

# Another dark side of gamification? How and when gamified service use triggers information disclosure

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**Abstract.** The increasing deployment of gamification in the digital service landscape has caught the attention of practitioners and marketers alike. Alarming, most of the empirical research has established bright side effects of gamified service use but neglected potential dark side consequences. As users engage with gamified apps, they might get so involved that they are more likely share private information with firms, threatening own personal information privacy. Against this background, the present study links motivational experiences of gamified services to information disclosure and shows that if a gamified service conveys experiences of social comparison, it can indeed lead to increased information disclosure. This effect is explained by increased loss of self-consciousness (i.e., when concerns about one's self drift out of the focus of the user's attention). Counter to the authors expectations, the authors do not find this effect when the gamified service triggers action-awareness merging (i.e., when users act spontaneously without conscious effort).

**Keywords:** Gamification, Information Disclosure, Flow Theory, Engrossment

## 1 Introduction

To keep users engaged with their offerings and services, firms increasingly build on gamification, which is broadly understood as aiming at creating motivational experiences (e.g., achievement or competition) by enhancing non-game services with game-like affordances (e.g., badges or leaderboards) [1, 2]. The maturing research field of gamification (see Koivisto and Hamari [3] for a comprehensive review) has mostly focused on behavioral outcomes which are either beneficial for the user engaging with the service (e.g., improved learning [4] and skill development [5], increased physical activity [6]) or for the firm providing such services (e.g., increased customer commitment [7], word of mouth behavior [8], and new product adoption [9]). Findings on negative behavioral outcomes of gamification, however, are scarce [3].

A recent literature review by Koivisto and Hamari [3] suggests that this imbalance might be a biased result of researchers focusing on behavioral outcomes that are directly related to the task that users engage in (e.g., learning a language using a gamified app) [3]. In other words, prior research shows that gamification works and represents a powerful tool to more intensively involve service users in performing a wide variety of tasks

[3, 10]. However, just focusing on these beneficial outcomes of engaging a user with the task at hand through gamification might represent a shortsighted view. In particular, while being highly concentrated and experiencing enjoyment when being engaged in the focal activity (i.e., when entering a state of flow [11]), users might drop their guard and engage in risky behaviors that are unrelated to the focal activity [12]. In this research, we investigate whether gamification can lead to behavior that threatens users' personal information privacy.

The above reasoning is grounded in the fact that many service providers rely on revenues from targeted advertising to keep their services free to use [13]. Against the background of governmental regulations, marketers are required to seek a user's permissions before using personal information for advertising purposes [14, 15]. Importantly, service providers appeal to users with the promise to provide more relevant advertising in return for disclosing private information (e.g., the user's current location) [13, 16]. Thus, we refer to *information disclosure* as all information a user shares with a service provider for the purpose of using the focal service [12]. This information may include location data or social media friend lists.

This study contributes to research that broaches the dark sides of gamification [3, 17] because we investigate whether engaging with gamified services can lead to increased information disclosure. We first build on flow theory to understand whether the engrossment (i.e., the concentration of one's entire affective, cognitive, and physical resources on the task at hand) with a gamified service impacts information disclosure [18]. This helps us to understand whether gamification-induced engrossment determines whether a user drops his/her guard (in terms of disclosing private information to the service provider). Finally, we examine how motivational user experiences arising in the context of gamified services trigger the two focal engrossment dimensions.

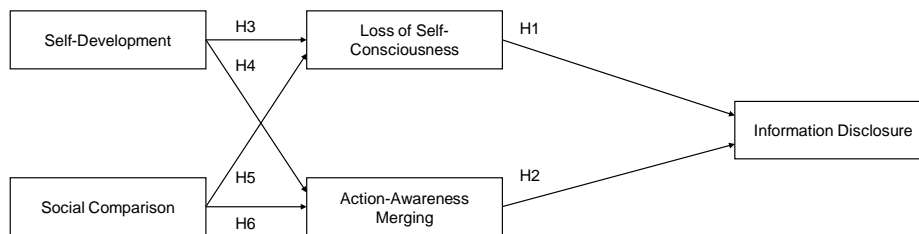
## 2 Research Model

Figure 1 depicts the research model, which we briefly outline in the following. The objective of this research is to explore whether gamification triggers information disclosure behavior. The model builds on the conceptualization of gamification by Hamari, Koivisto, and Sarsa [10] to explain how enhancing gamified services with affordances to trigger motivational experiences (i.e., self-development and social comparison) can evoke psychological outcomes relating to engrossment occurring during service use (i.e., loss of self-consciousness and action-awareness merging), and further drive undesired behavioral outcomes (i.e., information disclosure).<sup>1</sup> Our research model thus focuses on information disclosure as the key dependent variable and self-development and social comparison as the key independent variables. We focus on two dimensions of flow that have been highlighted in service marketing research [18] and typically arise in the context of gamified services (i.e., loss-of-self-consciousness and action-awareness merging) as mediating variables for the relationship between motiva-

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<sup>1</sup> See below for definitions of the focal constructs.

tional experiences and information disclosure. This section develops the study’s theoretical foundation of the variables contained in the model and the theoretical reasoning for the relationships between them.



**Fig. 1.** Research Model

## 2.1 The Impact of Flow on Information Disclosure

Flow theory is useful to explain the process of how motivational experiences stemming from gamified services might translate into information disclosure. *Flow* generally refers to a psychological state of deep involvement and absorption that in its core describes how individuals become so deeply concentrated on a task that they are not aware of themselves being separate from it [11, 18, 19]. Flow literature oftentimes describes the different levels of flow as ranging from engagement via engrossment to total immersion with a focal task [18, 20]. However, it is unlikely, that users become totally immersed when engaging in tasks such as language learning when using a gamified service [21]. We thus focus on the engrossment dimension of flow because it represents the core of flow as it occurs in the context of service consumption [18]. *Engrossment* is defined as the intense state of consciousness in which one’s entire affective, cognitive, and physical resources are totally invested in the task at hand [22].

Among others, engrossment encompasses two dimensions that may explain why users become so absorbed in using a digital service that they disclose private information to the firm. First, *loss of self-consciousness* refers to how concerns about one’s self are shifted out of the focus of the user’s attention [18, 19]. In other words, any disturbing and concerning thoughts during service use fade away when being fully concentrated on the task at hand. Second, *action-awareness merging* refers to users acting spontaneously without conscious effort [18, 19]. For instance, when an app motivates users to engage in a certain task (e.g., language learning), the dualism between user and activity vanishes. In this state, users experience a unified consciousness, which might make “real-world risks” less salient to the user. Thus, loss of self-consciousness and merging between actions and awareness while using a digital service may promote more negligent behavior in terms of sharing private information with a service provider. Importantly, loss of self-consciousness and action-awareness merging describe a state of mind where the intensive experience of engaging in the focal activity promoted by the gamified service may lead to the suspension of negative consequences of one’s behavior [18]. Thus, there is no psychic energy left (i.e., cognitive depletion) for distractions

unrelated for the focal activity [4]. We thus argue that users who are engrossed in gamified service use are more susceptible to disclose private information to firms when being prompted to do so, because privacy risks are less salient. Thus:

**H1:** Loss of self-consciousness has a positive impact on information disclosure.

**H2:** Action-awareness merging has a positive impact on information disclosure.

## 2.2 The Impact of Motivational Experiences on Engrossment

Two major motivational experiences that typically occur in the context of gamified service use are self-development and social comparison [3, 4, 7, 21, 23]. *Self-development* relates to the motivation to engage in a task with the intention to continually improving one's own abilities and valued skills to master everyday life [7, 24]. In the context of digital services, it is enhanced by affordances such as badges or medals that give users feedback to help them to reach goals and ultimately convey perceptions of achievement, being challenged, and making progress [3, 23]. Being continuously challenged by a task is likely to drive engrossment with a gamified service, for instance, if users develop language skills by using a language learning app to meet demanding challenges like answering quizzes that continuously increase in difficulty [4]. *Social comparison* on the other hand relates to being motivated to engage in a task to gain recognition by benchmark one's own abilities and accomplishments with others [7, 25]. In the context of digital services, social comparison can be fostered by affordances for comparing oneself to other users with performance-based rankings or leaderboards [3, 23]. Prior research suggests that experiences of social comparison increase the time spent with a task [26, 27] and intensifies the level of engagement with gamified services [8, 28]. Thus:

**H3 (H4):** Self-development has a positive effect on loss of self-consciousness (action-awareness merging).

**H5 (H6):** Social comparison has a positive effect on loss of self-consciousness (action-awareness merging).

## 3 Research Design

In order to test the theoretical model and compare the differences in information disclosure behavior in the context of gamified applications, we used an experimental survey method [29]. We decided to use a mental-based experiment with hypothetical applications, because it is efficient in the conduction and represents an established approach in information disclosure research [12]. Further, controlled, experimental research settings are recommended for gaining knowledge on the actual behavioral consequences of gamification [3].

### 3.1 Measures

The theoretical constructs of the research model have been operationalized using established scales from prior research and were adapted to the context of this work. The

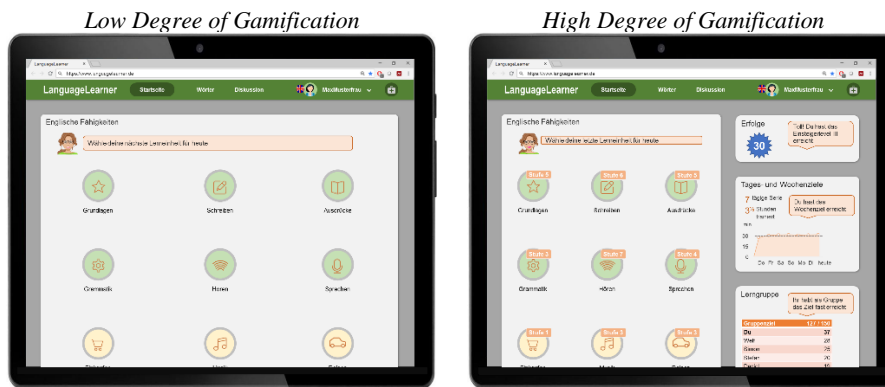
items were then translated into German and crosschecked by the authors. All measures were worded as statements. Seven-point Likert scales ranging from 1 = strongly disagree to 7 = strongly agree were used to measure most items. All constructs were of reflective nature. The research scales are depicted in Table 1.

**Table 1.** Measures

<b>Construct</b>	<b>Item</b>	<b>Source</b>
Information disclosure	For the LanguageLearner, I will provide the following information for further processing and usage: ... my friend list from my social media account. ... my app usage behaviour for further processing and usage.	[12]
Self-development	The app helps me to ... ... reach my objectives. ... develop myself.	[23]
Social comparison	The app helps me to ... ... compete with others. ... rival with others.	[23]
Action-awareness merging	While using the Language Learner, ... ... I acted correctly, without thinking about trying to do so. ... things just seemed to be happening automatically. ... I performed automatically, without thinking too much.	[18]
Loss of self-consciousness	While using the Language Learner, ... ... I was not concerned with what others may have been thinking of me. ... I was not concerned with what happened around me. ... I was not concerned with how I was presenting myself.	[18]
Privacy Risks of Information Disclosure	Providing LanguageLearner with my personal information would involve many unexpected problems. It would be risky to disclose my personal information to LanguageLearner. There would be high potential for loss in disclosing my personal information to LanguageLearner.	[12]
Privacy Benefits of Information Disclosure	Providing personal information can help make the features of LanguageLearner better suited to my needs. The learning content can be better tailored to my preferences and interests when I provide personal information to LanguageLearner. With the help of my personal information, LanguageLearner can show me the information or provide services that are particularly relevant to me.	[12]

### 3.2 Data Collection Procedure, Sample, and Data Screening

At the beginning of the survey, the participants were randomly assigned to different groups. The groups received different treatments regarding a hypothetical application called LanguageLearner with varying degrees of gamification. LanguageLearner is described as a hypothetical online service that encompasses a language learning functionality. A typical use case of a 1-week period is described as part of the scenario. Two different treatments were created. The low degree gamified app is described as a simple step-by-step language learning service. The high degree gamified app is enhanced with three additional game elements that provide motivational affordances. More precisely, it allows for skill development by including badges earned for achievements, a panel that highlights individual goal achievement and personal activity history, and it allows for social comparison through a leaderboard function. The descriptions of both treatments entail different screenshots. Exemplary screenshots can be found in Figure 2.



**Fig. 2.** Excerpt from Treatments

Each participant was asked to imagine the respective situation, with the goal of arousing a cognitive evaluation process [29]. After this treatment, all participants were asked to report their perceptions of the usage process from the perspective of a potential user. They then received a standardized questionnaire. In order to assure the effect of our treatment and the cleanliness of the questionnaire, we conducted a pretest ( $n = 18$ ). The subsequent interviews led to the selection of the two degrees of gamification, minor changes in the wording and length of the two treatments and the scales.

We decided to collect data in two different contexts. First, we distributed the online questionnaire containing the experiment in a German university. Second, we collected data through a German online panel provider. After excluding invalid data sets (e.g., incompletely answered questionnaires), the final sample contained 196 completed answers, which include 99 data sets with a “Low Degree of Gamification” treatment and 97 with a “High Degree of Gamification” treatment. Average age was 27 years. Of these respondents, 6% state that their highest level of education completed is middle school or equivalent, 43% have a high school degree or equivalent, and 51% university degree or equivalent. Finally, 57% of the sample is female, and 43% is male.

As we decided for a between subject experimental design, we also checked for differences between personal characteristics of the participants. A t-test revealed no significant differences for age and gender between both groups indicating that randomization worked properly and that personal differences had no confounding effect.

We also checked whether the manipulation in terms of the degree of gamification has led to the expected differences in our measurement scales for self-development and social comparison. We therefore conducted t-tests on all items separately. As expected, we find that subjects perceived motivational experiences significantly higher in the “High Degree of Gamification” treatment than in the “Low Degree of Gamification” treatment ( $p < .01$ ; for all four items). We thus conclude that these increased perceptions of motivational experiences can be attributed to our manipulation of gamified elements.

## 4 Data Analysis and Results

In order to test the theoretical model and our hypotheses, we used a structural equation modeling (SEM) approach. We decided to apply the partial least squares (PLS) method as it has fewer demands for sample size and excels at prediction. Furthermore, normal distribution is not required [30]. Our sample of 196 cases satisfies the heuristic that the sample size should exceed 10 times the number of paths directed to any latent variable in the model [31]. The analysis was conducted using SmartPLS 3.0 and SPSS Statistics 21. We follow the two-step approach for SEM: First, we assess the quality of the measurement model in order to ensure validity and reliability. Subsequently, the structural model is analyzed [32].

### 4.1 Measurement Model

To assess the fit of the research model and empirical data, the constructs were tested for content, convergent, and discriminant validity. All constructs were measured reflectively. All test results reported in Table 2 and Table 3 are based on the PLS estimation of the research model.

We assured content validity by using existing scales from related research that fit our theoretical constructs and by having the questionnaire reviewed by academic experts in the pretest. Furthermore, three measures were evaluated to offer evidence of convergent validity: individual item reliability, composite construct reliability (CR), and average variance extracted (AVE). One item of the action awareness scale revealed to have a factor loading below .7 and was thus excluded from the model. Afterwards, all items load on their respective constructs at .70 or above, indicating an acceptable level of individual item reliability [33]. The CR varies between .734 and .970, which is also above the acceptable limit of .70 [34]. Convergent validity refers to whether items measuring a construct correspond with one another. The average variance extracted (AVE) of each construct exceeds the lower bound of .50 [35]. Discriminant validity refers to whether theoretically distinct concepts are empirically distinct from one another. We checked cross-loadings and, as expected, all items have higher loadings on their assigned construct than on the other constructs in the model (see Table 3) [31]. Moreover, we used the criterion of Fornell & Larcker (1981): As the AVE for each construct is greater than the variance shared with other constructs (see square root of AVEs on the diagonal in Table 2), discriminant validity can be confirmed. Hence, the analyses suggest that our measurement model is both acceptable and reliable [36].

**Table 2.** CR, AVE, and Inter-construct Correlations

Construct	CR	AVE	1	2	3	4	5	6	7
1. Information Disclosure	.734	.581	.762						
2. Loss of self-consciousness	.907	.765	.139	.875					
3. Action-awareness	.906	.828	.070	.147	.901				
4. Self-development	.910	.835	.052	-.041	.202	.914			
5. Social comparison	.970	.942	.198	.185	.028	.117	.970		
6. Privacy Risks	.889	.730	-.357	.074	-.091	-.053	-.001	.854	
7. Privacy Benefits	.951	.867	.257	.081	.204	.006	.128	-.188	.931

Note. AVE: average variance extracted; CR: composite reliability; Bolded numbers: square root of AVE

**Table 3.** Cross-loadings

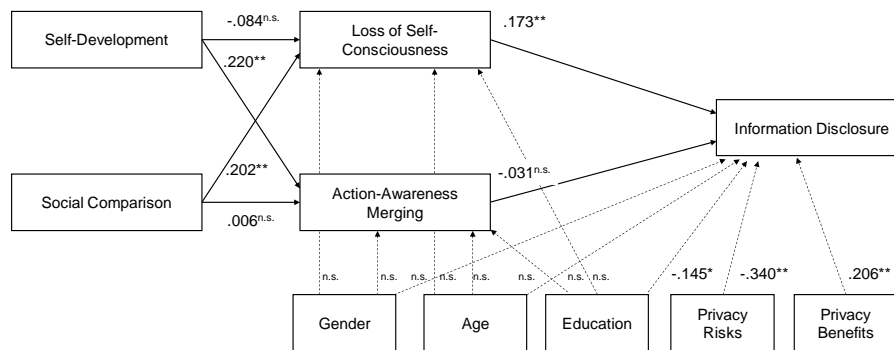
	Scale	Mean	Std. Dev.	ID	FLS	FAA	SD	SC	PR	PBP
FAA02	1-7	4.980	1.270	.101	.115	<b>.956</b>	.208	.021	-.092	.206
FAA03	1-7	4.944	1.367	.000	.171	<b>.862</b>	.149	.032	-.069	.155
FLS01	1-7	2.883	1.546	.105	<b>.921</b>	.130	-.051	.201	.077	.016
FLS02	1-7	3.260	1.625	.112	<b>.877</b>	.204	-.094	.093	.099	.046
FLS03	1-7	2.954	1.582	.155	<b>.823</b>	.061	.035	.172	.018	.167
ID01	1-7	1.740	1.392	<b>.815</b>	.182	-.016	-.067	.229	-.273	.168
ID02	1-7	4.184	1.968	<b>.706</b>	.015	.138	.170	.057	-.273	.233
SC01	1-7	3.423	1.708	.195	.174	.041	.106	<b>.969</b>	.041	.145
SC02	1-7	3.321	1.757	.188	.185	.013	.121	<b>.971</b>	-.042	.104
SD01	1-7	5.367	1.417	.037	-.053	.224	<b>.966</b>	.113	-.087	.005
SD02	1-7	5.301	1.427	.071	-.008	.117	<b>.858</b>	.101	.024	.005
PB01	1-7	4.153	1.674	.156	.033	.148	.021	.160	-.173	<b>.896</b>
PB02	1-7	4.112	1.734	.285	.076	.253	.005	.092	-.165	<b>.957</b>
PB03	1-7	4.082	1.718	.245	.103	.145	-.004	.127	-.190	<b>.940</b>
PR01	1-7	4.332	1.622	-.319	.039	-.103	-.113	-.011	<b>.881</b>	-.052
PR02	1-7	4.704	1.608	-.369	.046	-.064	-.006	-.039	<b>.926</b>	-.260
PR03	1-7	3.781	1.837	-.175	.149	-.068	-.012	.096	<b>.745</b>	-.165

Note. Information Disclosure (ID), Loss of self-consciousness (FSL), Action-awareness (FAA), Self-development (SD), Social comparison (SC), Privacy Risks (PR), Privacy Benefits (PB).

## 4.2 Structural Model

We used PLS for estimating the structural model. For assessing significance levels of the structural model, we used the bootstrapping re-sampling method and created 1000 samples. The results of the estimation are presented in Figure 3.





**Fig. 3.** Estimation of the Structural Model. Note.  $** p < .01$ ;  $* p < .05$ ;  $n.s.$  = not significant; Dotted lines represent paths from control variables.

The results indicate positive significant influences of loss of self-consciousness on information disclosure in support of H1. The results yield a negative and insignificant effect of action-awareness merging on information disclosure. Thus, we find no support for H2. Our estimation also yields positive effects for the influence of self-development on action-awareness merging and the influence of social comparison on loss of self-consciousness and thus provide support for Hypothesis H4 and H5. We find no support for H3 and H6, that is, self-development as an antecedent of loss of self-consciousness and social comparison as antecedent of action-awareness merging.

We find a significant effect of privacy risk and privacy benefits on information disclosure which is in line with the argumentation of the privacy calculus [16, 37]. Our estimation finds a significant negative effect for the education variable. This suggests that subjects with higher levels of education in our sample are less likely to disclose their personal information.

## 5 Discussion

The findings contribute to the nascent research on dark sides of gamification in that they show that experiences in social comparison during gamified service usage can trigger information disclosure through loss of self-consciousness. Thus, when benchmarking yourself against others when engaging in an activity with the help of a gamified service, disturbing thoughts regarding private information sharing drift away from the user's attention. Counter to our expectations, however, we find that action-awareness merging has no effect on information disclosure. Because action-awareness merging refers to reduced effort during service usage, we argue that the released additional cognitive resources may users to correctly account for the information sensitivity of, for instance, disclosing one's own location data to a service provider and thus not increase information disclosure. Based on our findings, we recommend that service providers who enhance their services with affordances to support social comparison (e.g.,

leaderboards and ranks) make an effort to actively communicate their data privacy policy to prevent users to disclose private information while their whole concentration is focused on the task at hand. Alternatively, firms should not ask users to disclose private information during service usage (e.g., using a pop-up window) and choose asynchronous communication channels instead (e.g., email [14]) to ensure that the user is not distracted.

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