

Exploring the Crossroads of Societal Dynamics and Game Theory in the Vacuum of CBS Survivor

Matthew Tsang, Leonard Marshall, and Monroe Farris

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Meet The Team!

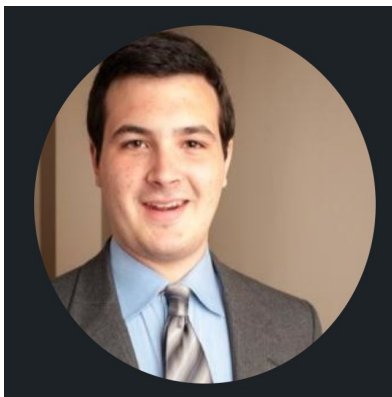


Monroe Farris

Current Role: Intermediate Data Science Engineer @ MITRE

Undergrad: University of Virginia

Fun Fact: Is a member of the Cheesecake Factory Customer Hall of Fame



Leonard Marshall

Current Role: Principal, Quantitative Analytics & Data Science @ Gartner

Undergrad: University of Virginia

Fun Fact: Survivor superfan - applied to compete twice and watched every episode



Matt Tsang

Current Role: Consultant @ Deloitte

Undergrad: Emory University

Fun Fact: Recently got a hammock and is very surprised by its usefulness

Research Topic

Applications of network analysis to reality competition shows, specifically, CBS's Survivor.

Allowing one to better understand:

- Game evolution over time
- Social dynamics within the game



What is Survivor?

Survivor is a reality competition based game show with a the general structure of:

- 16-20 contestants are marooned in an uninhabited area, split into 2 tribes, live off of the land, and compete against each other in challenges.
- A tribe that loses an immunity challenge faces the tribal council, where they must anonymously vote one of their own out of the competition.
- At some point, usually halfway, both tribes merge into one.
 - Contestants compete as individuals until only 2 finalists are left.
 - Those eliminated are part of the final council, who will anonymously vote to choose a winner.

As the franchise continued over the years, other factors changed:

- Location
- Tribal cast members (i.e. sex, race, age)
- Theme (i.e. *Blood vs Water*, *Winners at War*, *Heroes vs Villains*)
- Game elements (idols, redemption island)

Data Collection and Preprocessing

Data Collection

- Characteristic Data collected by Survivor Super-Fan Jeff Pitman for each season of the show
 - Source: (<https://www.truedorktimes.com/survivor/boxscores/data.htm>)
- Voting Data collected and made available (and then cross confirmed) from the Survivor Fandom Wiki Page
 - Source: (https://survivor.fandom.com/wiki/Main_Page)
- Transcripts of every episode in each season, to cull for text-based analysis.
 - Source: (https://reality-tv-transcripts.fandom.com/wiki/Reality_TV_Transcripts_Wiki)
 - Source: (<https://drive.google.com/drive/folders/0B8Xzl82K1TP8fmltS2RoYWUxeW1YSmZoUXVQSldNMTJnUEVSVlZvd2xYaFpLYnViOWJl1RXM?resourcekey=0-InqLqepahAhBF8fOjYeVrw>)

Preprocessing

- Extract historical voting records over the course of a season
- Extract other game related metrics (i.e. number of challenge wins)
- Assign additional attributes to each contestant (node) and relationship (edge) based on demographics, sentiment analysis, and more (to be determined)
- Engineered new features for ease of use
 - Gossip Scores and Popularity Scores

Analytical Approach

- Processed raw data, adding any new features that would be of use
 - Custom feature generation - obtained from Confessional data:
 - Gossip Scores
 - Popularity Scores
- EDA on the nodal properties
 - Looked at network summary statistics for each merged tribe episode
 - Looked at network summary for season level votes
- Plotted the networks for each episode of the season
 - Pre-merge approach: One complete network to represent the immune tribe and one directional network to represent the voting of the tribal council tribe.
 - Post-merge approach: One directional network to represent voting
- Measures of Centrality
 - Plot different measures of centrality over the course of a season, per post-merge episode
 - Plot measures of centrality of season-level votes, per season

Seasonal Approach

- Seasons 1, 19, and 36 were chosen for this analysis.
- Since it was the first season, Season 1 has the least amount of twists and turns and external game elements that were added later in the franchise. This season was taken as the benchmark of the show.
- Seasons 19 and 36 were chosen for two reasons:
 - With 42 completed seasons, 19 and 36 provide even snapshots of the franchise over the years. This would help to see if contestant behaviors in later seasons would differ from the pilot season.
 - To keep audiences engaged, the franchise has introduced many thematic seasons (who is competing and how initial tribes are created). Much like Season 1, Seasons 19 and 36 had similar initial conditions: all new players and initially divided into two tribes, not based on sex or age etc.

Research Questions and Objectives

Alliance Theory



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graph LR; A[Alliance Theory] --> B["Based on a given season, do alliances follow observed patterns laid out in the literature?"]; B --> C["- Goal: To observe parallels between empirical alliance theory and the microcosm game of Survivor"]; V[Voting Theory] --> D["How does someone's voting patterns and history impact their performance in the game?"]; D --> E["- Goal: To observe how voting patterns change during the phases of the game as it relates to a contestant's longevity."];
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Voting Theory

How does someone's voting patterns and history impact their performance in the game?

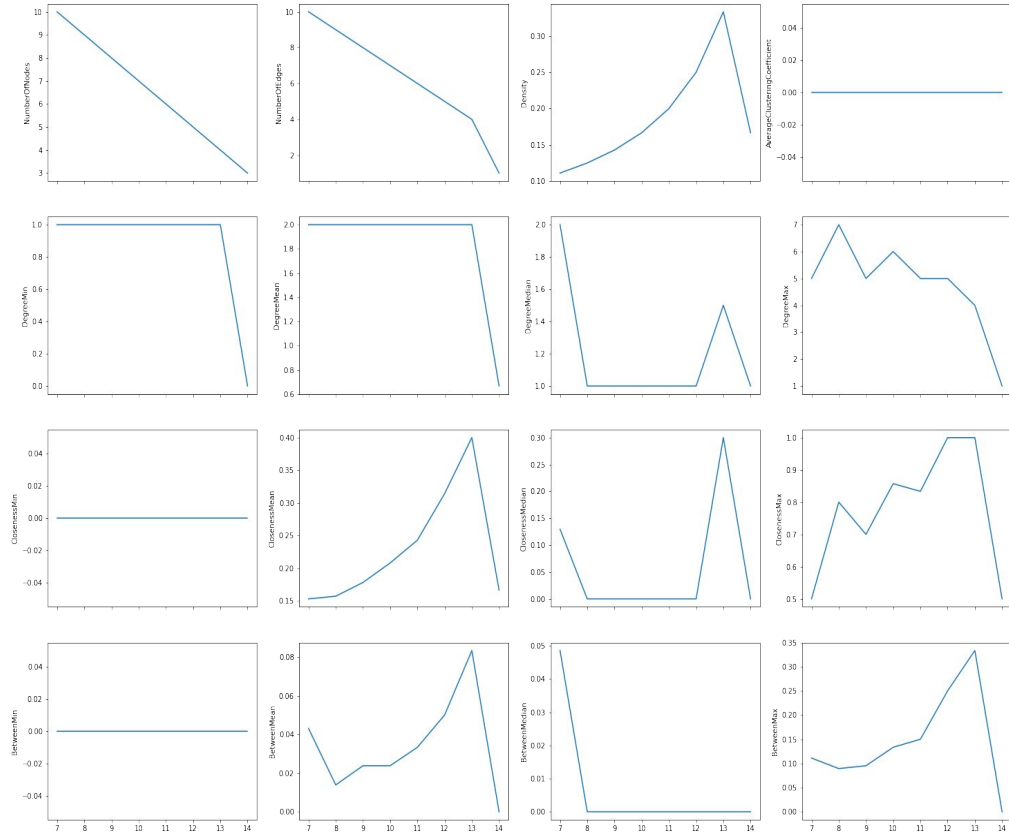
- Goal: To observe how voting patterns change during the phases of the game as it relates to a contestant's longevity.

EDA



Centrality Measures

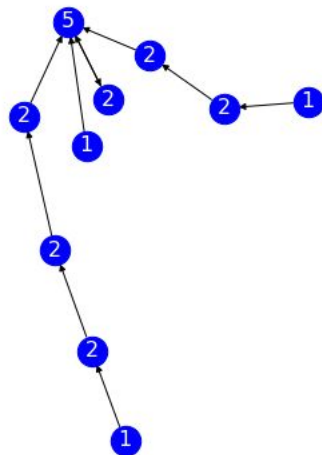
- Taking centrality measures across merged episodes, the results are expected for a steadily diminishing network
- As the network decreases:
 - # nodes/edges decreases
 - Density increases
 - Max degree centrality decreases
 - Max betweenness and closeness increases



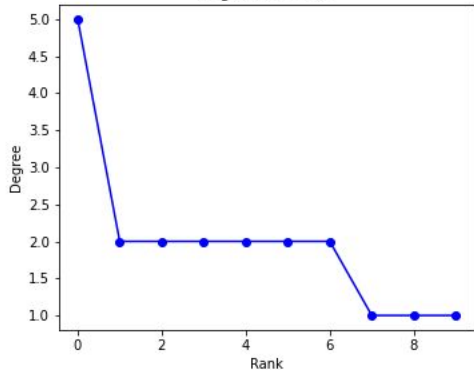
Degree Plots Across Seasons

- In the first ever season, the merge was a twist the contestants did not know about, but became a goal in subsequent seasons.
- With this knowledge, the dynamics of the first tribal council are vastly different between Season 1 and the other two.

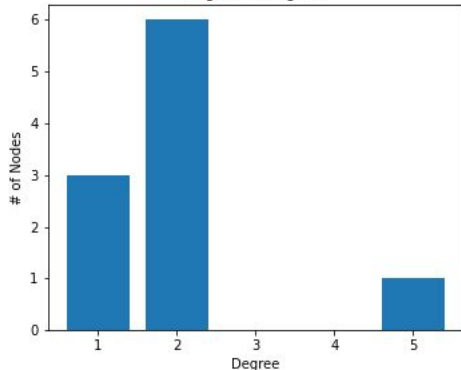
S1 Episode 7 Degree Plots



Degree Rank Plot



Degree histogram



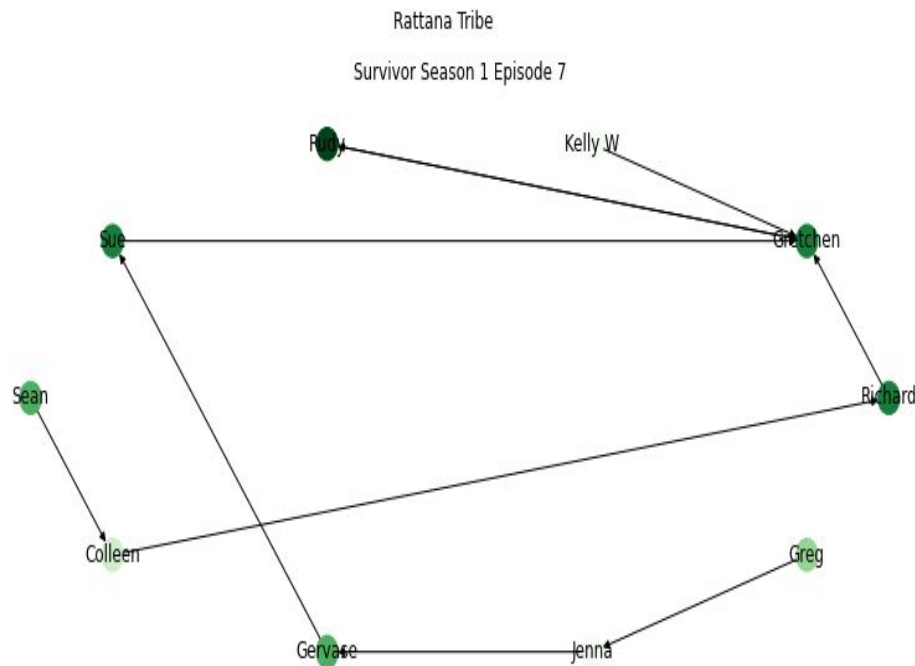
Alliance Theory

- The main takeaways from alliance theory is that nodes will link up with other nodes that share same values or have the potential to achieve a similar relationship that has worked in the past
 - Tangible attributes: age, sex, demographics, home town
 - Intangible attributes: core values, work ethic
- Does this hold true for *Survivor* contestants?



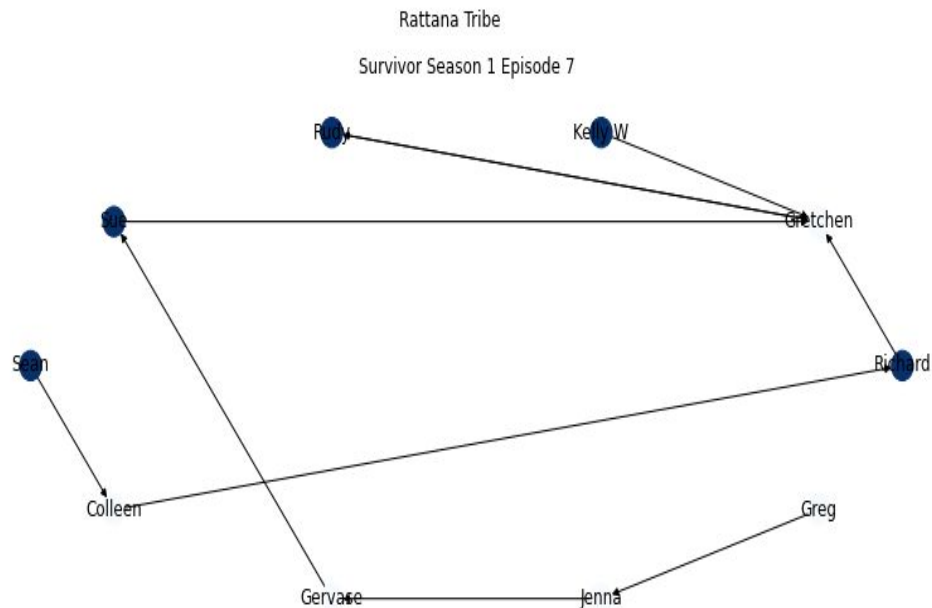
Alliance Theory by Physical Attributes

- With regards to sex and age, the merged voting networks do not seem to indicate much of any alliance built upon that.
- This holds true across seasons.



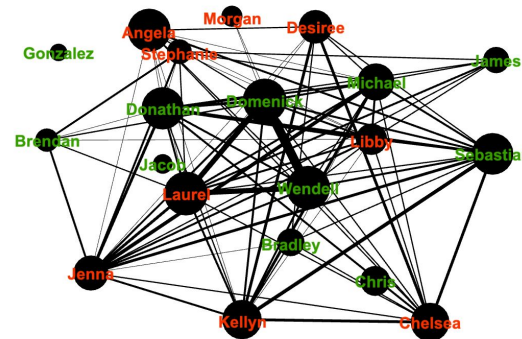
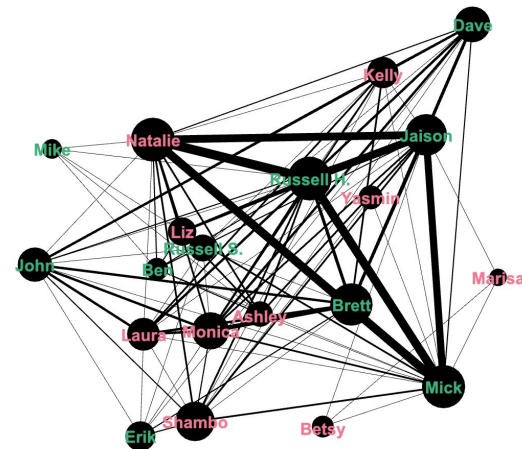
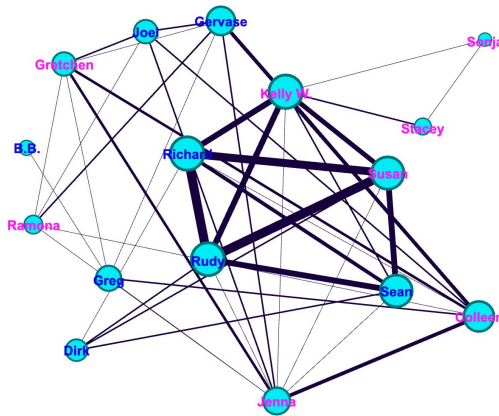
Alliance Theory by Initial Tribes

- On another level, creating alliances based on previous relationships would apply to members of the initial tribes.
- After the merge, do pre-merge tribe members stick together?
 - For the most part, the answer is yes!



Alliance Theory at Aggregate Level

- There is a common maxim in *Survivor*: *You can't trust anybody, but you have to trust someone!*
- Over the course of each season, we see that the finalists typically reach the final by staying true to one another.



Voting Theory

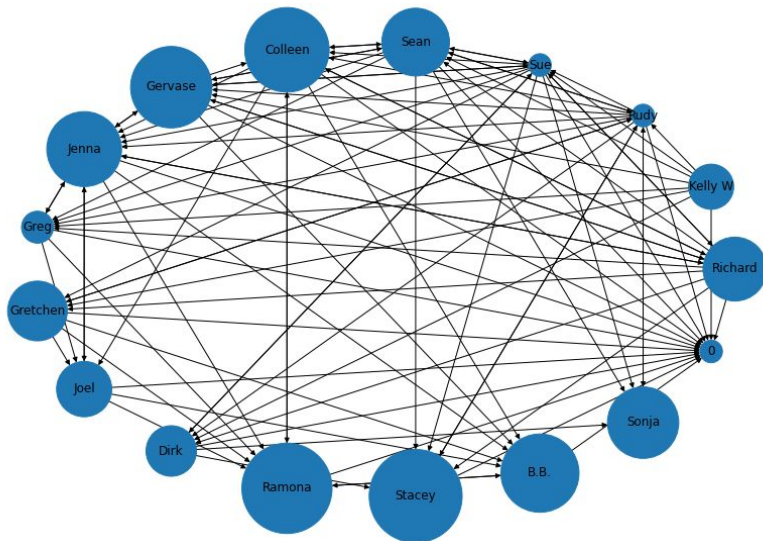
- How does a player's interactions impact voting?
- Are there patterns in final jury from recently eliminated players?



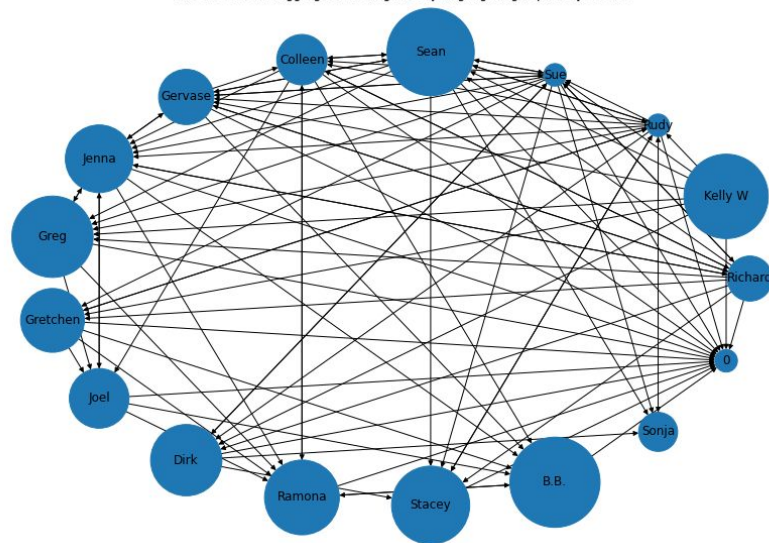
Voting Theory - Custom Metrics

- Creating custom metrics allows for a better understanding of certain attributes related to interactions in *Survivor* that aren't necessarily captured via other means

End of Season 1 Aggregated Voting History: Highlighting Gossip Scores

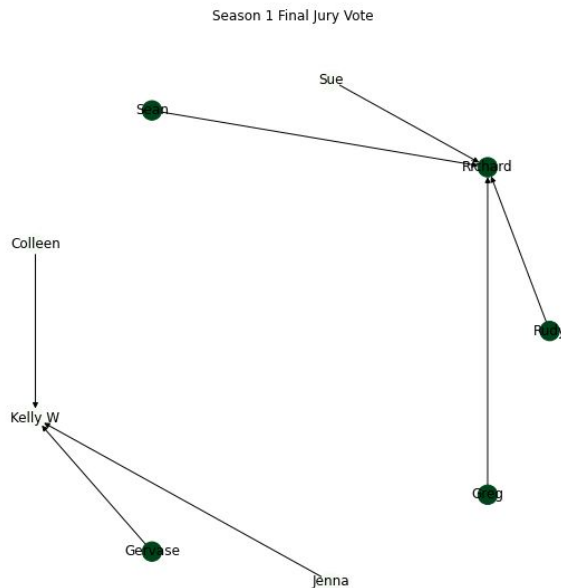


End of Season 1 Aggregated Voting History: Highlighting Popularity Scores



Final Jury by Sex

- Bringing recently eliminated players back to choose the winner can be politically tricky
- Are there jury trends?
 - While sex does appear to factor in Seasons 1 and 19 in the same manner, it had the opposite effect in season 36



Questions?

