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It Is About the Web *and* the User: The Effects of Web Use Depend on Person Characteristics

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The World Wide Web recently became one of the primary information sources and an important means of communication in the developed world, and it continues its triumphal advance throughout the developing world. Psychological knowledge about the impact of the web on the perception of (social) reality stands in sharp contrast to the intense web use. Hence, Sparrow and Chatman (in this issue) voice an important research deficit. They correctly state that human information processing is not substantially different when the web is used (versus any other information source) and most research in psychology—in particular in cognitive and social psychology—has already been conducted at the computer for several decades, partly even online as the authors correctly point out. Thus, we do not need a web-psychology that is starting from scratch. Nonetheless, there is a need for more psychological research targeting the influence of web use on cognitive and social processing, because some tools available on the web create situations with (combinations of) characteristics that exist either rarely, not to the same extent, or even not at all beyond the web. These media characteristics might ultimately result in unexpected or unique cognitive, motivational, and behavioral responses such as those outlined in the target article.

In this vein, Sparrow and Chatman (this issue) delineate an important avenue for (social) psychological research. Moreover, they provide an overview of existing research and highly relevant avenues for future studies. They are taking practices frequently applied in our digital lives and characteristics of the web as starting points for the analysis of the web's impact on memory processes, persuasion, beliefs, and social interaction. This approach led to an impressive set of important insights about the effect of the use of search engines and other tools available on the web (e.g., Sparrow, Liu, & Wegner, 2011; Ward, 2013).

In this commentary, I argue that to gain a more complete picture of the impact of the web on social and cognitive processing, research should consider not only *media* characteristics, but also *user* characteristics. In other words, considering anything, from interindividual differences, states, current goals, or mind-sets to activated knowledge, anything that might influence the way how the web is used and how (the information provided by) the web is received, could help to facilitate the understanding and the prediction of human social and cognitive processing online (Bargh & McKenna, 2004). This is in particular true for those differences between individuals that have the potential to *interact* with the characteristics of the web and its tools. As is evident from the research summarized next, some person characteristics even have the power to reverse the impact of media characteristics on the outcomes of web use. Thus, not considering person characteristics might lead to the wrong conclusions and recommendations for media use.

I set out to first summarize research on *social influence* in computer-mediated versus face-to-face communication. This work provides a prototypical, excellent example that person characteristics (here the salient aspect of the self-concept) can reverse the effect of media characteristics (here anonymity of others during communication). The next section summarizes research demonstrating how online *knowledge sharing* is affected by (a) individuals' prior knowledge in relation to the information available online as well as (b) their (chronic and situational) social motivation. The final example refers to the interaction between person and media characteristics and how they impact on the outcomes of web-based *information search*. Going beyond these examples, the concluding section outlines how some characteristics of the web might interact with certain individual-level variables and thereby identify avenues for future research.

Social Influence

For three decades now, research has been analyzing how computer-mediated communication (compared to face-to-face) affects social influence (i.e., the impact of others' characteristics, presence or communication on a person). As summarized by Sparrow and Chatman (this issue), the initial findings suggested that computer-mediated communication (CMC) equalizes the impact of *status differences* on participation in the discussion and potentially even on discussion outcomes (e.g., Dubrovsky, Kiesler, & Sethna, 1991; Kiesler, Siegel, & McGuire, 1984). In part, this certainly holds true, due to a lack of the requirement to gain the floor and take turns in text-based CMC as well as due to the many means to voice one's opinion the web has been providing, in particular since the

development of Web 2.0. However, as correctly noted by Sparrow and Chatman, the evidence that status differences matter less in CMC has been mixed. Overall, it seems that status differences stemming from task expertise (Sassenberg, Boos, & Klapproth, 2001; Weisband, 1992) or in- and outgroup membership (Postmes & Spears, 2002) affect social influence in CMC stronger than in face-to-face communication—but only if they relate to the discussion topic. Social influence in CMC is, for instance, stronger when individuals know that their interaction partners have expertise in the discussed domain (Sassenberg et al., 2001). Furthermore, gender-based status differences strongly affect communication and its outcomes in CMC when topics linked to gender stereotypes are discussed (compared to when topics without a link to stereotypes are discussed; Postmes & Spears, 2002). Thus, the social perception of the self and others (e.g., expertise and group membership), which individuals have in mind when using the Internet, moderated the effect of the medium in these studies (for a more extensive discussion, see Sassenberg & Jonas, 2007).

The social identity model of deindividuation effects (SIDE; Postmes, Spears, & Lea, 1998) analyzed this interaction between person variables and media characteristics more extensively. According to SIDE, *anonymity* (i.e., lack of knowledge about communication partners) is the crucial media characteristic, and the salient aspect of the *self-concept* is the key variable a person brings to the social interaction. They both interact in their impact on social influence. Anonymity should strengthen the impact of the salient aspect of the social self-concept. In case individuals perceive the interaction partner as a member of the same self-relevant group as themselves (i.e., a joint *social* identity is salient), social influence should become stronger in case of anonymity. In contrast, a perception of themselves and the vis-à-vis other as a distinct individual (i.e., salient *personal* identity) should lead to less social influence in case of anonymity. Both effects are explained based on the same mechanism: During anonymous communication, less social information that could work against the salient (personal or social) identity is transferred. This implies different effects on social influence: A salient social identity provides the basis for social influence (Turner, 1987; for an Internet example, see Sassenberg, 2002), and if this basis is challenged less (e.g., by nonverbal behavior) in anonymous than in nonanonymous communication, the former will result in stronger social influence than the later. Conversely, a salient personal identity that is associated with striving for differentiation from others rather fuels resistance against the influence by others (Spears, Lea, & Lee, 1990). In this case, anonymous communication will provide less opportunity to reduce this resistance against social influence than nonanonymous communication. A substantial body of evidence supports the SIDE (e.g., Postmes, Spears, Sakhel, & de Groot, 2001; Sassenberg & Boos, 2003; Spears et al., 1990). Overall, the model provides an excellent illustration for the basic argument put forward in this commentary: The impact of the characteristics of the *medium* is moderated by *person* characteristics—here, the self and social perception that individuals bring to the social interaction context. The effects of anonymity even reverses, depending on what the individuals bring to the social interaction.

More recently, anonymity has become much less relevant on the web. Since social network sides blurred the boundaries between online and offline social networks (e.g., Zhao, Grasmuck, & Martin, 2008), the majority of online social interactions nowadays take place between individuals who know each other. Nonetheless, the information about the communication partner (i.e., beyond the content of the message) conveyed during online communication remains scarce (e.g., in a tweet, a Facebook post, or in a chat). Therefore, receivers will still rely heavily on the impression of their communication partner (e.g., a nice person or a computer expert) they formed *before* this online communication and their relation to this person (e.g., a shared social identity). In line with the general notion of SIDE, the preassumptions that individuals hold when using the web should guide social influence even more, the more anonymous the vis-à-vis other is *during* the communication (the less information about him or her is conveyed).

Research comparing CMC and face-to-face communication identified another crucial person characteristic moderating the impact of communication media (and thus very likely also specific media characteristics) on social influence, namely, *private self-awareness* (Matheson & Zanna, 1989; Sassenberg, Boos, & Rabung, 2005). Private self-awareness is the propensity to monitor and evaluate one's state and action in the light of one's own values, standards, and concerns (Scheier, 1976)—no matter whether these standards, and so on, are derived from the personal or the social identity. The stronger individuals' private self-awareness (and with it the focus on own standards, etc.), the less they are influenced by others (Froming & Carver, 1981; Scheier, 1980). As traits often have a particularly strong impact on behavior in situations eliciting a state that is related to the trait (Endler & Magnusson, 1976), and computer-mediated settings facilitate state private self-awareness (Matheson & Zanna, 1988), those *high* in trait private self-awareness are particularly hard to influence via CMC (Matheson & Zanna, 1989; Sassenberg et al., 2005). This implies that web-based communication is less likely to assert social influence on individuals with high private self-awareness. This should in particular be true when a website and a user environment provide room to behave in line with this focus on the self (e.g., using the

Internet in a private setting rather than on a smartphone in public).

As a side note, the fact that Internet use in private settings is likely leading to heightened private self-awareness suggests an interpretation of strong negative comments on the Internet different from the one offered by Sparrow and Chatman (this issue), namely, a stronger focus on *own* attitudes and standards without any consideration of others. Private self-awareness facilitates perspective-taking performance (Hass, 1984), as it helps to differentiate one's own from others' perspective. Perceiving such a difference between the self and the other is crucial for successful perspective taking, because it prevents the projection of the own view on another person (Sassenrath, Sassenberg, & Scholl, in press), which otherwise often undermines perspective taking performance (Epley & Caruso, 2009). As private self-awareness is increased in private web use, conditions for understanding another person's perspective (i.e., perspective taking) are very good. However, understanding someone does neither necessarily imply sympathizing with that person, nor feeling empathy (i.e., sharing his or her feelings). The awareness of own values and attitudes, which is by definition part of private self-awareness (Scheier, 1976) and heightened online, might thus contribute to the clear, sometimes inappropriately unfriendly statement of one's own opinions and explicit negative evaluations of others' views on the web, even though (or precisely because) this view is much better understood in these contexts.

In sum, this literature suggests that the salient aspect of (personal or social) *identity*, the (sometimes related) information about the communication *partner*, and other communication relevant *information* about the vis-à-vis other as well as trait *private self-awareness* are likely to moderate the impact of characteristics of the web on social influence—meaning that social influence can be even more pronounced (or attenuated) on- versus offline. The key media characteristics here are others' *anonymity* during communication and the *social isolation* behind the screen. The following section summarizes research of the interplay between person and media characteristics in the domain of knowledge sharing—thus considering the contribution rather than the reception of information.

Knowledge Sharing

Over the last decade, the web turned increasingly from a medium where few were able to publish and many were able to read into a medium where everyone who is able to read, has also the opportunity to publish. That is what constitutes the so-called Web 2.0. The Web 2.0 allows for forms of collaborative writing and mass communication that are unique to computer-based communication environments. We are dealing with a new combination of media characteristics here that is original to the web and, therefore, calls for a new line of psychological research.

One of the prototypical tools of the Web 2.0 are wikis, such as Wikipedia, enabling numerous individuals to simultaneously share and contribute information online. Wikis are one of the key applications of the coevolution model of knowledge building (Cress & Kimmerle, 2008), which considers the relation between *media* characteristics and *user* characteristics as predictors of individuals' knowledge sharing. It suggests that knowledge sharing in the context of wikis depends on the (in-)congruency between the contributor's knowledge and the information in the wiki (Cress & Kimmerle, 2008). Research has provided evidence for the impact of this (in-)congruency on knowledge sharing. For instance, increasing differences between a person and a wiki concerning the information, opinions, or concepts considered crucial for a topic motivates this very person to contribute more facts to a wiki (i.e., enhances knowledge sharing). In contrast, restructuring of information by rewriting paragraphs or including new links is most likely at a medium level of incongruence (compared to high or no incongruence), as this activity requires some sort of connection between the contributor's knowledge and the content of the wiki (e.g., Bientzle, Cress, & Kimmerle, 2013; Moskaliuk, Kimmerle, & Cress, 2012). In sum, user contributions to wikis depend on (several facets of) the congruency between their own knowledge and the knowledge contained in the wiki. Again, these findings clearly demonstrate that the relation between media characteristics—here, the information provided—and those of the individual—here, own knowledge—should be considered when studying the consequences of the pervasiveness of new media in our lives.

Another domain in which the preconditions for online knowledge sharing have extensively been studied is research on computer-supported collaborative learning and work (CSCL and CSCW). This research has likewise provided some evidence that characteristics of the respective interface or tools (i.e., the medium) and those of the users interactively affect knowledge sharing. The social isolation behind the screen and the resulting focus on the self (i.e., private self-awareness) often elicit a problem for knowledge sharing, namely, substantially reduced sharing of information with others. Moreover, knowledge shared online is often not tailored to the receiver's needs or to the demands of the joint task. Therefore, *knowledge awareness* (i.e., being aware of the information held by others) is a key concept in research on CSCL (for reviews, see Engelmann, Dehler, Bodemer, & Buder, 2009; for related ideas in the domain of CSCW, see Gross, Stary, & Totter, 2005). Numerous tools have been created that provide users with metaknowledge on

learning partners' and coworkers' knowledge, thereby supporting the formation of a transactive memory (i.e., "knowing who knows what"; Wegner, 1986). These tools indeed facilitate sharing of information tailored to learning partners' needs (e.g., Dehler-Zufferey, Bodemer, Buder, & Hesse, 2011). In other words, the information that individuals share better addresses the deficits of a learning partner if a certain media characteristic has been implemented, namely, knowledge awareness.

There is, however, a caveat: If individuals receive information on and become aware of their learning partners' knowledge, this information is also suitable for social comparison (i.e., who knows more or less than oneself). Those who are superior and should therefore share most knowledge are at the same time those profiting most from the social comparison—that is, they receive positive information about the self. If these individuals are chronically or momentarily striving for positive self-image and thus for social comparison outcomes (e.g., "I want to be better than others"), knowledge awareness will reduce their willingness to share information and give up their advantage. And indeed, explanations provided by a superior learning partner are less detailed, the stronger these individuals' chronic social comparison orientation is or if their self-esteem has been threatened by a negative social comparison outcome before the collaborative learning session (compared to no social comparison; Ray, Neugebauer, Sassenberg, Buder, & Hesse, 2013). This finding suggests that knowledge awareness does *facilitate* sharing of information, but if superior learning partners are motivated to keep up the positive outcome of the social comparison (e.g., because it bolsters their self-esteem), knowledge awareness *undermines* the effort that is put into knowledge sharing. Hence, this work again provides an example for the importance of considering not only the impact of media characteristics per se—here, knowledge awareness—but also how they interact with user characteristics—here, motivation for social comparisons. Of importance, the person characteristics again proved to have the power to reverse the impact of the media characteristic.

All in all, knowledge sharing is affected by the *knowledge* that is provided online (e.g., in a wiki) and by the *awareness* of the knowledge others have (and do not have). The effect of these media characteristics is, however, moderated by individuals' *knowledge* and their striving for positive *social comparison* outcomes. Although optimizing media characteristics can often improve knowledge sharing online, in some cases person characteristics turn these otherwise beneficial media characteristics into detrimental ones, which is again underlying the importance of considering both person and media variables when aiming to understand behavior on the web.

Internet Search and Knowledge Acquisition

For the impact of Internet search, Sparrow et al. (2011) found that the state of a person moderates the impact of the Internet: For those who had answered *hard questions*, computer-related brand names were more accessible than for those who had answered easy questions, because computers are used to find answers to the hard questions. Similarly, research on the outcomes of an Internet search has repeatedly demonstrated that traits, attitudes, and states of a person conducting an Internet search affect search outcomes (for an overview, see Kammerer & Gerjets, 2011). Individuals with more *domain knowledge,* for instance, find and retrieve facts faster from the web and on the whole pursue their search goals more successfully (e.g., Duggan & Payne, 2008; Hölscher & Strube, 2000).

Another factor affecting knowledge acquisition during web search are epistemological beliefs. These beliefs range from a *naïve* belief that knowledge consists of absolute, established facts to *sophisticated* beliefs that knowledge is derived through reasoning or evaluation of evidence (Hofer & Pintrich, 1997). The more sophisticated individuals' epistemological beliefs are, the more detailed their web search behavior is (i.e., they search longer, read more pages, select more links at the end of a search engine result page), but also the less certain individuals are about decisions derived from their web search results (Hofer 2004; Kammerer, Bråten, Gerjets, & Strømsø, 2013).

Not only has more recent research addressed the impact of person variables on information search on the web, but it has started to address the interplay between individual and media characteristics. A study by Kammerer and Gerjets (2012), for instance, tested whether the *belief* that the internet provides correct knowledge (which is similar to a naïve epistemological belief) moderates the impact of the result presentation on acquired knowledge (i.e., number of arguments included in a summary about the search results). In an experiment, media characteristics were manipulated by comparing a standard Google search engine results page to a table output in which search results were arranged in columns based on the trustworthiness of the information source (i.e., opinions, commercial websites, and "objective" information). In line with the authors' hypothesis, participants strongly believing that the Internet provides correct information profited more from the table interface providing information about the credibility of the websites. Moreover, Rouet, Ros, Goumi, Macedo-Rouet, and Dinet (2011) demonstrated that individuals with more prior knowledge are better able to select websites of higher quality from a link list. In sum, these findings indicate that individuals' *prior knowledge* and their *attitude towards the web* (and the information it provides) interact with the

features of web-search interfaces in their impact on the success of information search.

Beyond the quality and the amount of information gained, the self-guided nature of Internet search (i.e., other than in books or libraries nothing, from search terms to the texts available, is preselected online) provides the opportunity for motivational biases to play out particularly strongly. For instance, the tendency to prefer positive over negative information when feeling threatened (e.g., Rothermund, 2011) might substantially affect the outcomes of Internet search. Indeed, we found that simply recalling a threat experienced in the past (e.g., compared to a challenge) or being provided with a fake medical diagnosis before performing an Internet search led to (a) the selection of more positive search terms, (b) the selection of more positive links from a link list, and (c) the remembering of more positive information after an Internet search (even though everybody received the same information; Greving & Sassenberg, 2013). This suggests that self-relevance of search content and related motivation might bias an Internet search severely.

Although such bias is useful to cope with threat experiences, it might also lead to an incomplete representation of the environment after performing the information search. A longitudinal study on patients with a certain chronic disease provided evidence for this conclusion. The severity of the disease served as a proxy of health threat. This threat and the amount of time participants spent searching on the Internet for health-related information interacted in their impact on health-related optimism. For those who used the Internet a lot to search for health-related information (but not for those who rarely used the Internet for this purpose), a stronger health threat led to more health-related optimism half a year later (Greving & Sassenberg, 2013). In sum, this indicates that self-relevant Internet search results in biased knowledge acquisition.

The crucial media characteristics for the interplay between individual and media variables on Internet search outcomes are cues that help to identify the *type* and *quality* of Internet sources and the *self-guided nature* of information acquisition online. Individuals' prior knowledge, their attitude toward knowledge from the Internet as information source (i.e., epistemological beliefs), and their motivational state all moderate the impact on search outcomes.

Summary and Conclusions

The summarized research provides evidence that person characteristics moderate the impact of media characteristics on social influence, knowledge sharing, and the outcomes of Internet search. In some cases—such as the impact of the salient level of identity on social influence in anonymous (vs. nonanonymous) communication—the person characteristics even have the power to reverse the effect of a media characteristic. Hence, not considering these person variables can obviously lead to wrong conclusions.

Across the three phenomena covered here, the *key media characteristics* are (a) less *social cues* during communication (resulting in less attention to others and more attention to the self), (b) *self-guidance* of online behavior (resulting in stronger influences of individuals' own agenda), and (c) *assisting cues* provided by tools to guide users (e.g., knowledge awareness tools or classifications of search engine results). This list is by no means comprehensive. The attentive reader might have noted that social cues and self-guidance are characteristics of the web (i.e., across web applications, e.g., social network sites, chats, wikis etc.), whereas assisting cues are implemented in a specific application, namely, information search. Such specific media characteristics exist in many web applications as communication science and human computer interaction research have found (e.g., Treem & Leonardi, 2013). Their analyses provide good starting points for psychological research on the impact of the web (e.g., recommender systems; Schwind & Buder, 2012).

On the side of the *person,* key characteristics are (a) *individual knowledge and skills*, (b) *attitudes toward the web and its content* (e.g., epistemological beliefs), (c) *social information* (e.g., information about the communication partner), (d) in situ *self-perception* (e.g., the salient aspect of identity), and (e) all sorts of aspects of *motivation* (e.g., threat, the striving for a positive social comparison outcome, etc.). This list likewise does not claim to be exhaustive. A useful initial step to identify further person characteristics might be to try to understand how the summarized media and person characteristics work together. When reconsidering the specific person variables that were found to moderate the impact of media characteristics, three closely related issues stand out.

First, the person characteristics cover a broad range of variables from interindividual difference variables (e.g., trait private self-awareness, social comparison orientation) over current motivational states (e.g., situational threat) to activated or provided information (e.g., an individual's impression of an interaction partner). Thus, these findings do not call for an analysis focusing exclusively on the moderation by stable traits but include all sorts of variable person characteristics.

Second, in cases where chronic person characteristics are moderating media effects, they are mostly specific (e.g., holding task-relevant information about the interaction partner; social comparison orientation) rather than general (e.g., the big five). This is in line with research showing that specific person characteristics predict online behavior better than the big five (e.g., Utz, Tanis, & Vermeulen, 2012).

Finally, the person characteristics acting as moderators are very closely connected to the media characteristics in question (e.g., impression of the communication partner and little information about the communication partner during communication; social comparison orientation and knowledge awareness displays). Psychological definitions, findings, models, and theories will in many cases be informative when searching for the person characteristics that are closely matching (and thus potentially altering the impact of) a media characteristic. This is by no means different from what research on cognitive and social processes has always done, when it moved beyond the study of main effects. However, relying on insights from psychological science (just as Sparrow et al., 2011, relied on research on transactive memory) might foster a significant and original contribution of our discipline to the understanding of how the web impacts on our lives (beyond research on human–computer interaction, in communication science, in sociology, etc.).

In general, there are two strategies that could be applied in this research. Research on the impact of the web on social and cognitive processing could start from the *media characteristics* that have been implemented during programming or identified by other disciplines (e.g., communication science; Treem & Leonardi, 2013), and then consider matching person characteristics that might determine how individuals respond to them. Alternatively, *psychological theorizing* might allow naming person characteristics and situation characteristics that can later be transferred into media characteristics. These media characteristics might, in turn, provide the basis for the design of certain tools and recommendations for users' agenda (i.e., characteristics).

Across the research summarized here, the research focus is on the *immediate* effects of media use (e.g., what information is shared and which knowledge is acquired as outcome of an information search). So far, research has rarely addressed how the web changes our lives beyond the given situation (for exceptions, see Greving & Sassenberg, 2013; McKenna & Bargh, 1998). Future research should thus consider studying the long-term effects of media use more extensively in order to gain insights about the impact of web use on our offline lives and potentially our societies.

To conclude, the current commentary suggests that research on the impact of the web on human cognitive and social processing should rely on approaches considering person as well as media characteristics. Because person by media characteristics interactions exist, it is often not only inappropriate to try to draw conclusions about a media or tool as a whole (e.g., Carr, 2007). In many cases, it is also inappropriate to draw conclusions about the impact of media characteristics without considering the person characteristics that contribute to a specific effect. This also implies that media development and interface design should ask not only for technical functionality but also for user expectations, intentions, and other person characteristics in order to be successful.

Note

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