

# A design analysis of Hearthstone through user experience research

## INTRODUCTION

In this report, some of Hearthstone's game design elements will be examined through the lens of user experience. To quantify this, a user research was conducted using the Game Experience Questionnaire (GEQ) [1], with two participants. To test whether there is a measurable difference in the experience of playing different decks, a three-stage method was used. Participants first played a Big Priest deck [2], that is focused on controlling the board; the experience was recorded via the short in-game module. The second deck was Secret Mage [3], that focuses on quickly expending resources to overwhelm the opponent; here the core module was used for measurement. These decks were chosen to have vastly different playstyles, but comparable power level, therefore successfulness should not affect the experience. Lastly, the two players competed against each other in the same room, playing Tavern Brawl, measuring social presence. The observations will be discussed in the context of game mechanics and choice.

## OVERVIEW OF HEARTHSTONE

Hearthstone (HS) [4] is collectible card game (CCG), made by Blizzard Entertainment [5], first released in 2014. Being a CCG, the game has drawn inspiration from physical games such as Magic: The Gathering [6], however, the purely digital format allowed it to evolve beyond what is possible in a physical card game. Up to 2017 December, there have been 7 expansions, that amounts to a whopping 1459 collectible cards, with an additional 135 cards being added in the 8<sup>th</sup> expansion in 2018 April. Using Fullerton's 8 point framework [7], the following formal elements can be identified in this game.

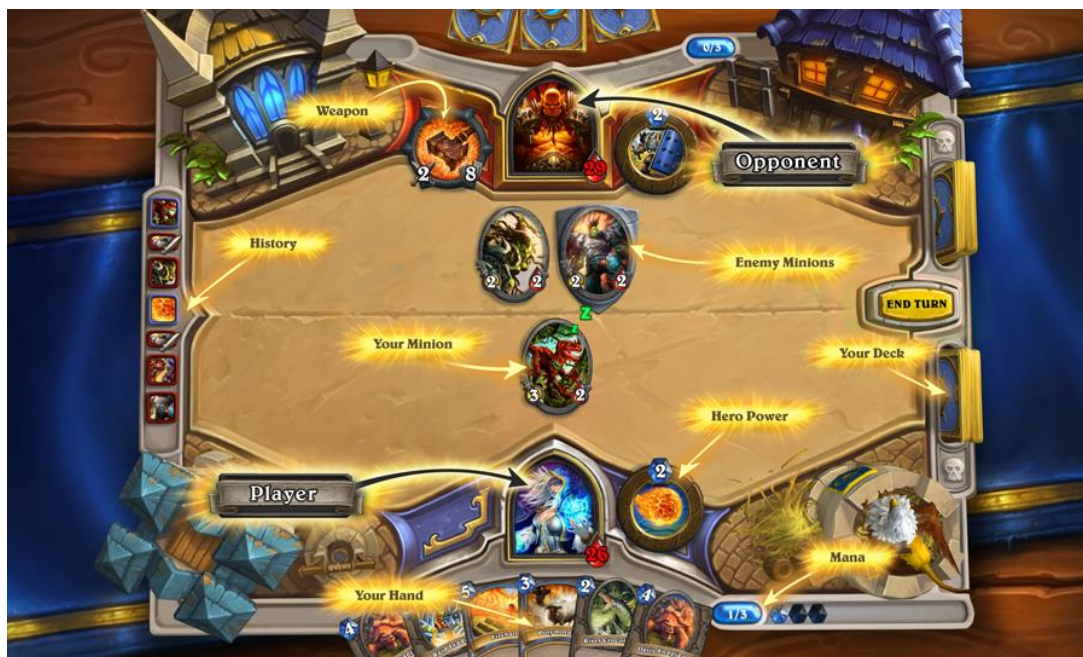


Figure 1 The board (hearthstone.gamepedia.com)

[*Players*] It is played between two players, that can choose between 9 classes. [*Goal*] Their goal is to reduce the other hero's health points from 30 to 0, while stopping the opponent from doing the same to them. [*Outcomes*] This is a zero-sum game, i.e. one winner and one loser. [*Procedures*] To win the game, players take turns playing cards from their hand that trigger different effects. [*Rules*] At the start of each turn players gain one mana crystal (from 1, up to 10), and draw a card from a deck of (usually) 30.

A deck mainly contains two types of cards: minions, and spells. [*Resources*] Every card has a mana cost (top left) that has to be paid in order to play the card. Any number of cards can be played during a turn. Minions have an attack (bottom left) and health value (bottom right). When a minion is played it enters the board (Figure 1). [*Conflict*] A turn after a minion is played it can attack the opponent or their minions. When attacking, a minion inflicts its attack value on the target, while taking damage from the target's attack value (if any). When a minion's health reaches 0 they leave the board.

[*Rules*] Cards can have text on them that describe what they do. Almost anything can be modified by played cards, a showcase of this can be seen in Figure 2. Some common effects are shortened to keywords (bold text). When spells are played, they just leave the hand after executing the text written on them.



Figure 2 Some examples of the range of abilities of cards. (Amara and Azari are reward cards, they cannot be in decks directly) (hearthpwn.com)

Although these might be simple rules, when multiple of them interact together can result in complex behaviours. To document this the player community maintains an unofficial Advanced Rulebook [8], which is over 40 pages.

[*Boundaries*] Matches are played in 4 different game modes that slightly modify the rules of play. **Ranked/Casual** – decks constructed from collection; **Solo Adventures** – players can fight against AI controlled bosses, that follow a limited narrative; **Arena** – craft a deck of random cards, try to get the most wins with it before 3 losses; **Tavern Brawl** – different rules every week.

## CORE MECHANICS

The core mechanics of games can be defined quite simply as “the essential play activity players perform again and again in a game” [9]. In this section, two core mechanics of HS will be analysed: playing cards in a match and collection management.

### Playing cards

Undeniably, the defining core mechanic of HS is the act of playing cards in 1v1 matches. Since this activity is very goal-driven, competitive, and abiding to strict rules, therefore it is easy to place this game in Lindley's triangle in the ludology corner (Figure 3) [10]. Since rules play such an important role in this genre, these have to be easy to learn, understand and apply to be enjoyable. These requirements are implemented extremely well in HS, and arguably, this is one of the most attractive factors of it.

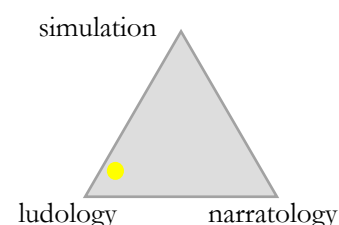


Figure 3 Position of HS in Lindley's triangle

In a match of HS, a player is faced with micro and macro level choices [11]. The micro level choices are playing a card, targeting the effects of cards, the placement of minions, etc. The macro level choices are the sequence of these micro choices, within a turn, and across turns. This manifests in the choice of playing a card after another to activate synergistic effects (aka. combos), saving cards to counter expected moves of the opponent, whether to follow the main or alternative game plan of the deck, etc.

## Micro choices

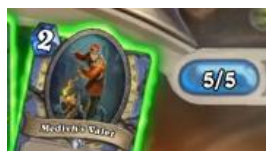


Figure 4 Playable



Figure 5 Active

When playing a minion, other minions already on the board ‘make space’ for the one to be played, by moving to either side to create an empty spot big enough for it (Figure 6). Although this animation is rather subtle, and a mechanic rarely used, it is still meaningful as there are cards that interact with the position of minions. Participant B learned this the hard way, when a Meteor (Figure 7) cleared their entire board, that could have been avoided had they placed minions in an alternative order.



Figure 7 Meteor  
(hearthpwn.com)

All micro level choices in HS are very meaningful, and there are several elements that ensure this. Let us take the example of playing a minion with a conditional effect, such as Medivh's Valet (Figure 5) from the Secret Mage deck, to examine why the play of this card can be meaningful in the context of a match.

First of all, before making any choice, the game state is always clearly displayed as numbers on the board. The possibility of choice, of cards to play is conveyed through the hand. When a card is playable, that is, when enough mana is available, it gains a green highlight border in the hand (Figure 4).

Cards with conditional effects can also gain an orange highlight that signifies that this condition is met, and the associated effect will be activated when played (Figure 5). In the case of Medivh's Valet, this means that there is enough mana, and there is a secret in play. Furthermore, if the card targets another game element then an arrow with a crosshair appears while playing the card, pointing from the card toward the player's cursor (Figure 6). While this ‘targeting mode’ is active, invalid targets are dimmed, making the valid choices available obvious.



Figure 6 Minions making space while targeting

The player makes the choice of playing a card by dragging it from the hand onto the board. The result of the choice is conveyed through the markers on the card and its text. In the case of card text, this can sometimes be vague (e.g. “add a Dream Card to your hand”). Perhaps, this makes the choice less meaningful, however, it can be argued that this instead promotes exploration. In the end, the result of the choice is always clear. After playing a minion, the card disappears from the hand, a new minion enters the board, and it can be used to attack the next turn.

To make this decision-making process easier, HS has several features that help the player remember what a card does. First of all, every card has unique artwork, which provides strong visual cues. Similar cards even tend to share a colour palette (e.g. demons tend to be purple). This also allows hiding the card text completely on the board (that can be viewed when the card is hovered). Cards also have unique sound bites, that are played when the card is interacted with. These sounds both help remembering and forming a personal connection with the cards. Sometimes these sounds can lead to streamers melting down live [12]. In both participants' play this manifested in repeating the sound bites out loud occasionally, which was especially apparent when the sound was human-like and playful.

Other type of cards and actions use similar mechanics, colour coding, and design patterns to make the choices discernible and integrated.



## Macro choices

The macro choices in this game are related to strategies when playing multiple cards in succession. To make good macro choices one requires some experience with both the game as a whole, one's own deck, and other [meta decks](#). To aid this kind of strategic thought, participants were given a [deck guide](#) before play, so that they do not only have to rely on their own experiences when making decisions. This guide introduced the core concept of the deck, some key cards, and good cards to keep in the starting hand (based on statistics from [hsreplay.net](#)).

Let us consider a play as an example of macro choices. Participant A is playing Big Priest against a [midrange](#) Jade Druid deck. The participant's health is already at a problematic level (12). The board was stabilised and the opponent's resources were almost depleted with clears in the previous turns, yet no minions were played up to this point as the cards that could summon big minions early were missing. However, having 8 mana already, Ragnaros (Figure 8) and The Lich King (Figure 9) become playable. There is still an enemy minion on board with a dangerous 5 attack.

If the Lich King is played then the bet is on the opponent not having [removal](#). If Ragnaros is played, then the bet is on it hitting the dangerous minion. Given the fact that the opponent is playing a midrange type deck, which do not usually have many removals, the correct play would be to play the Lich King. Yet Ragnaros is played, and luckily, the end of turn effect removes the dangerous minion; however, the opponent responds with an unexpected removal, and three more minions, which would result in a [lethal](#) next turn. Having had a minion die, the Resurrect (Figure 10) and Eternal Servitude (Figure 11) cards become playable; without thinking (as this choice was made last turn) 3 Firelords are summoned using these cards, which subsequently clear the board again. Even though the opponent still has full health, they concede immediately.

This vignette shows a high level of risk and resource management, within a tight interplay between the two players where a mistake or misfortune could have led to losing the match. The participant has recognised that switching quickly to an aggressive, but riskier tactic after having defended for the first half of the game, can surprise the enemy and lead to a quick victory. In this case, it is clear that the choices made by the participant were meaningful. There was a plan, with clear steps of execution. If Ragnaros had missed the targets it would be obvious why the plan had failed, and this risk taking was a large part of the decisions. Lastly, the plan had a clear outcome, an immediate surrender after execution, that is even more rewarding than having played out the rest of the game.

The above experience is most likely one of the reasons why this participant has enjoyed the Big Priest deck much more over the other one. The GEQ scores show that comparing to the other deck, the participant felt more competent, and challenged, while having less negative feelings. It is unclear whether this was due to the fact that the deck had a more fitting playstyle, or the fact that it had more wins than the other deck, or perhaps some other factor at play.



Figure 8 Ragnaros  
(beathpwn.com)



Figure 9 Lich King  
(beathpwn.com)



Figure 10 Resurrect  
(beathpwn.com)



Figure 11  
Eternal Servitude  
(beathpwn.com)

## Collecting cards

Another core aspect of HS is collecting cards and managing them. This part of the game is closer to the simulation corner in Lindley's triangle since this part of the game is not goal oriented and lacks an end-state. Due to the fact that collection management takes ongoing effort, measuring the gameplay experience

of this was outside of the scope of this exercise, and requires further research. The collection aspect of this game was explored in more detail, and contrasted with other games in 2016 by Toups et al. [13].

Nevertheless, some micro and macro choices can still be identified, as the collection can be viewed as a unique resource management challenge. A micro choice in the context of the collection could be buying some packs for gold or crafting a card for arcane dust. A macro choice could be crafting missing cards for a specific deck (perhaps one from a preferred archetype) or saving gold for new expansions to get a head start on new cards.

These choices can also be considered meaningful, as they satisfy the same criteria as above. However, the fact that the size of one's collection is largely dependent on the amount of real currency spent on the game might undermine these decisions of players who decide to play for free.

## FLAWED MECHANICS

Although, the above mechanics tend to lead to meaningful, fun play, HS also has some mechanics that have negative effects on the user experience. This section explores two such mechanics: overpowered decks and turn based combat.



Figure 12 Brawl

### Oppressive decks

An important issue in this game is to do with balance. There always have been decks that just seem unfairly powerful. To address these there have been balance changes, but most of the time these have resulted in other decks rising to the top. This issue has showed up two times during observation.

The first occurrence was when participant A was playing Secret Mage against a Mill Rogue deck. A mill deck is a unique type of deck that relies on forcing the opponent to draw too many cards. Since any card drawn over the maximum of 10 allowed in the hand is discarded, this tactic can remove threats at no cost. The win condition here is to empty the opponents deck quicker than one's own and finish the game with fatigue damage. Although, this deck is not very powerful on its own, but if one is lacking the required tools to combat its repeated cheap removals it can feel rather unfair. Since the Secret Mage deck is vulnerable against mill, participant A felt weak, saying "I do not know what to do" several times over that game. The Rogue had answers for most plays of the participant, while the tools to combat this were lacking on the other side, and therefore the player's choices did not feel meaningful. This match might have been one of the reasons the participant felt frustrated with Secret Mage, reporting a 4.0 tension score and 2.0 on negative feelings.

The next occurrence was when the participants were playing against each other in the Tavern Brawl. The Brawl during the experiment's week was titled "Showdown at Blackrock Mountain", where players took the roles of Nefarian and Ragnaros. This brawl has appeared a few times over the years and many players have complained about it being unbalanced. The game is designed such that Nefarian starts with a sizeable early-game advantage, while Ragnaros' powerful cards and hero power should be able to take back control in mid to late-game. It was interesting to see how participants had dealt with this seeming imbalance.

They played 2 games, one with each hero; both times participant A has won, possibly because more previous experience with the game. Both players had quickly noticed the imbalance and especially participant B was quite vocal about it. When realising that Nefarian starts with 4 mana the player asked "What is this, you have 6 mana already? How is this fair again?". Another example, during the same game, playing a Brawl card (Figure 12) that could have changed the outcome of the game the participant shouted out loud "Let's take a gamble!", showing a disbelief in having any luck with this card after a series of misfortunes already encountered in that game. In this case, some of participant B's choices were not meaningful as they seemed arbitrary, in the face of the unjust advantage of participant A.

These experiences have shown in the Social Presence module of the GEQ. Very low empathy scores for both players, participant A reporting 4 on feeling schadenfreude, while participant B reporting that their actions were largely controlled by A.

## Turn based combat

One of the most surprising findings in the GEQ scores is that neither players had felt flow, reporting an average of 0.9. Most likely, the main reason for this is that HS uses turn based combat. In this system, half the time players do not have to pay attention and therefore lose focus and flow, even though turns only take at most 90 seconds. Another reason might be that it is hard to expect the opponent's plays and it may be required to re-plan at every turn, making the experience spasmodic. To combat this there are some features implemented, such as idle clickers and a limited social interaction in the form of emotes.

HS has several game boards; these do not differ in functionality, only in the decorations in the four corners. They serve two purposes: it helps set the theme for new expansions, and to help waste time when the opponent is taking too long with idle clickers built into the decoration. One of the most popular boards in terms of clickers, based on observing the participants, is the Goblins vs Gnomes board where a rocket can be launched, and a laser can be fired among other things.

The other feature that can be used between turns is the emote system. This gives players the option to communicate with the other through six predefined emotes. This can be used to signal that the other is taking too long, or to admire a good play, etc. During the observations participant B did not use emotes at all, however participant A used "Greetings" to wish good luck at the start of most games.

## CONCLUSION

In this short research, it was shown how HS's core mechanics can be considered meaningful, supported by data collected with the GEQ. Some mechanics were also highlighted that can cause negative feelings in players. Based on the observations it was confirmed that the experience is heavily influenced by the deck being played, but there are other influencing factors, such as the relative power level of the opponent's deck. To fully evaluate the design of HS, a long-term research is required that investigates the collection aspect as well.

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## APPENDIX A: GLOSSARY

Archetypes	<p>A way to broadly categorise decks, based on their general playstyle. Traditionally, there are four main archetypes (borrowed from Magic: The Gathering):</p> <ul style="list-style-type: none"><li>• <b>Aggro:</b> Short for aggressive. Focus on finishing the games fast, usually by flooding the board with small minions and/or cheap direct damage spells.</li><li>• <b>Control:</b> Tries to slow the game down and win in attrition in the late-game. Usually includes lot of powerful cards, as well as many board clears.</li><li>• <b>Midrange:</b> A sweet spot between control and aggro. Often has a very strong early-game and a decent number of medium sized threats.</li><li>• <b>Combo:</b> A deck entirely based on the powerful interaction of a small number of cards. Close to the control archetype as it has many board clears and removals to stay alive until the combo. Significantly more draw than other decks to increase the chance of getting the ‘combo pieces’.</li></ul>
Big Priest	<p>A control-style deck, that forfeits its early-game advantage for big value plays in the mid to late-game. The game plan of this deck is to utilise Barnes and Shadow Essence to summon (reduced attack/health) 8-10 mana minions on turns 3-6, then summon them again for their full value with Resurrect and Eternal Servitude. To reliably summon these big minions there are no other smaller minions in this deck, therefore it can feel unusual at times, when the first few turns have to be skipped without any actions. Instead it is packed with many removals, board clears and heals to ensure that the player can get to the later turns.</p> <p>Full deck list with statistics: <a href="https://hsreplay.net/decks/IVXec9I2o3AcBO8g22hWc">https://hsreplay.net/decks/IVXec9I2o3AcBO8g22hWc</a></p>
Classes	<p>There are 9 different classes. Each has a unique hero power (e.g. Mage – deal 1 damage), that can be cast every turn for 2 mana. Each class has access to a class-specific card pool, as well as neutral cards.</p>
Currencies	<p>The game has two currencies: gold and arcane dust. Gold is gained through completing daily quests and can be spent on packs or arena entries. Arcane dust is gained through disenchanting (destroying) cards and can be spent on crafting cards. The ratio between crafting and disenchanting is <math>\sim 4\times</math>, that is, if one needs a specific card crafted 4 other cards of the same rarity must be disenchanted.</p>
Fatigue damage	<p>After using all 30 cards in the deck, every draw causes increasing damage to the hero. The first draw is 1 damage, the second is 2, and so on.</p>
Hand	<p>The hand is where playable cards are displayed. For the player this is on the bottom of the screen, for the opponent it is on the top, face-down. When a card is drawn it leaves the deck and enters the hand. A player can hold at most 10 cards at a time, drawing more than this discards the card.</p>



Keywords	<p>Some common card effects are shortened to keywords, that are signified by bold text. Cards can have multiple keywords. Here is a non-exhaustive list of such effects with their in-game descriptions, relevant to the decks used in the research:</p> <p><b>Battlecry</b> Does something when you play it from your hand.</p> <p><b>Deathrattle</b> Does something when it dies.</p> <p><b>Discover</b> Choose one of three cards to add to your hand.</p> <p><b>Lifesteal</b> Damage dealt also heals your hero.</p> <p><b>Secret</b> Hidden until a specific action occurs on your opponent's turn.</p> <p><b>Silence</b> Removes all card text and enchantments.</p> <p><b>Spell Damage</b> Your spells deal extra damage</p> <p><b>Taunt</b> Enemies must attack minions that have Taunt.</p>
Lethal	Having enough total damage on the board and in hand to finish the opponent.
Meta decks	Powerful decks that are frequently played and shared online. These change every time there is a new expansion or balance change. A deck can only be considered powerful at a given time if it can deal reasonably well with other current meta decks.
Removal	Cards that can remove or incapacitate powerful minions.
Secret Mage	<p>A more aggressive midrange-style (aka. tempo) deck, that tries to get ahead early with cheap, efficient minions and to have enough answers to hold off the opponent until they can be finished off. It uses a lot of draw and secret synergies like Arcanologist and Mad Scientist, to keep the pressure up. At the same time direct damage cards like Fireball can be used as removal or as a finisher. If the opponent can keep up, then large threats like Dr. Boom are there as a backup.</p> <p>Full deck list with statistics: <a href="https://hsreplay.net/decks/Ya2VO94jTEdcFndr87favd">https://hsreplay.net/decks/Ya2VO94jTEdcFndr87favd</a></p>

## APPENDIX B: COMPLETED QUESTIONNAIRES

[illegible][illegible]

# APPENDIX C: DECK GUIDES

Big Priest Guide (<https://hsreplay.net/decks/1Vxec9J2o3AcBo8g22hwc>):

Big minions:



Cheating out big minions:



Resurrect big minions (timing!):



Rest of the deck is to control the board & stay alive.

Good starters:



Secret Mage Guide (<https://hsreplay.net/decks/7a2VO9q1TEdCndr87favd>):

Cheat out secrets:



Synergize with secrets:



Finishers:



Good starters:

