The Effects of Gameful and Playful Design on Users' Behavior: The Case of Duolingo

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Abstract

This study aimed to investigate and compare the effects of gameful and playful designs on user behavior in the case of a language learning app called Duolingo due to its use of both approaches. Literature shows that while gameful design has been widely studied, playful design is still relatively unexplored, and both designs can be utilized in educational contexts to enhance learning. Therefore, this research contributes to the understanding of the differences between gameful and playful designs, their impact on user behaviors, such as user engagement, motivation, and interaction with educational applications, and the influence of the users' individual differences. To collect data, 20 semi-structured interviews were conducted during which participants were shown six real Duolingo notifications in both gameful and playful designs and asked to share their thoughts. As an additional layer, this explorative qualitative research examined the impact of Bartle's Player Types as a means of individual differences between participants on the design's effects. Later, insights were thoroughly analyzed and the key findings revealed that both designs positively influence user engagement and motivation in a similar matter, and the extent of this impact of the approaches varies based on individual differences and personal preferences.

Keywords: gameful design, playful design, user behavior, engagement, motivation, Duolingo, Bartle's player types, learning

The Effects of Gameful and Playful Design on Users' Behavior: The Case of Duolingo

Maintaining user engagement in the context of learning and educational applications can be challenging. However, much can be drawn from games and play as a means to raise the level of engagement as well as motivation. Game and play might mean similar things to a less knowledgeable crowd, but they are not the same. The former focuses on the defined nature of games, while the latter on the broader and more open-ended concept of free-form play. According to Deterding (2016), play relates to the activity and psychological-behavioral approach of engagement with the world, while game applies to objects or systems created and developed for said activity. From these simple concepts, two designs emerged: gameful, more structured by introducing concrete challenges, goals, and progression, and playful, offering an experience or object that allows for more freedom and creativity.

As gameful design started to be used for educational purposes and appears more often in various applications and platforms, it has been heavily researched, and its effects on learning thoroughly analyzed (Chapman & Rich, 2018; Deterding, 2015; Hamari et al., 2014; Huotari & Hamari, 2012; Schöbel et al., 2016). However, less attention is paid to playful design in the educational field (Deterding, 2011; Deterding, 2015; Deterding, 2016). While there is a lot of evidence of the positive effects of gameful techniques in learning, especially when it comes to increased (short-term) motivation and engagement (Boyle et al., 2016), many applications that utilize gameful design prioritizes the extrinsic motivators and research does not show that they promote lasting enjoyment or deep learning which is associated with playful design (Nørgård et al., 2017). Furthermore, according to Deci et al. (2001), extrinsic motivators could lead to decreased intrinsic motivation in the long term and thus be harmful to learning. Therefore, this study aims to investigate in better detail how both designs influence user behavior and further contribute to little knowledge about how the two approaches (playful and gameful design) relate to each other in the area of learning and educational applications.

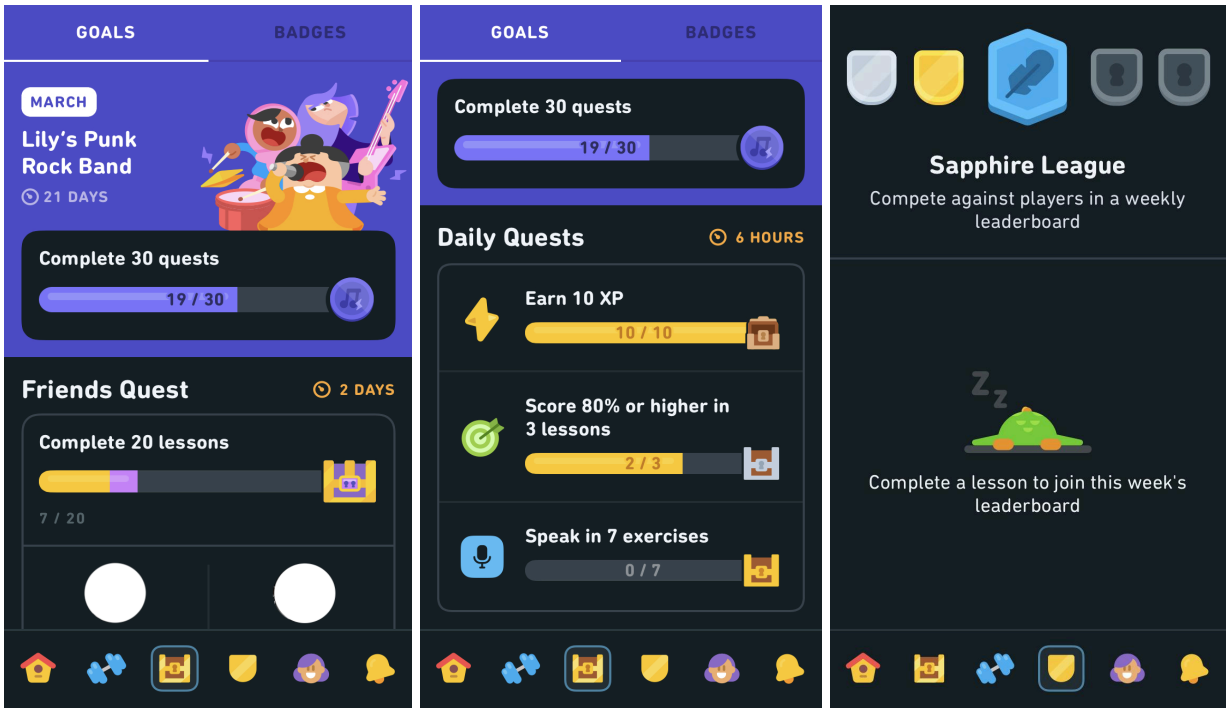
Gameful and playful designs have a substantial role in learning, as was presented above, and will be explained in more detail in the following section. Thus, it creates a strong reason for this research to choose an application or platform that serves an educational purpose and implements both designs, such as Duolingo, the biggest free language learning platform, which is "both playful and built on serious learning science" (Freeman et al., 2023). Duolingo was created

in 2011, and it offers 98 language courses teaching 39 languages with over 500 million users from 194 countries (Blanco, 2020). It is also universally accessible to anyone with an internet connection through a website or mobile app on iOS and Android. Thus, it makes a good subject for this study due to it being scientifically founded and popular.

The platform has gained enormous popularity thanks to its gameful design elements, such as badges, daily quests, friend quests, experience points (XP), and leaderboards (see Figure 1). These components encourage its users to engage and interact with the app to learn a language. The gameful design in Duolingo is fairly visible, but the app also integrates playful design, e.g., in interactive stories (Freeman et al., 2023). In 2020, nine new characters with unique personalities, aside from its famous owl Duo, were introduced to create more enjoyable learning (Lyons, 2020). Said characters are supposed to guide users through scenarios with typical everyday conversations to make the new language feel more familiar. By doing so, users can establish an emotional connection with the characters and thus be more encouraged to interact with them and the app. That way, an element of play has been introduced to the app by letting the user engage in playful interactions aside from gaining achievements.

Figure 1

Duolingo's User Interface: Friends Quest, Daily Quests, and Leaderboards



Therefore, this research aims to determine the impact of Duolingo´s relatively new playful design on users' behavior and attitude in terms of interacting with the app compared to an already existing and successfully utilized gameful design. Knowing the differences between the designs, it is very likely that some users prefer to engage with one or the other based on their individual preferences, just like the effectiveness of extrinsic and intrinsic motivators depends on the person. Moreover, "A broader understanding of [...] playful and gameful experiences could provide richer, more profound, and perhaps more meaningful experiences to people" (Lucero et al., 2014, p. 39). The effects of both designs in Duolingo on user behavior can relate to a broader range of applications and platforms as long as they apply it as successfully as Duolingo does. This, therefore, leads to the following research question:

What are the effects of gameful and playful design elements on the user's behavior, and how are these effects influenced by the users' individual differences in the case of Duolingo?

Theoretical Framework

Gameful Design in Learning

To analyze the effects of both designs, it is crucial to understand them first, starting with the gameful approach, which comes from games. In a classical focus, a game is perceived as "a rule-based system with a variable and quantifiable outcome, where different outcomes are assigned different values" (Juul 2005, p. 36). Although they appear to be similar, there is also a difference between gameful design and gamification. The first one incorporates the positive aspects of games into various experiences but does not necessarily involve direct game elements. At the same time, the other focuses on integrating components taken directly from video games, which can be done by simply adding a layer of reward systems (Deterding et al., 2011). Therefore, gameful design is implemented through gamification done in the right way. This paper puts a particular focus on gamification as the use of different elements from games in non-game contexts and environments (Schöbel et al., 2016), such as learning.

Research shows (Chapman & Rich, 2018) that students would much rather choose gamified learning over traditional courses, because gameful design emphasizes the experiential nature of games and gamification. Furthermore, Deterding (2015) argues that learning is perceived as more pleasant and satisfactory by introducing enjoyable game design features, such

as including game feedback in the form of sounds and visuals in learning tasks. A gameful approach to learning also supports constructivist learning, where the student is actively learning and more in charge of their own learning process. Nørgård et al. (2017) indicate that using game elements in non-game environments and using games to teach are more commonly utilized in education to improve and strengthen learner motivation and engagement or enjoyment. Moreover, according to Hadi Mogavi et al. (2022), gamification's core focus is on enhancing people's motivation to accomplish different tasks or missions and, thus, is connected strongly to extrinsic motivation, which will be further explained below.

Playful Design in Learning

According to Deterding et al. (2011), playfulness and gamefulness should be perceived as complementary but also distinct at the same time. Playful design offers an experience or object that invites playful behavior, focusing on exploring and experiencing activities without determining the value or gain from said interactions (Deen, Schouten, & Bekker, 2015). It can result in a pleasurable experience or fun and aims to achieve qualities of free play, namely "the unstructured, curiosity-driven exploration and recombination of behaviors, objects, and meanings" (Deterding, 2015, p. 296). Play also strongly relates to an enjoyable and intrinsically motivated activity, which has many beneficial outcomes on experience, social interaction, well-being, and motivation (Deterding, 2016). Playfulness, on the other hand, is defined as an enjoyable activity necessary to expand and broaden our personalized experiences and promote autonomy and freedom (Arnab, 2016). Playful design thus aims to evoke playfulness in users by integrating playful elements.

Furthermore, Deterding (2016) indicated that playfulness has an extensive positive impact on, among others, motivation, social interaction, and learning. Playful elements can generate excitement, enjoyment, and interest as part of the process of learning (Rice, 2009). Nørgård et al. (2017) also remarked that "play is a fundamental part of human experience and learning, providing the opportunity to practice and explore in a safe environment" (p. 3), further suggesting that playful design can improve spontaneous learning. According to Arnab (2016), play and playfulness have also been included in learning to increase intrinsic motivation, as playful learning is often related to discovery and exploration, which can be linked to the autonomy factor of intrinsic motivation.

Intrinsic and Extrinsic Motivation in Learning

As mentioned in the introduction, motivation plays a key part in education. It influences how students acquire knowledge and interact with learning platforms (Gooch et al., 2016). Reeve (2009) describes that motivation is established as the psychological "processes that direct and energize behavior" (p. 8), and it can originate either from within (intrinsic motivation) or outside (extrinsic motivation). According to Hadi Mogavi et al. (2022), the former happens when engaging in the activity is seen as enjoyable and absorbing, with no need to earn anything due to completing the action. Conversely, the latter fully emphasizes the reward part, as one engages in the activity solely to accomplish the desired result. Both intrinsic and extrinsic motivation are equally important in learning. However, there is evidence that intrinsic motivators might have a bigger impact on long-term engagement. In the research by Tang et al. (2018), extrinsically motivated learners completed their studies with less engagement or commitment than intrinsically motivated students.

Knowing those differences and knowledge explained in the sections above, it can be concluded that intrinsically motivated people can be influenced more by playful design (Deterding, 2016), while extrinsically motivated people are influenced by gameful design (Hadi Mogavi et al., 2022). Furthermore, it has been acknowledged that both gameful and playful designs can positively affect learners' motivation, although in different manners (Boyle et al., 2016; Nørgård et al., 2017). In Duolingo's case, its gameful design successfully attracts users through extrinsic outcomes, such as maintaining the streak, completing daily quests, achieving badges, etc. However, it is relatively known that not all users remain motivated to use the app for a longer time and often keep dropping out and returning to learning a language through the platform. There is a chance this happens due to the gameful design elements (external motivators) not working after some time. In addition, Deci et al. (1999) indicate that while positive feedback can improve intrinsic motivation, other gameful elements, including competition and rewards based on performance, can be harmful to intrinsic motivation. Therefore, based on the literature discussed above, it can be assumed that it is up to playful design to sustain long-term motivation and create deep learning in Duolingo through intrinsic connections.

Engagement in Learning

Not only is motivation a factor in the learning process but so is engagement, which seems hard to achieve in a world full of distractions. Poondej and Lerdpornkulrat (2016) describe that engagement “refers to the extent of a student’s active involvement, the degree of attention, interest, and passion that students show when they take part in the learning process” (p. 1). Comparably to motivation, the higher the engagement in learning, the more knowledge is gained, and the bigger the progress is in learning (Poondej & Lerdpornkulrat, 2016). As the literature shows, both concepts of motivation and engagement are strongly interconnected. From one point of view, according to Jabbar and Felicia (2015), learning and motivation are influenced by engagement. On the other hand, Blumenfeld et al. (2005) suggest that cognitive engagement is enabled by motivation, which can enhance “achievement by increasing the quality of cognitive engagement” (p. 476). Furthermore, Jabbar and Felicia (2015) indicate that people can be further engaged to learn through games, which is further supported by Ibáñez et al. (2014), who found that engagement in learning can be enhanced via gamified activities.

This leads to the understanding that gameful design does have sufficient evidence to support engagement. According to Hamari et al. (2014), gamification supports the user's overall value creation by improving service with gameful experiences (Huotari & Hamari, 2012), which further encourages users' engagement, user activity, and quality and productivity of actions. Moreover, gameful design is frequently employed by various applications and platforms to stimulate its users to feel entertained, motivated, and engaged in non-game contexts or environments (Deterding et al., 2011). Research also shows that applying gamification for educational purposes is a motivational technique that enhances user learning and triggers positive user behavior (Hadi Mogavi et al., 2022). Conversely, little is known about the effectiveness of playful design on engagement. However, as stated by Nørgård et al. (2017), playful approaches gain more interest in learning and teaching mainly due to playfulness being an engaging method. Playfulness can also lead to purposeful and meaningful engagement (Arnab, 2016). Moreover, due to the interconnectedness of motivation and engagement, it is crucial to analyze the effects of playful design and how they relate to gameful design. Relating it to Duolingo and knowing that various design elements can enhance motivation in different manners, it is important to investigate how the same designs could also impact engagement, both in the short and long term,

and how well they work together to ensure that users continue their language learning journey and have an enjoyable experience.

Therefore, the first subquestion of this research is:

SQ1: What are the similarities and differences between the effects of gameful and playful designs on user behavior in the case of Duolingo?

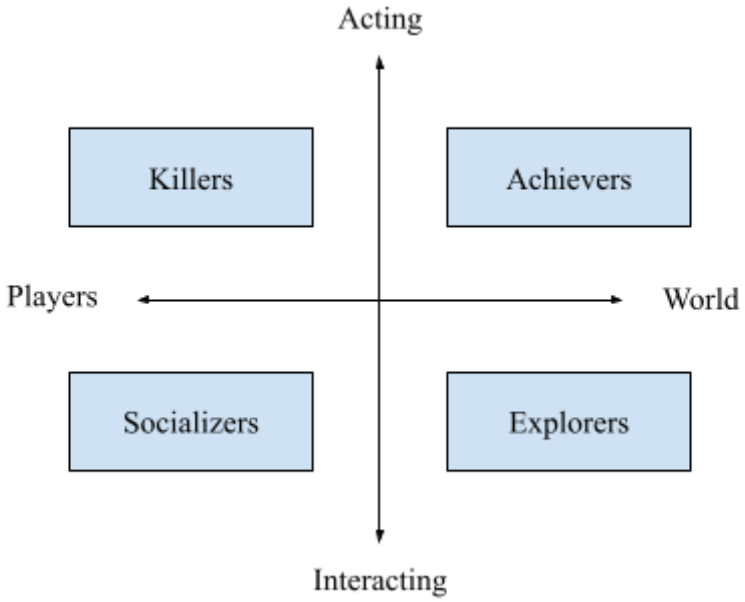
Individual Differences in the Effects of Gameful and Playful Designs

Just like intrinsic and extrinsic motivation varies among individuals, so do other individual differences, such as preferences and prior experiences, which can influence the impact of gameful and playful designs on user behavior. Tarhini et al. (2014) further confirm that individual differences can impact user behavior. Additionally, the study by Tondello et al. (2017) examined user preferences in the context of gameful design and identified that different design elements contribute to a positive user experience depending on the user's individual preferences. Therefore, it can be assumed that either or both gameful and playful design could influence user behavior determined by the user's individual differences. One simplified way to capture individual differences is through Bartle's player types, which designers use to create elements that appeal to various users (Tondello et al., 2017).

Bartle's player types describe how players approach and what they typically enjoy while playing games. Research done by Bartle (1996) suggests that people are divided into four player types: achievers, explorers, socializers, and killers (see Figure 2). The first one aims first and foremost to achieve the biggest number of points and gain the highest level. Aside from that, achievers also like to act alone and improve their capabilities within the game. The second one values discovering new features and figuring out how things work the most. Moreover, explorers prefer to rely on their instincts while playing a game. The third one, socializers, emphasizes interaction and relationships with other people in the game. The fourth and last one, killers, similar to achievers, like to play alone but gain more satisfaction from defeating other players rather than achieving rewards.

Figure 2

Diagram visualizing Bartle's Player Types



This can be applied to the Duolingo case. Park et al. (2021) indicated that players could be provided with different experiences from the same game components and that these experiences can influence players' motivation. Various users focus more on getting all daily quests done (achievers), unlocking more features within the app (explorers), collaborating with their friends to complete friends' quests (socializers), or beating other players to score as top 1 in a league (killers). Determining which elements of the learning app matter most to users will add an additional layer to the effects of gameful and playful designs on motivation.

Another way to understand the differences between said four player types is to look at the focus areas. As shown in Figure 2, there are four dominant focus areas. Achievers and killers emphasized acting, while explorers and socializers - interacting. Moreover, killers and socializers prioritize players, while achievers and explorers - the world. From the definitions of each player type, it appears that achievers and killers might prefer the gameful design, while explorers and socializers prefer the playful design. This furthermore points out that people whose dominant focus area is acting might be affected by gameful elements and, by contrast, those with interacting - by playful components.

Park et al. (2021) analyzed the differences in learning motivation among various player types and discovered no significant differences in the academic motivations among the player types. However, their research has not considered playfulness and only focused on gamification, motivating people regardless of their player type. That is why this paper also explored the effects of playfulness between different player types.

Thus, the second subquestion of this research reads as follows:

SQ2: How do the effects of gameful and playful designs differ between Bartle's player types?

Methods

Design

This study was explorative qualitative research that applied semi-structured, in-depth one-on-one interviews conducted via online video meetings. The reason behind choosing this method for this research is that the effects of playful design are relatively under-researched, especially in comparison to gameful design, and qualitative design is particularly appropriate for exploratory data gathering and addressing such a phenomenon (Fossey et al., 2002). Qualitative research emphasizes the importance of context and prioritizes the voices and perspectives of participants. This is especially important in this study due to its focus on the user experience of both gameful and playful design and their effects on user behavior. Moreover, interviews allow for rich data collection, as participants can express themselves in their own words. At the same time, the researcher can ask for clarification and follow-up in real-time. The direct interaction also allows the researcher to observe participants' non-verbal cues such as body language, tone of voice, or facial expressions.

Furthermore, Duolingo has been selected as a suitable application to conduct this study as it is an existing educational platform already deployed in real-world settings, providing a genuine context for research and greater stability and reliability. This allows the study to be executed in an authentic environment, offering insights that may be challenging to replicate in a prototype. Additionally, as was explained in the introduction, the app has already successfully developed its gameful design elements but only recently introduced playful ones that have not been studied yet, both as a separate design as well as in relation to the existing gameful one. This enabled a

more authentic comparison of effectiveness between both designs and their combination. Lastly, the app is the most widely known and used learning tool, which makes the search for study participants significantly more feasible than in the case of other tools.

Participants

The interview sample was selected using convenience sampling, an easy, quick, and inexpensive method of choosing respondents based on convenience availability (Straits & Singleton, 2011). The invitation to participate in this study was shared on a Tilburg School of Humanities and Digital Sciences (TSHD) Human Subject Pool through a SONA platform to gather 20 university students who received one credit for participating.

The requirement to enter this research was to be a current or former Duolingo user. Participants familiar with the app have a deeper contextual understanding of its features, functionalities, and user interface. Therefore, they can provide insights into their actual usage patterns, engagement, and preferences rather than hypothetical scenarios. Moreover, they can articulate their thoughts more efficiently as there is no need to spend time familiarizing themselves with the app.

Out of 20 participants, 13 studied Cognitive Science and Artificial Intelligence (CSAI), and 7 studied Communication and Information Sciences (CIS). Only 5 participants claimed that their field of study is creative, while the rest described it as theoretical and/or technical. Two participants had no gaming experience, 11 had a little, and 7 had plenty of gaming experience. Seven participants associated themselves with only 1 player type, 12 with 2 player types, and only 1 with 3 player types. Eight participants were current Duolingo users, while the remaining 12 used Duolingo in the past and were not active users anymore.

Materials

The notifications shown to the participants were actual and real Duolingo notifications collected from the app for this study. Showing the notifications to participants enabled to recreate the situation of a user seeing a notification on their phone and capture the user's thought process right after they saw the notification. It also helped the participants to assess whether they would be motivated to engage with the app, as notifications can serve as incentives for users to return to

the app or complete specific actions that would not be allowed through showing app features instead. Well-timed and relevant notifications can boost engagement and motivation by capturing the user's attention and encouraging them to interact with the app. Moreover, they create a sense of immediate importance and excitement, making the experience more dynamic and interactive. That is why it is important to investigate which strategies and designs work, considering that some people might prefer extrinsic motivators, while others prefer intrinsic ones. The notifications used have different psychological approaches. Some are joyful and positively reinforce the user to engage with the app, while others use time pressure or reversed psychology to motivate users to stay engaged and actively participate.

This research utilized the categorization of notification designs based on the Duolingo characters. As mentioned in the introduction, Duolingo implemented new characters that users can interact with to create more enjoyable learning and convince users to engage with the app more, which was described in this paper as the newly executed playful design in the app. According to theory, playful design offers a pleasurable and desirable user experience that focuses on more than just earning prizes, which is in line with the idea behind these newly developed characters. Therefore, three notifications were selected, emphasizing the enjoyment of engaging with the app, entertainment of doing lessons and practicing a language, and interactions with Duolingo characters (see Figure 4). In comparison, the original character of Duolingo, owl Duo, usually underlines the gameful side of the app and does not engage that much with the users. Therefore, three gameful notifications were chosen, highlighting achieving rewards, taking on challenges, and gaining higher scores and experience points (XPs) (see Figure 5).

Figure 4

Duolingo Notifications in Playful Design

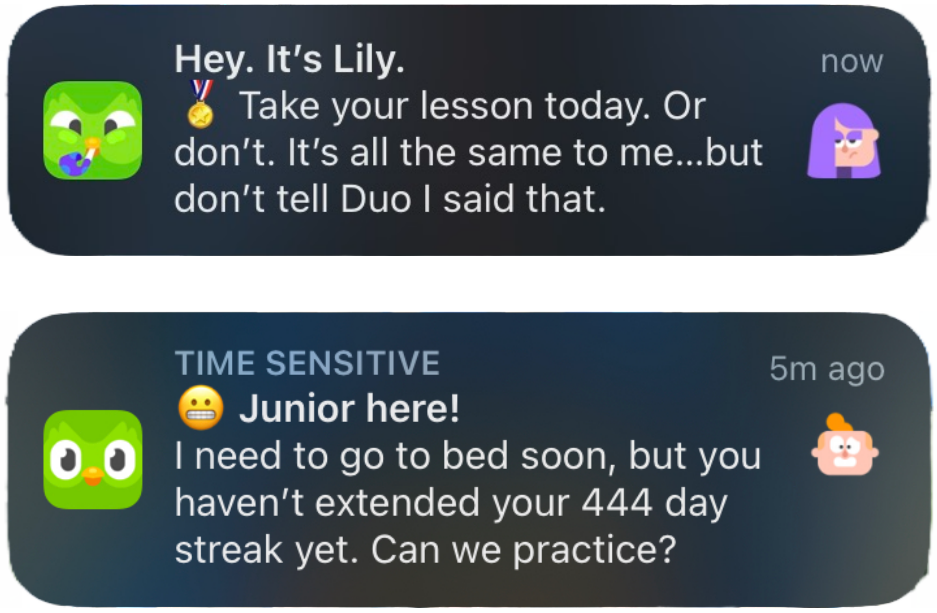
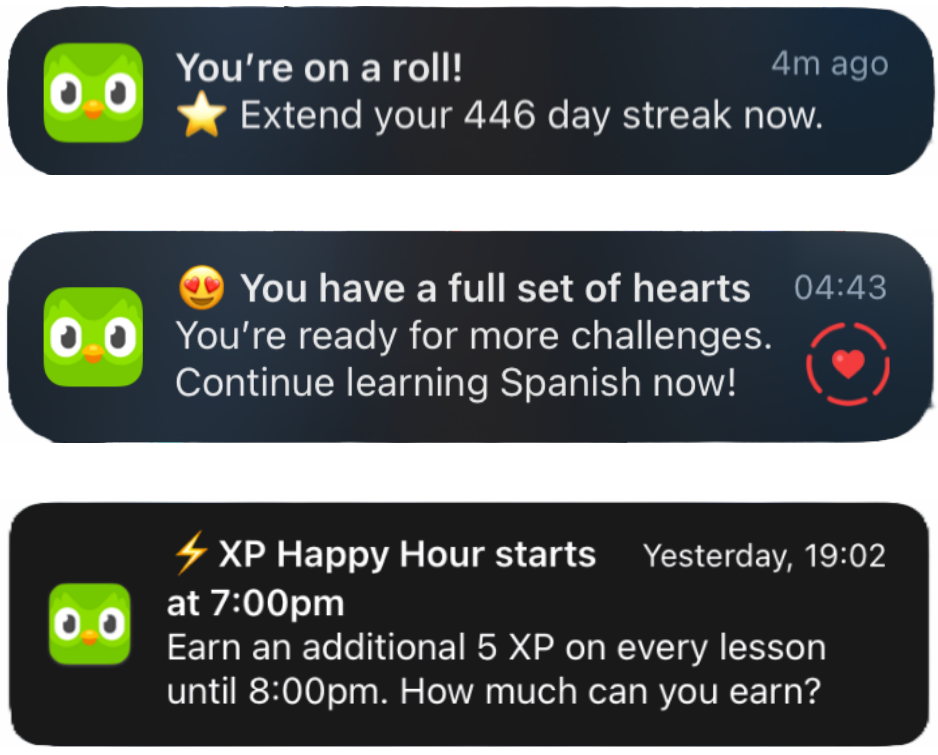


Figure 5

Duolingo Notifications in Gameful Design



Although other classification methods were possible, the main goal was to study the effects of implementing new Duolingo characters as playful design elements, which is why this approach was chosen. This paper also addressed it as the correct way of categorization to allow a more manageable analysis of the findings, as participants were asked to assess whether a notification was gameful or playful. Furthermore, to diversify the narrative, only one gameful notification revolves around extending the users' streak, which is usually the primary strategy of Duolingo notifications and is associated more with a gameful rather than a playful design. This was done to investigate whether the same stimulation of extending the streak would result in different user actions depending on the character delivering the piece of information. Characters' messages in selected playful notifications are focused on interaction with users rather than convincing them to gain something for themselves, which is more related to playful design.

Measurement

The session began with a short pre-interview about the participant's background and their experience with the Duolingo app. This was meant to get to know the participants better and identify individual differences that might affect their relationships with gameful and playful designs. Participants were asked about their background, gaming experience, and what they focus on while playing a game, which was supposed to point toward their player type. Those questions were chosen to be asked first since they are easy to answer and help participants feel comfortable in the interview. Additionally, no player typography questionnaires were used in this research. Using them would mean longer interviews, up to 90 minutes, and too much time would be spent on the beginning rather than the main part of the interview. It would also be harder for participants with no gaming experience to fill out such a questionnaire as they would have to hypothesize a lot, possibly leading to less deep insights about the notifications, which was the most important part of this study. However, it was offered at the end of the session as an additional but not an official part of the interview.

The next segment of questions focused on participants' Duolingo experiences. It was selected to establish the background information of the participant's familiarity with the app, which was also the requirement to enter this study. Participants were asked how long they were Duolingo users, how often they used it, and what language(s) they were learning. Multiple languages would indicate that interviewees stopped using the app at some point and then

resumed it by starting to learn another language. Therefore, participants were also asked what the reasons behind said actions were. This knowledge of previous language learning experience would give more insights into short and long-term user engagement and user motivation to use the app, which is discussed in more detail in the results section.

Lastly, in the main part of the semi-structured interviews, participants were shown Duolingo notifications in gameful and playful designs and then asked a series of open questions to gather insights about how these notifications affect their behavior in terms of interacting and engaging with the app. It allowed gathering insights into how notifications in both designs affect their engagement and motivation to interact with the app. All questions asked are available to access in Appendix A.

Procedure

In an individual 30-50-minute session, each respondent was first asked open questions in a pre-interview about their type of field regarding studies (e.g. technical, creative), gaming experience, and player type (achiever, explorer, socializer, and killer). These details represented individual differences that might have an impact on the effects of gameful and playful design on user behavior. Then, open questions about participants' experience with Duolingo followed, such as how long they had been familiar with the app.

Next, participants were asked if they knew the difference between gameful and playful design and were offered an explanation to make them aware of the basic contrasts between them. Afterward, participants were shown six screenshots of notifications taken directly from Duolingo. Three of them were in a gameful design with just the Owl Duo, the main character associated with Duolingo, while the other three were in a playful design with other Duolingo characters, namely Zari, Lily, and Junior, each having their own personality, which was visible in the notifications. This allowed participants to compare the two designs and their effects. The notifications were shown in a random order. After each one, the participants were asked open-ended questions to gain insights into the effects of notifications on user behavior in terms of interacting with the app.

This procedure was first tested in a pilot interview. The interviewee shared in feedback that seeing the notifications on the screen created responses and thoughts similar to those seen on

their phone. They also elaborated that presented notifications were sometimes clear to assess in design, but sometimes, it was hard to distinguish whether they were gameful or playful. This further implies that there are multiple ways to categorize the notifications into gameful or playful designs, and this research focused on a specific method associated with the presence of other Duolingo characters, which were part of the app's playful design. The interviewee also expressed that seeing six different notifications helped compare their effectiveness on motivation to open the app and engagement and the classification of gameful/playful design. As the structure worked successfully, the same plan was used in all interviews. The interviews were conducted between June 5th and 16th, 2023. All sessions were audio recorded and later transcribed using the Descript tool. Transcripts can be accessed in Appendix B.

Data Analysis

To analyze the findings, each transcript was closely read, examined, and coded to identify interviewees' insights. The data was put in a spreadsheet, which can accessed in Appendix C. This allowed a better comparison between participants' answers as well as notifications and designs. This research applied a deductive approach, meaning data was analyzed with some expectations based on the theoretical framework explained earlier in this paper (Braun & Clarke, 2022).

Firstly, all interview transcripts were thoroughly read and familiarized with by the researcher. This initial stage allowed an overall understanding of the data and identified preliminary themes or patterns, some of which were already picked up by the researcher from participants' answers during the interviews. Next, the interview transcripts were coded with the distinction of what the answer contained (an answer summary to the other interview questions), and this data was put in the spreadsheet.

Regarding the gaming experience, all answers were categorized into one of three categories: none (labeled as "1"), a little (labeled as "2), and plenty (labeled as "3"). This allowed a clearer separation of the broad spectrum of participants' gaming experiences and, thus, better comparison between interviewees. Moving to the dominant focus areas, the distinction was made between acting and interacting. Thus, if participants implied that they were achievers and/or killers, they were put under an "acting" label. Similarly, if the interviewee's player type

was an explorer and/or a socializer, they were put under an “interacting” label. If a participant signified player types from both dominant focus areas, they were put under a “both” label. Moreover, it was noted whether a participant was interested in filling out Bartle’s player test offered at the end of the interview (categories “yes” and “no”) and whether they actually completed it (same categories). Results shared by the participants who completed the test were also recorded in the spreadsheet.

Moving to the participants’ answers about their Duolingo experience. Firstly, if an interviewee was still an active user, they were put into the category “current” (labeled as “1”). If they no longer used the app, they were put into the category “former” (labeled as “2”). Answers to other aspects, such as which language participants were learning, how long they were users, how often they used the app, reasons they stopped, and reasons they started (again) using the app, were put in a spreadsheet in the form of a summary and not a full quote.

Concerning the assessment of the notifications in terms of design, participants used keywords that were noticed as patterns during the interviews and helped inspect whether a person felt the notification was gameful or playful. Keywords used by participants that pointed towards playful design included *opportunities*, *possibilities*, *freedom*, *personal* and/or *informal message*, while keywords for gameful contained *structure*, *streak*, *points*, *experience points*, and *formal message*. The answers were put into two categories: either “gameful” or “playful”.

Lastly, for each notification, the insights from each participant about different effects were pasted into the spreadsheet as entire quotes, as they were often the most important insights. From there, the connections, similarities, and differences across notifications and designs were thoroughly analyzed and transformed into findings presented in the section below.

Results

Participants’ Duolingo Experience

As explained in the methods section, after the pre-interview part, participants were asked to share their Duolingo experience, such as how long they were a Duolingo user, which language they were learning in the app, and how often they were using the app.

The participant with the shortest experience with Duolingo used the app only for a couple of days, and the most extended period of use was between 5 and 6 years. Fifteen out of 20 participants declared that they were using Duolingo (almost) every day, with the remaining 5 describing that they used it a couple of times a week, in both cases, either currently or in the past.

Moving to the languages, 8 participants used Duolingo to learn only 1 language, 9 used it for 2 languages, and 2 for 3 languages, while only 1 interviewee was learning 4 languages. This means that more than half of the respondents stopped using the app at some point and then picked it up again. The two most popular languages to learn by participants were French (mentioned by 10 participants) and Spanish (learned by 8). Other languages mentioned by participants were Dutch, English, German, Italian, Japanese, Polish, and Russian.

Most participants started using Duolingo because of a clear goal (external motivation), such as learning a language for a school exam, getting to know their partner's mother tongue, or moving/traveling to another country and wanting to learn the local language. Two people particularly mentioned that they started interacting with the app because they liked the design of the app and they were curious about it. Among the reasons for stopping using the app, participants mainly said that they lost the motivation to continue learning or that the goal was achieved and did not want to continue learning for themselves (internal motivation).

Distinguishing Between Gameful and Playful Notifications

To confirm whether participants' assessment of playful versus gameful matches the categorization made in this paper, the interviewees were asked to distinguish notifications as gameful or playful after first learning the definitions of the two design types, as discussed above in methods section. The participants' classifications are shown in Table 1 below.

Starting with gameful notifications (numbers 2, 3, and 6), the majority of the participants agreed with this research's classification that the second and sixth notifications were gameful. However, that was not the case for the third notification. Moving to the playful notifications (numbers 1, 4, and 5), more than half of the participants stated that all of them were playful. Interestingly, one participant (interviewee number 9 with a player types explorer and socializer) declared that all notifications were gameful because the app algorithm that send them automatically to user. Moreover, another participant (interviewee number 11 with player types

achiever and killer) expressed that the fourth notification was neither gameful nor playful. Lastly, at least one participant said that Notifications 1, 3, 4, and 5 had both gameful and playful elements.

Table 1

Participants' classification of notifications in terms of design

Design	Notification	Participants' Design Classification			
		Gameful	Playful	Both	Neither
Gameful	Notification 2	**20**	0	0	0
	Notification 3	**9**	10	1	0
	Notification 6	**15**	5	0	0
Playful	Notification 1	9	**10**	1	0
	Notification 4	5	**13**	1	1
	Notification 5	8	**10**	2	0

Participants' Insights on Presented Notifications in Gameful and Playful Designs

While participants were determining the design of the notifications, insightful opinions and views on the notifications in both designs were collected and served as a base for later examining the effectiveness of gameful and playful designs. The insights on notifications in gameful design are presented first.

For Notification 2, participants declared that the message was not very personal and relatively formal. Moreover, it mentioned the app's structure and extending the streak. Interviewee number 13, with a player type socializer, stated: "I mean, the fact that it's telling you what to do. Uh huh. So you can come and extend your, uh, the streak. You have no other option. Just do it." For Notification 3, the argumentation was similar to the second one. However, some participants also said that hearts in the notification are associated with games. Interviewee number 12, with player types achiever, explorer, and socializer, expressed: "The fact that it's telling you that you have more hearts, like heart health, is something that is generally used in

video games, something like this.” For Notification 6, the opinions focused on the app’s structure, the formal message, and the mention of rewards and additional points associated with games. Interviewee number 17, with player types achiever and socializer, pointed out: “There is a structure, there, there are some rules in the application, like XP, happy hour, blah, blah, like additional points [...]”.

Furthermore, the participants who believed the third and sixth notifications were playful instead declared that the reasons were, respectively, challenges and opportunities mentioned in the message and possibilities to gain more Experience Points (XPs). Additionally, some participants noted that the message had a playful touch and mentioned challenges they could explore in the app.

The insights on notifications in playful design are presented next. For Notification 1, participants expressed that the message is positive and informal due to the emojis, encourages them to play, and most importantly, includes the character (Zari). Interviewee number one, with player types explorer and socializer, said: “[...] it's trying to be playful with, you know, the character having their own personality, you know, as if they're an actual person trying to friends hype you on, you know.” For Notification 4, the participants focused substantially on the phrasing of the message and the Duolingo character (Lily). As interviewee number six, with a player types explorer and socializer, pointed out: “[...] it's like coming from someone, a person because it's, it's Lily and it's looking to use a friendly mode.” For Notification 5, the participants stated that the notification was informal and funny because of the character (Junior) and that they felt a sense of freedom. Interviewee number 13, with player type socializer, argued: “Because simply it's giving you more freedom. I mean, it's like... You don't feel like you're following something, you know, just there is asking you for a mission.”

Furthermore, the participants who believed Notifications 1, 4, and 5 were gameful instead of playful declared the common reason was that the messages related to keeping or extending the streak, which, in their opinion, is strongly associated with games and not freedom.

Effectiveness of Playful versus Gameful Notifications

As shown in Table 2, 5 out of 6 notifications were generally received positively because at least half of the participants liked the notifications and would open the Duolingo app based on

those notifications. When comparing the overall effectiveness, more participants liked, on average, gameful notifications than playful ones (63% versus 55%) and would open the app based on them rather than playful ones (61.67% versus 53.33%).

Table 2

Answer allocations assessing the effectiveness of the notifications

Design	Notification	Liked the Notification		Would Open the App Based on the Notification	
		N	%	N	%
Gameful	Notification 2	12	60	12	60
	Notification 3	14	70	14	70
	Notification 6	12	60	11	55
	Mean	12.67	63.33	12.33	61.67
Playful	Notification 1	12	60	12	60
	Notification 4	8	40	4	20
	Notification 5	13	65	16	80
	Mean	11	55	10.67	53.33

In particular, the participants responded best to Notification 3 (14 both liked it and would open the app based on it) and Notification 5 (13 liked it and 16 would open the app based on it). Notification 4, however, was received the worst (only 8 liked it and only 4 would open the app based on it). The reasons the notifications appealed to the participants were as follows.

For Notification 1, interviewees appreciated 3 factors: a reference to the streak, a message with positive reinforcement that made people feel proud of their achievements, and the presence of a Duolingo character - Zari. In particular, interviewee 16 with player type killer established: “It looks like she's really talking to you, so it feels like you have to kind of do something back for her. You're not playing the game, I think.”

For Notification 2, participants enjoyed the message, specifically how clear, short, and to the point it was. This notification also gave them a sense of control and made them feel like they were the ones to decide what to do. Interviewee 6, with player type explorer and socializer, described: “[...] this one is very short, so the short one captures my attention more.” However, the notification was also perceived as much less enthusiastic compared to the first one.

For Notification 3, interviewees declared that it encouraged and motivated them to learn as well as gave them opportunities to try again if they failed instead of pushing them to interact with the app. Interviewee 19, with player types socializer and killer, said: “[...] it’s encouraging you to continue learning or something like that.”

For Notification 4, participants liked that the message was relatively funny and informal, especially due to the use of the phrase “Take your lesson today. Or don’t” by a Duolingo character, Lily. Interviewee 15, with player type explorer and socializer, indicated: “[...] it actually makes you laugh, like, I feel like, it triggers positive emotions because it's funny, it's just funny to put a sad character saying that, basically. [...] it's unconventional.”

For Notification 5, interviewees expressed that the message was motivating in a funny way, and smartly caught their attention by not being demanding but instead making them want to help the Duolingo character, Junior, go to bed soon. Interviewee 13, with player type socializer, described: “[...] it attracts the attention and motivates you. [...] And the text is also, as I said, you know, motivating, like it mentions my achievement [...]”.

For Notification 6, participants heavily focused on and appreciated the reward part, which was presented as earning additional/bonus points and served as an external motivation to open the app and spend more time in it. Interviewee 1, with player types explorer and socializer, shared: “But at the end of the day, I'd say it would always be these kind of notifications that would entice me the most to open the app.”

As all but one notification appealed to more than half of the interviewees, only arguments behind the disfavor of this exact notification, which included the character Lily, are presented. Participants declared that its message was not very motivating, quite confusing, and gave mixed signals as it said: “Take your lesson today. Or don’t. It’s all the same to me…” In particular,

interviewee number 13, with player type socializer, who classified this notification as gameful, stated that the notification is “Faking a playful style”.

Lastly, in terms of what participants did in the app after opening it and how long they would spend in the app, the findings are largely similar as participants had a very strong user behavior regardless of which notification they saw, whether they liked it, and whether they would open the app based on it. Interviewees declared that they would do the same, namely extend their streak by doing a lesson or two, which always took the same amount of time - 3 most popular answers were 5 minutes, 10-15 minutes, or 30 minutes. However, the case was different for the sixth notification as people still did the same (extend the streak), but they indicated an eagerness to do more lessons and spend more time in the app to gain more XPs.

Role of Player Types

In the matter of Bartle’s Player Types, 7 participants associated themselves with only 1 player type, 12 with 2 types, and 1 with 3 types. That is why the results show the comparison between the dominant focus areas, namely acting (player types achiever and/or killer) and interacting (player types explorer and/or socializer), which enabled a clearer comparison. Four participants belong in the acting category, nine in the interacting category, and seven in both. Additionally, although 14 out of 20 participants were interested in completing the official Bartle’s Player Type test, only 9 did so and later shared their results with the interviewer. On an interesting note, for 8 of those interviewees, the results from Bartle’s test and their self-assessment matched and indicated the same player type(s).

Table 3 compares answers between dominant focus areas (acting, interacting, and both) and between gameful and playful notifications with differentiation of each notification. The findings present that from gameful notifications, participants with the dominant focus area acting liked the third notification the most and were the most eager to open the Duolingo app based on this one. From the playful notifications, however, the acting group preferred the fifth notification for both the appeal and eagerness to open the app. In contrast, for participants with interacting as the dominant focus area, the sixth notification had the highest scores from gameful notifications and the fifth notification from playful ones. Lastly, the participants who focused on both acting

and interacting considered the third notification as the best from gameful notifications and favored equally first and fifth from playful notifications.

Table 3

Comparison between dominant focus areas and notifications

Design	Notification	Dominant Focus Area	Liked the Notification		Would Open the App Based on the Notification	
			N	%	N	%
Gameful	Notification 2	Acting	2	50	1	25
		Interacting	5	55.56	6	66.67
		Both	5	71.43	5	71.43
	Notification 3	Acting	4	100	4	100
		Interacting	4	44.44	4	44.44
		Both	6	85.71	6	85.71
	Notification 6	Acting	2	50	1	25
		Interacting	7	77.78	7	77.78
		Both	3	42.86	3	42.86
Playful	Notification 1	Acting	2	50	2	50
		Interacting	5	55.56	6	66.67
		Both	3	42.86	4	57.14
	Notification 4	Acting	1	25	0	0
		Interacting	3	33.33	2	22.22
		Both	4	57.14	2	28.57
	Notification 5	Acting	3	75	3	75
		Interacting	7	77.78	9	100
		Both	3	42.86	4	57.14

Table 4 shows, on average, how participants with different dominant focus areas felt about gameful and playful notifications. Overall, in comparison to the interviewees with acting as the dominant focus area, participants with dominant focus area interacting were more eager to open the Duolingo app based on all notifications (62.96% versus 50% for gameful notifications and 62.96% versus 41.67% for playful ones). However, the situation is different for the appeal of the notifications. Acting participants liked the gameful notifications more than interacting (66.67% versus 59.26%), and the case was reversed for the playful notifications (55.56% for interacting versus 50%). This further corresponds to expectations deducted from the theoretical framework.

Lastly, the analysis of participants whose dominant areas are both acting and interacting, meaning they associated themselves as achiever and/or killer as well as explorer and/or socializer. The findings identified that they like gameful notifications more and are more eager to open the Duolingo app based on them rather than playful ones (both 66.67% versus 47.62%).

Table 4

Overall comparison between dominant focus areas and designs

Design	Dominant Focus Area	Liked the Notification	Would Open the App Based on the Notification
Gameful	Acting	66.67%	50.00%
	Interacting	59.26%	62.96%
	Both	66.67%	66.67%
Playful	Acting	50.00%	41.67%
	Interacting	55.56%	62.96%
	Both	47.62%	47.62%

Discussion

This research aimed to investigate the impact of Duolingo´s relatively new playful design on users' behavior and attitude in terms of interacting with the app in comparison to an already existing gameful design. Although the sample of this study turned out to be quite homogenous

(students of the same department and close study programs), participants differed in their gaming experiences, attitudes, and user behaviors. Furthermore, this research brought up many insightful findings that are valuable to playful design research in learning.

Regarding the first sub-question, "*What are the similarities and differences between the effects of gameful and playful designs on user behavior in the case of Duolingo?*". Results show that gameful design appealed more to the users and made them open the app more. However, the difference is not very big (less than 10% while examining Table 2). There was one noticeable difference while comparing notifications, however. Out of all, participants felt unfavorable towards one notification, namely the fourth one, which was in playful design. The reason is most probably because Lily is a very specific character, and participants had strong opinions about her messages, thus, they either liked her and found her funny or did not and found her annoying or fake. This is strongly connected to the assumptions of the playful design - it is a high-risk and high-gain approach, and participants' insights confirmed it. Moving to what participants would do in the app and how long they would spend in it, no differences were discovered; thus, both designs influence user behavior similarly. In Duolingo's case, it is presumably participants' personal preference concerning what they focus on while using this app to learn a language and how long they spend on it, which does not change regardless of the design.

Previous research established that using game elements in learning improves and strengthens learner motivation as well as engagement or enjoyment (Nørgård et al., 2017; Poondej & Lerdpornkulrat, 2016). Moreover, play also leads to enjoyment and intrinsic motivation (Arnab, 2016; Deterding, 2016). Therefore, the effects of gameful and playful design might seem similar, but the difference is in the details. As participants shared, gameful notifications made them feel engaged with the app just the same as playful ones but also focused more on the external motivators, e.g., extending the streak or gaining additional experience points. In contrast, playful notifications emphasized the internal motivation more, namely doing a language lesson because a Duolingo character encouraged them to or they wanted to help another character while learning the language. Thus, the healthy mix of both designs appears to be the key to ensuring both short and long-term motivation and engagement of users.

In terms of the second sub-question, "*How different are the effects of gameful and playful designs between Bartle's player types?*", there was an adjustment as instead of comparing

between four player types, the findings show a comparison between dominant focus areas, acting and interacting, as according to the theory, participants in these categories should have different opinions on gameful and playful designs. Moreover, based on the results concerning the eagerness to complete the official Bartle's Player Type Test, the question "What do you value more in a game - achieving rewards, exploring the game world, socializing with other players, or defeating other players?" was successful for participants to estimate their player type correctly.

According to Park et al. (2021), there were no significant differences in the academic motivations among the player types. However, players could be provided with different experiences from the same game components, and these experiences can influence players' motivation. For example, it can be presumed that participants with the dominant focus area acting are more driven by external motivation, while those with interacting are driven by internal motivation. Furthermore, it could be assumed that acting participants could be more predisposed to gameful design and interacting ones to playful design. The results show that, indeed, participants with acting as their dominant focus area liked the gameful notifications more than playful ones, and so did people with both and interacting (but only slightly). The reason could be that gameful notifications did not focus only on game aspects e.g., extending the streak but also had some playful touches. It was also confirmed that the same gameful and playful elements gave interviewees diverse experiences. For example, the fourth notification with Duolingo's character Lily had distinctively two very different viewpoints - people either loved it and it made them want to interact with the app, or hated it, and it made them not want to engage with the app.

Consequently, the answer to the main research question, *"What are the effects of gameful and playful design elements on the user's behavior, and how are these effects influenced by the users' individual differences in the case of Duolingo?"* is as follows. Both designs make users feel engaged and motivated to use the app, as well as influence what people focus on and the time spent in the app. However, the extent to which this applies is caused by individual differences, such as player types, which can cause users to have different experiences while encountering the same design. Therefore, it would be wise for educational applications to apply a measured combination of gameful and playful designs, as both affect user behavior positively, to ensure that users feel motivated to engage with the app in both the short and long term and provide them with enjoyable experiences while learning.

Limitations and future research

While interpreting the findings of this study, several limitations and opportunities for future research should be acknowledged. First, the question concerning the field of study, specifically asking whether it is more technical or creative, was not a useful measure, as participants expressed many subjective opinions, which did not provide valuable insights. It also did not allow for a good categorization of participants' backgrounds and, therefore, for a good comparison between groups.

Secondly, not all interviewees were familiar with Duolingo characters despite being familiar with the app itself. This could be explained by the fact that the same characters are not present in all languages that can be learned in the app. Advice for future research or an alternative study proposition would be to gather only participants who learn the same language and, therefore, be exposed to the same characters. In addition, a good suggestion for Duolingo itself would be to have the characters a user likes present in their notifications.

Furthermore, the following approach for the design classification was chosen for this study. If a notification included only Duo the Owl, it was considered gameful, but if it was a character other than Duo, it was categorized as playful. Moreover, if the participants disagreed with this paper's design classification, this does not necessarily mean they are wrong, despite saying so in the results section, as it was only described this way for the ease of analyzing findings. It could also be that this study's criteria for labeling the notifications as gameful or playful were inaccurate or incomplete. That is why an alternative would be to divide, even the same notifications used in this study, by the message itself or its purpose, e.g., make the user focus on the streak, which would indicate gameful design, or make the user roam free in the app which would indicate playful design.

The last suggestion for future research would be to utilize this research in the context of app use itself instead of just notifications, and over longer periods as well, to explore whether combinations of and/or variation in the notifications work better on user behavior instead of repeatedly using the same ones.

Conclusion

This study intended to investigate the distinct but interconnected concepts of gameful and playful designs and their implications on user behavior and attitudes, with a particular focus on the language learning app Duolingo. Gameful design, often manifested through gamification, introduces structured challenges and progression. In contrast, playful design fosters a free-form play environment and invites playful behavior without focusing on gains or rewards. The differentiation between these two designs is significant, as the literature on playful design and playfulness, particularly in the learning field, is relatively limited compared to gameful design and gamification. The research aimed to bridge this gap by investigating the impact of Duolingo's playful design on users' interaction with the app in comparison to its gameful design.

In conclusion, this research presented useful insights into the outcomes of both designs. The findings suggest that gameful design influenced participants slightly more concerning user engagement, with users favoring more and being more likely to open the app. However, the playful design demonstrated a high-risk, high-reward dynamic, particularly in the case of the character Lily, which caused polarized participants' experiences and reactions, demonstrating that the success of playful elements can depend highly on user perceptions. There was little difference between the two designs concerning how users interacted with the app and the amount of time spent. This suggests that personal preferences and learning goals are significant factors in user engagement, regardless of the design approach. The research also indicated that the designs can elicit different types of motivation. Gameful design appeared to stimulate more external motivators, such as extending streaks, while playful designs seemed to foster more internal motivation, with users encouraged by characters. Regarding Bartle's player types, the findings showed different preferences for both designs, supporting the idea that the same components can offer distinct experiences and influence motivation differently across player types.

Finally, this study underlines the importance of understanding the subjective nature of playful and gameful designs and (combined) their effects on user behavior. It also highlights the need for further research to investigate these dynamics more deeply, considering this paper's limitations. This includes the need to improve categorization methods for participant backgrounds so that the individual differences can be better inspected and a more comprehensive exploration of user familiarity with specific elements of the app, such as characters.

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Appendix

Appendix A: Interview Questions

Pre-interview:

- What is your field of study?
    - Is it more technical or creative?
- What is your gaming experience?
    - Have you ever played video games?
    - What type of games do you like to play the most?
- What do you value more in a game - achieving rewards, exploring the game world, socializing with other players, or defeating other players?

Establishing Duolingo Background:

- How long have you been a Duolingo user?
    - If you stopped using Duolingo at some point, what was the reason?
    - If you resumed using Duolingo after a break, what was the reason?
- What language have you been learning in Duolingo?
- How often do you use Duolingo? (Or how often have you used Duolingo?)

Questions to Assess the Notifications:

- What do you think of this notification?
- Do you like this notification and does it appeal to you? Why or why not?
- Would you open the app based on this notification? Why or why not?
- What would you do in the app after opening this notification?

- How long would you spend in the app based on this notification?
- Do you think this notification is more gameful or playful? Why?

Appendix B: Interview Transcripts

https://drive.google.com/drive/folders/11ynPBEVJsMj0vA94Px_i-cwvYcAInjqw?usp=sharing

Appendix C: Interviews' Insights Spreadsheet

https://docs.google.com/spreadsheets/d/1HgPuzvmGrYWrkQCmyAkmZ43C4CAJZnvp0B-3Vqu2CdM/edit?usp=sharing