Quantitative Analysis

- Our design and playtesting of "The Royal Ascension" involves a detailed quantitative analysis to ensure a balanced and engaging gameplay experience. Here we outline the statistical elements considered and the adjustments made to maintain fairness and interest throughout the game.

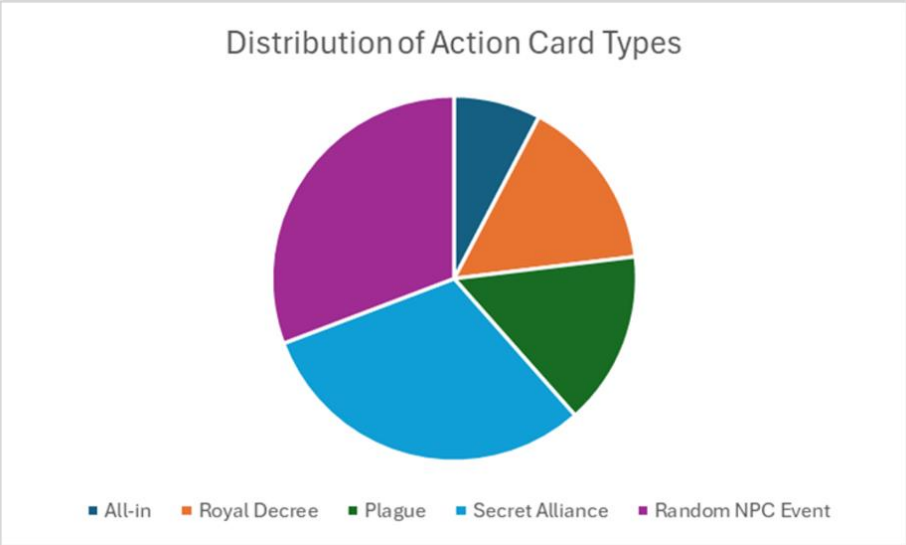
Game Play Duration

1. **Average Game Duration:**
    - Typical sessions last between 60 to 90 minutes.
    - This duration was confirmed through multiple playtesting sessions with varying numbers of players.
2. **Average Time Per Turn:**
    - Time per turn was observed to be approximately 2-3 minutes.
    - This includes dice rolling, drawing cards, and performing actions.

Card Probabilities

1. **Deck Composition and Probabilities:**
    - There are 2 decks of 52 suite cards (Hearts, Diamonds, Clubs, Spades)
    - Probability of landing on a specific suite:
        - Each card type:
            - Shop = 2/35 or 5.7%
            - Heart = 11/35 or 31.43%
            - Diamond = 11/35 or 31.43%
            - Spade = 11/35 or 31.43%
2. **Action Cards (Spades):**
    - **Distribution of Action Cards:**
        - Given that we had 26 action/battle cards (Spades) we distributed it amongst the 5 “types” based on the impact we believed the card would have on the flow of the game. With this in mind, we decided on the following probabilities of action cards.
    - **Total of 26 action cards in the Spades suite.**
        - All In (Jack of Spades): 2/26 or 7.69%
        - Royal Decree (King and Queen of Spades): 4/26 or 15.38%
        - Secret Alliance (3,4,5,6 of Spades): 8/26 or 30.77%
        - Random NPC Event (7,8,9,10 of Spades): 8/26 or 30.77%
        - Plague/Sickness (Ace and 2 of Spades): 4/26 or 15.38%

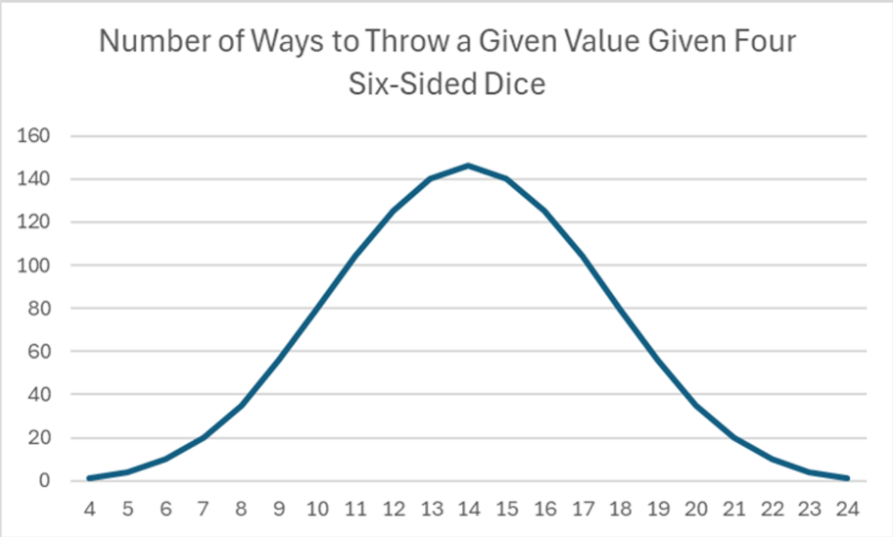
- **Chart Showing Distribution of Action Cards**



Dice Rolling Probabilities

1. **Single Die Roll:**
    1. We felt that given a 35-space board map, one dice would be sufficient for mobility around the board.
    - Probability for any specific number (1-6) = 1/6 or 16.67%
2. **Two Dice Rolls (for battle advantage):**
    1. **Possible Results when rolling four six-sided dice and adding the resulting numbers:**
        1. To achieve a more balanced battle system, we implemented dice rolls to allow weaker players to upset stronger players if they get lucky in "tactical advantage during battle". Generally, the difference in random dice rolls can make up for a slight difference in territory strength and health cards, with the maximum difference being equal to 20 assuming you roll six 4's totaling to 24 and your opponent rolls four 1's totaling to 4.
    - **Probability distribution (Showing all the probabilities of rolling four 6 sided dice would take too long so we showcased the most and least common outcomes):**
        - Total sum of 14 (most probable) = 146/1296 or 11.27%
        - Total sum of 4 (least common) = 1/1296 or 0.077%
        - Total sum of 24 (least common) = 1/1296 or 0.077%

- **Total Distribution for all Possible Outcomes**



Balance Adjustments Based on Playtesting

1. **Health and Weapon Card Limits in Battles:**
   - We decided to limit the use of health cards to a maximum of 2 per battle to prevent overpowering advantages. This was not the case for armor as it was harder to achieve because you had to purchase it from the shop making it already rarer hence, when using weapons, they can use as many as they like. We also implemented that after a battle the winner would lose a health card and battle card in the battle to again adjust for fairness and dominance.
2. **Territory Imbalance:**
   1. During initial playtesting, we noticed that including all territories in a battle presented too much imbalance after beginning fights. Similar to losing a battle, it would be almost impossible for a player to come back in the game. The adjustment was to allow players to only select one territory for battle. This made for fairer gameplay and increased the probability that a weakened player could make upsets and regain strength.

Statistical Insights from Playtesting

1. **Resource Distribution:**
   - Equal initial distribution of resources (2 Gold, 2 Health/Armor cards) provided a balanced starting point.
   - Players successfully accumulated and utilized resources in roughly equal measures, indicating balanced opportunities for advancement.