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Foundations of interactive media use

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Abstract |

Interactivity is at the heart of digital media, forming a central foundation for many media use processes. It can be described as a possibility of reciprocal influence and refers to the interactions between users via media as well as to the interactions between users and media. Interactivity can be conceptualised as a property of the medium, as a subjective perception of the user and as a form of the media use process. For media use research, the shift in the role of the media user associated with interactivity is of particular interest: Instead of being passive observers of media content, they become active users who must continuously make selection decisions. This shapes media use processes on multiple levels. On a cognitive level, interactivity has been found to influence the depth of information processing and the formation of judgements about a medium; however, these effects depend heavily on inter-individual differences. On a motivational level, interactivity has proven particularly conducive to intrinsic motivation and a resulting deep engagement with the media content. Finally, on an affective level, it has been shown that interactivity itself elicits emotions, but can also facilitate immersion in the media content, thereby intensifying emotional responses to the content. The chapter concludes with a reflection on the theoretical and methodological challenges that increasingly interactive media environments pose for media use research.

Keywords |

Interactivity , Information processing , Motivation , Emotion , Immersion

1. Introduction

The last 30 years have witnessed a media revolution (van Dijk, 1999). While media development in previous centuries mainly progressed in small, evolutionary steps, recent decades have seen the emergence of a large number of digital, networked media offerings at the intersection of mass communications, data communications and telecommunications (van Dijk, 1999). Many of these innovations have long since become an integral part of our everyday lives – websites, blogs, social media platforms, or video games are just a few examples.

A central characteristic of these digital media offerings is their *interactivity* (Bucy, 2004; Sundar et al., 2015; van Dijk, 1999). Unlike linear, analogue media, digital media offerings allow users to take an active role during media use, select content, individualise it, create it themselves and share it with others (Sundar & Oh, 2020, p. 357). For example, while viewers of a television programme cannot influence the pre-produced content on screen, users of video

games can and must actively intervene in the unfolding action so that the game and its narrative can progress (Bowman, 2018; Grodal, 2000; Klimmt, 2003). The degree of interactivity offered by digital media technologies has steadily evolved in recent years (Sundar, 2020; F. Yang & Shen, 2018) – from websites with basic comment functions to interactive visualisations in online articles, to mobile apps, video games and complex virtual reality environments.

From a communication science perspective, it is important to analyse how the increasing interactivity of media offerings affects their use and effects, given that one of the fundamental assumptions of the discipline is that the way in which a message is transmitted shapes its effects (Sundar et al., 2015, p. 47). For example, how we perceive, process and respond to an environmental protection appeal likely depends on whether we hear it in a personal conversation, read it in a newspaper or experience it in an interactive video game. In parallel to the growing prevalence of interactive media, communication researchers have therefore begun to explore how the degree of interactivity influences users – both independently of and in interaction with the content (Sundar et al., 2015; Sundar & Oh, 2020). This chapter provides an overview of this research. After discussing the definition of interactivity and characterising interactive media use as a process of continuous selection, we provide an overview of the research on cognitive, motivational and affective processes in interactive media use. We conclude by outlining the opportunities and challenges that the study of interactivity presents for media use research.

2. Definition of Interactivity

Although interactivity is a central concept in the description and study of many forms of media and has been researched for decades (Leiner & Quiring, 2008), a generally accepted definition is still missing (Sundar et al., 2015; F. Yang & Shen, 2019). The literature presents a wide range of approaches to defining and operationalising the "elusive concept" (Bucy, 2004, p. 373) of interactivity (Weber et al., 2014; F. Yang & Shen, 2019). At a very basic level, interactivity can be described as the possibility of reciprocal influence (Vorderer, 2000) and refers to the interactions between users *via* media as well as the interactions between users *and* media (Bucy, 2004; Sundar, 2020; Stromer-Galley, 2004). A helpful working definition of interactivity is therefore: "the possibility for users to manipulate the content and form of communication and/or the possibility of information exchange processes between users or between users and a medium" (Weber et al., 2014, p. 82). Furthermore, interactivity can be conceptualised at three levels: (1) the medium, (2) the recipient's perception, and (3) the media use process (Bucy, 2004; Sundar & Oh, 2020; Weber et al., 2014; see also Possler, 2021, pp. 97-100).

If interactivity is conceptualised *at (1) the level of the medium*, the focus lies on the technological design of a media offering, which allows users to manipulate form and content or enables an information exchange process (e.g. Jensen, 1998; Steuer, 1992). Important design features include, for example, the extent of selection or modification options a medium offers or the speed with which it reacts to user input (Steuer, 1992; Vorderer, 2000). Accordingly, a football video game such as *EA Sports FC 25* (EA Sports, 2024) would be more interactive than a gamebook in the 'choose your own adventure' style about a football match (e.g. *"Game Day Soccer: An Interactive Sports Story"*; Terrell, 2021). Readers of the gamebook can only influence selected scenes of the story and can only choose from a limited number of options. *EA Sports FC*, on the other hand, offers a wide range of technical options for influencing the content (e.g. players can use a controller to precisely direct the movements of the football players).

Interactivity can also be situated *at the individual level* as a subjective perception (e.g. Bucy, 2004; Leiner & Quiring, 2008). According to this perspective, users may perceive a media offering as being more or less interactive, or as enabling more or less information exchange. In recent years, various scales have been developed to measure this perceived interactivity (e.g. Leiner & Quiring, 2008; McMillan & Hwang, 2002). However, users' perceptions do not necessarily correspond to the actual possibilities (Bucy, 2004). For example, less experienced *EA Sports FC* players may think that the game does not allow certain actions (e.g. lobbing a ball), even though they are possible.

Finally, interactivity can be situated at *the level of the media use process*, that is, at the intersection between users and media (e.g. Rafaeli & Sudweeks, 1997; Stromer-Galley, 2004). Approaches with this focus often emphasise the reciprocal exchange of information between users as well as between users and the medium (Klimmt, 2003; Rafaeli & Sudweeks, 1997; Stromer-Galley, 2004). For example, Klimmt (2003) describes interactivity in video games as an interplay between player commands (input) and system responses (output), which produce discrete interactions at the micro level. For example, if an *EA Sports FC* user presses a button (input), the game reacts by adjusting its output (e.g. displaying a pass to another player). This output, in turn, forms the basis for the next input of the user (Klimmt, 2003). From the multitude of these input-output loops, interconnected episodes emerge (e.g. an attack on the opponent's goal), which, in turn, form the basis of higher-level contexts (e.g. a complete digital football game).

Regardless of the level at which interactivity is conceptualised, it can be understood as a *continuum* (Vorderer, 2000). This means that interactivity can be more or less technically afforded

by a medium, can be more or less subjectively perceived by users and manifest itself in a more or less extensive reciprocal exchange between users as well as between users and the medium (Possler, 2021, p. 100).

3. Interactive Media Use as a Process of Continuous Selection

As the definitions above illustrate, interactivity touches on the fundamental components of media use—the characteristics of the medium and users' perception of the medium—as well as their processual sequence. As a result, interactivity also shapes users' behaviour, especially their selection behaviour. On the one hand, interactivity can be seen as a *new feature of media offerings* that can motivate people to engage with or avoid certain types of media. This classic media choice perspective follows the logic of the uses-and-gratifications tradition (Ruggiero, 2000;→ II.3 Motivation and media choice), according to which media users purposefully and actively evaluate the characteristics of media offerings to make a selection decision (Sundar & Limperos, 2013). Depending on individual needs and preferences for specific modes of media use, interactivity may, thus, become an important reason for selecting or avoiding a medium, for example when choosing between a printed newspaper and its online edition (e.g. Huang, 2009).

Secondly—and even more important for this chapter—the interactivity of many digital media offerings challenges the traditional *phase separation* between selection (pre-communicative phase) and exposure (communicative phase) (for a distinction between these phases, see Levy & Windahl, 1985). Interactive media use means constantly deciding between available (mini) messages at high frequency, for example, in social media feeds or on news platforms (e.g. Pearson & Knobloch-Westerwick, 2018). Although such micro-selection decisions also exist in non-interactive media environments such as television (Bilandzic, 2009), it is only in highly interactive media that the acts of selection and processing become fully interwoven during media use. Interactivity confronts the audience almost permanently with the question "What next?" and thus transforms the role of users from passive recipients of conventional mass communication to curators of their individual usage process (e.g. Sülflow et al., 2019).

For example, while a film will continue playing regardless of whether the viewer is paying attention (even if they fall asleep), a video game progresses only when the player actively participates in it (Bowman, 2018). Without users' continuous acts of selection and decision-making, interactive media cannot function. The possibilities and necessities of this co-creative form of media use have consequences not only for selection processes, but also for information processing, motivational processes and affective dynamics (see the following sections). Finally,

intelligent ("algorithmic") digital media should relieve users of (too many) individual decisions in the process – giving rise to entirely new active-passive, personalised forms of media selection that need to be explored theoretically and empirically (→ IV.9 Media reception in algorithmic environments).

4. Cognitive, Motivational and Affective Processes of Interactive Media Use

The discussion above suggests that interactive media use differs significantly from conventional linear mass communication, which has traditionally been the primary focus of media use research in communication science. Consequently, numerous studies have explored how interactivity shapes cognitive, motivational and affective processes during media use (Sundar et al., 2015; Sundar & Oh, 2020).

4.1 Cognition: Interactivity and Information Processing

From the perspective of perceptual and cognitive psychology, interactive media are considered highly complex (Bradley, 2007; Lang, 2017; Sundar & Oh, 2020; → I.1 Cognitive foundations of media use). Their adaptability and navigability place high demands on users' *information processing*, "that require them to go well beyond passive reception of content to active participation in co-construction of content" (Sundar & Oh, 2020, p. 360). Especially interactive media with strong immersive qualities (e.g. video games) place considerable demands on users' capacities for processing, storing and retrieving information (Bowman, 2018; see also Possler, 2021, pp. 238-239). Against this background, concerns have been raised that interactivity may impair information processing as users typically do not possess sufficient cognitive resources to simultaneously interact with the system *and* process the presented information thoroughly (Skulmowski & Xu, 2022; Sundar & Oh, 2020).

This issue is discussed using concepts such as "cognitive load" (Skulmowski & Xu, 2022, p. 172), "task load" (Rieger et al., 2015, p. 139) or "cognitive demand" (Bowman, 2018, p. 5) and in particular the assumptions of the *Limited Capacity Model of Motivated Mediated Message Processing* (LC4MP, for an overview see: e.g. Fisher & Weber, 2020; Lang, 2017; → I.1 Cognitive foundations of media use). Developed by Lang (2009, 2017), the LC4MP is based on the fundamental assumption that humans possess a naturally limited capacity for information processing – a finite pool of cognitive resources to process stimuli from the environment. This also applies to media use, where users must allocate their cognitive resources across three concurrent information processing tasks: (1) *encoding*—the selective sensory intake of information into the cognitive system—, (2) *storage*—the linking and anchoring of newly received information with existing information—and (3) *retrieval* of stored information. The pool of cognitive resource must be sufficient to support all three processes. For example, the more energy is allocated for encoding information, the less remains for

storage and retrieval, which reduces overall processing performance and may therefore influence the effects of media use (Fisher et al., 2018, pp. 271-272). Although interactive media are not equally demanding for all users due to inter-individual differences in information processing, they generally require more cognitive resources than their non-interactive equivalents (Bowman, 2018; Lang, 2017; Sundar & Oh, 2020). For example, video games generally present a multitude of stimuli, require constant monitoring of gameplay, frequent decision-making (often with consequences), and active user participation through inputs (Klimmt, 2003; Possler et al., 2018; Possler, 2021, p. 239). Similarly, social media platforms and interactive websites assign users the role of "active information initiators" (F. Yang & Shen, 2019, p. 214) and draw on the cognitive resource pool through numerous customisation and interaction options.

Nevertheless, it would be misleading to assume that interactive media is generally detrimental to information processing, for at least three reasons (Fisher et al., 2018; Skulmowski & Xu, 2022; F. Yang & Shen, 2018). First, interactive media are used by different people who vary in terms of their motivation[1], skills and personality traits, as well as the media use situation – all of which influence how cognitive resources are allocated. Second, the processing of interactive media also depends on their content, particularly on message characteristics (e.g. emotionality, valence) as well as more general structural aspects such as tempo, change of perspective or typography (Fisher & Weber, 2020; Lang, 2017). Third and finally, the findings reported in the literature also vary depending on how 'interactivity' was defined in the respective study – for instance, whether the focus is on the quantity or quality of interactive features or which form[2] of interactivity is studied (Oh, 2022; F. Yang & Shen, 2019).

In a meta-analysis of the cognitive effects of interactivity on websites, Yang and Shen (2019) examined 37 studies and found that interactivity—defined here as a technological feature that enables users to communicate with the website and/or other users reciprocally—has an overall weak positive effect on cognition-related variables. However, a closer examination of the key dependent variables—in particular, message comprehension, elaboration, memory and knowledge gain—reveals no significant effects (F. Yang & Shen, 2019, p. 220). The authors interpret this as evidence that

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[1] As the full name of the LC4MP indicates, motivation plays a central role for Lang (2009, 2017). The LC4MP distinguishes between two motivational systems – an approach system (turning towards positive stimuli; *appetitive system*) and an avoidance system (turning away from negative stimuli*; aversive system*). These systems are automatically activated in response to motivationally relevant stimuli in the environment and influence ongoing information processing (for more details, see Fisher et al., 2018; Fisher & Weber, 2020).

[2] Sundar (2009), for example, distinguishes in the context of websites between *modality interactivity* (basic interaction techniques such as clicking, drag-and-drop, etc.), *message interactivity* (possibilities for exchanging messages between users and the system or other users) and *source interactivity* (possibility for customisation/personalisation, in which users thus become the 'source' within the system).

considerable inter-individual differences exist in the effects of interactive online offerings, especially for cognitively demanding processes. The meta-analysis also reveals differences between various types of websites and regarding the extent of interactivity: For example, no significant effects are found for informative (compared to experiential) sites. Moreover, while interactivity has a positive effect on cognition-related variables when conceptualised binarily (interactivity low/absent vs. high/present), this effect disappears when a three-level conceptualisation (low vs. medium vs. high interactivity) is used. This curvilinear relationship suggests that it is not interactivity per se, but *too much* interactivity that can overwhelm users (see also Bowman, 2018, p. 5). Similarly, Skulmowski and Xu (2022) find in a review of the effects of interactive learning media that low and medium levels of interactivity enhance motivation and learning while avoiding the cognitive overload that results from high interactivity – for example, because users must first learn specific interaction patterns or understand the mechanics of a learning game (Skulmowski & Xu, 2022, p. 180).

However, interactivity can influence information processing during media use even when it is not *actively* used (Sundar, 2008; Sundar et al., 2015; Sundar & Oh, 2020). To form a judgement about media offerings and their quality or credibility as efficiently and effortlessly as possible, media users rely on a variety of cognitive 'shortcuts'. These decision-making rules, known as heuristics, are triggered by so-called *cues* – salient aspects of a media offering "that might allow for quick evaluation of that information" (Sundar et al., 2008, p. 3455). In the *MAIN model* (Modality-Agency-Interactivity-Navigability), Sundar (2008) theorises how the affordances of communication technologies are associated with specific heuristics that influence user judgements. Interactivity is one of these affordances, whose visual cues, according to Sundar (2008), can trigger a range of heuristics. For example, chat windows or comment fields on interactive websites may trigger the so-called *interaction heuristic*, while the presence of clickable features or input options may trigger the *activity heuristic* (Sundar, 2008, pp. 85-86). Depending on the context of use and the characteristics of the users, these heuristics can be associated with positive or negative connotations and thus influence how users perceive the quality of the offer or its content. For example, the 'activity cues' embedded in a website’s user interface can cause users to perceive the site as more dynamic, which in turn may positively influence credibility evaluations (Sundar, 2008, p. 86).

Regardless of whether one focuses on the active use of interactive media or merely their heuristic evaluation, it can be concluded that interactivity influences information processing in various ways and that these effects are shaped by inter-individual differences. Because interactivity can potentially be cognitively overwhelming, the question arises as to why interactive media offerings are so ubiquitous – especially in areas where thorough processing of the presented content is essential, such as in the health context (Sundar et al., 2012). One possible explanation is the *motivating* and *absorbing quality* of interactivity.

4.2 Motivation: Interactivity and Intrinsic Motivation

Numerous studies have documented that interactive media have a high motivational effect (Sundar & Oh, 2020, pp. 359-364; → I.3 Motivational and behavioral foundations of media use). For example, research has demonstrated that interactivity is a key factor in fostering motivating learning experiences in the context of learning media (Skulmowski & Xu, 2022). Moreover, a meta-analysis indicates that technical functions on websites that promote interactivity motivate users to revisit the site or purchase the products offered there (F. Yang & Shen, 2018). To give yet another example, a meta-analysis suggests that web-based health interventions motivate their users to engage in health-promoting behaviour more effectively when they have interactive features (Q. Yang et al., 2020).

The motivational effects of interactive media are typically explained in the literature by a two-step process (e.g. Sundar et al., 2012, 2015): It is assumed that interactive media offerings motivate their users more effectively to engage with the content. In a second step, regular and proactive use of these media offerings is expected to increase users' motivation to adopt the behaviours intended by the content creators – for example, purchasing products in the context of online shops or engaging in health-promoting activities in the context of health applications. Research on interactivity has primarily focused on the first process step, investigating how interactivity promotes user engagement (Sundar et al., 2012, p. 113)[3]. Self-determination theory or Flow frequently serve as the theoretical basis in this research.

Self-Determination Theory (SDT; Ryan & Deci, 2000, 2017) represents a general theory of human motivation. Like many other theories of human motivation (see Vorderer et al., 2006), SDT posits that human behaviour can be motivated extrinsically or intrinsically (Ryan & Deci, 2000, pp. 71-73). Extrinsically motivated activities are carried out in anticipation of a separate reward (e.g. reading an academic book to earn a good grade in class). Intrinsically motivated activities, on the other hand, are performed because they are inherently satisfying (e.g. playing a video game because it's fun). An intrinsically motivated activity, therefore, "has an end in itself" (Vorderer et al., 2006, p. 7). Against this background, SDT postulates the conditions under which intrinsic motivation is particularly well supported. Central to this is the satisfaction of three innate basic needs (Deci & Ryan, 2000, p. 231; Deci et al., 2013, pp. 112-113; see also Possler, 2021, p. 41):

- 1. *Need for competence:* The desire to interact effectively with the environment and achieve valued outcomes (e.g., successfully completing a challenging task).
- 2. *Need for autonomy:* The desire to act in a self-determined and voluntary manner.

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[3] Some authors even describe 'user engagement'—defined as the extent to which users are cognitively, affectively, behaviourally and temporally invested in a medium (O'Brien, 2016)—as the "ultimate outcome variable" (Sundar & Oh, 2020, p. 362) in the field of Human-Computer Interaction.

- 3. *Need for relatedness:* The desire to have secure and emotional bonds with significant others.

If these three basic needs are satisfied in the context of an activity that a person pursues out of intrinsic interest, then intrinsic motivation is facilitated and the activity appears more interesting, satisfying and enjoyable (Ryan & Deci, 2000, pp. 70-72; see also Possler, 2021, pp. 40-41).

SDT has frequently been used to explain the motivational potential and appeal of interactive media use (e.g. Reinecke et al., 2014; Ryan et al., 2006; Sundar et al., 2012; Tamborini et al., 2010). Research applying SDT in this context relies on the premise that the use of interactive media is at least partially intrinsically motivated – be it health applications (Sundar et al., 2012, p. 114), video games (Ryan et al., 2006, p. 349; Tamborini et al., 2010, p. 761) or social media platforms (Reinecke et al., 2014, p. 420). Furthermore, this research assumes that interactive media is particularly effective in satisfying users' basic needs for competence, autonomy and relatedness, thereby promoting intrinsic motivation (Reinecke et al., 2014, pp. 422-423; Ryan et al., 2006, pp. 349-350; Sundar et al., 2012, pp. 115-119; Tamborini et al., 2010, pp. 762-763). This assumption seems plausible, given that users typically have control/autonomy when using interactive media, often interact with others through these media, and are also more strongly challenged due to continuous selection processes (see section 2), which likely facilitate competence experiences. Indeed, empirical studies repeatedly found that interactivity satisfies the three basic needs postulated in SDT (e.g. Peng et al., 2012; Reinecke et al., 2012; Tamborini et al., 2011). For example, studies on video games have shown that players experience a stronger sense of competence when the game requires more input from them to achieve success – in other words, when the game is more interactive and, therefore, more demanding (Reinecke et al., 2012; Tamborini et al., 2011). Similarly, the experience of autonomy is higher when the game offers more freedom of choice (e.g. opportunities to customise characters or choose dialogue options: Peng et al., 2012). Finally, when games allow interaction with other players, the experience of relatedness increases (Tamborini et al., 2010). Moreover, as predicted by the SDT, greater need satisfaction was accompanied by increased motivation to continue using the medium (e.g. Peng et al., 2012) and greater enjoyment (e.g. Reinecke et al., 2014; Tamborini et al., 2010, 2011).

Another concept that has been used to explain the motivational potential of interactive media is *flow* (e.g. Hoffman & Novak, 1996; van Noort et al., 2012). Flow was also developed in psychological research on intrinsic motivation (Nakamura & Csikszentmihalyi, 2002, p. 89). It refers to a mental state in which people are so deeply engaged in an activity that they become fully absorbed in it (Csikszentmihalyi, 1990; Nakamura & Csikszentmihalyi, 2002). Flow therefore strongly overlaps with other media-induced experiences of immersion or absorption, such as presence or transportation (→ III.10 Immersive experience in media use; see also section 4.3). Flow occurs when a challenge has clear goals, provides immediate feedback about the progress being made and optimally matches the skills of the person facing the challenge (Nakamura & Csikszentmihalyi, 2002, p. 90). Typical examples of flow-eliciting activities include mountaineering or making music

(Csikszentmihalyi, 1990). Flow is a pleasurable and intrinsically motivating state (Nakamura & Csikszentmihalyi, 2002, pp. 90-92). Consequently, when experiencing flow in an activity, we are particularly motivated to continue it.

In the context of interactivity research, it has been hypothesized that interactive media can induce flow and thus have a high motivational appeal (e.g. Hoffman & Novak, 1996; Sherry, 2004). For example, video games seem especially well suited to induce flow (Sherry, 2004, pp. 339-340): They present a clear task (e.g. winning a virtual car race), inform players about the progress they made (e.g. current position in the race) and can be finely adjusted to match players' skills due to scalable difficulty levels. Indeed, studies have shown that the perceived level of interactivity of video games is correlated with the experience of flow (e.g. Weber et al., 2014). Games are certainly particularly conducive to the emergence of flow due to the medium's inherent focus on challenges (Possler, 2021, pp. 94-97), but empirical studies have also demonstrated the occurrence of flow during the use of other interactive media, such as social media platforms (J. Lin et al., 2020) or marketing websites (van Noort et al., 2012). Furthermore, studies suggest that flow mediates the relationship between perceived interactivity and users' intention to continue using a media offering (e.g. Rodríguez-Ardura & Meseguer-Artola, 2016; van Noort et al., 2012).

To summarise, the perceived, technically afforded, or actually realised interactions between medium and user are particularly conducive to the development of intrinsic motivation and therefore facilitate deeper engagement with the medium. Another explanatory approach to the appeal of interactive media focuses on their capacity to elicit intensive *affective* processes.

4.3 Affect: Interactivity as an Elicitor and Amplifier of Emotional Processes

The interactivity of media offerings has often been directly or indirectly linked to the elicitation of intense affective states (e.g. Villani et al., 2018;→ I.2 Emotional foundations of media use). On the one hand, interactivity has been regarded as an *elicitor of* affective states. Different layers of the media use situation can evoke emotions (Schramm & Wirth, 2010; Wirth & Schramm, 2007). For example, when reading an online news site, the emotion anger may be caused by the content of an article (e.g. if it deals with injustice), by the formal characteristics of the news site (e.g. if it has a confusing layout) or by situational circumstances (e.g. if users are waiting for a delayed train while reading). Which layer elicits an emotion at a given moment depends on what the user is focusing on ("*situational reference*", Schramm & Wirth, 2010, p. 319; Wirth & Schramm, 2007). Following this logic, the way the interaction with the media offering proceeds may also elicit an emotion (Possler, 2021, p. 213). Specifically, as discussed in the sections above, a high degree of interactivity can challenge users and hold their attention. If users succeed in using a highly interactive medium, competence experiences, flow, intrinsic motivation and associated positive emotions can arise (e.g. Rieger et al., 2014). At the same time, however, interactive media also hold the potential to evoke negative emotions, such as frustration or anger, when the interaction does not unfold as intended (e.g. Triberti, 2016).

However, typically interactivity is not conceptualised as a direct elicitor but as *a moderator* of affective reactions to other aspects of the media use situation – particularly the media content (e.g. Chirico et al., 2017; Possler, 2021; Possler et al., 2018). Specifically, it is assumed that interactivity facilitates immersive media experiences, which in turn intensify emotional reactions to the content (e.g. J.-H. Lin, 2013). As Bilandzic (→ III.10 Immersive experience in media use) explains, various forms of immersive media experiences have been theoretically developed and empirically investigated. All these experiences have in common that users focus their attention intensively on the media content, block out their actual surroundings and perceive the presented stimuli as non-mediated ("Experiences of Non-Mediation": Hartmann et al., 2010, p. 139; → III.10 Immersive experience in media use). Immersive experiences thus intensify recipients' emotional reactions to the media content as it temporarily appears to the user as non-mediated ('real'; Possler, 2021, pp. 246-249). Immersive experiences are therefore not affective states per se, but facilitate their emergence. However, the precise process of how interactivity facilitates the formation of immersive experiences has been modelled differently for the different immersive experiences. We illustrate this process below for (1) spatial presence, (2) social presence and (3) identification.[4]

Spatial presence is often described as the experience of being physically 'present' within a media environment (Biocca, 1997; Lee, 2004; Tamborini & Skalski, 2006). Several theoretical models have been developed to explain the formation of spatial presence (→ III.10 Immersive experience in media use). In a widely cited model, Wirth and colleagues (2007) posit that spatial presence arises when media users develop a mental model of the mediated environment and imagine to be located in it. Media users thus temporarily disregard their actual surroundings (e.g. the armchair they are sitting in) as well as the artificiality of the mediated environment and have the impression of being present in the depicted environment (Wirth et al., 2007; see also Possler, 2021, p. 119). This perception is particularly likely to occur when using interactive media, as users can perform actions in the mediated environment and are therefore more easily convinced that they are ‘in’ the depicted environment (Wirth et al., 2007). In line with this assumption, a meta-analysis shows that media offerings evoke a stronger sense of spatial presence the more degrees of freedom they offer users to influence or navigate the content (Cummings & Bailenson, 2016). The illusion of being present in an (interesting) media environment can—in combination with specific content characteristics—elicit strong emotions in users, for example, joy resulting from heightened spatial presence when playing video games (Skalski et al., 2011, Study 2).

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[4] Other immersive media experiences that cannot be discussed in detail here due to space constraints include *flow* and *transportation* (→ III.10 Immersive experience in media use). Flow was already described in the section above, with interactivity identified as a factor conducive to the flow experience. Transportation was originally conceptualised as an experience arising during linear media use, but can also be applied to interactive media environments (Sangalang et al., 2013).

Social presence is typically understood as the perception that other social entities—other users or media characters—are together with and reacting to the media user (Biocca, 1997; Heeter, 1992; Tamborini & Skalski, 2006; see also Possler, 2021, p. 118)[5]. Users thus have the feeling of being involved in a 'real', non-mediated social interaction. Against this background, it can be assumed that the more opportunities exist for reciprocal communication—that is, the more a situation resembles a real social interaction—the more likely it is that social presence will be experienced (Fortin & Dholakia, 2005). In line with this, a systematic review shows that interactivity is a central factor in the emergence of social presence (Oh et al., 2018). In turn, social presence facilitates emotional media experiences that users are familiar with from non-mediated contexts, such as positive feelings of trust in cooperative settings (Bente et al., 2008).

Finally, *identification* refers to the experience of temporarily adopting the identity/perspective of a media character (Klimmt et al., 2009; → III.13 Empathy, identification and social comparison in media use). Users temporarily step into the 'shoes' of a character. Although identification has also been studied in the context of linear media (e.g. Cohen, 2001), interactivity should be particularly conducive to the formation of identification, as users do not merely observe media characters, but actively control them (Klimmt et al., 2009, p. 358). Indeed, studies have observed that media users identify more strongly with a character when they engage with interactive rather than linear media (e.g. Hefner et al., 2007; J.-H. Lin, 2013). The experience of a “merger of player and character identity” (Klimmt et al., 2009, p. 358) during identification can lead to strong emotions, especially in entertainment contexts, because users feel personally affected by situations the character faces. For example, players have reported stronger aggressive feelings when playing a violent video game if they have identified with the main character (J.-H. Lin, 2013).

Overall, both theory and empirical findings suggest that users of interactive media are more easily immersed in the depicted environments, social interactions or characters and perceive them (at least temporarily) as 'real' or rather non-mediated. These immersive experiences in turn increase affective responses to the media content.

4.4 Effects of Interactivity: Situational and Synergistic Interaction of Cognitive, Motivational, and Affective Processes

In line with the central assumption of communication science that the way in which a message is transmitted shapes its effects and how it is processed (Sundar et al., 2015, p. 47), the sections above have shown that cognitive, motivational and affective processes of media use are substantially affected by interactivity. The processes were discussed individually and in isolation

[5] However, definitions of social presence vary considerably in the literature (for a review: Cummings & Wertz, 2022).

in the sections above. However, media effects models suggest that such a strict separation of media use processes does not reflect the reality (e.g. Valkenburg & Peter, 2013). Firstly, it cannot be assumed that all the aforementioned processes are *always* active during media use. For example, an interactive feature that encourages intensive engagement with a medium's content may not necessarily represent an optimal challenge that induces flow. Secondly, it cannot be assumed that the processes are necessarily additive. Rather, the effects of interactive media are likely to result from the *synergistic* and *dynamic* interaction of cognitive, motivational and affective processes (e.g. Klimmt & Possler, 2021). This assumption is supported, on the one hand, by studies showing a close relationship between the processes of interactive media use (e.g. flow and spatial presence: Rodríguez-Ardura & Meseguer-Artola, 2016; Weibel & Wissmath, 2011). Thus, media use processes such as immersive experiences usually manifest on multiple levels and not exclusively on the cognitive, motivational or affective level. On the other hand, it has been shown that the various processes can lead to similar effects. An observed media effect may therefore result from the synergistic combination of multiple processes. For example, studies in entertainment research have repeatedly demonstrated that the two aforementioned motivational processes, which are shaped by interactivity—satisfaction of basic needs (Reinecke et al., 2014; Tamborini et al., 2010, 2011) and flow (Weibel & Wissmath, 2011)—are both closely related to enjoyment. Additionally, the high cognitive engagement that can occur during interactive media use has also been linked to enjoyment, as being highly cognitively engaged may serve as a welcome and effective distraction from everyday life (Reinecke et al., 2011). Finally, immersive media experiences—such as presence and identification—and the associated affective responses have likewise proven to be key foundations for enjoyment (for an overview, see: Possler, 2021, pp. 116-119). The various processes can thus complement each other in their effect on media users (see, in the context of entertainment: Klimmt & Possler, 2021).

5 Conclusion and Outlook: Interactivity as an Opportunity and Challenge for Media Use Research

The overview presented here highlights the far-reaching implications of the multifaceted construct of interactivity for the development of research questions and the ways of thinking and working in media use research. In the history of the discipline, the 'arrival' of interactivity as a feature of new media initially marked only an incremental challenge: interactivity had to be understood and studied in order to further develop theories, models, methods and bodies of knowledge – including those in media use research. This relatively minor programmatic step

seemed logical and obvious for communication science, given its traditional roots in conventional, linear mass communication. However, after several decades of digital media change, it must be concluded that minor adjustments to 'traditional' concepts of media use research are no longer sufficient to explain today's (and even more so, *tomorrow's*) highly interactive everyday media reality.

This becomes especially evident in the case of young media users and their fully digital media socialisation, which shows that interactivity has become a natural, almost necessary, element of even everyday media use that once appeared as linear mass communication (Beisch & Koch, 2021; Medienpädagogischer Forschungsverbund Südwest, 2021). For example, the use of algorithmically curated audio streaming services is similar to conventional radio use, but cannot simply be regarded as 'radio + a bit of interactivity', rather, it is something fundamentally new – completely focused on individual needs, motivations and decisions (→ IV.9 Media use in algorithmic environments). Consequently, it is no longer just incremental theoretical innovations that are needed, but entirely new theories and models to explain the users' interaction behaviour. These new theories and models must break away from a linear understanding of media, focus on inter- and intra-individual differences and personalised dynamics of media use instead of uniform reception processes (e.g. Kümpel, 2022; O'Sullivan & Carr, 2018). Metaprogrammatically, the *Differential Susceptibility to Media Effects Model* (Valkenburg & Peter, 2013) can serve as a guide: The theoretical conceptualisation of interactive media use can be revised along the lines of the dynamic relationships between media and user characteristics (as well as the usage contexts) outlined in the model. Such a theoretical innovation perspective would also involve a reorientation compared to the idea of linear mass communication. Specifically, the traditional perspective has always emphasized the dominating role of *media content and form* in the media use and effects process, given that media offerings were (more or less) identical for every audience member. In contrast, the perspective discussed here, which takes into account today's ubiquitous interactivity, would place the *individual* interacting with media and their *situation* at the center – down to the consideration of media effects at the granular level of individual persons (*N = 1 analyses*; Valkenburg et al., 2021). The selected, interactively controlled and individually personalised media offerings would then no longer be conceptualised as dominant constants, but as dynamic components for explaining person-specific media use processes and experiences.

This theoretical reorientation also poses new methodological challenges for the empirical description and explanation of the target variables of media use research in communication science (→ IV.9 Media use in algorithmic environments). As users increasingly turn to interactive

and personalised media, the investigation of media use processes becomes more challenging: It can neither be assumed that media offerings are uniform or static, nor that users encounter comparable content when using a given media offering. On the one hand, it is necessary to capture the qualities and sequences of content that are individually selected and assembled. On the other hand, process-oriented data collection methods are required that can measure interaction behaviour and its diverse correlates (e.g. in information processing). Useful approaches in this regard include measurements accompanying media use such as diary surveys (Bolger et al., 2003), situational surveys based on the (Mobile) Experience Sampling Method (Karnowski, 2013) or combinations of observation and think-aloud protocols (Bilandzic, 2012).

Finally, considering interactivity as the new focal point of digital media communication—which has been discussed here from the perspective of media use research—also raises paradigmatic questions that affect the entire field of communication studies. With the creation of new theories, models and methods, it seems necessary to modernise the traditional concept of mass communication, which is typically used as a comparative reference point. Even today, mass communication continues to be defined as a form of communication in which statements are conveyed publicly, indirectly and unilaterally to a dispersed audience via technical means of distribution (Maletzke, 1963). The phenomenon of uniform messages received by large audiences has undoubtedly not been eliminated by (highly) interactive media. However, interactivity has brought about a profound change that increasingly replaces the classic 'push logic'—media deliver an identical offer to a broad audience—with a 'pull logic': Users increasingly have the power to decide when, how, and in what form they use media, but also which direction they want to steer the content. With the rapid development and spread of artificial intelligence (AI) in media offerings, the interplay between recipient decisions and media responses will most likely lead to even higher degrees of individualisation and further development of messages that can hardly be planned by the original communicators (Sundar, 2020). For example, while computer-controlled characters in video games (non-playable characters, NPCs) typically offer a limited repertoire of interaction options (e.g. a few sentences with which they react to players), conversations with generative AI applications (e.g. chatbots such as *ChatGPT*) can evolve in ways that are virtually impossible to be planned in advance. Interactivity thus challenges the academic community to establish a new paradigmatic understanding that considers both communicators and recipients in actor and decision-maker roles.

Recommended reading

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