H.2 Making the Right Choice: Gamification for Different Attribution Styles to Increase Motivation

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1 Introduction and Theoretical Background

Experience, expertise, but also self-confidence and attitudes towards computer technology play an important role in how people interact with computers, especially when problems arise (cf. Janneck, Vincent-Höper, & Ehrhardt, 2013). In this regard, attribution theory is a promising approach to explain general types of user behavior. Attribution theory deals with the causal explanations people find for things happening around them, and also with the extent of control people feel they have over external events. Attribution styles have a considerable influence on motivation, behavior, and emotions (Weiner, 1985; Abramson, Seligman, & Teasdale, 1978). While originating in social psychology, attribution theory is also applicable to computer-related experiences. Recent research found distinct computer-related attribution styles (Niels & Janneck, 2015). Moreover, a study has shown that users with more unfavorable (e.g. low sense of control) attribution styles are less motivated in handling computer issues – such as breakdowns or learning to use new features – than users with more favorable attribution styles (Niels & Janneck, 2017). These results raise the question which specific measures are appropriate to specifically support users with less favorable attribution styles with the intention to increase their motivation to master computer applications.

A successful method to increase motivation is gamification, which describes the use of game-design elements in a non-gaming context (Deterding, Dixon, Khaled, & Nacke, 2011). In empirical studies, the effects of gamification on experience and behavior in different application contexts (e.g., work, education, health) has been examined and largely positively confirmed (Hamari, Koivisto, & Sarsa, 2014). However, motivators can have different effects even in similar contexts, so personality traits and motivation of the target group should be measured at the beginning of a design process of gamification projects. A general approach to gamify an application is often not enough and personalization of the system for different users seems more effective (Tondello et al., 2016).

Therefore, this paper examines whether users with different attribution styles differ in terms of gamification preferences to derive recommendations for target-group oriented support for users.

1.1 Attribution Theory

Attribution Theory deals with the question of 'Why did that happen?' and is based on the human need for identifying causes for events (Heider, 1958). Explanations of causality are correlated with emotional responses, which in turn have an impact on motivation and behavior (Kneckt, Syrjälä, & Knuuttila, 1999). For example, attributing success to one's own ability triggers affects like pride, and self-confidence, while attributing failure to one's own actions results in feelings of incompetence, resignation, or even depression. Attribution to one's own effort resulting from success is associated with relief, satisfaction, and relaxation, while in a situation of failure this rather coincides with guilt, shame, and fear.

Attributional Dimensions and Attribution Styles. Attribution research has identified four major dimensions that are related to causal attributions, namely Locus, Stability, Controllability, and Globality (Weiner, 1985; Abramson, Seligman, & Teasdale, 1978). The *Locus* dimension (internal vs. external) describes whether the cause of an event is explained internally (by one's own actions) or externally (by external circumstances). The *Stability* dimension (stable vs. unstable) refers to whether an individual perceives the factor to which s/he has attributed success or failure as unchangeable and consistent regarding similar future events. The *Controllability* dimension (controllable vs. uncontrollable) denotes whether a person has the possibility to exert control in a given situation. Finally, *Globality* refers to whether individuals believe that a cause of success or failure in a specific event will influence other aspects in life as well (global attribution) or just have effects on similar events (specific attribution).

Based on these dimensions, Abramson, Seligman, and Teasdale (1978) distinguish favorable and unfavorable – or pessimistic and optimistic – attribution styles. Pessimistic attribution styles are marked by internal, stable, and global attributions in failure situations, but external, unstable, and specific attributions in success situations (Abramson, et al., 1978; Martinko, Zmud, & Henry, 1996). In other words: Individuals with pessimistic styles tend to blame themselves for all their failures, but don't take the credit if something goes well – instead they attribute success to e.g. chance, luck or other external factors. On the other hand, an optimistic attribution style is related to external, unstable, and specific attributions in failure situations, but to internal, stable, and global attributions in success situations (Abramson et al., 1978). I.e., individuals with an optimistic style pride themselves for their successes, but blame external circumstances for their failures, and they are more likely to succeed (Henry, Martinko, & Pierce, 2014).

Computer-Related Attributions. Attribution theory has been applied to a wide range of contexts and gained much recognition especially in the field of depression research (Sweeney, Anderson, & Bailey, 1986) and other health-related behaviors, but also regarding academic achievements (Eccles et al., 1999; Weiner, 1983). Recent research has shown that attribution processes also influence Human-Computer Interaction. Niels and colleagues identified and validated a typology of specific computer-related attribution styles for success and failure situations (Niels & Janneck, 2015; Janneck & Guczka, 2013; Niels, Guczka, & Janneck, 2016). As discussed before, favorable and unfavorable attribution styles also emerged in this typology. The "confident" styles can be seen as favorable, with users taking responsibility for computer-related success as well as failure, but believing in their ability to control and change the situations and challenges they encounter. On the other hand, the "humble" and "resigned" styles, respectively, can be considered as unfavorable styles, as they are associated with low levels of controllability and a feeling of helplessness when interacting with computers. Furthermore, a "realistic" style was characterized by medium values in the attributional dimensions. We will build on this typology of computer-related attribution styles in our study. Furthermore, Niels and Zagel (2017) found that gamification is perceived and accepted differently by users with different attribution patterns, albeit using only limited gamification methods (collecting points and ranking on a leaderboard). The question of target group-adequate gamification remains open.

1.2 Gamification User Types

In game research, users are often classified based on their game interests, so that games can be customized according to user preferences. One of the best-known player-type models is Bartle's (1996) taxonomy of *Achiever*, *Explorer*, *Socialiser* and *Killer*. For *Achievers*, an increase of status is very important, while *Explorers* rather like to discover the game world. *Socialisers* want to interact with other players, while *Killers* strive for competition and superiority. However, the model was specifically designed for multi-player virtual role games and therefore its applicability to other contexts is limited. Likewise, other player models are equally limited to certain genres (e.g. Yee, Ducheneaut, & Nelson, 2012) and do not fit clearly within the gamification context (Tondello, 2016).

Based on research findings on player types, motivation, and practical design experiences, Marczewski (2015) developed the *User Types Hexad*, a model specially adapted to the concept of gamification. In this model, a distinction is made between the six gamification user types: *Philanthropists* are dedicated and social. They are motivated by helping others and by sharing knowledge. *Socialisers* are motivated by interactions as well as relationships with other users. This type is already known

from the Bartle model. *Free Spirits* are creative users and strive for autonomy, they want to fully explore everything and gain new experiences. *Achievers* are also known from the Bartle model. These users are motivated by accomplishment and the desire to make their achievement visible to others. *Disruptors* are motivated by changes in the system, potentially achieved through disruptions. Such intentions may be negative (fraud) as well as positive (improvement of the system). *Players* focus on gaining personal advantages and are driven by extrinsic rewards.

According to Marczewski (2015), these types can be subdivided into intrinsically (*Philanthropist*, *Free Spirit*, *Socialiser* and *Achiever*) and extrinsically (*Player*) motivated users as well as in disturbing users (*Disruptor*). The different gamification user types can be motivated with specific game-design elements. E.g., suggested elements for *Philanthropists* are gifting and knowledge sharing, for *Socialisers* social networks and social comparison, for *Free Spirits* easter eggs and unlockable content, for *Achievers* certificates and progression, for *Disruptors* voting mechanisms and development tools, and for *Players* badges and leaderboards (Tondello, 2016). There are also other approaches that modify, extend or combine existing user type models. However, the User Types Hexad is preferred due to its timeliness and close relation to gamification (Trojanek, Fischer, & Heinz, 2017).

2 Research Methodology

Building on the findings of Niels and Zagel (2017), we aimed to investigate how computer-related attributions impact the perception of gamified systems. To analyze whether users with different attribution styles differ in their gamification preferences and to determine which gamification elements and principles motivate users with certain attribution styles, an online study was conducted. In order to provide a well-balanced sample, participants were paid and recruited via an online research panel.

To determine the respondents' computer-related attributions, a standardized and validated questionnaire was used which includes hypothetical scenarios of computer use, five addressing positive outcomes (success) and five addressing negative outcomes (failure). Subscales include items regarding the perception of locus, stability, controllability, and globality, answered on a 7-point Likert-type scale (Dickhäuser & Stiensmeier-Pelster, 2000, Guczka & Janneck, 2012).

To determine the participants' gamification preferences, we used the gamification user type questionnaire by Tondello et al. (2016). The questionnaire consists of 24 items grouped into six subscales measuring the user types of Philanthropist, Socialiser, Free Spirit, Achiever, Disrupter and Player described in section 1.2. The items

are answered on a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). Furthermore, socio-demographic data (age, gender, self-assessed computer skills) was collected.

3 Results

3.1 Gamification User Types and Attribution Styles

To determine gamification user types, the mean values for each type were calculated per participant. The highest mean determines the corresponding gamification user type. Participants who had equally high values for several gamification types were excluded from further analysis, resulting in N=1160 participants. Of those, 49.7% were female and 50.3% male. The average age was 41.87 years (M = 42.00 years, SD = 13.23). The general level of education was fairly balanced, ranging from „no school-leaving qualification“ to „university graduation“. Subjects self-rated their computer skills on a 7-point Likert scale from 1 (low) to 7 (expert) averaging 5.24 (median = 5.0, SD = 1.36).

Gamification Questionnaire Results. The gamification user type *Achiever* is most frequently represented with 40.6%, followed by *Free Spirit* with 31.9% and *Socialiser* with 21.6%. The *Disruptor* was scarcely identified with 5.9%. Pure *Philanthropists* and *Players* were not present at all in this study (Table 3).

Attribution Questionnaire Results. K-means clustering was used to classify data into existing clusters and to determine the attribution styles for each participant. Clusters identified in prior studies (Niels & Janneck, 2015) served as the basis for classification. Overall, the distribution of attribution styles is relatively balanced. For success situations, cluster analysis revealed 406 persons with a *Confident*, 315 with a *Realistic* and 439 with a *Humble* attribution style; for failure situations, 265 with a *Confident*, 352 with a *Realistic* and 543 with a *Resigned* attribution style. Table 1 shows the mean values for the six clusters. ANOVAs were calculated showing significant differences between clusters. Effect sizes (according to Cohen’s classification of $\eta 2$, Cohen, 1988) are high.

Table 1. Averages of attribution dimensions per attribution style, group sizes, and ANOVA for success and failure attributions.

Success	**Confident (n=406)**	**Realistic (n=315)**	**Humble (n=439)**	**F**	**p**	**η^2**
Locus	1,97	2.50	4.15	643.44	<0.001	0.527
Stability	6.09	3.75	4.61	603.11	<0.001	0.510
Controllability	1.80	2.59	3.95	781.54	<0.001	0.575
Globality	5.50	3.22	4.16	508.97	<0.001	0.468
Failure	**Confident (n=265)**	**Realistic (n=352)**	**Resigned (n=543)**	**F**	**p**	**η^2**
Locus	2.70	4.46	4.33	436.51	<0.001	0.430
Stability	3.07	3.29	4.70	496.85	<0.001	0.462
Controllability	2.63	3.24	4.16	305.07	<0.001	0.345
Globality	2.92	2.96	4.50	442.50	<0.001	0.433

3.2 Correlations between Attribution Styles and Gamification User Types

Since the combination of attribution styles and gamification user types corresponds to a nominal pairing, Phi and Cramer-V values were used to calculate correlations. Correlations were calculated separately for attribution styles in success and failure situations via cross tabs (Table 2). Both coefficients are based on chi-square, Phi considers only the number of respondents, and Cramer-V considers the number of occurrences of both variables. However, in both cases, for attributions of success it can be assumed that there is a significant dependency between gamification user types and attribution styles. This is also true for attributions of failure, albeit less pronounced (cf. Cohen, 1988).

Table 2. Dependency analysis – Gamification user types and attribution styles in success and failure situations.

	Success		**Failure**	
	r	**p**	**r**	**p**
Phi	.150	<0.001	0.107	.040
Cramer-V	.106	<0.001	0.076	.040

Table 3 shows the distribution of gamification user types for success and failure attribution styles, respectively. Overall, the gamification user type *Achiever* is most commonly represented in all attribution styles, both in terms of success and failure. The second most common type is *Free Spirit* in all attribution styles, followed by *Socialiser*. The type Disruptor is the least common in all attribution styles. The types *Philanthropist* and *Player* do not occur in their pure form.

Table 3. Distribution of gamification user types for the attribution styles.

	Attributions Styles Success							
	Confident		**Realistic**		**Humble**		**Total**	
Gamification Type	n	%	n	%	n	%	n	%
Philanthropist	0	0.0	0	0.0	0	0.0	0	0.0
Socialiser	73	18.0	70	22.2	108	24.6	251	21.6
Free Spirit	123	30.3	99	31.4	148	33.7	370	31.9
Achiever	198	48.8	119	37.8	154	35.1	471	40.6
Disruptor	12	3.0	27	8.6	29	6.6	68	5.9
Player	0	0.0	0	0.0	0	0.0	0	0.0
Total	406	35.0	315	27.2	439	37.8	1160	100
	Attribution Styles Failure							
	Confident		**Realistic**		**Resigned**		**Total**	
Gamification Type	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Philanthropist	0	0.0	0	0.0	0	0.0	0	0.0
Socialiser	59	22.3	68	19.3	124	22.8	251	21.6
Free Spirit	70	26.4	117	33.2	183	33.7	370	31.9
Achiever	112	42.3	153	43.5	206	37.9	471	40.6
Disruptor	24	9.1	14	4.0	30	5.5	68	5.9
Player	0	0.0	0	0.0	0	0.0	0	0.0
Total	265	22.8	352	30.3	543	46.8	1160	100

4 Discussion and Conclusion

In this paper, we examined whether and to what extent users with different attribution styles differ in their gamification preferences. For this purpose, an online survey was conducted. Results show significant – albeit weak – correlations. Especially interesting differences were revealed regarding attribution styles in success situations. Looking at the distribution of the three most common gamification user types (*Achiever*, *Free Spirit* and *Socialiser*) over all attribution styles shows that about half of the users with a *Confident* attribution style resemble the *Achiever* gamification type (48.8%), whereas the distribution among users with a *Humble* attribution style is more balanced (35.1% *Achiever*, 33.7% *Free Spirit*, 24,6% *Socialiser*). Therefore, game-typical elements or mechanics appealing to *Achievers* – such as the collection of certificates and the display of progress – are probably less suited to motivate users with unfavorable attribution styles. Consequently, a combination of the recommended elements for types *Achiever*, *Free Spirit* and *Socialiser* (see Table 1) seems to be a better choice for people with a more unfavorable attribution style.

In addition, users with *Humble* style seem to be motivated more by social components (*Socialiser*) than persons with a *Confident* style (18.0% vs. 24.6%). This is an interesting finding, because the *Humble* attribution style is characterized in particular by attributing success to external causes (e.g., they might be motivated by sharing success with others). Therefore, it seems advisable to use social components such as team activities or further interactions with other users to motivate and support people with unfavorable attribution styles.

Somewhat unexpected was the result that users with *Humble* and *Resigned* styles can be found among the *Free Spirit* type to a similar degree as users with a *Confident* style, as *Free Spirits* are happy to be guided by their curiosity and like to try new things whereas *Resigned* persons often feel helpless and perceive to have little control, especially in situations of failure. A possible explanation might be that playful applications and contexts like gaming encourage even persons with otherwise more reluctant attitudes towards technology to adopt more open and exploratory behaviors. Thus, gamification might be especially useful for persons with unfavorable attribution styles. This should be investigated in future studies.

Furthermore, it is interesting that in spite of our large sample the *Philanthropist* type was not found in its purest form, while in another study using a student sample this turned out to be by far the most common type (Trojanek, Fischer, & Heinz, 2017). The *Player* type, on the other hand, was almost non-existent in the student sample as well (Trojanek, Fischer, & Heinz, 2017). This raises the question whether this finding is due to the influence of social desirability, as the *Player* behavior might be seen as deplorable and thus people are less likely to admit they are attracted to it. Furthermore, it emphasizes that more research is needed regarding gamification preferences and effectiveness among different target groups. Up to now, detailed recommendations as to what gamification methods are suitable for which user groups and contexts are not available.

In this study, only participants with very clearly pronounced gamification user types were considered to investigate possible relations with attribution styles. However, it is not uncommon that people show mixed forms of gamification types (Trojanek, Fischer, & Heinz, 2017). Therefore, we will collect more data to investigate whether there are certain patterns of “mixed types” that should be considered in the user typology. Also, possible relations with factors like gender and age should be explored.

A limitation of our study is that it was not related to actual usage experiences, even though prior research showed that the attribution questionnaire is a valid instrument to measure attribution styles (Niels & Janneck, 2015). Nevertheless, we plan to

conduct further studies with actual users of real systems which incorporate certain gamification elements to study their effects in different user groups. Furthermore, besides motivation-enhancing effects of gamification we also plan to investigate motivation-inhibiting effects for users with unfavorable attribution styles.

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