

# Analysis on Human Personality and In-Game Factors in League of Legends

<https://github.com/terry00123/CS564-LoL-Personality>

## Team 16

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## 1 Introduction

Personality affects his or her daily life in many ways. People's personalities are different and various personalities affect not only conversations with others but also their usual behavior. Recently, with the emergence of MBTI, which divides the characteristics of a person's personality, interests in the relationship between personality and human activity have increased further.

There have been researches finding relations between personality and in-game play styles. However, previous works lack analysis on detailed game factors which could potentially show a high correlation with personality. Therefore, we will target specific game League of Legends, and detailed game factors as categorizing the most played champions (i.e., playable characters), finding relations with Myers-Briggs Type Indicator (MBTI), which has been widely examined in Korean communities.

In this study, we first conduct a survey to collect MBTI and League of Legends username. We then utilized the League of Legends API to collect game-play records to get the most champions. Champions are clustered using internal properties, and we analyzed the correlation between MBTI and most-played champions' clusters.

## 2 Background

### 2.1 League of Legends

League of Legends is a world-famous MOBA game. One team consists of five players and each player controls their own **champion** to kill the enemy champion. The most commonly used map and the official map of professional competition, "Summoner's Rift", has a total of 5 different **lanes** (play roles).

1. **Top:** Top Lane means the road that stretches along the 11 o'clock direction of the Summoner's Rift. The champion in charge of this area is called as Top laner.
2. **Jungle:** The entire central part of the map, except for the top, mid, and bottom lanes, is referred as Jungle. Four champions are in charge of each lane, and the



Figure 1. Lane of LoL (Image from the [link](#))

other one is in charge of the entire jungle area. In the jungle, there are AI monsters that provide gold and experience in the event of eradication, and they grow up killing them. Each Jungle player often joins the battle of each line for an opportunity.

3. **Mid:** Mid Lane means a road that extends towards the center of the Summoner's Rift. The champion in charge of this is called the Mid Laner. This is an area where there are frequent battles that instantly overpower the enemy. The mid lane is mainly dominated by champions with a strong offense and weak defense, so it's a matter of momentary judgment and wit that determines whether the enemy is overpowered.
4. **Bottom:** Unlike other lanes, the bottom lane consists of two champions per team. In this paper, the word Bottom means a dealer in the bottom lane.
5. **Support:** Support champions cooperate with Bottom champions in the bottom lane. They usually lack powerful dealing, but have strength in helping their own team and obstructing the opponents.

Also, there are 3 types of game matches in the Summoner's Rift: **Normal game**, **Ranked game (Solo/Duo)**, **Ranked game (Full Team)**. Players can freely choose their lane and champions in the Ranked game (Solo/Duo).

## 2.2 Myers-Briggs Type Indicator

MBTI (Myers-Briggs Type Indicator) is a self-reporting personality type inspection tool devised by Myers and Briggs based on psychological typology by Swiss psychoanalyst Carl Jung. MBTI consists of four preferred indicators that represent the differences in attitudes, perceptions, and judgments for each individual [2]. The four are outgoing-internal (E-I) indicators indicating the direction of mental energy, sensory-intuitive (S-N) indicators indicating the function of recognition, including information collection, thought-emotion (T-F) indicators that rationally judge and determine based on collected information, and judgment-recognition (J-P) indicators that show the lifestyle exposed to real life. MBTI explains 16 personality types through a form combining these four preference indicators, helping to understand the relationship between personality traits and behavior.

## 2.3 Related Work

In the past, studies focused on human character, and gameplay has been figured out. In the study of [7], they focused on the relationship between a person's character and gameplay, and the analysis of the main components of the World of Warcraft game's behavioral survey showed that six categories were identified: Player-versus-Player, Social Player-vs-Environment, Working, Helping, Immersion, and Core Content.

The authors in [5] examined whether a personality profile can be determined by observing a player's behavior in a game. Also, [4] explores six factors that interact with each other in creating this online disinhibition effect: Dissociative anonymity, invisibility, asynchronicity, solipsistic introjection, dissociative imagination, and minimization of authority.

The authors in [1] investigate the behavioral patterns observed in players of Fairyland Online, a globally serviced MMORPG game, during social interactions when playing as in-game avatars of their own real gender or gender-swapped. However, unlike MMORPG games, players can change their playable character for each game in MOBA games. Therefore, their works are not directly applicable to MOBA games.

The authors in [8] investigate the connections between personality, psychopathic traits, and behaviors in video games more generally. Moreover, [3] study the relationship between players' personality and game behavior in League of Legends. Also, [6] present four studies connecting the power motive to role and champion type choices in the League of Legends and show that champion type choice is uniquely predicted by dominance and pro-sociality. However, previous studies lack in detailed analysis of champion play styles.

In this work, we focus on analyzing the relationship between gameplay style and personality according to people's MBTI in League of Legends.

## 3 Data Collection

To analyze relations between MBTI and champion preferences, we 1) conducted a survey to collect MBTI and champion preferences, 2) collected game data based on survey records, 3) preprocessed game data, and 4) collected champions data.

### 3.1 User Survey

In order to test the validity of the survey questions, we created and distributed a draft questionnaire to a small number of respondents before we finalized the questions. Taking feedback into consideration, we modified and improved the questions and had collected data from November 10th to 17th, 2020. We collaborated with Youtube channel **Pro-spectator P.S**<sup>1</sup> and collected survey from their subscribers who enrolled the channel's membership.

Survey questionnaires are as the followings (we did not collect any personal information):

- LoL username (mainly used)
- Gender
- The year of birth
- (Optional) The name(s) of LoL champions which respondents want to give it a try or be better at playing as in Rank Matches
- (Optional) The year when respondents started out playing the game
- MBTI information (four categories)
  - Introversion(I) or Extraversion(E)
  - Sensing (S) or Intuition (I)
  - Thinking (T) or Feeling (F)
  - Judging (J) or Perceiving (P)

As the result, we collected a total of 356 responses.

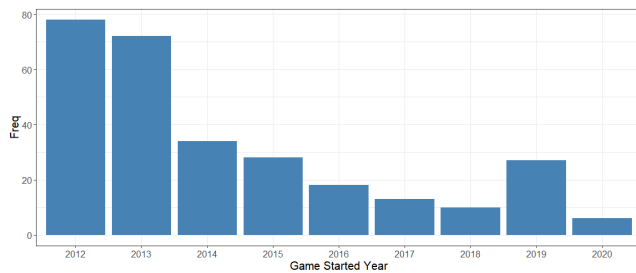
### 3.2 Collecting Ranked Game Match Data

Based on LoL username from survey responses, we collected Ranked game match records per user with Riot API<sup>2</sup>. We only target to collect Ranked games (Solo/Duo) in user game records since players would select best-fit champions in Ranked games to achieve a higher ranking compared to Normal games. We collected data of Season 10 (Jan 10 ~ Nov 10, 2020), and filtered out users with less than 50 match records in the period. As the result, 115,470 Rank Match data of 287 unique users were collected. The attributes of the data are as the followings:

- Account ids
- Platform location (all KR in our data)
- Game ids

<sup>1</sup><https://www.youtube.com/channel/UCqI5lyTpC79pOy2D-VXAMdA>

<sup>2</sup><https://developer.riotgames.com/apis>



**Figure 2.** User count on game started year

- Champion id which each user selected in a match
- Queue (filtered to have 420 representing Rank Matches)
- Season (all 13 representing Season 2020)
- Timestamp
- Role (duo, solo, duo support, and etc.)
- Lane (top, bottom, jungle, and etc.)

### 3.3 Data Preprocessing

With survey data and corresponding collected Ranked game match data, we generated a data frame with each row representing a unique user, with attributes of the followings:

- MBTI
- Gender
- Year started playing LoL
- Most selected lane
- Top 3 most picked champion for the most selected lane

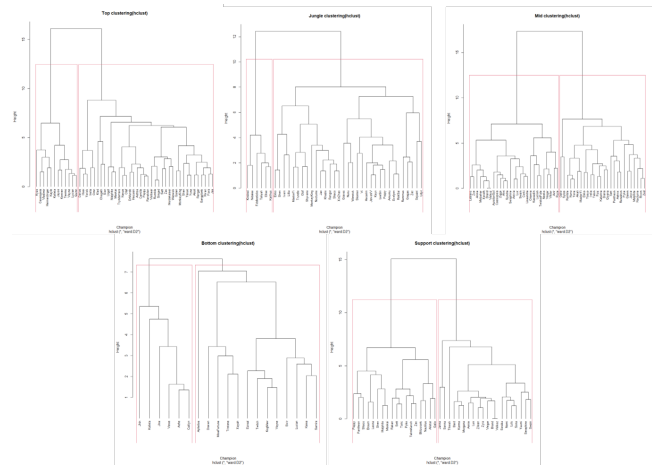
As in Fig 2, we could find that most of the users had sufficient experience in LoL to experience many lanes and champions. Also, most played lanes are collected as in Table 1, showing no bias. However, we could find a bias in gender term; there was only one female player among 287 players.

We could confirm our assumption that LoL players would select similar champions for Ranked games, since at least two of three champions are included in the same cluster for 96% of results.

### 3.4 Collecting Champions Data

In LoL, there are 152 different champions (checked on December 1, 2020). Players can choose different champions for every match. Riot API<sup>3</sup> also gave us access to LoL Champions data in JSON format regarding various properties of each Champion such as attack (how strong is a champion when attacks), defense (how much damage a champion can stand), hp (the health of each champion), lanes and etc. We finally extracted 31 feature columns of all Champions from the dataset we gained via the API request and transformed it into a data frame to apply to the cluster. More will be elaborated in the result section about the clustering.

<sup>3</sup>[http://ddragon.leagueoflegends.com/cdn/10.22.1/data/en\\_US/champion.json](http://ddragon.leagueoflegends.com/cdn/10.22.1/data/en_US/champion.json)



**Figure 3.** Hierarchical Clustering Results for each Lane (From top left, Top, Jungle, Mid, Bottom and Support Lane). For the full version of each figures, check the appendix.

## 4 Results

### 4.1 Clustering

In order to determine champion similarities, we performed clustering to group similar champions based on their internal properties. We manually selected target champions for every five lanes and performed hierarchical clustering with normalized properties.

The clustering results each for Top, Jungle, Mid, Bottom, and Support lanes are shown in Fig 3 and detailed figures are shown in the Appendix. All of the lanes are divided into two clusters except Bottom and their characteristics are shown in Table 2. The Bottom lane lacks of champions and showed bad clustering results with too few champions per cluster, thus we fixed cluster size as 2. Table 2 indicates that clusters are successfully divided by their characteristics, and shows differences among clusters.

### 4.2 Relation between MBTI and Champion Cluster Preference

#### 4.2.1 Chi-Squared Test

From the preprocessed data and champion clustering, we generated a data frame as in Table 3. We performed a chi-squared test to find the correlation between the most played champion clusters and MBTI.

The mosaic plot of most playing champion's clusters for MBTI factors (Fig 4) shows the significant distribution of each cluster to each binary MBTI factor, and detailed figures are attached in the Appendix. In Fig 3, the p-value is calculated from the chi-squared test and Pearson residuals show the difference between real value and expected value based on chi-squared distribution. These results indicate that the cluster of most playing champion depends on MBTI factors of E/I and F/T. N/S factor has a p-value of 0.0569, which

**Table 1.** User count on most played lanes

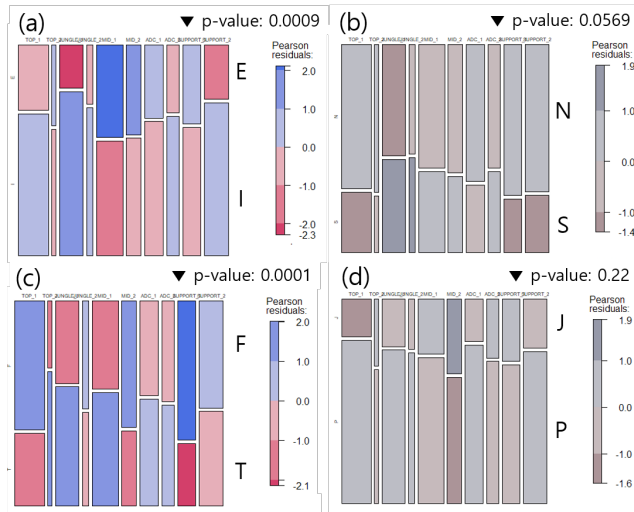
Top	Jungle	Mid	Bottom	Support
56	48	67	49	67

**Table 2.** Characteristic of Each Cluster

	Cluster1	Cluster2
<b>Top</b>	Tanker+Semi tanker	Dealer
example	Ornn, Malphite, Aatrox, Jax	Jayce, Vladimir, Kalista
<b>Jungle</b>	Tanker+Warrior	Dealer
example	Jarvan IV, Sejuani, RekSai, LeeSin	Karthus, Nidalee
<b>Mid</b>	Strong moment deal	Wizard
example	Zed, Akali, Galio, Pantheon	Zoe, Orianna
<b>Bottom</b>	Strong Bottom in 2nd half	Strong Bottom in beginning
example	Ezreal, Xayah	Jhin, Ashe
<b>Support</b>	Tanker type	Supporter type
example	Alistar, Leona	Lulu, Janna, Sona

**Table 3.** Example of Dataframe

	Champion	E/I	N/S	T/F	J/P	Cluster	Lane
User1	Lulu	I	N	F	J	2	Support

**Figure 4.** Mosaic plot of chi-squared test for champion clusters and MBTI ((a) E/I factor (b) N/S factor (c) F/T factor (d) J/P factor with Champion clusters). For the full version of each figures, check the appendix.

is close to the standard value of 0.05, so it shows that this N/S factor also affects champion choice. Therefore, the chi-squared test and the mosaic plot show that preferences of champion choice have a significant relationship with MBTI factors.

#### 4.2.2 Qualitative Analysis

Each cluster of the same lane indicates a different style of playing games, so it shows that gameplay style also depends on MBTI factors. Following are few examples indicating that game-play style is depending on MBTI factors.

Refer to Fig 4(a), MBTI factor E shows the higher distribution in the Mid cluster, and MBTI factor I shows the higher distribution in the Jungle cluster. It indicates that a person with the E factor prefers the Mid cluster where the I factor prefers the Jungle cluster. In general, champions in Mid cluster need communication with teammates, where jungle champions not deal with opponents directly but deal with non-human objects. Thus, its characteristics correspond to the characteristic of E(extraverts) and I(introverts) factors.

Also, refer to Fig 4(b), MBTI factor N shows the higher distribution in the Top, Support cluster and MBTI factor S shows the higher distribution in the Mid, Jungle cluster. It indicates that a person with the N factor prefers the Top, Support laners are required to rapidly respond to the opponent's attack. Jungle, Mid laners are required to choose 'correctly' rather than 'rapidly'. Thus, its characteristics correspond to the characteristics of N(intuition) and S(sensation) factors.

Also, refer to Fig 4(c), MBTI factor T shows the higher distribution in the Jungle1 cluster and MBTI factor F shows the higher distribution in the Mid2 cluster. It indicates that a person with the T factor prefers the Jungle1 cluster where the F factor prefers the Mid2 cluster. In general, Jungle 1 champions require to design the game flow rationally, but



**Table 4.** Champion Recommendation by MBTI

MBTI	Recommendation
ESTP ESTJ	Zed, Akali, Galio, Talon (Cluster: Mid1)
ENFP ENFJ	Alistar, Leona, Ornn, Malphite, Aatrox, Jax (Cluster: Support1 or Top1)
ISTP ISTJ	Jarvan IV, Sejuani, Lee sin, Rek'sai (Cluster: Jungle1)
INFP INFJ	Lulu, Janna, Sona (Cluster: Support2)
ESFP ESFJ	Zoe, Orianna (Cluster: Mid2)
ENTP ENTJ	Jayce, Vladimir, Kalista, Ash, Ezreal (Cluster: Top2 or Bottom1/2)
ISFP ISFJ	Karthus, Nidalee (Cluster: Jungle2)
INTP INTJ	Jayce, Vladimir, Kalista, Ash, Ezreal (Cluster: Top2 or Bottom1/2)

mid2 champions require high interaction with opponents, containing active deal exchange with each other. In addition, MBTI factor T shows the higher distribution in Top2 which generally using dealer champions require high thinking ability to avoid ganking and growth.

Additionally, people with the T factor are frequently played in the Bottom lane, which has champions that are fragile and require high thinking ability to maximize dealing while surviving from strong opponents. However, people with F factor are frequently played in the Support lane, which has champions that need to communicate with every teammate and having a high roaming rate. Thus, the characteristics of frequently playing clusters correspond to the characteristic of T(thinkers) and F(feelers) factors. Therefore, the chi-squared test and mosaic plot show gameplay style have a significant relationship with MBTI factors.

#### 4.2.3 Champion Recommendation by MBTI

We can generate the Table 4, which shows the recommendation of champion types by each MBTI, by collecting all relationships between champion clusters and MBTI factors from upon results. It can provide information of champion type for novice players.

## 5 Discussion

We used players' data who played Ranked games for more than 50 matches on analysis. However, preferred lanes and champions might be dependent on an individual's understanding of the game. Therefore, if we could collect a sufficient amount of data to filter out high-skilled players, analysis of high-skilled players would be interesting.

Also, hierarchical clustering is highly dependent on the feature. If we could utilize more factors (ex. stern skills count,

item tree) which Riot API does not offer, we may get more explainable clusters and show better correlation results with personality.

Selecting champions might also be related to other factors rather than MBTI, such as champion appearance, gender, and game experiences. Previous research on MMORPG shows user behavior of selecting the opposite gender [1], and analyzing such artifacts on League of Legends would be interesting.

## 6 Conclusion

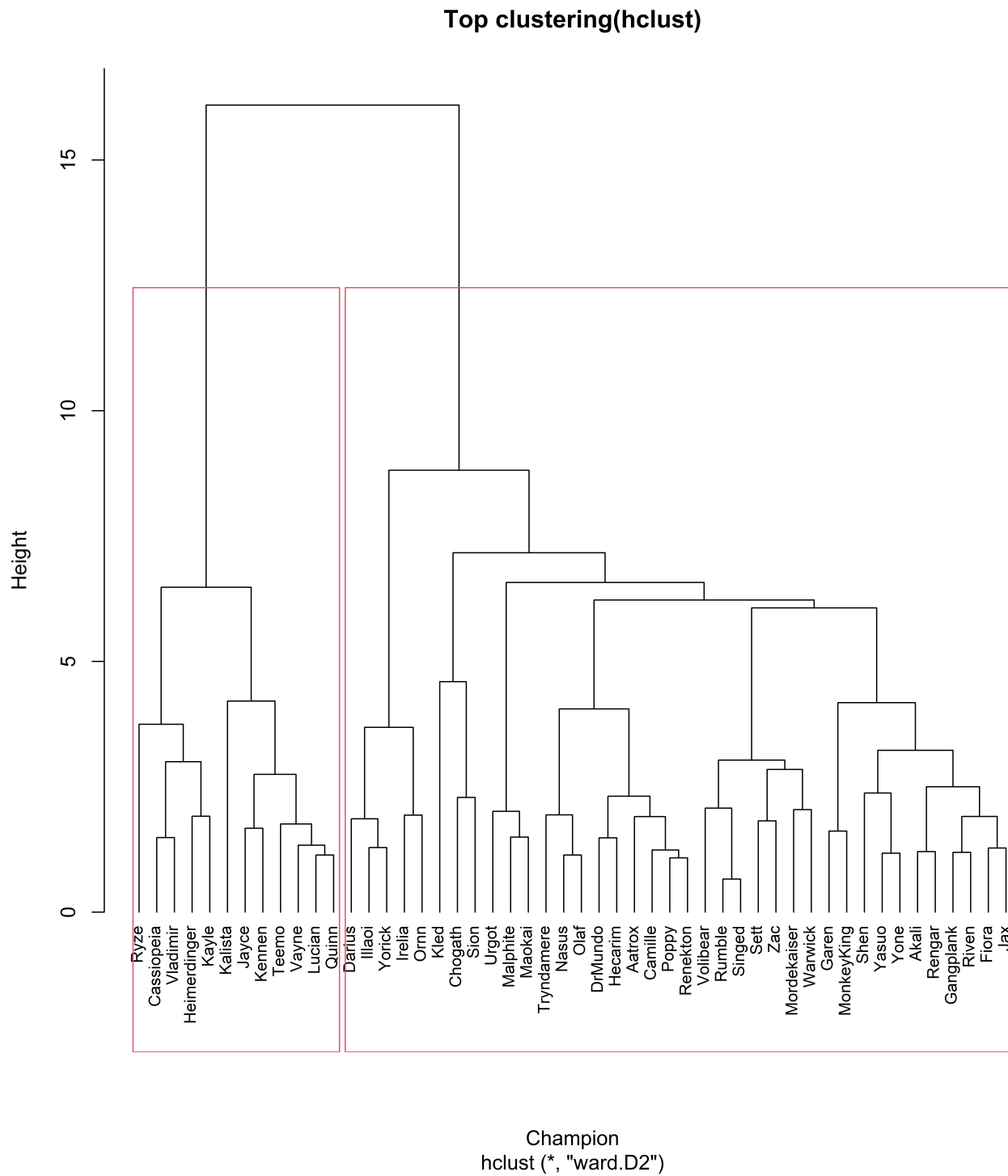
In this project, we analyzed the relationship between League of Legends and personality. We collected user survey records and collected League of Legends Rank game match data. Also, we collected champions' internal properties to perform clustering. By the chi-squared test, we could find the significant relationship between champion clusters and personality in E/I and T/F factors of MBTI. We further investigated qualitative analysis on chi-squared test results and suggested a champion recommendation by MBTI.

We could successfully improve existing works by utilizing widely-used personality indicator MBTI and analyzing on detailed in-game play styles. We believe further explorations with larger data size and advanced champion clustering would show more significant relationships.

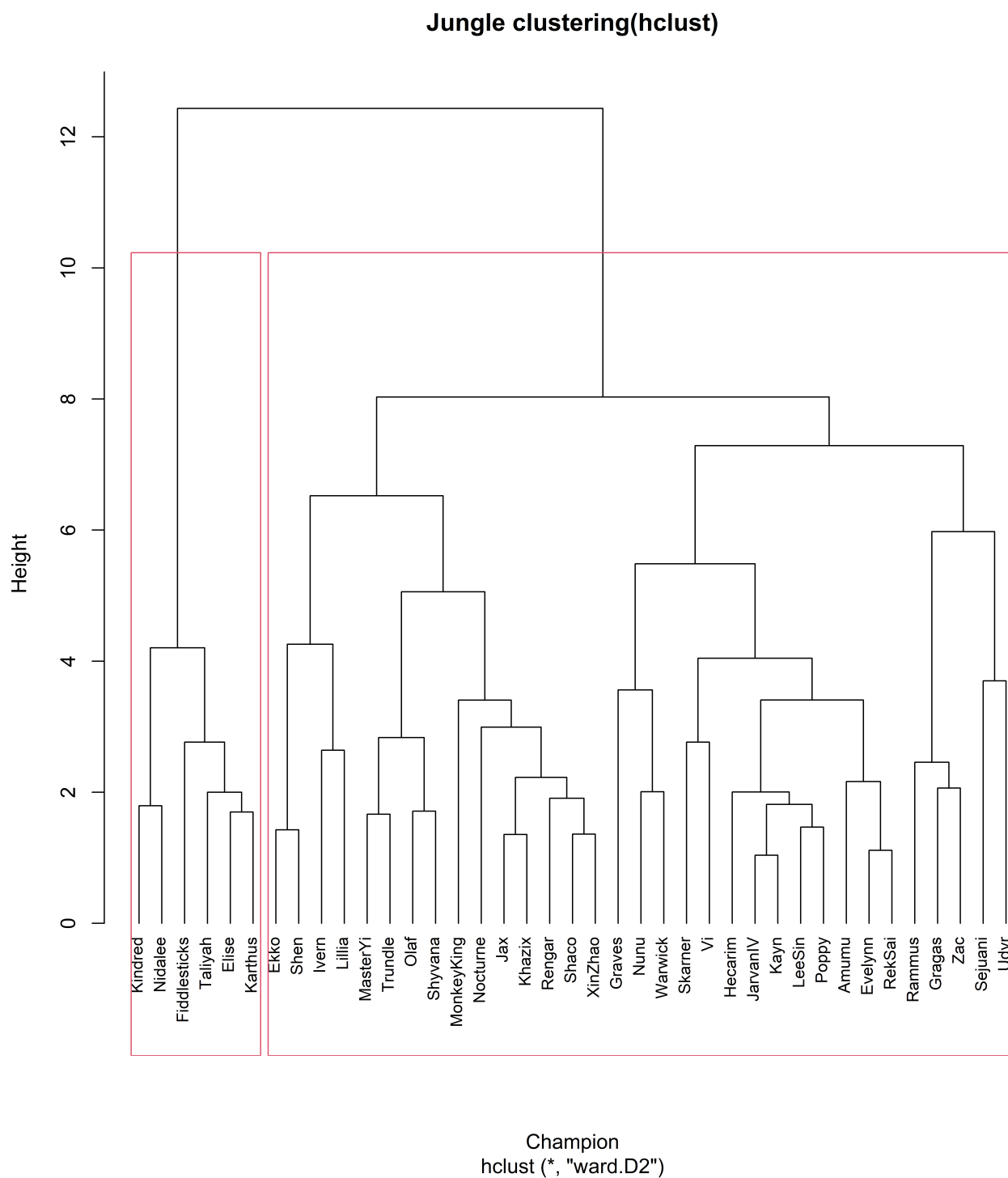
## References

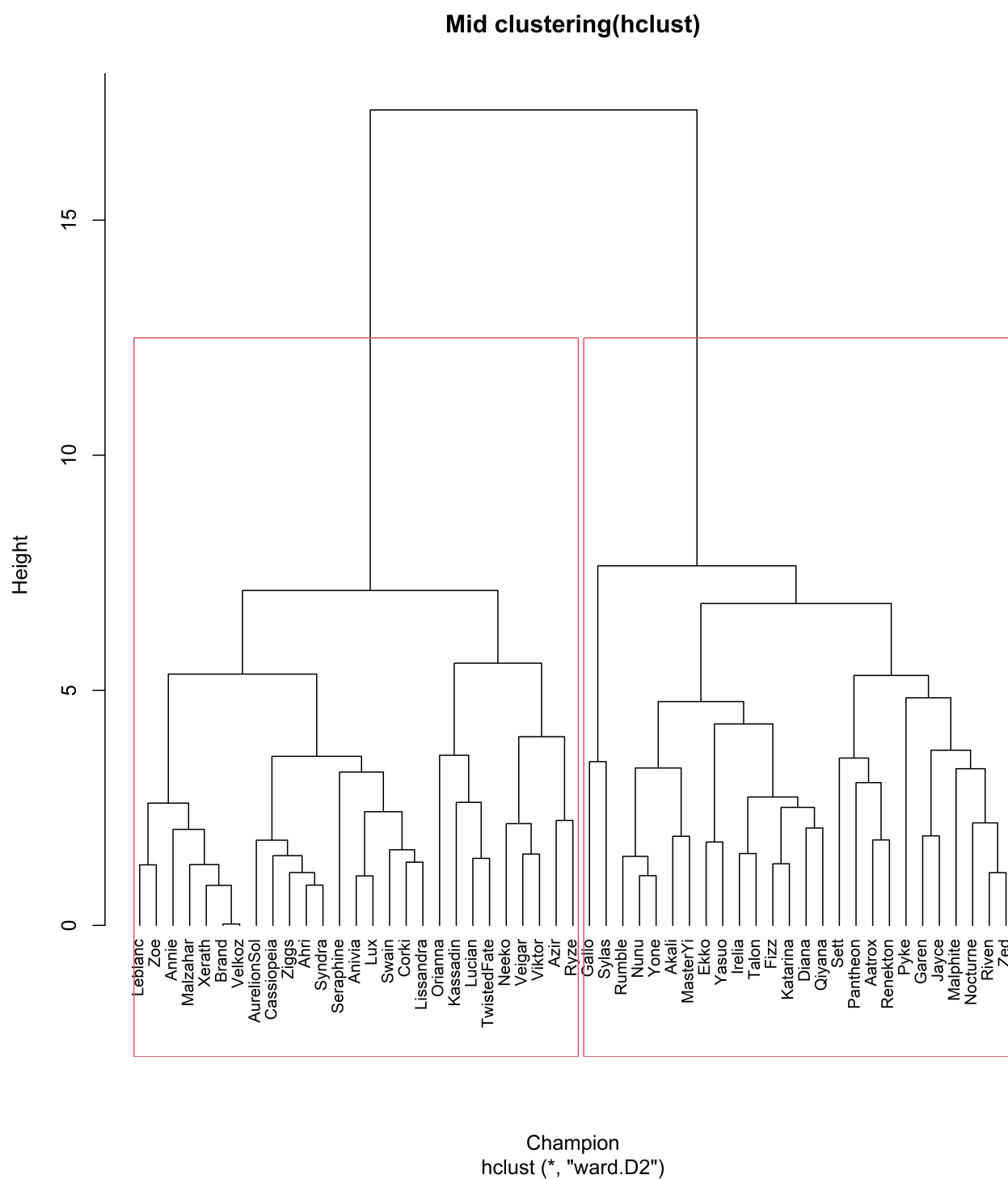
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## A Hierarchical Clustering

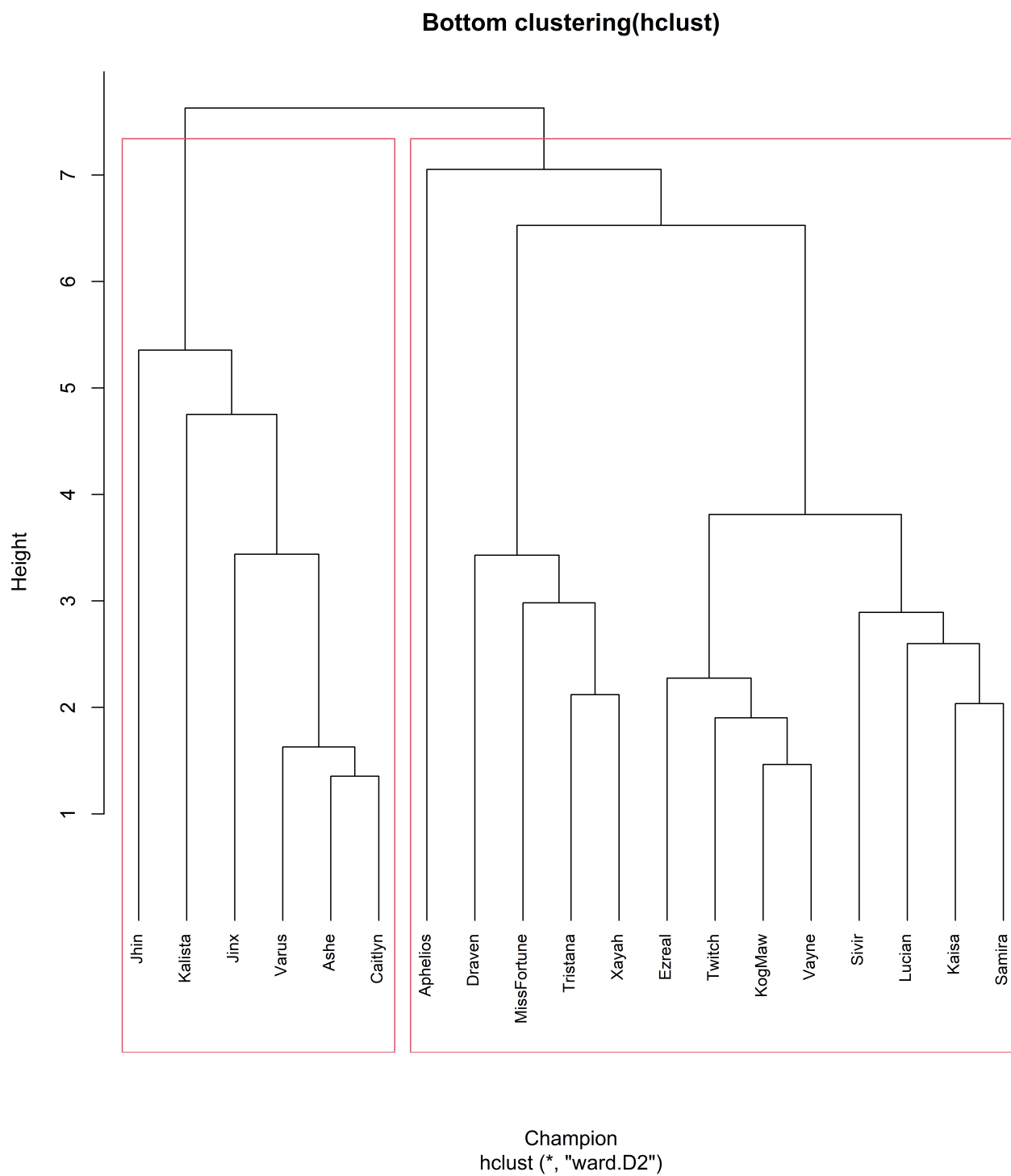


**Figure 5.** Hierarchical Clustering Results for Top Lane

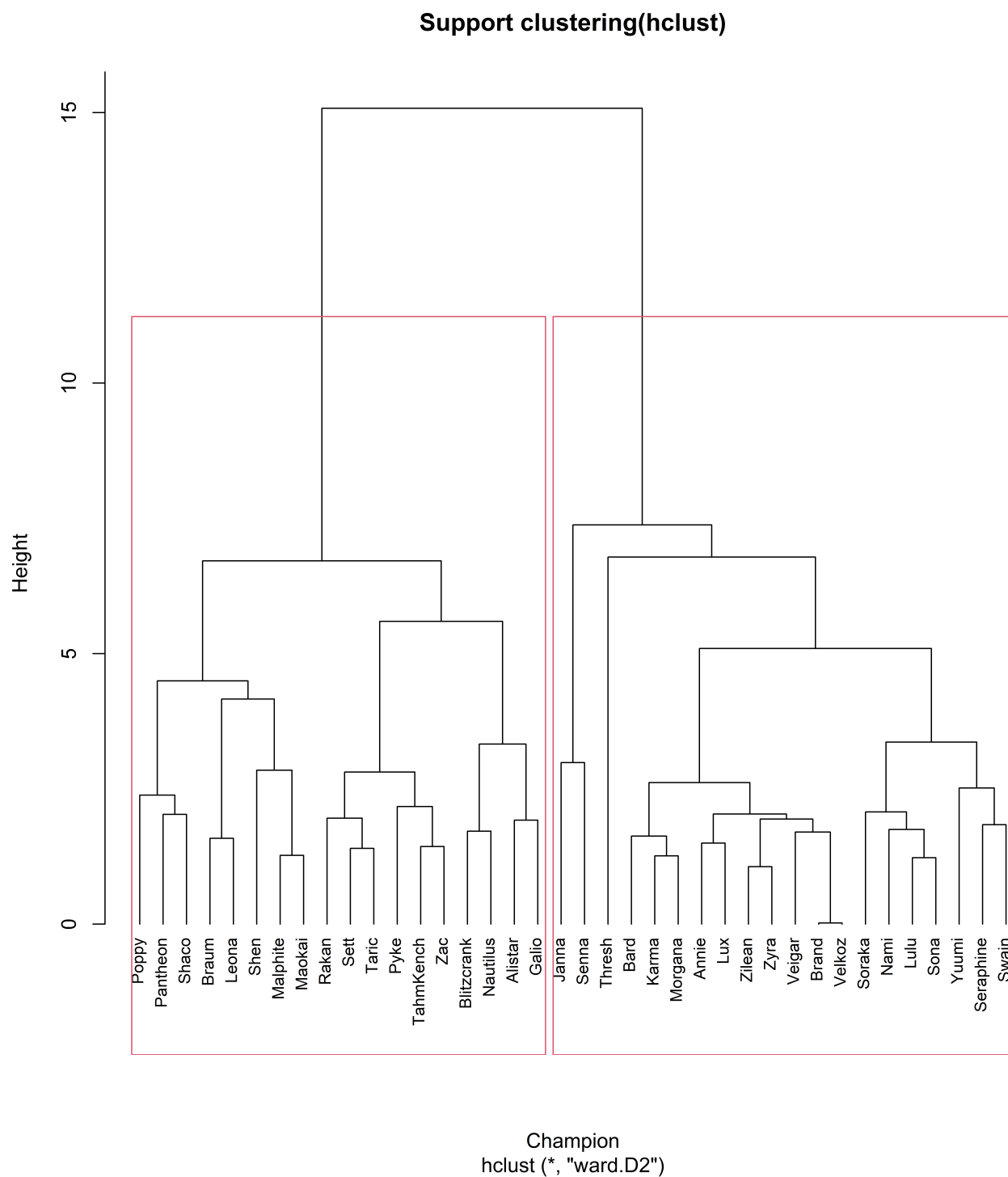
**Figure 6.** Hierarchical Clustering Results for Jungle Lane

**Figure 7.** Hierarchical Clustering Results for Mid Lane



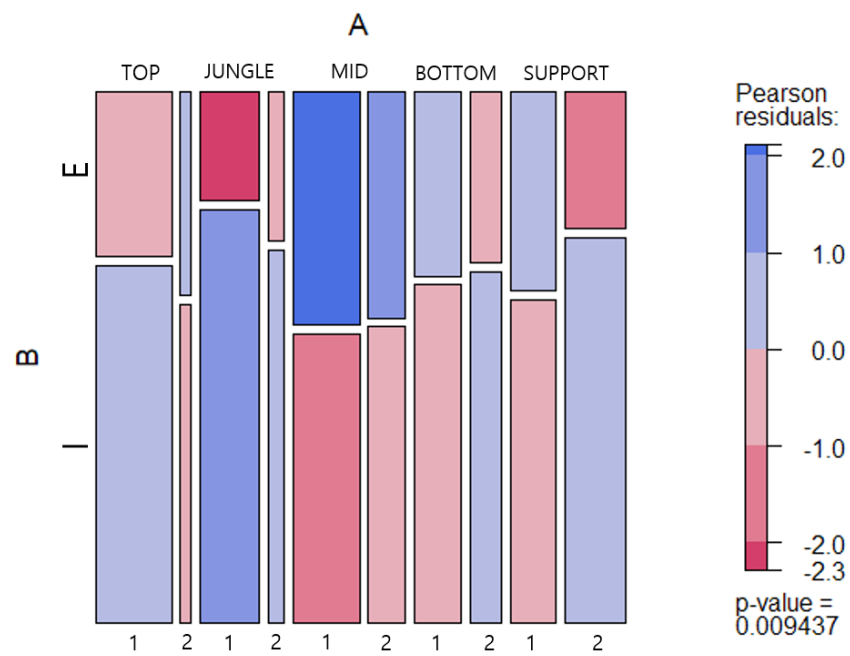


**Figure 8.** Hierarchical Clustering Results for Bottom Lane

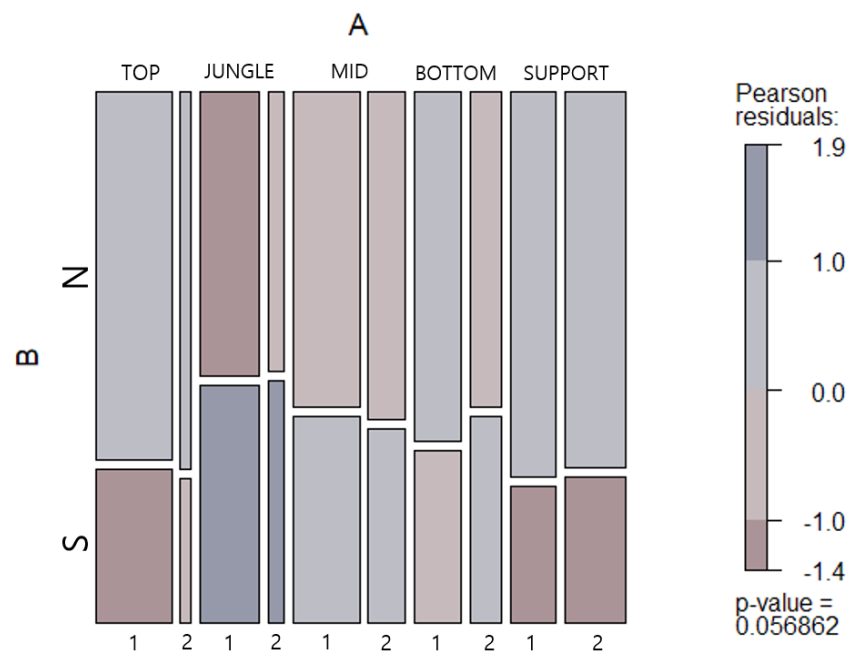


**Figure 9.** Hierarchical Clustering Results for Support Lane

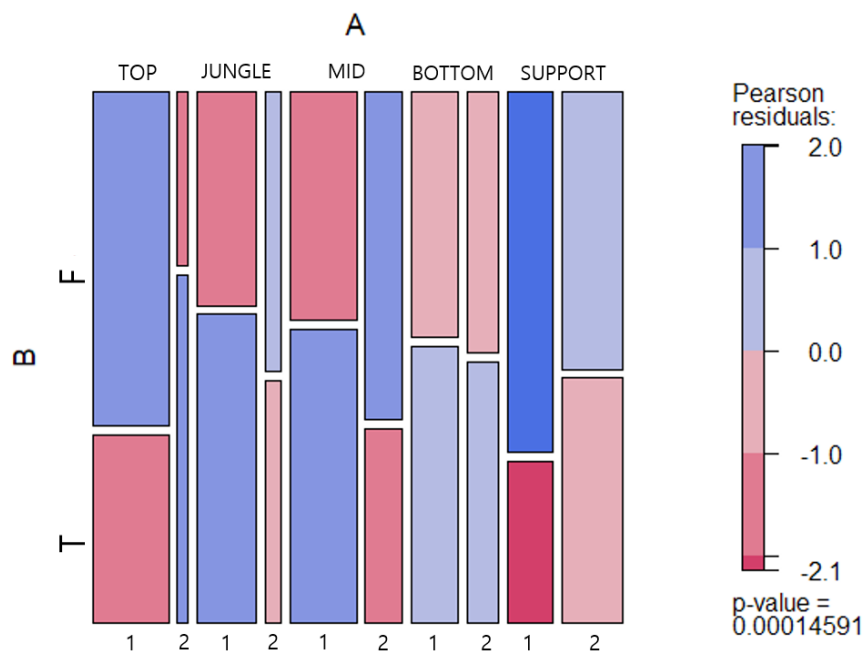
## B Mosaic plot



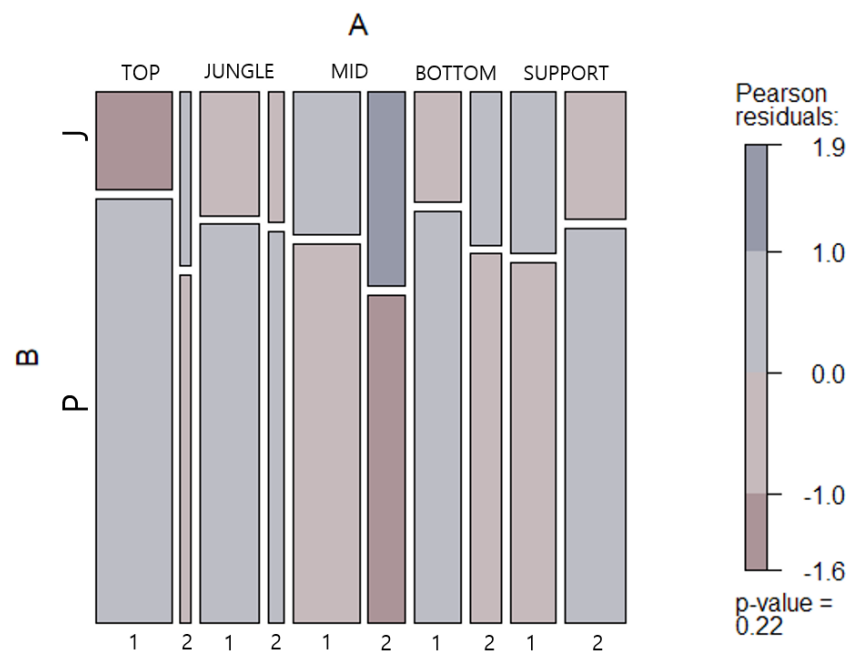
**Figure 10.** Mosaic plot of chi-squared test for champion clusters and MBTI factor E and I



**Figure 11.** Mosaic plot of chi-squared test for champion clusters and MBTI factor N and S



**Figure 12.** Mosaic plot of chi-squared test for champion clusters and MBTI factor T and F



**Figure 13.** Mosaic plot of chi-squared test for champion clusters and MBTI factor J and P