

# **Personality Embodiment in Multicharacter Online Games**

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## **Introduction**

According to industry reports, seventy-two percent of American households play computer or video games. Many of the top-selling games are in the action, role-playing, shooter, and strategy genres, which often require the player to create or select a character at the start of play (ESA 2011). From that point on, the player's interactions with the game world are mediated by the chosen character. This transfer of agency from player to character is a form of *embodiment* (Gee 2008), which in gaming ranges from controlling the character from a distance (third-person), to seeing and hearing what the character senses from their perspective (first-person). In most games with multiple characters, character selection significantly affects the experience of the game. Thus, we believe that players' character choices are *motivated* — they pick a specific character, rather than selecting one at random.

This project aims to uncover the factors influencing the character selection process and to explore the relationship between a player's personality and his perception of the personality of his chosen character. Because players of multicharacter games spend so much time in an embodied state, we theorize that players will prefer to play characters who they perceive to be similar to themselves, and that they will likewise disfavor characters with contrasting personalities to their own.

## **Multicharacter Games**

Understanding players' motivations for character selection has implications for the design of multi-character games. Video game sales have tripled over the last decade, with Americans spending an

estimated 16 billion dollars on games in 2010 — and of the top 20 highest selling games in 2011, 14 incorporate multiple playable characters (ESA 2012).

One extremely popular and lucrative type of multicharacter game is the MMOs, or Massive Multiplayer Online games. Players of MMOs like World of Warcraft spend an average of 22.72 hours each week in their game of choice (Yee 2006). Unlike a typical boxed PC game, many MMOs have adopted a subscription-based business model, where players pay a fixed price per account per month. This model has proven very successful; World of Warcraft alone generates an estimated 1 billion in revenue per month for its developer, Activision Blizzard (Quora).

Most MMOs allow the player to create an avatar whose body they will inhabit in the game world. The degree to which the avatar is customizable varies from game to game. Research suggests that players enjoy creating avatars and generally find their presence to be a positive feature (Crete et. al 2009), but also that the range of options for customizability affects whether or not someone wants to play a game. For example, Bryant and Akerman interviewed teenagers about their motivations for creating avatars; one participant said she disliked Habbo Hotel because she “was expecting cooler hairstyles and more face and clothes styles” (Bryant and Ackerman 2009, 137).



Avatar editing screen in World of Warcraft

(Source: MMOHut)

In order for a multicharacter game like World of Warcraft to be successful, the process of character development should match player's desires and expectations for their virtual selves; as Coulson et. al state, "Understanding the mapping between real and virtual people, and the factors which determine how the former respond to the latter, will assist in the development of more effective, believable, and entertaining virtual characters" (Coulson et. al 2012, 177).

Fortunately for game designers, video games and other virtual worlds have been heavily studied by academia. Video games are of interest to scholars in psychology, sociology, and other

human-centered disciplines because they enable unique research that would not be possible in the real world. As Bainbridge notes, scientists may be able to “design experiments that are feasible in virtual worlds but were never possible before. For example, experiments can be done comparing the socioeconomic consequences of alternative government regulations, something next to impossible in society at large” (Bainbridge 2007, 473). This freedom has enabled fascinating research in fields as diverse as law (Lastowska and Hunter 2004), international relations (Kuboya and Satoshi 2005), and even epidemiology (Loffgren and Fefferman 2007).

## **Identity and Self-Representation in Virtual Worlds**

For social psychologists, video games offer unique insights into how humans represent themselves and form relationships in the absence of face-to-face cues. One of the core areas of study is the expression of identity in virtual worlds. In the real world, the body is a critical site for identity performance — we project our inner selves outward through movement, posture, clothing, etc. (boyd 2007, 11). This is doubly true in online worlds. Freed from the trappings of the physical body, creating an avatar is a purely expressive act; thus, just as a MySpace profile can be seen as a form of digital body where individuals must write themselves into being (boyd 2007), an avatar is a way for users to express and explore their identities. As Taylor notes, “Virtual environments without a doubt remain a space in which users are constantly creating and performing a variety of identities.” (Taylor 2006, 95)

A user’s chosen online self-representation could be an accurate depiction of their offline self, but it is more likely to be an expression of their “ideal self”. In social psychology, the ideal self is defined as the person an individual would like to be as opposed to their perception of their current self (Rogers

1959). Research shows that people often select avatars that depict their ideal self instead of their actual self (Vasalou et. al 2008), but that the degree to which they do so varies based on the personality traits of the player. For example, Dunn and Guadagno found that while most people create avatars that conform to societal norms of appearance, this tendency was more pronounced in introverts and people high in neuroticism (2012). In another study, Bessiere et. al discovered that WoW players view their main character more similar to their ideal self than the players themselves were. They noted that players rate their character as having attributes more favorable than their own self-rated attributes. A key discovery was that this trend was stronger among those with lower psychological well-being, who rated themselves comparatively lower than they rated their character. The researchers concluded that “MMORPG virtual worlds offer players the opportunity to create idealized characters as virtual, alternative selves. On average, participants rated their virtual character as being more conscientious, extraverted, and less neurotic than they themselves were.” (Bessiere et. al 2007, 534)

Although a player’s avatar is frequently an idealized depiction of their real-world self, virtual realms also enable people to experience the world from a completely different perspective. Kozinets and Kedzior (2009) refer to this as the “multiperspectivity” of virtual worlds. For example, players may opt to present themselves as a different race, age, or gender than their physical body, or they may even choose to present themselves as physically handicapped (Kozinets and Kedzior 2009, 14).

In every virtual world, some percentage of the players will choose to present themselves as a different gender, a phenomenon that has received much attention in recent years from researchers in media and gender studies. As Kozinets and Kedzior (2009) note, “gender-swapping in virtual worlds can be seen as a risk-free opportunity to learn about the otherwise inaccessible world of members of

the opposite sex" (15). Players' motivations for gender-swapping vary, but are frequently based in the desire to transgress traditional gender roles — shared cultural expectations that are placed on individuals on the basis of their socially defined gender (Williams et. al 2009, 702). In Western cultures, women are expected to be nurturing and exhibit traits such as altruism and empathy, and men are supposed to be "heroic" and exhibit competitiveness, aggressiveness, and ambition (Kidder 2002, p. 630).

Research shows that on average, players select characters that conform to these expectations. For example, Companion and Sambrook asked subjects to rank their preference for four character classes ("stealth", "healer", "range", and "warrior") and found that women were most likely to put the healer as their first choice, whereas men usually ranked that option last (2008). However, despite the overall tendency toward normative roles, there is a strong contingent of players that do opt to adopt a character of a different gender or who has traits associated with the opposite gender. For example, one female player who had both female and male avatars found that she was better respected: "When I play my male characters, other male members of the party will listen to me better, take me more seriously. In my male form I could give orders and have them listened to, whereas as a female, my characters aren't always taken quite as seriously" (Yee 2006, 207).

## **Characters vs. Avatars**

Although thus far we have used the terms "character" and "avatar" interchangeably, they are not exactly the same. An *avatar* is virtual entity that a player builds for himself out of a set of options (body parts, items of clothing, props, etc.). Avatars are highly individualized representations of an individual

player; games with avatars allow extensive customizability so that each player's avatar may be unique within the game world. In contrast, games with *characters* offer the player a choice of one or more pre-existing personas. Characters have distinct appearances and traits that are assigned to them by the game's creators. Characters are always recognizable to players familiar with the game; therefore, a character's appearance is only minimally customizable. Based on this notion of characters, a *multicharacter game* is defined as any game where players select from three or more characters and then play as that character for the duration of the game (or another set time frame, such as a round or match).

The vast majority of the research outlined above investigated the relationship between identity or personality and *avatars*, whereas we are concerned with *characters*. We could find no existing research investigating the relationship between personality and character choice, where characters are pre-existing entities within the game world that the player merely adopts, rather than creates from scratch.

## Dimensions of Personality

The notion of personality is notoriously hard to define; George Allport, one of the founding fathers of personality psychology, once called personality "one of the most abstract words in our language" (Allport 1937, 25). However, a concrete definition of personality is necessary in order to evaluate the role that personality plays in character selection. In the DSM IV, personality is defined as "enduring patterns of perceiving, relating to, and thinking about the environment and oneself that are exhibited in a wide range of social and personal contexts" (Amer. Psychiatric Assoc. 2000).

In psychological research, personality is frequently conceptualized in terms of the dimensions of the Big Five traits (Digman 1990). In the Big Five model, an individual's personality is described along five axes: Conscientiousness, Extraversion, Agreeableness, Neuroticism, and Openness to experience.

*Conscientiousness* refers to an individual's degree of organization and motivation in the pursuit of a goal or accomplishment. Individuals who score high on conscientiousness are productive and reliable, whereas those who score low are viewed as self-indulgent. *Extraversion* refers to one's preference for being around and interacting with people; extraverted people are thought of as sociable, assertive, and active. In contrast, people who score low on extraversion prefer being alone to socializing in large groups. *Agreeableness* measures "interpersonal orientation". Individuals high on agreeableness can be characterized as trusting, tolerant, kind, generous, and gullible. *Neuroticism* refers to how easily a person experiences negative emotions; people who rank high in neuroticism tend to be anxious and self-conscious. The final measure, *openness to experience*, assesses just that — the individual's enjoyment of unfamiliar scenarios. Individuals who score high on this trait tend to be politically liberal and anti-authoritarian, whereas those on the opposite end of the spectrum are more conservative and traditional (Costa and McCrae, 1992).

Although the Big Five model is necessarily reductionist, it has held up remarkably well to cross-cultural variation; studies have successfully applied the model to Dutch, Hungarian, Chinese, Italian, South African, German, Finnish, Portuguese, Israeli, and Filipino subjects, among others. (McCrae and Costa 1998). And although men and women tend to score differently along two of the different axes — agreeableness and neuroticism — these differences are consistent in different populations and between younger and older subjects (Chapman et. al 2007).

In this study we will use the Big Five model to measure *personality similarity*, the relationship between an individual's personality and the personality of another. Personality similarity is also referred to as 'homophily' (Lazarsfeld and Merton 1954). Numerous studies have shown that "birds of a feather" do flock together — people favor those who are similar to themselves in personality and are more satisfied with the relationship, for both friendships (for example, Selfhout et. al 2010) and romantic partnerships (e.g., Botwin, Buss, and Shackelford 1997). Personality similarity also matters in the workplace; Schaubroeck and Lam found that in individualistic cultures, employees who were similar to their peers were more likely to be promoted, whereas in collectivist cultures, the similarity of the employee to his supervisor was significant (2008). In another study, researchers found that customers preferred to interact with customer support representatives with Big Five personality traits matching their own (Streukens and Andreassen 2009).

Research in this area has also discovered a significant distinction between personality similarity and *perceived* personality similarity; people sometimes overestimate how similar they are to another, and this can result in a positive rating of the other, even in the absence of true similarity (Linden-Andersen, Markiewicz, and Doyle 2009). Separating actual from perceived personality is important because it allows researchers to study personality in the absence of an actual relationship or interaction. For example, researchers studying the correlation between male attractiveness and female fertility asked women to rate the personality of strange men based solely on photos of their faces (Penton-Voak and Perrett 2001). These so-called "zero acquaintance" studies are employed to understand personality solely from one side of the relationship — a construct that is necessary when the person who is perceived does not actually exist, as is the case with video game characters.

## **Personality Similarity and Character Choice**

The present research investigates the relationship between a player's personality and the (perceived) personality of their favorite and least favorite character. While there has been little research in this area, a recent study by Coulson et. al (2012) looked at how players of the game Dragon Age: Origins perceive non-playing characters. These characters, also called NPCs or "companions" are AI-driven personas that assist players throughout the game. In their introduction, the researchers highlight the importance of perceived similarity for game design: "To the extent that similarity determines liking, the nature of both observer and observed needs to be understood. In trying to understand believability it is therefore important to measure variables describing both the (virtual) person being observed, and the (real) person doing the observing" (Coulson et. al 2012, 76).

Coulson et. al found that players expressed strong interpersonal attraction for several of the non-playing characters. However, despite the quote above, their work fails to account for the role of perceived similarity in liking, a weakness they address in their discussion: "Perhaps the most important [limitation] lies in the lack of a measure of the companion's personality, and the importance of similarity in interpersonal attraction could only be investigated in a limited manner" (Coulson et. al 2012, 183). Our research aims to pick up where Coulson et. al left off, by asking players to assess both their own personality and that of their favorite character, in order to understand how personality similarity is correlated with liking a particular character.

## **Research Scope**

To understand the relationship between a player's personality and that of their favorite

character, we will look at two of today's most popular multicharacter online games: Team Fortress 2 (TF2) and League of Legends (LoL).

## Team Fortress 2

Team Fortress 2 (TF2) is an online multiplayer game, in which players play in 2 teams of up to 12 per side. It is a team based, first-person shooter game, developed by Valve Corporation, and a sequel to the original Team Fortress and its GoldSrc engine remake. It was released on October 10, 2007 for Windows and Xbox 360. The core game became free to play on June 23, 2011, while unique equipment and character outfitting remain the means of in-game monetization (Wikipedia).

The characters in TF2 belong to player classes, where each class possesses different abilities, weapons, character models, visuals, and sounds. These combinations offer alternative sets of play and rules. The nine classes are divided into three categories — assault, defense and support. The nine characters of TF2 are:

- **Demoman (Defense):** He has two grenade launchers but no direct fire weapons.
- **Engineer (Defense):** As the name suggests, he has the ability to build different structures to aid his teammates in battles.
- **Heavy (Defense):** With a machine gun as his main weapon, Heavy has the ability to wreak havoc on his opponents even though he moves slowly.
- **Medic (Support):** This is the most well-known support class of the TF2 franchise. He is focused on healing his teammates instead of fighting with the enemy. In TF2, the Medic is characterized as a mad scientist.
- **Pyro (Assault):** Pyro is the ideal attack character, with the ability to move quickly and disrupt the enemy with a flamethrower. Pyro is notable because unlike the other eight (male) characters, the gender of the character is ambiguous. In TF2, pyro can be identified by a trademark gas mask.

- **Scout (Assault):** The fastest character in the franchise, whose speed is useful in objective based games
- **Soldier (Assault):** An offense oriented character who is the backbone of any attack, the Sniper has a robust hit point total, splash-damaging rockets and a hot temperament.
- **Sniper (Support):** He takes out key targets from a distance.
- **Spy (Support):** He has the ability to turn invisible and also disguise himself as a member of the opposing team, thereby making him best suited to hunt down high value targets.



*The nine characters of Team Fortress 2*

(Source: Valve)

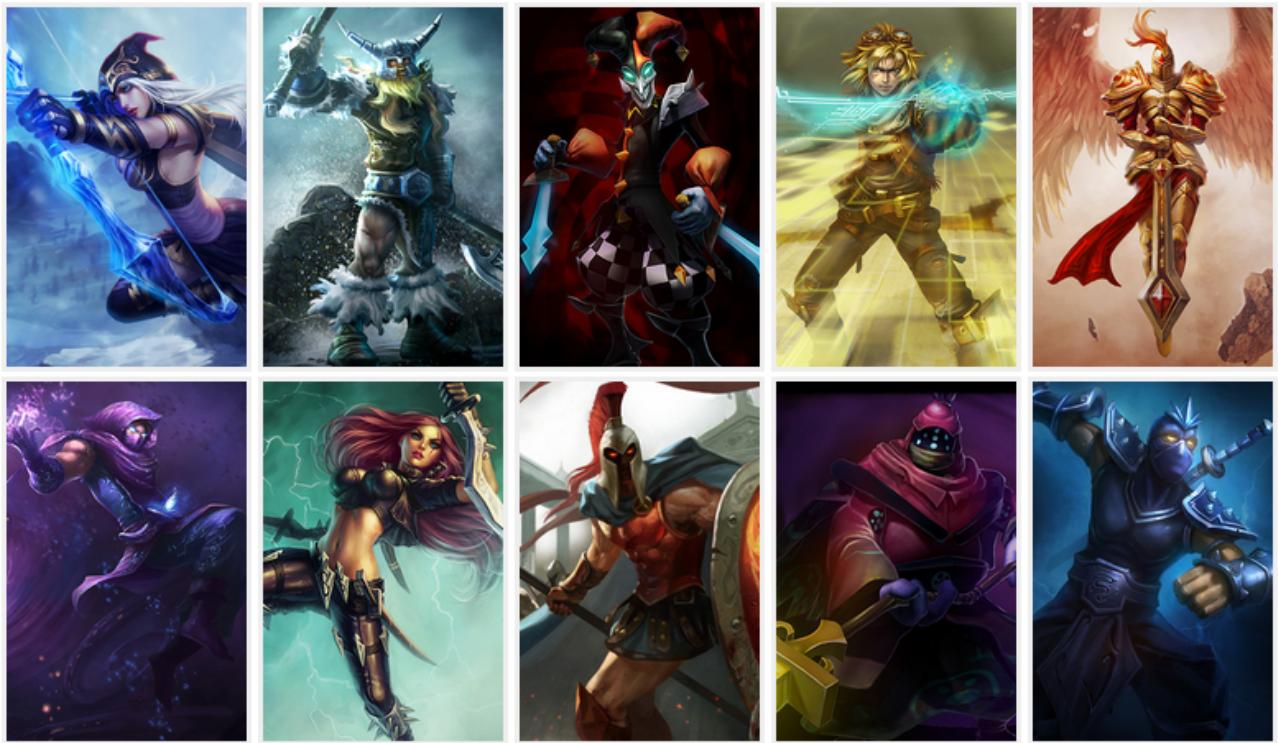
## League of Legends

League of Legends (LoL) is an online multiplayer game produced by Riot Games for Windows and Mac OS X. The game was inspired by the Defense of the Ancients map for Warcraft III and launched on October 27, 2009. With over 12 million players per day, LoL is currently the most played

PC game in North America and Europe (Gaudiosi 2012). It is also a free to play game, supported by microtransactions within the game (Wikipedia).

LoL has over a 100 characters, called ‘champions’. Every champion belongs to one of 5 champion types, which are, ability power carry, fighter/bruiser, jungler, range DPS carry, support and tank. Players play in even teams of champions, 3v3 or 5v5. The following is a description of the play style of each of the types:

- **Ability Power Carry:** A champion whose fighting skills are mostly magic base who is designed to be weak in early game, but gets really strong in late game so they can carry their team to victory.
- **Fighter/Bruiser:** A champion who does close-up combat (also known as a melee).
- **Jungler:** A champion that roams across the map in zones call “the jungle” killing neutral monsters in these zones and assisting other champions in their lanes by ambushing the enemy team.
- **Range DPS (Damage per Second) Carry:** A champion that fights from a distance and whose main skill is physical attack. This champion is designed to be weak in early game, but gets really strong in late game so they can carry their team to victory.
- **Support:** A champion whose main purpose is to assist their fellow champions by healing, buffing (giving armor), revealing shadow areas that cannot be seen on the game map, and crowd control (temporarily reducing the enemy team’s skills).
- **Tank:** A champion who has a lot of health and armor. His main purpose is to initiate fights and redirects enemy attacks and attention to himself so that he can protect his teammates.



*A selection of champions from League of Legends*

(Source: Riot Games)

## Method

### Participants

Three surveys were distributed to a total of 836 participants. The first two surveys (survey A and B) targeted frequent players of either League of Legends or Team Fortress 2. If players were familiar with both games we asked that they only complete one of the surveys. The third (survey C) was open to all subjects, provided they had never seen or played either of the games.

We received 101 total responses for League of Legends and 583 for Team Fortress 2. For the non-player survey, we randomly assigned participants to one of the two games and ended up with 70 responses for Team Fortress 2 and 82 for League of Legends. The age range and gender breakdown of

respondents was as follows:

|        | TF2 (Survey A)                      | LoL (Survey B)                      | Non-Players (Survey C)              |
|--------|-------------------------------------|-------------------------------------|-------------------------------------|
| Age    | Mean 19.28, range 11-69,<br>SD 5.64 | Mean 21.90, range 13-40,<br>SD 4.71 | Mean 25.64, range 13-57,<br>SD 8.98 |
| Gender | Male 87.80%, female<br>12.19%       | Male 58.41%, female<br>41.58%       | Male 53.10%, female<br>46.89%       |

## Materials

In order to measure the relationship between an individual's personality and his or her choice of video game character, our study incorporated the Ten Item Personality Inventory (TIPI) test created by Gosling et al. (2003). TIPI consists of a series of 10 statements about the subject's demeanor that correspond to the Big 5 dimensions of personality; for example, "I am extraverted, enthusiastic" or "I am anxious, easily upset". After reading a statement, the subject marks their response on a 1-7 scale where 1 is "disagree strongly" and 7 is "agree strongly".

All three surveys followed a similar format. After providing their demographic information and answering questions about their gaming habits, participants completed the TIPI for themselves. Next, they were shown a selection of video game characters and asked to pick their favorite and least favorite. Finally, participants completed a modified TIPI assessment for each of these characters.

Participants in surveys A and B were asked about characters from Team Fortress 2 and League of Legends, respectively. For Team Fortress 2, all nine characters were provided as options. However, because League of Legends has over 100 champions to choose from, we listed 20 of the most common champions and also provided an "other" option for participants who did not see their preferred or least favorite character listed. We also added a question about the players' favorite character class to assist

with comparisons between the two games (for example, in TF2 there is one range character whereas there are many within that class in LoL).

Respondents for survey C had not played either of the games, so their survey was slightly different. Instead of selecting characters from a list, they were shown pictures of characters from either League of Legends or Team Fortress 2 (which game they saw was determined by random assignment). As before, they were then asked to select their favorite and least favorite characters, and perform a TIPI assessment of each.

## Procedure

Surveys A and B were created and distributed through Google Forms (<http://drive.google.com>). However, we were unable to use the same channel for Survey C because Google Forms does not support embedded images. Instead, we created a modified version of the form and hosted it ourselves, and also created a script to randomly redirect participants to view images from either TF2 or LoL.

We recruited participants for all three surveys through social media channels (such as Facebook and Twitter) and through word-of-mouth. For surveys A and B, we also posted a link to the survey in gaming forums and on each game's page on Reddit.com. Although we did not ask for referral information, it is safe to assume that the vast majority of respondents for the first two surveys were from Reddit.

## Hypotheses and Results

**Hypothesis 1: Gamers will prefer characters they perceive to be similar to themselves, and dislike ones they perceive to be different.**

H0: Gamers don't have any special preferences.

For this hypothesis we used a **permutation test**. The following steps illustrate our calculation process:

Step 1) We first recoded the respondents' perceived personality Likert scale from 1(strongly disagree)...7(strongly agree) to -3...3.

Step 2) Using the same concept in the Ten-Item Personality Inventory (TIPI) we tabulate the scores the following way:

- Extraversion: 1,6R
- Agreeableness: 2R, 7
- Conscientiousness: 3, 8R
- Emotional Stability: 4R, 9
- Openness to Experiences: 5, 10R      *Note: R means reversed (the sign gets flipped).*

Step 3) Then we recoded the respondents' Most Favorite Character and Least Favorite Character traits from yes/no to 1/0. We then again apply the TIPI concept to Most and Least Favorite Character to sum up the related variables and obtain the same 5 dimensions of personality. We took the difference of Most Favorite Character and Least Favorite Character for each dimension of personality.

Step 4) For each respondent, for each of the 5 dimensions of personality we multiplied the value for the respondent and the difference from step 3. Then we summed these products up for each respondent to get the final score. If the respondent's personality and their character choice are consistent (which is our alternative hypothesis) then the score will be large and positive. If the respondent's personality and their character choice are completely unrelated (which is our null hypothesis) then the score will be around 0. If the respondents and their character choice are in the opposite direction then the score will be a large negative number.

Example:

|                                   | R has this Trait                     | R doesn't have this Trait            |
|-----------------------------------|--------------------------------------|--------------------------------------|
| R prefers trait in his Character  | <b>Positive (support Hypothesis)</b> | Negative * Positive = Negative       |
| R dislikes trait in his Character | Positive * Negative = Negative       | <b>Positive (support Hypothesis)</b> |

For example, if Respondent is extraverted (has +3) and his favorite character is also extraverted while his least favorite is not, we will calculate  $3 * (1 - 0) = 3$ . Such numbers would be added up for all traits for all respondents.

Step 5) The scores for all respondents were then averaged. This came out to be 1.91.

Step 6) We needed to know how far the average score can be from zero if our null is true. To find out, we simulated the survey results 30 times using random responses. The random responses had the same frequency as the real responses. For example the response of 1 (strongly disagree) showed up 6% of the time in the real survey responses, thus this was reflected in the simulated randomized responses, etc. If the null is true then the score should be similar to the randomized results. The average score from the randomized simulations was about .04 with a standard deviation of .12.

Step 7) The actual survey response average score (1.91) is higher and not similar to the average randomized score of .04. The dissimilarity is obvious due to the number of standard deviations the randomized scores are away from the actual survey response average scores. This is represented in the z-score of about 15 (15 standard deviations away from the actual average score).

**Conclusion:** We **reject** the null hypothesis in favor of the alternative hypothesis.

Summary of findings:

|                                 |                              |
|---------------------------------|------------------------------|
| Average score                   | 1.9142                       |
| Average randomized tests        | 0.0388 (randomized 30 times) |
| Standard Deviation random score | 0.1235                       |
| Z-score                         | 15.1797                      |

## **Hypothesis 2: Women are more likely than men to choose support characters**

H0: Women are as likely as men to choose support characters

We conducted two **Chi-square tests** using survey A and survey B (one for LoL and one for TF2). We did not combine the games. If we did, the fraction of females playing support would be larger than the fraction of males playing support simply because females in our survey play LoL more often, and support is more popular in LoL. We are testing independence of the gender and the choice of the support role. Note: support means “medic” in TF2, since we believe this is the role most closely related

to support in LoL.

H2 Results for League of Legends:

|  | Support Cha               | Non Support | Total | Level of significance     | 0.05       |
|--|---------------------------|-------------|-------|---------------------------|------------|
|  | number of rows            |             |       | number of rows            | 2          |
|  | number of columns         |             |       | number of columns         | 2          |
|  | critical value            |             |       | critical value            | 3.8415     |
|  | chi-square test statistic |             |       | chi-square test statistic | 2.6420     |
|  | p_value                   |             |       | p_value                   | 0.10407012 |

For LoL we found that we got only very weak statistical significance because we had too few data points. We could not reject the null. In addition, the practical significance measured by Cramer's V is not very high either: 0.16.

Results for Team Fortress 2::

|  | Support Cha               | Non Support | Total | Level of significance     | 0.05        |
|--|---------------------------|-------------|-------|---------------------------|-------------|
|  | number of rows            |             |       | number of rows            | 2           |
|  | number of columns         |             |       | number of columns         | 2           |
|  | critical value            |             |       | critical value            | 3.8415      |
|  | chi-square test statistic |             |       | chi-square test statistic | 4.3355      |
|  | p_value                   |             |       | p_value                   | 0.037325969 |

In TF2, the result is statistically significant, so we reject the null in favor of the alternative. However, the practical significance is low: Cramer's V = 0.08.

### **Hypothesis 3: Men are more likely than women to choose attack characters**

H0: Men are as likely as women to choose attack characters

For this hypothesis we conducted two **Chi-square** tests using survey A and survey B (one for LoL and one for TF2). The attack roles are fighter/bruiser for LoL and soldier, demoman and heavy for TF2.

Results for LoL:

|        | Attack Damage | Non Attack | Total | Level of significance | 0.05        |
|--------|---------------|------------|-------|-----------------------|-------------|
|        | Male          | Female     | Total | p_value               | 0.214343275 |
| Male   | 9             | 50         | 59    |                       |             |
| Female | 3             | 39         | 42    |                       |             |
| Total  | 12            | 89         | 101   |                       |             |

For this test our frequency was violated (less than 5 data points in one cell). We could not make any conclusion from the test about men and women and the likelihood of choosing attack characters in the game LoL.

Results for TF2:

|        | Attack Damage | Non Attack | Total | Level of significance | 0.05        |
|--------|---------------|------------|-------|-----------------------|-------------|
|        | Male          | Female     | Total | p_value               | 0.085010753 |
| Male   | 151           | 360        | 511   |                       |             |
| Female | 14            | 57         | 71    |                       |             |
| Total  | 165           | 417        | 582   |                       |             |

There is weak evidence against the null in favor of the alt: Men are more likely than women to choose attack characters. Cramer's V is 0.07, very low.

**Hypothesis 4: Introverted people are more likely than extraverted people to choose range characters**

H0: Introverted people are as likely as extraverted people to choose a range character

For this hypothesis we combined the two games survey responses (LoL and TF2) and conducted one **Chi-square test**. Our reason was that personality between the two games are somewhat similar. Note: "ranged" means "Range DPS" in LoL and "Sniper" in TF2.

Results:

|           | Extraversion | Ranged Damage | Ranged Damage | Total |
|-----------|--------------|---------------|---------------|-------|
| Intravert | <=1          | 31            | 242           | 273   |
| Extravert | >=1          | 12            | 185           | 197   |
|           | Total        | 43            | 427           | 470   |

|                           |             |
|---------------------------|-------------|
| Level of significance     | 0.05        |
| number of rows            | 2           |
| number of columns         | 2           |
| critical value            | 3.8415      |
| chi-square test statistic | 3.8146      |
| p_value                   | 0.050806833 |

We reject the null and conclude that introverted people are more likely than extraverted people to choose range characters. Cramer's V is 0.09, which suggests that the results are not very practically significant.

## Observations and Results

- We wanted to see whether the relationship between the player and character personality is stronger in LOL or TF2.

Using data from our surveys, we simply compared the two games. Whichever game had the higher z-score would have a stronger relationship. Here is the summary of our findings:

|                           | League of Legends | Team Fortress 2 |
|---------------------------|-------------------|-----------------|
| Average                   | 2.4554            | 1.8173          |
| Average Random            | 0.0388            | 0.0388          |
| Standard Deviation Random | 0.1235            | 0.1235          |
| z-score                   | 19.5598           | 14.3953         |

The z-score for LOL is noticeably higher, so it seems that LOL players care more about their character personality than TF2 players. The numbers in this table were obtained in the same way as the numbers for the test of hypothesis 1, except the data is separated between the two games.

- We wanted to see if the relationship between the perceived personality of the individual and the favorite character is stronger for players or non-players.

Here is a chart of our findings:

|                    | Gamers  | Non-Gamers |
|--------------------|---------|------------|
| Average Score      | 1.9142  | 3.5205     |
| Average Random     | 0.0388  | 0.0388     |
| Standard Deviation | 0.1235  | 0.1235     |
| z-score            | 15.1797 | 28.1806    |

Personality of individual and favorite character are stronger for non-gamers than gamers. The calculations are the same as in hypothesis 1 but based on gamers vs. non-gamers.

- We wanted to see if there was a common personality trait about the players who like a particular game character and the same for players who dislike a character.

Summary Findings:

| Row Labels          | Average of Extraversion | Average of Agreeableness | Average of        |             | Average of Emotional Stability | Average of Openness to Experiences |
|---------------------|-------------------------|--------------------------|-------------------|-------------|--------------------------------|------------------------------------|
|                     |                         |                          | Conscientiousness | Neuroticism |                                |                                    |
| Ability Power Carry | 0.70                    | -0.15                    | 0.18              | 0.13        | 0.38                           |                                    |
| Demoman             | -0.20                   | 0.31                     | -0.03             | 0.27        | 0.34                           |                                    |
| Engineer            | -0.36                   | 0.65                     | 0.10              | 0.28        | 0.03                           |                                    |
| Fighter/Bruiser     | 0.49                    | -0.26                    | -0.19             | -0.48       | -0.79                          |                                    |
| Heavy               | -0.35                   | -0.13                    | 0.14              | -0.27       | -0.01                          |                                    |
| Jungler             | 0.66                    | -0.30                    | 0.39              | 0.40        | -0.04                          |                                    |
| Medic               | 0.26                    | 0.16                     | -0.12             | -0.13       | 0.18                           |                                    |
| Pyro                | -0.01                   | 0.05                     | -0.18             | -0.06       | -0.17                          |                                    |
| Range DPS           | -0.64                   | -0.12                    | 0.10              | -0.52       | -0.12                          |                                    |
| Scout               | 0.00                    | -0.07                    | -0.02             | 0.16        | 0.05                           |                                    |
| Sniper              | -0.12                   | -0.21                    | 0.03              | -0.04       | 0.01                           |                                    |
| Soldier             | 0.08                    | -0.11                    | 0.07              | 0.05        | -0.03                          |                                    |
| Spy                 | -0.09                   | -0.14                    | 0.17              | 0.09        | -0.05                          |                                    |
| Support             | 0.21                    | 0.22                     | -0.30             | -0.34       | 0.15                           |                                    |
| Tank                | 0.36                    | 0.53                     | -0.65             | 0.11        | -0.29                          |                                    |

This chart shows that among the respondents who took surveys A and B, people who like certain characters have common traits. For instance, people whose most favorite character is an AP Carry tend to be more extraverted. People whose most favorite character is Range DPS tend to be more introverted. This chart was calculated using the average trait for players who prefer a certain character role, minus the overall average for that trait.

- We wanted to see which characters women and men most often list as their favorite or least favorite.

In the tables below, we provide the fraction of people (female only, male only, and total) who prefer to play each of the available roles. The last column shows the difference between the male and the female columns, so that “+” indicates that males have a preference for this role and “-” indicates that females have a preference for this role.

Here are our findings for League of Legends:

| Count of My *favorite* type of character is a Row Labels | Column Labels  |                |                |             | A Male(+) or Female(-) Thing? |
|--|----------------|----------------|----------------|-------------|-------------------------------|
|  |                | Female         | Male           | Grand Total |                               |
| Ability Power Carry                                      | 22.50%         | 27.59%         | 25.51%         |             | 5.09%                         |
| Fighter/Bruiser  | 7.50%          | 15.52%         | 12.24%         |             | 8.02%                         |
| Jungler  | 0.00%          | 20.69%         | 12.24%         |             | 20.69%                        |
| Range DPS  | 40.00%         | 13.79%         | 24.49%         |             | -26.21%                       |
| Support  | 30.00%         | 15.52%         | 21.43%         |             | -14.48%                       |
| Tank   | 0.00%          | 6.90%          | 4.08%          |             | 6.90%                         |
| <b>Grand Total</b>                                       | <b>100.00%</b> | <b>100.00%</b> | <b>100.00%</b> |             | <b>0.00%</b>                  |
|  |                |                |                |             | <b>0.00%</b>                  |

We see that females prefer to play Range DPS and support, while males prefer to play jungler.

Here are our findings for Team Fortress 2:

| Count of My *favorite* type of character is a | Row Labels | Column Labels  | A Male(+) or Female(-) Thing? |                |              |
|---|------------|----------------|-------------------------------|----------------|--------------|
|   |            |                | Female                        | Male           | Grand Total  |
| Demoman                                       |            | 2.90%          | 7.34%                         | 6.81%          | 4.44%        |
| Engineer                                      |            | 7.25%          | 4.76%                         | 5.06%          | -2.48%       |
| Heavy   |            | 10.14%         | 5.36%                         | 5.93%          | -4.79%       |
| Medic   |            | 17.39%         | 9.13%                         | 10.12%         | -8.26%       |
| Pyro  |            | 18.84%         | 21.23%                        | 20.94%         | 2.39%        |
| Scout   |            | 13.04%         | 12.90%                        | 12.91%         | -0.15%       |
| Sniper  |            | 15.94%         | 5.16%                         | 6.46%          | -10.78%      |
| Soldier                                       |            | 7.25%          | 17.26%                        | 16.06%         | 10.02%       |
| Spy   |            | 7.25%          | 16.87%                        | 15.71%         | 9.62%        |
| <b>Grand Total</b>                            |            | <b>100.00%</b> | <b>100.00%</b>                | <b>100.00%</b> | <b>0.00%</b> |

Here, the females prefer sniper and medic, and the males prefer soldier and spy.

It seems that in both games, females prefer to be a little away from the battle as either a ranged or support character.

## Infographic

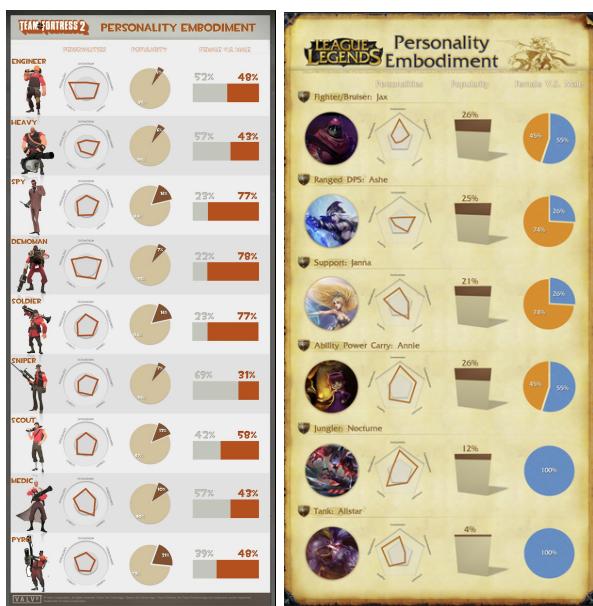
We thought our results would also be interesting to the general public, but we wanted to present them in a way that gamers could digest and appreciate. We decided to create an infographic for each game. In order to cater to the public, we focused on the information that most would find interesting. This includes personality traits of each character type, which characters people like, and how much males or females prefer each character. We visualized this information in a clear and concise way, and presented each infographic in the style (i.e. color, typography, etc.) of their respective game.

In the infographic for League of Legends, of the most popular characters our respondents selected, Ranged DPS and Support characters are dominated by female game players (74% versus 26%). However, Fighter and Ability Power Carry characters are more interesting to the male players, but not overwhelmingly so (55% versus 45%). We believe that this is because females prefer to stay in the back line of fights, supporting or damaging from a distance. Besides, the Jungler and Tank characters are

absolutely chosen by male characters. These .

In the infographic for Team Fortress 2, we found that Spy, Soldier, and Pyro are the most popular characters. However, among respondents who chose Spy and Soldier, only 22% were female, while 39% female gamers chose Pyro. Women's favorite characters are Sniper, followed by Heavy and Medic. This trend follows the same trend as LOL, in that these are characters that fight from a distance.

An additional interesting finding when comparing between these two infographics is that TF2 gamers seem to be more mild — they show more moderate personalities — than LOL gamers. However, this is probably due to the fact that we have much more respondents for TF2 than LOL, causing more extreme results.



*Infographics for Team Fortress 2 and League of Legends (see [www.yang-zhao.com/216](http://www.yang-zhao.com/216) for full size)*

## Discussion

Previous research in the psychology of gaming found that people make avatars for a variety of reasons: to represent their real-life self, to experience an ideal self, to explore new identities, and to

conform to or flout gender norms. However, no prior research had looked at why people choose a particular character option out of a set range of possible characters. Research in personality psychology shows that people prefer to interact with others who are similar in personality to themselves, and that an individual's *perception* of another's personality is equally or more important than *actual* similarity in predicting liking. We applied this insight to the question of video game character selection, and hypothesized that gamers will prefer characters who they perceive to have similar personalities to themselves. This research shows that this is in fact the case.

While designing our survey, we expected that the relationship between an individual's personality and the personality of their chosen character would be stronger for non-players than for players. Frequent players of LoL and TF2 are familiar with the personalities of the characters supplied by the games' designers, as well as the play style of the characters, and we theorized that these factors would muddle the correlation between personality and character choice. In contrast, the non-players' choice of character was entirely based on their subjective interpretation of the characters' appearance, and thus they would be more likely to project personality onto the characters and pick one that was similar to themselves. Our results offer support for this intuition.

In this research we also investigated whether specific big five traits could be correlated with a preference for certain character types. For example, the ideal play style for a 'range' class like TF2's sniper is to hide away from the main battle and pick off key targets from a distance. Unlike heavy and medic who respectively heal and protect each other, or the engineers who help each other build structures, the sniper does not have a symbiotic relationship with any character — he essentially works alone. As discussed previously, introverted people tend to be independent and dislike crowds; thus we hypothesized that introverted players would be more likely than others to choose range characters like the sniper. We

found that was indeed the case. Although we only investigated this one trait, it is fun to think about what other correlations there might be between personality and character type. For example, people who score high on ‘agreeableness’ are thought of as generous and kind. Since medics/healers spend their playing time keeping others alive, it seems likely that players who choose medic would score high on this trait. These kinds of relationships would be interesting to explore more in future research.

Finally, we also investigated the relationship between character selection and gender. As discussed previously, research shows that men and women choose character classes that conform to typical gender roles; e.g., women prefer to play healing characters over attack characters. Where the sample size was sufficient, our results showed that women did list healers as their favorite, confirming previous studies. However, a male preference for attack characters was more ambiguous, with only weak evidence in favor of rejecting the null.

## **Limitations**

One of our key avenues for response collection was a posting on the Team Fortress 2 and League of Legends subreddits on Reddit.com. The posting for TF2 attracted a lot of attention on the site, with over 500 responses total. However, although anecdotal evidence suggests that the TF2 community is both older and less male-dominated than most first person shooters, the vast majority of Reddit users are males in their early 20s. Thus, the source of the traffic to our survey ended up making our sample demographics less representative.

We also did not consider the effects of physical attractiveness, facial expression and other aspects of the character that could affect a person’s desire to play a character. This would have helped us in both the gamer as well as non-gamer surveys especially since non-gamers did not have any

information other than the appearance of the character to make judgments of personality.

The most important limitation lies in the fact that the characters aren't real people and cannot take personality assessment tests. Therefore, we measured the observer's subjective interpretation of their preferred character's personality. This makes it impossible for us to conclusively say whether people choose their characters because they believe them to be similar to themselves, or whether they project their own personalities onto the characters they choose for other reasons. The nature of this relationship means we cannot decisively conclude a causal relationship between personality similarity and character selection. However, we think we could have solved this by taking an average of the sample population for the perceived personalities of the characters to get a somewhat objective view about a character's personality. We did not do this for lack of time.

There is another reason why we cannot assume anything about causation. Suppose game designers decide to create range characters that are usually introverted and suppose the players who like to play range are usually introverted as well. We would see a positive correlation between the players' personalities and their characters' personalities, even though gamers do not have any special preferences in the characters' personalities.

## Conclusion

We conclude that players tend to pick characters they perceive to be most similar to themselves. Therefore, we encourage game designers to consider building characters that exhibit a wide range of personality traits from the big five scale. It is important that the range of characters is representative of all personality types, and isn't skewed toward all extraverted or all aggressive ones.

A further study could also examine the key personality types exhibited by players of popular

games and ensure that the distribution of personality types for the characters is split in the ratio of player personalities. Game designers could also evaluate the preferred unique weaponry and game artifacts that each of the big 5 personality types prefer and tailor the in-game merchandise to reflect these preferences. This would help with in-game monetization.

We also see implications for the use of avatars outside of gaming. Research shows that avatars positively influence consumer satisfaction even in non-game contexts. For example, Crete et. al show that the use of a personalized avatar increases consumer ratings of the design of e-commerce websites (2009, 102-105). Thus, the understanding gleaned from this study could be used to improve user experience in both gaming as well as non-gaming contexts that require users to select characters or avatars that represent them.

## Project Roles

Although almost every portion of this project had some input from all of the members of our group, the primary roles of each member are as follows:

- **Divya** created slides for the presentation and helped write our final report.
- **Kate** was responsible for background research and writing/editing the report.
- **Evie** did all of the statistical analysis work, reporting of quantitative results and helped write the report.
- **Taeil** helped program the website for survey C and worked on the infographics.
- **Yang** also worked on the website for survey C, designed the infographics, and wrote up that section of the report.
- **All members** participated in survey design.

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