

Using Hobbies as Proxy for Gamification Player Types

Semi Rantanen, Antti Knutas and Jussi Kasurinen

LUT University / School of Engineering Science (LENS), Lappeenranta, Finland

antti.knutas, jussi.kasurinen@lut.fi

Abstract—Many gamification approaches use a one size fits all approach. Different gamification player types and associated preferences have been proposed, such as the gamification player type Hexad. According to the Hexad, people prefer different gameful activities, such as exploration, social activities, or competition. Similarly in hobbies, different things motivate and interest different people, such as some finding board games interesting, while others like hiking and going on camping trips. We propose that a person’s hobbies and interests provide an insight into what type of person they are, indicating what they might like, and could have a connection to gameful system preferences. In this paper, we explore the relationship between free-time activities and gamification player types, to enable earlier and faster detection of the player types and their preferences. The research was conducted by building a survey to measure the free-time activities of people and also measure the Hexad player type as defined by Marczewski and Tondello et al. Significant relationships were found between free-time activity variables “Active physical exerciser”, “Audience of cultural events”, and the player type Philanthropist. Overall, these results indicate that free-time activities can have correlations with player types and reported hobbies can be used as a proxy when selecting personalized gamification approaches.

I. INTRODUCTION

Generally, the agreed definition of gamification is defined as the “intentional use of game elements for a gameful experience of non-game tasks and contexts” [1]. In practice, it’s often about motivating users to interact with systems through the utilization of game design elements. Overall, often the goal of applying these elements is to improve human interaction with the system and improve intrinsic motivation to complete task at hand. Lately, a lot of research revolves around finding different contexts where to apply gamification and investigating possible benefits of applying game design elements in different applications. Gamification could play significant role in helping people find intrinsic motivators in contexts where it often might be difficult such as school or work environment [2], [3], [4], [5]. Utilization of game design elements in non-gaming contexts is about enhancing the experience that is being gamified. A hot topic within the research community has been finding proper use cases and even the right people that most benefit from these elements. The emergence of player types [6] that describe how and why people enjoy certain elements has led to questioning whether these player types connect to different aspects of our lives rather than just games. In other words, there could be hints in our everyday life into what sort of game design elements we enjoy and therefore

would there be correlation between our free time non-gaming activities and the game design elements that we enjoy.

In this paper, we explore the identification process of player types for tailored gamification by using hobbies as the proxy. Overall, our research question is as follows: *Do the free-time activities of a person correlate with gamification player types and therefore have predictivity into the game design elements that they enjoy?*

To investigate the connection between hobbies and preferred enjoyment, this study is about connecting real-world activities with gamification player types and seeing if there are correlations where activities could predict the type of player a person is. For our study, we selected the gamification player type Hexad by Marczewski [7] and empirically validated by Tondello et al. [8], [9]. The study should help us understand how these player types connect with our behaviour in the real world and whether there are predictivity in free-time activities and enjoyed gamification elements. Overall, the goal is to extend our knowledge of gamification and how it is related to other activities that we enjoy and find outside factors that could explain our alignment with these player types.

II. RELATED RESEARCH

In theory, the game design elements applied in non-entertainment applications should increase participation and intrinsic motivation to complete the task at hand, but research has shown that the application of gamification has varying results in different contexts [10], [2], [3], [4]. For example in education, the application of gamification elements seemed to have improved motivation and activity participation in a classroom setting but at the same time, these elements did not improve grades significantly [2]. Similarly, adding playfulness and robots to programming courses has failed [11], as has applying gamified learning platforms [3]. Its also important to understand that there are several ways to implement gamification, with the most game-element saturated systems practically being designed as serious games, whereas the minimal gamification can be something simple as showing a total number of likes for user’s content, or percentage of users with less progress than the player, to motivate users to either catch up, or keep ahead [12]. In any case, the amount of gamified elements, and the type can vary in a wide spectrum, which means that quick identification of the most motivating elements that work,

and more importantly, those that don't work, for the target audience is important.

One important lesson to understand is that not all groups of people are motivated by gamification elements. Gamification for some students seemed to add another layer of complexity and did not seem to support their learning [3]. Conflicting results even within the same context seem to suggest that other factors could predict the successful outcome of gamification. The findings question whether context alone is enough to explain the successful outcome of gamification, or if other factors are more motivating, such as individual preferences. Often, applications of gamification take the one-fits-all approach, which depending on the application context may completely fail to account for differences in the way players want to experience their games [13]. It's also fairly common to blame misalignment with the user needs and gamification goals for the failures in product gamification [14].

The concept called adaptive gamification considers different playing motivations, and tries to explain different motivating factors by providing different gamer-profiles which try to explain why types of people enjoy certain gamification elements more [13]. Previous research indicates that a correlation between gamification feature categories and video game preferences exists. This means that people who enjoy certain types of games are more susceptible to enjoying similarly working gamification features [15], although empirical research validating and connecting player type to external attributes is quite rare. The connections between player types and personalities have been made and these comparisons try to answer how these traits play into gamification elements that people enjoy [16].

III. RESEARCH PROCESS

To study how users' personal life and hobbies could correlate with the preferred gamification methods, a survey was designed to collect information. Overall, the research process consisted of three separate phases: survey construction, data collection, and data analysis, explained in detail in the following chapters.

A. Research methods

Surveys are used to gather generalized information about specific population. Different survey instruments are tools to conduct empirical research. Self-administered questionnaires allow people to answer survey by themselves and are ideal for quantitative research. Another tool is to interview people and often could be used to gather qualitative information [17], [18]. Purpose of these surveys is to gather data from smaller population and be able to extrapolate the results into larger population. To be able to do extrapolation, sufficient sampling is needed. Essentially, this means that there needs to be enough responses to allow data to be accurate and representative of a larger population. Data needs to be from heterogeneous group of people that are part of so-called representatives. These are people who belong into target demographic that are being researched [19], [20]. In total, there are three

objectives for surveys. Descriptive surveys are used to enable assertions about certain population. Explanatory survey tries to explain why certain population behaves the way they do. Finally, explorative aims to assure that important issues are not foreseen during pre-study phase [17]. The goal of this research is to find correlations between two distinct attributes within a population, namely free-time activities and gamification player types. This research is not trying to explain why people behave in certain way but rather assert that people who enjoy certain leisure time activities are also more likely to enjoy certain gamification elements. To collect data about this relationship, a survey was built.

The process of building the survey requires three distinct components. First, a basic demographic questionnaire that asks for basic information regarding respondent of the survey. This type of data is commonly collected to get an idea who is responding to the survey and in this case ensure that answers are from diverse group of people. Demographic data works as an additional analytical tool that can be used in analysis to see if different demographics deviate from overall results. Second, some sort of categorization of hobbies is needed. There are possibly thousands of different leisure time activities, and it is not feasible to allow people to choose too specifically. In nutshell, the more options you give to people the more data will be needed to confirm any hypotheses. Increased scope might not be possible due to budgeting and scheduling constraints. Third, a framework that can accurately predict person's player type accordingly to some player type typology is needed. This framework needs to be compatible with descriptive survey type and be simple enough that it can be self-administered. These three components provide data that is necessary to conduct this research.

B. Data collection

The survey was implemented as self-administered questionnaire hosted online. The survey was created using Webropol survey tool, which includes data management and has possibility to export data out of the service for analysis purposes. Goal of the research was to gather data from as wide group of people as possible and as such there is no specific target demographic specifically meant for this survey. While there was no specific target group, the questionnaire questions were in Finnish, limiting the respondents to those who know Finnish, albeit online translation tools do exist which means that submission is technically possible for non-speakers. In addition, there is not much need for detailed demographic data. For example, while it could be interesting to ask respondents for their occupation, getting that information might be redundant as it's not directly related to the research question of this research. These are mainly used to get some basic understanding on who is filling out the survey and validate results against previous research. In total there are two points of data collected: age and gender. These were used to validate that not all answers came from same demographic group, but there was some diversity with survey respondents. Question about age had five categories: under 18, 18-30 years old, 31-50 years old,

51-70 years old, and those over 70. These age ranges are kept wide as more narrow ranging would likely not yield different results and this allows for more data entries per category. Question about respondent's gender included three options: male, female, and other.

Problem with categorizing different leisure time activities is that there are thousands of different hobbies and past time activities. Difficulty stems from finding general enough hobbies that apply to most respondents, while not being too general that all respondents share majority of the hobbies. To narrow down selection five distinct categories were chosen. These categories were collected from Finnish statistic agency Statistic Finland that collects data about different activities of Finnish people. Recreational data is one of the data groups collected by the agency. The five chosen categories were Active physical exerciser, Creative pursuit as a hobby, Audience of cultural event, Watching television programmes, and digital gaming. Even though these are very generalized activities there might be respondents who do not participate in any of these activities and therefore a sixth one was added titled "Something else." This section also included open-text field that could be filled out by the respondent. In case there would be enough responses with similar activities, these would be included in the analysis. Respondents were given option to choose any number of these activities, but at minimum one had to be selected. To help respondents find their hobbies from these categories, each option was given some example activities that are associated with that specific general category. For example, Creative pursuit as a hobby had examples that included cooking, dancing, or photographing. All given example activities are listed in Table I.

To determine respondent's player type, framework developed by Tondello et al. [8] in their research "The Gamification User Types Hexad Scale" was used. It is a 24-item survey that has four related questions for each six player types. This framework was built upon initial description of different player types that were first described in "Even Ninja Monkeys Like to Play: Unicorn Edition" by Marczewski [7]. Hexad scale framework was chosen mainly because there has been follow-up research that support validity of this framework [21], [9]. Another factor was the simplicity of the implementation. Questions regarding player types can be understood by people who might not be aware of gamification or phenomena related to it. Survey respondents will answer how well each question relates to them in a 7-point Likert scale. Total points from each category's four questions are summed together and the one with most points is respondent's primary player type. Interestingly, Tondello et al. [8] also noticed that there were some medium correlations between different player types. For example, if primary player type is Philanthropist, they are more likely to have more points in Socialiser category as well. Player type determining questions and translations are available in the online appendix ¹. The authors suggest that each item is presented without identifying the player type

¹Anonymized for review purposes

category they are related to. Another suggestion was to present these questions in randomized order. The approach described here is the recommended way to determine player type from this survey by the authors.

IV. FINDINGS

In total, there were 59 responses to the survey. Demographic results are as follows: 70% of the respondents were in the 18-30 age group. This young adult age group had the most respondents for both male and female segments. Majority of the respondents were men, 40 out of 59 respondents. Rest were women and zero participants reported other as their gender.

First, factor analysis was used to reduce the data into clusters of variables and discover any underlying latent variables that cannot be measured directly. The first step of the process was to submit data into IBM's statistics software SPSS which is used to perform factor analysis. Then, linear regression was applied to confirm the strength of correlations between player types. Due to combining both exploratory and confirmatory methods, the entire statistical process should be considered exploratory and tentative.

A. Factor analysis

Kaiser-Meyer-Olkin (KMO) test indicates the suitability of data for factor analysis [22], [23]. Values less than 0.5 indicate that sampling is not adequate. With values between 0.5 and 0.6, researcher should evaluate the study and make the decision. For this dataset, a KMO test result outcome with a value of .563 is passable in certain situations. Bartlett's Test of Sphericity is used to validate the adequacy of the correlation matrix [23]. The test is significant at $p < .001$ which indicates that there are high correlations between some of the variables. Any significance value below $p < .05$ indicates that the dataset is suitable for factor analysis [23]. With these results, we decided to proceed, since the study is initial and exploratory.

Varimax with Kaiser Normalization was used to rotate resulting matrix and was used to ensure no correlation between factors. Factors found by the analysis are likely to have some level of correlation, but for the sake of analysis simplicity, orthogonal rotation method which eliminates correlations between factors was used. Factor analysis can provide as many factors as there are variables and therefore system is needed to only select the most meaningful factors out of the group. In this case, factors were selected based on their eigenvalues, and those with value over 1 were selected. Rotated factor matrix is presented in Table II.

After identifying the factors, the next step is to give names based on the underlying trait they try to explain. Factor 1 was named "Affection to sports and wellbeing" and factor 2 as "Appreciation of arts". Factor 1 describes a person that enjoys doing as well watching. At face value, it is difficult to find some underlying human characteristics that these variables explain. Therefore, it was chosen that these types of people are likely to enjoy sports by doing and watching as this is the common factor between the free-time activity two variables. Philanthropist is interested in well-being of others

TABLE I
LEISURE ACTIVITY CATEGORIZATION AND TRANSLATIONS

Name of English activity	Name of Finnish activity	Example activities
Active physical exerciser	Liikunnan harrastus	-
Creative pursuit as a hobby	Itsetekeminen	Writing, Dancing, Photographing, reading
Audience of cultural events	Kulttuuri	Visiting theater, cultural events, museums
Digital gaming	Pelaaminen	Video games, board games
Watching television programmes	Viihde	Watching sports, watching television, Netflix

TABLE II
ROTATED FACTOR MATRIX

Type	Factor			
	1	2	3	4
Philanthropist	0.685		0.380	
Active physical exerciser	0.553			
Watching television programmes	0.551			
Free Spirit		0.615		0.397
Disruptor		0.497		
Creative pursuit as a hobby		0.445		
Audience of cultural events		0.442		
Socialiser			0.739	
Player			0.465	
Achiever				0.775

and themselves and motivated by purpose and meaning [7]. As such, additional description of “and well-being” was given to factor 1 to highlight purpose and meaning aspect of the factor. Naming factor 2 was a little easier as these people are fond of cultural activities and like to partake in some themselves. Player types Free Spirit and Disruptor have already been found to positively correlate [8], [21], [24]. It is likely that this type of person enjoys artistic expression while being interested in finding their own path.

B. Linear regression analysis

The purpose of factor analysis was to cluster data into factors that at first glance display relationships between player types and free-time activities. This exploratory method was used to give advice on what free-time activity variables to test against player type variables. The next step is to validate the results by conducting multiple linear regression analysis where closer look will be taken into how these free-time activities impacted player type scores. Free-time activity variables that constituted the two relevant factors were used as independent variables to try and explain dependent player type variables.

Multiple linear regression analysis findings are presented in Table III. MLR1 variables are part of the first multiple linear regression equation and MLR2 variables are part of the second.

There were in total two relationships that had statistical significance between independent free-time activity variables and dependent player types. Both were present in the Philanthropist player type. First run, which was based on the factor “Affection of sports and well-being” contained both “Active physical exerciser” and “Watching television programmes” as independent variables. The results of this indicate that “Active

physical exerciser” has statistically significant relationship and moderate strength relationship with Philanthropist.

What this analysis confirms is that there are some indications of free-time activities correlating with player types. Especially Philanthropists in this sample seemed to have two free-time activity variables that had a positive correlation with the player type. Simply put, a person who selects any of the “Active physical exerciser” or “Audience of cultural events” is likely to score higher in the Philanthropist type. As was mentioned in the previous chapter, these relationships are not strong, but they are significant. In this sample, other tests did not signify statistical significance.

V. DISCUSSION

The results of this study indicate that free-time activities can play minor role in person’s player type alignment. This can have implications for the practical design of tailored gamification, because it is rarely possible for game designers or advertisers to be able to measure the player type of a person directly. Inference through correlation from other forms of data could help these people to tailor game mechanics to those who appreciate them the most, without having to resort to scientifically rigorous but difficult to answer surveys.

The main finding of our paper continues the line of research of gamification user analysis, which includes analysis of player behaviour Loria et al. [25] and evaluation of gamification preferences from player types [15]. This paper extends the state of the art by introducing a new potential correlation for inferring gamification preferences.

A second finding is that our study confirms earlier analysis on player types, where our analysis of Free Spirit and Disruptor correlation matches earlier studies by [8], [21], [24].

TABLE III
MULTIPLE LINEAR REGRESSION OUTCOMES BETWEEN FREE-TIME ACTIVITY VARIABLES AS INDEPENDENT VARIABLES AND PLAYER TYPE SCORES AS DEPENDENT

	Philantropist	Socialiser	Free Spirit	Achiever	Disruptor	Player
MLR1: Active physical exerciser	4.988 ($p < 0.01$; $R^2=0.177$)	1.905		1.696		
MLR1: Watching television programmes	1.638					
MLR2: Audience of cultural event	1.835 ($p < 0.05$; $R^2=0.61$)		1.007		0.899	

Due to limited dataset and not using an independent dataset for statistical inference (regression analysis), this paper can be considered an exploratory paper only and not hypothesis testing one. As future research, we recommend further data collection and confirmatory research with an independent dataset, guided by these initial findings. Additionally, research constraints limited the size of the dataset and the survey research is based on a convenience sample. However, despite these limitations, the findings are promising.

VI. CONCLUSIONS

In this paper, we explored the possibility of identifying player types by using hobbies as a proxy. We found that free-time activities can play a minor role, especially with the philanthropist player type. Our initial findings suggest that there is potential in designing tailored gamification by using personal preferences, such as hobbies, as a proxy for gamification player types.

We extend the state of the art similarly by pointing out the potential for this avenue of research. Our findings are exploratory, but these findings on player types guide the path for future hypothesis testing -based confirmatory research.

REFERENCES

- [1] K. Seaborn and D. I. Fels, "Gamification in theory and action: A survey," *International Journal of human-computer studies*, vol. 74, pp. 14–31, 2015.
- [2] G. Barata, S. Gama, J. Jorge, and D. Goncalves, "Engaging engineering students with gamification," in *2013 5th International Conference on Games and Virtual Worlds for Serious Applications (VS-GAMES)*, pp. 1–8, 2013.
- [3] K. Berkling and C. Thomas, "Gamification of a software engineering course and a detailed analysis of the factors that lead to its failure," in *2013 International Conference on Interactive Collaborative Learning (ICL)*, pp. 525–30, 2013.
- [4] J. Majuri, J. Koivisto, and J. Hamari, "Gamification of education and learning: A review of empirical literature," in *Proceedings of the 2nd International GamiFIN 2018 Conference*, p. 9, 2018.
- [5] S. Reyssier, S. Hallifax, A. Serna, J.-C. Marty, S. Simonian, and E. Lavoué, "The impact of game elements on learner motivation: Influence of initial motivation and player profile," *IEEE Transactions on Learning Technologies*, vol. 15, no. 1, p. 42–54, 2012.
- [6] A. C. T. Klock, I. Gasparini, M. S. Pimenta, and J. Hamari, "Tailored gamification: A review of literature," *International Journal of Human-Computer Studies*, vol. 144, p. 102495, 2020.
- [7] A. Marczewski, *Even Ninja Monkeys Like to Play: Unicorn Edition*. Independently Published, 2016.
- [8] G. F. Tondello, R. R. Wehbe, L. Diamond, M. Busch, A. Marczewski, and L. E. Nacke, "The gamification user types hexad scale," in *Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play*, 229–43. CHI PLAY '16. New York, NY, USA: Association for Computing Machinery, 2016.
- [9] G. F. Tondello, A. Mora, A. Marczewski, and L. E. Nacke, "Empirical validation of the gamification user types hexad scale in english and spanish," *International Journal of Human-Computer Studies, Strengthening gamification studies: critical challenges and new opportunities*, vol. 127, p. 95–111, 2018.
- [10] J. Hamari, J. Koivisto, and H. Sarsa, "Does gamification work? – a literature review of empirical studies on gamification," in *2014 47th Hawaii International Conference on System Sciences*, pp. 3025–34, 2014.
- [11] B. S. Fagin and L. Merkle, "Quantitative analysis of the effects of robots on introductory computer science education," *Journal on Educational Resources in Computing (JERIC)*, vol. 2, no. 4, pp. 2–es, 2002.
- [12] K. Werbach and D. Hunter, *For the win, revised and updated edition: The power of gamification and game thinking in business, education, government, and social impact*. University of Pennsylvania Press, 2020.
- [13] I. Rodríguez, A. Puig, and A. Rodríguez, "Towards adaptive gamification: A method using dynamic player profile and a case study," *Applied Sciences*, vol. 12, no. 1, p. 486, 2022.
- [14] K. Robson, K. Plangger, J. H. Kietzmann, I. McCarthy, and L. Pitt, "Game on: Engaging customers and employees through gamification," *Business horizons*, vol. 59, no. 1, pp. 29–36, 2016.
- [15] L. Hassan, J. Rantalainen, N. Xi, H. Pirkkalainen, and J. Hamari, "The relationship between player types and gamification feature preferences," in *Proceedings of the 4th International GamiFIN Conference*, 2020.
- [16] L. S. Ferro, S. P. Walz, and S. Greuter, "Towards personalised, gamified systems: An investigation into game design, personality and player typologies," in *Proceedings of The 9th Australasian Conference on Interactive Entertainment: Matters of Life and Death, 1–6. IE '13*. New York, NY, USA: Association for Computing Machinery, 2013.
- [17] C. Wohlin, P. Runeson, M. Höst, M. C. Ohlsson, B. Regnell, and A. Wesslén, *Experimentation in Software Engineering*. Berlin, Heidelberg: Springer, 2012.
- [18] A. Fink, *The Survey Handbook*. SAGE, 2013.
- [19] J. A. Krosnick, "Survey research," *Annual Review of Psychology*, vol. 50, no. 1, p. 537, 1999.
- [20] K. KELLEY, B. CLARK, V. BROWN, and J. SITZIA, "Good practice in the conduct and reporting of survey research," *International Journal for Quality in Health Care*, vol. 15, no. 3, p. 261–66, 2003.
- [21] J. Krath and H. F. Korfflesch, "Player types and game element preferences: Investigating the relationship with the gamification user types hexad scale," in *HCI in Games: Experience Design and Game Mechanics*, ser. Lecture Notes in Computer Science, X. Fang, Ed. Cham: Springer International Publishing, p. 219–38, 2018.
- [22] C. D. Dziuban and E. C. Shirkey, "When is a correlation matrix appropriate for factor analysis? some decision rules," *Psychological bulletin*, vol. 81, no. 6, p. 358, 1974.
- [23] N. Shrestha, "Factor analysis as a tool for survey analysis," *American Journal of Applied Mathematics and Statistics*, vol. 9, no. 1, p. 4–11, 2011.
- [24] A. Manzano-León, P. Camacho-Lazarraga, M. A. Guerrero-Puerta, L. Guerrero-Puerta, A. Alias, R. Trigueros, and J. M. Aguilar-Parra, "Adaptation and validation of the scale of types of users in gamification with the spanish adolescent population," *International Journal of Environmental Research and Public Health*, vol. 17, no. 11, p. 4157, 2020.
- [25] E. Loria and A. Marconi, "Player types and player behaviors: analyzing correlations in an on-the-field gamified system," in *Proceedings of the 2018 Annual Symposium on Computer-Human Interaction in Play Companion Extended Abstracts*, 2018, pp. 531–538.