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THE PROTEUS EFFECT IN CONTEXT: EVIDENCE FROM A GAMING COMMUNITY

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BY
ROSS BURKHOLDER

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ABSTRACT

This dissertation builds upon previous studies showing how a person's behavior in virtual environments is altered by the characteristics of the digital avatar they control, an effect coined as the Proteus Effect by Yee and Bailenson [2007]. The goal of the dissertation is to extend this research by evaluating the Proteus Effect in a naturally occurring context, rather than a controlled laboratory setting. The community chosen for this study is one which has formed around the game Dota 2, a popular game in the multiplayer online battle arena genre.

Whereas the majority of Proteus Effect research to date has focused on the effects of an avatar's aesthetic appearance on player behavior, the retention of local context in the present study allows for a wider range of avatar characteristics to be studied. This study also uses two distinct corpora of linguistic behavior, one composed of the language players use in the game itself, the other taken from a popular online forum dedicated to the Dota 2 community. The differences between these two interactional sites allows for a meaningful comparison of the conditions necessary to trigger the Proteus Effect.

Findings show that the Proteus Effect does take place in naturally occurring environments, with linguistic differences found between players controlling avatars of different genders, and avatars fulfilling different functional roles within the game environment. Comparisons between the two corpora show that conditions with increased levels of embodiment lead to increased Proteus Effect differences, confirming the hypothesis proposed by Fox et al. [2013].

CHAPTER 1

INTRODUCTION

1.1 Introduction

As technology continues to become more pervasive in our everyday lives, we spend more of our time communicating online. Communities form in which members have no knowledge of the other members offline, and even communities with offline relationships use technology as a way to organize, schedule, and socialize. Within this new reality, it is crucial to understand the role these virtual relationships play in our society. This dissertation aims to shed light on one aspect of this complex maze of technological relationships, taking the following question as its primary motivation: How do our digital representations affect our linguistic behavior?

As a result of pursuing this question, this dissertation builds on the idea that our digital representations, called avatars, have an effect on our behavior, including our linguistic behavior. Prior research has shown evidence suggesting that indeed the avatars we control in online settings have the potential to effect everything from our sense of personal space [Yee and Bailenson, 2007] to the stories we compose [Peña et al., 2009]. This idea, first introduced by Yee and Bailenson [2007] as the Proteus Effect, is the launching pad for the present work. From this point of departure, the present study aims to push the boundaries of the concept by exploring its ramifications in a thriving online community.

In order to accomplish these pursuits, data is taken from the community of players and participants surrounding the popular online game Dota 2, published by Valve Software in 2013. Thus a secondary contribution of this dissertation is a focused linguistic analysis of this community, taken as a case study. Rather than serve as survey of general linguistic practice in this community, however, the focus remains on the interactions between digital avatars and linguistic behavior.

Looking beyond the quantitative question of whether or not avatar selection triggers a

subsequent difference in linguistic behavior, this dissertation seeks to understand how the given community of practice imbues these avatars with personae, creating an indexical field around them which savvy community members navigate and use as a resource in personal identity construction [Eckert, 2008].

The goal in embedding the search for Proteus-like effects within such a localized context is that it 1) allows for cautious generalizations outside of the laboratory setting, and 2) enables an investigation of how the local context itself is leveraged in the production and realization of the resulting behavioral alteration.

The larger impact of this dissertation is geared towards a more solid understanding of the ways in which medium factors such as avatar-appearance affect our communication habits. With the trend of increased computer-mediated communication showing no signs of slowing down, a better understanding of these medium effects is a vital aspect in evaluating the changing conditions, and the resulting changes in our social structures. Beyond the effects on computer-mediated communication, preliminary results from prior research also show that behavioral alteration effects based on avatar attributes can persist even after the user has 'logged-off' and moved on with their day [Banakou et al., 2016, Peña et al., 2009].

1.2 Primary Research Goal: Extension of the Proteus Effect

The majority of the research done of the Proteus Effect to date has been conducted in a laboratory (notable exceptions include Yee et al. 2009). The motivation for this kind of research design is clear, laboratory settings allow for significantly greater control of variables, which is crucial when establishing a new theory like the Proteus Effect, in which the intent is to establish a causative relationship between dependent (behavior) and independent (characteristics of the avatar) variables. While this approach has obvious advantages, it also has limitations. In particular, the generalizability of these findings to non-laboratory settings is often unclear. Much research, including some research into the Proteus Effect itself, has shown that

people behave differently based on their local context [Peña and Blackburn, 2013]. People behave differently in a laboratory setting than they do in their day-to-day lives. This is a particularly crucial finding with concern to behavioral research, like the Proteus Effect.

One of the major contributions of this dissertation is furthering previous research on the Proteus Effect by extending it beyond the laboratory setting. This extension is accomplished by looking for Proteus-like effects in a naturally occurring data-set, in this case the data-set collected from the Dota 2 community. This data set has not been altered in any way, with data collection being automated, and sampled at various time-points (See Chapter 2 Section 2.5 for more on data collection). All of these factors make it reasonable to assume that the behavior captured in the data set is a natural representation of the actual community being studied, without bias from the nature of the study itself.

1.2.1 Avoiding Participant Bias

Another advantage of using naturally occurring data sets is that the population demographics, such as age and socio-economic status, are representative of the wider community. This is often a significant concern with laboratory-based research designs, particularly those conducted on university campuses, in which the primary population for studies is typically drawn from the student population of the university itself. This can bias the findings of the study towards young (18-22) and economically privileged populations, making it difficult to extend the findings to a wider population [Henrich et al., 2010].

By using naturally occurring data, which will be qualified here as data occurring outside of a laboratory, with no input from the researcher, we can be sure that any findings are not a result of the laboratory setting. This assurance, though it may seem trivial, is important for research which has as one of its goals the ability to describe or predict something about human behavior. The present study's use of naturally occurring data is designed to establish the Proteus Effect, and other behavioral consequences of avatar selections as a factor in the

day-to-day life of many people.

Two important caveats on using naturally occurring data should be kept in mind. First, although it serves an important role in establishing human research findings outside of the laboratory, this does not diminish the importance of laboratory work. Rather, there is often a trade-off between using laboratory as opposed to naturally occurring data. While naturally occurring data provides more generizability, the laboratory setting provides more control (See Chapter 3 Section 3.5.1 for more on the limits of control in the present study). Additionally, varieties of human research exist that rely on taking participants out of context, or rely on creating contexts which are non-naturally occurring; both sorts of research have important contributions to make.

A second caveat to using naturally occurring data is that although it provides for greater generizability, care must still be taken not to overgeneralize. The present findings hold for the community from which the data comes, the Dota 2 community, and may be cautiously hypothesized to apply to the communities of similar types of online games (Multiplayer Online Battle Arenas). Further generalizations require further research.

1.2.2 Avoiding Researcher Bias

The use of naturally occurring pre-existing data also minimizes the potential effects of researcher bias. None of the data used as part of this study was created specifically for the study itself, but is rather independently created by the community and is entirely in the public domain. This has benefits in terms of ethics in addition to limiting the potential for the research design, as the information is all public access with no expectation to privacy. This also limits the researcher's actions to have an influence on the data and subsequent findings.

Though using pre-existing data largely precludes researcher bias in the data itself, there is still potential for misleading findings based on research design, focus, and presentation.

Steps taken to account for this potential are described in the methods section of each chapter.

1.2.3 The effect of local context on the Proteus Effect

As a consequence of the majority of Proteus Effect studies prior to the current project being performed in a laboratory, there is a limitation on the range of avatar characteristics which have been studied. This range of characteristics includes avatar height [Yee and Bailenson, 2007], avatar attractiveness [Yee and Bailenson, 2007], gender [Lee et al., 2014, Palomares and Lee, 2010, Sherrick et al., 2014], race [Banakou et al., 2016, Peck et al., 2013], and weight (Obana et al. 2017; see Section 1.4 for more details on these Proteus Effect studies).

The reasoning behind the selection of these variables is that there is a presumed homogeneity in the indexical values of these variables within the participant population. Put into different terms, there is assumed to be a shared perception of what makes a person attractive, how attractive people behave, and how attractive people are typically treated by others. These assumptions are necessary in that they ensure that when the participants are confronted with an attractive avatar (either as the controller of the avatar or the perceiver), they respond in a similar enough way to create detectable patterns within the behavioral data.

The reliance on these assumptions, when combined with the laboratory setting in which the majority of Proteus Effect research has been done, creates a gap in research knowledge with regards to the types of avatar characteristics which can elicit Proteus-like effects.

Broad vs. Narrow Avatar Characteristics

In order to push the boundaries of current Proteus Effect research, a much wider ranger of avatar characteristics should be tested. To pursue this goal, we may conceptualize avatar characteristics as being assigned values based roughly on the size of the group which shares indexical values about the characteristic. Avatar characteristics such as clothing-color asso-

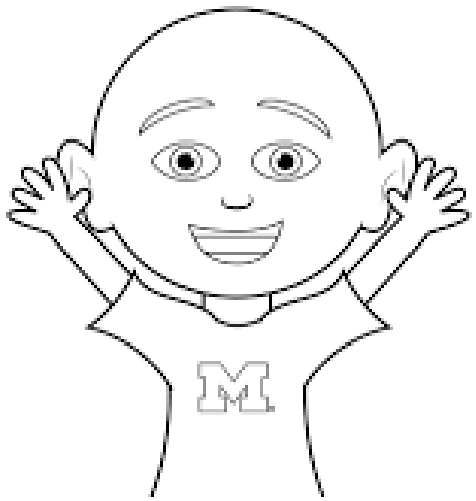

Figure 1.1: Avatar Wearing a 'block M' t-shirt

ciations which share indexical values across a fairly large section of the population we will call *broad avatar characteristics*. Those characteristics whose indexical values are shared amongst a smaller community will be called *narrow avatar characteristics*.

The association between the color black and deviant behavior, the Proteus Effect association on display in the study conducted by Peña et al. [2009], is likely shared at some level with white Americans, if not a yet broader group [Adams and Osgood, 1973]. Other avatar characteristics may have shared indexical values among a much smaller community. The avatar depicted in Figure 1.1, for instance, who is wearing a t-shirt with the University of Michigan logo the 'block M', will have some shared indexical value in the community surrounding Ann Arbor, a significantly different set of values to the community encompassing Columbus, Ohio, and perhaps no associations at all amongst communities unfamiliar with the University.

Given the current state of Proteus Effect research, which tests an extremely limited set of avatar characteristics, two possibilities emerge.

- Broad avatar characteristics are better candidates for eliciting the Proteus Effect than narrow characteristics. Narrow avatar characteristics either do not trigger the Proteus

Effect or do not trigger it strongly enough to be detected.

- Given the laboratory setting of prior Proteus Effect research, the only avatar characteristics which share indexical values amongst the participants were broad avatar characteristics.

These two possibilities are not mutually exclusive, it could be the case that broad avatar characteristics make for more likely candidates for the Proteus Effect and that they were the only ones available for prior research. However, the simplest means of differentiating between these two possibilities is the one taken by the present study; conduct Proteus Effect research on a small enough community of practice that narrow avatar characteristics can successfully be tested. This extension of the Proteus Effect answers the important question of what kinds of avatar variables trigger the Proteus Effect.

Non-physical Avatar characteristics

An additional consequence of prior Proteus Effect literature relying on broad avatar characteristics is that the majority of them are based on the physical appearance of the avatar. These characteristics include avatar height [Yee and Bailenson, 2007], color of avatar clothing [Peña et al., 2009], avatar attractiveness [Yee and Bailenson, 2007], gender [Lee et al., 2014, Palomares and Lee, 2010, Sherrick et al., 2014], race [Banakou et al., 2016, Peck et al., 2013], and weight [Obana et al., 2017]. This set of avatar attributes leaves an important gap in Proteus Effect studies in that it is unclear from prior literature whether the Proteus Effect applies to only the physical attributes of the avatar in question, or if it applies to non-physical attributes as well.

Some of the non-physical avatar characteristics tested in this work include the background and lore of the character and the actions and skills available to the controller of the avatar in an in-game scenario. Each of the characters in the game is given a short biography by the

game producers, and is assigned to one of two factions, either the Radiant (good guys) or the Dire (bad guys). The different skills and actions available to each character plays a part in determining the role the character most often plays on the team (healer, damage dealer, tank; see Section 2.2.1 for more on hero roles). The present study tests these traits, finding that non-physical avatar traits are indeed triggers for Proteus-like effects in the same way that physical avatar traits have been shown to be (See Chapter 3).

The availability of non-physical avatar traits to trigger Proteus-like effects has large implications on the psychological mechanisms underlying the Proteus Effect. In particular, behavioral differences can be caused by a much wider range of indexical associations that a controller has with respect to the avatar they control, rather than being limited to indexical associations with the appearance of the avatar.

The preliminary evidence presented in this dissertation suggests that **shared indexical perceptions of an avatar are what makes an attribute available for use as a site for behavioral modification.** These findings are a direct result of conducting research on a community of practice with sufficiently homogeneous perceptions of non-physical avatar attributes, and are one of the primary contributions of the present work.

Consequences of Diverging Indexical Values

Without these shared behavioral patterns, the Proteus Effect may still be happening. It is possible that participants exposed to certain avatar characteristics would have diverging rather than converging reactions. The lack of pattern in these reactions would make the evidence of such effects difficult to separate from a multitude of different sources of variation, but would not necessarily mean that no effects were present. Thus, while the burden of proof clearly lies with finding positive evidence demonstrating the Proteus Effect within a data set, the lack of behavioral patterns cannot rule out the possible presence of the Proteus Effect. The lack of pattern could alternatively be caused by the participants lacking

homogeneous expectations and indexical values when confronted with avatars demonstrating certain characteristics.

1.3 Secondary Research Goal: Exploring Communities Across Mediums

The secondary goal of this dissertation is to further a specific methodology which encourages community-based research studies to incorporate data from multiple contexts. The motivation behind this methodology is the understanding that the majority of communities exist and interact in multiple spaces. Any study which takes data from only a single of these interactional sites is necessarily missing aspects of the community itself.

More particularly, this methodological push is aimed at improving corpus-based research studies of online communities, as they are often disproportionally hampered by limiting the scope of interactions involved in research studies. Other areas and disciplines of study have successfully incorporated a multitude of interactional sites into their research expectations. Anthropology, and the use of participant observation is particular, has a long history of incorporating multiple interactional sites, as living and working within a community of practice often necessitates such an approach.

This incorporation of multiple interactional sites is also present in many works conducted on online communities. Steinkuehler's (2006) work on the community surrounding the video game Lineage 2 demonstrates exactly this type of methodology. In this work, Steinkuehler incorporates data taken from in-game scenarios, and combines them with a series of interactions and interviews which have taken place outside of the game itself. Such a perspective allows for a more nuanced and complete picture of online communities of practice, recognizing them as rich and multiplex networks, with varying interactional norms in different spaces.

Beyond this work, there is still great potential for improvement, particularly within

studies of online communities. The lag in adoption of such methodologies among researchers of online communities stems from multiple sources: a mischaracterization of the way online communities work, the difficulty of access to multiple interactional sites, and a failure to differentiate interactional sites when they are acknowledged.

This characterization of online groups misses the reality of them in two key ways: 1) Downplaying the complexity of interactions within online communities, and 2) homogenizing all technological forms of communication as a single interactional site (see Section 1.3.2). These two factors are interconnected, when all technological sites are seen as a single site, it often becomes true that many virtual communities take place solely in this virtual realm.

1.3.1 Online Communities: Beyond and Across the Internet

One potential roadblock to the adoption of more multi-site research programs is a misunderstanding of the structuring of many online communities. While it is common for primarily offline communities to have an acknowledged online component, whether this is in the form of an online website, community forum, or even group messaging/emailing, the reverse is rarely thought of. Instead, online communities are often portrayed as existing solely online, with 'irl' meetups seen as a newsworthy event. In this asymmetrical perception of the relationship between non-virtual and virtual communities we can see an underlying ideology; virtual communities are seen as secondary sites.

Instead of being single-site communities, virtual communities readily lend themselves to dense multiplex networks. Participants often engage in a single community through a number of websites, technologies, and modalities, each with their own norms and communicative expectations. To use the Dota 2 community as an example of the multi-faceted nature of virtual communities, interactions can be seen to take place 1) in game 2) on forum sites such as Reddit.com 3) in the chat rooms of popular streamers (most typically on twitch.tv) 4) in discussion forums attached to relevant youtube videos 5) on third party websites such

as dotabuff.com. Any of these sites can be accessed either from a computer or through a mobile device (with the exception of the gameplay interactional site, which is only available on a computer). This list of interactional sites is far from a complete picture, and is in constant flux as both the community and the technology that surrounds it continue to grow and adapt. Nonetheless, this list of community sites serves to illustrate the complex nature of the community, despite not having a significant non-virtual component.

1.3.2 Online Communities: Banishing the Netspeak Myth

A common misconception of online communities overlooks the differences between the many technological sites utilized by a single community, in terms of both their function and their cultural norms. A crucial misstep in the homogenization of all virtual sites, and more specifically in the homogenization of the communication of such sites, into an overarching 'netspeak' category (a catch all term for online communication; Crystal 2001), is allowing shared forms to distract from the greater levels of differentiation.

Using the classification schema presented in Herring [2007], we can see a wide variety of both medium and situational factors present in the two different corpora analyzed in this dissertation. Among the medium factors we find a difference in:

- format (limited gameplay chat vs. forum site)
- synchronicity (synchronous gameplay vs. asynchronous forum)
- transcript permanence.

With respect to situational factors, differences can be seen in every category listed by Herring [2007], most particularly participation structure, participant characteristics, purpose, topic, and tone.

1.4 Proteus Effect: Background

In their seminal research study *The Proteus Effect: The Effect of Transformed Self-Representation and Behavior*, [Yee and Bailenson, 2007]) introduce the primary hypothesis of the Proteus Effect:

> "an individual's behavior conforms to their digital self-representation independent of how others perceive them" (p. 271)

Yee and Bailenson [2007] conducted two separate experiments, each looking at a different avatar attribute, and whether it had any effects on participant behavior. The first of these experiments manipulated avatar attractiveness, assigning participants either more or less attractive avatars. Participants were then instructed to approach a research confederate and introduce themselves. Findings show that participants controlling an attractive avatar moved closer to the research confederate and disclosed more information about themselves than participants controlling unattractive avatars (p. 276-282).

The second experiment manipulated avatar height. In this experiment, participants were given avatars that were either shorter, taller, or the same height as the research confederate's avatar. Participants were then led through a short money-bargaining scenario in which 100 dollars was split between the participant and the research confederate. Findings of this experiment show that participants controlling avatars taller than their interlocutor negotiated more forcefully to their own benefit, while participants controlling shorter avatars were more likely to accept offers which disadvantaged them. [Yee and Bailenson, 2007, p. 284]

These foundational experiments were the first to quantify the behavioral differences triggered by the characteristics of the avatars. Crucial to this line of research are the technological affordances gained through the use of virtual reality. In both of these experiments participants were controlling avatars through the use of a virtual reality head-set. This set-up allowed for participants to see the features of their avatar, while the research confederate was

blind to their avatar condition, eliminating the possibility that behavioral differences seen were the result of differential treatment on the part of the research confederates (behavioral confirmation, for more discussion see 1.5.3; Yee and Bailenson 2007, p. 280).

1.4.1 Extensions of the Proteus Effect

Since the initial publication of Yee and Bailenson [2007] more than a decade ago, there has been a large number of studies which have sought to either replicate or extend the Proteus Effect. These extensions include looking at a large variety of avatar characteristics, including gender [Lee et al., 2014, Palomares and Lee, 2010, Sherrick et al., 2014], race [Banakou et al., 2016, Peck et al., 2013], and weight [Obana et al., 2017], as well as a variety of behavioral alterations including aggression [Peña et al., 2009] and creativity [Buisine et al., 2016, Guegan et al., 2016].

Extensions in other directions include investigations into how long the effects of avatar characteristics remain with the participants after they have ceased to control the avatar. Banakou et al. [2016] perform an experiment of this nature, finding that white participants who control a black avatar show decreased levels of implicit racial bias a full week after control of the avatar has ceased (p. 7). A study by Yee et al. [2009] shows similar results. In this experiment, participants performed a single task twice, the first time controlling avatars which varied by height, the second time in a non-virtual setting. Participants showed some residual effects of the avatar condition in the non-virtual setting, suggesting that Proteus Effects linger for some amount of time after avatar embodiment (p. 33).

A recent meta-analysis of Proteus Effect studies conducted by Ratan et al. [2020] collects data from 46 quantitative studies focusing on the Proteus Effect. This study serves as a solid review of the quantitative studies of the past decade, concluding that "the Proteus effect is a reliable phenomenon, with a small-but-approaching-medium effect size" (p. 651).

1.4.2 Previous Proteus Effect Studies Outside the Laboratory

This dissertation is not the first study to attempt to find Proteus-like effects outside of the laboratory. A study conducted by Yee et al. [2009] attempts to explore the Proteus Effect in naturally occurring situations for just the same reasons described in Section 1.2. Similar to this project, their study uses data from a popular multiplayer online video game (World of Warcraft (WoW)). A description of this study is given here, along with an assessment of the differences and advantages of our study with respect to Yee et al. [2009]. This is intended less as a critique of the study, with which my dissertation shares obvious motivation, as well as many design similarities. Rather, this dissertation can be seen as a natural extension of this line of research, and shows what a more detailed pursuit of the same research goal can discover.

In Yee et al. [2009] the relationship between avatars and performance is analyzed. Avatars are analyzed along two dimensions: attractiveness and height. This study operates under the assumption that attractiveness is associated with positive evaluation (as seen in Section 1.5.3), including self-esteem, performance, and work-place success (Judge and Cable 2004 as cited in Yee et al. 2009). With these stereotypes in mind, the authors hypothesize that when players in a virtual environment control avatars which possess qualities such as attractiveness, which is associated with performance, the players themselves will adopt these attributes into their non-virtual identities and thus perform better in the virtual environment. Here then avatar appearance is the independent variable, and performance is the dependent variable. Performance in this study is measured through the level of the virtual character in question. The level of the virtual character in this game environment is a steadily increasing number based on the amount of time the player has spent playing the character, rather than a marker of skill. Level determines a variety of aspects of a character, primarily effecting how much damage they do and which abilities they have access to.

Instead of gauging the individual attractiveness and height properties of each unique

avatar, which would have drastically reduced the amount of data the authors were able to collect, they used an avatar's fantasy race as a proxy. Set in a typical Tolkien-influenced fantasy setting, WoW has a number of fantasy races (elves, orcs, trolls) which a player can choose for their avatar.[1] While avatars have some customization options (hair styles, clothing) they are relatively limited, making each iteration of an avatar for each fantasy race immediately recognizable to players. The authors had a randomly generated avatar for each race/gender combination rated for attractiveness on a 7-point scale by 22 undergraduates. Each fantasy race has a pre-set and unalterable height, therefore height was measured for each race as well [Yee et al., 2009].

This study found that across 76,843 avatars, the Proteus effect generally seemed to hold (p. 298). Among both unattractive and attractive avatars, tall avatars had higher in-game levels. Among tall characters, attractive avatars had higher levels than unattractive ones. The only surprise finding of the study was that among short characters, unattractive avatars had higher levels than attractive avatars. The authors provide some discussion of possible explanations for this finding (p. 300). On the surface then, this study seems to confirm the hypothesis that players controlling tall and attractive avatars outperform players who control short and unattractive avatars. There are however, several issues with this study.

The first of these issues applies to this dissertation as well. It is impossible to control variables with large sets of naturally occurring data in the same way that small sets of laboratory data can be controlled. For instance, both this study and my dissertation are unable to account for player demographics. Nothing is known about the players who are controlling the avatars, but only the avatars themselves. Without such controlled information, causation is impossible to prove. For instance, the findings in Yee et al. [2009] could be attributed to high-performance players tending to choose tall and attractive avatars. While this in itself may be drawing from some of the same underlying psychological mechanisms

1. At the time of writing there are 20 playable races in World of Warcraft: Battle for Azeroth.

as the Proteus Effect (Behavioral confirmation [Snyder et al., 1977], self-perception theory [Bem, 1972]), there need not be any effect on player performance due to the attributes of the avatar, rather the performance distinctions are a pre-existing condition.

A problem more specific to this study is the underlying assumption that character level can be used as a stand-in for performance. The underlying design concept of WoW is that character level is first and foremost a function of time spent in the game. It is from this well-known feature of the game that players talk about the 'grind' of leveling up a character to the maximum level, the point at which many players believe skill or performance to be more of a factor, since all players are plateaued at the maximum level and are at more of a even playing field. Therefore it seems that character level is perhaps a better proxy for something like devotion, dedication, or simply time-commitment than it is of performance. This switch does not make the findings less interesting from a objective stand-point, the connection between a character's fantasy race and mean level has no apriori explanation, and thus demands further investigation. With the hypotheses from Yee et al. [2009] resting on previous research connecting attractiveness and height to performance no longer relevant, however, the findings require a re-evaluation of possible Proteus effects (or other effects) in order to account for the data.

1.5 Theoretical Background: Psychology

The exact psychological mechanisms that underlie the Proteus Effect are a matter of some debate. The original conception of the Proteus Effect put forward by Yee and Bailenson [2007] relied heavily on the idea of self-perception to explain the effect [Bem, 1972]. Subsequent researchers have proposed that priming [Peña et al., 2009], deindividuation [Zimbardo, 1969, Johnson and Downing, 1979, Reicher et al., 1995], and behavioral confirmation [Snyder et al., 1977], may also play a role in bringing about this effect. The present study follows the lead of Ratan and Dawson [2016] and Ratan and Sah [2015] in suggesting that all of these

listed sources may play a role in creating the Proteus Effect.

1.5.1 Self-Perception Theory

Originally proposed by Bem [1972], self-perception theory holds that actors view their own bodies and behaviors to determine how they feel about certain situations and scenarios. This reverses the common perception that our attitudes are a key motivating factor driving our actions. With regards to the Proteus Effect, it is suggested that when people control avatars they view their own digital bodies and take cues on their thoughts and feelings from their perceptions of these digital bodies. Thus in a study by Banakou et al. [2018], participants given an avatar resembling Albert Einstein view themselves as being intelligent based on the self-perception of themselves embodying the Einstein character.

1.5.2 Priming

As noted in Section 1.5, there is some debate about the exact psychological mechanisms underlying the Proteus Effect. While the original conception of the Proteus Effect [Yee and Bailenson, 2007] relied heavily on self-perception theory [Bem, 1972], subsequent work has suggested that priming plays a potentially critical role. Work by Peña and colleagues in particular has argued suggests an automaticity model of priming, with Peña [2011] going as far as suggesting that priming could potentially explain the Proteus Effect in its entirety [Peña et al., 2009, Peña, 2011, Peña and Blackburn, 2013]. The automaticity model itself claims that people associate concepts and contexts with particular behavioral patterns, such that exposure to a context can either activate or inhibit particular behavioral responses [Bargh, 2006].

Peña and Blackburn [2013] attempt to show the ability of virtual contexts to prime certain behaviors by conducting an experiment in which participants interact in contexts with different cultural associations. In this experiment, participants conduct conversations in

either a virtual cafe or a virtual library setting. The results of this study show that participants expectations of behavior changed based on virtual setting (less disclosure of personal information expected in the library setting), as well as behavioral differences (greater word counts in the cafe setting; p. 714-715).

Yee et al. [2009] provide a response to the claim of increased importance of priming by conducting an experiment designed to differentiate observations of external factors from observations of self. In this experiment, the level of embodiment that a participant feels with respect to their avatar has an effect on the amount of behavioral alteration seen, suggesting that not all stimuli function as equivalent sources of priming, but rather self-perception and embodiment retain some effect outside of what could be expected from priming alone.

1.5.3 Behavioral Confirmation

One possible explanation of how a user's avatar could affect their behavior is through *behavioral confirmation*. Originally proposed by Snyder et al. [1977], behavioral confirmation is the idea that the reactions of someone you are interacting with (the perceiver) affect your actions (the target). For instance, if someone treats you like you are in a leadership position, you begin to act more like a leader. You are gauging the actions of other people towards yourself in order to ascertain more information about how you are being perceived. You then change your behavior to fit how people are already treating you.

In Snyder et al.'s (1977) classic demonstration of this effect, a male participant is engaged in a conversation with a female participant via telephone. Before the conversation takes place, the male (perceiver) is shown a picture of a female (target) and told that the woman in the picture is the woman he will talk to. In one condition the man is shown a picture of an attractive female, in other the other condition they are shown a picture of an unattractive female. In all interactions the female target is blind to the study condition. Analysis of the phone conversations between the male and female participant show that in the condition

where the male is shown an attractive female, the female acts more friendly and likeable manner. That is, when the male perceiver treated the female as though she were attractive, the female target then begins to act in a way that is indexically associated with attractiveness.

In a virtual space inhabited by players controlling avatars, behavioral confirmation is expected to be in effect. In their original article on the Proteus Effect, Yee and Bailenson [2007] suggest that the effects of self-perception may be heightened in virtual spaces. The same may well be true for behavioral confirmation. The reasons for this hypothesis are two-fold. First, behavioral expectations are built up over a lifetime. That is, over time we become accustomed to how the people around us react to our non-virtual bodies. Given this accumulation of information, the individual impact of a single interaction is likely dulled in the face of an accumulated average reaction. This assumption, in association with the certainty that virtual world inhabitants have spent less time inhabiting their virtual avatars than they have their non-virtual bodies, results in the prediction that each individual interaction in the virtual world may be more prone to affecting the behavior of an individual in the virtual world than in the non-virtual world.

1.5.4 Deindividuation

A similar idea has been prevalent in Computer-Mediated Communication (CMC) literature in what have been called *Cues filtered out* theories by Walther [2011]. The basic idea behind many of these theories is that mediated channels of communication contain fewer social cues (body language, intonation etc...) than face-to-face communication. One possible result of this lack of cues is the strengthening of effects of the relatively few cues which remain. The Social Identity Model of Deindividuation (SIDE) uses such a line of reasoning to argue that group membership plays a more central role in CMC than in face-to-face communication [Lea and Spears, 1992, Reicher et al., 1995, Postmes and Baym, 2005]. It could be that in this way the effects of behavioral confirmation are also amplified in mediated communication.

Indeed, it is of note that in Snyder et al.'s (1977) original formulation of the behavioral confirmation affect, the testing was done using a form of mediated communication (over the telephone) in which non-virtual bodies were obstructed.

1.6 Theoretical Background: Sociolinguistics and Linguistic Anthropology

Coupled with the prior research on the Proteus Effect and its underlying psychological mechanisms, this dissertation adopts a sociolinguistic perspective. This perspective narrows the focus of the behavioral alterations which are a result of avatar characteristics to only those which have bearing on linguistic behavior. In addition I make use of many of the sociolinguistic and linguistic anthropological findings of the past twenty years, concepts of indexicality (Section 1.6.1) and identity construction (Section 1.6.2) being chief among them.

1.6.1 Indexicality and Indexical Order

Drawing from Peircean semiotics, linguistic anthropology and sociolinguistics rely on the notion of an index, a symbol that has the power to index or become associated with conventionalized meanings [Peirce, 1982]. The focus here, and indeed much sociolinguistics research, is on non-referential indexicality, in which signs point to socially created meaning such as group membership, rather than contributing to the semantic content of a proposition (though a single sign can index both referential and non-referential meanings simultaneously; Peirce 1982). In this way the apical realization of a final ING cluster in English (such as in the word [faɪndɪn]/ 'finding') can be used as a linguistic resource to index the speaker as Southern (within the context of the United States; Campbell-Kibler 2007). Countless studies have solidified the use of linguistic variables to index group membership as a mainstay of modern sociolinguistic research. Labov's studies showing the use of centralized diphthongs on

Martha's Vineyard to index islander status, or the correlation between r-fullness/r-lessness and social class in New York department stores are two classic studies in this vein of research [Labov, 1963, 1966].

Indexicality does much more social work in discourse than simple identification of group membership, however. More recent scholarship, first in linguistic anthropology, and subsequently in sociolinguistics has looked at more nuanced, more locally constructed patterns of indexicality in which linguistic resources are used not to directly signal group membership, but rather to invoke or index particular properties associated with the group. This pattern of associations is formalized as indexical order by Silverstein [2003]. First order indexicals are often those that point to group membership. Thus a group of white suburban males may make use of negative concord as a linguistic resource, which is most typically associated with African American Vernacular English (AAVE) and African American communities. The connection between negative concord and the African American community is then a first order indexical. Such groups of white suburban males are not attempting to index themselves as members of the African American community, however. Rather, groups get decomposed into the stereotypical attributes associated with them, making these stereotypical attributes available for reference. In this hypothetical situation, the group of suburban white males may be using negative concord in order to index themselves with a property such as street smarts, or male toughness, both attributes stereotypically associated with African American communities. This usage typifies a 2nd order indexical [Eckert, 2008, 2012].

With the notion of indexical order in mind we gain a clearer understanding of the way in which meaning is constructed and perceived in psychological studies like the one performed by Snyder et al. (1977; Section 1.5.3). In this scenario the perceiver collects some information, in the form of a photograph, about a possible social categorization of the target (i.e. as attractive). He selects linguistic resources which are felt to be appropriate when dealing with people of this social group. The female target in turn is sensitive to these linguistic

variables, and comes to understand that she is being perceived as attractive. Some part of this perception of beauty must then be internalized by the target, which is the crux of behavioral confirmation. Once this transformation is accomplished, the target selects linguistic resources for use which index physical beauty.

Shared Background and Indexicality

Indexical relationships rely on, and are mediated by, cultural knowledge. For instance, with regards to the indexical relationship between attractiveness and self-disclosure (Snyder et al. [1977]; discussed in more detail in Section 1.5.3), the social moves navigated through the language of the target female require that she a) recognize that she is being treated like an attractive person and b) know how attractive people typically act, such that she can recreate this pattern of behavior. In order for such a performance to succeed, it requires that both parties share the cultural knowledge and background about what it means to act like an attractive person. If the study were conducted with participants of a different cultural background, we would still expect a behavioral change, but the direction of the change could be entirely different. This demonstrates the local and contextualized nature of indexical meaning, as remarked by [Eckert, 2012, p. 458]. Far from being static connections, the indexical field, which is comprised of the various indexical meanings associated with a particular linguistic resource, changes as a result of the group, time, and place in question.

The effects of indexicality and shared background can also be found in the Proteus effect study conducted by Yee and Bailenson [2007]. In this study participants who were given an avatar dressed in blacks robes behaved more aggressively than participants given avatars in white robes. There is nothing inherent about the color black that is more or less aggressive than any other color. Aggression is not a property that colors have, but rather a property that we associate with colors. This then is the crucial step, the psychological effects discussed in this chapter depend on complex indexical fields which are rooted in cultural knowledge.

This context sensitivity is a major motivator in the present studies use of communities in context, rather than in a laboratory setting (see Section 1.2.3).

1.6.2 Identity Construction: Third Wave Sociolinguistics

This project is interested in multiple facets of the linguistic contribution to online community formation. On an individual level, I look at questions such as how members of this community are using language to position themselves in certain roles within the community (veteran vs. initiate, skilled vs. unskilled) and how they use language either explicitly or implicitly to reflect the speech styles which have been created around in-game groups and characters. At a community level this project looks at how and why speech varieties are co-created by the members of online communities. What existing linguistic resources are being drawn on, re-purposed and innovated in order to create these community-specific styles, and how to these styles compare to their offline counterparts? Both of these question are variations of a central question which is how speech styles develop in online communities and how these speech styles are used to index group membership by the individual community members.

The focus of this project on speech styles, and how specific linguistic resources are used to construct complex, multi-faceted identities, follows the recent trend of sociolinguistics often referred to as 'third wave' sociolinguistics. Pioneered by Eckert [2000, 2003, 2005], this framework for sociolinguistics takes linguistic variables to be tools, whose indexical properties can be utilized by speakers to create an identity for themselves. This is distinct from 'first wave' sociolinguistics, which is primarily focused on the distribution of linguistic variables amongst broad pre-existing groups (often race or socio-economic class). A classic example of such a first-wave sociolinguistic study is Labov's study of the pronunciation of [ɹ] in New York department stores. In this study presence or absence of the [ɹ] is correlated with socio-economic class, as demonstrated by the status of the department store in which the forms were elicited [Labov, 1966]. Such studies are important to the historic trajectory of

the field of sociolinguistics. In addition, they have current uses, often when using large-scale corpora where observation of subtle uses of linguistic variables are not possible.

1.7 Avatars and Identity

A common mechanic in video games is to have a specific virtual object, typically a three-dimensional representation of a character, that an individual player controls. It is through the mediation of this virtual object/character that players take action and have effects on virtual worlds. These virtual representations are called avatars. In his book on the relationship between players and avatars in RPG video games, *My Avatar, My Self: Identity in Video Role-Playing Games* (2009), Waggoner relies on a distinction between avatars and agents. The dichotomy is borrowed from Goldberg [1998], though Waggoner uses the definition of avatar provided by Laetitia Wilson to make the distinction between avatars and agents less ambiguous.

> "[An avatar is] a virtual, surrogate self that acts as a stand in for our real-space selves, that represents the user. The cyberspace avatar functions as a locus that is multifarious and polymorphous, displaced from the facticity of our real-space selves.... Avatar spaces indisputably involve choice into the creation of one's avatar; there is substantial scope in which to exercise choice and create meaning [within the video game]"(Wilson 2003 cited in Waggoner 2009, p. 9).

Crucial to Wilson's definition of an avatar is the ability of the player to mold and shape the avatar, both in terms of appearance and action. This distinguishes avatars from protagonists often seen in single-player games which often have the player control characters which have pre-defined appearances and mentalities (such as the Witcher, or Tomb Raider series; Wilson 2003).

This study looks at two different forms of virtual representations: three-dimensional

Figure 1.2: The in-game three dimensional model for the character Lion

characters models which are controlled by players in the game Dota 2 (such as the hero shown in Figure 1.2), and two-dimensional portraits of these same characters which are selected as profile pictures on a Dota 2 community forum (examples shown in Figure 1.3).

According to this definition the virtual representations found in Dota 2 exist somewhere on the border between avatars and agents. The appearances of the virtual representation in Dota 2 can be altered through the application of cosmetic items, but the range of variation in appearances is quite low, with the explicit intent of keeping characters immediately recognizable across games. An example of the differences these cosmetic items can make is demonstrated in the two different appearances of the hero Pudge given in Figure 1.4 and Figure 1.5. Figure 1.4 shows the default model for the character, while Figure 1.5 shows the hero model with some player selected cosmetic items.

The actions of the virtual representation are controllable by the player in the game, but the style or persona (see Section 1.7.3), is unaffected by player actions, instead being conveyed through appearance and a small number of recorded voice lines. Due to the lack of customization options, and the less direct link between the human controller and the virtual representation, the two-dimensional flairs of reddit would likely not qualify as avatars.

The differences between the two types of virtual representations are discussed in Chapter 3 (in-game representations) and Chapter 4 (reddit flair). Instead of differentiating between

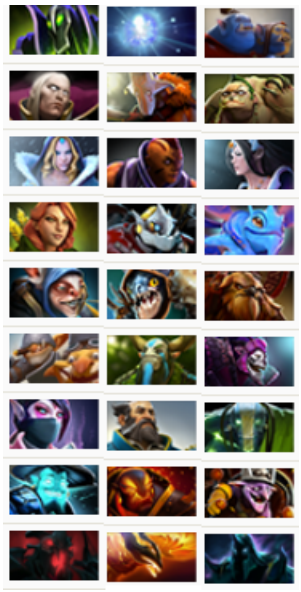

Figure 1.3: The 27 most common flair pictures on reddit.com/dota2

Figure 1.4: The default character model for Pudge

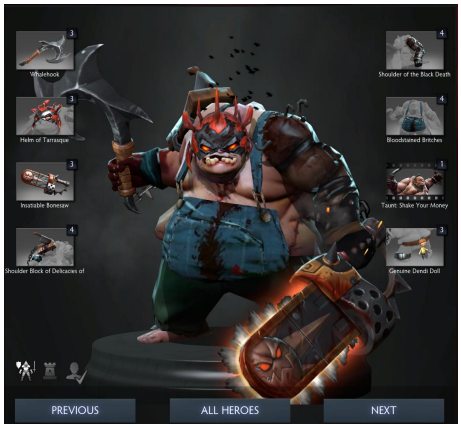

Figure 1.5: Pudge with some cosmetic items applied

avatars and agents, we instead adopt Harrell's (2010) perspective on avatars. Harrell specifically includes forum profile pictures in his definition of avatars: "Avatars, in their simplest form, are often nothing more than graphical images, such as jpeg files, that are presented next to user names." [Harrell, 2010]. Thus in the remainder of this dissertation both in-game models and reddit flair will be referred to as avatars.

1.7.1 Avatars, Heroes, and Characters

Three terms, *avatar*, *hero*, and *character* are variously used to describe the virtual representations controllable by players in the game Dota 2. While these three terms have a degree of overlap, there are distinctions between them. I will refer to an *avatar* when focusing on the aspects of the digital graphical representation. Alternatively, I refer to *character* when the focus is instead on social aspects such as persona and community perception. The term *hero* is a more emic term, used by the community itself. I use this term more wholistically to refer to the combination of an avatar and character.

1.7.2 Identity

In his book *What games have to teach us about learning and literacy*, Gee makes a three way distinction when considering identity in virtual environments. The three categories are real-world identity, virtual world identity, and projective identity. Real-world (or non-virtual) identity is likely the most intuitive of the three concepts, as it mirrors our understanding of our personal identities as individuals in the non-virtual world. Virtual world identities are the identities assigned to virtual objects or individuals [Gee, 2003]. As discussed in Section 1.7, virtual characters are often imbued with personalities, traits, beliefs, and styles which all contribute to their identity. Virtual characters like the gruff father Kratos in God of War, or the witty and humorous villain Handsome Jack from Borderlands 2, can be memorable characters which catch the public imagination. The most innovative of Gee's three identity

constructs is the projective identity, which crucially draws on the other two concepts of identity. Projective identity is the identity which arises out of a person, their own non-virtual identity, controlling an avatar, with its own virtual identity. It is this combination which Gee calls projective identity.

A key aspect of this projective identity is that it is something unique, it is neither the virtual identity, nor the non-virtual identity, though it often draws from aspects of both. The distinction and relationship between the projective identity and the other two identity constructs is variable depending on context. To illustrate this point, we will briefly consider three different virtual environments, each of which lead to a different variety of projective identity

Projective Identity as an Extension of Real World Identity

There are some virtual environments where a person is asked to essentially be themselves. While video games rarely use this mechanic, it is the most frequent form of projective identity seen outside the gaming world. Business meetings which take place in virtual spaces, whether they are chat rooms with two dimensional avatars, or more elaborate virtual spaces like those which can be created in platforms like Second Life [Boellstorff, 2008, Peña and Blackburn, 2013], the user is asked to project their non-virtual identity into a virtual environment, and often a virtual body. While at the outset such scenarios may seem to be exactly that, non-virtual identities displaced into a virtual space, it is naive to think that the virtual environment has no effect on the identity construct of the participant. Aspects of behavior, style, and even cognitive processes may be altered by the virtual surroundings.

Studies like those conducted by Peña et al. [2009] show exactly these types of effects. Participants in this study were not asked to play a role, or alter their non-virtual identities in any way. Despite this, statistically significant differences in their behavior, here linguistic behavior, were found based on the context of their virtual bodies, or avatars. Here we see

evidence of Gee's projective identity. The identity of the three dimensional models in this experiment, underspecified though they were, alter the non-virtual identity of the user to create a hybrid [Gee, 2003].

1.7.3 Assigning Personae to Avatars

Through the psychological processes described in Section 1.5, and the processes of indexicality and indexical order (described in Section 1.6.1, the Dota 2 community co-constructs virtual identities not only for themselves, but also for the characters/avatar pairings in the game. These personae which are attributed to the avatars are linked through the same processes of indexicality and indexical order. Thus, in just the same way as people can leverage linguistic variation to index themselves as a certain type of person (attractive, intelligent, kind), members of the Dota 2 community can use the styles and symbols of the avatars personae to tap into the indexical field of a particular in-game character.

The existence of these avatar personae alongside the non-virtual identities of the players leads to the creation of combined player-avatar identities, which are projected into the virtual space when players control or inhabit certain avatars [Gee, 2003]. These combination identities take pieces of each of the contributing identities, both player and avatar, and create something unique, not quite player, and not quite the character. Players themselves often remark on this state of fused identities while playing games, saying with regards to the actions of their avatar 'that wasn't me! That was *insert character name*', or 'that was me-while-playing-character'. While the notion of responsibility for the actions of player-character identities is not within the scope of this dissertation, and indeed rarely is raised with regards to the relatively harmless actions of virtual avatars, players have correctly identified in these situations that they are not entirely themselves when controlling a virtual avatar.

1.8 Structure of the Dissertation

The remainder of this dissertation proceeds as follows. Chapter 2 provides additional information about the Dota 2 community being analyzed, and discusses the corpora themselves in terms of quantity and quality. Additionally, some time is spent orienting the reader to the types of communication present in the corpora, with particular focus on some of the defining linguistic features of the community. The overall goal of this chapter is to give the reader some idea of the context in which this study is placed. Chapter 3 turns to discussion of the Proteus Effect in the in-game corpus, looking at both quantitative and qualitative measurements of avatar characteristics affecting the player's linguistic behavior. Chapter 4 largely follows a structure parallel to that found in Chapter 3, with the exception that Chapter 4 focuses instead on the effects of two-dimensional pictures associated with users in the forum corpus, and how these virtual representations are used as a stylistic resource. Chapter 5 provides a summary of the overall findings from the previous chapters, and discusses their place and importance within the existing set of Proteus Effect research. Chapter 5 also addresses the limitations of the present study, as well as future plans for extending the present research.

CHAPTER 2

BACKGROUND & METHODS

2.1 Introduction

With the primary research questions and theoretical framework being set in Chapter 1, this chapter complements the first by providing a brief background on the game Dota 2 and the community that surrounds it (Section 2.2), information about the two corpora created for this project (Section 2.5), and the use of language in the Dota 2 community (Section 2.7). The chapter is intended to ground the reader in the necessary context to be able to interpret the findings with regards to the Proteus Effect in the two corpora (Chapter 3 and Chapter 4).

2.2 Dota 2: The Game Basics

Dota 2 is a massively popular multiplayer online battle arena (MOBA) video game published by Valve in 2013. Each game is comprised of two teams composed of five players. Each team controls one half of the map, which is separated by a river down the middle. The half controlled by the dire team is barren and uses a black and red color scheme, while the side controlled by the radiant team is lush and green. Other than being visually distinctive, the two sides have no functional difference as the map is roughly symmetrical.

At the beginning of the game each player chooses a hero to control out of 115 hero options. Each hero has a unique set of skills, strengths and weaknesses, as well as its own unique character model. Heroes are roughly divided up into classes, discussed more in Section 2.2.1. A balanced team has players selecting heroes from each role. A player selecting a certain hero from the roster makes it unavailable to the other players; two players may not control the same hero. The two halves of the map are connected by three pathways, called lanes. Throughout the course of the game, non-player characters (NPCs), called *creep*, walk down

Figure 2.1: Dota 2 Map with labeled pathways

each of the three lanes where they meet and fight the enemy creep. The creep of each team are evenly matched and thus would be balanced if not for the intervention of the players. The goal of the game is to cooperate in order to kill the heroes on the enemy team, shift the balance of the creep fighting in the middle of the map, and ultimately destroy the enemy base.

An average game of Dota 2 lasts between 25-50 minutes, though there is no true upper bound to the game length since without intervention, the NPC creeps will eternally clash in the middle of the map. The two teams of players are formed through one of two methods. Before the game starts, players can form groups of up to five players, typically friends or acquaintances, these groups will enter the game together on the same team. Players can also search for a game without a full group of five players, in which case they will be matched with other players of a similar level of experience and skill by an automatic matchmaking algorithm.

2.2.1 Hero Roles

In the game DOTA 2, each hero is designed to fulfill different functional roles. Some heroes, for example, are able to sustain large amounts of damage without dying, making them useful for protecting more fragile heroes. These heroes, typically referred to as *tanks* in most video game communities, are given the tag *durable*. Each hero in the game fills one or more roles, denoted in the in-game selection screen by hero tags. To avoid subjective hero categorization, only the tags given to the heroes by the game itself are used here in the analysis.

While some tags are mutually exclusive within a single game of DOTA 2 (the tags *carry* and *support* are seen as two different roles with any given hero optionally fulfilling one of these roles, but never both), it is possible that from one game to the next a certain hero might be able to fulfill both roles. The hero Skeleton King, for example, can either be played as a carry or a support depending on the player's preferred play-style. Thus none of the role tags assigned to heroes are mutually exclusive. The number of tags assigned to a hero varies from one (Zeus) to 6 (Naga Siren, Dragon Knight). A list of each of the tags, along with a short description, and a list of the heroes with that tag is given in Table 2.1. As can be seen in this table, tags are not evenly distributed among the hero pool, with 82 disablers and only 15 junglers.

Table 2.1: Hero Tags

Tag	No. of heroes	Role
Carry	62	deals damage
Disabler	82	disrupts enemies
Durable	45	absorbs damage
Escape	44	difficult to kill
Jungler	15	kills NPC enemies
Initiator	51	initiates team fights
Nuker	81	deals damage quickly
Pusher	29	destroys buildings
Support	39	heals and aids others

Though these hero roles are functional in nature, with their skills and statistics pro-

grammed directly into the game, a major factor in the way a game of Dota 2 is played out is determined by the communities expectations. These expectations include a large amount of expected in-game actions and activities. Beyond these functional expectations, the Dota 2 community has developed shared cultural expectations of the attitudes and personae of these hero roles. The effect of these social expectations and the influence it has on player behavior forms one of the primary questions of Chapter 3.

2.3 Why Study Dota 2

The Dota 2 community was selected for study for numerous reasons, including the author's prior community membership, ease of data collection/processing, and the fact that the set-up of the game conditions mirrors key aspects of a laboratory study.

Though it was not a factor in the selection of Dota 2 as a research object, the novelty of the object itself provides for an opportunity to discuss closely the linguistic habits of a particular video game community, and the role these habits play in the social interactions of the community. To date there is a dearth of linguistic research which takes video game media and the communities which form around them as a serious research object, though this is beginning to change ([Hutchinson, 2013, Boellstorff, 2008, Klimmt and Hartmann, 2008, Milik, 2017]. With the increased prevalence of the video game industry in our lives, and our increased reliance on virtual communities, studies like this one, which look at the functions and processes of computer mediated communication and computer mediated society, are all the more important.

2.3.1 Community Knowledge

The initial idea for this study came about as a result of my pre-existing membership in the community. For the past several years I have been active member of the Dota 2 community, having logged over 1,000 hours of in-game time. In addition to bringing about the original

conception, this active membership also allows me to make more informed decisions on the course of the specific research questions pursued, and gives me insight into the priorities and concerns of the community I am studying. This allows me as a researcher to maintain both an emic and etic perspective, at times focusing on more objective questions, such as the effects of avatar selection on player behavior, while at the same time being able to bring insider knowledge to bear on more sociolinguistic questions, such as how language is used to construct identity in the game, a question which prioritizes the player experience.

The importance of this dual role aligns with admonitions for researchers, particularly those attempting any sort of descriptive account of a community of practice, to be a part of the group that they are studying. The benefits of such participant observation have long been noted within the field of Anthropology. As Constance Steinkuhler, an avid video game researcher and player explains,

> "The one piece of advice I would give people: If you're going to study these games, you damn well better be playing them" (Constance Steinkuhler, interviewed in [McKee and Porter, 2009, p. 20]

Susan Herring, coming from a tradition of Computer-mediated Communication (CMC), extends these same sentiments to research which takes any virtual community as the object of study.

> "Ideally, in any analysis of virtual community, textual analysis would be supplemented by ongoing participant observation." [Herring, 2004, p. 352]

The benefits of participant observation serve a variety of functions. As mentioned, membership in the community being studied gives you a perspective on the research question and materials that cannot be gained any other way. This perspective allows the researcher to better situate the data in context. Context maintenance in turn is responsible for increased insight and the realistic generalizability of data. The people, the place, and the time are

all crucial for the appropriate meaning to be conveyed by the speech act. A concrete consequence of the inherent context-sensitivity which is relevant to the present study is that findings based on language data which do not maintain context cannot be generalized. The findings of this study apply directly only to the context in which they were found, namely, the Dota 2 community. Only when we understand this context can be begin to hypothesize about which other situations the findings might apply to, other video game communities, for instance, or other virtual communities more generally still.

Of course, the perspective of any single member of the community should never be mistaken for the perspective of every member of the community, a fact which must be kept in mind when conducting research in a community one is familiar with. Any mistakes in community perception here are squarely my own.

Unlike much of the traditional participant observation research, this study focuses less directly on my personal observations made in game, and more on a large corpora of collected texts. There are, of course, both advantages and disadvantages to studies which focus more on corpora than interviews and observation. The advantage of this approach is the simplification in separating my dual roles as a player and researcher in the community. Playing the game helps me to be in touch with the actual user experience aspect of Dota 2, informs my intuitions about linguistic behavior, and guides my understanding of the communities priorities, but my personal interaction with the game does not directly affect the data under inspection. In addition, using large corpora comes with all the benefits linguists have come to expect, including wide data coverage and robust statistical findings.

The disadvantage of this approach to internet gaming research is that some of the more subtle layers of meaning and contextualization are lost when the researcher is not present in the moment the actions are happening. With the in-game corpus I am able to simulate some of this in-the-moment perspective by re-watching replays of individual games to be a better understanding of the context. While this method successfully allows me to observe events in

simulated real-time, I nonetheless am restricted to observing rather than participating, and thus there is some inherent loss of context.

2.3.2 Accessibility

One advantage of studying virtual communities, is that there is frequently a large body of publicly available, digitized material to work with. These data often take the form of a online forum, message board, website, or other community gathering place. Scraping data from such sources, either manually or through an API, is usually low in both effort and cost for the size of the resulting corpus. The Dota 2 community is no exception. Data from the popular discussion forum website Reddit[1] has proven to be an invaluable resource. The immense traffic, explicit dedication to the community in question, and pre-digitized format made this an ideal source of data in our virtual community investigation.

The in-game data too, is an excellent source of an incredible amount of publicly available linguistic behavior. While most online forum websites are publicly available, this is not the case for all online games. Dota 2 has the distinct advantage here of having publicly accessible data from each game that is played, making it an easier target as an object of study. While not all communities, virtual and non-virtual, can be studied by using such resources, when they are available they provide a low-cost high yield source of invaluable information.

The pre-digitized formatting of the data in both the forum and in-game setting also decreases the cost of the project. This saves valuable time that would otherwise have to be spent transcribing spoken language data. Instead the pre-digitized format allows for relatively straightforward data analysis without the intermediate step of transcribing. The elimination of the transcribing stage also reduces the chance for the introduction of human error in the process.

1. www.reddit.com

2.3.3 Laboratory-like Environment

One of the most appealing aspects of dealing with data from Dota 2 is that a typical game of Dota 2 is set up a lot like an laboratory experiment. Ten participants, formed into two teams are asked to complete a task which requires communication and cooperation. Each instance of the game lasts between 20-60 minutes and is recorded in full. The exact same set-up, using the same task, characters, and map, is repeated many times a day. All of these features lend themselves towards some level of experimental control when using the data for research.

Of course, it is important to remember that games of Dota 2 are not designed by researchers, but instead occur naturally. On one hand this increases the desirability of the data, making it more broadly generalizable than laboratory collected data. On the other hand, however, it does mean that full control and design manipulation are unavailable. We know nothing about the demographics of the players themselves, nor is the hero selection process controlled (see Section 1.2 for more on the benefits/drawbacks of a naturally occurring data set).

2.4 Virtual Community

There has been active debate over the past thirty years as to how the term *community* applies to online virtual groups, and even if the term can be appropriately applied at all. This concern over the application of *community* has at least two different sources. The first source of concern is that in giving virtual groups the status of the term *community*, the population will settle for only partaking in a more easily accessible virtual community, rather than seeking more traditional forms of face-to-face community. Many authors would see this as a loss, and stress the benefits of face-to-face community over exclusively online groups [Lockard, 1997]. Such claims often stress the ephemeral nature of group membership, arguing that group membership should mean more than clicking the subscribe button on a

web page. This ease of navigation among communities could mean that members have no incentive to remain part of the group during times of difficulty, and can simply log off when faced with uncomfortable conversations or circumstance. These qualities, seen as inherent to online groups, preclude the more foundational benefits of traditional communities.

This viewpoint operates under the assumption (or fear) that virtual communities will supplant traditional face-to-face communities. While internet use has steadily been on the rise since its inception, there is little evidence to suggest the replacement of face-to-face communities. Rather, these online communities can be seen as additive, with Baym [1998] suggesting that participation in online groups is more likely to replace more solitary activities, such as watching television. Regardless of the accuracy of these claims of virtual communities supplanting traditional communities, the heart of this argument ultimately lies in evaluating the merit of online activities and the communities which form around them, and whether they should thus be supported or opposed. Though such questions are perhaps interesting, and certainly of import, this paper does not engage with online communities in this way. Rather, a descriptive approach is taken here, focusing more on taking the existence of these activities and the groups around them as given, putting more emphasis on what is, rather than what should be.

The second source of concern for the application of the term *community* to online groups is more academic, and perhaps more subtle. This viewpoint, expressed by Herring [2004] is that term *community* gets applied without discretion to every online group. Herring concludes that such uses strip the term *community* of any substantial meaning, decreasing its descriptional power for use in academics. In contrast to this, Herring argues that we should be more conservative with our application of the term, limiting it to groups which are more deserving of the status, perhaps meeting some threshold of characteristics based on face-to-face community characteristics. As Herring, among other authors notes, however, community is a notoriously difficult concept to define.

> "Community is a term which seems readily definable to the general public but is infinitely complex and amorphous in academic discourse. It has descriptive, normative, and ideological connotations... [and] encompasses both material and symbolic dimensions" [Fernback, 1997, p. 39]

As a first attempt, Herring [2004] outlines five featural categories of communities: structure, meaning, interaction, social behavior, and participation. Further descriptions of these categories are reproduced in Table 2.2.

Table 2.2: Features of Community [Herring, 2004]

structure	jargon, references to group, in-group/out-group language
meaning	exchange of knowledge, negotiation of meaning (speech acts)
interaction	reciprocity, extended threads, core participants
social behavior	solidarity, conflict management, norms of appropriateness
participation	frequent, regular, self-sustaining activity over time

Each of these characteristics is discussed at various points throughout this dissertation as it becomes relevant.

A different perspective on the question of community in online groups has been taken up by Baym [1998], who indirectly furthers Anderson's (1983) claims that all non-traditional communities are imagined. Rather than disparaging these imagined communities, these authors instead take as the object of their research the consequences of these imaginings. This shifts the question from one of definitional criteria, like those shown in Table 2.2, and instead focuses on the effects of the perception of community in online groups. The research presented in this dissertation shares this perspective, and is not interested in using the term *community* as a rigorous term which includes some online groups and excludes others, but rather as a description of the perceptions of the members of the group, and the indisputably real consequences of this perception. This perspective is aligned with Herring's (2004) reminder of the importance of the participant's views when discussing communities (p. 22).

2.4.1 Dota 2 as a Community of Practice

The question of whether virtual groups should be considered communities generally takes all available aspects of the group into consideration. While this is both intuitive and reasonable, this paper is ultimately a linguistic work, and thus we may also question to what extent virtual groups compose communities based more specifically on their speech habits. In this Gumperz provides a definition of a speech community:

> "We therefore choose as our universe of analysis a speech community: any human aggregate characterized by regular and frequent interaction over a significant span of time and set off from other such aggregates by differences in the frequency of interaction." [Gumperz, 1964, p. 137]

This definition of community is relatively relaxed in terms of definitional criteria, but maintains the fundamental intuition that a community is a group of individuals who interact over a significant period of time. It is important to note that although this definition is specifically for a speech community, the criteria make no reference directly to speech habits or linguistic traits of the group, relying instead of the principle that frequent interaction will ultimately result in these shared linguistic traits.

The concept of a speech community has been critiqued by Eckert and McConnell-Ginet [1999] on several grounds. These include the concept of a speech community as overly prioritizing language as a binding factor, its view of identity as a static property, and a bias towards etic instead of emic perspectives. As an alternative to the speech communities, Eckert and McConnell-Ginet prefer the Community of Practice (CofP; Lave and Wenger 1991, Wenger 1998, Eckert and McConnell-Ginet 1999). A Community of Practice is:

> "an aggregate of people who, united by a common enterprise, develop and share ways of doing things, ways of talking, beliefs, and values- in short, practices." [Eckert and McConnell-Ginet, 1999, p. 186].

This definition of Community of Practice fits the current project well. With respect to the Dota 2 community, the common enterprise is the engagement with the game Dota 2, most often through directly playing the game itself (though spectating the game itself may count as well). The practices developed by this community, particularly the linguistic practices their interactions with virtual avatars, form the primary subject material for this dissertation.

2.4.2 Real vs. Virtual

When discussing CMC and particularly online phenomena, comparisons between the digital or virtual world and the offline or 'real' world are inevitable, and indeed are often necessary. When discussing these comparisons I use the term *virtual* to refer to the online, digital realm, and *non-virtual* or face-to-face to refer to more traditional means of communication and community. This decision is made not only for consistency and clarity's sake, but is also part of a perspective which attempts to not place the non-virtual world in a more privileged place than the virtual.

Terms like *real*, which often get used to describe more traditional face-to-face interactions, carry with them strong connotations that anything that is not face-to-face is fake, or at best somehow less real. This perspective is unsurprising given the relatively recent emergence of computing in our society, and the even more recent development of online communities. It is important to realize that use of the term *real*, even without explicit mention of online interactions and communities as fake, such as use of the dichotomy *real vs virtual* is at its root pejorative, and thus has no place in academic discourse.

2.4.3 Anonymity in the Dota 2 Community

A common feature in the discussion of virtual vs. non-virtual communities is the perceived anonymity available within virtual communities. The assumption of anonymity, however,

can be problematic when overgeneralized as an inherent property of virtual communities. One major source of overgeneralization is the assumption that the use of a username alone is enough to establish anonymity. This simplistic viewpoint overlooks the fact that usernames are exactly what makes users identifiable in a virtual group. Even in communities such as the Dota 2 community, where users are free to change usernames freely, members of this virtual community are disincentivized to change usernames exactly so that they avoid such anonymity. Rather, members of this and many other online communities participate in the community through the identity associated with them through a username. Through such methods members garner a reputation and form friendships all of which are attached the use of a particular username.

The loss of a username, whether through a user opting to change their own username, or through the violation of Valve's naming conventions, means the loss of an identity and the accrued associations and relationships. It is this pressure to maintain a steady identity within the community which acts as a heavy counterbalance to the much higher degree of anonymity possible through constant changing of usernames. It is in relation to this social pressure that we find more bias against virtual communities. One of the reasons for correlating usernames to anonymity is the assumption that usernames do not carry value, and thus can be discarded or changed without any loss of value. Such decisions of value can never be made a priori; rather, that the value of objects is determined by the perspectives of the community members.

2.4.4 The Dota 2 Community's Relationship to Larger Contexts

With any community, the players do not exist exclusively in the context of Dota 2. Thus, the Dota 2 community itself is connected and integrated into larger and larger communities (the PC gaming community, the gaming community), as well as voluntary participation in smaller groups yet (/r/DOTA2, twitch.tv). These connections are natural, and come about

through the shared and varied interests of its players.

This positioning of the DOTA 2 community in a web of both larger and smaller groups, has significant bearing on the linguistic analysis of the community. The practical consequence of this positioning is that some of the terms which at first seem specific to the Dota 2 community might not necessarily be unique to this context. The words *gg* (good game) and *wp* (well played), for example, are common throughout a large number of gaming communities, and have arguably become a part of a larger set of 'gamer terms'. Despite this overlap in shared linguistic terms, the indexical meanings of these shared words picks up unique nuances in each gaming community, thus for the purposes of this dissertation the terms are discussed with focus on the meaning inside the Dota 2 community, rather than addressing the terms larger cultural range.

2.5 The Data

The data for this dissertation comes in the form of two separate corpora. The first corpus comprises data taken from 153,615 games of Dota 2 that were played on the North American servers (NA East and NA West). The second corpus contains 117,091 comments that were posted in www.reddit.com/r/dota2, a popular forum site dedicated to all things concerning the game Dota 2.

2.5.1 The In-game Corpus

The in-game corpus comprises the information from 153,615 games of Dota 2. Games were downloaded as full replay files using the OpenDota API (https://docs.opendota.com/), and then parsed for linguistic and relevant contextual data using a simple python script. Games were taken from different times of the day, pinging the servers for the most recent games available in an attempt to prevent a bias based on time the game was played. Only games from the two United States-based servers (US East and US West) were used for this project.

Table 2.3: In-game Corpus Stats

Total Games	153,615
Total Messages	3,412,627
Total Words	7,666,725
Mean Words per Message	2.25
Mean Messages per Game	22.22

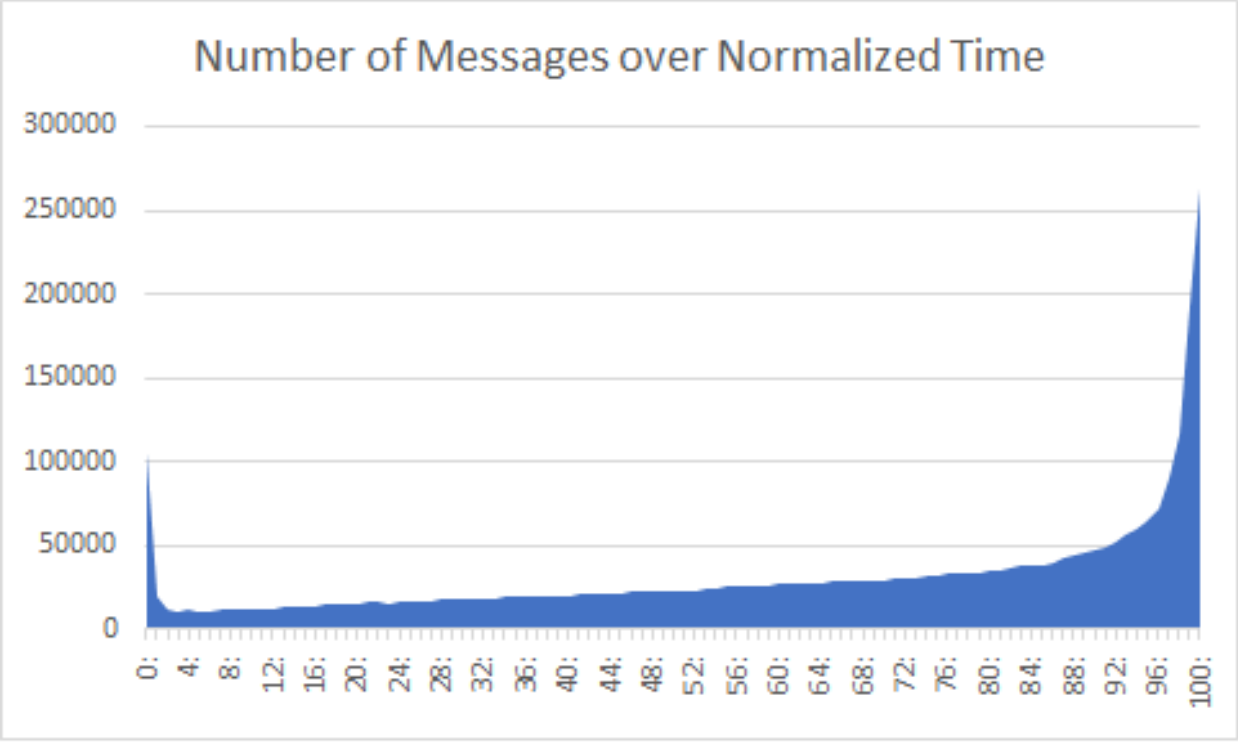

Figure 2.2: Chat Distribution over time: Time given by percentage of total game time

Chat activity over the duration of the game is not consistent, but rather shows two spikes of activity. Figure 2.2 shows the message activity over normalized time. The first peak of activity is right at the beginning of the game. This period of the game is the introduction period, where players greet each other, typically with one or more of a set of standardized greetings: *gl* (good luck), *hf* (have fun), *gg* (good game). In addition, the beginning of the game is a low stress and low activity part of the game. This reduction in demands from a gameplay standpoint frees up resources which can then be allocated to chatting, resulting in increased message counts in the earlier portion of the game.

After this initial spike of messaging activity, talking diminishes sharply, and then proceeds to increase over the duration of the game, with a dramatic rise during the last ten percent of game time. Similar to the beginning of the game, a large portion of these chats take the form of standardized phrases, typically *gg*, or *wp*. Additionally, taunting of the losing team by the winning team is common during this portion of the game, as the outcome has typically already been decided. The most common taunt is *ez* (easy), implying that the speaker's opponents were not skilled enough to make the game difficult for them. As with the spike at the beginning of the game, the end of the game is often a time of low activity as well, with one team clearly on route to a victory.

Available Chat Channels

Within the game Dota 2 there are two options for sending messages. Messages can either be sent to only players on your team (team-chat) or to players from both teams (all-chat). Data for the in-game corpus is taken exclusively from the all-chat channel. While looking at the all-chat messages, and comparing the messages sent via this channel to the all-chat channel would certainly be interesting, data collection from the all-chat channel in any sizable quantity is not possible, as only all-chat messages are encoded into the replay files from which the in-game corpus is built.

While collecting data from the team-chat channel is not feasible for this project, the availability of such a channel has an influence on both the quantity and quality of messages sent via the all-chat channel. The vast majority of team planning and strategy, for example, is sent exclusively through the team-chat channel, so as to keep it secret from the opposing team. The all-chat channel is thus comprised of primarily between team banter (friendly or otherwise), and general commentary on the state of the game. The vast majority of the messages sent in this channel falls into one of four categories, examples of which can be found in (1) and (2): 1) formulaic pleasantries exchanged at the beginning and end of the game

(Example 1, Lines 8-14) 2) emotive outbursts (either positive or negative) corresponding to in-game events (Example 1, Lines 1-2), 3) commentary on the play of one or more characters (Example 1, Lines 3-10), or 4) meta-game analysis/commentary, typically about the relative strength of heroes/items/strategies (Example 2).

(1) 1 Skywrath Mage: sheeeeeeeeit

2 Shadow Demon: got EMMMMM

3 Tinker: ez

4 Tinker: ez

5 Skywrath Mage: LOL

6 Skywrath Mage: rip

7 Axe: space

8 Skywrath Mage: ggwp friends

9 Shadow Demon: gg

10 Tinker: space created ez

11 Axe: gg

12 Death Prophet: gg

13 Tinker: gg

14 Shadow Demon: gg

15 Tinker: tie breaker?

16 Death Prophet: gj mid

(2) 1 Storm Spirit: i wish my ranged attack like dispelled images

2 Storm Spirit: thatd be so bamf

2.5.2 The Reddit Corpus

A second corpus was created composed of messages from the popular forum site Reddit (www.reddit.com). Reddit.com has different forum pages dedicated to different topics/content, or subreddits. These different subreddits have quite a broad range in content, from subreddits dedicated to different hobbies or interests (as is the case with the Dota 2 subreddit analyzed in this dissertation), to specific authors, to different post formats (such as poetry or fan fiction; see Section 4.3 for more specifics on the reddit context from which this data is collected)

The subreddit dedicated to the game Dota 2 provides an ideal environment in which data can be collected from the same overarching community as the in-game corpus, namely people interested in Dota 2, but in a significantly different context (see Section 2.6 for differences between the two corpora). Overall, 117,091 messages were collected for the Reddit corpus, totaling 2,852,037 words. Data were collected from the archive at www.pushshift.io (Baumgartner et al., 2020) from March to June, 2018 using Google's BigQuery platform (https://cloud.google.com/bigquery). More detailed information on the Reddit corpus is given in Table 4.2.

Table 2.4: Reddit Corpus Stats

Total Messages	117,091
Total Words	2852037
Mean Words per Message	24.36
Median Words per Message	14

2.6 Differences Between Corpora

While the two corpora created for this project share an overarching community, they differ significantly in a wide array of other features. These differences show themselves in both a technical and functional manner, with regards to the available channels and the function-

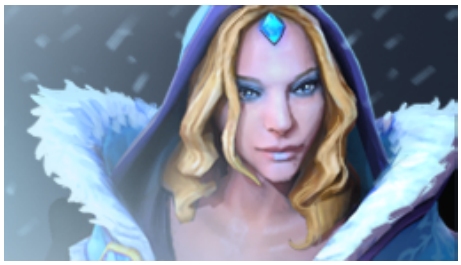

Figure 2.3: Flair for Crystal Maiden

alities presented to the user. Crucial to the subject matter of this dissertation, linguistic differences are also apparent between the two corpora, in terms of both what people are talking about in each virtual space, as well as how they are talking about it.

2.6.1 Technical and Functional Differences

Avatar Differences

The technical context of each of the two corpora provide a set of differences which has direct bearing on both the primary question of this dissertation, how avatars affect linguistic behavior in a naturally occurring environment. The most straightforward difference between the corpora in this regard is the nature of the avatars themselves. In the in-game corpus, avatars take the shape of three dimensional character models which are selected and actively controlled by the participants during the course of the game. Avatars in the forum corpus, on the other hand, are two-dimensional picture of heroes selected by the participants. These two dimensional representations, called *flair*, are not controllable in any regard by the speakers who select them (for more on the differences between avatar types see Section 4.2.3). This lack of control of avatars within the forum context likely leads to a decrease in embodiment in this environment (for more on embodiment and the effects of embodiment, see Section 4.2.2). Examples of the two types of avatar, each representing the same hero are shown in Figures 2.3 and 2.4.

Figure 2.4: Crystal Maiden's in-game model (avatar)

Time Pressure During Composition

The context in which the messages are composed plays an important role in differentiating the two corpora. Messages from the in-game corpus are necessarily composed during the course of a game of Dota 2. The methods for composing these messages typically involve the use of the keyboard. This creates a competition for resources, as the keyboard is also a central method of input for playing the game itself. Thus, players must choose whether to devote keyboard time to composing messages to other players, or to play the game itself, as both cannot be done simultaneously. This competition for resources results in the in-game corpus having much shorter messages than the forum corpus (2.25 words per message vs. 24.36). The time pressure component also concentrates messages in the in-game corpus into times when the player cannot perform in-game actions, or when these actions are less meaningful (such as at the beginning and end of the game, as well as when the player has been killed and is waiting to respawn, as shown in Figure 2.2).

Structural Differences

The presentation and organization of the messages themselves is different between the two corpora. The in-game corpus features a system which displays chat messages in the order

Figure 2.5: A Reddit conversation hierarchical conversation structure

in which they are sent, with the newest messages appearing at the bottom of the screen, pushing the older messages higher up. The messages disappear once the reach a certain height on the screen, or after a certain amount of time, whichever happens first. This simplistic display system means that multiple conversation threads happening at the same time are often difficult to keep track of [Baron, 2010].

The organizational system of the forum corpus is somewhat more complex hierarchically. Within a single thread, each comment has two possibilities: it can either be replying directly to the post, in which case it appears unindented, or it can be replying to another comment, in which case it appears indented underneath the comment to which it is a response. In this way particular avenues of conversation can be easily isolated and followed by the reader, while other conversations may be happening elsewhere in the thread.

Additionally, the comments that make up the forum corpus are organized within each thread by their popularity rather than their time of composition. The most popular comments appear at the top of the screen, where they are most visible, while less popular

comments are listed lower, often meaning the user must take additional actions (scrolling down) in order to access them.

The overall result of these structural and organizational differences between the two corpora is that the in-game corpus is bound much more tightly to temporal constraints (synchronous) whereas the forum corpus is significantly more asynchronous [Herring, 2007].

Permanence of Transcript

One of the medium factors used by Susan Herring to differentiate online communication is the permanence of the transcript, or how long the communicative act sticks around in an intelligible form [Herring, 2007]. From this perspective, spoken language generally has very little permanence, whereas writing typically has much greater. While both corpora are composed of written data, there is nonetheless a difference in the permanence of the transcript. The forum corpus is composed of messages with quite high permanence. The forum itself is publicly accessible, and old threads complete with their messages are retained and can be looked up quite easily.

The in-game corpus messages are somewhat different. While these messages too can be recovered, as evidenced by the existence of the corpus itself, this cannot be done without a substantial amount of work. First recovering the replay file, and then deconstructing the replay file into its component messages. This being the case, while there is knowledge that these files can be accessed, there is relatively little expectation that anyone would go through the effort to actually perform such a recovery. The result of this is that when the message fades from the in-game screen after a few seconds, in many ways it it seen as gone by the community of players. It is likely that the result of this perceived impermanence, combined with the time constraints discussed earlier in this section, result in less polished and less filtered messages.

Participant Structure

A final structural difference between the two collected corpora is the number of ratified participants [Goffman, 1981]. Within the forum corpus, there is no limit to the number of possible participants. Anyone at all can make an account and contribute to the conversation, and even without an account anyone with internet access can read the conversations. The in-game corpus is much more rigidly structured with regards to participation, only the ten players are able to contribute to the conversation.

2.6.2 Linguistic and Cultural Differences

Topical Differences

While the vast majority of conversation in both corpora revolve around the subject Dota 2, the different contexts of the two corpora lead to different elements of this topic being discussed in each virtual space. Unsurprisingly, the in-game corpus is more focused on real-time events which are happening within the game being played, as well as commentary about the heroes and items being used. An example of such commentary on current game happenings is given in (3), in which the hero Ursa urges the opposing team to finish the game quickly, a sign that Ursa believes his team is too far behind to make a realistic attempt at victory, and would like the game to end.

(3) 1 Ursa: FINISH PLS

2 Viper: lol

3 Bristleback: dont def then

Another major topic found within the in-game corpus are complaints and insults leveraged at other players, both on the speaker's team as well as on the opposing team. In (4), we find an enemy hero asking for the group to report the player controlling Invoker after the game has finished. Reporting players is the primary consequence of poor behavior in the

community, and thus asking for others to report a player is a direct statement about another player's behavior.

(4) 1 Slark: invoker report pls

In contrast, the forum corpus is made up of more meta-analysis of the game, discussion of the professional Dota 2 tournaments, as well as topics more related to the non-gameplay aspects of Dota 2, including fan-art and cosplay. In 5, the speaker contributes to a conversation about a particular professional game of Dota 2 and the relatively poor performance of the team Evil Geniuses (EG).

(5) 1. Speaker A: Io is a fragile, easy to kill character. he died only 2 times during the match, while half of EG kills were on Ogre Magi. EG just dug their own grave

Grammar and Punctuation

The use of normative grammar and punctuation is rarely used within the in-game corpus. Instead, players frequently omit capitalization and punctuation altogether. Spelling mistakes are also very common in this corpus. The dialogue featured in (6) showcases a typical level of prescriptively incorrect English grammar.

(6) 1 Ursa: FINISH PLS
2 Viper: lol
3 Bristleback: dont def then
4 Ursa: dael
5 Puck: WE CAN WIN THIs
6 Bristleback: no sry
7 Puck: RAPPORT

The reasons behind these alleged 'mistakes' is twofold. First, the time-pressure described in Section 2.6.1 encourages players to type quickly and not to edit their messages before

sending them, even if errors are noticed. The second reason is that these seeming errors play into a discursive style which has developed in the community in which exactly these type of errors are expected. This particular style goes beyond the simple errors seen in (6), and includes other typographic features such as the repetition of a single character (Example 7, Line 2) and the use of all capital letters for a word of sequence of works (Example 7, Line 1).

(7) 1 Nyx Assassin: NO YOU WONT
2 Slark: finish ittttttttttt

While the typographic style used in the in-game corpus occasionally finds its way into the forum corpus, the messages in the forum corpus tend to follow traditional grammar rules, including correct spelling and punctuation. This change can largely be thought of as a consequence of asynchronous message composition, and an overarching culture of the reddit.com website. An example of more standard grammar and punctuation can be seen in the comment from the forum corpus found in (8):

(8) Generally speaking it's obvious that the context of a joke changes the interpretation you should make of it. A joke will set a very different vibe coming from one person or another for example, and the flair simply is a part of this context, and it's even most of it on the internet where the context is limited.

2.7 The Language of Dota 2

2.7.1 Multilingualism in the Dota 2 Community

In order to get a better characterization of the languages spoken in the (US-based) Dota 2 community, speakers in the corpus were categorized into five groups based on their linguistic behavior. Each speaker was categorized as either a monolingual English speaker, monolingual

Spanish speaker, bilingual English/Spanish speaker, or as participants who use only Dota 2 specific language (such as *wp, gg, wp*, discussed further in Section 2.8), thus resisting traditional language categorization. The fifth category was for players who do either do not participate in the all chat channel, or who did not participate enough in order to be properly categorized. Categorization was done by tagging the list of 200 most frequent words as either English, Spanish, or Dota, and then looking through each players chats for words which had been tagged.[2] For this first pass, a single token of a language added that language to the speaker's proficiency profile.

Although this is a simple system which is prone to errors, it was used in lieu of other pre-existing software (such as googles language detection system, or the NLTK toolkit), due primarily to the specific context of the corpus. Chat messages tend to be very short, and are often misspelled, either on purpose or by accident, both of which can cause problems for existing systems. While the brevity of the messages also makes it difficult for the system used in this project to identify 100% of messages, there are significantly fewer errors due to misspellings and slang as a result of its hand-tagged nature. This method of categorizing speakers is similar to the one used by Bamman et al. [2014]. In this paper the authors train a classifier to identify gender from only linguistic information in tweets. In order to filter out non-English speakers (i.e. categorize speakers), they retained only tweeters who used at least 50 of the top 1000 words in the corpus. Because the majority of these top 1000 words were English, this method of dividing speakers into English and non-English speakers was successful [Bamman et al., 2014, p. 139]. While the categorization method used in this paper is less strict than those used by Bamman et al., the same principles of lexical token counting apply.

As can be seen in Table 2.5, this categorization method successfully classifies almost 84% of players in the database. The process of tagging the top 200 words in the corpus gives

2. Ambiguous words, such as *es*, which could either be the Spanish word 'is' or as an acronym for the hero Earth Shaker, were not categorized at all.

us an overall coverage of about 37% of total tokens tagged. Tagging additional words in the corpus in order to increase the coverage of both players and tokens has significantly diminishing returns, as the words that are tagged become increasingly rare. Additional sophistication in the tagging process, such as grouping together words by their lemma, and including some of the most common misspellings, instead of an exact lexical match (i.e. grouping together *gg*, *ggg*, and *geegee* under a single tag) may help improve our coverage even further.

Once each player has been put into one of the five groups outlined, we can begin to see a rough picture of the distribution of language proficiency in the Dota 2 community[3]. The raw counts and percentages of each category are given in Table 2.5.

Table 2.5: Corpus Population by Language Proficiency

Category	Count	Percentage of Total
English Monolingual	1566	25
Spanish Monolingual	907	15
Bilingual	302	5
DOTA only	2379	39
Unidentified	1025	17
Total	6179	100

The only demographic information about the players is gathered through investigation of the linguistic material they produce, such as described in this section. This means that while we can guess at a speaker's linguistic background, other demographic information typically considered useful in sociolinguistic projects, such as gender, age, and ethnicity is not available for use in our analyses. Though this information could be used to answer questions which cannot be answered with the current data, the advantage is that it forces the researcher to use only the information which is available to the community itself, situating the research in the context of the player experience. As Mary Bucholtz notes in her critique of the

3. The community referenced here as 'the Dota 2 community' is shorthand for the community which exists on the two North American servers, which is the focus of this project. There certainly exist other Dota 2 communities formed around the other servers.

use of speech communities in sociolinguistics, many studies tend to privilege the analytical perspective of the researcher, rather than the perspective of the participants themselves. As a solution to this problem, Bucholtz proposes that more sociolinguistic studies need to shift towards ethnographic methodologies [Bucholtz, 1999]. While this study relies of a corpus rather than materials gathered through ethnography and participant observation, the author's membership in the Dota 2 community, in addition to the exclusion of information available only to the researchers, ensures that patterns and correlations found in the data are those which are grounded in the experiences of the community members.

The numbers given in Table 2.5 give us a sense of how linguistically diverse the Dota 2 community is. Twenty percent of the community demonstrates proficiency in Spanish. In addition to categorizing players according to which languages are present in their chat messages, each individual game of Dota 2 was treated as an independent entity and subjected to the same treatment. Instead of measuring monolingualism vs. multilingualism, this categorization produces a measurement of which languages were encountered in a game. Taken in aggregate, these numbers provide a fair picture of the language use players expect when they enter a game of Dota 2 on the North American servers. The distribution of languages by game is given in Table 2.6.

Table 2.6: Languages used by game

Category	Count	Percentage of Total
Enlgish only	415	34
Spanish only	207	17
Both Eng. and Spn.	398	33
DOTA only	191	16
Total	1211	100

The numbers found in Table 2.6 provide further evidence of the multilingual nature of the Dota 2 community. A full 33% of games in the corpus contain both recognizable English and Spanish tokens. Again, this number is likely to under-identify languages, especially Spanish due to the lower number of identifying words when compared to English. Thus the level of

bilingualism in Dota 2 is likely to be even higher than presented in Table 2.6.

2.8 Dota Specific Language

Like any speech community or community of practice, the Dota 2 community has developed its own patterns of communication. In particular, the community has developed a large lexicon with meanings specific to the game context. These words, most often derived from English vocabulary, take on either additional meanings or occasionally completely different to the community, so that while readable to speakers of English, conversations like the one in (9) are largely indecipherable to those outside of the community.

Due to the Dota 2 community's relationship with larger gaming communities, many of these terms and phrases are not truly unique to this environment, but rather shared amongst a larger gaming community (see Section 2.4 for more on these connections). Nonetheless, this specialized vocabulary will be viewed as Dota 2 specific language and vocabulary. Understanding the speech patterns of this community is crucial to analyzing how avatars in this community affect linguistic behavior, as this Dota specific language is often leveraged as a cultural and stylistic resource by the community when engaged in the identity-construction work resulting from the Proteus Effect.

(9) 1 Skywrath Mage(d): sheeeeeeeeit
2 Shadow Demon(r): got EMMMMM
3 Tinker(d): ez
4 Tinker(d): ez
5 Skywrath Mage(d): LOL
6 Skywrath Mage(d): rip
7 Axe(r): space
8 Skywrath Mage(d): ggwp friends

9 Shadow Demon(r): gg

10 Tinker(d): space created ez

11 Axe(r): gg

12 Death Prophet(r): gg

13 Tinker(d): gg

14 Shadow Demon(r): gg

15 Tinker(d): tie breaker?

16 Death Prophet(r): gj mid

The vast majority of utterances in (9) are composed of Dota specific phrases. Furthermore, excluding a few lines (2, 10, 15), the claim in this chapter is that most of these lines would be intelligible in any language, given that the players are integrated enough into the Dota 2 community. Each of these lines can be typed in a relatively short period of time. Some of the longer lines (1, 2) contain repeated letters which reduces both the time and keystrokes necessary to produce this utterance during the course of a Dota 2 game.

An idea of the prevalence of Dota specific language in the corpus can be seen by examining the top twenty most frequent words, given in Table 2.7. The words in this Table that are part of this repertoire appear in bold.

As can be seen in Table 2.7, seven of the top twenty words in the table, including the four most common words, are part of the Dota specific lexicon. The meanings of these individual words are given in Appendix A. The fact that these words show up so frequently in the corpus is not only a testament both to their overall frequency in game, but more particularly to their use by speakers of varied languages.

2.8.1 Social Aspects: What Work Does Dota Ppecific Language Do?

Due to the nature of the all chat medium from which all the data in the corpus comes, the primary function of the chatting that occurs in this medium is social rather than functional.

Table 2.7: Top 20 Words

Word	Meaning	No. of tokens
gg	good game	2848
lol	laughing out loud	1431
ez	easy	1190
report	-	987
no	-	974
a	-	789
me	-	724
?	-	713
you	-	651
de	-	614
i	-	611
GG	good game	595
team	-	591
mid	middle lane	589
que	-	478
wp	well played	458
xd	emoticon	437
is	-	423

The basic principle is that there almost nothing functional for opposing to teams to discuss, and the only reason to use the team chat is when you specifically want to send messages to the other team rather than sending a message only to your teammates. The secondary nature of the all chat relative to the team chat is characterized in the games programming itself by making the team chat the default chat channel. In order to send chats via the all chat medium, an extra key press is required. The only exception to this division of labor is when players from different teams are negotiating when a game should be paused or unpaused. See Section 2.5.1 for more on the distinguishing properties of the team chat vs. all chat.

Within the these soft constraints, we can then ask the question 'what does this game specific way of speaking *do*?'. The framing of this question has its roots in the work of Austin's 'Speech Acts' (1962), as well as Conversation Analysis [Sacks et al., 1974], and more recent works who build on these traditions [Auer, 2005]. A common thread in all these foundational works is that they created a field of study in which the language as an independent unit is

not the sole object of study, but is more concerned with what people accomplish with the use of language, what they *do* with words. This approach is necessarily more sociological in nature. Studies employing such methodologies necessarily concern themselves with situated language use, that is, taking into account the context of the language use as a key factor in analysis.

Communicative Function

Because of the prevalence of Dota's specialized vocabulary in both monolingual English and Spanish, one of its functions seems to be that of a system of inter-language communication. This vocabulary, while itself not particularly large, serves to facilitate communication in the intensely multilingual virtual space in which it occurs (see Section 2.7.1 for more on multilingualism in the community). The success of this vocabulary in covering the majority of the communicative function in the in-game setting is further facilitated by the relatively small number of topics which show up in this space.

Many of the Dota specific words originated as English words (*report*, *commend*), are derived from English forms (*noob* from *newbie*, meaning someone new to the context), or retain some semantic connection to these English roots. Nevertheless, they form a bounded set of Dota specific words and phrases which is now used independently of these English origins. This independence is demonstrated primarily by its use and distribution among speakers. In the corpus 70% of all speakers use some aspects of this specialized lexicon (68% of monolingual English, 55% of monolingual Spanish, 86% of bilinguals). The ubiquitous nature of such terms in the corpus, and its widespread distribution over the various language groups provide evidence that these lexical items have transcended their English based roots. The dialogue in Example 10 demonstrates the use of such English derived Dota terms in an otherwise monolingual Spanish stretch of conversation.

(10) 1 Abyssal Underlord:]ok se jugar a tu mod

2 Abyssal Underlord: xD

3 Abyssal Underlord: uhm

4 Abyssal Underlord: team noob

5 Abyssal Underlord: afk

In (10) line 1, Abyssal Underlord demonstrates competency in Spanish. In the following four lines (10 2-5), the player uses terms which are part of the Dota specific vocabulary. If we had only (10) 2-5, it might be tempting to claim that Abyssal Underlord is an English speaker. This, however, would be the incorrect conclusion, as the speaker uses no other English competency outside of this limited vocabulary.

The word *team* is a good example of how intuitions of what is and what is not part of this specialized vocabulary can be misleading. At first glance, the word *team* does not seem to be part of the same category as most of the other words in the set. It is not an abbreviation like *ez*, it is not an emoticon (*xD*), or a word specific to the game context (*mid*). Rather, it seems like an English word which would elicit no particular response when used in everyday context. Furthermore there is an equivalent term in Spanish already, *equipo* 'team', which we might assume Spanish speakers would use for the same concept as English *team* during the course of the game. In fact we do see these two terms being used in the same context in the corpus, as demonstrated in (11) and (12).

(11) Chaos Knight: soy el unico lvl 25 en mi equipo

(12) Rubick: mi team es un asko comenzando de invoker

While both *team* and *equipo* are used in the corpus, there is a clear preference for *team*. This is true even among monolingual Spanish speakers, where *team* appears 184 times, while *equipo* appears only 11 times. There are two possible reasons that otherwise monolingual Spanish speakers engage in the use of terms such as *team*. The first, described in this section, is to ease the communicative burden in multilingual (and often English dominated)

situations. The second reason is more social in nature rather than linguistic, and is described in Section 2.8.2.

2.8.2 Dota Vocabulary as a Social Identifier

Although Dota vocabulary can act as an aid when no shared language is present, as shown in Section 2.8.1, its primary function is to perform identity. Research showcasing the ability of language and specifically code choice to construct and perform identity have been prevalent in the sociolinguistic research of the past two decades [Auer, 2005, Cashman, 2005, Bucholtz, 2000, Hinrichs, 2006]. Our corpus is amenable to just such an analysis. The primary piece of evidence that such vocabulary serves more than just a communication role is its prevalence in use between monolingual speakers of the same language. In these circumstances it is clear that monolingual discourse would adequately serve as a tool for communication (using *equipo* instead of *team*, see Section 2.8.1), but this is not what is found in the regular communication of the Dota 2 community.

Rather, this community specific language is used to establish group membership. In a study of code choice and group membership in a home for the elderly in Detroit, Cashman shows how residents actively construct identities through code choice: The use of Spanish by individual members of the community is used to position themselves as part of the Spanish speaking in-group. This use of a code in order to index group membership is available to be challenged or ratified by the other members of the group. Cashman makes special note that language in this community, similar to the Dota 2 community, is a crucial part of constructing social structure, rather than simply reflecting it [Cashman, 2005].

Many of the points raised by Cashman are applicable to the Dota 2 community. Dota specific vocabulary is a resource which individuals can use to ascribe group membership to themselves. The use of this code can also be challenged by other members of the community. Unlike the Spanish speaking in-group which Cashman deals with, membership in the Dota

2 community is not defined by the members access to the code, but rather defined by the joint activity of playing a game of Dota 2 [Cashman, 2005]. That is, Dota specific language does not create the social structure. While language is an essential piece of establishing membership in the Dota 2 community, it is not a sufficient condition.

2.9 Conclusions

This Chapter provides the context and necessary background to understand the present dissertation. This includes a brief background on the game Dota 2 (Section 2.2) as well as the community which surrounds it (Section 2.4). While this dissertation does not provide a full ethnographic or linguistic analysis of the Dota 2 community, some basic knowledge of the community is necessary to appropriately contextualize the effect different avatars have on linguistic behavior.

Along the same lines, a more specific background on the linguistic habits and expectations within the Dota 2 community is given in Section 2.8. These linguistic habits are the means through which we can see the Proteus Effect in action within the community, both in the in-game corpus (Chapter 3) and in the forum corpus (Chapter 4).

In addition to providing the baseline for community behavior and linguistic habits in the community, critical for understanding the discussions of the Proteus Effect in future chapters, this background attempts to ground the reader in the reality of the community context, giving them some understanding of the community itself, and the activity they are engaged in. This is particularly the case with the numerous examples of dialogue from the corpus given in this chapter.

Lastly, this chapter provides background information about the two corpora created for this dissertation (Section 2.5). This includes information about the size and collection of the corpora. Key differences between the two corpora are highlighted, and how these differences affect the language used in each (Section 2.6).

CHAPTER 3

EVIDENCE FOR THE PROTEUS-EFFECT WITHIN DOTA 2

3.1 Introduction

As the pace of technological development continues, people around the globe spend more and more time using technology to interact with one another. Our community-wide interdependence with technology makes it critical that we understand the consequences of these interactions. While this line of reasoning is often used by alarmist media outlets to further the trope of the constant degeneration of the human species, there is undeniable value in understanding both our relationships with media, and our relationships with others as they are mediated by technology.

Studying the relationship between humanity and technology is a difficult challenge. First and foremost it is a relationship that is multifaceted, with prior studies looking at technology's impact on our health, social lives, productivity, and quality of life. Additionally, the variety of the human experience across time and space, combined with the variety of available technology and the pace at which new technology is developed, make generalizing a difficult process.

The present chapter contributes to the ever-expanding wealth of information on human-technological relations by highlighting a single dimension of this relationship: how do the physical representations controlled by human participants affect their behavior, particularly their linguistic behavior. Pioneering work on this topic by Yee and Bailenson (2007) has termed this phenomenon the Proteus Effect. The present work expands on these foundational ideas by exploring the potential of the Proteus Effect in a naturally occurring virtual community, providing quantitative evidence that suggests that the Proteus Effect is indeed a naturally occurring phenomenon. Furthermore, this chapter provides critical analysis of the social construction and relevance of the observed differences in speech patterns.

The remainder of this section provides a short synopsis of the Proteus Effect and its relevance to work at hand. For a more in-depth look at prior research on the Proteus Effect, see Section (1.4). Section 3.2 details the data and experimental methods used, while Section 3.3 provides the quantitative results. The social implications and ramifications of the uncovered linguistic differences are discussed qualitatively in Section 3.4, providing a more in-depth look at how these differences arise, and how they are used in the Dota 2 community as a social resource. The implications of this line of research and its potential generalization to other online communities, as well as the practical potential of this research are discussed in Section 3.5.

3.1.1 Naturally Occurring Data

The key deviation of the present study when compared to prior research on the Proteus Effect is the use of a naturally occurring data set rather than a laboratory setting. This differentiation carries with it both affordances that prior studies lacked, as well as some drawbacks. The result is a study in complementary relation with the previous laboratory research rather than an eclipsing stance. The strengths and weaknesses of each methodological approach must be kept in mind, with the goal of gaining a perspective on the broader research question as a whole by the observation of both.

Con: Hero Selection Bias

There are two possible causes for different heroes using different speech patterns in our data. One possibility is that different heroes have different personae within the game of DOTA 2, and that players adjust their speech patterns in accordance with the expectations of these personae. This possibility is fully in line with the Proteus Effect as outlined by Yee and Bailenson [2007], and can be seen as a form of role playing. Preliminary data from online forums suggests that players resist DOTA 2 being termed a role playing game in favor of the

tag *strategy game*, which is perceived to be more prestigious amongst gaming communities. Such denials, however, have no bearing on the validity of this hypothesis.

A second possibility is that people with certain types of speech patterns might choose certain heroes with a higher frequency, thus statistically altering the speech patterns of the hero. This would introduce an intervening stage in the relationship between language use and hero selection. Instead of the hero selected causing a difference in the way a player speaks, this hypothesis states that people who speak differently (for a variety of reasons unrelated to their gaming preferences) tend to play certain heroes more often than others, creating the illusion of connection between types of language and types of heroes.

There are two methods for distinguishing these two possible explanations, both requiring additional data. The first involves gathering large amounts of game data from individual players. By analyzing data from an individual as they play various heroes, it should be possible to separate out a baseline set of linguistic behaviors for the individual, and then see how these linguistic behaviors change when different heroes from different classes are played. A second method for distinguishing why different heroes may exhibit different linguistic behavior is by using data from a game mode where players are randomly assigned to heroes. This controls for the confound of people with certain linguistic behaviors systematically choosing certain types of heroes. Such a study stands outside the scope of the present work. The working hypothesis of this chapter is that both factors contribute to the differential use of language by different heroes. Further ramifications of this uncertainly are discussed in 3.5.2.

Pro: Generalizations

The most readily apparent benefit to using naturally occurring data is the confirmation that the phenomenon observed is not one which is manufactured by the experimental conditions, but rather a phenomenon that truly takes place in everyday life. This is the goal of the present

research, though it is important to bear in mind that this is not the only valuable research paradigm. Indeed, some research can only be conducted by manufacturing the necessary conditions, perhaps because they do not exist naturally. Medical research interested in the effects of a new drug, for instance, requires testing of a non-naturally occurring substance.

With the goal of shedding light on an aspect of the human-computer relationship, finding evidence of the Proteus Effect in a naturally occurring environment is necessary. Furthermore, the presence and manifestation of the Proteus Effect in such an environment provides a much more responsible foundation from which to hypothesize about the presence of the Proteus Effect in similar virtual environments.

Pro: Contextually Embedded Interactions

Perhaps the most crucial upside to using data from a naturally occurring data set is that the interactions of the participants remain in context. This moves beyond the question of *if* the Proteus Effect occurs outside of the laboratory, and instead asks *how* and *why* the Proteus Effect occurs outside the laboratory, and in the process highlights any differences as meaningful sites of analysis.

While laboratory studies may take participants out of their natural contexts, this does not mean that laboratory studies are context-free. Apart from the context lent to a situation by the researcher's presence, there are also larger cultural contexts in consideration. The relative size of the shared cultural context typically depends on the the demographic characteristics of the participants, and can be seen as a sort of cultural common denominator. If participants are taken from all across the United States there may be a shared 'American' cultural context present, whereas if all participants are taken from the State of Michigan there may additionally be a 'Michigander' or 'Midwesterner' cultural context. This phenomenon has shown itself to be a problem in research paradigms which rely heavily (or exclusively) on college student populations. Under the best circumstances, this reliance on college student

populations should force researchers to take into account the possible confound of shared college cultural context (Henrich et al., 2010). Unfortunately, the biasing properties of research performed using narrow slice of population demographics is often not taken in account.

> "However, despite their narrow samples, behavioral scientists often are interested in drawing inferences about the *human* mind and *human* behavior... This lack of episetemic vigilance underscores the prevalent, though implicit, assumption that the findings one derives from a particular sample will generalize broadly; one adult human sample is pretty much the same as the next" [Henrich et al., 2010, p. 64]

The difference between laboratory and naturally occurring environments with regard to context is thus a matter of degree of available contextual information, rather than a complete lack of context on the part of laboratory studies. This difference of degrees has the potential to lead to meaningful implications. In the current research context, one such concern lies in establishing which aspects of an avatar are correlated to the behavioral patterns observed as part of the Proteus Effect. In Yee and Bailenson's (2007) foundational study, for instance, the avatar characteristics discussed as relevant to behavioral alteration were height and attractiveness. The first experiment performed in Peña et al. [2009] uses colored clothing as the relevant avatar variable.

As discussed in Peña [2011], the observed behavioral differentiation likely rests on a form of cultural priming wherein the color black is associated with negative stereotypes while both height and attractiveness are associated with power and confidence (See Section 1.5 for a more in-depth look at the psychological underpinnings of the Proteus Effect). What is noteworthy is that these are associations which hold at a broad cultural level, minimally 'Standard White America' though possibly much more far reaching than that. The problem which arises here is the inability of laboratory-based studies to successfully differentiate between two possible

reasons for the Proteus Effect's reliance on these broad cultural associations. It could either be that a) broad cultural associations are either required or preferred to trigger the Proteus Effect, or b) broad cultural associations were the only ones available in a culturally displaced laboratory setting.

It would be difficult for a single follow-up study to fully differentiate between these two possibilities. Furthermore, it would be possible to design an experimental study which could at least address the possible necessity of shared cultural background by utilizing a participant pool drawn from a broad, multicultural demographic. The present chapter takes an alternate approach, utilizing data from a naturally occurring environment in order to maintain access to both broad and community-specific context. The resulting findings suggest that broad cultural associations are not preferred over more specific cultural knowledge, but are likely relied upon more heavily in the laboratory setting in which more specific cultural knowledge is not shared.

3.2 Data and Methods

The data for this chapter comes from 153,615 games of the popular video game Dota 2. The data collected has all been made public by Valve, the software developers of the game. The original formatting of the data is a proprietary format used for encoding the entirety of the match data into a single file, with the intent that these files are available for consumers to watch using the Dota 2 client at their own leisure. These replay files were accessed in conjunction with the OpenDota API, an independent website which collects and stores large numbers of replay files on an independent server. Further corpus statistics are given in Table 3.1.

While the replay files were designed to include the complete match information, the files were subsequently trimmed down to only linguistic information and relevant match meta-data, such as the players involved, heroes selected, team configuration the score of the match,

Table 3.1: In-game Corpus Stats

Total Games	153,615
Total Messages	3,412,627
Total Words	7,666,725
Mean Words per Message	2.25
Mean Messages per Game	22.22

and player kills/deaths. All match data is time-stamped and the full match details remain recoverable.

3.2.1 Non-traditional Data

After collection and trimming took place, the data was subjected to a variety of linguistic analyses, both quantitative and qualitative. The range of analyses were designed to maintain perspective on a non-traditional data set. Due to the particular medium in which it was collected, the data differs in substantial ways from both spoken and written language.

While there are many community specific linguistic innovations, primarily lexical coinages, these innovations fall within the expected range of linguistic variation, and thus are not a major concern for linguistic analysis (See Section **??** for more on the specific lexical changes in the data). Rather, the major changes are primarily structural in nature, and stem more from technical peculiarities rather than cultural ones. The two major technical influences on the data are shared input methods between playing the game and chatting, which creates a competition for resources, and the availability of multiple discourse channels.

Structural Changes

The most noticeable feature of the in-game corpus is the brevity of the messages, with a mean of only 2.25 words per message. The cause is readily apparent in the competition for resources that takes place during a game of Dota 2. Over the course of a game of Dota 2, players input commands for their heroes to follow, whether it be moving to a certain

point in the map, attacking other characters, or buying items from the shop. The ability to quickly enter a large number of inputs is seen as critical to achieving a high degree of skill in Dota 2. In many gaming communities the corresponding statistic, codified as APM (actions per minute), has become a key indicator in player skill, and does indeed show a wide variation among the player base, with beginning players often having an APM of 50, while professional players can average an APM of 300+.

Table 3.2: Summary Statistics for both corpuses

	Total Messages	Total Words	Mean message length
In game	3,412,627	7,666,725	2.25
Reddit	117,091	2,852,037	24.36

All of these commands are input using the mouse and keyboard, the same methods used to create and send chat messages. This competition for resources in an extremely time sensitive game of Dota 2 means that players often must to sacrifice in-game efficiency in order to type messages. The result of this competition is that when players do choose to write messages, they tend to be short, in order to minimize the efficiency loss inherent in such message composition.

Another result of the priority which is placed on fast-paced messaged composition is an increase in misspellings and a general lack of many 'standard' grammatical practices, such as punctuation. While such practices are not uncommon in many other forms of online messaging, the particular circumstances of the data set further encourage such behavioral patterns. These disfluencies, along with the short nature of the messages, make traditional textual analysis more difficult (discussed more in Sections 3.2.2 and 3.3).

Semantic Changes

While the intense time pressure of creating messages has a structural affect on the messages, it also has semantic and topical ramifications. When typing messages detracts from the

player's ability to play the game itself, players tend to be more selective about the things they spend the effort to type. Pleasantries, outside of construction during the liminal spaces of the game, is largely absent. Instead players tend to deliver messages which fall into one of the following categories: 1) formulaic pleasantries exchanged at the beginning and end of the game; 2) emotive outbursts (either positive or negative) corresponding to in-game events; 3) commentary on the play of one or more characters; or 4) meta-game analysis/commentary, typically about the relative strength of heroes/items/strategies. Examples of each of these categories, along with discussion of these examples is given in 2.5.1

Another factor which has bearing on the semantic content of the in-game corpus is the built-in availability of multiple chat channels. When constructing messages in a game of Dota 2, players have the option to either send the message to every player present (all chat), or just to their team (team chat). The availability of the team chat channel means that much of the strategy talk, which is often deemed by players to be worthy of scarce keyboard time, is relegated primarily to the team chat rather than the all chat. This leaves the majority of the semantic content of the all chat corpus to be emotive or humorous exchanges. Such exchanges can be simple table talk and banter, or they can take more serious tones in the form of complaints, accusations, and arguments.

3.2.2 Linguistic Inquiry and Word Count

The primary quantitative measure used in this chapter is the Linguistic Inquiry and Word Count (LIWC) software [Pennebaker et al., 2015]. This software is a variant of classic sentiment analysis. Rather than tracking only the positive and negative sentiment of the words or phrases used in a given text, LIWC tracks the linguistic data across 90+ dimensions, ranging from basic statistics (word count, average word length) to a variety of linguistic categories which have been shown to correlate with various psychometric qualities (affect, cognition, drives; see Kacewicz et al. 2014, Cohn et al. 2004, Pennebaker et al. 2014, Pasupathi 2007;

for various applications of psychometric evaluation using LIWC).

LIWC was selected as a key tool based on its wide ranging linguistic categories and its simplicity. To generate its output, LIWC uses a simple count and tally system. Each linguistic category relies on a dictionary of lexical items which are reflective of that category. For instance, the anger category might contain the words *hate, kill, destroy* and *seethe*. When given a text to process, the software looks through each word in the text file and counts each word that falls into the appropriate category. Results for each category are then displayed as percentages of the total word count which fall into each dictionary [Pennebaker et al., 2015].

LIWC Modificaitons

A key benefit to the simplicity of the LIWC system is its customizability. Given the context of the data in the present corpus (See Section 3.2.1), it was critical that any tool used be able to account for these differences from traditional written data. Within the LIWC system, manipulations were made to the default dictionaries which form the backbone of the software. The bulk of these modifications fall into three categories, each related to an increasingly smaller community of practice: 1) internet slang; 2) gamer slang; and 3) Dota 2/MOBA specific slang.

While LIWC makes an attempt to account for internet slang in its dictionaries by including words and abbreviations such as *lol, brb, gtg* as well as emoticons, there are still significant gaps in what it can account for. In particular there exists a subset of terms among many online games which is absent from any LIWC dictionary. These terms include *wp, gg, gl, op, newb* among others. These terms would be recognized by many players of other games or genres of games without specific knowledge of the Dota 2.

The terms which are more specific to Dota 2 or the MOBA genre generally revolve around the specifics of the game (heroes, items, spells, in-game objectives) or the strategy

that has been built up around the game by the players (map placement, player positions). More difficult to detect and classify are terms which exist outside of the Dota 2 community, but take on drastically different meanings or connotations within the community. Such terms present a difficulty in that they not only need to be added to the appropriate LIWC dictionaries, but they also need to be removed from any inappropriate dictionaries. Failure to address these differences can lead to misunderstanding an exchange. The conversation in (13) illustrates one such example.

(13) 1. Earthshake: GG MID
2. Ursa: ez mid noob
3. Ursa: easy invoker
4. Windrunner: ez ursa
5. Phantom$_a$ssassin: report invoker
6. Phantom$_a$ssassin: que ascoi de inboker report please
7. Earthshaker: ez invo

In this exchange a series of insults are traded between the different players. For those unfamiliar with gaming culture, particularly for those whom the term *noob* is not part of their lexicon, line two of this conversation would be completely intractable. Those acquainted with the term *noob*, derived from *newbie*, which is used an insult suggesting that the player is new to the game and thus unskilled, may correctly identify this line as an insult, but be unsure of the 'ez mid' portion of the text. Indeed the term *easy* is generally viewed as a positive word in English, with a sentiment score of .58 (on a scale of -1 to 1) according to the Sentiwords Sentiment Analysis dictionary, making the potential insult more uncertain [Gatti et al., 2016].

In reality the term *easy* and its derivative *ez* are themselves insults, suggestive that the opponent's skill was low enough that overcoming them was trivially *easy*. This community knowledge renders the conversation in (13) transparent as the simple exchange of insults

that it is. These often subtle changes to wording meaning and connotation pose a potential threat to both qualitative and quantitative analyses of the text, necessitating a degree of insider knowledge on the part of the researcher.

3.2.3 Selecting Linguistic Variables

Using the LIWC methodology described in Section 3.2.2, four dictionary categories were selected for testing: *rude, polite, certain, tentative*. While results from the other dictionary categories may be of future interest, only four categories were selected in order to avoid issues with over testing.

The four categories themselves were chosen for a variety of reasons. These four categories are intuitively linked to the psychometric qualities suggested in their category titles, which makes the results more straightforward to discuss qualitatively in terms of persona construction within the community. Grammatical categories like verb vs. noun usage, while independently interesting, would be more difficult to interpret. These four categories also have the advantage of forming two oppositional though not mutually exclusive sets, with rude and polite serving as rough opposites on a single spectrum, and certain and tentative serving in the same relationship. While not a central finding of the current work, this sheds some light on the question of whether or not these oppostional forces are distributed amongst avatar personae or whether personae construction follows a marked vs. unmarked dichotomy.

These four variables have a history in the literature, particularly in the field of Gender Studies. Feminine speech has been noted to use a greater degree of politeness, both offline [Coates, 1993] and online [Baron, 2004]. Masculine speech, in contrast, has been shown to include more interruptions [Tannen, 1994], more profanity [Herring, 2003, Baron, 2004], and be more adversarial in general [Herring, 2003], all attributes which could be related to the rudeness category discussed here. This prior research gives the present research a place from which to make comparisons between the non-virtual and virtual worlds. This is vital not only

from a comparative viewpoint, but in also allowing into the conversation a new perspective on which indexical associations, if any, community members are transferring from the virtual to the non-virtual world.

Rude Behavior

All four of these linguisitc categories are well represented in the corpus. Most obviously, the rudeness category shows up through a variety of insults, as shown in (14).

(14) 1. Bountry Hunter: you noob
2. Bounty Hunter: necro
3. Necro: even noob know whos an idiot
4. Necro: retard

In this short exchange, the hero Bountry Hunter insults the opposing team's hero Necro by calling him a *noob* (Line 1). Necro responds to this insult with an insult of his own, calling Bounty hunter both an idiot and a retard (Lines 3 and 4). Such small exchanges are incredibly common in the data set, and provide a good example of the sort of language that the rudeness category

Polite Behavior

Polite Behavior is less common within the corpus, but is nonetheless present. The majority of politeness markers in the text appear at the beginning and end of the match, when players typically exchange a variety of stock pleasantries, such as *gg* (good game), *gl* (good luck), or *hf* (have fun). Other examples of polite behavior come in the form of complementing other players on their performance, such as can be seen in Example 15.

(15) 1. Spirit Breaker: can you wait?
2. Enigma: hes back

3. Sniper: nice estun
4. Spirit Breaker: gee gee

In Line 3, a player complements another player for performing a nice stun, a move which temporarily takes away another player's ability to move or attack, making them much more vulnerable to incoming attacks. This comment is followed up in Line 4 by Spirit Breaker saying 'gee gee', a modified version of the more common form 'gg'.

Tentative Behavior

Similar to politeness, tentativity is not necessarily expected from players in a game of Dota 2. Still, examples are available in the corpus. In (15), one of the players has disconnected from the game server, and his team mate Spirit Breaker in Line 1 asks for the rest of the players to wait for his return. This line, with its modal verb 'can' and question format, is an example of tentativity in the corpus.

Certain Behavior

An example of linguistic behavior in the certain category can be seen in (16).

(16)
1. Anti-Mage: this game is garbage
2. Anti-Mage: 1
3. Anti-Mage: i AM DOne
4. Storm Spirit: :)
5. Anti-Mage: every1s feeding
6. Anti-Mage: END

In this example, Anti-Mage goes on a short and frustrated tirade. The capitalization (Lines 3 and 6), generalizations like 'everyone' (Line 5), and imperative form (Line 6), all point to a certainty of speech in the corpus.

3.2.4 Selecting Avatar Variables

Once category variables were selected, it was also necessary to categorize the in-game avatars. While it would be possible to test the linguistic behavior of each of the 100+ avatars individually, the database is simply too small at present to maintain meaningful amounts of data when split into over 100 segments. This particularly true due to the uneven distribution of data in the corpus; while some heroes see play in up to 25 percent of games, others see play in less than 2 percent.

In light of this, avatars were categorized along three axes: role, faction, and gender. The role of the game is a result of the avatars skills and abilities. These skill and abilities make some heroes better suited to play certain roles such as damage dealers (carries), or healers (support). For more on the roles in Dota 2 see Section 2.2.1. The faction of the heroes is a non-functional differentiation of heroes into two teams, the Dire (archetypal villains) and the Radiant (good guys). The gender of the avatar is included in order to have increased parallelism for comparing non-virtual gender roles and behavioral differences to possible virtual ones.

An additional benefit of categorizing heroes along these three particular axes is that each of them has a different primary motivator. Whereas the faction of the hero is strictly determined by the game creators, the strategic role the hero plays is a matter of community controlled practice. The gender of the avatar exhibits heavy influence from the non-virtual world. By comparing these three axes of avatar differentiation against one another, rather than comparing their component binary divisions, insight can potentially be gained as to what influence the community themselves is keyed into. This comparison is the subject of Section 3.3.2, and is covered in finer detail in Burkholder [2019].

3.3 Quantitative Findings

Using the methodology and categories described in Section 3.2, a two-tailed t-test assuming unequal variance was performed with the null hypothesis that each category of avatar within one of the three selected axes (role, faction, gender) would use the lexical items in each linguistic category roughly the same amount. The results of these t-test are shown in Table 3.3. Significant findings are marked with an asterisk (for $p<.05$) or a double asterisk (for $p<.01$).

Table 3.3: T-Tests of In-game Corpus Categories by Variable

-	Role	Faction	Gender
Certain	.000**	.242	.975
Tentative	.000**	.675	.015*
Rude	.039**	.147	.015*
Polite	.001**	.1	.572

As can be seen in Table 3.3, there is significant evidence suggesting that the null hypothesis does not hold. Rather, different categories of avatars are behaving differently in the corpus with respect to linguistic variables. Crucially, such findings tell us nothing more specific about the differences in linguistic behavior, only that they exist. More concrete details on what these differences look like are given in Section 3.4.

3.3.1 Unclear Causation

As discussed in Section 3.1.1, the correlations between avatar category and linguistic behavior should not be seen as a causative relationship. While it is possible that these results reflect the influences of avatar appearance on behavior, as was originally conceived by the Proteus Effect, there are other possibilities. One such possibility, is that different player types, or players with certain behaviors and personas, are drawn to play certain heroes (see Section 3.1.1). This selection bias could account for the findings in Table 3.3.

The uncertain causation of the effects shown in Table 3.3 does not invalidate the reality of the correlations discovered. These are rather very real and present effects that are acknowledged by and influence the subsequent behavior of the community at hand. While the underlying causation of the correlations uncovered are certainly of interest, and provide an interesting path for future research (Section 3.5.2), the present study focuses instead on the social reality of the findings.

The defense of this stance lies primarily in its emic perspective. The members of this community, themselves blind to the causation of the linguistic oddities of their peers, are constantly engaging in this patterned environment. They are adept at navigating such spaces, forming indexical connections along the way which themselves influence their perceptions and future interactions within the space. While it is hoped that demonstrating the existence of the avatar-behavior correlation in a naturally occurring environment does begin to shed light on the Proteus Effect from a different perspective, it is to the subsequent significance of these patterns that the remainder of the chapter now turns.

3.3.2 Uneven Distribution of Significance

Results are not evenly distributed across role, gender, and faction, but rather cluster along certain axes. The strongest evidence against the null hypothesis is found along the role axis, with each of the comparisons resulting in a p-value of less than .01. The gender axis also shows some significant results, but only in the tentative and rude dimensions, and only at a p-value of less than .05. Lastly, the faction axis shows no significant findings whatsoever, with few even approaching significance.

One possible explanation for this pattern of significance is the higher degree of salience of certain variables to members of the community. The reason for this increased salience is difficult to determine, as there are several factors which differentiate role from faction. In Table 3.4, each avatar categorical axis is given a rating with four tiers (None-Low-Medium-

Figure 3.1: Crystal Maiden

High) on the degree to which the avatar axis has functional ramifications for players playing Dota 2. The role axis receives a high rating in functional ramifications as the role of the hero is heavily influenced by the stats and abilities of the hero, dictating which actions the hero is capable of performing during the course of the game. Conversely, the gender and faction of the hero have no bearing whatsoever on the functional performance of the hero.

Table 3.4: Avatar Distinction Categories

Category	Functional	Aesthetic
Role	High	Low
Gender	None	High
Faction	None	Medium

The avatar axes are also rated on the degree to which the avatar distinctions result in a visual aesthetic difference, though the axes studied here show less differentiation in this category. The avatar axis gender receives a high rating in this category, as the gender of the avatar is most often displayed aesthetically on the game model, often demonstrating visually apparent stereotypically feminine features (prominent breasts, long hair, wide hips; see Figure 3.1) or stereotypically masculine features (angular face, defined musculature, broad shoulders; see Figure 3.2).

The avatar axes role and faction are more difficult to determine with respect to aesthetic

Figure 3.2: Kunkka

Figure 3.3: Omniknight

differentiation. While neither axis shows as much visual differentiation as the gender axis, there are nonetheless some visual cues of both role and faction. The faction of the hero is a choice determined by the game developers. The two factions of Dota 2 are the Radiant and the Dire, corresponding to a great extent to the notions of 'heroes' and 'villains' respectively. This reliance on classic notions of heroes and villains, particularly within the fantasy genre, leads to factions that are artistically distinct both in their color schemes and their imagery. The Dire, borrowing imagery of witches and demons, relies more heavily on a black and red color scheme (see Figure 3.4), while the Radiant, borrowing imagery of knights and nature, relies more on the a white and green color scheme (see Figure 3.3).

Given the patterns of significance in Table 3.3 and the distinctions between avatar categories summarized in Table 3.4, two hypotheses immediately present themselves. The first is that the high functional differentiation of the role category distinguishes itself, perhaps via community salience, to establish itself as a suitable site for Proteus-like behavioral dif-

Figure 3.4: Shadowfiend

ferentiation. This hypothesis is particularly promising for a variety of reasons. First, there is a match between the role category having the most significant results in Table 3.3, and simultaneously having the most noticeable difference in terms of function in Table 3.4. Additionally, the correlation of functional differentiation and significant behavioral alteration could serve to explain the lack of significant results in the Reddit corpus, in which there is no functional basis for avatar selection (For more on the results of the Reddit corpus, see Chapter 4).

A second possible hypothesis is that the level of aesthetic differentiation between the avatar categories is significant in determining their ability to cause behavioral differentiation. The evidence suggesting this correlation is the moderate level of significant findings in Table 3.3 and the moderate level of differentiation along the aesthetic axis displayed in Table 3.4, such that categories with high aesthetic relevance (gender) show some amount of Proteus-like effects. While this hypothesis is marked in less extremes than the correlation between functional differentiation and Proteus-like effects, it nonetheless is worthy of note. In particular this hypothesis is worthy of note as it is most similar to the findings produced by preceding literature on the Proteus Effect, which almost exclusively rely on aesthetic differentiation in avatars [Yee and Bailenson, 2007, Peña et al., 2009, Peña, 2011].

3.4 Qualitative Findings

Whereas Section 3.3 provides statistical evidence of the presence of Proteus-like effects in the in-game corpus, this section uses primary qualitative methods to explore the community-based meaning tied to the specific observable effects. In addition to the discussing the meaning behind these findings, this section begins to explore the question of how these community effects arise in the first place, both in terms of motivation and direction of effect.

The crucial finding presented in Table 3.3 is the presence of statistically significant differences in the linguistic behavior of avatars. What this table doesn't show, however, is the direction in which the behaviors differ. This information is provided in Table 3.5, which shows the percentage of words which fall into a behavioral category for each of the relevant avatar axes. Table 3.6 distills this information by displaying only the linguistic-avatar pairings which demonstrate a significant difference, highlighting which of the competing avatar-categories use more or less in the respective linguistic categories.

Table 3.5: Percentage of Words by Linguistic Category

-	Rudeness	Politeness	Certainty	Tentativeness
Male	3.427	0.881	0.193	0.505
Female	3.419	0.928	0.192	0.536
Carry	3.429	0.877	0.185	0.496
Support	3.336	0.930	0.207	0.572
Dire	3.454	0.888	0.196	0.514
Radiant	3.396	0.888	0.190	0.510

Table 3.6: Direction of Behavioral Change by Category

-	Rudeness	Politeness	Certainty	Tentativeness
Male	More	-	-	Less
Female	Less	-	-	More
Carry	More	Less	Less	Less
Support	Less	More	More	More

What emerges when the data is viewed this way is in many ways familiar, even to those unfamiliar with the game Dota 2 or its surrounding community: female avatars are using less

rudeness terms, more politeness terms, and are linguistically more tentative. Transported out of context, these claims are reflective of a large sector of prior gender-based linguistic studies. For instance, a selection of these studies found that women use more politeness markers [Coates, 1993], apologize more [Herring, 2003], use more emoticons [Baron, 2004], interrupt less [Tannen, 1994], and use less insults and profanity [Herring, 2003]. These are only a few of the findings and studies which have been conducted over the past 30 years. See Baron [2004] for a more detailed review of these findings with particular emphasis on CMC.

Though the parallel findings of linguistic behavior in speaker gender and linguistic behavior in avatar gender may be intuitive, it nonetheless demands an explanation. There is no a priori reason why this should be the case. One explanation for this parallelism is that members of the Dota 2 community are recreating meaningful social distinctions from their non-virtual worlds inside the virtual space. This transfer of expectations from the non-virtual world to the virtual world gives reason to the direction of behavioral differences discussed in Section 3.3.

3.4.1 The Virtual World Mirroring Reality: Beyond Gender

While the parallelism between the non-virtual gender category and the virtual gender of avatars is perhaps the most readily apparent connection between virtual and non-virtual worlds, and serves as a reasonable basis for some findings, such as female avatars using less rudeness terms (See Table 3.6), there exist other connection candidates. The other avatar-category to showcase significant behavior alterations was the role category.

The binary distinction between the support role and the carry role is potentially a key site in which virtual to non-virtual world connections are established. Chief among these connections is a perceived power-imbalance. The carry role is designed to deal large amounts of damage to the enemy team. The support role, in contrast, is designed with abilities which ensure that the carry is able to perform their duties, either through healing, or through

disrupting the enemy heroes. While both roles may begin the game at similar power levels, their power trajectories diverge significantly. The reasons for this divergence are twofold. First the inherent design of the game is such that the abilities of carry heroes scale better, allowing them to become naturally more powerful by the end of the game (allowing them to 'carry' their teammates to victory). Second, the community-based strategies call for different play patterns between the two roles, with support heroes encouraged to explicitly limit their own access to resources in order to accelerate resource production for the carry heroes.

This community-acknowledged power-imbalance between roles in Dota 2 is an abstract enough relationship to find correlates in a number of non-virtual world sites. Previous literature on socio-economic class disparities and the linguistic behavioral differences that accompany them has shown that children from families with low socio-economic status tend to use more politeness terms (such as *thank you*) than children from middle class socio-economic backgrounds [Becker and Smenner, 1986]. When socio-economic status is viewed as a form of power-disparity, an exact behavioral match appears in the Dota 2 data. Players controlling avatars of lower power-calibre (support heroes) tend to use more politeness terms than players controlling avatars of a higher power-calibre (carry heroes).

Traditional gender-roles in the United States, a history of legislative inequality, and continued systems of economic oppression have led to a power-imbalance between genders in the United States. Though less direct, this correlation between gender and power in the United States could be another site for carry-over from the non-virtual world into the virtual world. These effects can be difficult to tease apart in the current data set, as both avatar gender and avatar role show increased use of politeness forms, as shown by 3.6, a feature which is associated with both non-virtual gender as well as non-virtual power-dynamics in the United States.

Rather than attempt to tease apart the independent effects of these intertwined variables, this analysis instead highlights the transferal of an entire indexical field from the non-virtual

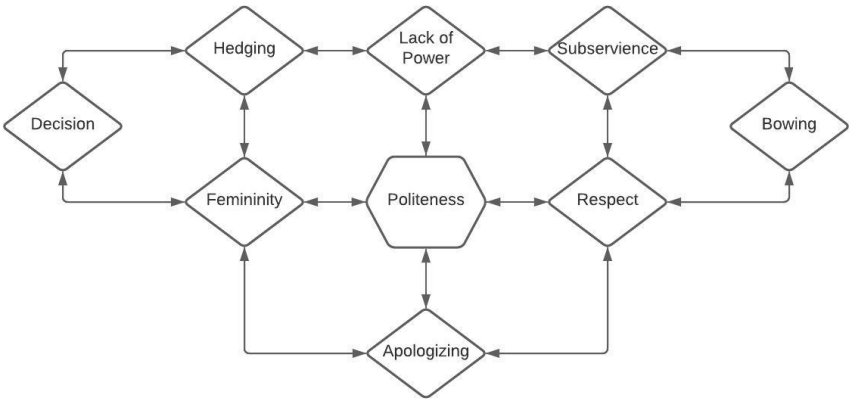

Figure 3.5: Indexical Field centered around Politeness

world to the virtual one. An indexical field, introduced as a theoretical concept in Eckert [2008], builds off of Michael Silverstein's (2003) notion of indexical order. The core concept underlying both of these terms is that a given behavioral variable has the potential to index a wide variety of social meaning. While a linguistic variable can be associated with the group that most frequently uses it, it can as well be used to index stereotypes associated with that group. While the non-standard form *fishin'* in English has the potential to index lack of education, it has additional layers of indexical meanings, including casual and friendly [Campbell-Kibler, 2007]. Use of a single linguistic variable then has the potential to index a number of social meanings. The resulting web of inter-weaved meanings is what is known as an indexical field [Eckert, 2008].

In the present example, we can view politeness as a behavioral variable which indexes just such a range of possible social interpretations, including, but not limited to, both femininity and relative lack of power. A depiction of such a possible indexical field is given in Figure 3.5. This indexical field seems to be shared by players across modalities, transferring from their origins in the non-virtual world to the a new home in the virtual world of Dota 2.

3.5 Conclusions

This chapter extends prior research on the Proteus Effect by providing evidence that Proteus-like effects are found in non-laboratory settings. The quantitative support for these findings is provided in Table 3.3. This extension of the prior research is a major development in terms of generalizability and applicability of the Proteus Effect to an increasing number of diverse media making use of controllable avatars.

In addition to improving generalizability, evidence from a non-laboratory setting allows the research in this chapter to build on the potential of the Proteus Effect by examining what features of an avatar have an influence on behavior. Due to the lack of a shared practice amongst participants, the prior research on the Proteus Effect relies heavily on the aesthetic appearance of avatars as sites for behavioral differentiation. Within a community of practice such as that which surrounds the game Dota 2, non-aesthetic features of avatars can be more gainfully investigated, as participants can be assumed to be working with a far greater amount of shared-ground information. This chapter begins that work by investigating the importance of avatar-function and avatar-history in addition to avatar aesthetics.

The results of testing non-aesthetic variables for possible Proteus-like results allows for a more nuanced analysis of community perception and practice. Section 3.3.2 reviews the quantitative findings of behavioral differences in terms of three avatar dimensions: role, gender, and faction. For the community in question, role and gender seem to demonstrate the most stratification in terms of linguistic behavior, with role being more significant than gender. This hierarchy, while likely specific to the selected community, demonstrates the importance of studying avatar variables that aren't strictly aesthetic.

Finally, this chapter questions how community perceptions of avatars and avatar-based distinctions come into existence. These community based perceptions, whether conscious or unconscious, are what underpin the behavioral differences associated with various avatar attributes. Using the Dota 2 community as a case study, Section 3.4 provides an explanation

by which cultural expectations and stereotypes with a long history in the non-virtual world are subsequently transferred and reified in a virtual medium. This interplay between the indexical meanings of virtual and non-virtual worlds, along with the tweaks and shifts made by the community in re-imagining them, demonstrates the potential for better understanding human behavior online, and is a promising direction for future research.

3.5.1 Limitations

As identified in Section 3.1.1, the extension of prior research into a non-laboratory setting brings with it more than just an expanded database. The primary drawback of the present approach is the lack of control possible in a laboratory setting. One facet of this lack of control is that hero selection is not randomized, allowing for players to select their favorite hero. This selection process has a potentially skewing effect on the data which makes it impossible to determine the cause of the differences in behavior outlined in this chapter.

As stated, the effects of this potential confound make it difficult to determine the cause of behavioral differences. What this confound does not affect is the reality of the observed behavioral differences, and how these behavioral differences are noticed and ascribed meaning by the Dota 2 community.

3.5.2 Future Research

The current research program can be extended in one of a number of ways in order to overcome the limitations discussed in Section 3.5.1. The most clear-cut solution to the potential confound of players selecting their own hero is to gather and analyze data from a play environment where players are randomly assigned heroes instead. Fortunately, such a play environment does exist within the Dota 2 community, providing an avenue for future research. It should be noted however, that using data from such an environment comes with its own limitations. First, the environment in which players are randomly assigned

heroes is a marginal game-mode within the community, and while marginal communities can provide valuable information in understanding the community at large, it is imporant to realize that this environment itself is not representative of the normal play patterns for the community. This atypical play pattern itself likely skews data in a different direction, with players perhaps feeling a decreased sense of embodiment with heroes that they are randomly assigned as opposed to those they have actively selected. Thus this potential pathway forward for research should be viewed as complementing and bosltering the the present reserach rather than superceding it.

Another potential area for future research within the Dota 2 community involves focusing on a smaller group of individuals' behaviors over an extended period of time. Such a research paradigm would provide an alternate solution to the potential confound of having players select their own heroes. Rather than looking at the data in aggregate, where uneven distribution of hero selection by certain categories of players has the potential to skew the data, focusing on a few individuals would provide allow for observation of potentially differential behavior across different heroes while keeping the player information a constant. More concretely, such a study would allow us to see if an individual's behavior changed when they are playing as or embodying different heroes. Given many players' play habits within the community, in which many players play several games of Dota 2 within a week, such data should be naturally occurring and potentially available for study.

CHAPTER 4

THE PROTEUS EFFECT IN AN ONLINE FORUM

4.1 Introduction

On a given afternoon I am chatting with friends I know in person while playing a game of Dota 2 with them. On a separate monitor I've got a stream of a large international Dota 2 tournament running, with a chat bar on the side full of viewers like me. After the conclusion of the game I am playing, I hop on the forum website Reddit to post a comment about a play that I saw in the tournament stream. Later, I will check the messages which have been posted in a Dota 2 discord, a group instant messaging service heavily used by gamers, to catch up on what I've missed. Four different technological services are being used in this example, typical for many gamers in today's society, to interact with different subsections of the Dota 2 community. Each of them exhibit different technological affordances, different social norms and expectations, but all are crucial components of a thriving online community (See Herring [2007] for more on technological vs. social differentiation of media channels.)

Though the example here is particular to the DOTA community, examples from a variety of different communities are not hard to find. Co-workers chat via email, texting, in the office, over Skype, and on dedicated websites. With the increased prevalence of technology in our day-to-day lives, and as technologies like virtual reality blur the lines between the virtual and non-virtual, communities at large have more opportunities than ever to interact and thrive in multiple mediums.

The goal of this chapter is to recognize the multiplex nature of online communities, taking into account data from a medium other than the in-game chat logs themselves. By introducing this new data source two tasks are accomplished: 1) the new data source allows for a more nuanced construction of the relationship between language and virtual representations in the Dota 2 community; and 2) the technological differences between the mediums allow

us to push on notions of what is crucial in triggering the Proteus Effect, with particular emphasis on the importance of embodiment (Yee and Bailenson 2007, Yee et al. 2009).

After providing background information on the concepts used in this chapter (Section 4.2), Section 4.3 provides more detailed information on the community and the nature of data collected. Quantitative evidence suggests that high levels of embodiment in virtual representations are a vital factor in producing Proteus-like effects, particularly lexically-driven effects (Section 4.4). Nonetheless, Section 4.5 demonstrates crucial ways that virtual representations are used in the community as a stylistic resource, allowing participants to take on the indexical properties of their virtual representations (Section 4.5.4). These indexical properties in turn afford the participant different levels of access to certain speech acts and patterns in a given context, and these different levels of access ultimately result in the differentiation of speech patterns demonstrated in this chapter. Specifically, this chapter shows how the indexical association between a participant and an avatar (1) allows for the participant to be seen as an expert on the pictured hero (Section 4.5.3), (2) imbues the participant with some of the properties in turn indexed by the virtual representation through the notion of indexical order (Section 4.5.4; see Section 1.6.1 for more on indexical ordering), and (3) enables a shift in footing wherein the participant voices the virtual representation itself (Section 4.5.5).

On a methodological level, this chapter demonstrates how the use of multiple corpora can be successfully applied to research questions involving large-scale constructed corpora. With the increased number of available data-sets, and with the relative ease of creating new data-sets from online sources, this methodology has become more plausible for use throughout the field of linguistics and Computer-mediated communication (CMC).

4.2 Background

4.2.1 Online Communities as Multiplex Networks

A common practice when studying online communities is to base hypotheses and findings on data taken from a single medium. Whether the data comes from twitter (Bamman et al. 2014) or in-game messaging (Hutchinson 2013), online communities have the tendency to be seen as overly simplex networks (exceptions to this trend certainly exist, see Yan et al. [2015]). An over-reliance on the notion of a 'shared enterprise' as a central binding feature of the Community of Practice, particularly within studies focusing on online communities, may help explain some of this oversight [Eckert and McConnell-Ginet, 1999, p. 186]. In the work at hand the shared enterprise that binds this community is the video game Dota 2. This does not mean, however, that the only site in which the community exists is within the game itself. Taking these different mediums into an account leads to a more complete, nuanced picture of the community in question in a way that a single medium study cannot.

This dissertation is far from the first publication to advocate for such a methodology. Studies in linguistic anthropology, with its focus on community-wide phenomena and participant observation, tend to naturally use data taken from a multitude of interactional sites. Though studies on online communities are often based on corpora collected from a single medium/source, more recent work has seen a push towards more holistic community studies. Steinkuehler [2006], for example, uses participant observation to study the habits of a community of players in the game Lineage 2, a massive multiplayer online role-playing game (MMORPG). Steinkuehler complements data she gathered while playing the game itself with data gathered from personal interviews. These two data sets cross the line of in-game (IG) and out-of-game (OOG), a very important distinction in this community, as players may be embodying completely different characters IG when compared to their non-virtual OOG selves [Steinkuehler, 2006].

4.2.2 Embodiment

Previous research has suggested that embodiment, the process by which participants control and identify with a virtual body, rather than just observing it, is a crucial factor in the causation of the Proteus Effect [Fox et al., 2013, Yee and Bailenson, 2007]. Fox, Bailenson, and Tricase (2013) attempt to increase the participants' identification with the avatar (thus increasing embodiment) by assigning some participants' avatars whose faces resemble their actual appearance at the time of testing. The experiment they ran used a two-by-two model where some participants were either assigned a sexualized avatar or a non-sexualized avatar, as well as avatars with faces that either resembled their own or did not. Sexualized avatars were dressed in more provocative clothing and confirmed to be 'sexier' by a preceding survey. After controlling their assigned avatar, participants took a brief questionnaire. Participants who controlled a sexualized avatar displayed more body-related thoughts than those that controlled non-sexualized avatars. In addition, participants who controlled avatars who were both sexualized and resembled themselves displayed more rape-myth acceptance than any other avatar condition [Fox et al., 2013].

The present chapter can be framed as a continuation of this line of research. Rather than attempting to increase the levels of embodiment as was done in the Fox et al. (2013) study, this chapter questions what elements of the Proteus Effect remain in virtual environments with drastically reduced levels of embodiment. Prior studies on the Proteus Effect take place exclusively in game-like virtual worlds in which the participant controls the behavior of the avatar directly [Fox et al., 2013, Yee and Bailenson, 2007, Yee et al., 2009]. The present chapter reports findings from a medium in which a participant's virtual representation is instead a small two-dimensional, uncontrollable, picture which appears next to the participant's name. This change in virtual representation allows us to ask questions about how important three-dimensionality and embodiment are in the potential to alter user behavior with a virtual representation.

4.2.3 Virtual Representation: Flair

Within the forum data set analyzed in this chapter, the virtual representations of the participants are known as *flair*. A user's flair is a small, two dimensional picture which appears next to the user's name when they post on Reddit, a forum website based around user-submitted content founded in 2005.. A single user may post in any of a number of sub-forums (subreddits), each devoted to a different topic or genre. While the participant's username remains constant regardless of which subreddit they are posting in, a user may have a different flair for each subreddit of which they are a member. Unlike classic profile pictures, users are unable to select any picture they like to serve as their flair, but are rather limited to a preset list of images determined by the subreddit moderators.

Within the Dota 2 subreddit, their are two primary sets of flair to choose from, images of heroes from the game, and images of the logos of professional teams. By limiting the data from the subreddit to users who have self-selected a flair which represents a hero from the game Dota 2, an interesting parallel is created between the forum data set and the in-game data set. In each data set we take as the object of our analysis speech acts which are created by community members associated with one of the 120 in-game Dota 2 heroes by means of a virtual representation.

Figures 4.1 and 4.2 show an example of a single virtual character, the support hero Crystal Maiden, in both her two-dimensional flair representation as it appears on Reddit (Figure 4.1), and her three-dimensional in-game model as it appears in-game (Figure 4.2). Immediately, some differences between these two types of virtual representations become clear; the in-game model is three-dimensional and depicts the entire character, while the forum flair is two-dimensional and depicts only the character's head and shoulders.

In addition to these graphical differences, there is a marked difference in the way that players interact with their avatars in these two different settings. After selecting a Reddit flair, community members have no further direct interaction with their avatar. Contrarily,

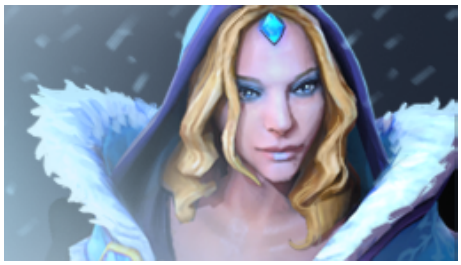

Figure 4.1: Flair for Crystal Maiden

Figure 4.2: Crystal Maiden's in-game model (avatar)

after selecting an avatar in the in-game condition, community members spend long portions of time inputting commands that directly control the movement and actions of their avatar. This increase in direct control marks a large difference in the embodiment potential between the forum flair avatar and the in-game character model avatar. These effects are analyzed in this chapter.

Table 4.1 shows the 10 most commonly used hero-based flairs in the Dota 2 subreddit and the depicted heroes corresponding pick rate (and rank) in-game.[1] Table 4.1 highlights the fact that while some of the most commonly played heroes do show up as common flairs (Shadowfiend and Invoker at ranks 3 and 5, respectively), many of the most popular flair pictures on r/dota2 represent heroes who rarely see play (Io and Meepo at ranks 107 and

1. Reddit data from https://www.reddit.com/r/DotA2/comments/85g6z8/rdota2$_f$lair$_s$tatistics$_a$s$_o$f$_m$arch$_2$018/ accessed 7/24/2018. In-game pick rates from the past 6 months as of 7/24/2018, accessed on https://www.dotabuff.com/heroes/winning?date=6month.

102, respectively).

Table 4.1: Ranking frequency of appearance in Reddit vs in-game

Hero name	Rank on Reddit	Flair Count	Rank in game	Pick Percentage
Rubick	1	5170	26	12.07%
Invoker	2	5107	5	24.26%
Crystal Maiden	3	4328	25	12.73%
Windranger	4	3769	12	16.95%
Meepo	5	2960	102	2.58%
Techies	6	2880	75	5.59%
Templar Assasin	7	2716	91	3.98%
Storm Spirit	8	2561	34	10.62%
Shadow Fiend	9	2427	3	25.31%
Io	10	2273	107	2.23%

4.2.4 Flair as a Stylistic Resource

In her article "Variation and the Indexical Field" [2008], Eckert addresses what she calls persona style (page 456-457). Persona style in this view is rooted in the recognition that we as humans ascribe social meaning to variation, whether that variation is linguistic, clothing, posture, or otherwise. These variables to which meaning is ascribed combine together to form a style through the process of bricolage, whereby individual variables are cobbled together to make a unique whole [Hebdige, 1984]. Crucial to Eckert's view of style is the understanding that the meanings attributed to variables are not static; rather they are in constant flux as a community's perception and use of them shift over time through "a continual process of production and reproduction" [Eckert, 2008, p. 256].

These shifting connections between variables and meaning are an example of indexicality in action; use of a particular variable serves to associate the user of the variable with certain attributes, perhaps as a certain type of person [Silverstein, 1976, 2003]. Variation, then, becomes a site of useful resources in the construction of persona styles and identities. By wielding a collection of variables, a person constructs for themselves a subsequent collection of attributes, the amalgam of which is seen as their style.

The notions of style and indexicality are critical for understanding how flair, as the virtual representation of the player, serve to influence the linguistic environment in which they are found. In this community, flair serves as a social resource which can be leveraged by players to index things about themselves and construct their own persona styles. Consider the conversation shown in (17).

(17) 1. Techies: yes would be great

2. Techies: i was archon 2 yesterday but i used a few tokens now i am leaderboard player top 50

3. Lone Druid: Techies flair ppl are always the dankest memers

4. Invoker: because if you play techies social ostracism and clinical depression are the basic requirements

5. Shadow Demon: It all makes sense now

The context for this conversation is a thread on whether or not a list of the top players in the game should be readily viewable within the game client. The first two lines of this snippet of conversation are made by a player with flair representing the hero known as Techies. In line (2) the speaker discusses their own rank progression at the very highest levels of skill. Given the difficulty of achieving such a feat, Techies' comment is judged to be in jest, as demonstrated in line (3) proclaiming that "techies flair people" are excellent at making such jokes. Line (3) demonstrates two critical aspects of the community in question. First it shows that, at least for this member, people on the forum can be grouped into categories based on their flair selection, making "techies flair ppl" a socially relevant category. For a more familiar example, this statement can be seen as a parallel to someone making a statement about people who wear baggy jeans: it assumes that the act of wearing baggy jeans, or selecting a techies flair, is a socially relevant marker. Second, it demonstrates a particular meaning ascribed to the social variable of selecting this particular hero as one's flair, namely that this flair is associated with successful humor attempts.

Line (4) is a direct follow-up to line two in the sense that it ascribes social meaning to the selection of Techies as a flair, though in this instance the attributes indexed by the Techies flair are being socially ostracized and being clinically depressed. These two negative associations join the positive association in line (3) to form a set of traits which may be indexed by selecting a Techies flair. This list, a nebulous and shifting cloud of possible indexical connections is what [Eckert, 2008, p.454] calls the indexical field.

Line (4) suggests that these social valuations are true not of people who select Techies as their flair, but rather of people who play Techies in the game Dota 2. Why then, is this line relevant in the context of the conversation? The underlying assumption, another instance of indexicality, is that people who select a hero as their flair have selected their favorite hero. Furthermore, based on the assumption of the shared enterprise which binds this community of practice, namely playing the game Dota 2, it is assumed that the player is a fan of the given hero not from merely an aesthetic or character design standpoint, but that the person actually engages in playing that hero regularly. It is in this light that Line (4) can be seen as a relevant comment which has bearing on explicitly detailing what social attributes as assigned to "Techies flair people".

4.3 Data

The data used in this chapter comes from the Reddit corpus, a corpus of 117,091 comments (2.85 million words) from the popular website Reddit (www.reddit.com), specifically the sub-forum (subreddit) dedicated to the Dota 2 community. Data were collected from the archive at www.pushshift.io from March to June 2018 [Baumgartner et al., 2020]. Additional statistics and details on the collection process can be found in Chapter 2.

Any registered participant can create a new thread on a Reddit forum. The thread itself could be a picture, a video, a link to an external site, or simply text. Other registered users can then comment on the the thread, treating it as a typical discussion forum. Both the

Table 4.2: Reddit Corpus Stats

Total Messages	117,091
Total Words	2852037
Mean Words per Message	24.36
Median Words per Message	14

original post and the subsequent comments can be upvoted or downvoted by other members. How well a topic does in the this voting process controls how close to the top of the website the post appears. Posts that accrue a large amount of upvotes appear at the top of the web page, drastically improving visibility to other users.

In addition to increasing the visibility of a particular post, when a post or comment gets upvoted, it contributes to the user's *karma* score. Karma is roughly a measure of the valued contributions a user has made to reddit.com. Karma increases with upvotes and decreases with downvotes, though karma scores do not necessarily increase by one for every upvote. While karma has no value outside of the Reddit community, and cannot be spent like traditional currency, a high karma score does increase the legitimacy of a user's contributions to the community.

4.3.1 Subreddits

The main Reddit website is broken up into a multitude of sub-communities, called subreddits.[2] Each subreddit is typically devoted to a certain kind of posting, these can be topical, such as r/sports, r/politics, or r/pokemon, or they can specify the type or formatting of the posts allowed, such as r/jokes, r/TIL (Today I learned), or r/dankmemes. Once a user has registered a username on Reddit, they can subscribe to specific subreddits. The subreddits a user is subscribed to control the posts on their front page. Additionally, users can choose to browse specific subreddits, seeing only posts which were posted to that subreddit. This

2. Subreddits are referenced by the name of the subreddit preceded by r/, thus the Dota 2 subreddit is referenced here as r/Dota2. This convention is derived from the URL associated with each subreddit.

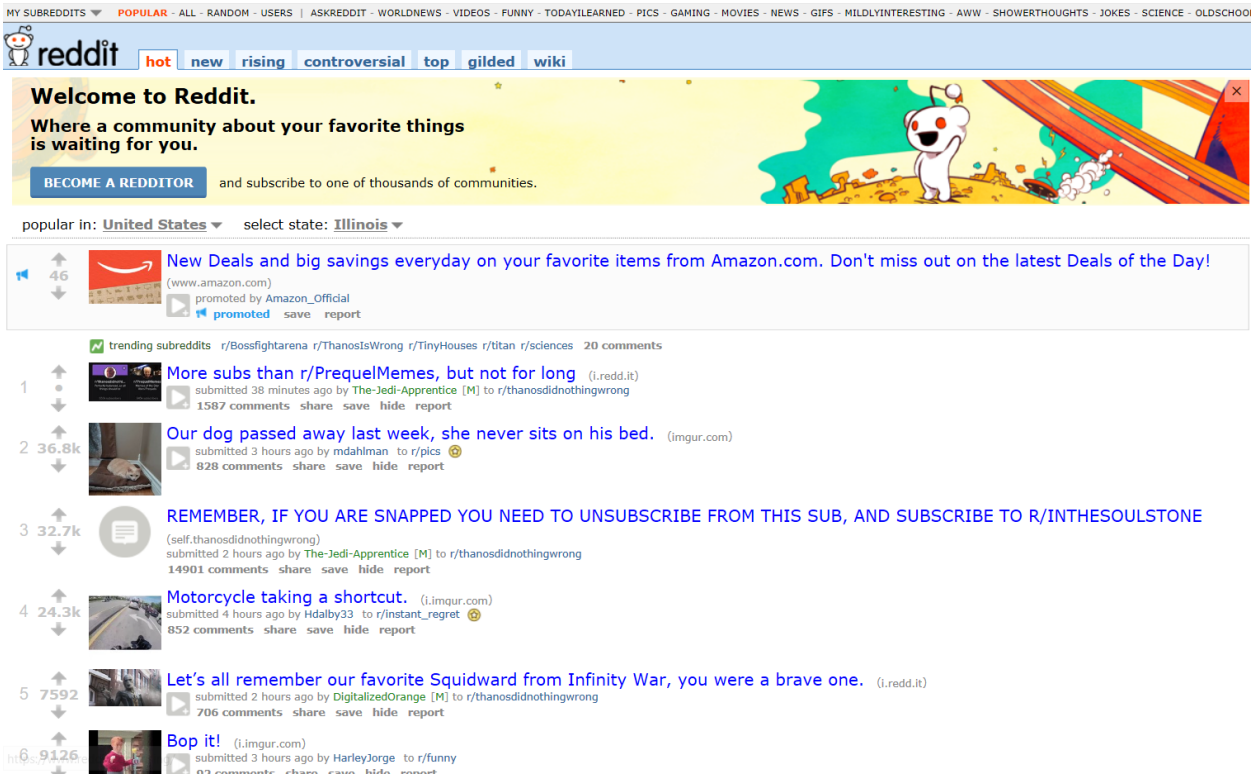

Figure 4.3: Reddit: The frontpage of the Internet

feature, being able to post and read on only a specific subreddit which other users on the site will never see (unless also subscribed), allows for an increased feeling of community belonging. The exclusivity of a subreddit only goes so far, however, as there are no limits to the number of subreddits which a user can subscribe to.

Subreddits vary wildly in size, with r/funny having over 18 million subscribers at the time of writing, while some more obscure subreddits may consist of only a handful of subscribers. Additionally, subreddits can set individualized rules on what qualifies as an appropriate post. While all posts on Reddit must abide by the site-wide posting rules, subreddits are free to further constrain this space as they see fit. Policing of these subreddit internal rules is done by moderators, who have the power to remove posts and comments which do not conform to the rules.

4.3.2 Linguistic Differences between Corpora

The type of data in the Reddit corpus is significantly different from the in-game comments analyzed in Chapter 3. Several major differences immediately present themselves. These include a difference in message length, formatting, subject matter, and discourse patterns.

The majority of these differences are relatively straightforward consequences of medium differences. In-game messages are, by definition, composed while conducting an additional time sensitive activity, namely playing the game. The simultaneity of these actions, combined with the fact that the input to both activities utilizes the keyboard, leads to an intense competition for resources. A player cannot play the game and write chat messages at the same time. This leads participants in the in-game environment to reduce the amount of time they spend composing messages, leading to shorter messages. These short messages allow a player to communicate, while minimizing the negative effects of typing a message has during gameplay. The average length of chats is 24.36 words per message in the Reddit corpus, as opposed to only 2.25 words per message for the in-game corpus. More general comparison

statistics are presented in Table 4.3.

Table 4.3: Summary Statistics for both corpuses

	Total Messages	Total Words	Mean message length
In game	3,412,627	7,666,725	2.25
Reddit	117,091	2,852,037	24.36

An additional effect of the simultaneity of playing and chatting in the in-game corpus is on the content of the messages. Due to the pressure on a player during the course of the game, messages are typically only composed and sent if they have immediate relevance with respect to the state of the game. This is contrasted sharply with messages in the Reddit corpus, where messages are composed at the leisure of the user, with relatively little time-pressure. Examples of these topical differences can be seen in Table 4.4. Note the diversity of topics in the Reddit examples, which range from commentary on professional teams (Example (1)) to an assessment of hero balance in the game (Example (2)).

It is important to keep in mind that the topics discussed in these two corpora are not mutually exclusive. Discussions in all cases (excluding a few bizarre outliers), have to do with Dota 2, either the game or community surrounding it. More specifically, there are several themes which appear frequently in both corpuses. Example (2) from the Reddit corpus and Example (4) from the in-game corpus both address the issue of hero balance. However, even in these instances of shared theme there is a critical difference. The messages in the in-game corpus are primarily direct stimulus responses. Whereas the speaker in (2) seems to want to genuinely discuss an issue he has with the balance of a certain hero in the game, the speaker in (4) has likely just died as a result of the actions of the discussed hero, and is expressing the resulting frustration of the moment by blaming the failure on the game itself rather than their own skill as a player.

The form and structure of messages on the Reddit corpus also varies significantly from the messages found in-game. With little time pressure, redditors more often compose complete sentences which follow the traditional normative rules of written English, complete with

Table 4.4: Examples of messages in the Reddit Corpus

Reddit Corpus Examples
(1)Liquid IS a good team which is why they don't usually play like this and why it is insulting to themselves, their fans and their opponents when they play like they don't care.
(2)IO is broken right now in divine brackets
(3)WHO FUCKING CARES BTW?
In-game Corpus Examples
(4) gg broken hero is broken
(5) WE CAN WIN THIs
(6) pls ban invoker pls

capitalization and punctuation. Example (1) in Table 4.4 demonstrates this, showing several features of standard written language that are missing from Examples (4)-(6). The beginning of the sentence is capitalized, and an apostrophe is appropriately used in the contraction 'don't'. Punctuation, such as a comma and period, are also used, if a bit more haphazardly.

Despite this tendency towards standard language in the Reddit corpus, there is still a great deal of non-standard language use, both conventionalized and unconventionalized. Common online conventions for written language such as capitalization as an emphasis marker can be seen in both examples (1) and (3) of Table 4.4, with Example (3) using a more extreme form of capitalization to serve as a parallel to increased volume in spoken language. Example (3) also makes use of the acronym 'BTW' standing for the phrase 'by the way'. Other examples of non-conventionalized non-standard language include an increased amount of typos and misspellings.

4.4 Quantitative Findings

4.4.1 Methods

The quantitative methods of this section follow closely those outlined in Chapter 3 Section 3.3. With the reddit flair serving as the virtual depiction of the speaker, speakers were

partitioned into categories based on the properties of their virtual representations. The categories fall along three axes: role, faction, and gender. Speakers are divided into groups for two primary reasons. The first is an effort to increase the amount of data in each category. While theoretically the data set could profitably be divided by individual hero flair itself, this would split the data into over 100 categories, making the amount of data for any given category to small too be of use.

A second advantage of combining the heroes into community relevant groupings is to more easily ascertain what sort of distinctions between heroes, if any, community members pay attention to. It could be that speakers pay more attention to aesthetically oriented variables like gender (and to a lesser extent, faction) than to gameplay-oriented categories like role. The aesthetic/functional associations of each categorical axis are summarized in Table 4.5. These particular axes were selected in order to better explore potential differences between variables which (a) affect gameplay (role), (b) are aesthetically based (gender), or (c) are part of the heroes background based on lore determined by the game creators. The effect of these categorical distinctions and their and their relevance for video game character creation and game developer responsibility is explored further in Burkholder [2019].

Table 4.5: Avatar Distinction Categories

Category	Functional	Aesthetic
Role	High	Low
Gender	Low	High
Faction	Low	Low

Each axis allows for a relatively straightforward binary categorization. Role is thus split into the emically validated categories of 'carry' and 'support' (See Chapter 2 Section 2.2.1 for the meaning and import of this distinction to the community), faction is divided into 'Radiant' and 'Dire', a game specific recasting of the heroes (Radiant) and villains (Dire) trope. Gender is divided into male and female.

Once the speakers were categorized into groups, each group was tested using a form of

sentiment analysis borrowed from the Linguistic Inquiry and Word Count (LIWC), developed by Pennebaker et al. [2015]. LIWC is a sentiment analysis toolkit which creates a number of large dictionaries containing words relevant to a particular psychometric trait, such as anger, self-focus, or happiness. A simple tag and count is then performed on the data returning the percentage of total words which fall into each of the LIWC dictionaries. Thus a speaker using words like 'hate', 'destroy', and 'mangle', will score more highly (in terms of percentage points) in the anger category then will a speaker who instead uses more neutral words such as 'write', 'lion', and 'chair' [Pennebaker et al., 2015].

The LIWC system provides a straightforward way to look for linguistic differences across large sets of data at a lexical level. Studies utilizing LIWC have been shown to be capable of uncovering meaningful patterns in various populations [Pennebaker et al., 2014, Kacewicz et al., 2014, Cohn et al., 2004, Pasupathi, 2007]. For the present work, four dictionaries were selected: certain, tentative, rude, and polite. Due to the large differences in the two corpora analyzed here as compared to the texts for which LIWC was originally constructed, significant community-specific alterations and additions were made to the LIWC dictionaries. Relevant samples of the dictionaries themselves can be found in Appendix B.

4.4.2 Quantitative Results

Once the dictionaries were compiled, the speech data for each speaker in a given category were analyzed. For each categorical axis this resulted in two scored populations, which were then compared using a straightforward two-tailed T-test assuming unequal variance. The P-values of the resulting T-tests are presented in Table 4.6.

As can be seen in Table 4.6, none of the results from these tests are significant ($p < .05$). This differs markedly from the data analyzed the same way in Chapter 3 Section 3.3, where several results were significant at this level.

Table 4.6: T-Tests of Reddit Categories by Variable

-	Role	Faction	Gender
Certain	.626	.292	.785
Tentative	.114	.194	.226
Rude	.271	.148	.226
Polite	.734	.732	.572

4.4.3 Discussion of Results

A central question is how the lower level of embodiment found in the Reddit corpus affects the differentiation in language use we might expect from the Proteus Effect. The expectation based on prior research is that there should be less evidence of the Proteus Effect due to the reduced levels of embodiment in the environment with two-dimensional flair rather than fully realized and controllable avatars [Fox et al., 2013]. The results in Table 4.6, when compared with the parallel results from Chapter 3, support such findings, suggesting that lower levels of embodiment result in lower linguistic differentiation based on speaker avatar.

It is crucial to keep in mind that unlike many of the original Proteus Effect studies, which control at least in part for player demographics and tendencies by randomly assigning avatars to players, this study has no control over the selection of avatars by the speakers in this community. This differentiation affects the possible explanations when comparing the significant results of Chapter 3, to the insignificant results found here. One possibility, as suggested earlier, is that the the decreased level of embodiment in the Reddit corpus explains the lack of differentiation. Another possible explanation, however, is that the community employs different criteria for avatar selection in the Reddit corpus when compared to the in-game corpus, and it is this difference in selection process which results in the observed difference in significance between the two corpora.

To speculate on this possibility more, it could be that different types of players are drawn to the gameplay mechanics of certain hero roles, and thus pick them systematically more in the in-game corpus in search of this mechanical attribute. We can call this the jerks-pick-

jerks effect, building on the community driven knowledge that it takes a certain 'jerky' type of person to pick certain 'jerk' heroes. The lack of significance in the tests found in Table 4.6 could thus be a amelioration of the jerks-pick-jerks effect, in a medium where picking certain heroes serves ONLY aesthetic purposes, rather than mechanical ones. In future research data could be collected in a more controlled environment where hero selection is more tightly regulated in order to better address this issue.

The possibility remains as well that there do indeed exist Proteus-like effects in the Reddit corpus, they simply exhibit differently than those demonstrated in Chapter 3, or that the LIWC methodology leveraged requires more nuance in order to observe the hypothetical linguistic differences. As a nod to this possibility, Section 4.5 demonstrates that qualitatively the speaker avatar does have an explicit effect on language use and discourse patterns, though these remain undetected by the quantitative methods leveraged in this section.

4.5 Qualitative Findings

The evidence provided thus far has used quantitative evidence to determine whether or not there exists a connection between a community member's flair and their speech patterns. In contrast, this section uses a qualitative approach to uncover differential patterns of use based on virtual representation that are not evident from lexical data alone. In addition this section looks in more depth at the meaning of these differences to the community in question, asking questions about the meta-awareness of the community with regards to flair (Section 4.5.1), and how flair serves to provide additional context to the community space (Section 4.5.2). Lastly this section provides some insight into the nature of the connection between flair and speech in the community by looking at specific examples in which flair is used as a stylistic resource. This stylistic resource can be leveraged in order to lend authenticity and weight to the argument of the speaker (Section 4.5.3), create an indexical connection between the speaker and the flair (Section 4.5.4), or provide differential access to speech acts

and voices to community members based on their flair (Section 4.5.5).

4.5.1 Flair Meta-awareness

Unlike players in the in-game data-set, who rarely if ever explicitly associate speech acts with particular characters or character types, contributors in the Reddit data-set seem much more aware of other participants' flair choices, and the associations between their flair and their linguistic behavior. It is not uncommon for Reddit users to make reference to another user's flair (see also Figure 2.5). The most common reference to another user's flair is through the phrase 'flair checks out', which is a Reddit-wide set phrase which draws attention to the user's flair with respect to the comment they have just made. In the broadest sense this speech act is a commentary that the user's flair is relevant to the comment they just made.

For example, in (18), users are discussing a picture in which the poster is dressed up like the Dota 2 hero Queen of Pain (cosplay).

(18) 1. Queen of Pain: Holy shit! This is the greatest thing I've ever seen!

2. No flair: flair checks out

The first comment, which expresses excitement at the cosplay picture of Queen of Pain, is made by someone with Queen of Pain selected as their flair. A subsequent speaker notices this association, and uses the 'flair checks out' phrase to comment that it is expected that users with a hero chosen as their flair are more likely to appreciate content which is centered around that hero. We can see in this example, and in many uses of the phrase 'flair checks out', that the flair a user chooses can give extra weight to the comment that they have posted.

This raises the question of what sort of social work flair is accomplishing in this community. In (18), the flair seems to give additional credence to the fact that the speaker truly does appreciate the Queen of Pain cosplay, since this is more believable coming from someone who has previously shown their dedication to the character Queen of Pain by selecting her as

their flair. The following sections take a more in-depth look at how community members use the concept of flair as a social resource to recontextualize the linguistic environment (Section 4.5.2), or index individuals with a variety of social qualities through the process of indexical ordering [Silverstein, 2003].

4.5.2 Flair as Context

Participants' flairs serve as part of the context in which conversation happens. As we saw in example (18), flair-as-context can be understood as a conversational resource which can be invoked and utilized by either the user whose flair is in question, or by other participants. This ability of flair to recontextualize conversations is explicitly discussed within the Dota 2 subreddit by the community members themselves.

(19) 1. Weaver: It's not nearly as funny coming from an EG flaired poster tbh.

2. EG: Why do people actually care about flairs on this sub? The flair of the user doesn't change how funny it is at all.

3. No flair: Just because you don't find something funny doesn't mean you're "upset".

Generally speaking it's obvious that the context of a joke changes the interpretation you should make of it. A joke will set a very different vibe coming from one person or another for example, and the flair simply is a part of this context, and it's even most of it on the internet where the context is limited.

Not saying his interpretation is the correct one, but it's a perfectly rational assumption and it's understandable that coming from this assumption it changes the meaning of the joke and makes it more awkward than funny.

Example (19) comes from a thread in which the poster makes a series of jokes about the quality of the performance of a popular professional team, Team Liquid. In line (1), Weaver comments that the joke is made less funny due to the fact that the original poster has the flair of Team Liquid's rival team, Team Evil Genius (EG). This comment is based on a cultural norm which allows supporters of a team to make self-deprecating jokes about their own team, whereas comments made about opposing teams are seen as more aggressive, and thus taboo.

In line (2), a speaker with no flair questions the community's high level of attention to a participant's flair, (a phenomenon discussed in Section 4.5.1), in an attempt to deny the social significance of flair in general.

The last line of this example is over 100 words in length, quite a bit longer than the average words-per-line rate of 24 within the corpus, and also demonstrates a stricter adherence to the prescribed norms of English writing, including the use of punctuation, capitalization, and complete sentences (See Section 4.3.2 for more on corpus relevant grammatical tendencies). In this comment the user eloquently explains the idea of that flairs serve as contextual setting for many of the conversations in the community. Furthermore, the user points to the relative lack of social cues available in the online setting as an explanation for the increased reliance upon player flair within the community. This comment serves both as further evidence of the high degree of flair-meta awareness within the community, and outlines its role in contextualizing speech acts on the forum.

Example (19) also showcases how flair recontextualization is used for humor, one of the main genres in which flair recontextualization happens. An additional example of humorous contextualization is given in (20). This example features a community member with Techies flair, the same flair as (2.5). This conversation highlights yet another indexical association with the hero, that the community views this hero as frustrating to play against. In some game modes of Dota 2, players can select heroes to make unavailable for either team to play.

In competitive play this mechanic is used to eliminate heroes who would be particularly detrimental to the strategy the team is forming. In lower levels of play this mechanic is more often used to ban heroes that players find to be frustrating to play against. In (20), users discuss this process of banning heroes from games, and whether or not it should be possible for the same hero to be banned in consecutive games.

(20) 1. Techies: Why should people be forced to play the way you want them to? Some people enjoy spamming just 1 hero

2. Templar Assassin: Techies flair makes this ironic. Seriously though, i agree with not having 100% ban but not to accommodate low hero pool players, but because it is good to face heroes you don't like from time to time.

In (20), the user with the techies flair makes the point that the same hero should not be able to be banned in every single game as this is unfair to people who play the game specifically hoping to select that hero. Line (2) draws attention to the previous speaker's flair, suggesting that the fact that the flair is a depiction of Techies, a hero who suffers from a high ban rate in low level matches, recontextualizes the comment. The comment shifts from contributing to the discussion of the game mechanics of banning certain heroes in consecutive games, to being seen as a complaint that the user with a Techies flair cannot play their presumed favorite hero as often as they would like. This conversational move is the result of a connection being drawn between the content of the user's comment (discussing heroes being banned) and the user's flair (a hero that is very often banned). In this example the user with a Phantom Assassin flair intentionally causes this recontextualization to humorously highlight the possible bias in the Techies player's comment. Thus, the user's selection of a Techies player has detracted from their argument by arousing the suspicion of bias, rather than lending weight to their assessment as in (18).

The recontextualization move performed by Phantom Assassin in (20) requires a significant amount of knowledge about the Dota 2 community. First it takes advantage of an

existing formula, which is the 'flair checks out' set phrase shared in many subreddits, and uses it in an contextually appropriate place. Furthermore, it makes use of more specific Dota 2 knowledge, which is that Techies is a hero that is often banned. Additionally, some of the humour comes of Phantom Assassin's comment comes at the expense of the user with the Techies flair. In this instance Phantom Assassin correctly judges that the community will accept such potentially face-damaging comments, as many players in the community see Techies as a frustrating hero to play against, and thus are perhaps less likely to come to their defense.

4.5.3 Authenticity and Authority

The following excerpt shows an example of the user's flair seeming to add extra weight, authenticity, and perspective to a comment made by that user. In (21) users are discussing the current power level and survivability of the character Io, who had recently been changed by the developers.

(21) 1. Speaker A: Io is a fragile, easy to kill character. he died only 2 times during the match, while half of EG kills were on Ogre Magi. EG just dug their own grave

2 Io: New IO is very hard to kill if he gets a good timing on his first item. The hero is crazy

3. Speaker A: it takes an Io flair to say that but yeah, that ball of light is really strong in good hands

In (21) the two users discuss the current state of the hero Io. Line (1) and (2) directly contradict each other in opinion on the survivability of the hero. In line (3) the community member who originally had a negative opinion of Io seems to be relatively convinced by the argument presented in line (2). Before admitting that their original assessment of the hero was not entirely accurate, however, this person notes the flair of the line (2) commenter. This small act of mentioning the flair is packed with meaning. First, it follows some of

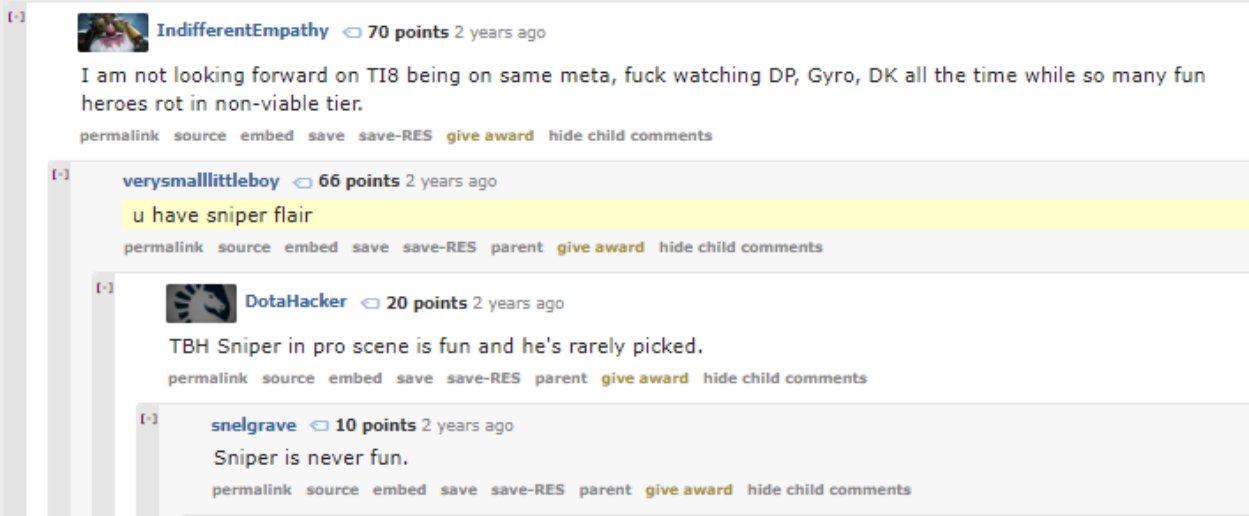

Figure 4.4: A reddit conversation showcasing authenticity

the expected assumptions of the indexical meanings of flair, as discussed in Section 4.2.4. Namely, what is being alluded to is the fact that the community member with an Io flair is likely to be a fan of the hero Io, and thus speaking out positively about the hero is an expected action.

Beyond this simple connection though, lies a further indexical action which assumes that someone with a particular hero flair is likely to actively engage in playing the hero in the game Dota 2. This assumed experience in actually playing the hero serves to make those with particular hero flairs de facto experts on the hero in question. This effect is likely amplified by the fact that Io is a hero that very rarely sees any play, as shown in Table 4.1, thus participants are even less likely to have much experience playing the hero. This social assumption in the community allows the user with the Io flair to debate from a position of power, the result of which can be seen in the change of opinion of Speaker A in line (3).

While community members may benefit from the assumption of expertise with their flair hero, as demonstrated in example (21), in certain scenarios a community member's flair may also serve to decrease the legitimacy of their argument, or make them less believable.

In Figure 4.4, a speaker with a flair depicting the hero Sniper laments the fact that "so

many fun heroes rot in non-viable tier", essentially that there exists a large number of heroes which are viewed as not strong enough to be used in professional matches. On the surface the immediate response to this lament is a simple statement identifying the original poster's flair as Sniper. Out of context this response seems like an inappropriate pair-part to the previous line.

With the original statement serving as an evaluative claim, we should expect the response to be either agreement or disagreement, perhaps in the form of support evidence or a counter-argument. Within its context, this second statement shows itself to be not only a response to the statement provided in the text, but to be sensitive to the entirety of the context, including the speaker's flair. This flair-as-context recontextualizes the original poster's claim to be viewed not as a simple statement about there existing fun heroes that do not see play, but more specifically a complaint that Sniper is among those fun heroes that do not see play. This recontextualization transforms an abstract complaint about the state of the game into a personal complaint about the status of the speaker's favorite hero. Even given this recontextualization move, the statement "you have sniper flair" reads as irrelevant to observers outside of the Dota 2 community. Only with the knowledge that Sniper is largely viewed as an annoying and 'unfun' hero does the full picture come into view.

With the combination of the flair recontextualization and the necessary community knowledge, this conversation which at first seems to be full of non sequiturs transforms into one which follows the expected patterns of discourse. In the line (1), a user with Sniper flair makes a complaint about there existing a group of fun-heroes which does not see any play, a group which is presumed to contain the hero Sniper on account of the poster's flair. Line (2) highlights this presumption, calling upon community knowledge to dispute the fact that Sniper meets the two necessary qualifications a) fun and b) unplayed, on account that the hero is in fact not fun at all. Lines (3) and (4) serve as confirmation that the counter-argument provided in line (2) was successfully understood. Line (3), provides a direct support

for the claim in line (1), explicitly claiming that Sniper meets both necessary conditions for line (1) to be true. Line (4), while it doesn't add any new information to the argument, clearly supports the counter-argument provided in line (2). Building on ideas presented in Sacks et al. [1974], this interpretation of the conversation happening in this example can be viewed schematically as depicted in (22).

(22) 1. Argument in presented
2. Counter-argument is made
3. Support for argument is presented
4. Support for counter-argument is presented

What is critical to the analysis being made here is the fact that the counter-argument in line two was not made based on the text of line one alone, but on the combination of the text and the flair of the speaker. In this scenario the flair of the speaker served to de-legitimize the argument being made, rather than adding authenticity as was seen in example (21).

4.5.4 Indexical Order

The majority of the examples presented thus far in the chapter have involved some level of indexicality. Example (18), for instance, relies on an indexical move whereby a speaker with a given flair is indexed as being a fan of the depicted hero. Example (21) takes this process one step further via indexical ordering and assumes that players with a given flair are not only fans of the hero, but in fact experts on playing the hero [Silverstein, 2003]. In both of these instances, assumptions are made about the speaker based on a presumption of their preferences and how they spend their time. In the present section a different aspect of indexicality is explored, in which a speaker with a given flair is indexed as having the traits of the hero themselves.

(23) 1. Speaker A: Lions are not jungle animals.

2. Speaker B: Both can be viewed as correct, as the word jungle is a Hindi word for an uninhabited place. This includes steppes, forests, etc. That's how it became known as king of the jungle.

3. Speaker A: Dude, this is an English forum and the comment is all in English. Stop nitpicking and bullshitting.

4. Speaker B: Lions are universally known as the king of the jungle you idiot.I was trying to be polite but fuck off if you're going to act like that. Congratulations on being clueless about such a common turn of phrase. Ogre flair checks out.

5. Speaker C: It's okay, in here we forgive the ogre flair

6. Speaker B: Only if the ogre flair wielders are cool. When they're condescending douchebags my forgiveness goes missing.

In (23), a debate is had on the topic of whether or not lions count as jungle animals, a debate sparked by the phrase 'king of the jungle' being used to describe lions. Speaker A opens the debate in line one by declaring the view that lions are in fact not jungle animals. Speaker B presents a counter-argument to this position using the Hindi etymology of the word *jungle* as evidence. Up to this point the debate has been largely good-natured. This good-naturedness takes a swift turn in lines (3) and (4) as the debate quickly devolves to name-calling. Line (4) is particularly interesting as Speaker B makes explicit reference to Speaker A's flair as part of the name-calling speech act, stating "Congratulations on being clueless about such a common turn of phrase. Ogre Flair checks out." Here the common flair meta-awareness phrase "flair checks out" is leveraged to draw attention to Speaker A's chosen flair, representing the hero Ogre Magi (see Section 4.5.1 for more on this awareness phenomenon). This move crucially relies on specific community knowledge about the character Ogre Magi.

Ogre Magi is a hero who is portrayed in game as a two-headed ogre, relying in particular on the stereotype of ogres as being slow and dimwitted. This hero persona is showcased

through a series of voice lines which can be heard as one plays the character. These voice lines often involve a dialogue between the two heads of the character with exchanges such as "Head one: I'm the Ogre Magi! Head two: No, you are!" or "Head A: We got this one in the bag. Head B: Where'd you get a bag?". Given this community perception of the hero Ogre Magi, Line (4)'s mention of this flair serves to draw a particular indexical connection between Speaker A and the dimwittedness of Ogre Magi, implying that all community members with Ogre Magi flair are presumed to be dimwitted. This flair-based insult can be seen as effectively communicated based on line (5)'s defense of community members with Ogre Magi flair.

What makes this example of indexicality and indexical ordering different from previous examples is that the speaker is being indexed based on the in-game persona of the character, rather than a more direct indexical connection between speakers with a hero flair and a proclivity towards enjoying or playing the depicted flair hero. This level of indexicality relies on a significantly more nuanced understanding of community perceptions. Choosing a flair does much more than indexes you as a fan of that hero, an indexical process which can be reduced to the simple algorithm of 'Speaker X selects a flair depicting Hero A, therefore Speaker X likes/plays Hero A', a schematic that can successfully be applied with impartiality to every hero in the Dota 2 roster. Rather, the selection of a flair depicting a hero indexes a speaker with a myriad of higher order indexical properties based on the communities construction of the persona of the hero involved, information which is unique to each individual hero in the game.

A last point of interest in (23) is the reference in line (6) to 'Ogre Magi flair wielders'. This descriptive phrase is an emic reflection of the idea presented in Section 4.2.4 that variants, both linguistic and otherwise, can serve as stylistic resources which can be 'wielded' by participants to bring about social consequences and shifts in perception.

4.5.5 Contrasting Voices

The final example of flair in the Dota 2 community serving as a stylistic resource is in the creation and production of certain styles of speaking, or *voices*. The term voices in this context is used in the sense presented in Bakhtin [1981, 1984], and developed in more depth by Agha [2005]. In these works voice represents a style of speaking which is differentiable from its surrounding co-text, and can be associated with either specific biographic individuals (what Bakhtin calls 'individual voices') or with broader more generalized meanings (Bakhtin's 'social voices'). For example an individual may shift speaking styles to imitate the voice particular celebrities in an attempt at humor, such as John Wayne or Arnold Schwarzenegger (individual voices) or a child may adopt the voicing and persona of a parent when lecturing a younger sibling (though the voice need not be related to the child's specific parents, only parenthood at large). Here we only concern ourselves with Bakhtin's individual voices, where community members in the Dota 2 subreddit adopt the voices of the heroes depicted in their flair.

In his groundbreaking work on the topic of voice and enregisterment, Agha [2005] identifies three features necessary in the successful production and reception of voice: a) identifiable and differentiable characteristics of repertoires; b) stereotypes of indexical effectiveness, or what people associate with the voice; and c) a social domain of users capable of the identification and production of the voice. Taking Figure 4.5 as an example of voicing in the Dota 2 community, this section looks at each of these features in turn, and the role that flair selection plays in aiding the successful deployment of voicing in the community.

In (4.5), repeated in textual form in (24), a conversation occurs between three speakers on the Dota 2 subreddit. The topic of discussion is a change to the hero Arc Warden's abilities that the the game creator Valve had considered, but ultimately not implemented. The first two lines of this conversation are both contributed by community members who have selected Arc Warden as their flair hero. Line (3) is an additional comment on the same

Figure 4.5: A reddit conversation showcasing authenticity and voicing

topic made by a user with no visible flair. At this point in the conversation the topic shifts markedly, with the remainder of the conversation centering on the third speaker and their flair-less status. Line (4) presents the initial argument against the flair-less speaker, explicitly recognizing and calling attention to the community standard that an argument made by a speaker without the appropriate hero flair bears less weight and authenticity than one made by a speaker with the appropriate flair (see Section 4.5.3)

Voicing Contrast

Starting with line (6) in Example (24), both speakers wielding an Arc Warden flair change voices from their default (illustrated in lines (1) and (2)) to voicing the hero Arc Warden (lines 6,7,9). This voicing change is denoted by a contrast in speech styles, including changes in metrical style, topic, and word choice [Agha, 2005]. This sudden change creates distinct textual zones in which different indexical values are associated with the Arc Warden flair wielding speakers.

(24) 1. Arc Warden 1: Balanced kappa. Maybe lvl 25

2. Arc Warden 2: It was supposed to be level 15

3. Arc Warden 2: You lose the ability to single target creeps/other units and it cannot break linken's anymore.

4. Arc Warden 1: Better than the boring cast range talent which is even worse then the DPS one that we had before

5. No Flair: I like the cast range talent

6. Arc Warden 1: No flair of self you don't count

7. Arc Warden 2: Inferior form,

8. No Flair: I am being attacked and discriminated against

9. Arc Warden 1: Your all alone in the flux...

The primary method of providing voicing contrast in Figure 4.5 is through direct citation of speech lines, phrases, and lexical items from the character Arc Warden's in-game voice lines. Line (7), for example, is a line that the in-game character Arc Warden says when defeating an enemy hero. In the present context this utterance can be seen as a metaphorical re-purposing not only of the text, but also of the context in which this line is uttered. While the original context for this line is the literal death of an opposing character, this line is re-purposed to signal the defeat (metaphorical death) of the argument presented by the flairless speaker. Lines (6) and (9), while not directly drawn out of the character's voice files, nonetheless borrow heavily from the lexical imagery the character is often known to use. The reference to 'the self' in line (6) mimics the habit of Arc Warden's character of referring to himself as 'self' or 'the self'.

Line (9) is more complex and requires more community knowledge to parse. The short second-person directed speech, often saying something ominous or threatening is typical of voice lines from the game Dota 2, and thus contributes to the voicing contrast of the text. Furthermore, the hero Arc Warden has the ability to cast a spell called 'flux' which creates a small area of effect on the map, any enemy caught alone in this area receives large amounts of damage. Thus line (9)'s proclamation that the flairless speaker is 'alone in flux' is a performative move which establishes the role of the speakers with Arc Warden flair as Arc Warden himself, and the flairless speaker as an enemy. What is crucial about this shift in footing and context is that the context in which in this exchange takes place is necessarily an 'in-game' context, albeit an imagined or hypothetical one [Goffman, 1981]. Through the use of all of these changes, lexical, metrical, and contextual, the voicing contrast is firmly established.

Stereotypes of Indexical Effectiveness

Once a voicing contrast has been identified and differentiated from the surrounding co-text, it becomes available for indexical valuation [Agha, 2005]. In (24), this relies on a community-shared notion of what Arc Warden is like, which is then indexically transferred to the speaker making use of the character's voice. Such stereotypes in the Dota 2 community tend to come from one of two origins, (a) the personality imbued in the character by its physical manifestations (appearance and voice lines); or (b) from the mechanical abilities of the hero themselves, which may serve to make the hero difficult to play, or annoying to play against, etc... Each of these sources of stereotypes are also subject to the communities perception of what type of person is drawn to that hero or type of hero.

With regards to the particular hero in (24), Arc Warden is seen as a complex, intelligent, aloof hero. His status as a mage, combined with his cryptic dialogue often involving vaguely science-adjacent topics such as the 'flux' create this perception in the community. Furthermore, this hero is most efficiently utilized with an atypical play pattern which is seen as requiring player skill and knowledge to a large degree, leading to the perception of people that play or associate themselves with the hero as competent, skilled, and intelligent (if somewhat anti-social).

Social Domain

Agha [2005] rightly points out that all of the voicing contrasts and stereotypes so far discussed are predicated by the fact that for any of this to function, there must exist a community which is capable of identifying and producing the voice in question. There must be people who can produce the speech act (voicing contrast) and still others capable of understanding, at least in some capacity, the meaning behind the speech act.

With respect to the case presented here, the Dota 2 community is exactly such a community. Much of the subtlety of the linguistic material relies on information only available

to those with knowledge of the game itself (which perhaps now, includes the reader, to a minimal extent). Example (24) provides co-textual evidence which suggests that the voicing contrasts present in the discourse are in fact successfully differentiated and understood in their intended context, as evidenced by the responses of other participants. In line (6) the flairless speaker speaks in his own defense, a speech act which itself only makes sense if the speaker (correctly) identifies lines 4-5 as attacks. More concrete evidence, however, is the uptake and continuation of the voicing contrast by a second speaker in line (5).

4.6 Conclusion

The primary goals of this chapter were (1) to explore the role of embodiment in Proteus-like effects by analyzing data from a corpus with particularly low-embodiment avatars, and (2) to demonstrate the advantages and necessity of leveraging multiple distinct corpora when researching online communities. With regards to the role of embodiment, the lack of statistically significant results in Section 4.4 suggest that high levels of embodiment may very well play a role in bringing about Proteus-like effects, particularly lexically-based effects. Section 4.5 complements Section 4.4 by illustrating how avatars nonetheless do seem to be playing an important role as a stylistic resource, affecting both the authority and availability of particular speech acts in the data. The data presented in these sections, when complemented by the quite different findings of Chapter 3, give a more complete picture of the role of avatars in the Dota 2 community, a view which would not have been attainable utilizing data from only a single community site.

4.6.1 Differences between Corpora

A summary of the differences between the two corpora analyzed is provided in Table 4.7. Of note is the difference between quantitative and qualitative findings in each of the corpora. While it is beyond the scope of the present study to demonstrate anything more than corre-

lation between the patterning of these qualitative and quantitative differences and the other variables displayed, a few observations and tentative hypotheses are offered here.

Table 4.7: Comparison of the Two Different Corpora

	In-game Corpus	Reddit Corpus
Message Length	Short	Long
Topics	Narrow	Broad
Time Pressure	Yes	No
Hero Selection	Functional	Stylistic
Quantitative Differences	Yes	No
Qualitative Differences	No	Yes

The first possibly meaningful connection illustrated by the work in this chapter is the connection between qualitative differences in the linguistic data and the availability of the avatar as a stylistic resource. Sections 4.2.4 and 4.5 demonstrate how the flair associated with a speaker in the community is viewed as meaningful social information about the speaker. Flair in this context is viewed as a window into the persona of the speaker themselves, viewed through the persona of the hero selected. It is this indexical valuation of speaker avatar which allows for the qualitative differentiation of speech acts in the corpus.

While this connection may exist in the in-game corpus as well as the Reddit corpus, there seems to be less reliance on this social dimension in-game. One possible explanation for this is that the community understands the increase in complexity of the demands on hero selection in the in-game environment. Not only must a player weigh their own personal preference for certain heroes at the beginning of a game, but they must also take into consideration what roles need to be filled by the team, what heroes they are skilled with, and how their potential hero may or may not synergize with their teammates' selections. The sum of this is that hero selection is likely the result of factors other than pure player preference in the in-game corpus. Hero selection in the Reddit corpus, contrarily, is purely a stylistic decision, with no regard to function or team composition. This lack of external consequences makes avatar selection a much better vehicle for stylistic statements and interpretation than the

corresponding in-game counterpart.

4.6.2 Future Work

Future work on the topics covered here aim to temper the limitations of the present study. These primarily rely on increasing the degree of control and regulation imposed on the study, at the expense of naturally occurring nature of the current corpus. In particular, increasing control over the hero selection process would decrease the number of confounds and allow for tighter connections to be drawn between the speaker's selected avatar and linguistic behavior. A potentially fruitful compromise between control and naturally occurring data could be drawing only data from a particular game mode of Dota 2 in which players are randomly assigned heroes rather than being allowed to select them. A further degree of control would exist in a longitudinal study in which a single player or group of players was given different heroes to play over time, and their linguistic data was tracked and analyzed for changes based on the hero they controlled. Care would need to be taken to avoid severing the connection to the Dota 2 community, which could be accomplished by selecting participants already embedded in the community.

A different line of future research would improve upon the simplistic lexically-based tests performed in Section 4.4. The current tests do not account well for any potential interactions between the tested variables, nor do they account for any degree of variation at the individual hero level. It could be that a more nuanced mixed effects model could detect meaningful linguistic differences that were missed by the generalizations made in this study.

CHAPTER 5

CONCLUSIONS AND DISCUSSION

The theoretical motivation behind this dissertation is to push on the boundaries of the Proteus Effect, looking at two naturally occurring environments to see the effects avatars have on linguistic behavior. Chapter 3 takes data from the game Dota 2 and explores how a set list of available avatars are given distinct personae by the community which plays the game. These personae are then enacted and performed by the community when controlling the avatars, leading to the observed Proteus-like Effects. This chapter furthers research on the Proteus Effect by not only looking for effects in a naturally occurring environment, but also moves beyond pinning these effects to avatar aesthetics, looking instead at community/context sensitive constructions of avatar identity in the community.

Chapter 4 continues this theoretical exploration of the Proteus Effect by looking for effects in a community with atypical avatars. Rather than looking at three dimensional virtual avatars which can be controlled and moved by a user, this chapter looks at a forum data set in which users select for themselves a two-dimensional profile picture. This condition thus explores the importance of embodiment in bringing about Proteus-like Effects [Fox et al., 2013, 2015]. Results suggest embodiment to be an important factor in bringing about traditional Proteus-like Effects, but notes that avatar selection and properties are still an important stylistic resource in the community even when the levels of embodiment are very low.

Taken together, Chapter 3 and Chapter 4 serve the methodological goal of this dissertation, which is to highlight the benefits of using multiple corpora taken from distinct interactional sites within a single community. Such an approach allows for comparisons between corpora, rightly viewing virtual communities as complex and multiplex, and makes possible a level of nuance which single-corpora studies can't match. It is the hope of this dissertation to serve as an example of the benefits of such an approach.

Table 5.1: Summary Statistics for both corpuses

	Total Messages	Total Words	Mean message length
In game	3,412,627	7,666,725	2.25
Reddit	117,091	2,852,037	24.36

5.1 The Proteus Effects In-game

Quantitative analysis of the data taken from the in-game corpus in Chapter 3 suggests that Proteus-like effects can indeed be found in naturally occurring environments. Table 3.3, repeated here for convenience as Table 5.2, shows statistically significant variation in linguistic behavior between players controlling heroes of different genders in all four linguistic categories (certain, rude, tentative, polite), and between players controlling heroes of different roles in two of the linguistic categories (tentative and rude).

Table 5.2: T-Tests of In-game Corpus Categories by Variable

-	Role	Faction	Gender
Certain	.000**	.242	.975
Tentative	.000**	.675	.015*
Rude	.039**	.147	.015*
Polite	.001**	.1	.572

While there are too many possible confounds in the naturally occurring data to prove that the correlations between avatar choice and linguistic behavior shown in Table 5.2 are causative (i.e. the avatar differences are causing the behavior differences), their presence outside of a laboratory environment is a large step forward in suggesting that the phenomenon is indeed an active factor in naturally occurring communities and interactions.

Prior research on the Proteus Effect has been largely concerned with the effects of an avatar's physical appearance on participant behavior [Yee and Bailenson, 2007, Peña et al., 2009, Peña, 2011, Sherrick et al., 2014, Palomares and Lee, 2010, Banakou et al., 2016, 2018]. The present work greatly extends our knowledge of the way the Proteus Effect works by looking not only at physically represented differences between avatars (such as gender),

but also looking at avatar distinctions which are created by and are important to the community themselves (role). Indeed, the most significant behavioral differences were found when avatars were grouped by these community-specific categories. Such context-sensitive categorization is a major contribution of this dissertation, and one which is only possible when investigating naturally occurring communities and data.

The qualitative analysis in Chapter 3 explores how the players' behavior is affected by their avatar selection. The general trends of behavioral alteration for each avatar category is given in Table 3.6, repeated here for convenience as Table 5.3. Table 5.3 shows that male avatars use rudeness terms more and politeness terms less, while carry and support avatars show differences in each category of linguistic behavior.

Table 5.3: Direction of Behavioral Change by Category

-	Rudeness	Politeness	Certainty	Tentativeness
Male	More	-	-	Less
Female	Less	-	-	More
Carry	More	Less	Less	Less
Support	Less	More	More	More

With the trends in behavior revealed in Table 5.3, the chapter suggests that many of these patterns, such as players controlling female avatars demonstrating more linguistic politeness, are drawn from the indexical associations and expectations in the non-virtual world [Coates, 1993]. These cultural expectations are reproduced by the Dota 2 community in the virtual environment.

5.2 Proteus Effects in Forum

Chapter 4 extends research on the Proteus Effect by analyzing a corpus of data taken from a forum dedicated to the Dota 2 community. By keeping the community the same, but significantly altering the medium from which the data is taken, the analysis of this corpus allows for meaningful comparisons with the in-game corpus (Chapter 3). In addition to

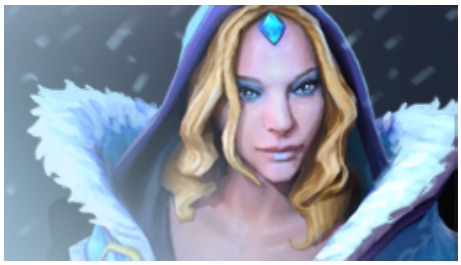

Figure 5.1: Flair for Crystal Maiden

Figure 5.2: Crystal Maiden's in-game model (avatar)

the structural and cultural differences afforded by the textual input and rendering of the two different virtual spaces, the primary difference between the two corpora is in terms of the avatar properties. While the in-game corpus features fully-fledged three dimensional character models whose actions are controllable by the player, the forum corpus features trimmed down avatar properties. The avatars in the forum corpus are static two-dimensional pictures which are selected by the forum users. These avatars cannot be altered or controlled in any way, appearing instead only as a small picture next to the textual posts made by the user. The visual differences between these two types of avatars are shown in Figures 2.3 and 2.4, repeated here for convenience as Figures 5.1 and 5.2, which shows a three-dimensional in-game avatar next to the corresponding two-dimensional forum corpus avatar for the same hero.

This marked difference in avatar characteristics leads to a difference in embodiment, the

feeling that a controlling player/participant identifies with the avatar. Prior work on the Proteus Effect has suggested that embodiment is a crucial factor in triggering the Proteus Effect [Fox et al., 2013, 2015]. The work in Chapter 4 is well positioned to further explore the importance of embodiment to the Proteus Effect by comparing the size of Proteus-like Effects in a corpus with high embodiment (in-game corpus) to a paralleled corpus with low embodiment (forum corpus). To this end, the same quantitative procedure performed on the in-game corpus in Chapter 3 was performed on the in-game corpus. The quantitative results of this analysis were given in Table 4.6, reproduced here.

Table 5.4: T-Tests of Reddit Categories by Variable

-	Role	Faction	Gender
Certain	.626	.292	.785
Tentative	.114	.194	.226
Rude	.271	.148	.226
Polite	.734	.732	.572

The results of the analysis performed show no significant effect of avatar type on linguistic behavior. This finding is quite different from the high levels of significance shown in the high-embodiment condition (given in Table 5.2), supporting the claim made by Fox et al. [2013] that embodiment plays a critical role in triggering the Proteus Effect.

Despite the lack of quantitatively significant results in the in-game corpus analysis, Chapter 4 shows that avatar choice and selection do play a meaningful role in the discourse patterns of the Dota 2 forum. Beyond lexical differences, avatar selection plays a role as a critical piece of context in interpreting discourse in the community. Participants in this community of practice can draw upon the community-shared knowledge of an avatar's personae to intentionally color the interpretations of their own comments, or of the comments of another participant. This context can lend authenticity and authority to a speakers comment (see Section 4.5.3) or give the speaker agency to invoke the voice of the avatar themselves in their comments (see Section 4.5.5).

5.3 Theoretical Ramifications: The Proteus Effect and Beyond

The findings from both the in-game corpus and the forum corpus make strides towards accomplishing the primary objective of this dissertation, pushing on the boundaries of the Proteus Effect. The three major findings with respect to the Proteus Effect are 1) the presence of Proteus-like Effects in a naturally occurring corpus, 2) non-aesthetic avatar characteristics triggering Proteus-like Effects, and 3) additional support for the importance of embodiment in triggering Proteus-like Effects.

5.3.1 Beyond the Laboratory

Prior research on the Proteus Effect has overwhelmingly taken place in a laboratory setting (Yee and Bailenson 2007, Peña 2011, Peña and Blackburn 2013, Peña et al. 2009; see Yee et al. 2009 for an exception). The reason for this laboratory preference is the unparalleled degree of control it gives the researcher when conducting the experiment. Participants in these research paradigms can be assigned specific avatars, the environments can be held constant, and the sequence of events is predictable, allowing researchers to avoid possible confounding factors in the connection between the characteristics of the avatar being controlled and performance on some behavioral metric. In addition, demographic information can be more easily collected from the participants in such an experimental setting.

While the nature of the Dota 2 game set-up mirrors many of these laboratory-like features (see Chapter 1 Section 2.3.3), the same level of control is not possible. As discussed in Section 5.5.1, the player's ability to select their own avatar, and the lack of background information on players, limits the possible level of control. However, the naturally occurring environment has distinct advantages over studies performed in a laboratory. The two key advantages highlighted in this dissertation are the increased levels of generalizability, and the preserved context of the data.

A possible downside to studying participants in such a controlled environment is that it is

unclear whether the effects discovered in a laboratory setting are unique to that environment, or whether they exist outside of the laboratory setting as well. The present study sheds some light on this problem by looking for effects originally established in a laboratory setting in a naturally occurring community. The findings here thus increase the generalizability of the Proteus Effect beyond the laboratory.

The preservation of community-context afforded by the naturally occurring data sets allows for more nuanced interpretation of the social aspects of the Proteus Effect, such as the qualitative importance of the two-dimensional avatars discussed in Chapter 4. Additionally, the retention of context increases the shared cultural knowledge found within the community at hand. This higher degree of shared cultural knowledge in turn allows for avatar characteristics other than aesthetic appearance to have a affect on the population in the same direction, uncovering the potential of such cultural determinate avatar characteristics to trigger Proteus-like Effects (see Section 5.3.2).

5.3.2 Beyond Appearances

The majority of studies which concern themselves with the Proteus Effect concern themselves with how avatar appearance can affect the controller's behavior. These differences in appearance include include the physical manifestations of gender [Lee et al., 2014, Palomares and Lee, 2010, Sherrick et al., 2014], race [Banakou et al., 2016, Peck et al., 2013] and weight [Obana et al., 2017]. The present study shows that the Proteus Effect is dependent on shared cultural knowledge through shared indexical relationships. For the Proteus Effect to be quantitatively discoverable within a population, participants must share enough knowledge of the avatar characteristic, such that this shared information alters the participants behavior in the same direction. For example, in Yee and Bailenson [2007], participants share enough of the indexical relationship between height and self-confidence to produce the effect that controlling taller avatars makes participants act more confidently.

Viewed from this perspective, prior studies dependence on aesthetic avatar characteristics is an artificial limitation based on laboratory design. By removing participants from the community contexts in which they live their lives, the amount of shared indexical relationships that exists in the population is greatly diminished, leaving what this dissertation calls broad characteristics, such as those based on appearances, but losing sight of more narrow cultural connections.

The findings in Chapter 3 suggest that these narrow cultural connections, such as the role an avatar plays in a specific game environment are not less likely to trigger Proteus-like Effects. In fact, narrow characteristics demonstrated statistically stronger results than broad characteristics in the in-game corpus. Rather, such narrow characteristics are less studied due to their context sensitivity.

5.3.3 The Importance of Embodiment

The study of multiple corpora from the same community allows for a high level of internal comparison. The role of embodiment in triggering the Proteus Effect is one such important comparison. The comparison here is between the in-game corpus, in which fully-realized three-dimensional avatars facilitate high levels of embodiment, and the forum corpus, in which two-dimensional avatars facilitate low levels of embodiment (see Chapter 4 Section 4.2.2).

Embodiment is a crucial factor in triggering the Proteus Effect. In research done by Fox et al. [2013], participants were more likely to be affected by the characteristics of an avatar if the avatar closely resembled them in facial features than when controlling an avatar who bore less resemblance to themselves. The present research provides additional support for the claim that embodiment increases the efficacy of the Proteus Effect by finding much stronger evidence for the Proteus Effect in the high-embodiment environment (in-game corpus) than in the low-embodiment environment (forum corpus).

5.4 Methodological Ramifications: Studying Virtual Communities

A secondary goal of this dissertation is to advocate for the use of multiple corpora in community-based studies. This methodology was demonstrated in the present dissertation by collecting data from two distinct interactional sites, each of which within the Dota 2 community (see Chapter 2 Section 2.5 for more on data collection). The benefits of this methodology are an increased level of nuance and internal comparison.

Communities today, both virtual and non-virtual, exist across multiple distinct spaces. While many of the community norms and expectations are held constant across these spaces, each site also comes with unique properties and experiences. This makes any community analysis which takes into account only a single interactional site, incomplete at best.

Much of the work done in 4, such as the findings concerning embodiment in Section 5.3.3, is comparative in nature, comparing the results from the in-game corpus to the results from the forum corpus. Such work is made possible by the existence of multiple corpora from the same community.

5.5 Limitations and Future Work

While this work has important ramifications, there remains more work to be done, both in terms of solidifying the present findings as well as pushing the work forward. Notes on the remaining issues and pathways forward are provided here.

5.5.1 Limitation: Participant Hero Selection

One of the main drawbacks of the research design of this project is participant's ability to select their own heroes during play. This lack of control makes it difficult to assess whether the behavioral differences seen between participants controlling different avatars is due to

avatar characteristics, as predicted by the Proteus Effect, or is the result of different types of people tending to choose different types of avatars (this problem is discussed in greater detail in Chapter 3 Section 3.1.1).

While this drawback is undeniable, it is the direct result of the intentional design of the study. The primary research goal of this project is to look for the Proteus Effect in a naturally occurring environment. In order to get the data which most accurately and honestly reflects the experience of the Dota 2 community, these limitations to the study were deemed an acceptable compromise. The alternative to this approach is to compromise the data set by removing participants from their local contexts and environments. Each of these decisions has advantages and disadvantages, and it is important to realize that such decisions in research design are rarely questions of better and worse, but rather a matter of choosing the design that best fits the research goals.

One possible mitigation strategy to the drawback of participants selecting their own avatar is to draw data from a different game mode within Dota 2. This game mode, called *all random*, randomly assigns a hero to each participant at the beginning of the game. This potentially allows for study of a naturally occurring environment, while maintaining a higher degree of control in terms of avatar selection. This data was not used for the current project due to simple scarcity. Since this game mode is not the default, far fewer games are played in this mode, allowing for significantly reduced amounts of data.

5.5.2 Limitation: Lack of Demographic Data

Another potential drawback which arises from the use of the naturally occurring data set is a lack of demographic information about the participants. Such data is not stored within the replay files, making the potential recovery of such information extremely tedious, if at all possible. Fortunately, the research goals of this project are not particularly hindered by this lack of demographic information.

Outside of the possible selection biases discussed in Section 5.5.1, there is no compelling reason to believe that the population studied is not evenly distributed in our data set. This does not mean that the population itself is representative of any particular larger grouping. One might expect the players in this study to skew heavily towards young males, for instance. While such information would be quite meaningful in making future predictions and generalizations about the Proteus Effect in other communities, it has no significant impact of the present findings.

5.5.3 Future Work: Individual Case Studies

This dissertation has opted for the gathering of large amounts of data to facilitate robust statistical findings. These findings are subsequently supplemented by qualitative findings generated by the author's own knowledge as a member of the community in question, and by intermittent analysis of individual stretches of conversation. An alternate approach to studying the Proteus Effect in this environment would be to significantly limit the number of players involved in the study.

By limiting the number of participants, more in-depth analysis could be done of individuals behavior within the community. A longitudinal study following only a few players, for instance, could offer important insights into how a single individual's linguistic behavior changes over time. These changes could be tracked both in terms of which hero the player selects, as well as over time as their knowledge of community practices increases.

5.5.4 Future Work: Multilingualism in the Dota 2 Community

The Dota 2 community in North America is intensely multilingual, as highlighted in Chapter 2 Section 2.7.1. This multilingual nature is an under-explored facet of the community, both with regards to the Proteus Effect as well as in a more general sense. The quantitative results of this dissertation are based on the use of the English lexical dictionaries from the

Linguistic Inquiry and Word Count (LIWC), and thus are not taking the Spanish discourse in the community into account [Pennebaker et al., 2015].

Questions thus remain about how these two co-existing linguistic populations use language with regards to avatars. Do cultural notions of avatar personae and characteristics transcend linguistic boundaries, as does the use Dota specific language (Chapter 2 Section 2.8) or are they linguistically sensitive? Preliminary evidence suggests that opinions of different heroes varies by cultural region, but a more in-depth analysis would be necessary in order to uncover the differences (if any) with relation to the Proteus Effect.

5.6 Final Thoughts

The overarching goals of this dissertation are to push forward research on the Proteus Effect, extending it to a naturally occurring environment, and testing avatar characteristics outside of the traditional aesthetic variables. The findings of this dissertation support the need for further study. The Proteus Effect does seem to be having effects on people outside of the laboratory. Combined with the findings of recent studies on the Proteus Effect that suggest that these Proteus Effects linger beyond the amount of time that participants control the avatars, these findings have ramifications for human interactions both virtual and non-virtual. As the pace of technological innovation continues to increase, the use of avatars to mediate interactions becomes more and more prevalent, increasing the importance of the present line of research.

In addition to the theoretical contributions of this dissertation, I hope too that this dissertation stands as a testament to the value of researching video game communities. Such communities are often maligned in the media as either juvenile or deviant, judgements which have the tendency to filter into academic opinions and practice if left unchecked. Though the lifespan of individual games is limited, and the video game communities are ever-changing besides, I hope this brief glimpse into the linguistically complex and fascinating Dota 2

community can help combat such prejudices, both in the present and future.

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APPENDIX A

TOP 20 WORDS

The 20 most common terms[1] in the corpus are used for analysis in this chapter. A list of these terms alongside their token counts is given in Table A.1. Several of the terms found in the list are acronyms. Where this is the case, or the terms have non-standard meaning (typically referring to in-game entities), a short explanation of the term is given. Short descriptions of the meaning and usage contexts for each termd are given after Table A.1 for terms with non-standard meanings.

Table A.1: Top 20 Words

Word	Meaning	No. of tokens
gg	good game	2848
lol	laughing out loud	1431
ez	easy	1190
report	-	987
no	-	974
a	-	789
me	-	724
?	-	713
you	-	651
de	-	614
i	-	611
GG	good game	595
team	-	591
mid	middle lane	589
que	-	478
wp	well played	458
xd	emoticon	437
is	-	423

gg: The term *gg* is an acronym which stands for 'good game'. This is by far the most frequent token in the corpus, with almost double the number of occurences as the next most

1. Here by term we mean any set of characters bounded on either sides by spaces or the beginning/end of a message. While this typically corresponds to the notion of *word*, it also includes acronyms like *gg* and individual uses of punctuation such as *?*.

used term (gg: 2848, lol:1431). This term is ubiquitous in DOTA 2 and many other video games, particularly those with a multiplayer competetive element. The most typical use of this term is at the very end of the game, when victory is assured for one team. In this scenario, players on both teams use the term *gg* as a sign of polieness and respect, implying that the qualities of the other teams play (skill, reciprocal politeness, etc...) were such to have made the game a good one (ie fun to play).

lol: This acronym stands for 'laughing out loud'. This acronym is very popular across many different technological media (texting, email, internet messaging). The literal interpretation of this acronym is to communicate that the author of the message is laughing out loud at or near the time of writing. This meaning has been extended to show that the author of the message finds something humorous, without the necessary implication that the author is physically laughing. In this way it can be seen as a substitute for laughter itself.

ez: This acronym stands for 'easy', implying that the other team lacks the necessary in-game skill to make the game difficult for the author. Thus this is almost always used as an insult towards another player or entire team. Typical contexts for using this insult include after the author has made a particularly skillful play (typically killing the addressee), or as meta-game commentary at the end of the game when the author's team has ensured victory.

report: This word is a reference to an in-game mechanism whereby players can report other players to the game company, Valve Software, for bad behavior. The most typical context of usage in DOTA 2 is when encouraging other players to report a player whom the author finds deserving of punishment (the typical punishement for reporting a player being longer wait times for games or a short-term ban from play), either for bad behavior or for lack of skill

team: A reference to one of the two five player teams involved in a DOTA 2 match.

mid: A reference either to the middle lane of the map, the shortest and most direct route to the opposing team's base, or a reference to the hero playing this area of the map. Though

any hero can play the mid position, there are a subset of heroes in the current DOTA 2 meta-game who typically occupy this position.

wp: This acronym stands for 'well played'. This is a compliment directed at another player or team for quality play. This word is typically used either in response to a particularly good play from another player, or as a meta-game analysis and politeness utterance when directed towards the enemy team at the end of the game.

xd: An emoticon used to express amusement.

APPENDIX B

MODIFIED LIWC DICTIONARIES

Table B.1: Dictionary of Rude Words

ez	2ez	report
easy	mother	madre
newb	noob	fuck
fucker	fucked	fu
shit	bitch	ctm
ass	damn	fck
dick	puta	mierda
conche	nigga	nigger
spick	peruvian	peruana
retard	idiot	uninstall

Table B.2: Dictionary of Polite Words

sorry	thanks	ty
wp	well played	excuse me
nice	good	great
gj	hf	

Table B.3: Dictionary of Tentative Words

almost	anything	apparently
appear	contigent	bet
depend	dunno	doubt
guess	halfass	hardly
hope	kinda	luck
maybe	often	probably
random	seem	try

Table B.4: Dictionary of Certain Words

absolutely	always	certain
clear	complete	confident
correct	entire	everyone
fact	forever	must
necessary	nothing	never
obvious	perfect	promise
total	true	wholly