The *Dota 2* Battle Pass: prevalence, consumption, and attitudes of a player community towards a growing type of video game monetisation.

Elena Petrovskaya and David Zendle,
Department of Computer Science,
University of York,
York, United Kingdom.

Author Note

Correspondence concerning this article should be addressed to Elena Petrovskaya, email: elena.petrovskaya@york.ac.uk; telephone: +447817801339; address: Empire House, New Road, London, E1 1HH.

Abstract

As the profit model in the video game industry shifts from upfront payment to continuous exposure to in-game microtransactions, new forms of monetisation are on the rise. One such example is battle passes: time-limited content which provides players with an opportunity to access rewards not available within the main body of the game. In this paper, we apply a mixed-methods approach to conduct an in-depth examination of the Battle Pass feature in *Dota 2*. We consider 1) quantitatively, the prevalence of the Battle Pass within the *Dota 2* player community, and 2) qualitatively, player attitudes towards this feature. Quantitative findings show that, despite the rising profitability of the Battle Pass, its presence has minimal effect on player uptake in *Dota 2*. Qualitative findings indicate complex player attitudes in which positive views on the Battle Pass contrast with concerns over elitism and difficulty in achieving rewards without spending money.

Keywords: microtransactions, in-game purchases, video games, esports, battle passes.

Introduction

Video game monetisation is undergoing a shift. Video game publishers historically treated individual games as marketable products, and made profits from the sale of copies of these games themselves (Lizardi, 2012).

However, more recent approaches to monetisation have centered around generating revenue beyond the initial point of purchase. Early examples of this include subscription-based models, in which monthly fees would be charged for access to a game's online content. More recent examples are based around microtransactions: in-game payments that players can repeatedly make in order to purchase small amounts of additional virtual content (Statt, 2013). This content may be purely cosmetic in nature, such as new and aesthetic looks for in-game characters. Alternatively, microtransactions may involve purchases which give a player advantage over others in the game in some way (Zendle, Meyer, Cairns, Waters, & Ballou, 2020).

The *Dota 2* Battle Pass

A new form of video game monetisation has emerged in recent years: the battle pass. The first widely-known battle pass appeared in an online multiplayer game named *Dota 2*. *Dota 2* is extremely popular: at the time of writing, 650,000 players were in game, with an estimate of around 11 million unique players in total ('Dota 2—Steam Charts', 2020). *Dota 2* is a free-to-play game, with revenue largely being generated via a store which offers cosmetic goods through microtransaction, and a subscription service named *Dota Plus*, which grants additional in-game information and cosmetic effects to subscribers.

In 2013, *Dota 2* pioneered an additional monetization approach. Players of the game were offered the opportunity to hand over money in return for something called the 'Interactive

Compendium’ (later renamed as the ‘Battle Pass’) (Dota Team, 2013). In exchange for their money, they did not primarily receive specific in-game content, as they would do under traditional microtransactional monetisation. Nor did they receive the specific and predefined benefits of a traditional subscription service. Instead, when the Compendium had been paid for, players were “eligible for special virtual item drops” for a specific and time-limited period. For this period (and this period only) they could receive exclusive in-game rewards not available without the pass. The very first Compendium was heavily focused around engaging players with The International, a large annual *Dota 2* tournament. For example, players received random cosmetic drops while watching professional matches. Since 2013, however, the Battle Pass has evolved to include far more additional content and rewards.

This is the core design of the Battle Pass: a form of monetisation in which players exchange money for the time-limited opportunity to gain additional in-game content as a reward for playing a game, rather than exchanging their money for specific content itself. Battle passes typically involve a progression system in which the player moves upwards through various tiers of reward through continued and intensive play during a specific season or other time period. Players receive rewards of higher prestige the higher they climb during this period, with the potential for future rewards being cut off when this time period ends. In some games, the option exists to pay for higher-level rewards rather than to achieve them by simply playing the game. Since being introduced through *Dota 2*, the model has been picked up by several other games, including *Fortnite*, *Rocket League*, and *Team Fortress*.

Monetisation and wellbeing

Advances in video game monetisation have seen unprecedented levels of profit for the video game industry. In 2020 alone, the industry is forecasted to generate a revenue of \$159

billion; a figure which is predicted to rise to \$200 billion by 2023 (Wijman, 2020) . However, this financial success has been accompanied by controversy.

For example, ‘pay to win’ refers to a monetisation strategy in which players can spend money on in-game features which provide them with some advantage towards winning the game: in the game *Hearthstone*, spending money on specific cards to build stronger decks with good card synergy confers a definite advantage. Although it is technically not essential to spend money to play the game, some cards are significantly better than others, and players are far more likely to experience loss without buying these cards.

Players themselves have raised potential problems with pay to win monetisation schemes from as early as 2015. For example, players who do use pay-to-win features are seen more negatively by other players because they were not seen as having earned what they had (Evers, Van de Ven, & Weeda, 2015). In response to concerns about pay-to-win, a nascent academic literature has developed that attempts to describe the potential impact of pay to win monetisation on player experience and wellbeing. Some critique this purchase model as being unethical (Heimo, Harviainen, Kimppa, & Mäkilä, 2018), given the unlevel playing field it creates, in which players may feel pressured to spend money which they do not have, or may physically not be able to afford upgrades, thus consistently being placed at a disadvantage. There have also been concerns about the psychological ramifications of such mechanics, and their potential to create a loop of frustration and increased gameplay (Larche, Musielak, & Dixon, 2017).

Similarly, issues regarding player experience and wellbeing may be raised with reference to loot boxes. Loot boxes are virtual items in games which contain in-game contents but are paid for with real-world money (Zendle & Cairns, 2018, p. 20). The contents of loot boxes are randomised, meaning even though real money is spent, the player is unsure of the contents until

after the purchase. Loot boxes are widely popular, present in 54% of the top-grossing games on the Google Play store and 34% of the top games on the Steam store (Zendle, Meyer, & Ballou, 2020). Concerns regarding loot boxes are also prominent - academics have noted formal similarities between loot boxes and gambling (Drummond & Sauer, 2018). Furthermore, they have established the existence of a correlation between problem gambling and loot box spending, whereby the more money people spend on loot boxes, the more likely they are to be a problem gambler (Zendle & Cairns, 2018, p. 20). It is important to note that the causal nature of this mechanism is unclear: It may represent a situation in which loot box spending leads to problem gambling; however, it may also represent a situation in which people who are problem gamblers simply tend to spend more money on loot boxes (Zendle & Cairns, 2019).

In contrast to pay to win monetisation and loot boxes, there is no research literature which deals with the potential impacts of battle passes on player wellbeing. However, one may speculate that the presence of a battle pass in a game may have a potentially important impact on player wellbeing and experience in-game. Such a system may have a similar effect to the proposed mechanism described above of pay-to-win games, whereupon a cycle of frustration and increased spending is facilitated. Additionally, battle passes parallel player entrapment; in which players might believe they had spent too much time playing the game to stop before they reach the levels with rewards, or likewise having spent a sum of money to reach a certain reward (Brockner, Shaw, & Rubin, 1979). This is a similarity between battle passes and loot boxes, in that both may take advantage of the sunk cost fallacy as a justification of sustained engagement or spending (King & Delfabbro, 2018). This could be aggravated by perceived higher social status which comes from the cosmetic rewards of higher levels, giving players an additional motivation to engage with the battle pass (Fristedt & Lo, 2019).

The present research

Battle passes may have an important relationship with player experience – and potentially, even, player wellbeing. However, despite their existence for over seven years, no literature that we are aware of deals with these issues. In order to address them, in this paper we take a mixed-methods approach. Firstly, in order to understand the landscape of player engagement with battle passes, we conduct an exploratory analysis of both the number of players of *Dota 2* over time, and their estimated purchasing of battle passes. This analysis is intended to explore both whether the introduction of battle passes has led to increased (or decreased) engagement with *Dota 2*; and to broadly quantify player exposure and uptake of this feature.

Secondly, in addition to this quantitative analysis, we conduct an exploratory thematic analysis of player posts on the *Dota 2* subreddit, a special interest online bulletin board that provides an important source of information and discussion within the *Dota 2* player community. This qualitative analysis is intended to explore player attitudes towards battle passes within the community. We therefore look at the following initial research questions:

RQ1: How prevalent is the Battle Pass in the *Dota 2* community?

This question is considered through 1) pure numbers of gameplay and player uptake, 2) numbers and increase in discussions about the game on the r/Dota2 subReddit (widely established as a central point for the *Dota 2* community), and 3) how much money is spent on the Battle Pass.

RQ2: What are player attitudes towards the Battle Pass?

This is answered through a thematic analysis of posts about the Battle Pass on r/Dota2.

For any readers who would like more information on the structure of the Battle Pass, a detailed overview is provided in appendix A.

Study 1: Prevalence of the Battle Pass

Study 1 aimed to quantify the popularity of the Battle Pass within the *Dota 2* community. As described above, we did this by combining data on player numbers, player conversations around the game, and money spent on purchasing the Battle Passes.

Methods

Firstly, we looked at SteamDB data ('Dota 2 · AppID', 2020). SteamDB is a publicly available database, through which anybody can download a .csv file of the history of player numbers for any Steam game. We were thus able to obtain the peak daily number of players in *Dota 2* for every day since the release of the game (19/07/2011) until the present day (14/06/2020). In this way, we were able to see prevalence patterns of gameplay over the whole year, and see how the Battle Pass release affected this pattern.

Secondly, we used the publicly available PushShift API (Baumgartner, 2021) to analyse activity around the Battle Pass in the community on the r/Dota 2 subreddit. The PushShift API is publicly available and non-intrusive; it delivers only data which is already public on Reddit, but with advanced search and aggregation functionalities. We used this API to extract numbers of posts on the r/Dota 2 subreddit during the first 20 days after the Battle Pass was released (May 25th-15th), as well as from an alternative 20-day period for comparison (January 31st-Feb 14th).

Lastly, we obtained a figure for how much had been spent on the Battle Pass within the first 20 days of its release. This was also publicly available on the Prize Pool Tracker ('Dota 2 Prize Pool Tracker', 2020) website. Because the Battle Pass is marketed as contributing 25% of its profits to the TI prize pool, the figure which has been raised by the players is presented on the

Dota 2 website. The total money spent on Battle Passes is therefore easily obtained by multiplying this number by 4.

All of the above were done for the last 5 years (2020-2016), to minimise the chance of confounds (e.g. COVID-19 pandemic in 2020), and to be able to see a trend rather than a snapshot of prevalence.

Results

Player numbers

A summary of the impact of the Battle Pass on player engagement with *Dota 2* is presented in Table 1.

Year	Average peak daily players	% change
2020	681,369	-11.4%
2019	768,931	+9.4%
2018	703, 045	-11.2%
2017	791,486	-17.2%
2016	956,434	-

Table 1. Summary of player numbers during the Battle Pass period for 2016 - 2020 and difference to previous year.

To analyse the effect of the Battle Pass on player engagement with *Dota 2* in more detail, we specified a generalised additive model (GAM) of daily *Dota 2* engagement from its release (2011-09-22) to the present day (2020-06-15). The model fitting underwent several iterations as we tried to find the most appropriate way for specifying time variables in order to best capture variance in the data and minimise error.

The final model had as its predictors date (with cubic regression splines), day of the year (with penalised cubic regression splines), and a separate Battle Pass binary predictor (0 if not in Battle Pass period, 1 if in Battle Pass period) for each year in which battle passes were being considered (2016-2020). Examination of the residuals of an uncorrected GAM model suggested the presence of significant autocorrelation. An ARMA model was fitted to the residuals using the Hyneman-Khandakar algorithm. This suggested that autocorrelation within the model's errors may be accounted for by an ARMA (p=3, q=3) structure. The model was therefore corrected to account for an ARMA(3, 3) correlation structure. We also checked the model for concurvity and multicollinearity issues, none of which were of concern. The fitted model is illustrated in Figure 1.

--Figure 1 goes here. Illustration of the fitted GAM terms and their effects.--

The final model provided a good fit to the data, at $R^2 = 0.939$. Full details of the model are provided in tables 2 and 3 below. Three of the Battle Pass terms - in 2016, 2017, and 2019, were significant within this model in their effects on player engagement.

Parametric terms						
Term	Estimate	Std. error	Statistic	P-value	Conf.low	Conf.high
BP 2020	66,541	36,728	1.812	0.0707	-5642	138,723
BP 2019	54,950	25,311	2.171	0.0305*	5205	104,695
BP 2018	27,391	25,312	1.082	0.2798	-22,355	77,136
BP 2017	57,494	25,214	2.280	0.0231*	7940	107,048
BP 2016	52,101	25,374	2.053	0.0406*	2234	101,968

Table 2. GAM model specification: parametric terms.

* marks significant terms at 0.05 alpha level.

Smooth terms		
Term	Edf	P-value
Day of year	0.001324	0.877
Date	4.791941	<0.001*

Table 3. GAM model specification: smooth terms.

^aIn the case of the smooth terms, the edf characteristic provides insight into the complexity of the smooth function: the higher the edf value, the more complex the characteristics are.

*marks significant terms at 0.05 alpha level.

Player money spent

The money spent per year for the last 5 years by players in the first 20-day period on the Battle Pass is presented in Table 4.

Year	Total spent on BP	% change
2020	\$53, 797, 628	+4.1%
2019	\$51,675,364	+33.6%
2018	\$38, 667, 676	+5.7%
2017	\$36, 593, 896	+4%
2016	\$35, 178, 032	-

Table 4. Summary of spend figures 2016-2020 and difference to previous year.

As Table 4 shows, the money spent has consistently increased year by year over the last 5 years. There is also a clear anomaly in 2019, in which the increase is 33.6% - this is 27.9% more than in the previous year.

Player discussions around the game

The numbers of posts relating to the Battle Pass on the r/Dota 2 subReddit over the last 5 years is presented in Table 5. To better situate the above numbers we calculated the effect size of the Battle Pass. This was $d = 1.38$, and can be interpreted as that post numbers during the Battle Pass period were more than 1 standard deviation higher than during an alternative period.

Year	BP period	% change	Non-BP period	% difference
2020	15,406	+20.6	7095	-54%
2019	12,774	-9.3	8734	-31.6%
2018	14,088	-13.6	9724	-31%
2017	16,300	-12.4	12,120	-25.6%
2016	18,628	-	14,628	-21.4%

Table 5. Post figures from 2016-2020.

Includes the number of posts in the first 20 days of a Battle Pass season and an alternative 20-day period, the difference between the two, and the change in post volume from the previous Battle Pass season.

Study 2: Player Attitudes towards the Battle Pass

Study 2 investigated the attitudes that players held about *Dota 2* Battle Passes. We collected a set of pre-existing posts discussing battle passes from the popular online bulletin board service Reddit. We then conducted a qualitative thematic analysis of these posts in order to identify player attitudes towards this feature.

Method

In order to gauge player attitudes towards the *Dota 2* Battle Pass, posts to the *Dota 2* special interest group (r/Dota2) on the online bulletin board Reddit were obtained for the first 20

days after the Battle Pass was released for both 2019 and 2020. This extraction was accomplished by downloading all posts containing the keywords 'battle pass' and 'bp' via the PushShift API for both the first 20 days of the Battle Pass period in 2020 (May 25th-June 15th) and 2019 (May 7th – May 27th). The r/Dota 2 subreddit categorises its posts according to the type of content they present, and we extracted those labelled as 'discussion', as the other tags, for example, 'bug' or 'art' were unlikely to present meaningful insight into player attitudes. This yielded a total of 149 posts in 2020, and 34 posts in 2019. Upon cleaning the data (there were some issues, such as the post had been deleted by the user but still appeared in the search), this left 71 posts in 2020 and 17 posts in 2019: a total of 88 posts.

A qualitative thematic analysis (Braun, Clarke, Hayfield, & Terry, 2019) was carried out on this data, with the aim of investigating player attitudes towards this feature. The analysis was conducted by one researcher at two time points, 2 weeks apart, which is a validated technique for establishing reliability in qualitative research (e.g. (Cohen, 2017)).

Reliability was assessed by first calculating the percentage agreement between the two time points as a measure of intra-rater reliability. This was done separately for the 2020 and 2019 data.

After the first analysis of the 2020 data, the agreement was 75%. This might be viewed as surprisingly low, given the coding was carried out by the same researcher; however, it could simultaneously be viewed as a positive outcome, as it suggests there was a lack of inherent bias within the coding procedure. Somewhat reassuring was also the fact that the prevalence of the major themes in the data had remained the same, and the disagreement was primarily within smaller codes, some of which actually did not belong to any key themes.

Nonetheless, for the sake of rigour and robustness of our work, the coding was repeated once again another week after the second pass. This analysis achieved a percentage agreement of 88%, and once again, the major themes remained consistent. We therefore proceed to report these themes.

After the first analysis of the 2019 data, the agreement was 83%. We decided to repeat coding a further time 1 week later to hopefully increase this reliability. On the third pass, the percentage agreement was 89%, with major themes remaining consistent. We report these themes below.

Results: 2020

Three main themes emerged from the analysis of 2020 posts: the spend-grind trade-off, elitism, and positive engagement. The first two themes are underpinned by negative attitudes towards Valve (the developers).

Spend-grind trade-off

One of the main goals of the Battle Pass is to reach higher levels, and this can be done either by spending money to buy more levels, by playing the game ('grinding') to earn Battle Points to progress to higher levels - or a combination of both. Discussions in 2020 observe that being able to level the Battle Pass purely by playing the game feels much more difficult than in previous years, and this is not liked by the players.

"So the biggest thing I dont [sic] like is that you barely level up your battle pass by grinding plays... The good prizes start from WK arcana, which basically means that you can never have anything nice in this battle pass if you dont [sic] plan on emptying your wallet, and this is what makes me sad... Why would someone who doesnt [sic] even have

money to buy 400 levels buy a battle pass. He will never achieve any good leveling and fine prize.”

“The battle pass goals are completely unrealistic for most players who don't purchase levels. The amount of time and games it takes to actually level up the battle pass just seems absurd compared to paying a couple of dollars to get a ton of levels.”

“The issue im [sic] discussing here is that the Battle Pass is becoming progressively expensive every year ... What's worse is that leveling is becoming harder and harder every year aswell [sic] ...”

This has led to speculation that this has been done intentionally by Valve, the developers, in order to encourage players to spend more money to reach the higher levels.

“What they are doing is a good course of action if they want to squeeze as much money without caring for the player base, take as much as you can before the ship sinks. But they are accelerating the process by pushing people away.”

This encouragement to spend more money on the Battle Pass is also framed particularly negatively by players within the context of the COVID-19 pandemic, which has caused problems for many economies and personal issues for players who have lost income sources.

“Come on valve. Its 10 years anniversary of celebrating dota2!! The whole world is F by economic hardship due to Covid 19, and all you [sic] thinking is how to milk your loyal base fan who stick [sic] with you for all those years?”

“I say this because we are currently on a atypical year, with the Covid19 situation that led many of economies to be damaged and along with them their currencies. Here in Brazil, for example, our currency (Real) has been devaluated by almost 40%. Many of us lost the possibility to buy the 100lvls BP (They now cost 40% more, and about of 30% of the minimum salary), so it gets even harder to level it up.”

Together, the above factors create a negative sentiment within the community towards Valve.

Elitism

This theme is directly related to the previous. The increased difficulty of levelling the Battle Pass purely by playing the game has left some players feeling that the rewards available at high levels are out of their reach, creating a sense of exclusivity around these items and making players feel as though they are being kept out of a closed community if they are not able to purchase the necessary number of levels.

“Instead it [sic] just locked behind pay wall and only rich people who offer enough can get it.”

“I agree that Valve needs to be more generous with the Battle Pass, but what really worries me is the continually growing list of exclusive items which I think is the underlying cause driving much of the anxiety surrounding the TI10 Battle Pass.”

To an extent, this causes further negativity towards Valve, because players feel their need to belong and fit in within the community is being exploited for monetary reasons.

“Logically since content is more, it should be fine to charge more; but its [sic] human nature to avoid missing out (especially for Time-Exclusive items). Until now Collector's Cache and a few Prestige Items were the only Limited Items and that was ok, but the current trend of make all the great skins limited, and exploit on the fear of missing out, to drive the Battle Pass sales... If the Arcanas/Personas could be bought separately, with Battle Pass being the cheaper option to get them all, it could be fine.”

Positive engagement

While a large number of posts focus on the negative elements of 2020's Battle Pass, there is also discussion of the positive side of the Battle Pass, and positive engagement with its content. For example, some players note the attractiveness of the rewards and the additional features.

“With all the negative hate around the Battle Pass I just wanted to make an appreciation thread. I'm loving the fact we're getting 3 arcanas and 2 personas on top of the normal treasures. Feels like a much better value this year compared to previous years. Can't wait to see treasures 2 and 3!”

“Personally I really like this year's Battle Pass. I think it's one of the best of the last few years with loads of content and I accept that Valve is a business company that first and foremost wants money.”

“The guild is amazing, striving to a common goal with 50 ppl [sic] is fun and the rewards are well thought of.”

Some players are also indifferent about spending money on the Battle Pass, or even view this positively - the reason for this is that because it is marketed as a contribution to the TI prize pool, players feel that they are giving back to the game and the community.

“The main focus of buying the Battle Pass any year should be to raise the prize-pool and production value for the teams competing in The International and viewers watching Live. Buy the Battle Pass for the enjoyment of Dota. Buy it to continue the tradition that each one of us is playing a part in keeping The International at the top of ESports. A thing to remember is Dota is not just a game, it's an economy. It provides people with jobs, enjoyment and friendship.”

Results: 2019

As noted above, there were far fewer discussions in 2019. The two themes prevalent in these discussions are of strategising how to best get higher levels, and discussion of specific features which are liked or disliked.

Strategising

Players post questions to other players to ask what level rewards they felt were most worth working towards. Advice is also asked for regarding what combination of spending and grinding would be most efficient.

“What’s the most valuable checkmark/stretchgoal worth getting to in 2019 Battle Pass in your opinion? I don’t want the Statue or the Aegis, already have one. Is it the Axe 425 level or the extra treasures at 625? What would you suggest?”

“Do you guys think that the new Battle Pass is worth the buy? If so, which battle pass (level 1, level 50, level 100) would be the most worth it to buy if you are planning to get the invoker persona?”

Discussion of specific features

This theme is connected to the previous. Discussion is prevalent in 2019 about the removal of a specific feature from the previous year; namely, being able to recycle certain rewards for additional Battle Pass levels. This makes levelling up harder, and there is emerging concern (which, as we can see, continued in 2020) that Valve is trying to make levelling harder to bring more money into the game.

“Last year, it was worth the money spent due to the recycling thingy. What about this year? How much will it cost to get to 1000 including levels from quests, achievements, mission etc? Calve does learn something from the fact that last year’s price pool barely exceeded ti7’s. It changes the recycle process and reduces the amount of treasure rewards

u can get from a certain level (not very sure about this part), so that people needs to pay more to get rare items. Very clever.”

Discussion

The aim of this work was to explore the impact of the Battle Pass within the *Dota 2* community on player engagement, and to gain an overview of player attitudes towards this feature. We took a mixed-methods approach to answering these questions, in order to provide as comprehensive an overview of this novel monetisation approach as possible.

The seasonal introduction of the Battle Pass does not seem to have a consistently significant effect on player numbers over the course of a *Dota 2* year: only in 2016, 2017, and 2019 were the periods significant in their effects on player engagement, and this was not the case in 2018 and 2020. Indeed, even in these cases the observed effects are minimal, with just over 50, 000 extra players per day in a game that, on average, has 627, 775 peak players per day. Thus, although the Battle Pass event seems to in some cases be significant in attracting players, this significance is perhaps just one of many, given the plethora of releases and announcements that are likely to cause fluctuations across the *Dota 2* season.

Moreover, our results show that there has been a decrease in the average peak daily player numbers throughout the Battle Pass period over the last 5 years: in 2016, this number was 956, 434, and in 2020, only 681, 389. Interestingly, this is directly inverse to the amount of money spent on the Battle Pass yearly, which has continued to steadily increase: in the first 20 days of the 2020 season, the figure spent was \$53, 797, 628 - as compared to the \$35, 178, 032 spent in the first 20 days of the 2016 season.

This inverted relationship between the amount of Battle Pass play and its profit is an unusual finding whose causes are unclear. One potential explanation for this may lie in the

qualitative data gathered from players. Battle Pass rewards are obtained by ‘levelling’ the battle pass itself. The Battle Pass can hypothetically be levelled by either playing the game or spending money on it. However, as noted in our results, one common theme of player discussions surrounding the Battle Pass centres on the ‘spend-grind trade-off’. These discussions suggest that the *Dota 2* battle pass is perceived as becoming progressively harder to level purely by playing - forcing players who want high-level rewards to spend more money on the game. One might speculate that this accounts for the observed situation, in which fewer people appear to be playing a game, but spending more. It is unclear what the consequences of such a situation might be. However, it is key to note that our qualitative data highlights concerns of exclusivity and elitism around the higher level reward items. If players begin spending money which they do not have on rewards which they may not even want, but feel pressure to acquire, then potential issues regarding financial and social wellbeing may arise.

However, it is also important to note that several other shifts in engagement may explain the inverted relationship between engagement and spending that we observed here. For example, it may represent a situation in which less players are acquiring the Battle Pass, but the smaller group which do are spending more money on levels, and most of the revenue is emerging from this small group of heavily involved spenders.

We also draw attention to increases in Battle Pass spending that were observed during 2019. Although each year the spend figure increases by 4-6% from the previous, in 2019 the increase was 33.6%. Furthermore, this was the only year in which the average increased rather than decreased; the average number of players in 2019 was up 9.4% from the previous year. There are a couple of potential explanations for this spike. Firstly, the TI tournament, which has been mentioned previously, enjoyed a large amount of success in 2018. This was caused by the

sudden win of an ‘underdog’ team, OG, whose journey engaged many viewers - to the extent that there have now been multiple documentaries created about their win (RedBull, 2020; Valve Corporation, 2016). One might speculate that viewers might have been inspired by this team, and wanted to support and contribute to the TI prize pool, and just generally engage more with *Dota 2* and the tournament by buying the Battle Pass the following year (as mentioned above, the Battle Pass is marketed as a contribution to TI and the community as a whole). Judging by our qualitative analysis, it also seems to be the case that in 2019 Valve began making it harder to level up purely by playing the game. Perhaps this is what caused the significant spike in money spent on the Battle Pass, going above the natural increase which might come from the feature gaining popularity.

The number of discussions on the r/Dota 2 subreddit has also been decreasing over the past 5 years, in line with the player numbers. In 2020, however, there is a 20.6% positive spike in post numbers. From qualitative analysis of these posts, this seems to be because many players are unhappy with how difficult it has become to level the Battle Pass purely by playing rather than spending money. In 2020, this feels particularly prominent within the community because of financial troubles caused by the COVID-19 crisis. Nonetheless, there is also some positive engagement with the Battle Pass within the community, and several features, such as the addition of guilds, are praised.

Limitations

Our analyses are limited in several ways. Firstly, we worked with only the initial 20-day period of the Battle Pass. This was a limitation that could only have been negated by waiting several months to work on this project. This is also not a strong limitation - the trends across the

last 5 years are still clear through comparison, and in considering player engagement numbers we looked at full Battle Pass seasons.

Secondly, we are restricted by the fact that we did not involve any direct research with players. This means we are at present unable to draw any further conclusions as to the mechanisms which might be encouraging players to spend money on the Battle Pass, and whether or not they might be harmful. We are also left to speculate regarding some trends we see in our data, such as the spike in 2019.

Finally, the use of general additive models to look at player engagement trends could in itself be seen as a limitation. Longitudinal modelling of observational data offers no way to make inferences about causal role of individual predictors. Indeed, the approach taken here can only specify whether the presence or absence of a predictor (such as a Battle Pass period) is able to significantly contribute towards explaining variance in an outcome measure (such as the number of players of a game) when other factors (such as time) are taken into account. As is the case with all analyses of this nature, there is the potential for third variables to confound results. Both our data and analysis code are publicly available at <<https://tinyurl.com/y5gfsgrt>> in order to encourage the scrutiny and replication of our modelling by the community.

Imminent future work

Linking to the above limitation, what we believe the imminent next step to be is to conduct survey-based work with consumers of the Battle Pass in which we gather more information on their demographic identifiers and reasons for spending money on the content. This will shed some clarity on any potential impacts of battle pass monetisation strategies on player experience and wellbeing. It would also be useful to conduct wider prevalence studies, in which we consider all games which offer a battle pass and look at player spend and engagement

around this feature across a broader sample to see whether the trends we observed in *Dota 2* hold.

Conclusions

This work conducts an exploratory set of analyses to establish the prevalence of the *Dota 2* Battle Pass within the player community, and player attitudes towards it. Our findings suggest that over the course of the last 5 years, play of the Battle Pass has decreased, which contrasts with spend on the Battle Pass increasing. Qualitative analysis suggests that this may be related to a perception of increased difficulty to level up the Battle Pass purely by playing to achieve higher levels, causing players to spend more money on the feature. This calls for further research to establish psychological mechanisms behind these spending patterns, and the demographic which is making up the spend figures.

Academics and policymakers are currently turning their attention to the experience and effects of monetisation elements in video games, such as loot boxes. We believe it is essential to conduct careful examination of other features, such as the battle pass, in our attempt to understand and safeguard player communities.

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References

- Baumgartner, J. M. (2021). *Pushshift/api*. Python, . Retrieved March 8, 2021, from <https://github.com/pushshift/api>
- Braun, V., Clarke, V., Hayfield, N., & Terry, G. (2019). Thematic analysis. *Handbook of Research Methods in Health Social Sciences*, 843–860.
- Brockner, J., Shaw, M. C., & Rubin, J. Z. (1979). Factors affecting withdrawal from an escalating conflict: Quitting before it's too late. *Journal of Experimental Social Psychology*, 15(5), 492–503. Elsevier.
- Cohen, Y. (2017). Estimating the intra-rater reliability of essay raters. *Frontiers in Education*, 2, 49.
- Dota 2 · AppID: 570. (2020). *SteamDB*. Retrieved March 8, 2021, from <https://steamdb.info/app/570/graphs/>
- Dota 2 Prize Pool Tracker. (2020). *Dota 2 Prize Pool Tracker*. Retrieved March 8, 2021, from <https://dota2.prizetrac.kr/>
- Dota 2—Steam Charts. (2020). . Retrieved September 16, 2020, from <https://steamcharts.com/app/570>

- Dota Team. (2013). Introducing the Interactive Compendium | Dota 2. Retrieved September 16, 2020, from <https://blog.dota2.com/2013/05/introducing-the-interactive-compendium/>
- Drummond, A., & Sauer, J. D. (2018). Video game loot boxes are psychologically akin to gambling. *Nature Human Behaviour*, 2(8), 530–532. Nature Publishing Group.
- Evers, E. R., Van de Ven, N., & Weeda, D. (2015). The hidden cost of microtransactions: Buying in-game advantages in online games decreases a player's status. *International Journal of Internet Science*, 10(1), 20–36.
- Fristedt, T., & Lo, N. (2019). *In-game transactions in Free-to-play games: Player motivation to purchase in-game content*.
- Heimo, O. I., Harviainen, J. T., Kimppa, K. K., & Mäkilä, T. (2018). Virtual to virtuous money: A virtue ethics perspective on video game business logic. *Journal of Business Ethics*, 153(1), 95–103. Springer.
- King, D. L., & Delfabbro, P. H. (2018). Predatory monetization schemes in video games (eg 'loot boxes') and internet gaming disorder. *Addiction*, 113(11), 1967–1969. Wiley Online Library.
- Larche, C. J., Musielak, N., & Dixon, M. J. (2017). The Candy Crush Sweet Tooth: How 'near-misses' in Candy Crush increase frustration, and the urge to continue gameplay. *Journal of gambling studies*, 33(2), 599–615. Springer.
- Lizardi, R. (2012). DLC: Perpetual commodification of the video game. *Democratic Communiqué*, 25(1).
- RedBull. (2020). Against the Odds: OG's underdog story from TI8. Retrieved September 16, 2020, from <https://www.redbull.com/gb-en/films/against-the-odds>
- Statt, N. (2013). Micropayments, mega angst, and the future of console games (N). *CNet*,

December 19th.

Valve Corporation. (2016). True Sight (TV Series 2016–)—IMDb. Retrieved September 16, 2020, from <https://www.imdb.com/title/tt6850842/>

Wijman, T. (2020). The World's 2.7 Billion Gamers Will Spend \$159.3 Billion on Games in 2020; The Market Will Surpass \$200 Billion by 2023. Retrieved September 16, 2020, from <https://newzoo.com/insights/articles/newzoo-games-market-numbers-revenues-and-audience-2020-2023/>

Zendle, D., & Cairns, P. (2018). Video game loot boxes are linked to problem gambling: Results of a large-scale survey. *PloS one*, 13(11), e0206767. Public Library of Science San Francisco, CA USA.

Zendle, D., & Cairns, P. (2019). Loot boxes are again linked to problem gambling: Results of a replication study. *PloS one*, 14(3), e0213194. Public Library of Science San Francisco, CA USA.

Zendle, D., Meyer, R., & Ballou, N. (2020). The changing face of desktop video game monetisation: An exploration of exposure to loot boxes, pay to win, and cosmetic microtransactions in the most-played Steam games of 2010-2019. *PLoS One*, 15(5), e0232780. Public Library of Science San Francisco, CA USA.

Zendle, D., Meyer, R., Cairns, P., Waters, S., & Ballou, N. (2020). The prevalence of loot boxes in mobile and desktop games. *Addiction*. Wiley Online Library.

Appendix A: overview of the *Dota 2* Battle Pass

The *Dota 2* Battle Pass provides three initial purchase options; in 2020 these were purchase level 1, level 50, or level 100. There is always the option to purchase more levels once you have any level pass. Purchasing the Battle Pass unlocks an additional set of features, the option to access which is visible as soon as the player enters the menu screen (see Figure 1). To get to higher levels, a player can earn Battle Points by completing challenges and tasks through playing games or can alternatively spend money to buy more levels. The main marketed goal of the Battle Pass is to reach higher levels to get the better rewards.

On entering the Battle Pass section of the menu, the player instantly has access to lots of activities, and is also able to see their progress through the pass in terms of levels, and a ‘leaderboard’ of their friends by level. It is also possible to see which rewards are unlocked at which level, and some of the bigger rewards, such as a cosmetic available at level 445, are advertised on the main menu screen, outside of the Battle Pass section. (This particular cosmetic, upon release, was even advertised through a special introduction when all players opened the game.) In the Battle Pass area, the player is also able to see how much the community has contributed to the TI prize pool, and they are given an option to contribute even more, either by

buying additional levels or by gifting a Battle Pass to their friends.

The Battle Pass and all its features are seasonal: they are added to the game at some point generally in May, and the option to buy the Battle Pass remains throughout the summer period, generally ending in September. Once the Battle Pass period is over, players no longer have access to its features or the ability to purchase one (although they have unlimited access to any rewards which they gained through the Battle Pass).

In 2020, the main activities, at the time of writing, are arcana votes, guilds, the cavern crawl, the battle gauntlet, community match predictions, a yet-to-be-announced special summer event, and the Rylai's Battle Blessing. The primary purpose of all of these activities is to acquire Battle Points to further level one's Battle Pass.

Arcana votes

Players have a certain amount of votes and distribute these votes however they see fit over a variety of possible options for a new 'arcana' - a cosmetic reward item.

Community match predictions

Players can see team compilations (heroes and lane assignments) and vote on which side they believe is likely to have won purely based on the matchup. Streaks of accurate guesses are rewarded with Battle Points.

Battle Gauntlet

This is a daily mini-competition - players queue at a certain time, and if they win 3 games before losing 2, they receive 1500 Battle Points towards the Battle Pass.

Guilds

Guilds allow the creation of communities of players. Some guilds are open, meaning any player can join; some are closed, making joining more exclusive. Upon entering a guild, players are able to complete in-game ‘contracts’, such as winning games with a particular hero. This contributes both towards levelling an individual player’s Battle Pass, and towards levelling the guild. Higher-level guilds receive more privileges, such as being able to do more contracts, and some cosmetics, such as chat emoticons. There is also a leaderboard of players within the guild, showing how many points each player has accrued for the community. Finally, the guild automatically creates a chat for all members, streamlining communication and game organization.

Cavern Crawl

The Cavern Crawl is a meta-game, based on Dota 2 progress. Players make their way through a map by winning games with specific heroes, e.g. winning a game with the hero Ogre Magi will take you to the next section of the map. Progress is rewarded with Battle Points.

Summer event

At the time of writing, the 2020 Summer Event had not been announced. The 2019 Summer Event was a separate game called Wrath of the Mo’rakai. By playing this game, players were able to earn 250 Battle Points per victory, up to a maximum total of 2000 points.

Rylai’s Battle Blessing

This allows players a certain amount of spins on a wheel which will produce a random item. Players are able to do this at certain Battle Pass levels for rewards. Because this feature is only accessible to owners of Battle Passes, which are only initially available for money, it can be considered a loot box.

The majority of the features outlined above are only accessible to those who have paid for a Battle Pass. However, any *Dota 2* player is able to join a guild. Moreover, alongside the Battle Pass, Valve generally releases additional features and upgrades to the game which are accessible to all players. In 2020, these were queue time trivia (a quiz to play while you are waiting for a game), new loading screens for games, the option to vote for an in-game MVP, and mini-games if a game is paused. There were also some returning features from older Battle Passes, such as in-game high-fiving, ‘tipping’ other players, recycling certain rewards, etc.

While some features outlined above are unique to the 2020 Battle Pass, the general structure is consistent from older Battle Passes.

As well as gamified activities and additions to the game itself, the Battle Pass includes several notable meta-features. Battle Pass owners are able to spend money on gifting the Battle Pass to others, and this in return gives them Battle Points towards levelling their own Battle Pass. Approximately one month into the Battle Pass, Valve also launched the ‘Battle Level Bundle’, which was available for several days and gave players the option to unlock 120 Battle Levels, 9x Immortal Treasure I, 6x Immortal Treasure II, and 3x Immortal Treasure III for ‘only \$29.99’ (a discount of 75% on the combined value of the levels and treasures). Arguably, as the specific treasures are not indicated before purchase, this offer can also meet the definition of a loot box.}