga et al., 2014).

While online media in general change the way recipients consume political information, the social functionality of online news sites in particular can drive participatory (political) news consumption (Purcell, Rainie, Mitchell, Rosenstiel, & Olmstead, 2010). Despite selective biases and homogeneous network structures fostering news reception in ideological lines (Garrett, Carnahan, & Lynch, 2013), studies suggest that individuals are exposed to ideologically crosscutting viewpoints online that might differentiate their political understanding (Bakshy, Messing, & Adamic, 2015). Partaking in online discussions has thus been considered an important participatory action of users in interactive online environments. Cappella, Price, and Nir (2002), as well as Luskin, Fishkin, and Iyengar (2006) have demonstrated that involvement in online discussion produces greater awareness of the reasons behind opposing views, thus holding the potential to broaden the political discourse through new alternatives and perspectives. Min (2007) and Knobloch and Gastil (2015) found that online deliberation increases political efficacy, understood as the subjective “feeling that an individual political action does have or can have, an impact upon the political process” (Campbell, Gurin, & Miller, 1954, p. 187). Frieß and Porten-Cheé (2018) showed that the intensity of involving in online political action positively influences the users’ perceptions regarding common good orientation and tolerance. These findings indicate that specific forms of deliberative online participation could have unique potential to induce desirable effects which benefit democratic value experiences (Frieß & Porten-Cheé, 2018).

Next to activities that are strongly connected with media usage—such as the selection and reception of political information—online participation can also become manifest in informational and/or communicative actions that recipients perform using online media channels subsequent to their online media exposure, explicitly or implicitly relating their behavior to received media content (Porten-Chee, 2017; Ziegele & Quiring, 2011). Here, research has shown that the reception of online media content can trigger a variety of participatory follow-up actions—each of which may contribute to the psychological feeling of actively dealing with perceived information and acting as a responsible, politically involved media user (Bucy & Gregson, 2001). These actions involve a broad range of online activities, such as content sharing, commenting, correcting or further reading up on the perceived (political) information (Shin & Thorson, 2017; Vosoughi, Roy, & Aral, 2018). Purcell et al. (2010) thus found that social media are emerging as a powerful news referring source: 52 percent of online readers in the US share links to news articles by email and on social networking sites, while 75 percent of online news readers utilize those links to further discover fresh news content.

Such “participatory media consumption” can also encourage further participatory behavior. For example, in the context of the European parliamentary elections in 2009, Porten-Chée (2013) found that the use of party websites caused positive effects on voting for the Greens and the Social Democrats in Germany. In particular, exposure to party websites most likely mobilized sympathizers who would not have
voted otherwise (D’Alessio, 1997; Porten-Chée, 2013). In the same vein, results provided by Marcinkowski and Metag (2013) or Gibson and McAllister (2006, 2011) indicated that campaign website usage fosters voter engagement. Min (2007) showed that participation in face-to-face as well as in online deliberation “can increase participants’ issue knowledge, political efficacy, and willingness to participate in politics” (Min, 2007, p. 1396). Taken together, studies examining the impact of digital media usage on participation online show that digital media exposure per se can unfold participation-engaging effects on their recipients. Such effects might even be amplified when the received digital media content provides particular features that catch the online audience’s attentiveness, as discussed in the following section.

The Impact of Digital Media Images and Their Specific Image Features on Online Participation

The rise of online media, technological advances in digital photography and online publishing, as well as aesthetic demands by editors and readers alike, have supported an unprecedented move toward visualization (Fahmy et al., 2014). Regarding the omnipresence of visuality in today’s online environment, it is even the more surprising that research on political online participation has little to say about the impact of visual media messages (Fahlenbrach, 2013; Mattoni & Teune, 2014). Nonetheless, media and communication studies and media psychology have suggested that media images are an important information source, that they provide eye-catching cues for selection, decrease selective exposure, and improve information processing of recipients (Bucher & Schumacher, 2006; Graber, 1990, 1996; Zillmann et al., 2001). Eye-tracking research has shown that news photographs are highly capturing; activating and binding the visual attention of their recipients as measured by eye movements (Bucher & Schumacher, 2006; Garcia & Stark, 1991). In particular, graphic press photographs—as typically embedded in professional media coverage—catch recipients’ visual attention fast and bind them for a longer duration of time (Dahmen, 2015; Holmqvist, Holsanova, Barthelson, & Lundqvist, 2003). They have also been shown to succeed in generating a first activation for the following text reception (Rössler, Bomhoff, Haschke, Kersten, & Müller, 2011).

Exploring the impact of visuals on political information, its reception and processing, experimental research has demonstrated that media images enhance political information seeking (Ryan, 2012), frame the understanding, interpretation, and evaluation of political actors and issues (Corrigall-Brown & Wilkes, 2012; Rohlinger & Klein, 2012), and thereby can influence political attitudes (Brantner, Lobinger, & Wetzstein, 2011; Dahmen, 2015; Grabe & Bucy, 2009; Powell, Boomgaarden, Swert, & Vreese, 2015), voting preferences (Rosenberg, Bohan, McCafferty, & Harris, 1986), support for war (Gartner, 2011), as well as agreement with political regimes (Bush, Erlich, Prather, & Zeira, 2016).

But can news images also mobilize their recipients? As most studies on political participation do not include the impact of visuals in causal models, little is known about the role of perceiving media images in activating participatory behavior. However, the few studies that take a closer look at the influence of media images on
political participation indicate that their perception can have positive effects on participation. Brader (2005, p. 397), for example, showed that emotion-evoking media images in political ads enhanced recipients’ willingness to participate—finding that recipients exposed to positive media images showed greater interest in the campaign and were more willing to vote. Powell et al. (2015) found that single press photos in the news exerted a dominant influence over recipients’ participatory intentions: the perception of news images enhanced their intention to discuss political issues in-depth, donate, sign a petition, and protest in support of actors embroiled in a conflict.

While these findings have not yet been transferred to research examining political participation online, they are closely tied to our question regarding the impact of digital news images on political engagement online, and thus allow inferences for our study. Moreover, while the existing studies suggest that media images, in general, hold particular potential to foster political information selection, perception, and processing—and that they can thereby also unfold effects on political knowledge, attitudes, and finally political actions and participation—this may be particularly the case in online media environments as they are rich in information, and tend to produce a rather fleeting and superficial reception with highly selective exposure in which “catchy” news images effectively can trigger and bind the visual attention of their receivers. In addition, in these environments, vivid media images are increasingly prominent and have the potential to encapsulate an often apathetic public’s enduring perception of an issue (Barry, 1997). The importance of news visuals in the context of online mobilization is thus linked to their potential to ease the processing of political information: “the more rapidly recipients can process pro-mobilization information, the more likely they are to join the action” (Casas & Webb Williams, 2018, p. 4). In line with these ideas, in a recent study Casas and Webb Williams (2018) found that digital media images increased participation in the context of online mobilization, by teasing out the mechanisms at play in an online media environment, eliciting the recipients’ attention, and activating their emotional involvement. Messages with images were thus more likely to be retweeted and were more likely to receive retweets from individuals who had previously not tweeted about the covered issue.

While we build upon these results that indicate the mobilizing power of news images, we also acknowledge research from cognitive psychology, perception and reception theories (Zaller, 1996), as well as eye-movement research (Duchowski, 2007; Geise, 2011; Just & Carpenter, 1976), which has a long history in establishing how the immediate sensory perception and processing of perceived information alters the impact of media content. Defined as “the preferential processing of some items to the detriment of others” (Findlay & Gilchrist, 2003, p. 3), we understand visual attention as a fundamental precondition of any subsequent effect that a media image can induce on political participation online. While the allocation of visual attention, however, is not directly open to observation, eye-movement data gives scholars the opportunity to examine more precisely how much visual attention has been paid to certain information (Bol, Boerman, Bergstrom, & Kruikemeier, 2016; Bucher & Schumacher, 2006).
To the best of our knowledge, no study has integrated observational data about the selective attention recipients guide to certain information in analyzing the impact of visual media messages on participation online. In their recent overview of how eyetracking is used in current research, Bol et al. (2016) have accordingly advocated for applying the observational methodology to political communication in order to further exploit the potential of the method. Following this idea, we have integrated observational eyetracking data on the perception process and the direction of selective attention, to shed light on the often neglected relationship between reader and media. In line with perception and reception theories (e.g., Zaller, 1996) as well as eye-movement research (Duchowski, 2007; Geise, 2011; Just & Carpenter, 1976), a longer reception time in which visual attention is guided to digital news images should amplify their specific effects. Summarizing this general expectation, we thus hypothesize:

**H1:** A longer reception time in which visual attention is focused on digital news images enhances the recipient’s willingness to politically participate online.

Besides the sheer reception time, research on media effects on political participation suggests that the nature of media content and its specific message properties also play a crucial role. Some scholars have shown that particular message features, such as presentation style, emotionality or negativity trigger the message’s effects on political participation (Brader, 2005; Parker & Isbell, 2010). For example, digital media content that evokes feelings of mistrust was found to be positively related to expressive political behavior, and recipients were more likely to publicly voice their own opinions (Barnidge & Rojas, 2014). It was also found to encourage further exploring on the issue, including potential correction of the received information afterwards (Rojas, 2010). Analyzing message properties that can intensify forms of low-cost online participation, Weber (2013) as well as Tenenboim and Cohen (2015) discovered that users (particularly those with a high level of online interactivity) performed increased participatory commenting when they perceived the received information as “fresh,” controversial, and curiosity-arousing. Likewise, particularly negative and controversial, emotionalizing news images enhanced political information seeking, substantively rising a web user’s proclivity to click through to a political website (Ryan, 2012). These images also increased forms of low-cost online participation such as online image sharing and online social movement mobilization (Casas & Webb Williams, 2018). Examining how political images activate recipients by appealing to their emotions, Brader (2005), Powell et al. (2015), as well as Casas and Webb Williams (2018), showed that by using emotion-evoking media images, political messages stimulated recipients’ emotions and thereby enhanced participatory intentions and behavior.

These findings perfectly line up with research on “news factors” (Eilders, 2006), that is, specific message features such as emotionality, conflict, humor, or unexpectedness that catch the online audience’s attention. While the concept of news factors was initially created to explain the selection of textual media content by journalists (Galtung & Ruge, 1965), based on ideas derived from the psychology of
attention Eilders (2006) has shown that they also influence media use and information selection by recipients. In the context of political participation online, Albrecht (2006) found that news factors are at work in determining the chances of a contribution in political online debates activating further participation in the form of receiving replies. For example, highly novel or controversial ideas were discovered to be represented most prominently in the analyzed debates (Albrecht, 2006, p. 76).

A handful of scholars has also transferred the concept of news factors to visual media content, its selection, and reception (Rössler et al., 2011; Rössler, Haschke, & Marquart, 2013). From a more general perspective, Craig (1994) has suggested that press photographs convey information about the newsworthiness of the story they accompany. Understanding them as specific visual qualities of news images, Rössler et al. (2011) argued that “photo news factors” both determine whether a press photo is worth publishing by journalists/communicators and is, from the recipients’ point of view, attributed with high levels of salience and awareness, thus strongly attracting their attention. In line with this idea, Potts, Bednarek, and Caple (2015) understand news factors as message features that help recipients to construct and interpret the newsworthiness of published information, deducing this from its specific semiotic resources (language, image, typography, layout, etc.).

Analyzing the impact of different photo news factors (such as damage, violence, controversy, unexpectedness, emotionality, or photo technique), an experimental study revealed that media images associated with “damage,” “negativity,” and, to a lesser extent, “emotionality” led to an intensified attentiveness: they gained more visual attention from recipients, were more often recalled and better evaluated, and exposure to media image with a strong representation of these photo news factors caused an increased interest in reading the accompanying article (Rössler, Haschke, & Marquart, 2010). The authors concluded, therefore, that “the more explicit an event is visually illustrated, the higher is the probability that the reader engages in a photo and becomes activated to get further involved” (Rössler et al., 2011, p. 417). Transferring this idea to the field of online participation research, and aiming to go beyond the general image effect on visual attention postulated earlier, we hypothesize:

**H2:** News images that are associated with photo news factors by recipients (such as perceived emotionality, proximity, relevance, controversy, negativity, saliency, newsworthiness, or visual attraction) significantly increase their willingness to politically participate online.

Given the results presented by Rössler et al. (2011) indicate that recipients perceived media images carrying photo news factors with a longer reception duration, we also hypothesize the following interaction effect:

**H3:** Both the fixation duration of the news image and the news factors can interact, thereby mutually reinforcing their impacts on the recipient’s willingness to politically participate online.
Method

In order to analyze how visual versus textual content in digital news media contributes to political participation, we realized an experimental study, combining presurveys and postsurveys with an eyetracking methodology. Our experimental design involves three steps. We first conducted a presurvey with each participant, which measured their political predispositions, prior knowledge, the inclination to various forms of political participation, as well as general control variables (e.g., nationality, gender, average usage of digital devices, age, and level of education). Second, we subjected each participant to a series of four digital news media images. These press photographs were taken from everyday media coverage and visualized protest issues (such as poverty and social inequality, cruelty to animals by industrial livestock farming) as well as protest movements (such as a peace movement demonstration, or an educational strike by students), and each photograph was embedded in a multimodal online news article that would appear on a typical online news site. During treatment reception, the sensory perception of recipients was measured by a stationary eye tracker (Tobii Pro), which was invisibly integrated in a customary computer screen and observed individual eye movements at a sample rate of 120 Hz.

Once they arrived at the laboratory, participants were informed about the study and were asked to fill out an informed consent. They were then asked to sit behind a desk with a monitor on it. In preparation for the eye movement measurement, recipients passed an individual calibration to adopt the eye-tracking system to their specific physiology and to ensure the accuracy and validity of the measurement. For calibration, participants had to follow a red dot running across the screen with their eyes. When measurements were valid and accurate (accuracy has been calculated as the mean offset in millimeters and thereafter gaze angles based on the distance between the eye and the eye tracker, and all measures that covered less than 90 percent of the session were later excluded as invalid), and participants were comfortable, the researcher asked them to look at the appearing four online news articles as they would normally do in their daily news reception routine. The participants were not told that the information they would read would be “tested” in any way, or how it would be relevant in the study to follow. While the study follows procedures that were successfully used in previous eye-tracking studies in laboratory settings (Adam, Quinn, & Edmonds, 2007; Kruikemeier, Lecheler, & Boyer, 2018), the researcher made sure a realistic-reception scenario was created, by encouraging the participants to perceive the news as they would do at home.

Four multimodal online news articles, all designed in a typical news layout, comprising an article headline, a typical press photograph, a caption, a published date and the name of the author were used as experimental treatments. The four online news articles addressed four different policy areas (animal rights, education, social equality, and external security). According to this differentiation, the press photos showed visualizations of the political fields addressed in the article (e.g., a chicken coop, an overcrowded auditorium, a homeless person in the pedestrian zone, a tank on a peace mission). All articles were comparable in size and style, and
each article contained the same proportion of visual and textual elements. While the design was based on a typical online news article that would appear on a typical online news site, further references to a source or platform were not implemented.

For treatment choice, news texts and photographs were first drawn from digital media coverage on protests and tested regarding their comprehensibility, valence and their images' inherent qualities and features. We finally selected those news images which, from the tested recipients' perspective, (i) best represented one of the corresponding policy areas, (ii) were easy to understand, and (iii) were perceived as a professional news photograph, thus encompassing specific image features. After treatment exposure, participants of the experiment filled in the postsurvey, involving repeated measures from the presurvey, providing us with information on possible changes in the participants' understanding and interpretation of the images, their evaluation of the quality and appeal of the image, and their willingness to engage in online forms of political participation (DV). The experimental study took place between January 26 and February 3, 2018. For the presurveys and postsurveys we used the program Unipark, and the Eyetracking was realized using Tobii Eyetrackers and Tobii Studio software.

Sample

For the experimental study, 143 participants were recruited among the students of a midsize German university. The final sample comprised 69 female, 72 male, and 2 neutral/other gender individuals, whose ages ranged between 18 and 43 years ($M = 23.76$; standard deviation $= 3.84$). Each of the 143 participants was exposed to four online articles, while the measures for each treatment were gathered separately. Our data set thus contains a total of 572 observations on the dependent and IVs, creating the basis of our statistical analysis.

Measures: Operationalization of the DV and Independent Variable

**Political Participation Online (DV)**

On the basis of definitions of political participation (Barnes & Kaase, 1979; Verba, Schlozman, & Brady, 1995), our DV encompasses four types of media‐related participation online: two of them are passive, namely (i) further information‐seeking in social media, and (ii) positively evaluating a published political post (“post liking”); two of them are active, namely (iii) forwarding a published political post to peers, and (iv) writing and publishing a political post. The latter three are theoretically derived from the typology of participation suggested by Wagner (2014), who distinguished forms of online participation between self‐positioning, getting self‐involved, and activating others (Porten‐Chee, 2017; Ziegele & Quiring, 2011). In line with current research (Purcell et al., 2010; Shin & Thorson, 2017), we extended this action‐based typology by adding the category of further information‐seeking through active digital media usage. Each individual
component was captured twice through the postsurvey and presurvey on a 5-point Likert scale which asked: “Some people are more engaged in the political sphere than others. How about you? How strong is your general willingness to participate in the following political activities?” Calculating the difference between post-political and pre-political participation by subtracting the latter from the former, our DV is continuous in nature and can theoretically range between −16 (if an individual had been very strongly motivated to engage in participation online before the media image treatment and is very strongly motivated to not engage in participation online after having seen the media image) and +16 (the strongest possible shift from the lowest motivation to the highest one to engage in online political participation). Table 1 provides the summary statistics for the variables used. For further statistical analysis, we merged the four types of participation online into one compound variable (change in political participation online), by summing up the four individual components (Cronbach’s $\alpha_{\text{PRE}} = 0.849$; $\alpha_{\text{POST}} = 0.843$).

### Specific Image Features (IV)

Our core IV, the perception of specific image features, was measured by applying the concept of “photo news factors” as suggested by Rössler et al. (2011), including image features such as the perceived emotionality, proximity, relevance, controversy, negativity, saliency, newsworthiness, or visual attraction of the image (Craig, 1994; Potts et al., 2015). The recipients’ perception/attribution of each of these eight photo news factors was captured in our postsurvey for each of the visual media images separately after treatment exposure. For each item, the

| Table 1. Descriptive Statistics |
|--------------------------------|
| **Variables**                   | **Observations** | **Mean** | **Standard Deviation** | **Minimum** | **Maximum** |
|-------------------------------|------------------|---------|------------------------|-------------|------------|
| Dependent variable             |                  |         |                        |             |            |
| Change in political online     | 572              | 0,509   | 3,168                  | −11         | 16         |
| engagement                    |                  |         |                        |             |            |
| Independent variables          |                  |         |                        |             |            |
| Reception time photo           | 572              | 5,285   | 3,868                  | 0,101       | 24,677     |
| News factor: surprise          | 571              | 1,807   | 1,035                  | 1           | 5          |
| News factor: emotionality      | 572              | 2,911   | 1,372                  | 1           | 5          |
| News factor: visual attraction | 572              | 2,094   | 1,108                  | 1           | 5          |
| News factor: newsworthiness    | 572              | 3,862   | 1,126                  | 1           | 5          |
| News factor: proximity         | 572              | 3,086   | 1,380                  | 1           | 5          |
| News factor: professionalism   | 572              | 2,425   | 1,089                  | 1           | 5          |
| News factor: controversy       | 572              | 3,316   | 1,375                  | 1           | 5          |
| News factor: negativity        | 572              | 2,878   | 1,385                  | 1           | 5          |
| News factor: relevance         | 572              | 3,191   | 1,346                  | 1           | 5          |
| News factor: saliency          | 572              | 3,184   | 1,277                  | 1           | 5          |
| Control variables              |                  |         |                        |             |            |
| Prior participation behavior   | 572              | 1,818   | 2,018                  | 0           | 10         |
| Political interest             | 572              | 3,545   | 1,032                  | 1           | 5          |
| Age                            | 572              | 23,762  | 3,843                  | 18          | 43         |
| Gender                         | 572              | 1,531   | 0,527                  | 1           | 3          |
questions followed the established structure in capturing the extent of agreement or disagreement with a statement, for instance, “How strongly do you agree/disagree with the following statement: ‘The media image seems ‘relevant’ to me?’”. Participants could classify their agreement/disagreement on a five-point Likert scale ranging from 5 (“I totally agree”) to 1 (“I do not agree at all”). In order to assign the individual indicators to the corresponding news articles and image motifs that were randomly presented beforehand, we inserted the topic-specific sections in the questionnaire with a schematic display of the articles in the form of thumbnails.

\[ \text{Visual Attention (IV)} \]

Understanding the degree to which a media image can trigger visual attention as a fundamental precondition of any subsequent effect on political participation online, visual attention was operationalized by the observation of sensory reception time through foveal fixations of the treatment, measured in seconds (rescaled from milliseconds). The minimum milliseconds required for a fixation to be registered was a fixation duration of 60 ms, with a velocity threshold of $30^\circ/s$. To implement this requirement, the I-VT fixation filter was set. While such a fixation filter is necessary so that the processing script can identify samples that should be grouped together when calculating precision, fixation-classification algorithms such as the fixation filter used here can be affected by data precision (Hessels, Kemner, van den Boomen, & Hooge, 2016).

To observe the individual eye movements of participants, we used stationary Tobii Eyetrackers which captured the duration of visual attention recipients paid to the visual and textual elements of the experimental treatments. For extracting the data, “areas of interest” (AOIs) were created for each news article, covering typical article areas (e.g., news visual, article text, headline, subline, caption, date, and author). Once quantitative data were collected, and AOIs were implemented, we could determine how long participants guided their visual attention to specific parts of the news article.

\[ \text{Controls} \]

Our presurvey captures information on the control variables, that is, age (in years), gender (male/female), political interest, and prior participation behavior. Political interest was measured by the presurvey question “Asking in general: Are you interest in politics—or are you not that interested in politics?” Respondents could classify their political interest using a 5-point Likert-scale (ranging from 1 for “I am not interested in politics at all” to 5 for “I am highly interested in politics”). Prior participation behavior was gathered by asking the participants for their previous political engagement in 10 policy fields/issues (ranging from human rights and public health to the economy and migration). For each field, the presurvey included a question “Here you see some issues/policy fields that are currently under discussion. Have you been politically engaged in these issues/policy fields before or have you not been politically engaged here so far?”. Respondents could answer each question in a binary manner, 1 meaning that they have prior experiences.
From these values, we calculated an additive index, theoretically ranging from 0 (=no prior engagement) to 10 (=strong prior engagement).

**Analysis and Results**

Our data structure is hierarchical in character. On the basis of our research design, each individual was confronted with four different online news articles, and we have four observations for the IVs and DVs per individual at one given point in time. Thus, the data is characterized by two nested levels, namely the image-related observations on level 1 (such as perceptions of newsworthiness, etc., i.e., the change in online engagement) and individual characteristics on level 2 (such as gender, age, and political interest). Thus, the image-specific perceptions form the first level and the features of a respondent form the group level, resulting in 143 groups in the analysis. Due to this multilevel data structure, we applied mixed multilevel models with random intercepts. The specifications of random intercepts are used in order to capture the possibility that intercepts can vary between individuals.

Table 2 reports the results of the multilevel analysis without cross-level interactions in order to avoid problems of multicollinearity between divergent “photo news factors,” “visual attention” (reception time), and the interaction term of these two variables. Table 3 also reports the cross-level interactions between the photo news factors and the reception time of the image. It is complemented by Figure 1, which provides a graphical representation of the cross-level interaction effects between photo news factors and the reception time of the media images in order to allow for a nuanced interpretation of the findings. As Table 2 shows, the reception time of digital media images does not have a significant positive effect on the change in the individual willingness to engage in political participation online by itself. It is not the case that—irrespective of the news factors triggered by a media image—increasing the duration with which an individual looks at a picture robustly and significantly increases his/her willingness to engage in political participation online. That said, models 4 and 8 in Table 3 indicate that an increasing reception time of digital news images can significantly increase the willingness to engage in political participation online under certain conditions, namely if the image is perceived as being newsworthy or as negative. Thus, when recipients perceive digital news images carrying specific photo news factors (“newsworthiness” and “negativity”), they are more likely to engage in political participation online, the longer they direct their attention to the media image. Hypotheses 1 is thus not supported by empirical evidence in general, as it is not the case that a longer observation duration of digital media images enhances participation online per se.

Table 2 also provides insights into the plausibility of Hypothesis 2 (i.e., “If participants receive news images that they regard as surprising, emotional, attractive, newsworthy, are geographically proximal, controversial, relevant, or salient, their willingness to engage in political participation online significantly increases”; see Models 2, 3, 4, 5, 6, 7, 9, and 10, Table 2). However, hypothesis 2 is only supported partially, as not all photo news factors cause the same amplifying...
Table 2. Multilevel Regressions, Without Cross-Level Interactions

| Model | Reception time photo | News factor: surprise | News factor: emotionality | News factor: visual attraction | News factor: newsworthiness | News factor: proximity | News factor: professionalism | News factor: controversy | News factor: negativity | News factor: relevance | News factor: saliency | Prior participation behavior | Political interest | Age | Gender | Constant | Var. class | Var. residuals | Observations | AIC | BIC | LL |
|-------|---------------------|----------------------|---------------------------|------------------------------|----------------------------|--------------------------|--------------------------|--------------------------|------------------|------------------|------------------|---------------------|---------------------|-------------------|------------------|----------------|----------------|------------------|
| 1     | 0.049 (0.030)       | 0.027 (0.090)        | 0.167 (0.067)*            | 0.187 (0.093)*               | 0.427 (0.088)**            | 0.195 (0.097)*           | 0.229 (0.110)*           | 0.226 (0.110)*           | 0.233 (0.110)*           | 0.225 (0.108)*           | 0.227 (0.110)*           | 0.234 (0.110)*           | 0.222 (0.109)*           | 0.229 (0.110)*           | 0.208 (0.109)           | 0.212 (0.109)           |
| 2     | 0.034 (0.031)       | 0.033 (0.030)        | 0.033 (0.030)             | 0.033 (0.030)                | 0.027 (0.030)              | 0.025 (0.031)            | 0.049 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.049 (0.030)            | 0.033 (0.029)            | 0.022 (0.030)            |
| 3     | 0.047 (0.030)       | 0.047 (0.030)        | 0.033 (0.030)             | 0.048 (0.030)                | 0.048 (0.030)              | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            |
| 4     | 0.033 (0.030)       | 0.033 (0.030)        | 0.033 (0.030)             | 0.048 (0.030)                | 0.048 (0.030)              | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            |
| 5     | 0.048 (0.030)       | 0.048 (0.030)        | 0.048 (0.030)             | 0.048 (0.030)                | 0.048 (0.030)              | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            |
| 6     | 0.048 (0.030)       | 0.048 (0.030)        | 0.048 (0.030)             | 0.048 (0.030)                | 0.048 (0.030)              | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            | 0.048 (0.030)            |
| 7     | 0.049 (0.030)       | 0.049 (0.030)        | 0.049 (0.030)             | 0.049 (0.030)                | 0.049 (0.030)              | 0.049 (0.030)            | 0.049 (0.030)            | 0.049 (0.030)            | 0.049 (0.030)            | 0.049 (0.030)            | 0.049 (0.030)            | 0.049 (0.030)            | 0.049 (0.030)            | 0.049 (0.030)            | 0.049 (0.030)            |
| 8     | 0.033 (0.030)       | 0.033 (0.030)        | 0.033 (0.030)             | 0.033 (0.030)                | 0.033 (0.030)              | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            |
| 9     | 0.033 (0.030)       | 0.033 (0.030)        | 0.033 (0.030)             | 0.033 (0.030)                | 0.033 (0.030)              | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            | 0.033 (0.030)            |
| 10    | 0.022 (0.030)       | 0.022 (0.030)        | 0.022 (0.030)             | 0.022 (0.030)                | 0.022 (0.030)              | 0.022 (0.030)            | 0.022 (0.030)            | 0.022 (0.030)            | 0.022 (0.030)            | 0.022 (0.030)            | 0.022 (0.030)            | 0.022 (0.030)            | 0.022 (0.030)            | 0.022 (0.030)            | 0.022 (0.030)            |

Note: The regression table for the multilevel analysis features the unstandardized estimates. Since these are linear models, a positive covariate indicates that an increase in this variable by one unit increases the dependent variables (DV) (change in online engagement) by the value of the covariate, while a negative sign indicates that an increase in the respective IV leads to a decrease of the DV. The relationship between the standard errors and the covariate influences the significance of the findings (expressed as standard errors in parentheses with *p < 0.05, **p < 0.01, ***p < 0.001). AIC, akaike-information-criterion; BIC, bayesian-information-criterion; LL, log-likelihood.
Table 3. Multilevel Regression Analysis With Cross-Level Interactions

|                          | Model 1     | Model 2     | Model 3     | Model 4     | Model 5     | Model 6     | Model 7     | Model 8     | Model 9     | Model 10    |
|--------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Reception time photo     | 0.049 (0.030) | 0.034 (0.031) | 0.047 (0.030) | 0.033 (0.030) | 0.048 (0.030) | 0.048 (0.030) | 0.025 (0.031) | 0.049 (0.030) | 0.033 (0.029) | 0.022 (0.030) |
| News factor: surprise    | 0.027 (0.090) |              |             |             |             |             |             |             |             |             |
| News factor: emotionality| 0.167 (0.067)* |              |             |             |             |             |             |             |             |             |
| News factor: visual      |              |             |             |             |             |             |             |             | 0.187 (0.093)* |             |
| attraction               |             |             |             |             |             |             |             |             |             |             |
| News factor: newsworthiness|               |             |             |             |             |             |             |             | 0.177 (0.067)** |             |
| News factor: proximity   |              |             |             |             |             |             |             |             | 0.195 (0.097)* |             |
| News factor: professionalism|           |             |             |             |             |             |             |             |             |             |
| News factor: controversy |              |             |             |             |             |             |             |             | 0.274 (0.071)*** |             |
| News factor: negativity  |              |             |             |             |             |             |             |             | 0.063 (0.065) |             |
| News factor: relevance   |              |             |             |             |             |             |             |             | 0.448 (0.067)*** |             |
| News factor: saliency    |              |             |             |             |             |             |             |             | 0.447 (0.073)*** |             |
| Prior participation      | 0.229 (0.110)* | 0.228 (0.110)* | 0.233 (0.110)* | 0.225 (0.108)* | 0.227 (0.110)* | 0.224 (0.110)* | 0.222 (0.109)* | 0.229 (0.110)* | 0.208 (0.109) | 0.212 (0.109) |
| behavior                |             |             |             |             |             |             |             |             |             |             |
| Political interest       | -0.645 (0.236)** | -0.667 (0.237)** | -0.680 (0.238)** | -0.653 (0.232)** | -0.658 (0.237)** | -0.691 (0.238)** | -0.655 (0.235)** | -0.635 (0.237)** | -0.686 (0.236)** | -0.739 (0.236)** |
| Age                     | 0.009 (0.058) | 0.011 (0.058) | 0.014 (0.058) | 0.022 (0.057) | 0.015 (0.058) | 0.019 (0.058) | 0.012 (0.057) | 0.010 (0.058) | 0.010 (0.057) | 0.023 (0.057) |
| Gender                  | -0.552 (0.457) | -0.515 (0.458) | -0.523 (0.459) | -0.397 (0.449) | -0.474 (0.459) | -0.518 (0.457) | -0.481 (0.454) | -0.541 (0.457) | -0.353 (0.456) | -0.389 (0.455) |
| Constant                | 2.691 (1.513) | 2.330 (1.507) | 2.333 (1.517) | 2.665 (1.530) | 2.007 (1.527) | 2.151 (1.526) | 1.829 (1.505) | 2.500 (1.519) | 1.302 (1.504) | 1.258 (1.505) |
| Var. class              | 0.870 (0.068)*** | 0.873 (0.068)*** | 0.876 (0.068)*** | 0.871 (0.068)*** | 0.871 (0.068)*** | 0.871 (0.068)*** | 0.865 (0.068)*** | 0.870 (0.068)*** | 0.872 (0.067)*** | 0.869 (0.068)*** |
| Var. residuals          | 0.614 (0.034)*** | 0.607 (0.034)*** | 0.609 (0.034)*** | 0.955 (0.034)*** | 0.606 (0.034)*** | 0.610 (0.034)*** | 0.600 (0.034)*** | 0.614 (0.034)*** | 0.567 (0.034)*** | 0.575 (0.034)*** |
| Observations            | 571          | 572          | 572          | 572          | 572          | 572          | 572          | 572          | 572          | 572          |
| AIC                     | 2631.121     | 2629.940     | 2632.050     | 2613.242     | 2629.247     | 2632.108     | 2621.274     | 2635.168     | 2593.860     | 2600.056     |
| BIC                     | 2670.248     | 2669.082     | 2671.192     | 2662.384     | 2668.389     | 2671.250     | 2660.416     | 2674.310     | 2633.002     | 2639.199     |
| LL                      | -1306.561    | -1305.970    | -1307.025    | -1297.621    | -1305.623    | -1307.054    | -1301.637    | -1308.584    | -1287.930    | -1291.028    |

Note: Standard errors in parentheses with *p < 0.05, **p < 0.01, ***p < 0.001. AIC, akaike-information-criterion; BIC, bayesian-information-criterion; LL, log-likelihood.
effect on the change in political participation online: While there are no specific image features that correlate negatively with the willingness to political participation online, the effects of two news factors, namely "surprise" and "negativity," are not significant (Models 1 and 8, Table 2).

Table 3 reports the multilevel regression analysis with cross-level interactions. Hence, in each model, we include an interaction term comprising the news factor featured in the upper part of the respective model and the reception time of the photo in order to study the interaction between both components. Table 3 indicates that there is support for Hypothesis 3, which expects that the fixation duration of the image and the perception of image-inherent photo news factors interact, thereby mutually reinforcing their impact on the DV. As shown in Table 3, the effect of a longer duration of foveal fixations/reception time on the DV of our study, the political participation online, is modified in a significant manner by media images that carry specific image features, such as negativity or visual attraction (given the interaction term is significant in Models 3 and 8, Table 3).

Since cross-level interactions could be at stake only for certain parameter values of the IVs from level 1 and level 2, we complement the regression analysis by a graphical depiction of the interaction effects for each news factor in turn. By shedding light on the margins plots of the respective models from Table 3 we can further investigate the interaction effects between the reception time of the digital news image, on the one hand, and the perception of specific photo news factors, on the other. Similarly to Table 3, Figure 1 lends partial support to Hypothesis 3 as it reveals that there are two significant cross-level interaction effects: First, it shows that the photo news factor "visual attraction" modifies the impact of the reception time of a photo on the change in the willingness to engage in political participation online. A perceived high visual attraction significantly increases the positive effect of the foveal fixation duration of the news photo on the willingness to engage online. By contrast, a low visual attraction significantly decreases the positive effect of an increasing reception time of the digital media image on the willingness for participation online. This is in line with Hypothesis 3. Second, perceived negativity also systematically modifies the impact of reception time on the individual willingness to engage in political participation online. Under the conditions of perceived low negativity, an increase in the reception time of the digital media image significantly increases the readiness for political participation online. Conversely, under conditions of high negativity, an increasing duration to which individuals look at the media image significantly reduces their willingness to engage in political participation online.

Finally, Table 3 shows that individuals are more inclined to participate online if they engaged in political activities before and if they have lower levels of political interest in general, but age, and gender have no significant effect on the change in the willingness to engage in political participation online. While the findings on political interest are counterintuitive at first glance, it might well be the case that people who are more strongly politically interested prefer more demanding forms of political participation. In addition, in line with Boulianne (2011) our results seem to confirm that people who were less interested in politics, but who used digital media for political information, were more likely to engage in low-level
participation as they might be more stimulated by the media images to become as active as people with a higher political interest. Our results are also in line with Bimber et al. (2014) who found a positive relationship between using online information and low-threshold forms of political participation for people who have a lower political interest (Bimber et al., 2014).

**Discussion and Conclusion**

Despite the primacy of digital news images in contemporary media environments and political discourses online, and despite prior research suggesting that images hold strong potential to influence political perceptions, attitudes, and participatory behavior, research still has little to say about the effects of digital media images on political participation online. With this article, we contribute to our understanding of the functions of digital media images in mobilizing political activism online, analyzing survey data in relation to observational eyetracking data capturing the recipients’ individual sensory perception and allocation of visual attention on online news articles in the context of different policy fields. By integrating the concept of perceived “photo news factors,” we acknowledge specific, image-inherent message features, what allows us to provide deeper insights into differentiated effects of divergent message properties that can unfold in diverse, multimodal online media environments.

Our results reveal that individuals are more willing to participate online, if they perceive media images as surprising, emotional, attractive, newsworthy, geographically proximal, controversial, relevant, or salient. Contributing to a more nuanced picture, we found that not all “catchy” image features have a similar potential to unlock and activate political participation as other studies have suggested (Rössler et al., 2011, p. 417). Particularly, media images conveying “surprise” and “negativity” did not generally increase the recipients’ willingness to further engage online. The acknowledgment of perceived “photo news factors” (Potts et al., 2015; Rössler et al., 2010, 2011) thus differentiates our understanding of how media images are perceived and why certain specific image features might amplify image effects—while others do not.

More specifically, our results show that image effects cannot be considered “universal” as the idea of “picture superiority” might imply (Hockley, 2008). Instead, our multi-level analysis reveals conditional images effects: While the reception time of digital media images does not significantly increase the willingness for political participation online across the board, it has an impact if recipients regard the media image they are looking at as newsworthy or negative. Perceiving these specific image properties during news media reception, an increasing reception time of digital media images affects the recipients’ willingness to engage in participation online afterwards.

In addition to this cross-level interaction effects, putting survey data in relation to observational eyetracking data revealed some interesting interactions. In particular, the perception of online media images as “visually attracting” modified the impact of the image reception time on the change in the willingness to engage in
Figure 1. Interaction Effects.
political participation online. While the perception of high visual attraction significantly increased the positive effect of the fixation duration of the news photo on the willingness for participation online, a low visual attraction reduced the positive effect of an increasing fixation duration. The impact of reception time on the individual willingness to engage in political participation online was also altered when media images conveyed “negativity”: While in cases of perceived low negativity, an increase in the reception time significantly increases the readiness for political participation online, the perception of high negativity had an inhibiting effect, as an increasing fixation duration significantly reduced the willingness to engage in further online political participation.

Given these findings, our results imply an important, more general conclusion. Our study underlines the relevance of addressing the interaction between media images, their image-inherent message features, and the recipient’s individual perception of this specific package. We find that the recipients’ subjective reception, its perception and evaluation, seems to strongly matter when estimating the effects of media images. Acknowledging these interactions might also provide an explanation for findings that seem to contradict our results regarding the role of negativity. While some studies have suggested that particularly negative messages shape the recipient’s cognition (Newhagen & Reeves, 1992, p. 26), and particularly motivate further participation (Brader, 2005; Parker & Isbell, 2010; Valentino et al., 2011), we found that the perception of negative media image indeed can trigger the visual attention of recipients, but that this does not necessarily lead to stronger participation online. Under certain circumstances, negative media visuals can, instead, also limit participation online after digital news reception.

Even though our analysis has particularly focused on digital media images and their effects on participation online, we do not expect the discovered effects to be triggered exclusively in online environments. Research from psychology and communication studies examining the perception and information processing of (media) images rather suggests that humans assimilate visual information based on sensory, cognitive, and affective principles that are activated irrespective of the specific media channel (Bucher & Schumacher, 2006; Graber, 1990, 1996; Zillmann et al., 2001). However, specific contextual conditions of the perceived information, its receiving, and processing, such as a rather fleeting reception in a complex media environment rich in information—as is typical in online and social media—should particularly accentuate the role of media images and their message features in triggering participation online. Following this idea, the mobilizing power of images may particularly unfold when “teasing out the mechanisms at play in a new media environment” (Casas & Webb Williams, 2018, p. 1).

Given that images are increasingly important in digital media and a growing number of citizens use these media to get political information, our study has important implications for democratic societies. While we have shown that digital media images have the potential to mobilize political participation online, participation theory suggests that low-level forms of “media participation” can also spill over to more demanding forms such as protest behavior or voting. These findings may also be of interest to political actors and/or journalists. Our findings imply
that reporting with media images that are perceived by readers as particularly relevant, salient and newsworthy can mobilize further political engagement. While political and communication science have a long tradition in demonstrating that highly involving textual information can mobilize participation, our results broaden the perspective by showing that visuals can also play a crucial role in participation processes.

However, given that we examine the effects of digital media images embedded in news articles addressing four selected policy fields, a note of caution about generalizing from these results is warranted. Our results should be validated by further research, especially work that includes a larger variety of policy fields, protest issues and movements as well as that addresses the effects of different online platforms (such as Facebook, Twitter, and Instagram).

Limitations associated with the choice of our sample must also be taken into account: We have chosen a student sample because students have a special affinity for protest themes and movements, so presumed media effects can be particularly well investigated here. At the same time, however, students are also well educated and have a high level of media literacy—their “susceptibility” to strategically intended media effects is therefore likely to be lower than in a representative sample. Though, this would have to be examined in future studies.

Moreover, in line with previous research on online engagement, we have operationalized political participation online with an indicator encompassing four types of media-related participation online, namely (i) further information-seeking, (ii) “post liking,” (iii) “post forwarding,” and (iv) actively writing and publishing a post (Porten-Chee, 2017; Shin & Thorson, 2017; Vosoughi et al., 2018; Wagner, 2014; Ziegele & Quiring, 2011). Although these participatory actions, like most forms of online engagement, are a relatively low-cost form of participation, they still have value from a participatory viewpoint. Already modest actions such as forwarding and commenting on a political message can help drive public, media, and political attention (Casas & Webb Williams, 2018; Freelon, McIlwain, & Clark, 2016). Nonetheless, these four actions are not the only forms of online mobilization recipients could perform as a result of being triggered by media exposure, and future work should therefore compare the discovered image effects on media-related participation online with the effects of images on other participation measures, such as signing online petitions, donating to political actors and/or organizations online, or participating in online protests.

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Notes

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1. For treatment check, we initially conducted an analysis of variance with repeated measurements distinguishing between the four different forms of online participation. It shows that the reception of media images embedded in online news articles can trigger political online participation. After treatment exposure individuals were more motivated to engage in the following forms of political participation online (1) further information-seeking in social media ($F = 138,786$ with $***p = 0.000$); (3) forwarding a published political post to peers ($F = 15,150$ with $***p = 0.000$), and (4) actively writing and publishing a political post ($F = 14,911$ with $***p = 0.000$). By contrast, (2) “post liking” showed only minor differences. In addition, the increase in the willingness for such participation varies. While the willingness to forward a posting increases the highest, followed by writing a posting, the increase is the smallest for liking posts, preceded by obtaining further information through social media.

2. In the preparatory stage the research team collaboratively put together a sample of 44 media images taken from online media platforms. In June 2017 the images were presented to three classes representing a total of 75 undergraduate students at the Christian-Albrechts-Universität zu Kiel (Germany). In a first step, each class was divided into small groups of about four students. The students were asked to assign the images to policy fields they think might be represented by the images. In a second step the students were asked to assess the valence of the images on a −4 to +4 scale (−4 very negative; +4 very positive). On the basis of the results, the instructor calculated the average valence value for each image. In third step, the 44 images were shown to the whole class to cross-check the policy field assignments made by each group. For the experimental study only those images with the least disputed policy field assignment and the highest negative and positive valence values were selected.

3. In our study, each participant was confronted with four news media images addressing four different political issues (embedded in typical online news articles). In each of these four policy areas the participant’s political online engagement was measured twice, before and after treatment exposure. For each participant, we thus collected four observations of change in political online engagement. Given the number of 143 participants in our study, these sum up to 572 observations.

4. The statistical analysis was conducted with Stata 15.

5. The recipients were thus confronted a second time with the picture thumbnails, not with the original treatments. Technically, there is no other way to do this, since complex survey items and scales cannot smoothly be collected in parallel during the eyetracking study on the Eyetracking monitor. However, as explained, the questionnaire did not include a second complete exposure of treatment material: In terms of cognitive psychology, the miniature recall merely fulfils the function of a mental anchor, which makes it easier for the recipient to classify their receptions and link them to the specific items. Theories of image processing suggest that only minimal amplification effects are to be expected. In our estimation, this is a methodically justifiable, quite common procedure.

6. Next to the total fixation duration of the photo, we also collected data on the total fixation duration of the text. The latter has a mean of 10.175, a standard deviation of 5.522 as well as a minimum of 0 and a maximum of 37.563. Thus, respondents looked at the text on average about twice as long as on the image (compare with Table 1). The variable “total fixation duration text” has no significant effects on the change of political online engagement if all models without (Table 2) and nine out of ten models with interaction effects (Table 3) are run with the variable “total fixation duration text” instead of the perception time of the visual image (tables are available from the authors upon request) and only one significant interaction effect (with newsworthiness as the only exception).

7. This is backed up by a Likelihood-ratio-test, which compares the multilevel model with a linear model. This reveals that the multilevel model is better suited to capture our data structure than a linear model ($\chi^2(01) = 303.98$ with $p \geq \chi^2 = 0.0000$) and that random intercepts should be used to capture the group structure. The inra-class correlation for an empty multilevel model is 0.66.

8. The decision not to introduce each specific news factor into a singular model is based on the tradition of research on news factors. While Galtung and Ruge (1965), for example, proposed various impact models in their pioneering study, in which they also juxtaposed a summary model (which would lead to a “summaric” regression as suggested), other scholars have underlined the unique contribution of
single news factors with a threshold model, in which effects of single news factors would be in focus (compare also Keplinger & Ehmg, 2006; Staab, 1990). However, the theoretical consideration of an “interaction” of different news factors (which nearly all scholars imply) statistically corresponds to the fact that these message factors are not independent of each other (e.g., negativism and controversy are highly correlated) and therefore generate problems of multicollinearity in data analyses. This has been critically reflected in research, for example, by Keplinger and Ehmg (2006) and Staab (1990), and should be taken into account acknowledging our results as well.

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Appendix 1

Treatment Sample. Both images were assigned to the policy field environment/agriculture by students of the Christian-Albrechts-Universität zu Kiel (Germany) during the image selection study which took place in June 2017, eight months in advance of the main survey. The image showing a close up of a cow's nose received an average positive valence score of +3 on the scale –4 to +4.
Die Abbildung einer Hühnerfarm erhielt einen durchschnittlichen Bewertungsindex von –4 auf einer Skala von –4 bis +4. Beide Abbildungen erhielten die höchsten Bewertungsindices im Vergleich zu allen Abbildungen, die zugeordnet wurden zu diesem Policy-Bereich.

The image showing a chicken factory farm received an average negative valence score of –4 on a scale –4 to +4. Both images received the highest valence scores compared to all images assigned to that policy field.
Appendix 2: Image examples:

Sozialer Sprengstoff: Ungleichheit in Deutschland trotz guter Wirtschaftslage
von Udo-Klaus Hermsmeyer

Social inequality

Siehern militärische Interventionen unseren Frieden?
von Daniel Philipparts

Peace Movement

Brauchen wir mehr Aktionen für den Tierschutz?
von Martin Mickel

Animal rights

Überfüllte Klassezimmer und Hösäle: Wann wird aus voll zu voll?
von Sebastian Sieverbeck

Student protests