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Explaining Perceived Interactivity Effects on Attitudinal Responses

A Field Experiment on the Impact of External and Internal Communication Features in Digital Magazines

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Abstract: In the context of digital magazines, this study investigates why higher levels of perceived interactivity improve consumers' attitudinal responses, and which interactive features have the ability to elicit these stronger interactivity perceptions. To examine this, a field experiment was conducted in which participants ($n = 197$) used a digital magazine with either (a) external communication features (facilitating social interactions on external platforms, like Facebook), (b) internal communication features (facilitating social interactions within the digital magazine itself), or (c) no communication features. Results revealed that both feature types increased consumers' interactivity perceptions, but that the effects of the internal communication features were the strongest. Subsequently, mediation analyses revealed that the higher levels of perceived interactivity elicited stronger feelings of flow and enjoyment through which the positive findings of perceived interactivity on consumers' attitudinal responses can be explained.

Keywords: perceived interactivity, perceived enjoyment, flow experience, digital magazines

Digital magazines are commonly enriched by interactive features, such as hyperlinks and social media buttons (Rauwers, Voorveld, & Neijens, 2016). Implementing these features can make people evaluate the magazine as more interactive (i.e., increasing levels of perceived interactivity), which subsequently translates into more positive digital magazine attitudes (Sundar & Kim, 2005; Wu, 2005). However, theory is still lacking about why these effects actually happen.

Flow experience and perceived enjoyment have both been suggested in the literature as underlying mechanisms of the aforementioned perceived interactivity effects (Cyr, Head, & Ivanov, 2009; Van Noort, Voorveld, & Van Reijmersdal, 2012). Flow is a state of mind that can be experienced when being completely absorbed by an activity (Chen, Wigand, & Nilan, 2000; Csikszentmihalyi, 1975). Perceived enjoyment is a positive emotion elicited solely by the execution of an activity, regardless of any performance consequences (Davis, Bagozzi, & Warshaw, 1992; Kimiecik & Harris, 1996). Only the role of flow has been empirically tested before (Van Noort, et al., 2012); however, never in a real-life setting. This latter is important, as it has

been argued that forced exposure methods can alter interactivity outcomes (Tremayne, 2005). Therefore, this study uses a field experiment to examine the underlying mechanisms (i.e., flow experience and perceived enjoyment) of the effects of perceived interactivity on consumers' attitudinal responses within the context of digital magazines.

Another question that this study wants to address is which interactive features have the ability to make consumers evaluate the content as more interactive, since a higher number of interactive features does not automatically translate into stronger interactivity perceptions (Lee, Lee, Kim, & Stout, 2004; Voorveld, Neijens, & Smit, 2011). For instance, some interactive features that facilitate human-to-human interactions (i.e., human interactive features¹) increase consumers' interactivity perceptions (e.g., social media buttons), whereas others do not (e.g., a chat box; Voorveld et al., 2011). More specifically, two types of human interactive features can be distinguished: external and internal communication features (Rauwers et al., 2016). In the case of external features, all magazine-related social interactions take place on external platforms (e.g., the magazine's Facebook page), which enables both readers

¹ Another form of interactivity in digital content is medium interactivity: Interactive features that give users, to a certain degree, control over the content (e.g., hyperlinks; Chung, 2008). This form is not examined in this study.

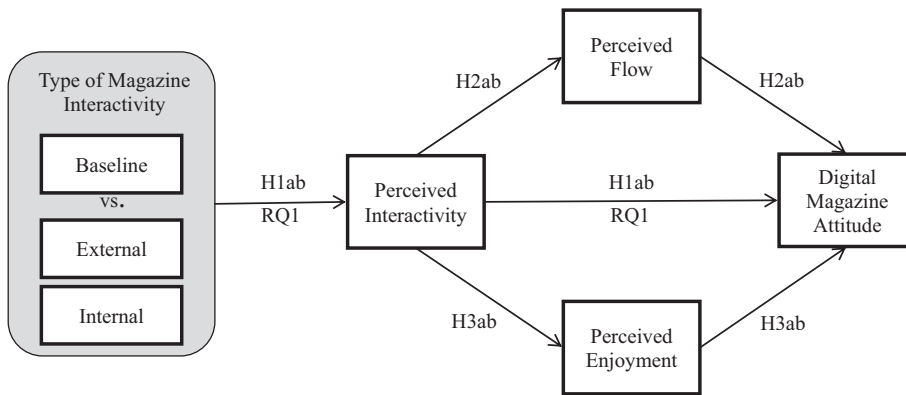


Figure 1. The study's hypotheses and research question visualized. The independent variable "magazine interactivity" has three categories: (1) baseline, (2) external, and (3) internal. All the analyses were performed with "baseline" as the reference category. The hypothesized mediations were tested for "baseline vs. external" and for "baseline vs. internal".

and non-readers of the magazine to participate in the online discussions. By contrast, in the case of internal features, all communications occur inside the digital magazine, and thus solely between magazine readers. Since currently little is known about the difference in effect between external and internal communication features in increasing consumers' interactivity perceptions, this study examines this as well.

In sum, this study contributes to the current theoretical knowledge on the role of perceived interactivity in two ways: (a) It examines the differences in effect between external and internal communication features on and through perceived interactivity, and (b) it tests whether flow experience and perceived enjoyment mediate the relationship between perceived interactivity and consumers' attitudinal responses (see Figure 1). This knowledge is also of value for digital content publishers, as it provides insights into whether adding human interactive features (i.e., external or internal communication features) in digital magazine content could improve consumers' reading experiences (i.e., by eliciting sensations of flow and enjoyment) and attitudinal responses toward the digital magazine.

Theoretical Background

The Mediating Role of Perceived Interactivity

The Difference Between Objective and Perceived Interactivity

Interactivity can be defined as "the technological attributes of mediated environments that enable [...] interaction[s] between communication technology and users, or between users through technology" (Bucy & Tao, 2007, p. 647). When examining its effects, it is necessary to make a distinction between *objective interactivity* (also known as

actual interactivity, or feature-based interactivity (Song & Zinkhan, 2008) and *perceived interactivity* (Voorveld et al., 2011; Yang & Shen, 2017). Objective interactivity can be measured by observing the number and type of interactive features that are placed within, for instance, a digital magazine, whereas perceived interactivity reflects consumers' *perceptions* about the level of interactivity (Voorveld et al., 2011; Wu, 2005).

The necessity to treat objective and perceived interactivity as separate constructs instead of using perceived interactivity simply as a manipulation check for objective interactivity is central for three reasons: First, adding more interactive features does not necessarily guarantee that users perceive the mediated environment as more interactive (Lee, et al., 2004; Song & Bucy, 2008). Several studies have discussed the unclear relationship between actual and perceived interactivity (e.g., Liu & Shrum, 2002; McMillan & Hwang, 2002), and some have empirically shown that not all interactive features contribute to user's interactivity perceptions (Lee et al., 2004; McMillan, 2002; Song & Zinkhan, 2008; Voorveld et al., 2011). Different explanations are given in the literature. Often it is argued that it seems that some interactive features are no longer able to affect interactivity perceptions because they have become so common. Furthermore, it is also argued that users' expectations, i.e., expected interactivity (Sohn, Ci, & Lee, 2007) make the difference. As people have certain expectations about the level of interactivity and the presence of interactive features, it is argued that probably only somewhat more unexpected functions affect interactivity perceptions (Voorveld et al., 2011). Second, a recent meta-analysis showed that perceived interactivity effects outweigh the effects of objective interactivity (Yang & Shen, 2017). Third, scholars have demonstrated that perceived interactivity mediates the relationship between objective interactivity and its outcomes (Song & Bucy, 2008; Wu, 2005). In conclusion, we believe it is important to manipulate objective interactivity (i.e., external and internal communication

features placed in a digital magazine) and measure the mediating role of perceived interactivity.

The Influence of External and Internal Communication Features on Digital Magazine Attitude Through Perceived Interactivity

An earlier study has revealed that digital magazines with either external or internal communication features are perceived as more interactive than those without these features (Rauwers et al., 2016). Research has shown that these higher levels of perceived interactivity could result in more positive attitudinal responses (Tan, Brown, & Pope, 2017; Van Noort et al., 2012), since perceived interactivity functions as a mediator in the relationship between objective interactivity and consumers' attitudinal responses (Song & Bucy, 2008; Wu, 2005). Therefore, in line with these findings, we hypothesize that both external and internal communication features have the ability to increase consumers' interactivity perceptions, and that this subsequently translates into more positive attitudinal responses toward the digital magazine (see Figure 1):

Hypothesis 1 (H1): The presence of (a) external or (b) internal communication features evokes feelings of perceived interactivity, which subsequently generates a more positive digital magazine attitude.

Besides, little is known about whether these effects on and through perceived interactivity differ in strength per type of interactive feature (external vs. internal). For instance, it can be argued that external communication features could elicit weaker interactivity perceptions than internal communication features, since all the social interactions take place on external platforms, such as Facebook. Consequently, users could ascribe the elicited interactivity perceptions to the external platforms instead of the digital magazine. To get a better understanding of the mediating role of perceived interactivity, the following research question is therefore posed:

Research Question 1 (RQ1): To what extent do the effects of external and internal communication features on consumers' magazine attitude through perceived interactivity differ in strength?

The Mediating Role of Perceived Interactivity Explained

In this study, two processes are identified that could potentially explain the mediating effects of perceived interactivity on consumers' attitudinal responses: (a) flow experience, and (b) perceived enjoyment. In the following, both paths will be described.

Flow Experience as Underlying Mechanism

Feelings of flow can be experienced when digital media users are so immersed in an online interactivity that little attention is left for anything else (Csikszentmihalyi, 1975; Hoffman & Novak, 1996). This state of mind can be elicited when consumers experience sensations of control, attention, curiosity, and feelings of interest toward the activity in question (Huang, 2006; Trevino & Webster, 1992; Webster, Trevino, & Ryan, 1993).

In the context of digital magazines, we expect that external and internal communication features can elicit the aforementioned sensations as long as consumers are at least aware of the presence of these features inside the digital magazine (i.e., increasing consumers' interactivity perceptions). First, both types of human interactive features can elicit a sense of *control* since they enable magazine readers to create own content (e.g., by writing comments). Second, people's *attention* can be aroused as the human interactive features enable them to communicate with other like-minded people (Hull & Lewis, 2014). Members of a magazine audience can be seen as like-minded since they share specific characteristics (e.g., age and gender) and interests (e.g., sports, fashion, cars; Consterdine, 2014). Third, human interactivity generates a constant flow of feedback (e.g., readers can reply to previous comments), which keeps magazine readers' *curiosity* awake. Fourth, owing to magazine readers' like-mindedness, readers are likely to be *interested* in sharing their thoughts about common interests with other readers.

Extrapolating from the above, we see that if consumers evaluate the magazine as more interactive by being aware of the implemented human interactive features, the presence of these features can bring consumers into a state of flow. Further, research has revealed that when people get into this flow state, this has a positive influence on their attitudinal responses (Van Noort, et al., 2012; Vermeir, Kazakova, Tessitore, Caubergh, & Slabbinck, 2014). Since we believe that digital magazines with external or internal communication features are evaluated as more interactive (H1), we therefore hypothesize that this will subsequently evoke feelings of flow, which ultimately improves consumers' digital magazine attitude (see Figure 1):

Hypothesis 2 (H2): The presence of (a) external or (b) internal communication features evokes feelings of perceived interactivity, which subsequently generates feelings of flow, and ultimately a more positive digital magazine attitude.

Perceived Enjoyment as Underlying Mechanism

A second underlying mechanism that could explain why perceived interactivity improves consumers' attitudinal

responses is perceived enjoyment. This positive emotion is elicited when people experience an activity to be enjoyable in its own right without taking its outcomes into account (Davis et al., 1992). More specifically, in the case of digital content, research has shown that online activities (e.g., reading a digital magazine) are perceived as more enjoyable when the content is evaluated as highly interactive (Cyr et al., 2009; Yang & Shen, 2017). Perceived interactivity can therefore be seen as an important predictor of task enjoyment.

Several studies have demonstrated that there is a strong, positive relation between perceived enjoyment and various evaluative outcomes, such as brand attitude (Segijn, Voorveld, & Smit, 2016) and website attitude (Childers, Carr, Peck, & Carson, 2001). However, the exact influence of perceived interactivity on these outcomes through perceived enjoyment has, to our knowledge, never been examined. Therefore, to test these mediation effects, the following hypothesis is formulated (see Figure 1):

Hypothesis 3 (H3): The presence of (a) external or (b) internal communication features evokes feelings of perceived interactivity, which subsequently generates feelings of enjoyment, and ultimately a more positive digital magazine attitude.

Method

Experimental Design

To test the study's hypotheses and research question, a field experiment was conducted with a one-factor (i.e., type of magazine interactivity) between-subjects design. There were three experimental conditions: (a) a condition with external communication features (i.e., external condition), (b) a condition with internal communication features (i.e., internal condition), and (c) one without human interactive features (i.e., baseline condition). The study was part of a larger project wherein participants used a digital magazine app for 8 weeks at home on their own tablet. After 3 weeks, participants received an email with a survey to collect the data for this study.

Participants Recruitment and Sample Size

Participants were recruited by Sanoma (one of the largest magazine companies in Europe) through social media and email. The cover story stated that Sanoma had developed a new Android magazine app, *The Digital Flair App*, and that they were looking for volunteers (18 years or older)

who were willing to test the Beta version of the app. In exchange, volunteers could freely use the magazine app for 8 weeks, and they would receive an access code for two additional digital magazines upon completion of a questionnaire. With this approach, more than 40,000 magazine consumers were reached. In total, 457 magazine consumers were willing to participate in our study, and were randomly assigned to our experimental groups. However, owing to dropouts ($n = 260$; see "Dropouts and Randomization Checks"), the final research sample consisted of 197 participants (97.5% female; $M_{\text{age}} = 40.42$, $SD = 10.46$): 62 in the external condition, 66 in the internal condition, and 69 in the baseline condition.

Stimulus Materials

Digital Flair App

For the purpose of this study, a magazine app was created called *The Digital Flair App*. Within this app, participants could read authentic issues of the Dutch *Flair*, which is a weekly magazine targeted at women between 25 and 45 years of age and is published by Sanoma. When participants logged onto the magazine app for the first time, they saw a tutorial that explained which interactive features were present in the digital magazine, and how they worked. After closing the tutorial, a digital "bookcase" popped up filled with *Flair* issues. By clicking on an issue, the content opened full screen and participants could start to read. Every week a new *Flair* issue was added to the bookcase, which was released on the same date that it also became available in real online stores. With this strategy participants were given the most optimal illusion that *The Digital Flair App* was a real magazine app that belonged to the magazine publisher Sanoma.

We decided to create our own magazine app, instead of using the already existing *Flair* app, because (a) this gave us the opportunity to install in-app analytic software inside the app, and (b) it enabled us to manipulate the type of magazine interactivity to create our three experimental conditions.

In-App Analytics

The installed in-app analytics were data trackers that traced down the user activities that were performed inside the magazine app. More specifically, they registered (a) which user had executed the activity, (b) the type of activity, (c) along with the date and time that this activity was performed. For instance, a registered user activity could appear as follows: ['USER9', 'OPENED_MAGAZINE', 'Flair1', '2016-04-04 10:08:20'], showing you the user that

performed the activity (USER9), the activity itself (opened magazine Flair1), and the date and time on which the activity was executed (on April 4, 2016 at 10:08:20). All these data were automatically stored in an online database. The inclusion of these in-app analytics was an important prerequisite of our field experiment, as this enabled us to “see” what people actually did inside the magazine app, without being physically there.

Manipulating Type of Magazine Interactivity

When participants had opened a *Flair* issue, the content of the magazine was automatically loaded in a “baseline interactive layout.” This baseline interactive layout consisted of the following non-human interactive features: zoom function, hyperlinks, navigation bar, and page orientation function (i.e., reading the magazine in either landscape or portrait). These features are commonly used in current digital magazines, as they increase the readability of the magazine content, but they do not facilitate any form of social interactions. This baseline interactive layout was present in all the three experimental groups of this study. Further, the presence of human interactive features was manipulated across conditions by the addition/omission of external and internal communication features. This resulted in the following three conditions:

The Baseline Condition

No human interactive features were implemented in this condition (see Figure 2).

The External Condition

The following cluster of external communication features was implemented in this condition: a Mail button, a Share button, and a Facebook button (see Figure 3). The Mail button enabled participants to directly contact the (fictive) magazine editorial board by email. By clicking on the button, the default email client opened, and a new email was crafted with the recipient email address (of the editorial board) filled in. The Share button allowed participants to share separate magazine articles with others via Facebook, Twitter, or by mail. The button included a live counter that displayed the amount of times an article had already been shared. The Facebook button enabled participants to take part in magazine content related discussions on the magazine’s (fictive) Facebook page. In addition, to let participants fully experience the functionality of the external communication features, we raised the scores of several article Share buttons (i.e., pretending that some magazine articles had already been shared a couple of times), and we created some fictive comments on the magazine’s Facebook page.

Internal Condition

The following cluster of internal communication features was implemented in this condition: a Poll button, a Comment button, and a Like/Dislike button (see Figure 4). The Poll button was attached to four articles in each *Flair* issue. Once participants opened an article with a Poll button, a small pop-up window appeared in the bottom right-hand corner of the screen, which could be easily clicked away or it disappeared after 3 s. In this window, a question was

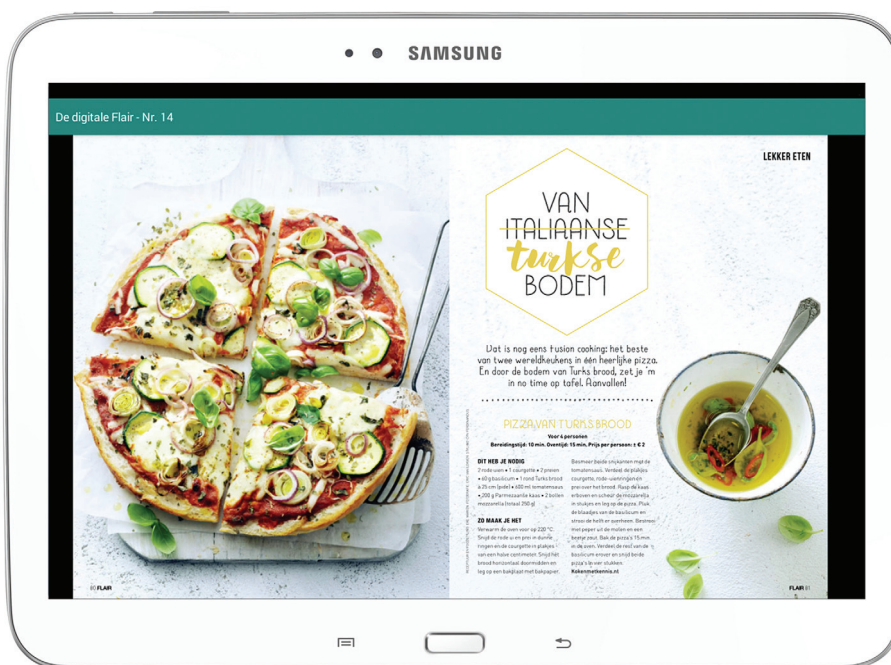


Figure 2. The baseline condition.

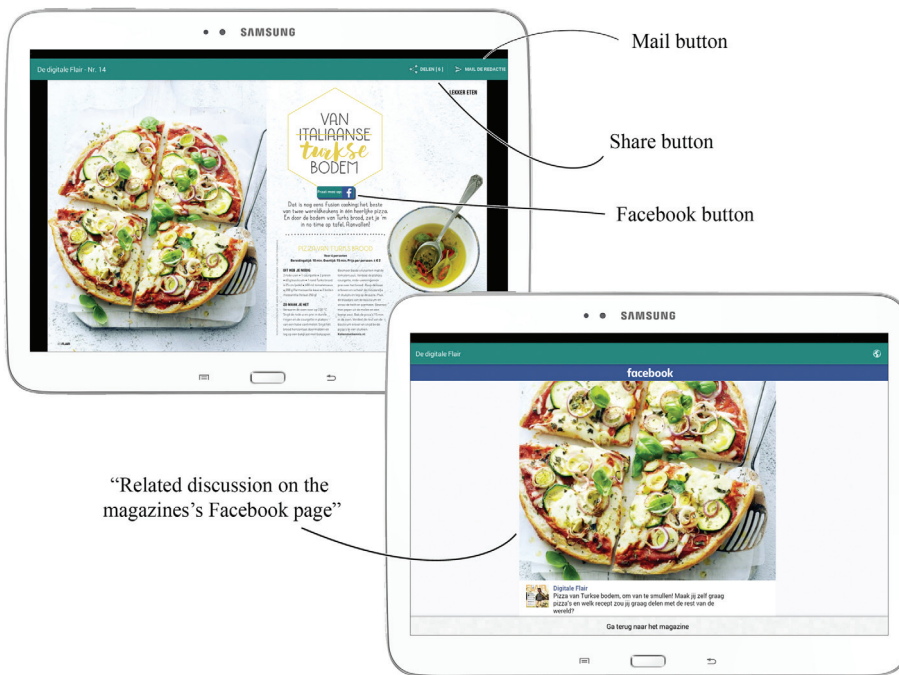


Figure 3. The external condition

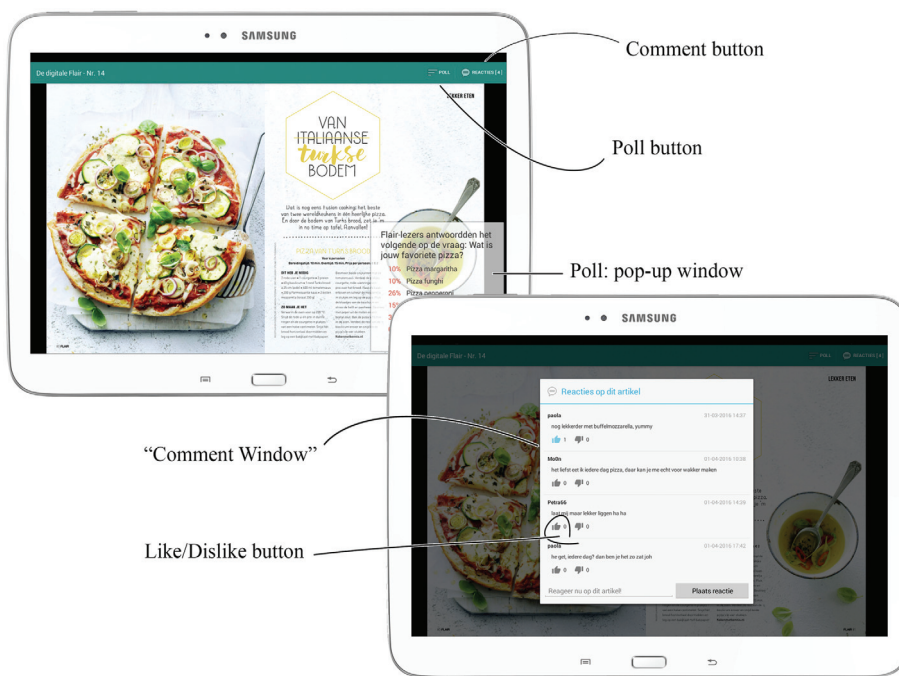


Figure 4. The internal condition.

posed related to the magazine article combined with several answer possibilities. After answering the poll, participants were able to see how other people had voted, and from then, the poll no longer automatically appeared. The Comment button enabled participants to discuss the content of a specific magazine article with other readers. If participants clicked on the button, a Comment Window appeared. Within this window, participants could read the comments

of other users, reply to them, or write their own commentaries. The button included a live counter that displayed the amount of comments that were placed within the Comment Window. Within the Comment Window, the Like/Dislike button enabled participants to either “like” or “dislike” a user’s comment, and it displayed the number of “likes” and “dislikes” the comment had already generated. In addition, to give participants the most complete

experience with *The Digital Flair App*, some internal communication interactions were made up by the researchers. More specifically, for several magazine articles, comments of fictional magazine readers were placed within the Comment Window combined with fake likes/dislike, and we had also already “answered” the Poll question a couple of times before participants were exposed to it.

Procedure

People who wanted to participate in our study provided an informed consent, and filled in a short survey wherein the study’s control variables and participants’ demographics were measured. Next, on the same day, all participants received an email with detailed instructions and a link to *The Digital Flair App*. Participants were asked to install the magazine app on their tablet, and to use the app regularly during the following 8 weeks. They were also informed that after 3 weeks they would receive a survey with questions about their experiences with the magazine. Further, if they did encounter any problems, they could contact the researcher for additional help.

To make it more likely that participants remained involved during the experiment, every week an email was sent by Sanoma when a new issue of *Flair* had been released inside the magazine app. After the third week, participants received an email with a link to the questionnaire. Questions were displayed in the following order: perceived interactivity, perceived enjoyment, perceived flow, and digital magazine attitude. Participants who did not complete the questionnaire after 4 days received a reminder, and after 7 days the questionnaire was closed. The procedure of this study was approved by the Ethics Committee of the Faculty of Social Sciences, University of Amsterdam.

Measures

Digital Magazine Attitude

Digital magazine attitude was measured with four items on a 7-point semantic differential scale. The bipolar ends were *not useful/useful*, *not valuable/valuable*, *not diverting/diverting*, and *unpleasant/pleasant* (Crites, Fabrigar, & Petty, 1994; Keer, Van Den Putte, & Neijens, 2010; $\alpha = .88$; $M = 5.47$, $SD = 0.91$).

Perceived Interactivity

Perceived interactivity was measured with two items on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*) that completed the statement “When I was reading the digital *Flair* ...” The items were: “I got the feeling that the digital magazine wanted to stimulate social interaction,” and “I experienced the digital magazine as

interactive” (Liu, 2003; McMillan & Hwang, 2002; $r = .77$; $M = 4.43$, $SD = 1.56$).

Flow Experience

Flow experience was measured with four items on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*) that completed the statement “When I was reading the digital *Flair* ...” The items were: “I felt totally captivated,” “Time seemed to pass very quickly,” “I just forgot everything around me,” and “I was totally focused on the magazine” (Barzilai & Blau, 2014; Novak, Hoffman, & Duhachek, 2003; $\alpha = .93$; $M = 4.42$, $SD = 1.37$).

Perceived Enjoyment

Perceived enjoyment was measured with five items on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*) that completed the statement “I would describe my experience with the digital *Flair* as ...” The items were: “interesting,” “a boring activity” (rev), “amusing,” “a waste of time” (rev), and “enjoyable” (Tauer & Harackiewicz, 1999; $\alpha = .89$; $M = 5.49$, $SD = 0.92$).

Control Variables, In-App Analytics, and Randomization Checks

A number of control variables were tested, to check whether the effects of our independent variable were not caused by other differences between our experimental conditions. More specifically, app installment and app usage were measured with our in-app analytics, whereas power usage (see below), previous *Flair* reading behavior, and demographics were tested with our survey.

To analyze the large number of data collected by our in-app analytics, several Python scripts were written. App installment was determined by whether or not a participant had opened *The Digital Flair App* (0 = *no*, 1 = *yes*, % that had installed the app: 54.6). App usage reflected the time in seconds that a participant had spent using *The Digital Flair App* ($M = 4,255.31$, $SD = 4072.87$).

With our survey, power usage – “a user’s motivation, efficacy, expertise, and demonstration of evolved technology” (p. 305; Marathe, Sundar, Bijvank, van Vught, & Veldhuis, 2007) – was measured with seven items on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). The scale included items such as: “I like to try out the different functions of digital devices” and “I find it easy to use digital devices” (Marathe et al., 2007; $\alpha = .85$; $M = 5.42$, $SD = 1.33$). Previous *Flair* reading behavior was measured on a 5-point scale by posing the question “How often do you read the *Flair*? (print or digital)”, which was adapted from Lee, Hornik, and Hennessy (2008). Answer categories were: (1) never, (2) once a year, (3) once or twice a month, (4) at least once a week, or (5) (nearly) daily ($M = 2.62$; $SD = 1.04$). Next, participant’s age, gender, and educational attainment were measured.

Table 1. Effects of type of magazine interactivity on magazine attitude through perceived interactivity

Type of magazine interactivity	Indirect effect <i>b</i> (<i>SE</i>)	Effect of magazine interactivity on perceived interactivity <i>b</i> (<i>SE</i>)	Effect of perceived interactivity on magazine attitude <i>b</i> (<i>SE</i>)
External (Baseline) ^a	.22(.08) [.085; .384] ^b	1.48(.24)***	.15(.05)**
Internal (Baseline) ^a	.31(.09) [.132; .497] ^b	2.08(.23)***	...

Note. ^aReference category. ^b95% BCBCI. ... = the same scores as above. **p* < .05. ***p* < .01. ****p* < .001.

Results

Dropouts and Randomization Checks

The in-app analytics revealed that from the people who were willing to participate in our study ($N = 457$), 208 participants had not installed *The Digital Flair App* on their tablet. Another 38 participants dropped out, as they had not filled in the study's questionnaire. Of the remaining 211 participants, 14 had to be excluded from further analyses as our in-app analytics revealed that they had not used the app for at least 5 min.² Thus, in total, there were 260 dropouts, leaving a final sample of 197 participants. Analyses showed that this final sample of 197 participants did not differ from the dropouts with respect to age, $F(1, 455) = 0.12, p = .73$, gender, $\chi^2(1) = 0.32, p = .57$, education attainment, $F(1, 455) = 1.17, p = .28$, power usage, $F(1, 455) = 0.16, p = .66$, or previous *Flair* reading behavior, $F(1, 455) = 3.28, p = .07$. It was also checked whether these dropouts affected the randomization of our experimental groups. The results revealed that the remaining participants in the experimental groups ($n = 197$) did not differ with respect to age, $F(2, 194) = 1.17, p = .31$, gender, $\chi^2(2) = 4.86, p = .09$, education attainment, $F(2, 198) = 0.24, p = .78$, power usage, $F(2, 194) = 0.56, p = .58$, previous *Flair* reading behavior, $F(2, 194) = 0.40, p = .68$, or time spent using the app, $F(2, 194) = 1.32, p = .27$. Randomization was therefore considered successful.

The Mediating Role of Perceived Interactivity

To test whether the presence of external (H1a) or internal (H1b) communication features positively affected consumers' digital magazine attitude through perceived interactivity, mediation analyses were performed using Hayes' (2017) PROCESS v 3.2 macro Model 4 (5000 bootstrap samples). To examine the differences between our three manipulated digital magazine types (baseline vs. external vs. internal), we created two dummy variables. The condition in which no human communication features were integrated functioned as the reference category (see Table 1).

Mediation Effects Through Perceived Interactivity

The results of PROCESS revealed that, compared with the baseline, the presence of external communication features had a positive indirect effect on consumers' digital magazine attitude through perceived interactivity ($b = .22, SE = 0.08, 95\% CI [0.085, 0.384]$). Also, a significant effect ($b = .31, SE = 0.09, 95\% CI [0.132, 0.497]$) was found for the presence of internal communication features. Hence, both external and internal communication features elicited increased feelings of perceived interactivity, which subsequently had a positive influence on consumers' digital magazine attitude. These findings were in support of Hypotheses 1a and 1b.

External Versus Internal: Comparing the Strength of the Indirect Effects

To answer Research Question 1, we compared the strength of the found indirect effects of external communication features versus the baseline condition and internal communication features versus the baseline condition on digital magazine attitude through perceived interactivity. The coefficients of the indirect effects show a slightly stronger effect of internal communication features on perceived interactivity ($b = .31$) than of external communication features ($b = .22$). Results revealed that the magazine with the internal communication features was perceived the most interactive ($M = 5.17, SD = 1.04$), followed by the one with the external communication features ($M = 4.57, SD = 1.36$), and lastly, the one without communication features ($M = 3.09, SD = 1.59$). Hence, both feature types make consumers evaluate the magazine as more interactive. However, since this effect is somewhat stronger for internal than for external communication features, this could indicate why the indirect effects through perceived interactivity are more pronounced for internal than for external communication features.

The Mediating Role of Perceived Interactivity Explained

To explain the underlying mechanisms through which perceived interactivity mediates interactivity effects on

² A short pretest revealed that participants had to spend at least 5 min in the magazine app to read the magazine tutorial and to get a sufficient impression of the magazine.

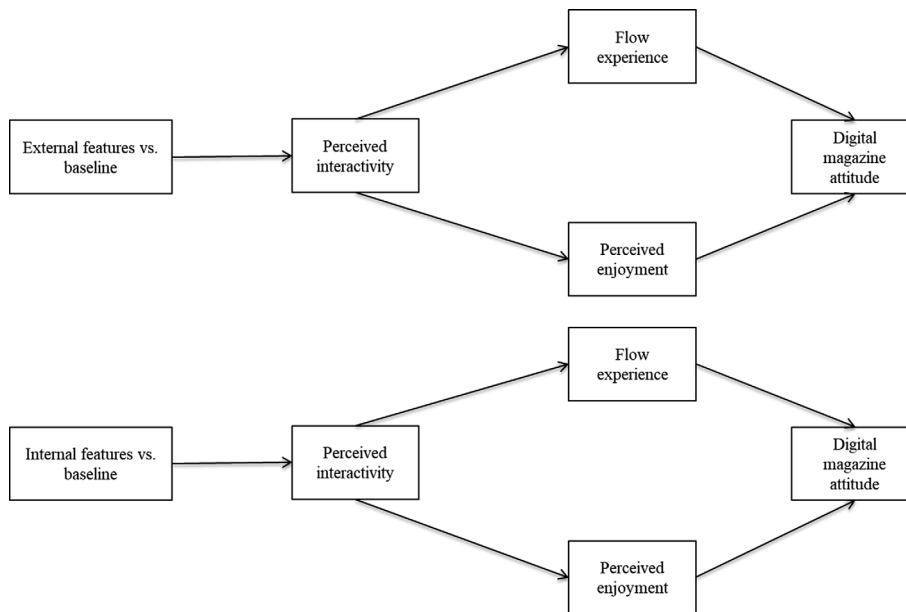


Figure 5. Model tested.

Table 2. Indirect effects through flow experience and perceived enjoyment

Type of magazine interactivity	Flow experience		
	Via perceived interactivity and flow <i>b</i> (<i>SE</i>)	Via flow <i>b</i> (<i>SE</i>)	Via perceived interactivity <i>b</i> (<i>SE</i>)
External (Baseline) ^a	.071 (.04) [.010; .148] ^b	-.031 (.07) [-.166; .099]	.084 (.05) [-.008; .189]
Internal(Baseline) ^a	.100 (.05) [.015; .210] ^b	-.176 (.08) [-.344; -.036]	.118 (.07) [-.011; .252]
Type of magazine interactivity	Perceived enjoyment		
	Via perceived interactivity and enjoyment <i>b</i> (<i>SE</i>)	Via enjoyment <i>b</i> (<i>SE</i>)	<i>b</i> (<i>SE</i>)
External (Baseline) ^a	.060 (.03) [.005; .139] ^b	-.126 (.07) [-.280; .008]	...
Internal(Baseline) ^a	.088 (.04) [.008; .185] ^b	-.129 (.07) [-.296; .003]	...

Note. ^aReference category. ^b95% BCBCI. ... = the same scores as above. * $p < .05$. *** $p < .001$.

attitudinal responses, flow experience (H2) and perceived enjoyment (H3) were tested for their explanatory power. Hayes' (2017) PROCESS macro Model 81 (a model for three or more mediators, both in parallel and in series; 5,000 bootstrap samples) was used to test our proposed serial mediations in one model (see Figure 5).

Serial Mediation Through Flow Experience and Perceived Enjoyment

In our hypotheses we proposed that the presence of either (a) external or (b) internal communication features would elicit feelings of interactivity, which subsequently leads to a stronger flow experience (H2), and stronger perceived enjoyment (H3), and ultimately to a more positive digital magazine attitude. To test this assumption, we ran Model 81 with two dummy variables. The condition in which no human communication features were integrated functioned as the reference category. In these analyses, perceived

interactivity functioned as the first mediator, flow experience and perceived enjoyment as the second set of mediators, and digital magazine attitude as the dependent variable.

With regard to flow experience, PROCESS revealed a positive indirect effect for both external and internal communication features on digital magazine attitude through perceived interactivity and flow experience ($b = .07$, $SE = 0.04$, 95% CI [0.010, 0.148] and $b = .10$, $SE = 0.05$, 95% CI [0.015, 0.210], respectively, see Table 2). More specifically, compared with the baseline, the presence of external or internal communication features resulted in stronger interactivity perceptions, which subsequently enhanced feelings of flow, and this ultimately generated a more positive digital magazine attitude. Hypotheses 2a and 2b were thus supported.

With regard to perceived enjoyment, PROCESS demonstrated a positive indirect effect for both external

and internal communication features on digital magazine attitude through perceived interactivity and perceived enjoyment ($b = .06$, $SE = 0.03$, 95% CI [0.005, 0.139] and $b = .09$, $SE = 0.04$, 95% CI [0.008, 0.185], respectively, see Table 2). More specifically, compared with the baseline, the presence of external or internal communication features resulted in stronger interactivity perceptions, which subsequently increased perceptions of enjoyment, and this ultimately resulted into a more positive digital magazine attitude. Thus, Hypotheses 3a and 3b were supported.

Conclusion and Discussion

In a field experiment we studied the effects of adding interactive features that facilitate social interactions between magazine readers on consumers' attitudes toward the magazine. First, we examined whether the effects of two types of communication features (external and internal) on and through perceived interactivity differ in strength. Results revealed that both types increased consumers' interactivity perceptions, that this subsequently enhances consumer attitudes toward the magazine, and that this effect was somewhat stronger for the internal communication features. This implies that both interactive feature types are of value to increase consumers' interactivity perceptions and to improve their attitudinal responses, but that these effects are the strongest for internal communication features.

Second, we studied why these interactive features could improve consumers' attitudinal responses via perceived interactivity, by testing the explanatory power of two potential underlying mechanisms: flow experience and perceived enjoyment. A mediation analysis with mediators operating both in parallel and in series demonstrated that both mechanisms underlie the effects of perceived interactivity induced by the communication features on consumers' attitudinal responses.

Theoretical Implications

With this study, several important contributions are made to the existing literature regarding interactivity effects. To start with, this study delivers important insights into the stream of literature aiming to disentangle which interactive features are able to increase consumers' interactivity perceptions (e.g., Voorveld et al., 2011), by examining this for both external and internal communication features. The study's findings suggest that although the interactive goal of the interactive features is identical (i.e., facilitating

social interactions between magazine readers), this does not automatically mean that these features also generate identical effects. In other words, this study provides substantive evidence for the claim that human interactive features need to be subdivided into different types, such as those facilitating external versus internal communication (Rauwers et al., 2016). The different effects of these features probably can be explained by the fact that these features facilitate social interactions at different locations. In the case of external communication features, all social interactions happen on external platforms, such as Facebook; whereas in the case of internal communication features, all communication takes place within the digital magazine itself. Consequently, this suggests that the location of the interactivity could play a crucial role in determining the strength of the interactivity effects. For instance, it could be argued that in the case of the external communication features, not all the elicited interactivity perceptions will be linked to the digital magazine, as a part of the interactivity could also be ascribed to the external platforms (e.g., Facebook). Other characteristics of the features included in this study could also play a role, since the external features included a Poll button, a Comment button, and a Like/Dislike button, and the internal features consisted of a Mail button, a Share button, and a Facebook button. To gain further insight, further comparative research between different types of external and internal communication features is required.

Second, the findings of this study contribute to the creation of a theoretical model to gain a better understanding of why higher levels of perceived interactivity generate more positive attitudinal responses. This knowledge is valuable, since previous research has already shown that perceived interactivity improves consumers' attitudinal responses (Sundar & Kim, 2005; Wu, 2005), but theoretical explanations for these effects were missing. In this study, two explaining mechanisms have been identified: flow experience and perceived enjoyment. The study's results revealed that both mechanisms underlie the effects of perceived interactivity on consumers' attitudinal responses. Thus, placing interactive features into a digital magazine makes people evaluate the magazine as more interactive, which then translates into higher levels of flow and enjoyment, which ultimately elicits more positive attitudes toward the magazine.

Limitations and Suggestions for Future Research

We believe that an important contribution of the current study to the explanation of interactivity effects lies in the

fact that this is a real-life field study with a sample of respondents representative of the target group (people interested in magazines, more specifically magazines like *Flair*). This has the advantage of a higher external validity compared with laboratory experiments with forced exposure and a student sample. However, cross-sectional research comes with the risk of a somewhat reduced internal validity as the researchers do not have full control over the use of the application by the respondents and confounding influences might be at play. However, we could check the use of the application to some extent through the in-app analytics, and we have no reason to believe that confounding factors played a significant role.

In these further studies the choice of other contexts than digital magazines (e.g., digital newspapers, online news sites) will help us understand to what extent the type of medium (e.g., entertainment vs. news, general vs. special interest) and platform play a role in the use, processes, and effects of interactive features. Furthermore, the developed theoretical model for perceived interactivity effects in this study has only been tested for human interactive features. Besides human interactive features, there is also another type of features that can be implemented in digital content, namely, medium interactive features (Chung, 2008; Stromer-Galley, 2000). Medium interactive features facilitate interactions between user and device by giving users, to a certain degree, the control over the presentation of the digital content (e.g., via photo galleries or movie clips) or the content flow (e.g., via hyperlinks). Consequently, this raises the question of whether the theoretical model found in this study is also applicable to these features. Future research is needed on this topic and could also include a study of how intensity of feature use (see also Liu & Shrum, 2009; Rauwers, Voorveld, & Neijens, 2018) influences interactivity effects.

Another issue that needs more examination is how interactivity effects develop over time. Our causal model hypothesizes that the dependent variables (DVs) are affected through the mediators that represent the underlying processes. The causal model does not specify the time course between exposure, processes, and DVs, only that the mediators will manifest themselves after exposure and that the DVs will manifest themselves after the mediators. We assume that these processes take some time, hence we have applied a period of 3 weeks. The tests we performed (post-measurements without specification of the length of the period of the processes) – common in non-experimental causal (cross-sectional) research – confirmed our theoretical assumptions. The mediating variables could have been measured at a Time 2 (e.g., after 4 weeks of using the app) and the dependent variable at a Time 3 (e.g., at 8 weeks). In this way, a causal sequence could be established

between the mediating variables and the dependent variable. Further insight into the causal processes can be gained by including the variable “last time use of the app” in the analysis.

An investigation of a longer process of interactivity effects can also give more insight into the process of how long the interactivity effects last. More specifically, it has been argued that consumers who have become too familiar with the interactive features, will no longer perceive the features as interactive – or to a lesser extent, which will subsequently result in a decrease of perceived interactivity effects (Voorveld, et al., 2011). In an attempt to rule out this potential novelty effect, participants of this study were given 3 weeks to first get familiar with *The Digital Flair App* and its interactive features, before they had to fill in the study’s questionnaire. However, more research is needed to examine the power and duration of the perceived interactivity effects over time.

A final concern is the measurement of flow. In line with previous research (see Hoffman & Novak, 2009 for a comprehensive overview) we applied a retrospective measure. Whereas earlier studies also measured flow retrospective (e.g., in Novak et al., 2003: “Can you recall a time where you experienced flow when using the Web?”), and some measured flow without referring to specific usage moments (Bridges & Florsheim, 2008), it might have been difficult for our participants to give a summary of their flow experiences in several sessions of user activity.

Practical Implications

The outcomes of this study provide publishers of online content with several interesting insights. First, this study shows that adding human interactive features (i.e., external and internal communication features) to digital content positively affects consumers’ reading experiences. The reason is that the presence of these interactive features makes consumers evaluate the content as more interactive, which subsequently evokes an increased state of flow and feelings of enjoyment.

Furthermore, this study also demonstrates that both external and internal communication features improve consumers’ attitudinal responses toward the digital content, but that the effect strength differs per type of interactive feature. More specifically, internal communication features have a substantial stronger impact on consumers’ attitudinal responses via perceived interactivity than when external communication features are used. Hence, both feature types are of value to implement in digital content, but when a choice needs to be made, internal has to be preferred over external as these features elicit the strongest persuasive effects.

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