Honours Project Portfolio - Barney Smith 1700875

Project Overview

My aim with this project was to gain games design experience, particularly around balancing games and designing for balance. I aimed to do this by investigating techniques for balancing games, and applying those to an existing game whilst designing new content for the game in parallel to this. Originally, I also planned to explore a new context for the use of the balancing methodology known as Metagame Bounds. As the project progressed my supervisor and I concluded that such research was, unfortunately, beyond the scope of an Honours Project.

Providing Context - What is Root and how is it played?

Root: A Game of Woodland Might and Right (Leder Games, 2018) which shall henceforth be referred to as Root, is an asymmetric strategy game for 2-6 players. In the game the players take control of a faction that is vying for control of the woods in which they live. As Root is an asymmetric game the factions are all unique in some way, but they do all make use of some common resources: They all draw from a deck of cards, they all score points on their progress to victory, and they all recruit warriors (with one exception).
Factions follow the same general turn structure which falls into 3 stages: Birdsong, Daylight then Evening. During these stages the players can take different actions, according to their faction. All of this makes for a fairly complex game to balance.

The entire rules for Root can be viewed here: https://ledergames.com/products/root-a-game-of-woodland-might-and-right

A 7 minute explanation of how the game is played can be viewed here: https://www.youtube.com/watch?v=G08TDwBbV7o

Intended Professional Development

As a student with a professional interest in games balance my aim with regards to professional development for this project was for me to gain experience with practical balance work as this is not something I had been able to pursue during other university modules. Based upon my personal study and research of the discipline I identified the skill gaps that I needed to address: a lack of knowledge and practice using spreadsheets which are of high importance in balance work, and a lack of experience applying what I have learned in the field of balance.

Practice Structure

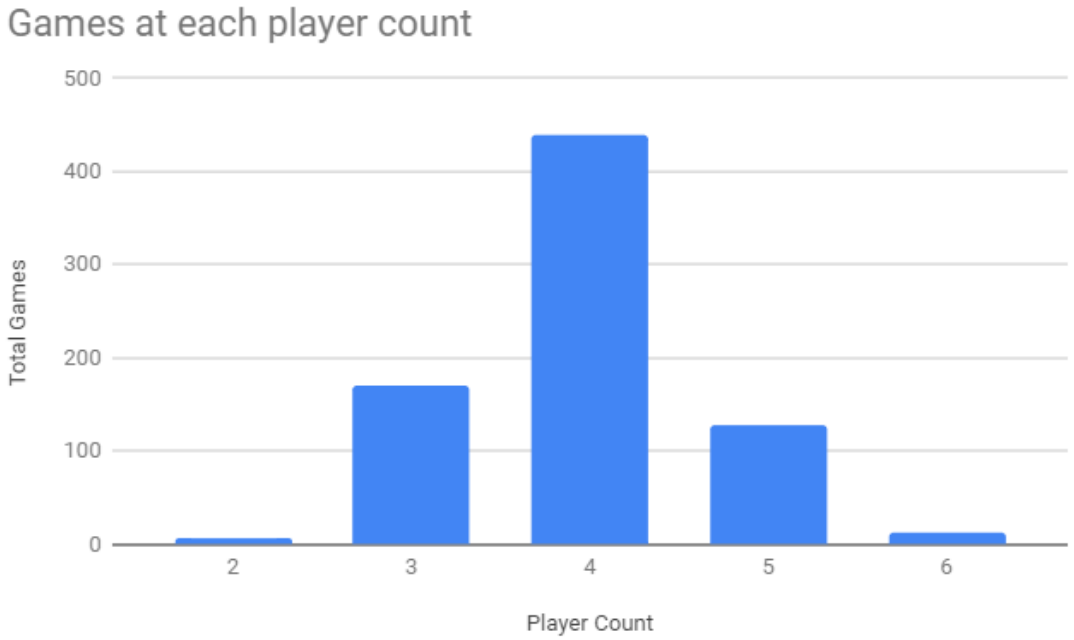
My aims with regards to investigating the metagame of Root were: First to get a picture of the metagame using publicly available data with a large sample size. This data would be used to identify what the typical game looked like, play and win rates of all factions, and perception of the state of the meta. The qualitative data used to get a picture of that perception of the meta would also be used to create matchup charts for use with Jaffe's Metagame Bounds.

Based upon these findings factions in need of work would be identified, and balancing considerations and tools would be used regarding them. Restricted play testing would be one such example of this.

Finally, parallel to this work, I would create my own faction from scratch to gain experience designing and balancing new mechanics and in support of this existing factions may also see mechanic changes.

The Metagame - Average Player Count

To assess the state of the meta in Root, I first needed to view data on finished games. As Root is a tabletop game there is unfortunately not a great wealth of data available, however I found a community created database of game results that contained several hundred recorded games. This was enough for me to draw statistically significant conclusions from. As the player count in a game of Root can conceivably affect the balance of the game due to certain factions benefiting from having more players to interact with, but faction mechanics themselves do not change at different player counts, I decided it was sensible to base my assessment on, and aim changes I make towards the most common play experiences. Based upon a sample of 766 games, the average player count for a game of Root is 3.97. The extremes of player count, at 2 and 6, make up only a small portion of games played at 0.8% and 1.8% of games respectively. With this knowledge I decided to structure my play testing around four player games.



The Metagame - Faction Pick Rates

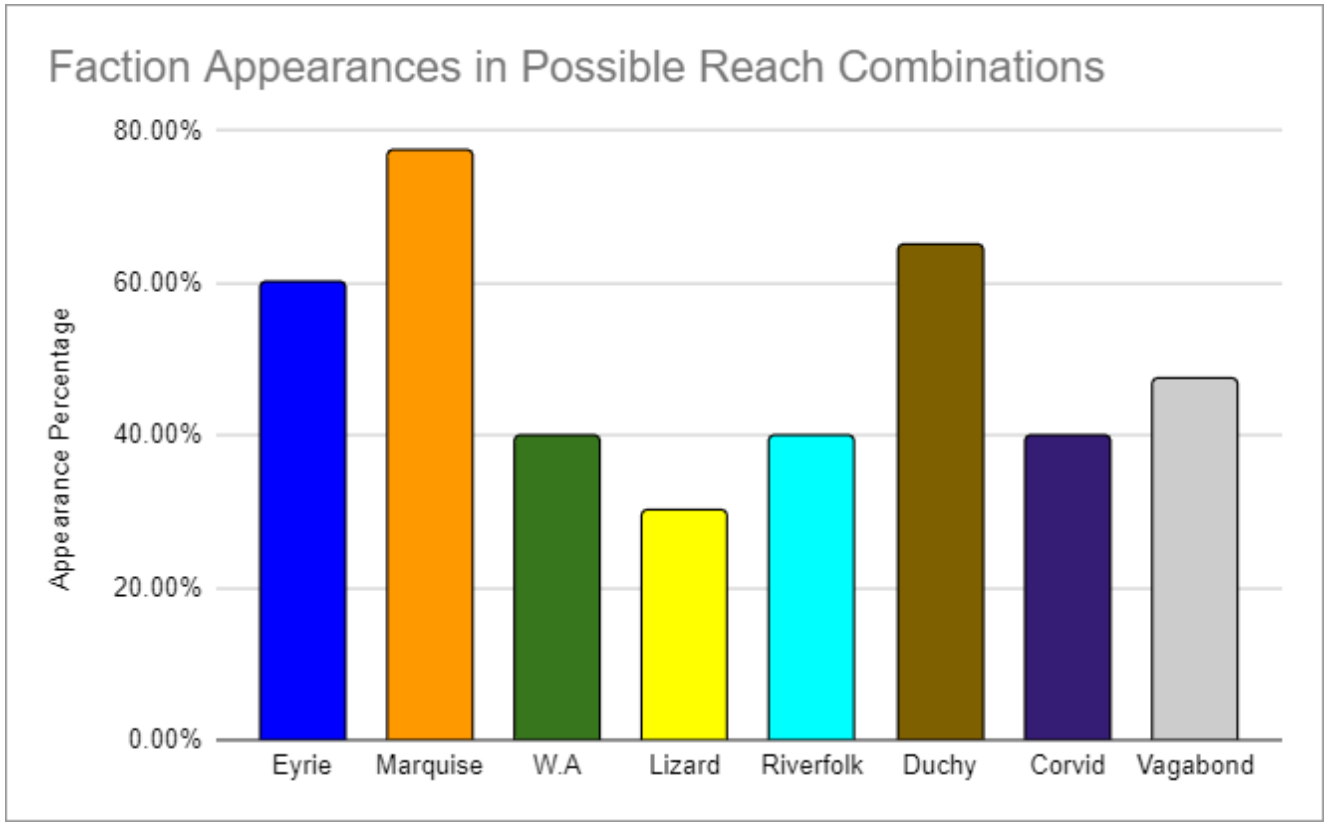
It is worth noting that in Root all factions are assigned a “reach” value, and each player count has a minimum total reach value required to play a viable game, therefore factions with larger reach values will naturally appear in more games as they are more often necessary to reach the minimum reach value to play a viable game. Below is a chart showing the rates at which factions would appear in four player games if games were set up by randomly choosing a viable reach combination, rather than on any other factors such as player perception of a faction’s power, aesthetics or mechanics.

A. Faction Combinations

There are hundreds of ways to play Root. To help you pick a faction combination that will produce an interesting game, use this simple system. Each faction has a specific value called Reach. To create a viable setup, the factions you choose should have a total Reach that equals or exceeds the number for your player count. Adventurous players are welcome to use any faction combination with at least 17 Reach.

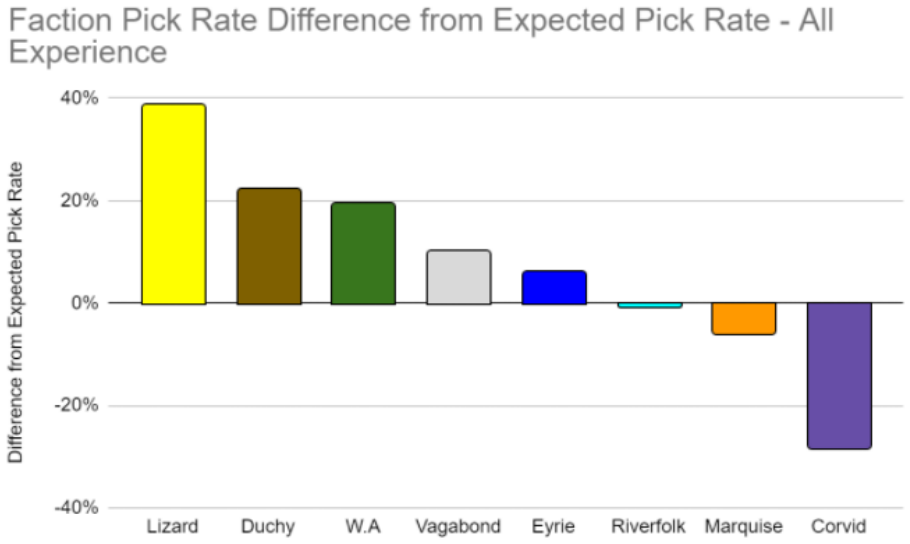
Viable Game Sums					
Players	2	3	4	5	6
Total Reach	17+	18+	21+	25+	28+

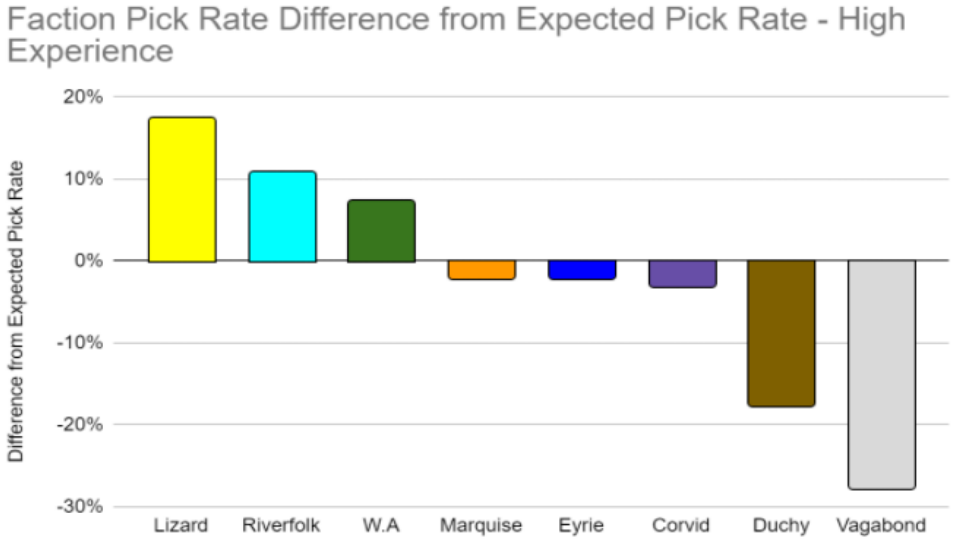
Reach Values	
Marquise de Cat	10
Underground Duchy	8
Eyrie Dynasties	7
Vagabond (first)	5
Riverfolk Company	5
Woodland Alliance	3
Corvid Conspiracy	3
Vagabond (second)	2
Lizard Cult	2



The Metagame - Faction Pick Rates

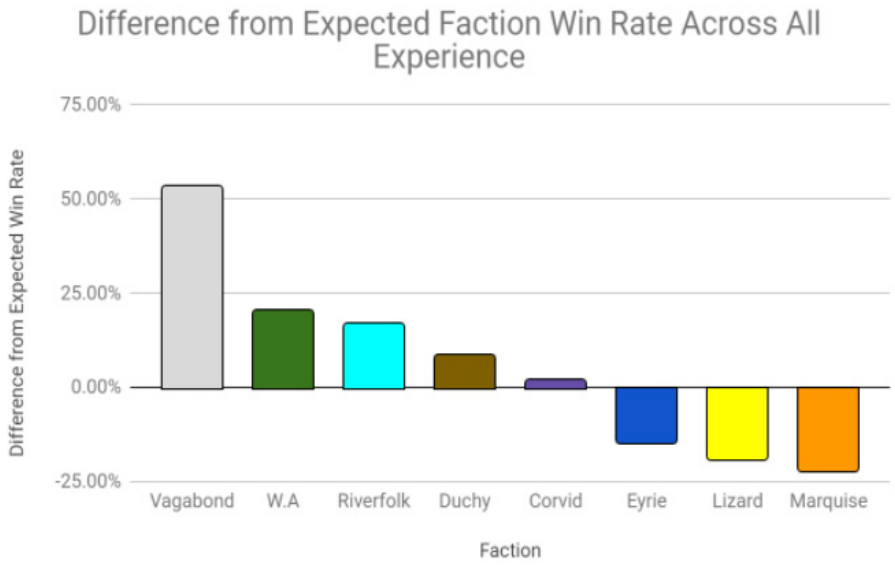
Below are the rates at which the factions are actually compared to the rate at which they would be played if each possible Reach combination was played equally. This data is based on a sample of 476 four player games played by players of all levels of experiences (left) and a sample of 94 four player games of players at high experience (right). The Marquise and Corvid are underplayed at all levels, Lizards and Woodland are overplayed at all levels. Eyrie, Duchy and Vagabond are underplayed at high levels of experience but overplayed at high levels of experience.

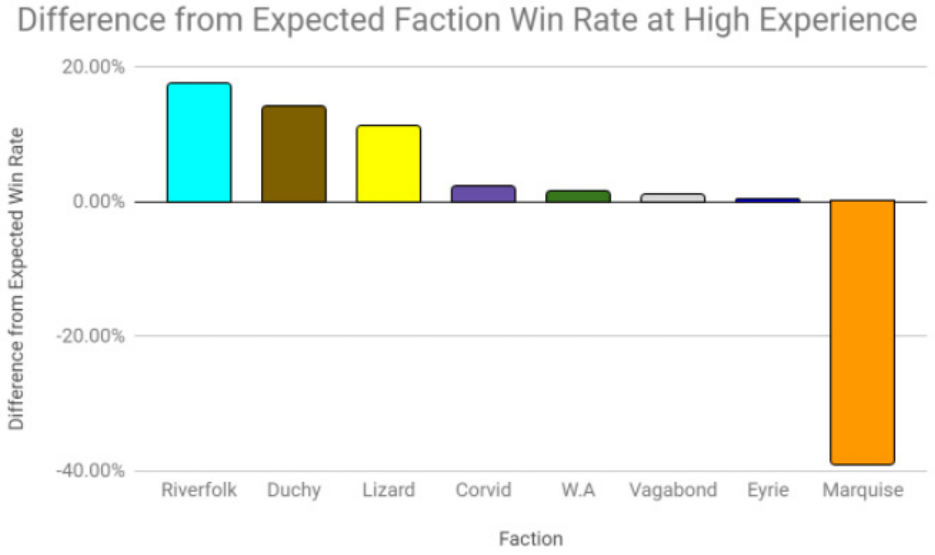




The Metagame - Faction Win Rates

Below are the rates at which the factions win according to a sample of 476 four player games played by players of all levels of experiences (left) and a sample of 94 four player games of players at high experience (right). An important note is that the expected win rate will be somewhere slightly above 25% as there are rare cases where 2 players can win in the same game but the majority of games have only one winner. Furthermore it should be noted that for both the graph on this page and the previous for High Experience games, I consider the bars for Corvid and Vagabond to be outliers. This is because their sample sizes are relatively small, and this data dramatically conflicts with the opinions of highly experienced players.





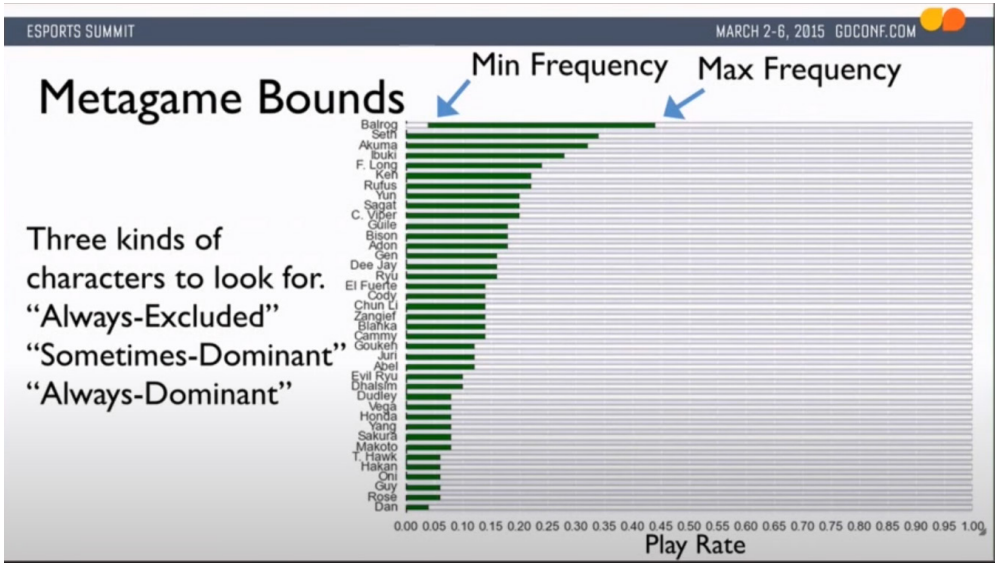
The Metagame - Matchup Survey and Chart

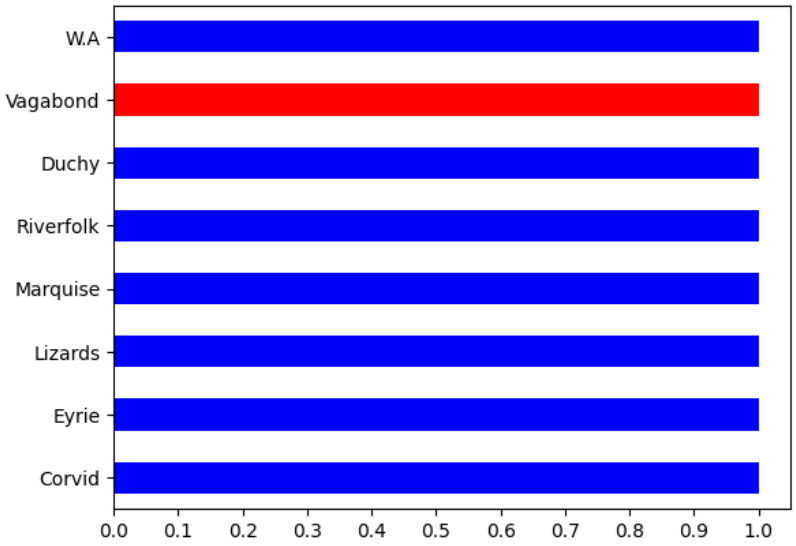
Based upon a survey of 81 players that I carried out, about half (39) of the respondents reported that they had high experience playing Root. I used their responses on their perceptions of individual match-ups, that is how much the presence of two factions in a four player game favours or hinders those two factions. For instance, if the Marquise de Cat is in the game, is that favourable for the Eyrie Dynasty or unfavourable and to what extent? Using that data, I created the following matchup chart. A matchup chart shows the likelihood that the player option row (in this case, choice of faction) beats the player option column. So for example players feel that in a matchup between the Eyrie Dynasty and the Corvid Conspiracy, the Eyrie Dynasty would win 65% of the time. On the right hand side is the average match-up favourability for each faction. Note that this data is based entirely upon player perception, but that the player opinions used to create these charts were from players who had a high level of experience with the game.

	Corvid	Eyrie	Lizards	Marquise	Riverfolk	Duchy	Vagabond	W.A	Totals	Average
Corvid	-	0.35	0.54	0.35	0.33	0.27	0.13	0.42	2.39	0.34
Eyrie	0.65	-	0.59	0.42	0.47	0.42	0.42	0.42	3.40	0.46
Lizards	0.46	0.58	-	0.52	0.34	0.41	0.13	0.39	2.83	0.39
Marquise	0.65	0.41	0.48	-	0.32	0.25	0.22	0.33	2.66	0.34
Riverfolk	0.67	0.53	0.66	0.68	-	0.29	0.29	0.48	3.60	0.49
Duchy	0.73	0.64	0.59	0.75	0.63	-	0.37	0.44	4.14	0.57
Vagabond	0.87	0.70	0.87	0.78	0.71	0.63	-	0.66	5.22	0.72
W.A	0.58	0.63	0.61	0.67	0.52	0.57	0.34	-	3.91	0.56

The Metagame - Metagame Bounds

Metagame Bounds methodology was created by Alexander Jaffe and involves a python programme that applies a branch of mathematics known as linear programming to a matchup chart. He first used it, and set a precedent for its effectiveness, when working on Playstation All Stars Brawl in 2015. The same methodology was later applied to DOTA 2 by Sean Levatino who again found it to be effective. The charts created by this methodology indicate how often a player should use each option available to them in order to succeed (that is win frequently) in a competitive multiplayer game. On the left below is an example chart used by Jaffe based upon a matchup chart for Street Fighter 4. The green bars show the minimum and maximum frequency a player should play each character in order to succeed. So for example it suggests that a player should play Balrog at least 5% of the time, and no more than 45% of the time. On the right is a match-up chart created by myself for Root. You may be wondering why it looks so different to Jaffes. The bars are different colours, and are filling the entire chart. Well, the explanation is that the red bar shows the space before the minimum play frequency and the blue bar shows the space after maximum play frequency. In other words, before I made these recolours to the chart it was essentially blank because the Vagabond faction was so dominant that the Metagame Bounds methodology tells us that players should only ever play the Vagabond.





The Metagame - Metagame Bounds

When proposing this project I proposed that I would research a possible new method for applying Metagame Bounds in a new context. As the methdology was originally designed for 1 versus 1 fighting games but hypothesised to be useful in other scenarios as well I was interested in researching its application to a free for all style game like Root. When the Metagame Bounds programme makes use of a matchup chart it considers each options individual matchups and bases its 'advice' on which option the players should play in which proportions on those individual matchups. In a game like Root players face multiple opponents at once, and the presence of the Woodland Alliance for instance may hinder the Eyrie Dynasty to a much greater extent than it hinders the Underground Duchy, so even if the Eyrie had a good matchup with the Duchy this may overall be a bad game to play the Eyrie in.

I hypothesised that by making some changes to the Metagame Bounds linear programme by adding constraints around player count and opponents it may be possible to account for this. However, whilst researching linear programming and python coding I eventually had to accept that this was beyond the scope of an undergraduate honours project and abandon this. This would be an interesting area to research as part of a Masters degree or PHD.

The Metagame - Fun

It is important amongst all this talk of win rates not to forget that players play games not just to win, but to have fun. Included with my survey on perception of faction matchups were questions on which factions players enjoyed playing as or against, and which they disliked playing as or against and why. 63% of respondents answered that they least liked playing against the vagabond making it the least liked faction to play against in Root by a large margin. Similarly, the majority answered the question on what their least favourite faction to play as was with "Vagabond" (22%). The Vagabond was also named as the strongest faction by 67% of respondents, with many reporting that the method of scoring points through Infamy was the source of this power.

Interestingly, the Lizard Cult (32%) was named the weakest faction, closely ahead of the Marquise de Cat (25%) and Corvid Conspiracy (23.6%) yet two of these factions were some of the most popular to play as. The Lizards were the most popular answer for Favourite Faction (26%) and Corvids were in second (19%). Meanwhile the Marquise de Cat were the least favourite faction with only 3% of respondents choosing them as their favourite. This suggests that 'strength' isn't the only thing that players look for when choosing a faction in Root.

The Metagame - Summary

- Metagame Bounds points to the Vagabond being "Always Dominant." that is; that the Vagabond is the best choice in every situation regardless of opponent.
- Win Rate data corroborates this when n=245 the Vagabond has a 38.4% winrate at all levels of experience, much higher than the average ~26%. The smaller sample size n=36 does not support this as the winrate over those games is only 27.8%
- The Vagabond is not picked much at high levels of experience, but those players explain they dislike playing an overpowered and uninteractive faction.
- The Marquise de Cat is underplayed at all levels of experience, and wins at a lower rate than the average ~26%
- Match-Up Charts suggest that the Corvid Conspiracy is the weakest faction in Root, though win rate data contradicts this.
- Opinion Surveys suggest that the Lizard Cult is the weakest faction, winrate data aligns with this at lower experience levels but contradicts this at high experience levels and when filtering surveys by experience the Corvid Conspiracy is viewed as the weakest faction.

Problem Factions

Based upon all of the previous discussion of the metagame there are several factions that could be looked at for changes. However one must consider the scope of a project and as I was also due to design my own additional faction from scratch I decided to limit myself to working on just 3 'problem factions'. These were:

- The Vagabond, both data and opinion point to this faction being overpowered and players dislike playing as or against this faction. It is the most obvious candidate for changes.
- The Marquise de Cat. A faction with one of the lowest winrates, but unlike the Underground Duchy this low winrate is present even at high levels of experience. By possible reach combinations Marquise should be the most played faction in Root, but isn't by a considerable margin. Further, it is not well liked to play as - but many players reported that it was their favourite faction to play against.
- The Corvid Conspiracy. Viewed as the weakest faction in Root but many players' favourite faction to play as.

Design Goals - Vagabond

When reworking the Vagabond I set myself the following design goals:

- The Vagabond's power must be reduced.

- The Vagabond must still maintain its flavour. Written on the back of the board to entice players to play the Vagabond faction is the following: "As the Vagabond, you will play all sides of the conflict, making friends and foes as it suits you. You score points through your relationships, as you aid friendly factions by giving them cards, and as you grow your infamy with hostile factions by removing them in battle. You'll also score points as you go on quests to spread your good name amongst the creatures of the Woodland." Any changes I make must uphold or further this flavour.

- To achieve this I will reduce the power of the Infamy points mentioned above, which are a dominant strategy for the Vagabond, preventing the relationships and quests mentioned above from being explored.

- A lack of interactivity was often complained about in regards to the Vagabond, so I will aim to make the faction more interactive through the points gained by relationships.

Vagabond - Restricted Play

To investigate player feedback that the Vagabond's Infamy scoring was too powerful I opted for a round of play testing using Jaffe's restricted play method. During these play test sessions, highly experienced Vagabond players were restricted from using the 'Quest' action, or scoring points with the 'Aid' action or in some games were restricted in both ways. The findings of these play tests were that the Vagabond was still able to win with either the Quest or Aid action restricted, and were still able to achieve high scores with both actions restricted but struggled to actually win games. These findings lead me to conclude that points scored through Infamy were too prevalent and were dominating the Quest and Aid portions of the Vagabond's design. In order to give players a deeper playing experience I would aim to remedy this with my changes by decreasing the power of Infamy and increasing the relevance of Questing or Aiding.

V1	Restriction
30	Quest
26	Quest
W.Dom	Quest
24	Quest
28	Quest
24	Aid
30	Aid
21	Aid
20	Quest and Aid
19	Quest and Aid
Dom	Quest and Aid

Vagabond - Faction Board

The Vagabond faction is quite unique compared to the other factions in Root due to the Lone Wanderer ability which you can see on the top right of the faction board. The piece that the Vagabond player places on the board is not a warrior and cannot be removed from the board. Where other factions will typically be in multiple places across the board with several warriors spread out, the Vagabond occupies only one area. Additionally, factions can score points when they remove other player's buildings or tokens from the map, but the Vagabond doesn't place any of these. These two factors combine to create the feeling of a lack of interactivity that many players complain about.

The Vagabond can use the Aid action to give a card from their hand (an important resource) to another player and thereby improve their relationship with that player's faction. The relationship mechanic is unique to the Vagabond, but is limited to Aiding factions to improve their relationship or attacking other factions to become hostile to them. Once Hostile the Vagabond scores points for every piece they remove (this includes warriors, something which no other faction scores when they remove). The speed at which points can be scored by removing Hostile warriors far outweighs that of the Aid, or Quest mechanics for points and is what is known as a Dominant Strategy.

Vagabond Iteration 1 - Reducing easy points and increasing rewards for opponents

As one of the main complaints from players regarding the Vagabond was a lack of interaction, particularly a lack of incentive to attack the Vagabond (there is no way to score points by attacking the Vagabond but there is for attacking every other faction) the first thing I did was to determine just how much the Vagabond tended to win by. I found that on average, in high experience games, the Vagabond was winning by about 6 points (Victory is achieved at 30). There is an identity relationship between the Vagabond's Explore action and points scored (up to a maximum of 4).

To provide incentive to attack the Vagabond I added a clause to the Vagabond's Hostility that Hostile factions would score one point whenever they hit the Vagabond in battle. Additionally I removed the points scored from the Explore action to remove 4 very easily achievable points from the Vagabond.

In play testing this did reduce the power of the Vagabond and give more of an incentive to hit them, but feedback was that it didn't really result in more enjoyable games involving the Vagabond. The sense of a lack of interactivity remained.

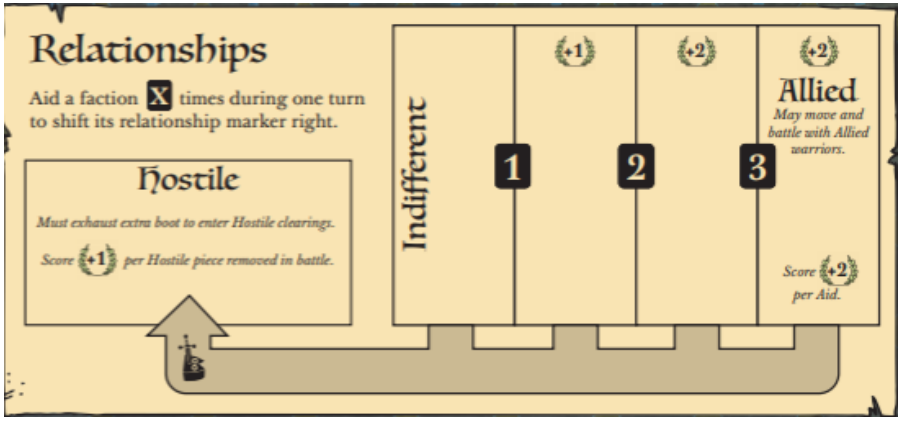
This sent me back to the drawing board so to speak, I realised that simply altering the power level of the Vagabond wouldn't really make the Vagabond more well-liked by the playerbase and it would instead need something of a rework.

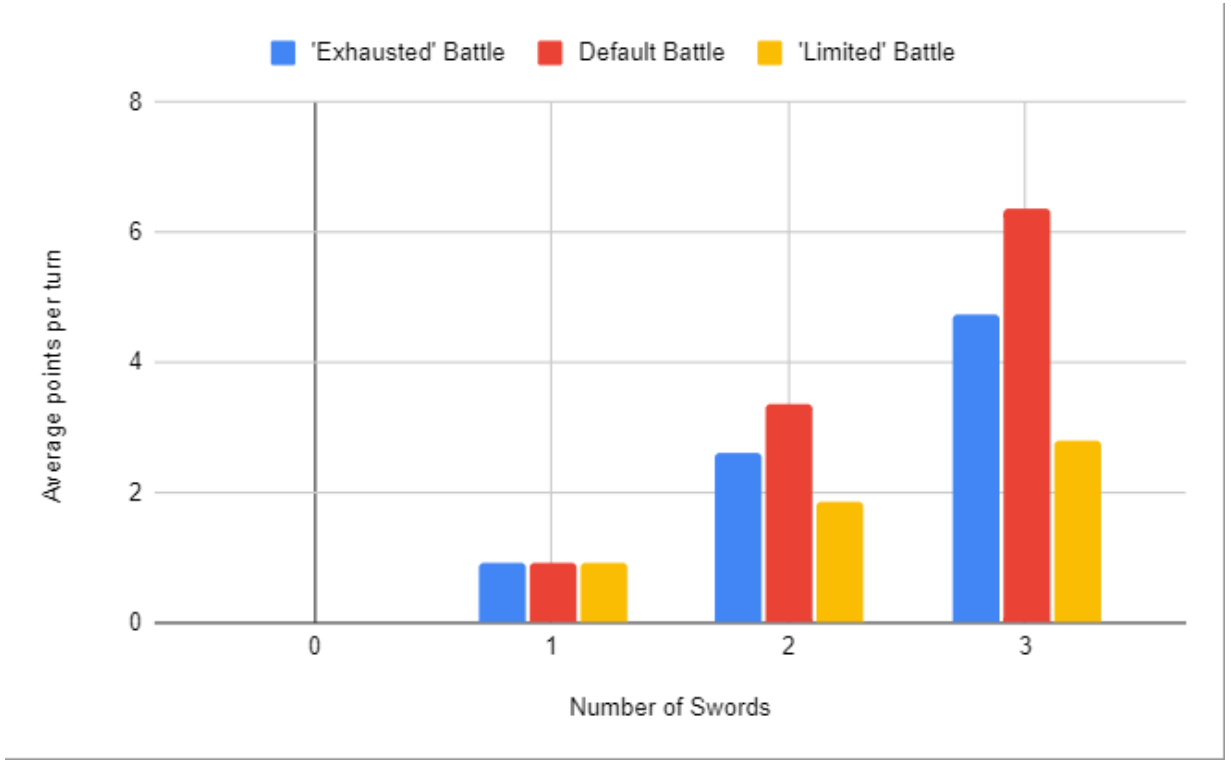
Vagabond Iteration 2 - Quest and Battle Rework

The relationship tracker on the Vagabond board takes up a lot of space, and is described as an important part of the faction on the setup decsription and flavour text. However in practice it doesn't play that big of a role in the game, with exception of the Hostile box.

With this rework I aimed to increase the points gained by questing while reducing the amount of points gained by Infamy (Points gained by removing hostile warriors). This was a change of the numerical relationship between a Vagabond's sword items and their points per turn. By default the Vagabond can 'exhaust' one sword item to battle, with a maximum number of hits determined by the number of swords they have (whether they are exhausted or not).

Shown to the right are three methods of battle and the average points scored per turn associated with them according to the number of sword items they have. Default, is the way points are scored in battle by Vagabond in the current version of Root which is essentially one hit equals one point. Exhausted is one method I came up with, which limits the maximum number of hits (and thereby points) to the number of unexhausted swords the Vagabond has available. This creates diminishing returns for multiple battles in one turn. The third method is another method I came up with and applied to a later version of the Vagabond - Limited. In this method the number of points scored by the Vagabond is always 1 if the Vagabond scores any number of hits. Thereby the points available to the Vagabond from battle are in an indentity relationship with the number of swords available to them.





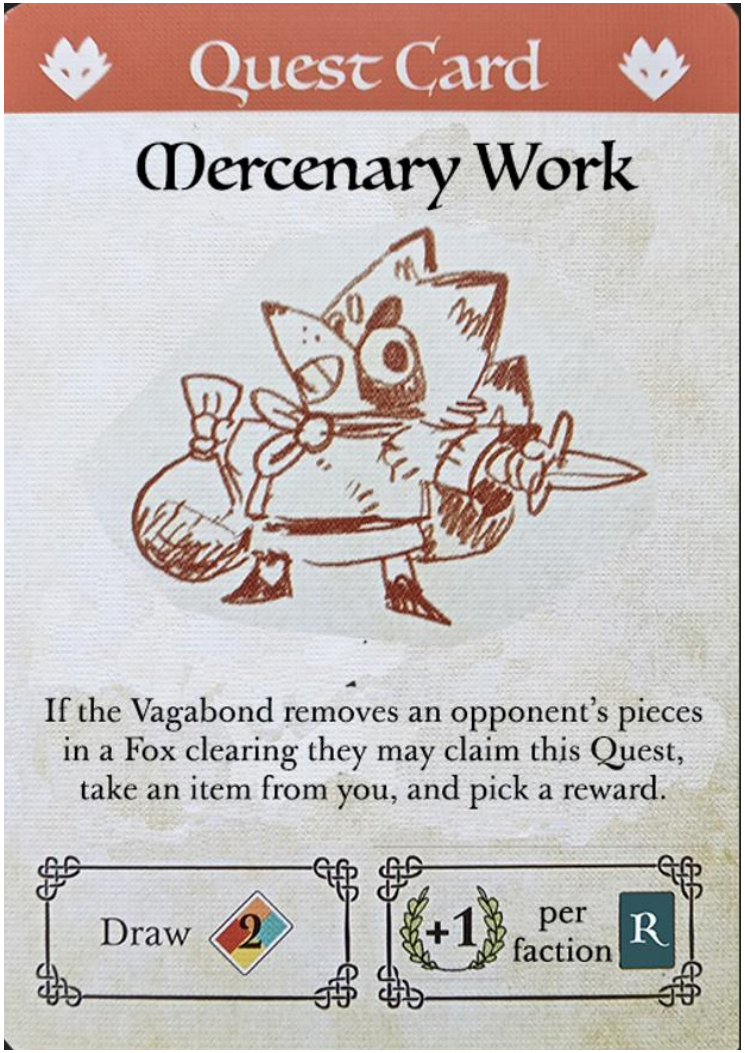
Vagabond Iteration 2 - Quest and Battle Rework

"As the Vagabond, you will play all sides of the conflict". With my rework of the Vagabond I aimed to make the players experience this more.

Quests for the Vagabond in the original version of Root are cards that can be claimed to score points by exhausting two items that match the card. This is an entirely solitary action that doesn't interact with other players at all, with my rework I aimed to change Quests entirely - into something that made for large amounts of interactivity between the Vagabond and other factions.

I envisioned other players giving the Vagabond player Quests - to help them or to hinder their enemies, and I designed new Quest cards like the one to the right. With these quests other players could choose a card to give to the Vagabond, requesting them to perform a task for them. In this case, removing enemy pieces. With these quests, the Vagabond can improve their relationship with other factions by completing Quests for them - and they score more points when they complete quests based on the state of their relationship.

By combining this with the use of the Exhausted battle explained on the previous page the emphasis on points is moved from battle to relationships.

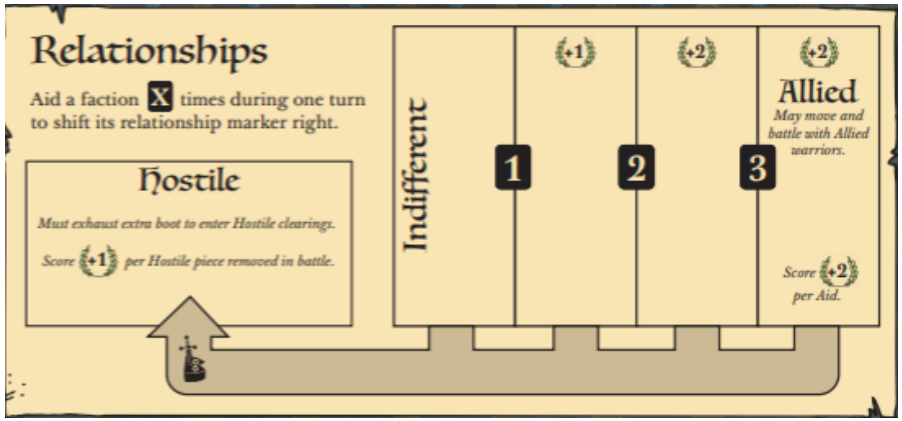


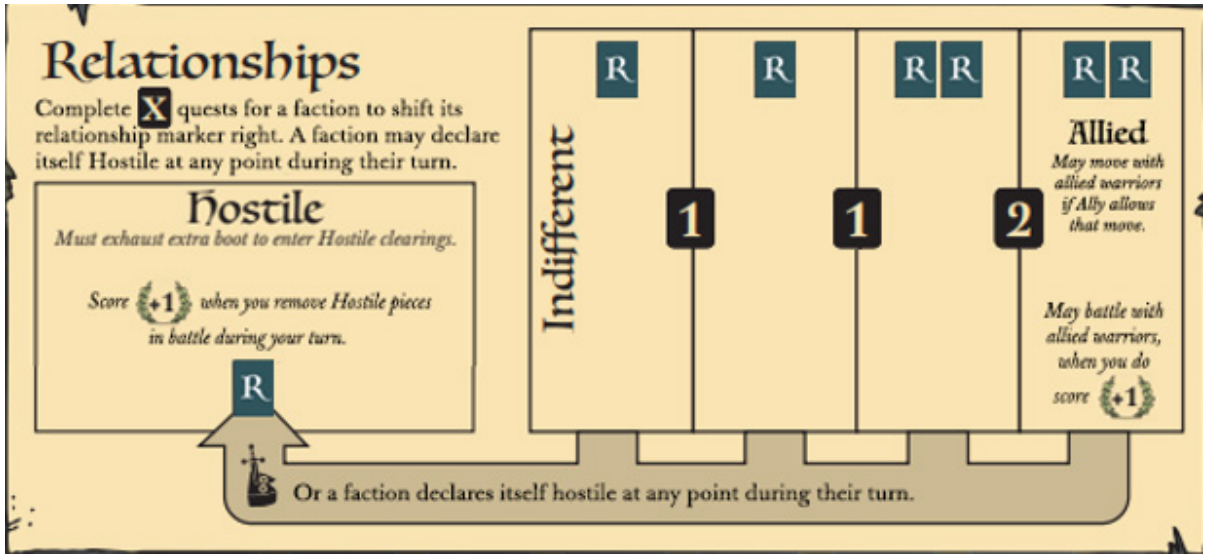
Vagabond Iteration 2 - Quest and Battle Rework

The new relationship track I implemented for this version of the Vagabond reatined the same basic structure to keep a level of familiarity for the player. I placed 'R' symbols in each stage of the relationship track - showing the player how much they can score for completing the quests they have been assigned by other players. In the first iteration of this.

Another change was to the 'Allied' status. In the default version of Root the Vagabond can move and battle with Allied warriors. For this reason experienced players would actively avoid becoming allied with the Vagabond, because they would risk losing control of their own warriors. In this iteration I added the stipulation that the Vagabond player must ask the Allied player to move those warriors. Additionally I added a point incentive to battling with Allied warriors, which coupled with the use of either 'Exhausted' or 'Limited' battle gave the Vagabond reason to get involved in their Ally's battles.

All of this together did make for a Vagabond that did feel much more like a character that 'plays all sides of the conflict'. Play testers were very receptive to these changes. One problem though was that due to the Vagabond's reliance on being assigned quests to score they found it incredibly difficult to close out games - they would keep pace with the other factions for the majority of the game but stall out at the end. This meant I needed to give them another point scoring mechanism, but had to be careful not to break the balance around quests and battles with this alternate point scoring mechanism or I would have undone the progress made so far.



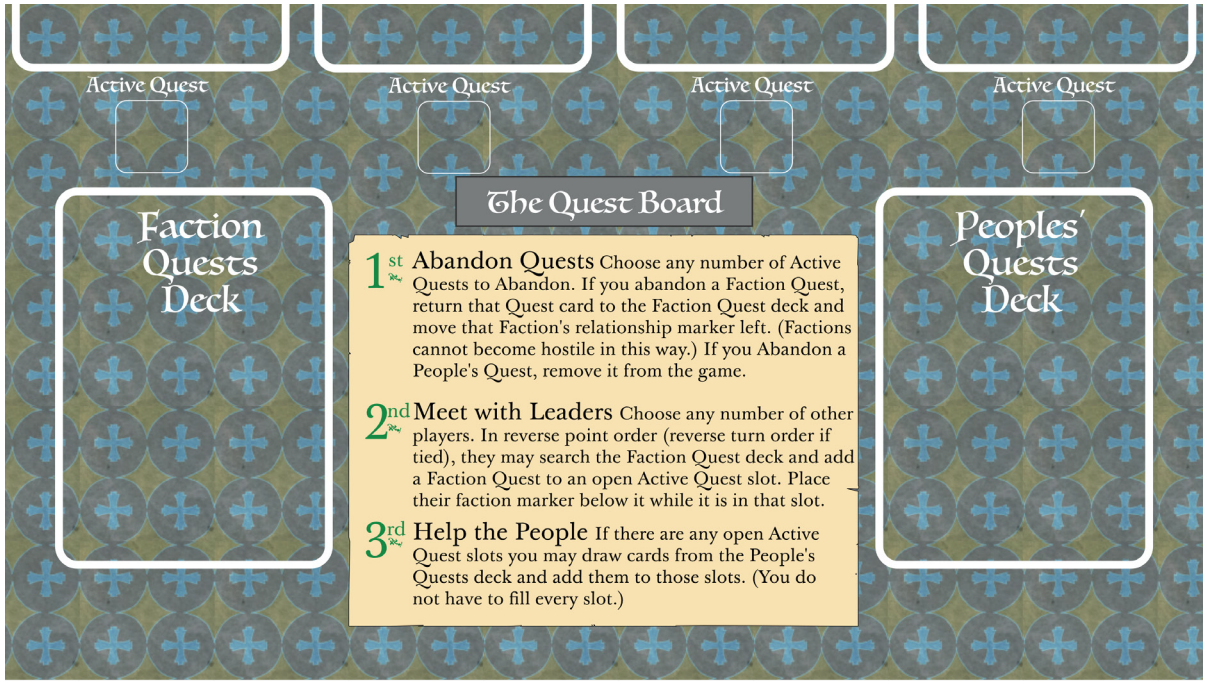


Vagabond Iteration 3 - Return of the Original Quests

Returning to the original faction board for the Vagabond there are 4 ways in which the Vagabond can earn points: Aid, Battle, Crafting, and Quests. In my updated version of the relationship track there were no longer any points to be gained from Aid. Battle points had been reduced, and this is a necessity of the rework because battle in the original board is too much of a dominant strategy and makes for a very linear play experience. Crafting was unchanged, and can be used for points. Unfortunately the Vagabond is quite limited in crafting due to the rarity of the item they need to be able to craft a meaningful number of times. Only 1 copy of the card to craft that item exists in the deck of 54 cards, which means they often rely on another player crafting that item for them.

This leaves only Quests, which I had just entirely reworked from something that was solitary into something that was highly interactive. I didn't want to compromise this interactivity but it seemed inevitable that the Vagabond would need to restore some of its independent point scoring and Quests were the only avenue to do this in other than Battle.

I decided to bring back the original Quests, but run them in parallel to my new Quests - creating two distinct types of Quest. 'Faction Quests' were my new cards - the interactive type, and 'People's Quests' were the old Quest cards - the solitary ones. To distinguish these, new art would be needed, and to streamline the experience for players I created a new board that could be placed beside the Vagbaond faction board. Small additional pieces to boards are not unheard of in Root - with the Riverfolk and Duchy both having such pieces.



Vagabond Iteration 3 - Return of the Original Quests

The return of the original quests did seem to solve the problem of the Vagabond being unable to close out games. The number of test games I got with this version of the Vagabond was not significant enough to really compare with the 766 game sample from earlier but players were receptive to the changes and anecdotally the power level of the Vagabond did seem to have been reduced whilst they still had the ability to win games.

Overall, I feel that my work on the Vagabond was moderately successful, and I would be interested to see winrate data for this rework over a larger sample size.

Design Goals - Marquise de Cat

When reworking the Marquise de Cat I set myself the following design goals:

- The Marquise's power must be increased.
- The Marquise must still maintain its flavour as an 'industrial and military powerhouse'.
- To achieve this I will attempt to solve the perceived problem of a lack of actions for the Marquise to take, making it difficult for them to prevent themselves from becoming an early game target.

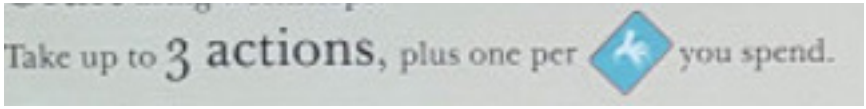
Marquise de Cat Iteration 1 - Faster Card Economy

The Marquise is a faction that starts with warriors all over the board, it amasses large amounts of warriors and occupies multiple areas of the board at once. Based on the data it is also one of the weakest factions in Root, one of the least popular factions to play as, but one of the most popular factions to play against. People want the Marquise in their game, but they don't want to be the one to play them. All of this made them a clear candidate for buffs.

In opinion surveys players reported that they didn't like playing as the Marquise because they they lacked enough actions to do everything they needed to do with the large amount of warriors they had. Another complaint was that the Marquise were an easy target in the early game.

It is true that the Marquise is easily targeted, but there is no real way around this because that easy targetting comes from the large amount of warriors the Marquise has - making it possible to attack them from almost anywhere on the board. To change this would require an entire overhaul of the Marquise and require a complete departure from the Marquise's flavour.

This meant that more actions were the prime candidate for the Marquise's buff. By default the Marquise gets 3 actions plus 1 per Bird Suit card they spend. There are 4 suits of cards in Root, and the Bird Suit makes up 1/4 of the deck. This creates a direct link between the Marquise's card draws and their number of actions per turn. Drawing a card is a 1/4 chance of 'drawing' an additional action for their next turn. In essence, the more cards the Marquise draws the more chances of gaining extra actions they have.



Which is the weakest faction in Root and why?

The weakest faction in root is marquise de cat because they don't have enough actions on their turn and are the only faction who cant ignore rule for movement in some way

Which is the weakest faction in Root and why?

Marquise de Cats, lack of actions hurts them in the lategame

Which is the weakest faction in Root and why?

The cats seem to be weakest faction due to the lack of actions in their turn. It's seems to be challenging to win with them from all the games I have participated in.

Which is the weakest faction in Root and why?

Marquise. Poor ability to increase actions. Nearly every other faction scales up as the game goes on, but not the Marquise.

Marquise de Cat Iteration 1 - Faster Card Economy

The Marquise's central mechanic is creating wood at Sawmill buildings, wood that they can spend on creating new buildings. This is how they score most of their points and is how they aim to control the board. When they build certain buildings the number of cards they can draw per turn increases. To begin with they can draw 1 per turn, with each of these 'card draw' buildings that number increases by 1 to a maximum of 3. By default these 'card drawing' buildings are the second and fourth Recruiter that the player builds. Buildings have an increasing cost in wood, meaning that to build all 4 of these Recruiters costs 9 wood.

To return to the link of card draw and actions, it is also possible to say that this costs 9 wood to give 2 additional 0.25 chances per turn at an extra action.

To slightly increase this number of 'extra action chances' available to the Marquise I decided to move the Card Draw symbol from the 4th Recruiter position to the 2nd Workshop position.
This means that it would only cost the player 6 wood, 33% less than the original 9, to reach the stage of drawing 3 cards per turn.

The benefits here from a balance design perspective are two-fold. Firstly it helps with the action limitations of the Marquise, and secondly it incentivises the player to use the generally unused Workshop buildings - which allow the Marquise to craft. Players generally do not make use of Workshops because the benefits they give the player in comparison to the Recruiter (which gives the player more warriors) or the Sawmill (which creates the wood the player needs to build and therefore score). However, by building Workshops the player gets to explore more ways of playing by incorporating cards into their play.

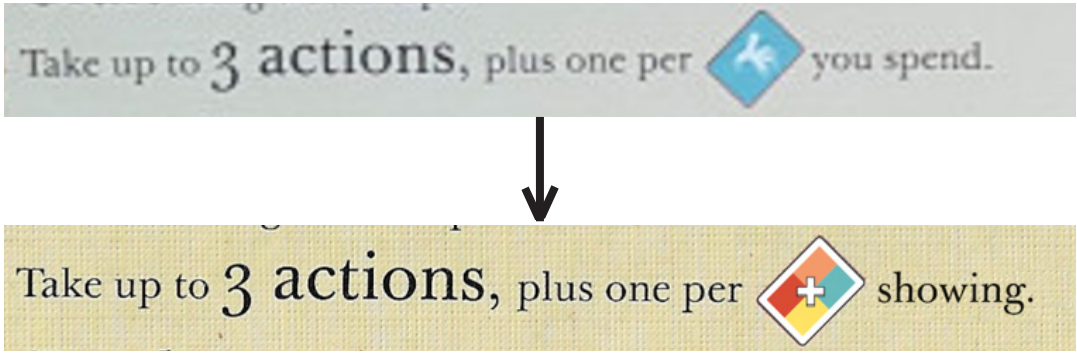
Marquise de Cat Iteration 2 - Direct Increase of Actions

In practice the goal of having the player use more Workshops, and spend a larger portion of the game drawing 3 cards was achieved but the effect seemed negligible and players reported as much too. Part of the problem here is that more 'chances to draw an extra action' is just that - a chance.

In my next iteration I decided to remove that chance. Quite a drastic change, but a useful experiment. There were two ways this could be achieved - firstly I could allow the player to spend any card they want for extra actions, and secondly I could just give the player extra actions.

I decide to begin with the second option, and scale things back if this proved to be too much of a buff. To give the Marquise extra actions but keep those actions tied to their card draw I decided to rewrite the 'plus one per [Bird Card] you spend' from their Actions to 'plus one per [Extra Card Draw Icon] showing'. As this made those icons much more impactful, I also moved these icons from the Recruiter track to the Workshop track. Again the aim here was to open more avenues of play to the player, creating a more diverse play experience.

Intuition told me that giving the player 5 actions for 6 wood (with my previous new card draw icon placement) would be too much. However I wanted to keep the emphasis on Workshops, so I moved both icons to the workshop track, in the same relative positions they were in on the Recruitment track.



Marquise de Cat Iteration 2 - Direct Increase of Actions

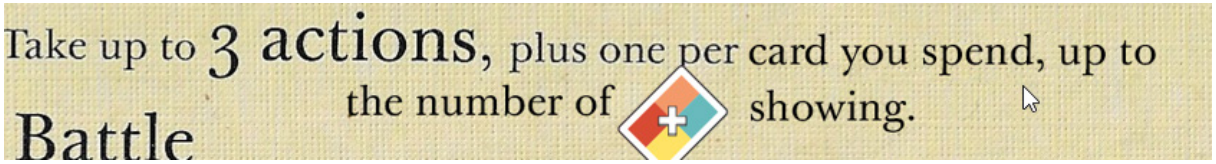
This change was an instant success with Marquise players, play test feedback was very positive - players felt much better about the number of actions available to them and felt 'more able to win games'. They also appreciated the 'sense of progression' there was around the Workshops because they were now directly tied to the players actions. They had to weigh up whether to build Recruiters to maintain their warrior presence, or build Workshops to reach a higher number of actions.

Unfortunately this iteration of the Marquise, whilst it did achieve some of my design goals, felt a little bit too strong. It won frequently in the play tests because the buff to their crafting ability by having more workshops meant they could score more points from crafting than before.

The third iteration of the Marquise would require a reduction in power. however I did think I was on the right track with this second iteration. Therefore I wanted to keep the guaranteed extra actions but increase the cost associated with them.

Marquise de Cat Iteration 3 - Cost added to Actions

I first considered shifting each card draw icon right, but some quick maths told me this would likely have been too much as the first icon's wood cost would increase from 3 to 6 and the second would increase from 9 to 13, a 100% and 44% increase in cost respectively.



Instead, I decided to focus on reducing the points gained through crafting. There were two ways I thought I could approach this - firstly by limiting the number of points the Marquise can gain from crafting directly. Another faction, the Eyrie Dynasty does this with its 'Disdain for Craft'. I did not want to have an overlap between factions if I could avoid it though and instead decided to keep a cost for the extra actions. The player would have to discard a card to make an extra action as they do in the original version of the board - except now it would be any card rather than specifically a Bird card. In this way the player could decide to spend cards to gain extra actions, or keep them in hand so they could craft them for points or other bonuses.

Following the final round of play testing my impression is that this may still be a little too powerful, though it is closer to where I wanted to bring the faction and I am pleased with the feedback I have had on the changes. An option for further adjustment could be to restrict the additional actions to particular action choices, such as movement or battle. However one thing to be careful of with this would be overcrowding, or overcomplicating the faction board.

Design Goals - Corvid Conspiracy

When reworking the Corvid Conspiracy I set myself the following design goals:

- The Corvids' power must be slightly increased, in a way that makes players view them as more capable of winning. However as their winrate is already in a respectable position I must be careful not to overtune them and create a new overpowered faction.

- The Corvid must maintain their flavour as "the true power behind the scenes", placing hidden plots and surprising other players with them.

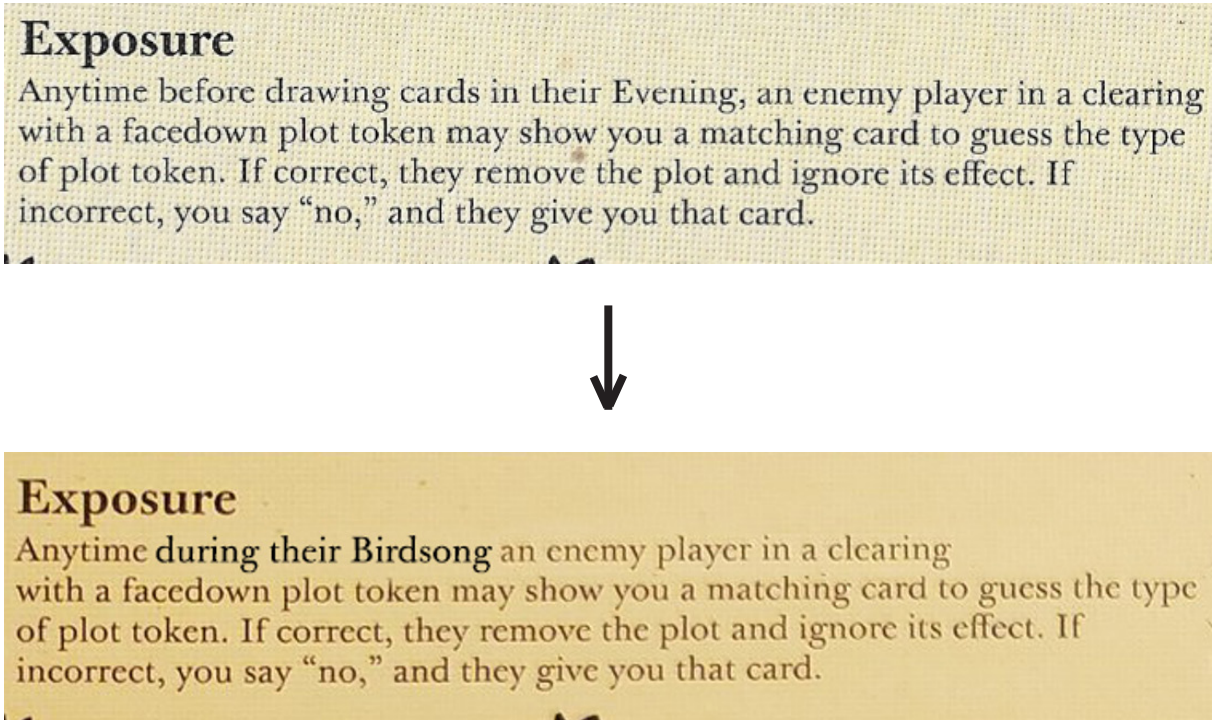
- To achieve this I will increase the power of the central Corvid point scoring mechanic of plot tokens which many players feel are too easily removed.

Corvid Conspiracy Iteration 1 - Less Exposure Opportunities

The Corvid Conspiracy's main mechanic, plots, has a counterplay available to their opponents named Exposure. Exposure allows the opponent to guess the identity of a hidden plot (there are 4 possible plots). If they guess right the plot is removed, if they guess wrong the Corvid player tells them they are wrong and they give a card to the Corvid player.

My first attempt to buff the Corvids was to restrict the timing of Exposure, by default the opposing player can guess at any time during their turn, meaning they can take actions and then attempt Exposure if they feel it necessary. This allows them to see how their turn plays out, which isn't always a certainty due to the random nature of battles, before attempting Exposure.

I opted to restrict Exposure to the opposing player's Birdsong, the first stage of their turn. The theory here was that you can either decrease the power of an option or increase its cost to make it weaker. I began with decreasing its power, and since you cannot remove half a plot the only way to decrease the power of Exposure was to limit the number of attempts or limit the timing of attempts. I went with limiting the timing of attempts. This did not seem to have as big an impact as expected, but was reported as quite frustrating in play test survey feedback. I opted to roll this back in the next iteration.

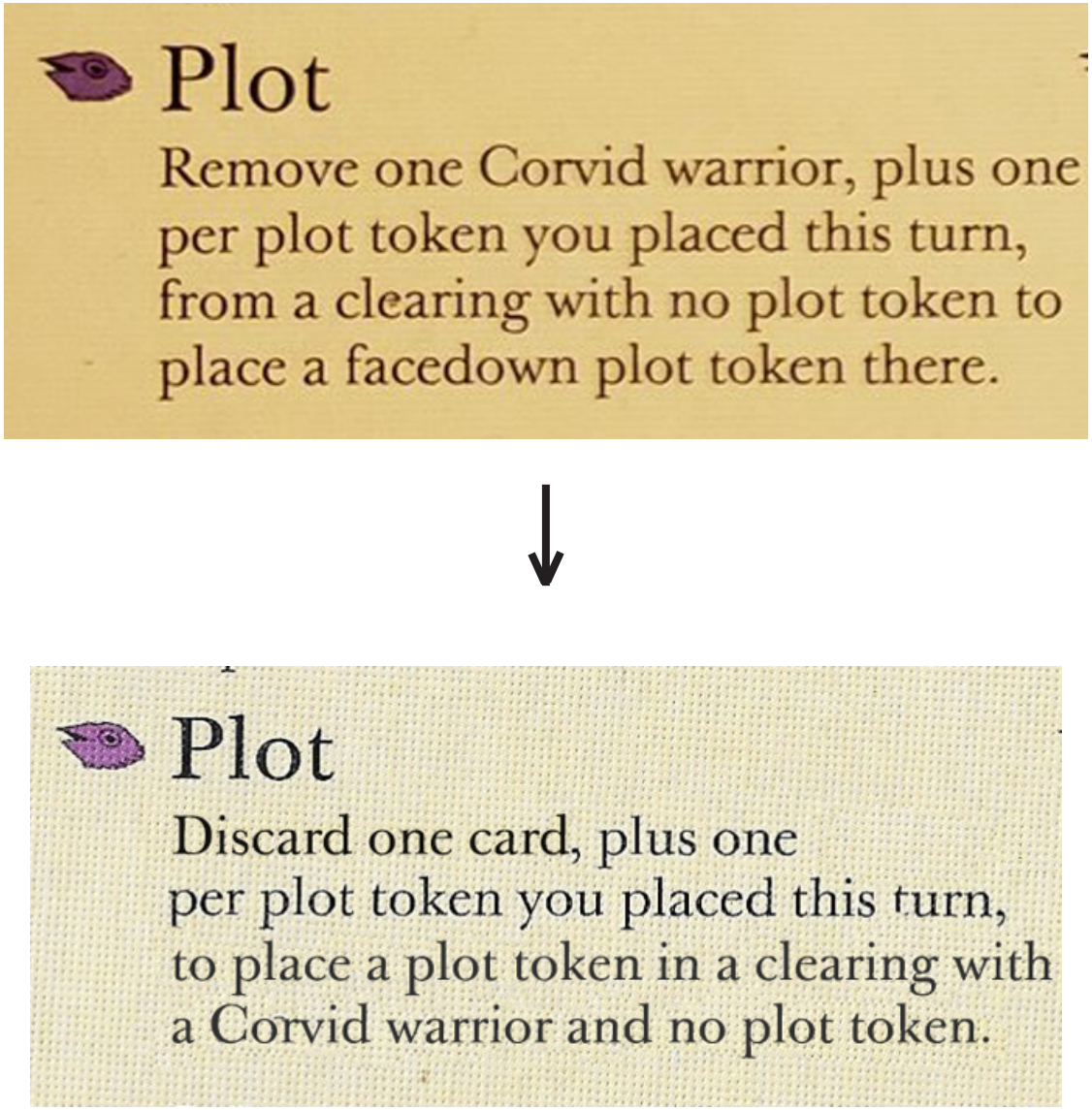


Corvid Conspiracy Iteration 2 - Altered Plot Cost

After restricting Exposure proved to be unsuccesful I instead looked at making existing Plots easier to defend, and therefore trigger by changing the cost of Plotting from removing a warrior from the board to discarding cards. The idea here was to create a relationship between the cards paid as the price of Exposure and the Corvid's ability to place new plots. Additionally not having to spend warriors to plot gave the Corvids a stronger army to defend their plots with.

This, again, had the intended effect and made the Corvids stronger through making their plots much easier to defend. However once more it seemed to be too strong of a buff and made it hard to counter their plots. Further it, in a small way, departed from the flavour of Corvids. By keeping a larger board presence they felt less like a small group of spies and more like an army.

This iteration of the Corvids won 50% of their games in play testing, and despite the small sample size it seemed that this plot change went a bit too far.

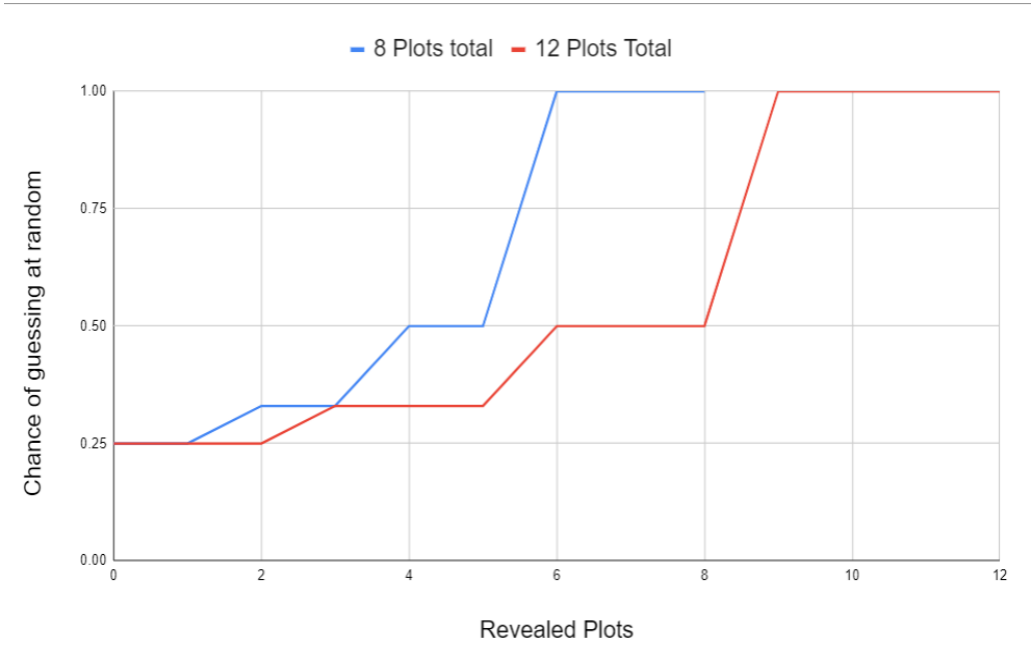


Corvid Conspiracy Iteration 3 - Improved Plot Power

The failure of making plots easier to defend brought me to look at improving the power of the plots themselves, whilst leaving the rest of the Corvid's abilities unchanged. To begin with I planned to add an extra copy of each plot. By default there are two copies of each, for a total of 8 tokens. This has the effect of players being able to eliminate one type of plot as a possibility for a facedown plot's identity once the Corvid player has revealed both of them. Adding a third copy of each plot makes this more difficult - the associated probabilities are graphed to the right. As it is unlikely that a player would ever actually get all 8 plots onto the board at once adding extra copies ups the number of plots that can be added on the board before elimination of a possibility occurs.

In feedback, players enjoyed this change but didn't really think it helped the Corvids much.

As I was aiming to improve the Corvid play experience without dramatically improving their power this may have been a suitable point to stop with their tweaks. However, on the chance that the small sample size of Corvid related data was an outlier (hence the disagreement between the data and the player opinion) I decided to explore further changes that could improve the power of the Corvids by buffing plots or plot related mechanics.



Note: Context clues would give players a greater chance than the plotted lines, these simply show the chance of a player guessing at random. This graph is also based upon the Corvid player playing all copies of a single plot in succession.The graph shows the shortest possible route to eliminating a plot as a possibility.

Corvid Conspiracy Iteration 3 - 5th Plot Type

Continuing with the idea of adding more plots I concepted a 5th plot, this would further obfuscate things and make the plots harder to remove through Exposure. The Concept was for a 'Decoy' plot, a plot that the Corvid player benefited from when it was removed. The first iteration of this (top right) allowed the player to place a facedown plot in an adjacent clearing, thereby retaining a hidden plot on the board to flip and score with on the following turn. However this was quickly abandoned, and doesn't feature in my iterative faction boards in the Corvid folder due to a quickly spotted exploit with this token that allowed for two players working together to place a Bomb plot into another players token and flip it before that player had a chance to react to the token being placed.

The second iteration of decoy was a token that when removed scored points as if it had been flipped, this achieved a similar goal to the original Decoy without the presence of the exploit. Though it did mean that points could be scored more quickly when opponents guessed wrong.

A problem with a 5th token occured to me during play testing however - As Root is a tabletop game the addition of a 5th plot would require manufacturing new tokens. Something that players would then have to buy seperately and they would likely be reluctant to do. I decided to explore the idea of adding a similar effect of the second Decoy iteration to other plots.

By this point I had also noticed that Corvids tended to stall out in the late game, struggling to close games due to players simply removing or exposing their plots.

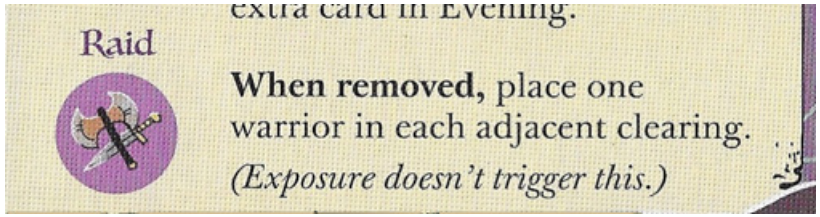
Corvid Conspiracy Iteration 4 - Improved Raid

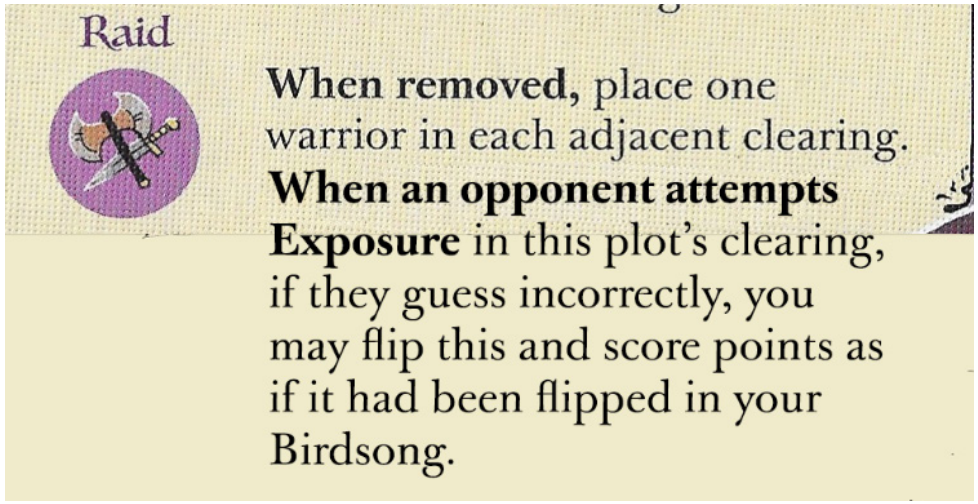
To remedy the problem of the Corvid's plots and late game scoring being too predictable I next incorporated the 'flip and score' element of the Decoy plot I had created into the Raid plot, but giving the player the option to flip that token when it was incorrectly guessed by an opponent attempting Exposure.

This turns the Raid plot into a plot that can be used to punish both a poorly chosen battle or exposure. The aim here is to make sure that the Corvid player can retain some element of unpredictability even in the late game.

I did not get the opportunity to play test this token unfortunately.

Overall, I think my changes to the Corvids were the least successful of the changes I made to Root factions in this project. They are a very complex faction, one that Leder Games themselves struggled with development for, and I found it a tough challenge to overcome. Were I to revisit the project I would probably further explore the concept on this page as I think it is the most thematic buff for the Corvids that I have concepted.





Design Goals - My Own Faction

Reading survey responses it became clear to me that players value interactivity outside of the common method of battle (which is available to every faction) with each other highly in Root, and as such I wish to create a highly interactive faction that players.

My faction should feel like a unique new addition to Root, not a small spin on an existing faction.

My faction's abilities and actions should be able to be explained on the standard size Root board, plus the possible addition of a small additional space (such as Vagabond quests, Eyrie's Decree, or the Riverfolk's Hand Cards Shop.)

My faction should be well balanced against the existing factions.

Faction Concepting

When brainstorming a new faction I began by thinking about possible woodland animals I could use for the faction - all of the factions in Root are based on such animals and they often contribute to the theming of their mechanics.

I identified a few possibilities: Wolves, Bees, and Songbirds. I envisioned Bees as a faction that would tend to gardens and collect flowers, needing to travel around the board to collect different kinds of pollen, building up stocks of honey to earn points. I thought that Wolves could be interesting by including a Pawn that could not be removed, like the Vagabond cannot, as an 'Alpha' and building the rest of the faction around that Pawn barking orders at the warriors it had around it. Finally, Songbirds I pictured as an entertainment industry group - building Stages and putting on performances for the other citizens of the forest.

After some early concepting the Songbird idea quickly came to the forefront as it offered the most opportunities for meeting my first and arguably most important design goal: Interactivity. I planned to make the performances that the Songbirds put on be an integral part of their identity and something that the other factions could 'attend' to earn benefits. The intent here was that other factions could plan their turns to travel to, or through Songbird clearings to gain an advantage on their turn and that the Songbirds would also benefit if other factions did this.

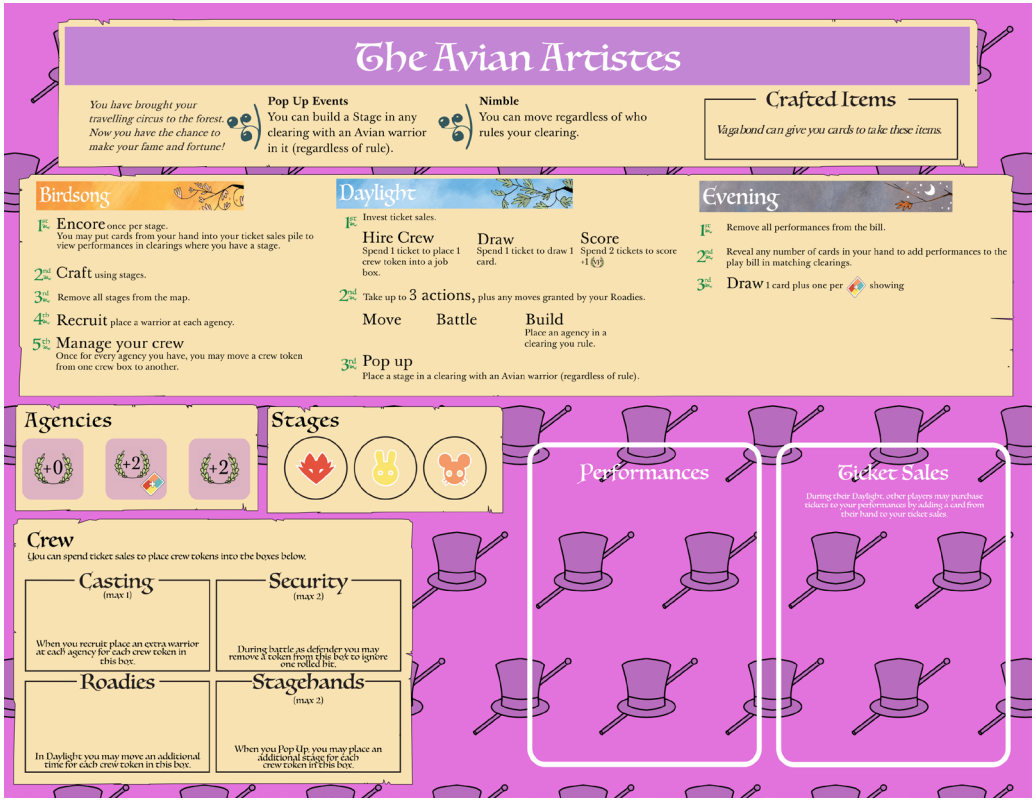
I quickly drafted a paper prototype and ran through a few turns with the faction to make sure it functioned. For this I made use of some blank playing cards, a pen and paper and used some other Root tokens as placeholders for the tokens I needed for my faction.

Faction Initial Balance - Cost Curves

The first iteration of my Songbird faction featured two main mechanics - performances and crew members. Essentially the player needs to put on attractive performances for the other players in order to sell tickets to them. Tickets sales could then be used to invest in actions, or new crew members. The Avian Artistes could also make use of their own performances, which they would do at the start of their turn.

A game with transitive mechanics, that is mechanics where one mechanic is clearly flat out better than other (for example higher level equipment in an RPG game) will be balanced through costs. Determining what costs to assign to those mechanics is possible using a cost curve, which is a curve that links costs and benefits. Root is a game with transitive mechanics, some factions are just better at a given thing than others. For example the Vagabond and Corvid are free to ignore the rules that everyone else follows about movement.

In Root there are a few obvious currencies: Points, Cards, Items and Warriors. In some form or another these four feature as both costs and benefits across the different factions and cards in Root. The card 'Tax Collector', which allows a player to remove a warrior from the map to draw a card once per turn, tells us that the cost curve between warriors and cards is about 1 to 1 (an identity relationship). In a similar, but more abstract, vein is the "Nimble" ability which allows a faction to move regardless of rule. This ability is only given to factions with low warrior counts that find it difficult to battle often. As that description fits my faction, and the faction is intended to represent a travelling group of entertainers, the ability seems appropriate to add.



Faction Initial Design

Using the machinations tool to create machinations diagrams for two of the factions in Root that have been around since the game's inception, and looking at the (somewhat limited) recordings of total turns in finished games of Root I was able to determine that on average a faction can earn about 4 points per turn when they are in a good position.

With this in mind I assigned point scores at values and with costs that should lead to the faction to score about 4 points per turn when in a good position however it was difficult to calculate this exactly because the faction is based around the 'selling' of performances and it is ultimately up to their opponents whether or not to 'pay' for a ticket by giving over a card.

The Encore step in the faction's Birdsong is designed so that the player playing the Songbirds can also gain the benefits of their performances and should therefore benefit from them more than other factions as they will always be in a clearing with a stage by default whereas other factions will need to travel to such a clearing.

The Performance cards themselves were balanced around existing mechanics. For example the Lizard Cult have an ability that allows them to spend a card to score points based upon how many Gardens of the discarded cards suit they have. As the Singer Performance is available to anyone, it is intended to be weaker than the Lizard's unique ability and therefore only offers 1 point.

Stages were coded by suit, like the cards. Other factions in Root use such a system for their buildings or tokens, however it is not a rule that they do so. However it felt thematic here - each suit represents a different species in the forest, and different audiences would require different stages.

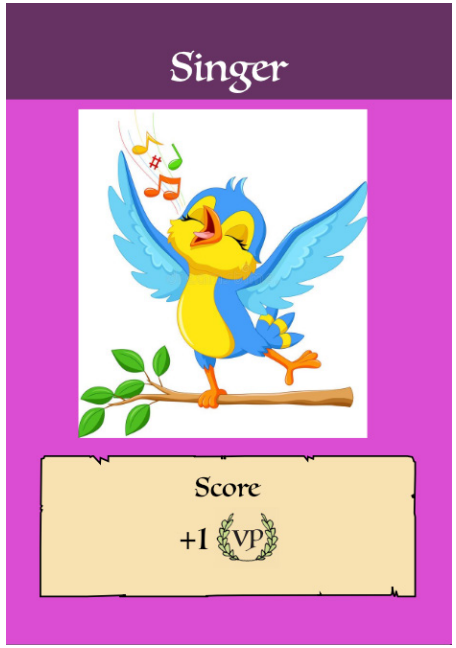
During their Daylight the Songbirds were able to make use of any cards they were given by other factions or that they had spent during their Birdsong. The costs for the Draw and Hire were based off of the costs that the Riverfolk Company use for their own Draw action.

Once this iteration of the faction hit the playtesting stage it quickly became clear that there were some issues with the initial design both thematically, and with respect to balance. The balance issues were to be expected for such an early prototype though. This iteration did not win a single game in play testing, and was being comfortably outscored by the other factions. Clearly the scoring was too difficult. Based upon my observations in playtesting I assumed this was because the faction was finding it too difficult to spread out and gain enough tickets to make time to discard tickets to score.

Additionally, the danger of losing an Agency meant that the majority of play testers played in a very static manner. Not only did this make it difficult for them to collect tickets, it also went against the theme of a travelling circus.

The Songbirds did seem to have an incredibly strong card economy however, between the Magician performance and their natural draws.

Faction Initial Design - Performance Cards



The Layout of these cards in terms of art placement, and text placement is identical to other Root cards. There are no suits on these cards however as they are intended to be used on any suit. The art used on the cards are stock images.

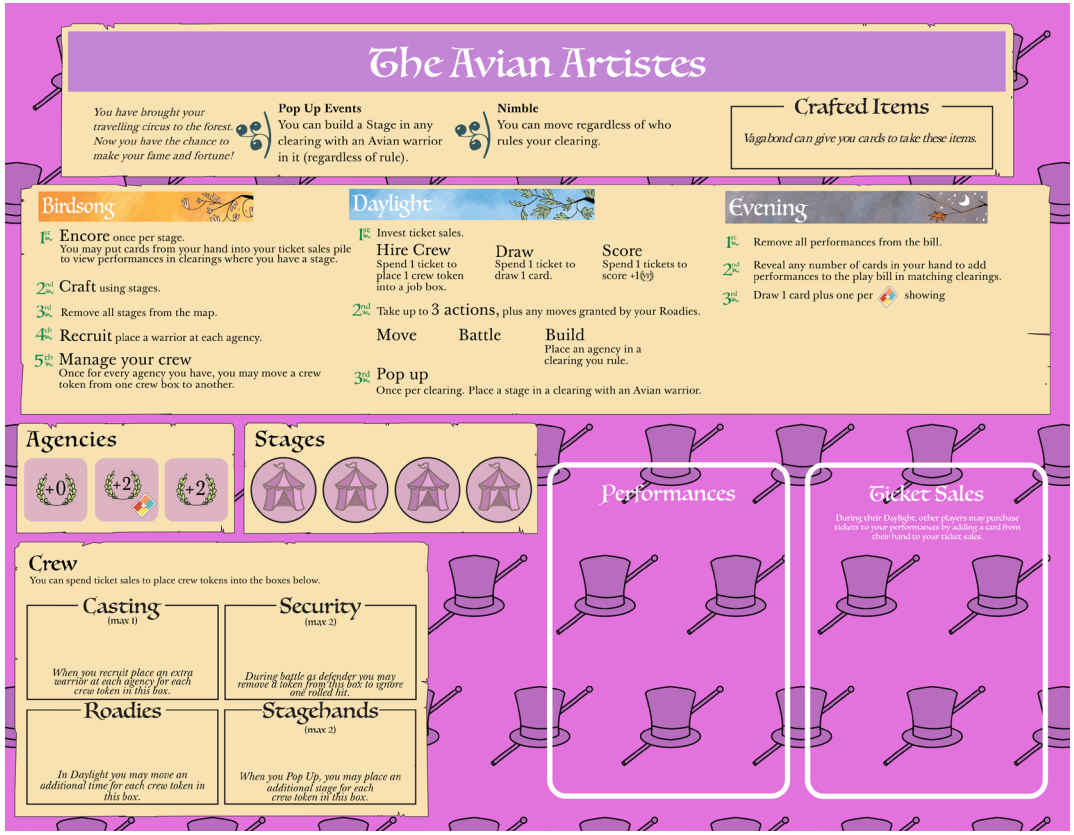
Faction Initial Balance - Iteration 2

The second Iteration of the Songbird faction intended to increase their power by giving them an extra Stage, and removing the suiting of Stages so that they could be placed in any clearing. The intent with this change was to allow the player to more easily spread out on the map and hopefully earn more Tickets. Additional card draw was removed from the faction's natural draws as the Magician performance seemed to offer more than enough card draw in the first round of play testing.

In retrospect I should also have increased the number of points earned when scoring by spending a ticket, and then scaled that back in the third round of testing if it was too drastic a change.

During this round of testing the faction was generally played fairly statitcally again, and unfortunately the scoring problem remained. However the faction did spread slightly more than in the first round of playtesting.

I concluded in this round of playtesting that the Agencies were too limiting on the Songbird players, they were so concerned with protecting them that they could not spread out across the map. This not only hindered their ability to score points but also did not reflect the theme of the faction.



Faction Initial Balance - Iteration 3

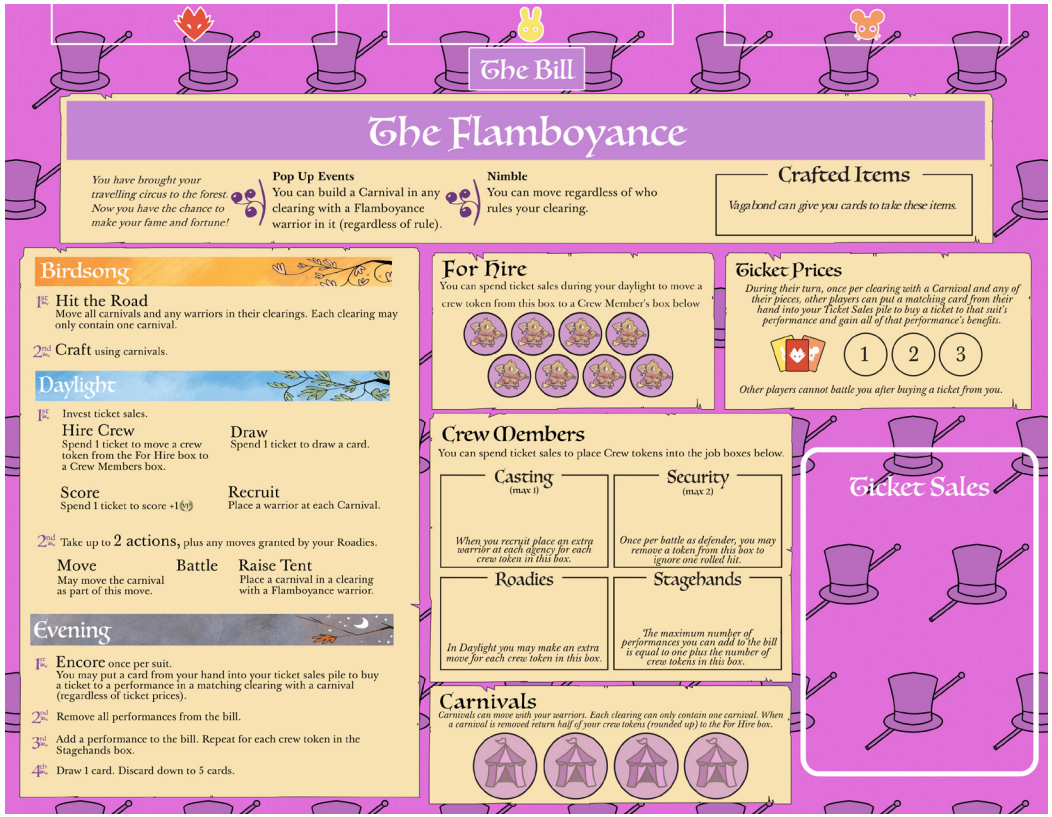
In this iteration of the Songbirds my biggest goal was to get the faction moving around the map to reflect the travelling circus it was themed around. I created the Hit the Road action which mandated moving during Birdsong, and allowed moving of the Stage tokens, in this iteration Stages were renamed to Carnivals but otherwise they serveed the same mechanical purpose.

This change was a great success both thematically and mechanically, as it did result in the faction moving a lot more and therefore gave them more opportunities to earn tickets. To further attempt to remedy the lack of tickets seen in earlier tests I added the option for the Flamboyance to set ticket prices in much the same way as the Riverfolk Company can set service costs.

Additionally, with the space created by removing the Agency box, and Performances box I added a For Hire box and placed the Crew tokens on the board. Earlier they had just been placed beside the board.

During play testing the Songbirds still struggled with getting enough tickets to score a good number of points. I concluded during this iteration that opportunities to sell tickets were definitely not the issue, rather the cost of tickets being cards was the issue. Some factions rely on cards much more than others and are therefore very reluctant to pay for performances with them.

Future Iterations of this faction would use warriors as the ticket cost rather than cards to remedy this.



Excel Spreadsheeting

Essential to balance work (and often Quality Assurance work) is the ability to make good use of Microsoft Excel or similat programmes. For this project I made use of Google Sheets but have included those sheets as MS Excel spreadsheets in the submission.

I learned several new functions as part of this project, how to reference between sheets, gained a lot of practice using Excel, and made an effort to establish a consistent style for my sheets by following a set of rules:

Those rules were:

- Bold font for titles and subtitles
- White cells for inputs the user is not supposed to change.
- Yellow cells for inputs the user is likely to change over time.
- Blue cells for outputs by the programme that the user should not interact with.
- Alternating columns have alternating colours, one being very slightly darker than the other to make it easier to quickly scan to different sections of the sheet.

Notable exceptions to these rules this were wherever faction names appeared, or in matchup charts.

Birds	Cats	W.A.	Lizards	Otters	Moles	Crows
25	19			30		24
	30		22			
	30					21
	WDom					26
19	24	30				25
				22	30	28
30	Dom					22
	30	24	22			
				30	29	
20	23			30		20
	20				30	
	30					22
			30		24	23
25	30		21			19
	Dom	30			20	
30	21		18			
24.83	25.70	28.00	22.60	28.00	26.60	23.00
25	27	30	22	30	29	22.5
6	13	3	5	4	5	10

Reflection

I should have been more bold with balance decisions regarding my own faction - I was too hesitant to make drastic increases in their power level and they remained underpowered for the entirety of the project. In future I should be less hesitant to make large changes, as they can always be rolled back later. Further, I could have spent a lot more time on directly observing play testing if I had better managed my time. This was in part due to issues out of my control, but another big reason for this was that an element of my project was overscoped to begin with. Planning to perform new research for Jaffe's Metagame Bounds was too much for an undergraduate project and I probably stuck with it for too long out of a sense of sunk-cost. If I had given up on this area of the project sooner I would have had more time to pursue other areas.

On the other hand, I did learn a lot researching this discipline and gained experience with applying balancing techniques in a real life scenario, including performing play tests and surveyingmembers of the public. I also greatly improved my ability to use spreadsheets which is useful for future balance work and is useful for work in QA roles. Overall I received a fair amount of positive feedback, particularly regarding the changes to the Marquise de Cat.