Exploring the Reliability of a Cross-Cultural Model for Digital Games: A Systematic Review

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Abstract—In recent years, the game industry has become one of the most popular and competitive industries. To quickly expand game markets and attract more game players and consumers, a variety of types of games are developed by the companies and developers. Cross-region games are also common in the current game markets. Consequently, a multi-national competition across different cultures or countries is inevitable. For successful expansion of game market, the existence of cultural differences of game players with various cultural backgrounds is one of the notable issues we cannot ignore. Even though there are studies focusing on the relevant cultural differences, there are no study summarizing the past findings. Additionally, no powerful norm has yet been defined, therefore this paper will investigate whether it is feasible to apply the Hofstedes' Cultural Dimensions Theory, often utilized in Management, to game industries and to be a reliable guidance for game design and development for cross-culture game players.

Keywords—cross-culture, digital games, culture model, Hofstedes' cultural theory, cultural differences

1 Introduction

Over the last decade, the game industry has grown rapidly, developing into the core of the world cultural industry and as one of the most popular industries in existence. According to Grand View Research (2020), global gaming market was worth USD 151.06 billion in 2019 and is expected to reach USD 398.15 billion by 2027, growing at a Compound Annual Growth Rate (CAGR) of 12.9% from 2020 to 2027. IBISWorld Company (2020) reported that the scale of U.S. video game industry increased by more than 8 percent annually from 2016 to 2021. In 2021, the video game industry in the United States is worth USD 65.5 billion. An economic impact study, conducted by Economists Incorporated and released by Entertainment Software Association (ESA) in 2019, indicated that generated direct economic output in 2019 exceeding $40.9 billion, over 143,000 direct jobs, and contributed $59.76 billion in value-added (growth in GDP) [13]. As a result, the U.S. video game industry substantially contributes to the

American economy. In China, an important constituent of the global games industry, the gaming market reached $31.96 billion in 2018 (which accounts for 23.6% of the global game market), achieving a 20% year-on-year growth, according to the China Game Publishers Association Publications Committee (GPC). This explosive growth implicates the importance of game development in the future.

Due to the fast growth and potential development of game market, targeting and positioning in local areas has not satisfied the managers and developers of game companies. Expansion of game market by penetrating other foreign game markets has been an inevitable trend. Many publishers have developed games for markets of different countries through localization in order to obtain foreign consumers. However, what was found is that not all of game companies could attract their foreign target audience, unless they understood the customers' characteristics (e.g. attitudes, preferences, regional features, etc.) as well as trends of foreign market, and further responded to the major needs of customers [7, 15, 32, 49]. To expand the scale of game market by attracting more foreign players/consumers, understanding what kinds of characteristics of games are most important for consumers or players to choose/play games is necessary. Xu, Turel, and Yuan [50] found that people play the online game due to the need for relationship and escapism. The interactive and collaborative or competitive features involved in the games are attractive to individuals [25, 36]. Gender and cultural differences may influence people's gameplay habit, preferences of game types and the choices of game characters [3, 4, 11, 19, 28, 34, 39]. However, for the sake of developing game markets in different countries, presumably the cultural difference, one of the obvious characteristics between diverse game markets of different countries is an inevitable issue.

Lots of cross-cultural research about the differences of gaming between various countries has been conducted. Hofstede [17, 18] indicated that the psychological activities of human beings coming from distinct cultures are different, which leads to the diversities of conceptual structures and different qualities or strengths in different cultures. The cultural differences can be discovered in a variety of conditions. Yuki, Maddux, Brewer, and Takemura [37] explored differences in depersonalized trust (trust toward a relatively unknown target person) across cultures and differences in discussing distal consequences [47]. When interacting with people, individuals coming from different cultures often show different behaviors or generate different understanding [1, 12, 26, 27, 42-45] or effects [6, 23] under a similar condition. The differences of cultures also affect the attitudes toward games [26, 27, 29] and product reviews of games which can be viewed as reflections of cultural values [2]. Furthermore, the cross-cultural effects lead to distinct motivations, habits and decision-making for purchasing games [31, 32, 40].

In this paper, a study based on literature review is conducted for exploring whether the game preferences of player in different cultures are consistent with corresponding cultural dimensions or characteristics. A cultural dimensions theory, which has been widely utilized in defining the feature of cultures, will be introduced in Section 2. Next, a method concerning the process of literature review will be stated in Section 3. Finally, all findings or results discovered from literature review will be discussed and the conclusion will be made in Section 4.

2 Cultural dimensions theory

In this section, a cultural dimensions theory, Hofstede's Cultural Dimensions Theory, is described, which has been widely utilized in defining the features of cultures for the field of Management.

2.1 Hofstede's cultural dimensions theory

To identify the cultural differences, Hofstede proposed a cultural dimensions theory and defined the systematic differences in national cultures on six primary dimensions: Power Distance (related to the different solutions to the basic problem of human inequality); Uncertainty Avoidance (related to the level of stress in a society in the face of an unknown future); Individualism/Collectivism (related to the integration of individuals into primary groups); Masculinity/Femininity (related to the division of emotional roles between women and men); Long/Short Term Orientation (related to the choice of focus for people's efforts: the future or the present and past) and Indulgence/Restraint (related to the gratification versus control of basic human desires related to enjoying life) [8, 16, 18], which has been widely utilized in distinguishing characteristics of different cultures.

Generally, the differences of cultures between Eastern World (e.g. China, Japan, Korea, Taiwan, etc.) and Western World (e.g. USA, Canada, Europe, etc.) are significant. Individualism and collectivism has been considered the most important characteristic to differentiate between Eastern cultures and Western cultures. For instance, a cross-culture research was carried out by Tse, Lee, Vertinsky, and Wehrung [9] and they concluded that individualism and collectivism are the prime distinction between North American and Chinese cultures. Schimmack [46] pointed out that individualism is a valid construct for cross-cultural comparisons. To be specific, Eastern culture is often characterized as collectivistic. People of this culture may emphasize interdependence and tend to have self-concepts on relationships and social obligations. In contrast, Western culture is often characterized as individualistic. People of this culture typically focus on the independence and tend to have self-concepts on their own aspirations and achievement [20, 21, 38, 48].

3 Methods

In this section, the specific research questions and the data collection procedure are identified first. To address the research questions through literature review, the approach of data analysis about how to organize related studies in the past years are described.

3.1 Research questions

The purpose of this study is to explore whether the game preferences of players in different cultures are consistent with corresponding cultural dimensions or characteristics. In this study, the primary research questions to be addressed in this paper are as follows:

1. Are the preferences or experience of digital games of people from diverse cultures relevant to the characteristics of cultures?
2. To what extent is the Hofstede's cultural dimensions theory (or other optional cultural dimensions theories) compatible with the preferences or experience of digital games of people from diverse cultures?

3.2 Data collection

The databases adopted in this study for search were EBSCO (including Academic Search Complete, Academic Search Premier, Communication & Mass Media Complete, Education Source, ERIC, OpenDissertations, and Primary Search), APA PsycInfo, and APA PsycArticles. The search terms used to search the relevant literature in these databases included:

First search term. [(“game*”) AND (cultur* OR "cross-cultur*" OR "multi-cultur*" OR multicultur* OR “multiple culture*” OR intercultur* OR “inter-cultur*”) NOT ("cultural game*" OR "culture game*")]

Second search term. [(“digital game*” OR "computer game*" OR "video game*" OR "console game*" OR "mobile game*" OR "online game*") AND (China OR Chinese OR "United States" OR America* OR USA OR "U.S." OR Japan* OR Korea* OR Germa* OR "UK" OR United Kingdom OR England OR Franc* OR Canad* OR Spain OR Spanish OR Ital* OR Russia* OR Mexic* OR Brazil* OR Australia* OR Taiwan*)]

Third search term. [("game*") AND (prefer* OR favorite* OR type* OR genre* OR style*) AND (cultur* OR countr* OR ethnic* OR rac* OR background*)]

3.3 Eligible inclusion and exclusion criteria

Inclusion criteria. To be included in the study, papers should be qualified by the following characteristics: (1) The papers should be written in English and have been published between 2000 and 2021; (2) The source types of articles should be academic journals, conference papers, and dissertations; (3) The full-text of papers must be available online or in hardcopy form; (4) The papers should focus on the digital games, such as computer games, video games, online games, and mobile games; (5) The papers should show empirical or theoretical evidence/results regarding to the behaviors, attitudes, motivations or psychological activities of different cultures or countries toward digital games.

Exclusion criteria. Several characteristics are identified for ensuring the validity and pertinence to this study: (1) Newspapers, websites and short articles are excluded;

(2) The papers did research about countries but not cover the Hofstede's cultural dimensions theory (or not cover other cultural dimensions or categories relevant or similar to Hofstede's cultural dimensions theory) will not be discussed; (3) The papers only focusing on one country or culture will not be considered; (4) The papers concerning application of digital games for learning, training, or management are not included in this study.

3.4 Data collection

The approach to systematic reviews adopted in this study is the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-analyses) proposed by Page et al. (2021) [35]. The flow of study selection process of PRISMA includes four steps: Identification, Screening, Eligibility, and Included (See Figure 1). The previous-mentioned eligible inclusion and exclusion criteria are involved in the process.

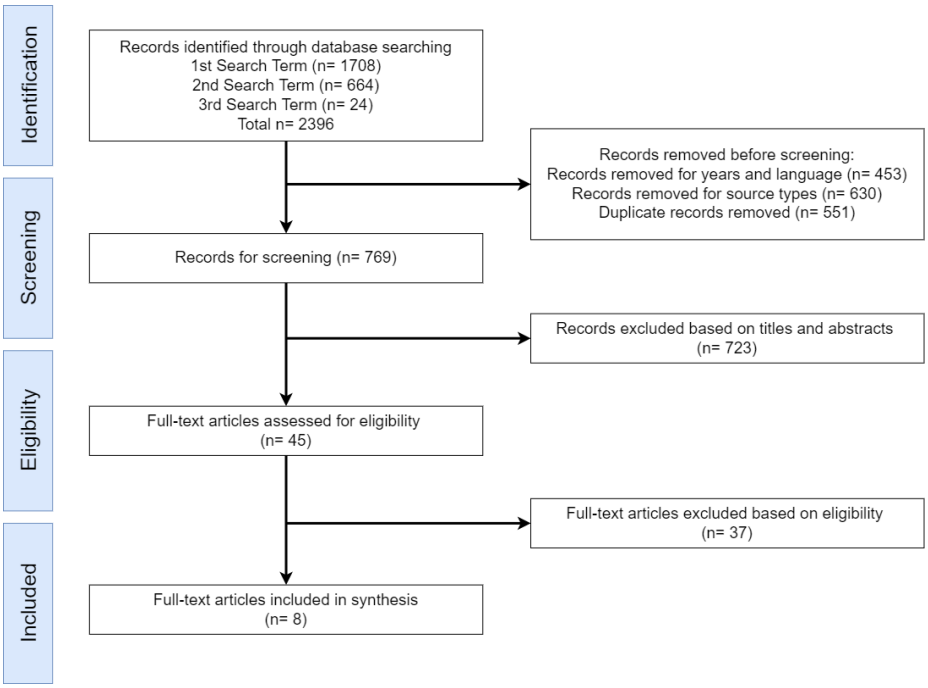

Fig. 1. The flow diagram of the study selection process based on PRISMA

3.5 Data analysis

Two steps are developed to analyze and organize the involved papers, which are described as follows:

Step 1. Based on the definitions of cultural dimensions proposed by the Hofstede's cultural dimensions theory, all papers involved in this study will be classified into six

categories corresponding to the six cultural dimensions (i.e., Power Distance, Uncertainty Avoidance, Individualism, Masculinity, Long-Term Orientation, and Indulgence).

Step 2. In order to examine the association between the preferences or experience of digital games and cultural features, the findings or evidence, about the similarities/differences of game preferences between diverse cultures in the involved papers will be compared to the matrix of dimension data established by Hofstede. The Hofstede analytical tool published in 2021 is used to obtain the score information of each country of the dimensions in the Hofstede culture model.

Notice that the scores listed in the matrix of dimension data will not be utilized for quantitative analysis; on the other hand, this study primarily depends on the cultural tendency or distinction of country reflected by the scores to conduct the research. Additionally, the information of experimental design (e.g. participants/sampling, types of games, environments, countries, etc.) employed in the chosen papers will be briefly described.

4 Conclusion and Implications

According to the result of study selection process in the previous section, eight papers with several interesting findings were chosen to be discussed in this section. James [48] used a website, called VGChartz, which tracks video game sales worldwide to investigate the American and Japanese consumers for video games in 2009. The results showed that all of the top 10 games sold in the United States in 2009 are console multi-players; however, the top 10 popular games sold in Japan in the same year are barely multi-player games (only three games are console multi-players). The author concluded that America has a group-oriented society and Japan is an individualistic society, which is inconsistent with the conclusion of Hofstede's culture model (See Figure 2). The culture model shows that the United States belongs to high individualism and Japan belongs to low individualism (Score of U.S.: 91; Score of Japan: 46) [14].

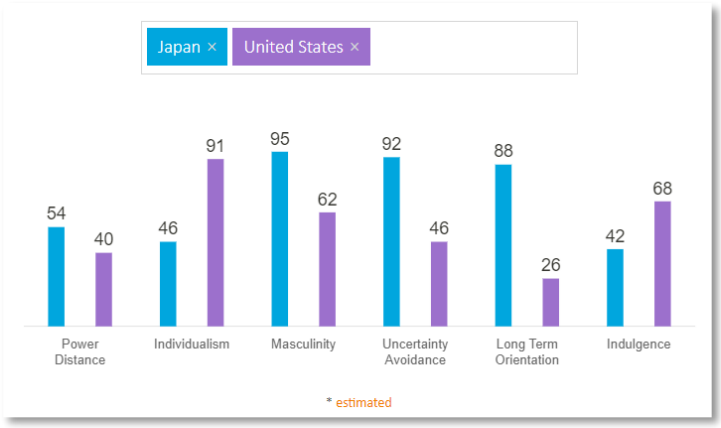

Fig. 2. United States vs. Japan (by the scores on the Hofstede's culture model)

Colwell and Kato [27] investigated the difference in video gameplay between the adolescents in the United Kingdom and Japan. There are 204 British adolescents and 305 Japanese adolescents involved in the survey. The result shows that self-esteem in the gameplay is higher in the United Kingdom than in Japan and it is also higher for boys when compared to girls. Additionally, aggressive games are more popular among U.K. adolescents. However, according to the dimension data matrix by Hofstede (2021), the expression of masculine society in Japan (score: 95) is stronger than that of United Kingdom (score: 66), which means Japanese often draws more self-esteem from their tasks than people in the United Kingdom (See Figure 3). It appears that the two results oppose each other.

On the other hand, the dimension data matrix indicates that the United Kingdom shows many of the characteristics of an individualistic society (Score: 89); on the contrary, Japanese society shows the characteristics of a collectivistic society (Score: 46) [14]. Individualistic societies, such as the United Kingdom, usually show a loss of self-esteem. It seems that the two results are also contradictory on the perception of Individualism/Collectivism.

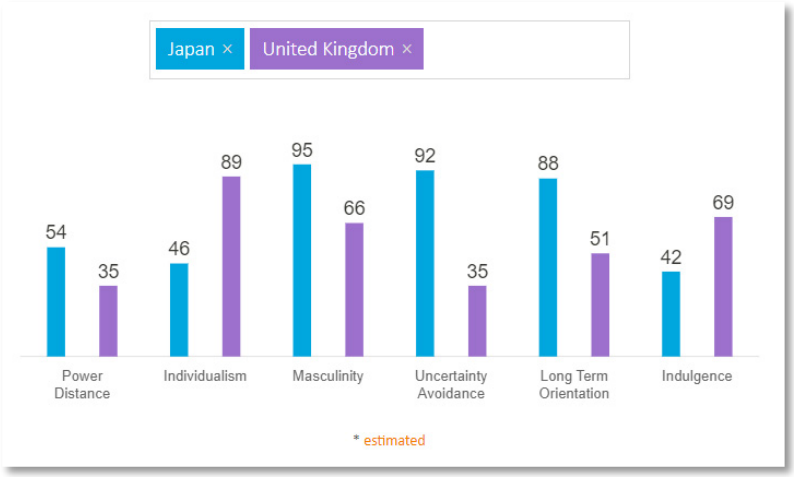

Fig. 3. Japan vs. United Kingdom (by the scores on the Hofstede's culture model)

Hou [8] employed content analysis to investigate avatars representation in ten multiplayers online role-playing games (MMORPGs) selected from the most popular games in Taiwan and the United States respectively. There are 71 avatars (from U.S. games) and 63 avatars (from the Taiwanese games) categorized into four types of facial expressions (including Happy/Cute, Aggressive, Sexy, and others). The number of aggressive avatars in Taiwan MMORPGs (Aggressive: 36.5%) are less than U.S. aggressive avatars (Aggressive: 45%). The Taiwan MMORPGs (Happy/Cute: 31.7%) include more happy/cute avatars than U.S. MMORPGs (Happy/Cute: 1.4%). Additionally, Hou (2008) examined 48 male avatars and 32 male avatars respectively from the ten games in Taiwan and the United States. Most of the male avatars (88%) in U.S. MMORPGs

show non-androgyny. However, in Taiwan MMORPGs, only 20 percent of the male avatars are non-androgyny and over 60 percent of the male avatars (65%) express more than 60% degree of male androgyny. Moreover, over 60 percent of the male avatars in U.S. MMORPGs were evaluated as more than 80% degree of male masculinity. On the contrary, 59 percent of the male avatars in Taiwan MMORPGs were evaluated as non-masculinity. The male avatars in Taiwan MMORPGs are significantly more aggressive, more androgynous, and less masculine than the male avatars in the United States. That is, in the MMORPGs, the masculinity of avatars in the United States is stronger than that in Taiwan (See Figure 4). The femininity of avatars in Taiwan is higher than that in the United States.

Wohn and Lee [10] found distinct differences in expected outcomes and usage patterns between Asian and Caucasian (located in the Colombia) respondents in their survey of Facebook game players. Asians were more likely to report social expected outcomes than Caucasians, and were more likely to engage in avatar customization activities than Caucasians, suggesting that cultural differences may affect expected outcomes and usage patterns of Social Network Games. If the kind of behaviors is likely judged as a way to "show off" to people, the Asian tends to be seen as individual players, which is in opposition to the conclusions of previous research described in Section 2.1 and Hofstede's culture model (See Figure 5).

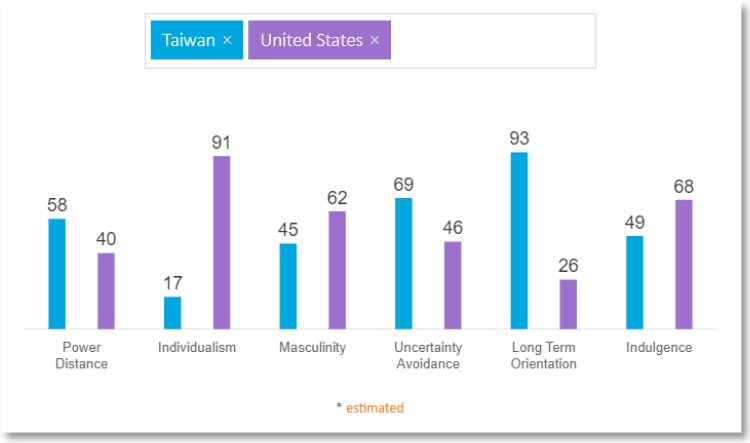

Fig. 4. United States vs. Taiwan (by the scores on the Hofstede's culture model)

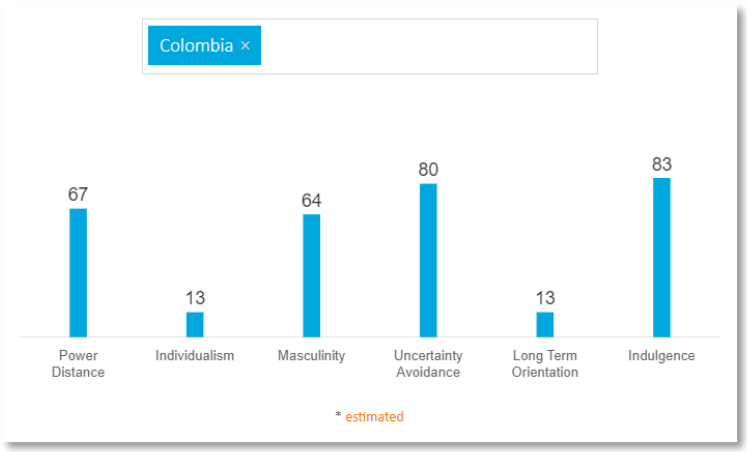

Fig. 5. Colombia (by the scores on the Hofstede's culture model)

Shadid, Krahmer and Swerts [41] conducted an experiment in which children with different cultural backgrounds (48 Dutch children and 48 Pakistani children) were invited to play a number guessing game alone or together with their friends. Results show that the correct classification in both cultures is higher for children playing games in pairs, thus children in pairs are more expressive than individuals. Furthermore, both Pakistani individuals and pairs are more expressive than Netherlands ones. According to the Hofstede's dimension model, cultures with a high score on the Uncertainty Avoidance are often very expressive. Consequently, the Uncertainty Avoidance score of Pakistani is certainly larger than that of Netherlands (See Figure 6).

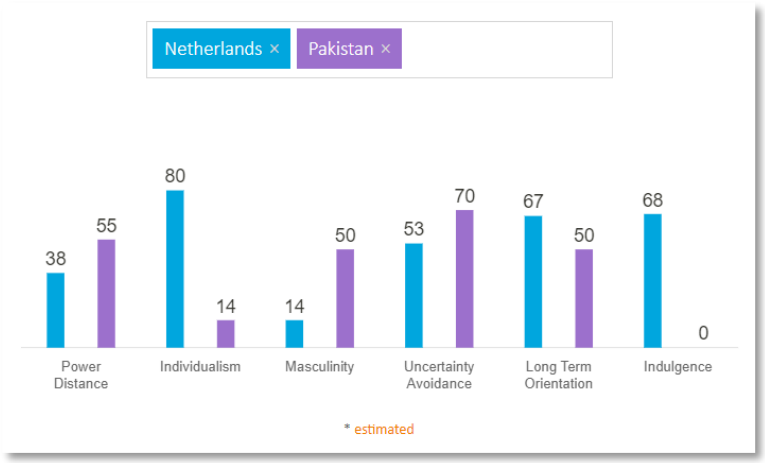

Fig. 6. Netherlands vs. Pakistan (by the scores on the Hofstede's culture model)

Cirnu and Tuncay [5] analyzed the metaphors in digital games based on two different cultures (Romania and Turkey) and other related results based on participants' gender and culture. The author chose Cypriot to represent the culture of Turkey. A total of 181 Romanian students and 220 Cypriot students were involved in this study. Based on the property of gameplay, Driving/Racing, Fighting, First Person Shooter and Sports, which strongly highlight the value of competition and success, may be utilized to determine the tendency of Masculinity/Femininity. Thus, in terms of the type of game genre (See Table 1), both the Romanian's preference of those four game genres (Driving/Racing: 33%, Fighting: 22%, First Person Shooter: 28% and Sports: 24%) and the Cypriot's preference of game genre (Driving/Racing: 32%, Fighting: 18%, First Person Shooter: 18% and Sports: 23%) makes their societies closed to being masculine. The finding may be similar to the results of the Hofstede's dimension data matrix (Score of Turkey: 45; Score of Romania: 42, see Figure 7).

However, according to the frequency of playing games (See Table 2), the results show that the frequency of Cypriot participants is not significantly different from that of Romania. If the frequency of playing games and Indulgence/Restraint culture dimension are probably considered to be associated— more playing times mean the inclination to indulgence because indulgent societies prefer to put much more emphasis on leisure time and control the gratification of their desires, the results will differ from the data in the Hofstede's dimension data matrix (2021) showing that Turkish people are more indulgent than the Romanian (Score of Turkey: 49; Score of Romania: 20, see Figure 7) [14].

Table 1. Type of Game Genre [5]

	Romanian		**Cypriot**	
Answer options	***Male***	***Female***	***Male***	***Female***
Adventure	44	45	40	41
Arcade	17	20	60	25
Driving/Racing	39	20	46	25
Educational	10	36	2	3
Fighting	27	12	35	5
First Person Shooter	39	12	30	10
Platform	10	4	7	4
Puzzle	14	31	10	3
Role Playing Game	18	19	3	5
Simulation	21	18	2	18
Sports	31	12	40	10
Strategy	46	59	50	10

Table 2. Frequency [5]

	Romanian		Cypriot	
Answer options	***Male***	***Female***	***Male***	***Female***
Once a week	13	37	9	67
Twice a week	13	25	12	27
Three days a week	3	13	13	14
More than three days a week	9	3	9	5
Everyday	36	29	42	23

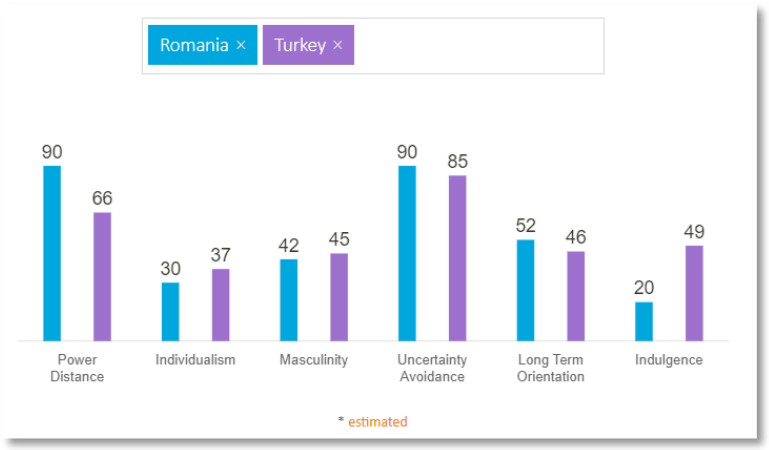

Fig. 7. Romania vs. Turkey (by the scores on the Hofstede's culture model)

Ćwil and Howe [33] investigated the game genre preference and hours of gameplay in Poland and the United States. There are 99 participants from Poland and 119 participants from the United States. The top three preferred game genres of the Polish participants are First-Person Shooter (26.3%), Strategy (16.2%), and Sports (14.1%). The top three preferred game genres of the American participants are First-Person Shooter (31.1%), Sports (19.3%), and Social (17.6%). The First-Person Shooter and Sports games are generally considered as masculinity-oriented games. These two game genres are included in the top three games in both Poland and U.S. Thus, their degree of masculinity may be similar, which is consistent with the scores of the masculinity dimension in the Hofstede's culture model (Score of U.S.: 62; Score of Poland: 64, see Figure 8) [14]. The difference between Polish and American participants is the Strategy and Social games. Social games focus more on the social interaction and network construction, which can be associated with the individualism dimension. Ćwil and Howe [33] found that social games are the third game genre preference of the American participants. This probably implies that American participants have lower score of individualism than the Polish participants; however, this implication is opposed to the Hofstede's culture model (Score of U.S.: 91; Score of Poland: 60, see Figure 8) [14]. Additionally, Ćwil and Howe [33] found that there is no significant difference in the hours

of gameplay between Poland and U.S. This may indicate that Poland and U.S. have similar degrees of indulgence. Nevertheless, the Hofstede's culture model shows that U.S. culture has higher scores of indulgence than Poland culture (Score of U.S.: 68; Score of Poland: 29, see Figure 8) [14].

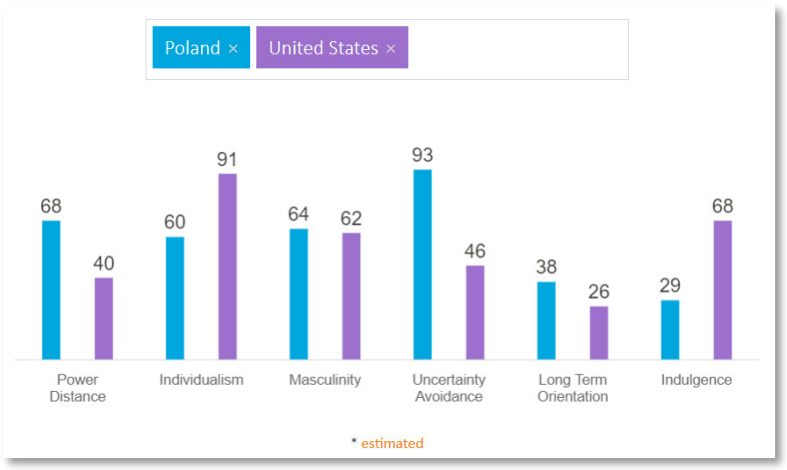

Fig. 8. Poland vs. U.S. (by the scores on the Hofstede's culture model)

Lukosch, Kurapati, Groen, and Verbraeck [22] studied the game performance of different countries in playing the Yard Crane Scheduler game. There are 42 Dutch, 39 Chinese, 37 American, and 16 German participating in the gameplay. The statistical results show that Dutch and German participants have significantly higher scores of game performance than their American participants. However, there are no significant differences between other countries (including German vs. Dutch, American vs. Chinese, Chinese vs. German, or Chinese vs. Dutch). According to the design of the Yard Crane Scheduler game, it is a single-player game and applying flexible planning strategies is the key tip to get more points and win the game. They may imply that Dutch and German participants significantly applied flexible planning strategies better than American. The flexible planning strategies is able to be connected to the dimension of the uncertainty avoidance in the Hofstede's culture model. Low uncertainty avoidance tends to adapt uncertain risk or high fluctuation easily and prefer flexible management or strategies. In contrast, high uncertainty avoidance tends to follow rules or regulations and cannot easily adapt or accept unexpected changes. Therefore, according to the results made by Lukosch, Kurapati, Groen, and Verbraeck [22], Dutch and German should have lower scores of uncertainty avoidance than that of U.S. However, this speculation is inconsistent with the scores of uncertainty avoidance in the Hofstede's culture model (Score of U.S.: 46; Score of Netherlands: 53; Score of Germany: 65, see Figure 9) [14], which shows that U.S. has the lower uncertainty avoidance than Germany and Netherlands.

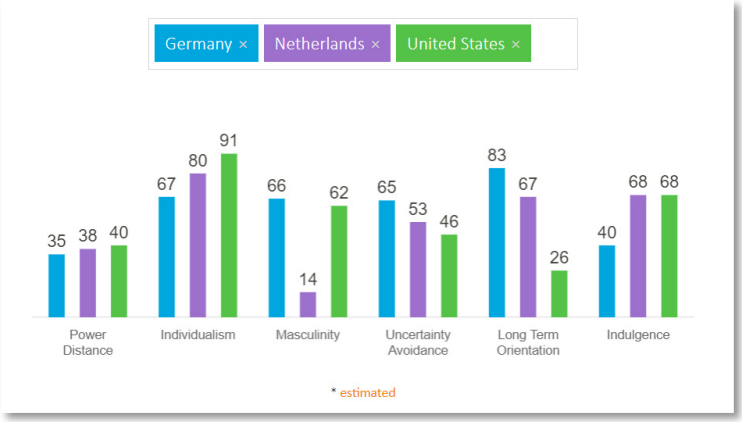

Fig. 9. Germany vs. Netherlands vs. U.S. (by the scores on the Hofstede's culture model)

The summarized review information and inferred results of the selected papers are listed in Table 3. In the selected papers, their research factors or components can be inferred or corresponded to one or more culture dimensions based on the information provided. There are four culture dimensions (including Masculinity, Individualism, Uncertainty Avoidance, and Indulgence) found. Masculinity dimension is the most common analytic characteristic revealed in the selected papers (see Figure 10). However, there is no clear evidence or characteristic to determine Power Distance and Long/Short Term Orientation. With respect to Masculinity, approximately 71.4% (5 out of 7) of the items is consistent with the relative scores of the Hofstede's culture model. Moreover, 33.3% (1 out of 3) of the Uncertainty Avoidance items is consistent with the relative scores of the Hofstede's culture model. However, all of the items regarding Individualism and Indulgence are opposed to the information provided by the Hofstede's culture model.

According to the reviews summaries and statistics (see Table 3 and Figure 10), it appears that the Hofstede's culture model may not be very suitable criteria for game developers to adopt in the process of game design for cross-cultural audiences. However, because not all of the papers emphasized on studying the comparisons of cultural differences, the information provided by these papers is limited and may be not enough to improve the accuracy of inferences. There may be bias when the researchers matched the culture dimensions. Furthermore, the limited numbers of research papers and their experimental design and sampling probably cannot represent or interpret the population from different countries. In addition to the difficulty of cross-culture data collection and classification, a variety of game genre including new types of game continues to be improved and created, which greatly increases the uncertainty and difficulty of relevant research. Moreover, a globalization may lead to the disappearance of cultural boundary. Even so, how to appropriately define and classify an innovative cultural model for game design and development is still an important and valuable challenge in the future.

Table 3. Overview of the results of the analysis of the selected papers

Authors	Countries for Comparison	Participants/Materials	Research Factor(s)	Mapping Cultural Dimension(s)	Consistent with the Hofstede's culture model?
Cirnu & Tuncay [5]	Romania & Turkey	181 Romanian students & 220 Cypriot students	Game genre preference	Masculinity	yes
			Frequency of playing games	Indulgence	No
Colwell & Kato [27]	United Kingdom & Japan	204 British adolescents & 305 Japanese adolescents	Self-esteem	Masculinity	No
			Preference of aggressive games	Masculinity	No
Ćwil & Howe [33]	Poland & U.S.	99 participants from Poland & 119 participants from the United States	Game genre preference	Masculinity	yes
				Individualism	No
			Hours of gameplay	Uncertainty Avoidance	No
Hou [8]	U.S. & Taiwan	71 avatars (from U.S. games) & 63 avatars (from the Taiwanese games)	Types of facial expressions	Masculinity	yes
		48 male avatars (from U.S. games) & 32 male avatars (from the Taiwanese games)	Degree of androgyny	Masculinity	yes
			Degree of masculinity	Masculinity	yes
James [30]	U.S. & Japan	Top 10 video games in U.S. & Japan respectively	Sales of multiplayers games	Individualism	no
Lukosch, Kurapati, Groen, & Verbraeck [22]	Dutch, Chinese, American, & German	42 Dutch, 39 Chinese, 37 American, & 16 German	Performance in playing the computer game	Uncertainty Avoidance	no
Shadid, Krahmer, & Swerts [41]	Netherlands & Pakistan	48 Dutch children & 48 Pakistani children	Ability of expression in the playing computer game	Uncertainty Avoidance	yes
Wohn & Lee [43]	Asian & Caucasian (located in the Colombia)	253 respondents (Caucasian: 51.2%; Asian: 42%)	Report of social expected outcomes in Facebook games	Individualism	no

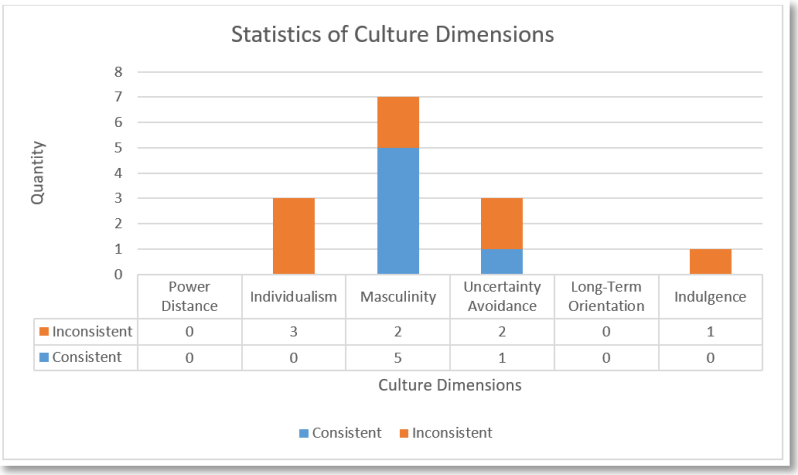

Fig. 10. Statistics of culture dimension inferences from the selected papers

5 References

[1] A. S. Kahn, C. Shen, L. Lu, R. A. Ratan, S. Coary, J. Hou, ... , and D. Williams, "The Trojan Player Typology: A cross-genre, cross-cultural, behaviorally validated scale of video game play motivations," *Computers in Human Behavior*, vol. 49, pp. 354-361, 2015. https://doi.org/10.1016/j.chb.2015.03.018

[2] A. S. L. Tsang and G. Prendergast, "Does Culture Affect Evaluation Expressions?: A Cross-Cultural Analysis of Chinese and American Computer Game Reviews," *European Journal of Marketing*, vol. 43, pp. 686-707, 2009. https://doi.org/10.1108/03090560910947007

[3] B. López-Pérez and D. Pacella, "Interpersonal emotion regulation in children: Age, gender, and cross-cultural differences using a serious game," *Emotion*. vol. 21, no. 1, pp. 17-27, 2019. https://doi.org/10.1037/emo0000690

[4] B. Paaßen, T. Morgenroth, and M. Stratemeyer, "What is a true gamer? The male gamer stereotype and the marginalization of women in video game culture," *Sex Roles: A Journal of Research*, vol. 76, no. 7, pp. 421-435, 2017. https://doi.org/10.1007/s11199-016-0678-y

[5] C. E. Cirnu and N. Tuncay, "METAPHORS IN DIGITAL GAME CULTURE. *The 9th International Scientific Conference "eLearning and Software for Education"* Bucharest, vol. 2, pp. 73, 2013.

[6] C. Grothaus, C. Dolch, and O. Zawacki-Richter, "Use of Digital Media in Higher Education across Country Contexts: A Comparison between Germany and Thailand", *International Journal of Emerging Technologies in Learning*, vol. 16, no. 20, pp. pp. 64-83, 2021. https://doi.org/10.3991/ijet.v16i20.24263

[7] C. Y. Chen, "Is the video game a cultural vehicle?," *Games and Culture*, vol. 8, no. 6, pp. 408-427, 2013. https://doi.org/10.1177/1555412013493349

[8] C.-I. Hou, "A Cross-Cultural Comparison of Gender Representation in Massively Multi-player Online Role-Playing Games: A Study of Taiwan and the United States," *China Media Research*, vol. 4, no. 2, pp. 13-25, 2008.

[9] D. K. Tse, K. H. Lee, J. Vertinsky, and D. Wehrung, "Does culture matter? A cross-cultural study of executives' choice, decisiveness, and risk adjustment in international marketing,"

Journal of Marketing, vol. 52, pp. 81-95, 1988. https://doi.org/10.1177/002224298805200408

[10] D. Y. Wohn and Y. H. Lee, "Players of facebook games and how they play," *Entertainment Computing*, vol. 4, no. 3, pp. 171-178, 2013. https://doi.org/10.1016/j.entcom.2013.05.002

[11] E. L. Law, T. Gamble, and D. Schwarz, "Gender and Cultural Differences in Perceiving Game Characters of Digital Educational Games," *12th IFIP TC 13 International Conference on Human-Computer Interaction*, vol. 1, pp. 49-153, 2009. https://doi.org/10.1007/978-3-642-03655-2_19

[12] E. V. Talalakina, "Fostering Cross-Cultural Understanding Through E-Learning: Russian-American Forum Case-Study"., *International Journal of Emerging Technologies in Learning*, vol. 5, no. 3, pp. pp. 42–46, 2010. https://doi.org/10.3991/ijet.v5i3.1290

[13] Entertainment Software Association (ESA), "VIDEO GAMES IN THE 21ST CENTURY: *The 2020 Economic Impact Report*," 2019.

[14] F. Hofstede, "Hofstede Insights: Compare Countries. Retrieved from https://www.hofstede-insights.com/product/compare-countries/.

[15] F. Hofstede, J.-B. E. Steenkamp, and M. Wedel, "International market segmentation based on consumer-product relations," *Journal of Marketing Research*, vol. 36, no. 1, pp. 1- 17, 1999. https://doi.org/10.1177/002224379903600101

[16] G. Hofstede, "Dimensionalizing cultures: The Hofstede model in context," *Online Readings in Psychology and Culture*, vol. 2, no. 1, pp. 2307-0919, 2011. https://doi.org/10.9707/2307-0919.1014

[17] G. Hofstede, "Dimensions of National Cultures in Fifty Countries and Three Regions," Expriscations in Cross-Cultural Psychology, pp. 335-355, 1983.

[18] G. Hofstede, "National Cultures in Four Dimensions: A Research-Based Theory of Cultural Differences among Nations," *International Studies of Management and Organization*, vol. 13 (1/2), pp. 46-74, 1983. https://doi.org/10.1080/00208825.1983.11656358

[19] Grand View Research., "Video Game Market Size, Share & Trends Analysis Report By Device (Console, Mobile, Computer), By Type (Online, Offline), By Region, And Segment Forecasts," 2020 – 2027, 2020.

[20] H. C. Triandis, "Individualism and Collectivism," Boulder, CO: Westview Press.

[21] H. C.Triandis, R. Bontempo, M. J. Villareal, M. Asai, and N. Lucca, "Individualism and collectivism: Cross-cultural perspectives on self-ingroup relationships," *Journal of Personality and Social Psychology*, vol. 54, pp. 323-338, 1988. https://doi.org/10.1037/0022-3514.54.2.323

[22] H. Lukosch, S. Kurapati, D. Groen, and A. Verbraeck, "Gender and Cultural Differences in Game‐Based Learning Experiences," *Electronic Journal of e-Learning*, vol. 15, no. 4, pp. 310-319, 2017.

[23] H. Yaseen, A. R. Alsoud, M. Nofal, O. Abdeljaber, and A. S. Al-Adwan, "The Effects of Online Learning on Students' Performance: A Comparison Between UK and Jordanian Universities", *International Journal of Emerging Technologies in Learning*, vol. 16, no. 20, pp. pp. 4-18, 2021. https://doi.org/10.3991/ijet.v16i20.24131

[24] IBISWorld Company. (2020). Video Games in the US - Market Size 2003–2026. Retrieved from https://www.ibisworld.com/industry-statistics/market-size/video-games-united-states/

[25] J. Barnett, and M. Coulson, "Virtually real: a psychological perspective on massively multiplayer online games," *Review of General Psychology*, vol. 14, no. 2, pp. 167-179, 2010. https://doi.org/10.1037/a0019442

[26] J. Colwell and M. Kato, "Investigation of the relationship between social isolation, self-esteem, aggression, and computer game play in Japanese adolescents," *Asian Journal of*

Social Psychology, vol. 6, no. 2, pp. 149- 158, 2003. https://doi.org/10.1111/1467-839X.t01-1-00017

[27] J. Colwell and M. Kato, "Video game play in British and Japanese adolescents," *Simulation & Gaming*, vol. 36, no. 4, pp. 518-530, 2005. https://doi.org/10.1177/1046878105279409

[28] J. Martí-Parreño, C. Ruiz-Mafé, and L. L. Scribner, "Acceptance of Branded Video Games (Advergames): A Cross-Cultural Study Spain-USA. *In Marketing and consumer behavior: Concepts, methodologies, tools, and applications* (pp. 851-871)," IGI Global, 2015. https://doi.org/10.4018/978-1-4666-7357-1.ch038

[29] K. Ando, J. Sugiura, S. Ohnuma, K. P. Tam, G. Hübner, and N. Adachi, "Persuasion game: Cross cultural comparison," *Simulation & Gaming*, vol. 50, no. 5, pp. 532-555, 2019. https://doi.org/10.1177/1046878119880236

[30] K. James, "Mario vs. the Lich King: How Culture Affects American Consumers' Preferences for American or Japanese Video Games," *In Dietrich College of Humanities and Social Sciences Carnegie Mellon University*, Pittsburgh, 2010.

[31] K. Kitami and R. Saga, , "Causality Analysis for Best Seller of Software Game by Regression and Structural Equation Modeling," *IEEE SMC 2010*, pp. 1495- 1500, 2010. https://doi.org/10.1109/ICSMC.2010.5642327

[32] K. Kitami, R. Saga, and K. Matsumoto, "Comparison Analysis of Video Game Purchase Factors between Japanese and American Consumers," *Lecture Notes in Computer Science*, vol. 6883, pp. 285- 294, 2011. https://doi.org/10.1007/978-3-642-23854-3_30

[33] M. Ćwil and W. T. Howe, "Cross-cultural analysis of gamer identity: A comparison of the United States and Poland," *Simulation & Gaming*, vol. 51, no. 6, pp. 785-801, 2020. https://doi.org/10.1177/1046878120945735

[34] M. Gentry, R. K. Gable, and M. G. Rizza, "Students' perceptions of classroom activities: Are there grade-level and gender differences?," *Journal of Educational Psychology*, vol. 94, no. 3, pp. 539- 544, 2002. https://doi.org/10.1037/0022-0663.94.3.539

[35] M. J. Page, J. E. McKenzie, P. M. Bossuyt, I. Boutron, T. C. Hoffmann, C. D. Mulrow, et al., "Updating guidance for reporting systematic reviews: development of the PRISMA 2020 statement," *Journal of Clinical Epidemiology*, vol. 134, pp. 103-112, 2021. https://doi.org/10.1016/j.jclinepi.2021.02.003

[36] M. Liu and W. Peng, "Cognitive and psychological predictors of the negative outcomes associated with playing MMOGs (massively multiplayer online games) ," *Computers in Human Behavior*, vol. 25, no. 6, pp. 1306–1311, 2009. https://doi.org/10.1016/j.chb.2009.06.002

[37] M. Yuki, W. W. Maddux, M. B. Brewer, and K. Takemura, "Cross-cultural differences in relationship- and group-based trust," *Personality & Social Psychology Bulletin*, vol. 31, no. 1, pp. 48 -62, 2005. https://doi.org/10.1177/0146167204271305

[38] O. H. M. Yau, "Chinese Cultural Values: Their Dimensions and Marketing Implications," *European Journal of Marketing*, vol. 22, no. 5, pp. 44-57, 1988. https://doi.org/10.1108/EUM0000000005285

[39] R. Ibrahim, G. Wills, and L. Gilbert, "deGendering games: Towards a gender-inclusive framework for games," *Multi Conference on Computer Science and Information Systems 2010*, pp. 127-130, 2010.

[40] R. Ozaki and K. Sevastyanova, "Going hybrid: an analysis of consumer purchase motivations," *Energy Policy*, vol. 39, pp. 2217- 227, 2011. https://doi.org/10.1016/j.enpol.2010.04.024

[41] S. Shadid, E. Krahmer, and M. Swerts, "Alone or together: Exploring the effect of physical co-presence on the emotional expressions of game playing children across cultures," *In P.*

Markopoulos et al. (Eds.), Fun and Games, vol. 5294, pp. 94- 105, 2008. https://doi.org/10.1007/978-3-540-88322-7_10

[42] S. Wu and B. Keysar, "The effect of culture on perspective taking," *Psychological Science*, vol. 18, pp. 600-606, 2007. https://doi.org/10.1111/j.1467-9280.2007.01946.x

[43] S.-H. Chuah, R. Hoffmann, M. Jones, and G. Williams, "An economic anatomy of culture: Attitudes and behaviour in inter- and intra-national ultimatum game experiments," *Journal of Economic Psychology*, vol. 30, pp. 732- 744, 2009. https://doi.org/10.1016/j.joep.2009.06.004

[44] S.-H. Chuah, R. Hoffmann, M. Jones, and G. Williams, "Do Cultures Clash? Evidence from Cross-National Ultimatum Game Experiments," *Journal of Economic Behavior and Organization*, vol. 64, pp. 35- 48, 2007. https://doi.org/10.1016/j.jebo.2006.04.006

[45] T. H. Cox, S. A. Lobel, and P. L. McLeod, "Effects of ethnic group cultural differences on cooperative and competitive behavior on a group task," *Academy of Management Journal*, vol. 34, no. 4, pp. 827-847, 1991. https://doi.org/10.5465/256391

[46] U. Schimmack, S. Oishi, and E. Diener, "Individualism: A valid and important dimension of cultural differences between nations," *Personality and Social Psychology Review*, vol. 9, pp. 17-31, 2005. https://doi.org/10.1207/s15327957pspr0901_2

[47] W. W. Maddux and M. Yuki, "The "ripple effect": Cultural differences in perceptions of the consequences of events," *Personality and Social Psychology Bulletin*, vol. 32, pp. 669- 683, 2006. https://doi.org/10.1177/0146167205283840

[48] Y.- J. Hsieh, and L. S. Debra, "Cultural and Economic Antecedents to Evolving Consumer Concerns in Taiwan," *Journal of Consumer Policy*, vol. 16, pp. 61- 78, 1993. https://doi.org/10.1007/BF01024590

[49] Y. K. Choi, S. Yoon, and C. R. Taylor, "How character presence in advergames affects brand attitude and game performance: A cross-cultural comparison," *Journal of Consumer Behaviour*, vol. 14, no. 6, pp. 357-365, 2015. https://doi.org/10.1002/cb.1555

[50] Z. Xu, O. Turel, and Y. Yuan, "Online game addiction among adolescents: motivation and prevention factors," *European Journal of Information Systems*, vol. 21, pp. 321-340, 2012. https://doi.org/10.1057/ejis.2011.56

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