Benti, Behailu Shiferaw; Hasse, Dominika; Stadtmann, Georg

Article

Cognitive Biases in Free- to-play Games

Marketing Review St.Gallen

Provided in Cooperation with:
Universität St. Gallen, Institut für Marketing und Customer Insight

Suggested Citation: Benti, Behailu Shiferaw; Hasse, Dominika; Stadtmann, Georg (2022) : Cognitive Biases in Free- to-play Games, Marketing Review St.Gallen, ISSN 1865-7516, Thexis Verlag, St.Gallen, Vol. 39, Iss. 4, pp. 34-42

This Version is available at:
https://hdl.handle.net/10419/276197

Marketingzeitschrift für Theorie & Praxis 4/2022

Marketing Review St.Gallen

«Cognitive Biases» im Marketing

Schwerpunkt

Customer Centricity durch Biases – Ein Interview mit Monica Dreyer & Matthias Fuchs

Elaboration Likelihood im E-Mail-Marketing

Cognitive Biases as Boosters – Using Cognitive Biases to Improve Communication Recall for Emmi Jogurtpur

Behavioral Return Interventions – How Behavioral Science Helps Prevent Returns in E-Commerce

Cognitive Biases in Free-to-play Games

Spektrum

Nachhaltigkeit vermitteln und verkaufen – Schritte zu einer grünen Customer Journey

Gamifying B2B Sales – An Analysis of the Status Quo and Potential for Gamification within Sales

The Art of Social-Media-Influence – Was es für eine erfolgreiche Kampagne zu berücksichtigen gilt und welche Fauxpas man besser vermeiden sollte

Universität St.Gallen

Cognitive Biases in Free-to-play Games

Considering free-to-play games and their virtual currency exchange rate policies, we analyze the incidence of the cognitive biases "money illusion" and "decoy effect." We show that above par exchange rates and advertising bonus packs instead of price discounts in the in-game stores lead to adverse implications for the players. From our findings we derive managerial and policy implications.

Behailu Shiferaw Benti, M.Sc., Dominik Haß, M.Sc., Prof. Dr. Georg Stadtmann

Behailu Shiferaw Benti, M.Sc.
Researcher and Ph.D. Candidate at the European University Viadrina, Chair of Economics, in particular Macroeconomics, Frankfurt (Oder), Germany
benti@europa-uni.de

Dominik Haß, M.Sc.
Fixed Income Investment Specialist at Legal & General Investment Management, Dublin, Ireland
hassd@tcd.ie

Prof. Dr. Georg Stadtmann
Chair Holder at the European University Viadrina, Chair of Economics, in particular Macroeconomics, Frankfurt (Oder), Germany and Institute for Economics, University of Southern Denmark, Odense, Denmark
stadtmann@europa-uni.de

In the traditional video game industry, premium games were sold to customers at a specific price in a way referred to as "one price, one service" (Vaudour & Heinze, 2020). Lately, however, the predominant business model has been the *freemium*, where games have a price of zero and microtransactions in the in-game stores generate the revenue.

In the in-game stores, virtual currencies that are sold for real money are used. The European Central Bank (2015, p. 25) defines a virtual currency as "a digital representation of value, not issued by a central bank, credit institution or e-money institution, which, in some circumstances, can be used as an alternative to money." Two price settings are thus crucial: (1) The exchange rate policy and hence the amount of virtual currency that can be acquired by one unit of real currency (such as EUR or USD). With price differentiation, packages with larger quantities of virtual currencies have better exchange rates, leading to the prevalence of multiple exchange rates. (2) Utilization of two economically equivalent but psychologically different forms of sales promotions – price discounts or bonus packs – to boost profitability by persuading consumers to spend more.

Ravoniarison and Benito (2019) investigate freemium game players' attitudes, feelings toward, and perceived value of their purchases from the in-game stores. Among other things, game players report their concerns about excessive, long-lasting and uncontrolled in-game spending.

In February 2021, a class action lawsuit was filed against *Epic Games* – the publisher of *Fortnite* – in California, stating that it misleads and manipulates in-game spending of minors by making conversion rates of V-Bucks difficult to interpret. With these difficulties, players – especially minors – are not able to determine the real cost of their in-game purchase, which, in turn, creates a high degree of money illusion (Class Action, 2021).

These observations indicate the importance of tracing the factors that lead to the purchasing intentions of freemium game players. In this paper, we rely on the theoretical framework of cognitive biases to investigate the mentioned price settings. While the cognitive bias money illusion is selected due to the mentioned class action, the selection of the "decoy effect" is motivated and supported by the existing marketing literature on framing strategies in general.

The following section provides a brief review of the empirical evidence on selected cognitive biases. The subsequent section presents the methodologies applied and the results of the empirical analysis.

Overview of Selected Cognitive Biases

Economic agents often make heuristic decisions (defined as "a strategy that ignores part of the information, with the goal of making decisions more quickly, frugally, and/or accurately than more complex methods"; Gigerenzer & Gaissmaier, 2011, p. 454) on issues that are relatively complex and uncertain. Although heuristic decisions are quite useful, they are rarely accurate and are prone to systematic errors that are referred to as cognitive biases (Tversky & Kahneman, 1974). The fields of psychology and social science have identified a range of cognitive biases (Wilke & Mata, 2012). The cognitive bias codex designed by Manoogian and Benson (2016) that identifies and documents more than 180 cognitive biases is presented in the Appendix as an example.

Money Illusion Through Exchange Rate Policies

Money illusion is defined as a situation in which economic agents fail to perceive the real value of a unit of money by focusing on its nominal value rather than the real value (Fisher, 1928). This phenomenon implies a lack of rationality and is interpreted as a cognitive bias where the nominal evaluation of economic transactions is outweighing

Management Summary

The predominant business model of video games is the freemium model, where microtransactions in the in-game stores generate the revenue. Here, we analyze the incidence of the cognitive biases "money illusion" and "decoy effect" in the top ten free-to-play games of 2019. Since the virtual currency exchange rates are above par and conversions to real currencies are difficult to compute, we conclude that the cognitive bias money illusion is being created. Furthermore, 40% of the game developers offer decoy options that may influence how players make decisions. Finally, we show that, although price discounts and bonus packs are economically equivalent, game developers opt to advertise the bonus pack percentages which always have a higher face value than the corresponding price discount percentages. This reflects the creation of the cognitive biases decoy effect and money illusion in the gaming industry.

the real value (Shafir et al., 1997). This bias can, for instance, be observed when tourists visit a foreign country and make transactions in a currency they are unfamiliar with. Raghubir et al. (2012) show that the way the nominal value of the foreign currency is presented leads to an underestimation or overestimation of the actual consumption expenses. In a laboratory experiment, participants were asked to imagine that they work and live in three foreign countries and were informed about three different exchange rates (1 Irish Punt/1 EUR; 0.5 GBP/1 EUR and 2 DEM/1 EUR). Each participant was asked to "buy" a shopping basket of 14 items (with a true cost of 46.96 EUR) and then to identify the actual value of the basket in the currency of their assumed home country. These values were then converted to Euros.

The result indicates that when the Euro was presented as a *multiple* of the local currency (1 EUR = 0.5 GBP), the value of the purchase was overestimated. When the Euro was presented as a *fraction* of the local currency (1 EUR = 2 DEM), the value was underestimated (Raghubir et al., 2012). This implies that when the exchange rate is above par, customers underestimate prices and spending, which leads to an overestimation of the value of the product and an increase in the intention to buy. This misinterpretation of nominal values is referred to as "the face value effect" (Raghubir & Srivastava, 2002) and is also related to the money illusion. In addition, Raghubir et al. (2012) report price underestimation and higher purchase intentions when customers are faced with exchange rates that are difficult to compute (when, for example, a simple division by 2 will not reveal the actual value of the currency). Based on these observations, we formulate two research questions that will subsequently be examined in the context of video game developers' virtual exchange rate policies.

Research question 1: Are the exchange rates of virtual currencies in the in-game stores set to be above par?

Research question 2: Are there apparent difficulties in connection with converting virtual currency prices back to real currency?

Main Propositions

1. Exchange rates of virtual currencies in the in-game stores of the selected games are above par.
2. In the majority of the in-game stores, computational difficulties related to the exchange rates are observed.
3. Four out of the ten games analyzed use the framing strategy of including a decoy option in their list of packages.
4. Observations reveal that in six of the games analyzed, bonus packs instead of price discounts are promoted.

Cognitive Biases Due to Sales Promotion Strategies

A frame is an observable irrelevant information, which is supplementary to feasible alternatives of choices, provided to alter consumer decisions. The cognitive bias "framing effect" occurs when consumers rely on the frame in making decisions (Salant & Rubinstein, 2008). The framing effect is categorized into different types (Levin et al., 1998). One category is the *decoy effect*, where, in a set of available choices, the presence of an asymmetrically dominated alternative (decoy) increases the probability of choosing the other, dominating, item (Huber et al., 1982). The presence of an inferior alternative – for example in terms of price – induces nonrational decision making in consumers (Lehdonvirta & Castronova, 2014). Ariely (2010) shows that the presence of decoy options makes consumers more likely to change their preferences, as other packages are made relatively more attractive. This strategy of the sellers thus motivates the consumers to go for costlier packages, which, in turn, boosts revenue.

Apart from framing strategies, price discounts and bonus packs are other forms of sales promotion strategies. Such strategies are also prone to cognitive biases and

Table 1: Top Ten Free-to-play Games of 2019

Rank	Game	Virtual Currency	Publisher	Platform	Revenue in Bill. USD	Average Exchange Rate
1	Fortnite	V-Bucks	Epic Games	Mobile, PC & Console	1.8	147.57
2	Dungeon Fighter Online*	CERA	Nexon	PC	1.6	121.95
3	Honor of Kings**	Voucher	Tencent	PC & Console	1.6	108.53
4	League of Legends	Riot Point	Riot Games, Tencent	PC	1.5	136.48
5	Candy Crush Saga	Gold	KING Dig. Enter.	Mobile, PC	1.5	6.80
6	Pokémon GO	Poké Coins	Niantic. Inc.	Mobile	1.4	112.35
7	Crossfire*	ZP	SmileGate	Mobile & PC	1.4	2135.25
8	Fate/Grand Order*	Saint Quartz	Aniplex	Mobile	1.2	1.92
9	Game for Peace (PUBG)	UC	Tencent	PC & Console	1.2	65.91
10	Last Shelter: Survival	Diamond	Long Tech/im30.net	Mobile	1.1	113.48

Source: Revenue and publisher data from SuperData (2020). The virtual currencies used, their corresponding prices to calculate the exchange rates and the game platforms are retrieved from the game developer websites and in-game stores in January, 2021.
* Original prices in USD are converted to Euro. Exchange rate 1 USD = 0.82 EUR in February, 2021.
** The game Honor of Kings is available on the Chinese market only. For our data analysis, the game Arena of Valor, which is an international adaptation of Honor of Kings, is considered.

are often used to influence the buying behavior of customers. Price discounts are typically percentage reductions in prices that increase the perceived value of the products and thus the customers' purchase intention (Alford & Biswas, 2002). Bonus packs relate to the quantity of the product by giving the customer an additional number of items in a special pack size and thus offering the possibility of acquiring more of the product at the same price (Mishra & Mishra, 2011).

Chen et al. (2012) show that customers prefer bonus packs over price discounts when both are expressed as percentages (except for situations where the percentages are small in magnitude). Furthermore, this preference is prevalent when customers are faced with computational difficulties in comparing one offer with the other. These tendencies are related to the cognitive bias money illusion since customers consider the nominal values instead of the real ones.

Sales in in-game stores are important determinants of the revenue streams of game developers. Thus, strong sales promotion strategies that influence players' spending are used to increase the amount of virtual currencies sold. Ariffin et al. (2018) state that, generally, customers' online purchases are adversely affected by financial risks (monetary loss related to unsatisfactory product performance or overestimation of the product value). Thus, sellers use eye-catching offers/discounts which create illusions and influence the purchase intentions (leading to unnecessary overspending). Schöber and Stadtmann (2020) state that *Fortnite* opts to promote package 4 with a bonus (35%) instead of the equivalent price discount (26%). The equivalence is not directly obvious to the consumer: when faced with choosing between a 26% price discount or a 35% bonus, consumers most frequently opt for the bonus (this is in line with the findings of Chen et al., 2012).

In accordance with these examples, we present the following research question, to be answered in the next section:

Research question 3: Is the framing strategy of adding a decoy option to the list of virtual currency packages offered evident in the in-game stores? Are the offers of virtual currency packages promoted with bonus packs (that have a higher face value) rather than the equivalent price discounts?

Empirical Evidence

Data Set and Methodology

Table 1 presents the ten top-selling free-to-play games of 2019 with the ranking of each game, the names of the virtual currencies used, the game publishers, the platforms of the games, the revenue figures in billion USD, and the average exchange rates of the virtual currency per 1 EUR.

For the empirical analysis, we first consider the virtual currency prices reflected in the in-game stores. Each store offers multiple packages of virtual currencies. We define the minimum amount of virtual currency as the *basic package*. The average exchange rate reported in Table 1 is computed by considering all available packages per game.

We then consider each package with its corresponding price and quantity information individually, resulting in a total of 55 virtual currency exchange rate observations.

We first calculate the price discounts offered in each package using equation [(1)] below.

$$\textit{Price discount}_i\,(\%) = \left(1 - \frac{VC_1/P_1}{VC_i/P_i}\right) \times 100 \quad (1)$$

Here, P_1 and VC_1 are the price and amount of virtual currency of the *basic package*, respectively. Package i is a larger package with a price of P_i and a virtual currency amount of VC_i. For example, in *Fortnite*, the basic package of 1000 V-Bucks (VC_1) is offered for 7.99 EUR (P_1) and package 2 with 2800 V-Bucks (VC_i) is offered for 19.99 EUR (P_i). The price discount in package 2 is thus

$$\left(1 - \frac{1000/7.99}{2800/19.99}\right) \times 100 \approx 10.65\%$$

After identifying all price discounts offered, we sorted out 18 packages offering 0% or a slightly negative price discount. For the remaining 37 packages, the bonus pack percentages are computed by first calculating the actual cost of the offered quantity of virtual currency, i.e., using the price of the basic package. Then the price of *package i* is subtracted from the actual cost. This difference as a percentage of the price of *package i* then gives the package's bonus pack percentage as described in equation[(2)].

$$\textit{Bonus pack}_i\,(\%) = \left(\frac{VC_i/P_i}{VC_1/P_1} - 1\right) \times 100 \quad (2)$$

For our example of *Fortnite's* package 2, the bonus pack percentage is

$$\left(\frac{2800/19.99}{1000/7.99} - 1\right) \times 100 \approx 12\%$$

which can also be seen in Figure 2b.

Finally, we cross-checked how these 37 observations are advertised (i.e., as price discounts or as bonus packs) in the in-game store.

Table 2: Virtual Currency Prices and Exchange Rates

Virtual currency	Price	Exchange Rate	Virtual currency	Price	Exchange Rate	Virtual currency	Price	Exchange Rate	Virtual currency	Price	Exchange Rate	Virtual currency	Price	Exchange Rate
Fortnite			Candy Crush Saga			Fate/Grand Order*			Dungeon Fighter Online*			Pokémon GO		
1000	7.99	125.16	10	2.29	4.37	1	0.81	1.23	100	0.82	121.95	100	0.99	101.01
2800	19.99	140.07	50	8.99	5.56	5	3.27	1.53	500	4.1	121.95	550**	5.49	100.18
5000	31.99	156.30	100	16.99	5.89	18	9.83	1.83	1000	8.2	121.95	1200	10.99	109.19
13 500	79.99	168.77	250	32.99	7.58	41	19.67	2.08	2000	16.4	121.95	2500	21.99	113.69
			500	59.99	8.33	76	32.79	2.32	3000	24.6	121.95	5200	43.99	118.21
			1000	109.99	9.09	167	65.59	2.55	4000	32.8	121.95	14 500	109.99	131.83

Virtual currency	Price	Exchange Rate	Virtual currency	Price	Exchange Rate	Virtual currency	Price	Exchange Rate	Virtual currency	Price	Exchange Rate	Virtual currency	Price	Exchange Rate
Game for Peace (PUBG)			Arena of Valor			Crossfire*			Last Shelter			League of Legends		
60	1.09	55.05	100	1.09	91.74	15 000	7.37	2034.78	300	5.49	54.64	310	2.5	124.00
325	4.99	65.13	500**	5.49	91.07	30 000	14.34	2091.79	1200	10.99	109.19	650	5	130.00
660**	10.99	60.05	1200	10.99	109.19	75 000	35.25	2127.55	1600**	20.99	76.23	1380	10	138.00
1800	27.99	64.31	2500	21.99	113.69	150 000	65.59	2286.87	8000	54.99	145.48	2800	20	140.00
3850	54.99	70.01	6500	54.99	118.20				20 000	109.99	181.83	5000	35	142.86
8100	109.99	73.64	14 000	109.99	127.28							7200	50	144.00

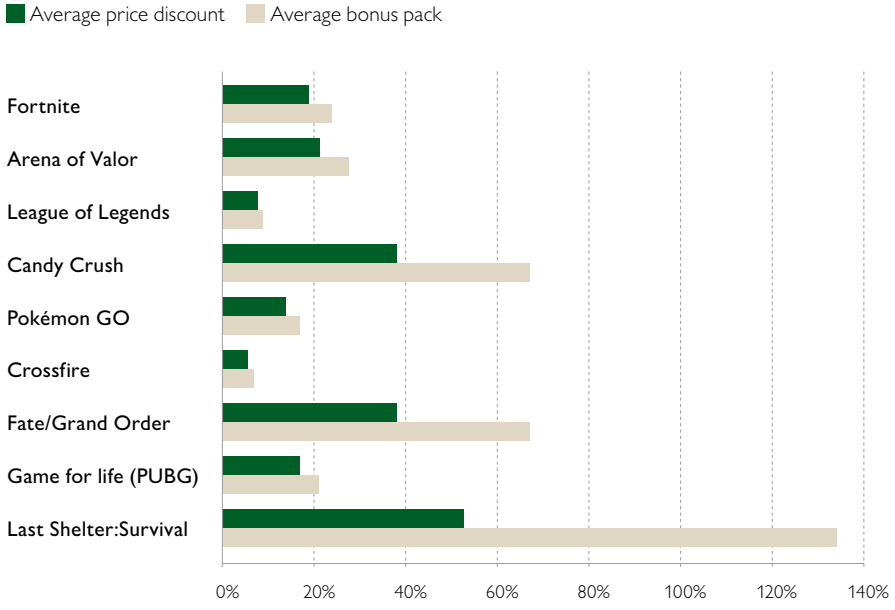
Source: Own representation.
* Original prices in USD are converted to EUR. Exchange rate 1 USD = 0.82 EUR in February, 2021.
** Decoy options.

[1]Kitchen (2014) states that when players are competing in freemium games, the incentive to purchase virtual currencies and be more competitive is high. In the research on cognitive biases, such positive network externalities are referred to as the "bandwagon effect."

Lessons Learned

1. Non-transparent exchange rate settings and advertising strategies of game developers will influence the in-game purchase intention of players and create misconceptions of the actual in-game spending.
2. By carefully analyzing the actual values of their purchases, players could avoid the adverse effects.
3. Our findings back up the concerns regarding excessive, long-lasting and uncontrolled in-game spending.
4. To avoid regulatory control, the gaming industry should strive for more transparency and improved customer service.

Fig. 1: Average Price Discount and Bonus Pack Percentages Per Game



Source: Own representation.

Results

To obtain the results, we use eyeball estimation through tabular and graphical representations of the collected data.

Regarding research question 1, an above par exchange rate can be identified by checking the average virtual currency exchange rates listed in Table 1 (last column). For the exchange rate to be at par, the average virtual currency exchange rate should be equal to 1. However, all the exchange rates listed in the table are above par (this also applies to the USD exchange rates of the three games where the original prices are converted to EUR).

We considered the virtual currency exchange rates of the 55 identified packages to analyze whether an above par exchange rate prevails across all the virtual currency packages offered. Table 2 summarizes the amount of virtual currency in each package, the corresponding prices, and the exchange rates, for each game. All the exchange rates (except for that of *Fate/Grand Order* which also has an average USD exchange rate of 1.58) are tremendously larger than 1. Therefore, with this analysis we answer the first research question and conclude that the exchange rates are set above par, which will lead to money illusion on the part of the players.

Regarding research question 2, it is also evident from Table 2 that, except in the case of *League of Legends*, the exchange rates are of a nature that makes it difficult to calculate the prices in a real currency. Furthermore, converting original prices in USD to EUR for the three games indicated has a minimal impact on the overall result. While the USD exchange rates in *Dungeon Fighter Online* are relatively easy to compute (such as dividing 500 by 5), the USD exchange rates of the first three packages of *Fate/Grand Order* are almost at par (for example, 1 *Quartz* is sold for 0.99 USD). However, this exception doesn't apply to the EUR exchange rates. For example, a note in the in-game store of *Dungeon Fighter Online* states that purchases in EUR are subjected to VAT and the applicable EUR/USD exchange rate in the

> « In this paper, we rely on the theoretical framework of cognitive biases to investigate the mentioned price settings. »

respective country. Both the computed exchange rates and the prices from the list are mostly indicated with two decimal places. Therefore, it becomes clear that an easy rule of thumb (such as "divide by 2") is not applicable.

Thus, we conclude that computational difficulties might arise due to the applied exchange rates. This could again lead to money illusion on the part of the players.

Table 2 also answers the third research question regarding the decoy effect, as some game developers follow a strategy of adding decoy options. We operationalize the given definition of decoy option for our case as follows: A decoy option is an alternative where the exchange rate (virtual currency/EUR) decreases as the size of the package increases. Among others (similar decoy options are observed in Arena of Valor (package of 500 *Vouchers*), *Pokémon GO* (package of 550 *Poké Coins*) and *Game for Peace (PUBG)* (package of 660 UC)), an extreme example of a decoy option is found in package 3 of *Last Shelter: Survival*. Buying two packages of package 2 and acquiring 2400 *Diamonds* costs 21.98 EUR (2 × 10.99 EUR). It is clear that no player will buy package 3 for 20.99 EUR to get 1600 *Diamonds* when there is the possibility to get 800 more *Diamonds* by paying a marginal additional amount of 0.99 EUR (21.98 – 20.99 EUR). These observations give an answer to the first part of research question 3 and show that four out of the ten games use the framing strategy of including a decoy option in their list of packages.

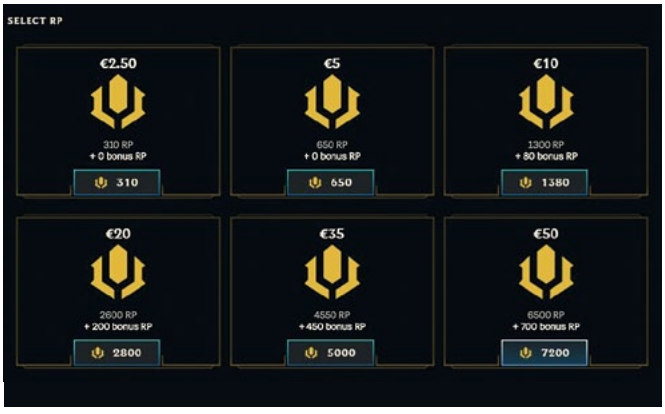
> « Our findings provide empirical evidence which indicates that cognitive biases are created on the part of the players. »

To answer the second part of research question 3, we refer to Figure 1 which depicts the average price discount and bonus pack percentages as computed using equations (1) and (2). These two forms of sales promotion are economically equivalent but psychologically different. As evident in Figure 1, the average bonus pack percentages are higher than the average price discount percentages. Although the extent differs, this applies to the nine top-selling free-to-play games of 2019. It is important to mention here that *Dungeon Fighter Online* doesn't offer any form of price discount.

Additionally, we extended our analysis by identifying which packages are actually promoted by game developers. We found that 23 packages from six free-to-play games (with *Dungeon Fighter Online, Arena of Valor, Candy Crush Saga* and *Pokémon Go* not advertising any price discounts or bonus packs) are promoted in the respective in-game stores. A common observation for all six games is that game developers promote the bonus pack instead of the price discount. Some in-

Fig. 2: Forms of Bonus Packs Promoted

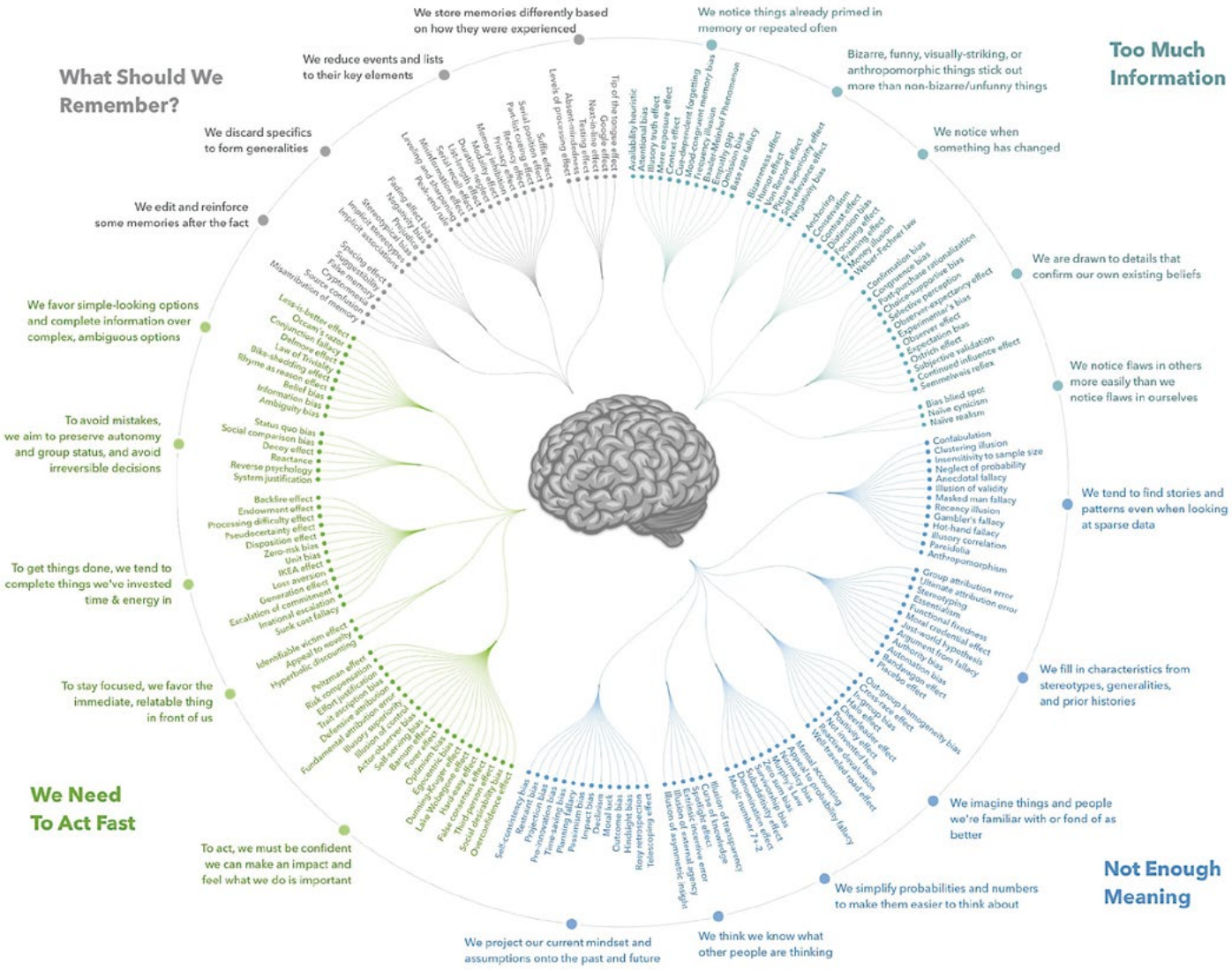
(a) League of Legends



(b) Fortnite

Source: Screen captures from the respective in-game stores.
Note: While League of Legends advertises the absolute value, Fortnite advertises in percentage terms. Both games advertise bonus packs instead of price discounts.

Appendix: Cognitive Bias Codex



Visual & Algorithmic Design: John Manoogian III; Concept & Categorization: Buster Benson; List of 188 Cognitive Biases: Wikipedia. Source: Manoogian & Benson (2016).

game stores promote the bonus quantity of virtual currency awarded per package. Some others promote the percentage of the awarded virtual currency relative to the basic package. The first form of promotion is, for example, used by *League of Legends* (Figure 2a) while Fortnite (Figure 2b) opts for the second form.

We conceptualized three research questions that revolve around the observed exchange rates of virtual in-game currencies and the advertising strategies of the game developers. Our findings provide empirical evidence which indicates that cognitive biases are created on the part of the players.

Scope of the Findings

We examined the available packages of the top ten freemium games of 2019. Further research is necessary to verify whether the created cognitive biases have an impact on the day-to-day spending of freemium video game

players and will require the spending data of game players. Our research only looked into the impact of price settings in the in-game stores of the selected video games on the purchase intention of players. Other factors that might influence the purchase intention of players – such as peer-pressure or purchases made to boost the in-game performance – are not addressed. Furthermore, based on our findings, no conclusion can be reached on the intentions of the video game publishers. The question whether the price settings that are creating cognitive biases are intentional or merely unintentional video game design issues is beyond the scope of this research.

> «We believe that our paper falls into the category of research that provides a broader perspective on the industry.»

Policy Implications

Cerulli-Harms et al. (2020) recently published a report for the European Parliament Committee on the issue of Internal Market and Consumer Protection (IMCO), considering the behavioral effects of *loot boxes* and the corresponding regulatory framework in the EU. One of their recommendations for further research is to take a broader perspective of the gaming industry in addressing consumer protection (Cerulli-Harms et al. 2020). We believe that our paper falls into the category of research that provides a broader perspective on the industry.

References

Alford, B. L., & Biswas, A. (2002). The effects of discount level, price consciousness and sale proneness on consumers' price perception and behavioral intention. Journal of Business Research, 55(9), 775–783.

Ariely, D. (2010). Predictably irrational: The hidden forces that shape our decisions. Harper.

Ariffin, S. K., Mohan, T., & Goh, Y. N. (2018). Influence of consumers' perceived risk on consumers' online purchase intention. Journal of Research in Interactive Marketing, 12(3), 309–327. https://doi.org/10.1108/JRIM-11-2017-0100

Cerulli-Harms, A., Mu¨nsch, M., Thorun, C., Michaelsen, F., & Hausemer, P. (2020). Loot boxes in online games and their effect on consumers, in particular young consumers. Publication for the Committee on the Internal Market and Consumer Protection (IMCO), Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament, Luxembourg. https://www.europarl.europa.eu/RegData/etudes/STUD/2020/652727/IPOL_STU(2020)652727_EN.pdf

Chen, H., Marmorstein, H., Tsiros, M., & Rao, A. R. (2012). When more is less: The impact of base value neglect on consumer preferences for bonus packs over price discounts. Journal of Marketing, 76(4), 64–77.

Class Action (2021). The Epic Games class action lawsuit is Williams, et al. v. Epic Games, Inc., Case No. 3:21-cv-00976. In the United States District Court for the Northern District of California. https://www.classaction.org/media/kw-et-al-v-epic-games-inc.pdf

European Central Bank (2015). Virtual currency schemes – A further analysis. European Central Bank. https://www.ecb.europa.eu/pub/pdf/other/virtual-currencyschemesen.pdf

Fisher, I. (1928). The Money Illusion. Adelphi.

Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. Annual Review of Psychology, 62, 451–482.

Huber, J., Payne, J. W., & Puto, C. (1982). Adding asymmetrically dominated alternatives: Violations of regularity and the similarity hypothesis. Journal of Consumer Research, 9(1), 90–98.

Kitchen, T. (2014). Aggressive monetization: Why the pay for currency model is dominating the iOS App Store today. Honors Theses, 544. https://digitalworks.union.edu/theses/544

Lehdonvirta, V., & Castronova, E. (2014). Virtual economies: Design and analysis. MIT Press.

Levin, I. P., Schneider, S. L., & Gaeth, G. J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. Organizational Behavior and Human Decision Processes, 76(2), 149–188.

Manoogian, J., & Benson, B. (2016). Cognitive bias cheat sheet. Visual Capitalist. https://www.visualcapitalist.com/every-single-cognitive-bias/

Mishra, A., & Mishra, H. (2011). The influence of price discount versus bonus pack on the preference for virtue and vice foods. Journal of Marketing Research, 48(1), 196–206.

Raghubir, P., & Srivastava, J. (2002). Effect of face value on product valuation in foreign currencies. Journal of Consumer Research, 29(3), 335–347.

Raghubir, P., Morwitz, V. G., & Santana, S. (2012). Europoly money: How do tourists convert foreign currencies to make spending decisions? Journal of Retailing, 88(1), 7–19.

Ravoniarison, A., & Benito, C. (2019). Mobile games: Players' experiences with in-app purchases. Journal of Research in Interactive Marketing, 13(1), 62–78. https://doi.org/10.1108/JRIM-06-2016-0060

Salant, Y., & Rubinstein, A. (2008). (A, f): Choice with Frames. The Review of Economic Studies, 75(4), 1287–1296.

Schöber, T., & Stadtmann, G. (2020). Fortnite: The business model pattern behind the scene. Die Unternehmung, 74(4), 426–444.

Shafir, E., Diamond, P., & Tversky, A. (1997). Money illusion. The Quarterly Journal of Economics, 112(2), 341–374.

Stadtmann G., Pierdzioch, C., & Sch¨ober, T. (2020). Law of one price: BigMac versus Fortnite – A Note. Economics Bulletin, 40(4), 3338–3348.

SuperData (2020). 2019 Year in Review: Digital Games and Interactive Media. SuperData – A Nielsen Company.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases: Biases in judgments reveal some heuristics of thinking under uncertainty. Science, 185(4157), 1124–1131.

Vaudour, F., & Heinze, A. (2020). Software as a service: Lessons from the video game industry. Global Business and Organizational Excellence, 39(2), 31–40.

Wilke, A., & Mata, R. (2012). Cognitive bias. In V. S. Ramachandran (Ed.), The Encyclopedia of Human Behavior (Vol. 1, pp. 531–535). Academic Press.