Always thank the Bus Driver

- A longitudinal observational study of the effects of prosocial behaviour in an online gaming community

Seamus Ryan - N00172907

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This Thesis is my own work and has not been previously submitted to this or any other third level institute.

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Jesus, through whom all things are possible.
Satan, through whom even more things are possible and are more fun.

McDonald's for making the crunchie McFlurry.
That ice cream place in St Stephens Green. The one on the bottom floor at the back behind Tiger, yea know the one. They do a cracking choc-dip 99.

My supervisor, my family, my girlfriend, and everyone who told me doing a part-time masters while working would be easy.

And, of course, the Bus Driver.

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Abstract

This research addresses a longitudinal observational analysis of the affect an introduced prosocial action has on an online community by measuring linguistic markers. A data set was collected from an online community, Reddit, looking specifically at the FortNite online game and analysing it both before and after the ability to thank the bus driver was introduced. The data set was also analysed after the motivation for thanking the bus driver changed to one of explicit reciprocity. Posters (n = 9,037) were queried, with those that met the validity requirements (n = 7,221) having their posts (n = 1,232,741) assigned to three cohorts, those of pre-prosocial, post-prosocial, and post-reciprocity, depending on when they were posted.

A statistically significant (R squared = 0.572) increase in positive emotion linguistic markers was detected in the data set after the prosocial action was added. There was no statistically significant change in negative emotion linguistic markers. The change in motivation also did not reduce the use of positive emotion linguistic markers, contrary to what was expected. This research is of importance to the psychology of game design and online community analysis and management.

1.Introduction

In recent years, there has been significant growth in the number of online communities, the largest collection of which, Reddit, has 330 million active users and sees 2.8 million comments per day (Smith, 2018). These communities tend to build around a single identifiable facet of the participant's life (Williams & Cothrel, 2000). Some of the largest online communities have formed around the act of playing games or a particular game, with Reddit's /r/Gaming having 17.5 million accounts subscribed to its content (Top Subreddits, 2018). This community explosion is something that the wider game development industry has noticed; with the importance of growing a healthy community surrounding a game being directly linked to the long-term financial success of a project (Lin, Holin, & Chuen-Tsai Sun, 2011). Contributing to this financial success, research has shown that customers engaged in a community run by the developer would spend an average of 19% more on products (Manchanda, Packard, & Pattabhiramaiah, 2015). While the financial and business case for community cultivation is well documented and easy to justify, there is also significant importance for Game Designers, as these communities have been shown to inform in-game behaviours (Zimmerman, 2017). This can be seen explicitly with logistics for in-game activities being planned in online communities, with the best examples being a game known as ‘Eve Online’ where player-run corporations discuss plans extensively outside of game before enacting them in-game (Taylor, Bergstrom, Jenson, & de Castell, 2015). The movement of language also happens implicitly with tone and terms; a frequently studied example being the word --“*kek*”, meaning a malicious laugh, moving interchangeably between the game world and the online communities of World of Warcraft (Root, 2016).

As discussed in *‘Online communities: Design, theory, and practice’* (Preece & Maloney-Krichmar, 2005) online forums develop a culture of their own with unique acronyms and coding. Within gaming forums, terms and paralanguage

tend to be specific to either that game in particular, such as *'mid'*, *'top'*, *'sup'*, *'ADC'*, or use broader terms applying to gaming in general, such as *'afk'*, or *'troll'* (Houghton, 2016). These examples of coding and development of colloquialisms are not unique to gaming and have been studied extensively in all online communities as part of a broad area of research grouped under the title of Computer-Mediated Communication (Kunz & Seshadri, 2015).

The use of tracking linguistic markers, as part of research in online communities, is growing in interest (Harris, & Paradice, 2007). Likelihood to participate in the perpetuation of conspiracy theories (Klein, Clutton, & Dunn, 2018), growth of racist intent (Bäck, Bäck, Sendén, & Sikström, 2018), and shifting of self perception during the recovery from domestic violence (Sánchez-Moya, 2018) are some of the most recent examples of what can be correlated with the use of certain linguistic words and phrases. This approach can also be used to estimate if a player enjoyed playing a game or not (Sirbu, Secui, Dascalu, Crossley, Ruseti, & Trausan-Matu, 2016). In gaming, the majority of the research in this area is retrospective and correlative. It focuses on the review of actions already taken or the analysis of content for future review. It has not yet focused on the analysis of members in a community to establish how that community or those members related to a change in non-linguistic behaviour.

The purpose of this study is to demonstrate a causal link between the changes a company makes to its game and the culture of the community that surrounds the game. In particular, it will focus on the addition of a prosocial activity in a game and the changes that have happened in the community surrounding it by comparing linguistic markers before and after its introduction, while controlling for other changes.

2. Literature Review

2.1. Online Communities

According to David Jacobson, communities online form around a single identifiable facet of the participant's life or an artefact they interact with (Jacobson, 1999). These communities are user-generated and the participant's motivations range from a wish to share information, a need for human interaction, or seeking to be part of a collective experience (Malinen, 2015). Online communities have their own set of social norms and expected behaviour from the participants. These norms can be stated explicitly via our rule sets or moderation guidelines, or implicitly based on encouragements from other peers within the community and the tone of the response (Johnson, 2001).

In one study the prevailing dichotomy of active versus passive participation was challenged (Malinen, 2015). Before this, the dominant research approach was to consider that only those who post were part of the in-group of the community, while other models hold that those that are passive or “lurking” members are still considered active consumers (Cullen & Morse, 2011). As such, when researching a community it is important to understand that it is more than just those that would be willing to fill out a survey, it is the very impact and tone of the words and norms within a community and how those change that need to be considered.

2.2. How Online communities change over time

Online communities are constantly in flux. There is a constant shift in tone, mood, and engagement styles that can be said to be caused by two inherent attributes of the group. The first is internal; this is the change in participants who are involved in the community, with older members leaving and new members joining (Hamilton, Zhang, Danescu-Niculescu-Mizil, Jurafsky, & Leskovec, 2017). The other is external, with ongoing changes to

the area, topic, or artefact that caused the community to form in the first place (Riverin & Stacey, 2008). While there is a significant amount of research into a community's participants and their loyalty (Hamilton et al, 2017), stickiness (Kuo & Hou, 2017), and motivation over time (Stragier, Abeele, Mechant, & De Marez, 2016), there is a lack of analysis of how this is impacted by changes to the explicit topic of the community.

2.3. Studying online communities

When looking at online communities there are two separate areas that have distinct theoretical models, these being, one; the formative process of a community and two; the structure/norms within a community (Groenewegen & Moser, 2014). Both fall under the umbrella of computer-mediated communication, itself a broad topic that covers a lot of different facets of online discourse of which community analysis is only a small part (Herring, 2019).

The method of studying an online community depends greatly on the conceptual model or theory being applied (Groenewegen, & Moser, 2014). When doing quantitative, longitudinal analysis on structure/norms within a community, there is a large body of research that points towards Psycholinguistics as the preeminent method of analysis of tone and mood in a community (Newman, Pennebaker, Berry, & Richards, 2003; Anand, Walker, Abbott, Tree, Bowmani, & Minor, 2011; Berger, & Milkman, 2012).

2.4. What is Psycholinguistics

The choice of words people make when communicating has a clear, measured, correlation with intentions and behaviours. In both experimental and observational research, the linguist tags that are used online have been correlated with actions. This includes levels of adult playfulness (Proyer, & Brauer, 2018), the stress level of academics based on their publications (Ratsamy, Ruppman, Swanson, Seiberlich, Dehnbostel, & Smith-Keiling, 2018), and learning outcomes in online courses (Lee, & Recker, 2018). Focused on

game communities, psycholinguistic and linguistic markers can also be used to estimate if a player enjoyed playing a game or not (Sirbu, Secui, Dascalu, Crossley, Ruseti, & Trausan-Matu, 2016).

2.5. How Linguistic marker analysis is done

The LIWC (Pennebaker, Booth, & Francis, 2007) is a dictionary based Linguistic marker detection tool. It has been used extensively in the analysis of mood and tone in online text-based observational research (Klein, Clutton, & Dunn, 2018; Bäck, Bäck, Sendén, & Sikström, 2018; Sánchez-Moya, 2018). LIWC contains 70+ dictionaries (Appendix A) that have been compiled by several groups cross coding and 'selecting for fit' from larger correlated dictionaries (Pennebaker, Boyd, Jordan, & Blackburn, 2015). These were then assessed for internal and external reliability and assigned a corrected Cronbach's Alpha by the creating researchers.

A corpus of data is processed by LIWC to create the statistic output, this is the frequency at which linguistic markers that match those of a certain dictionary are used. For example, the phrase "*The quick brown fox jumps over the lazy dog*" would break down as in table 1 for hypothetical dictionaries.

Table 1
Example output of LIWC

Dictionary Name	**Word Collection**	**Content Percentage**
Athletic	quick, jumps,	.18
Descriptive	Lazy, quick	.18
Relative Descriptors	over	.09
Apathy	lazy	.09

2.6. Criticisms with communication analysis using linguistic markers

A potential criticism common across some of this type of research is that it conflates the terms *'mood'*, *'tone'*, *'theme'*, and *'linguistic marker'*. This is especially evident when the dictionary used, to refer to a collection of linguistic markers, is named for an emotion. There is also criticism of the lack of context used in the grouping of words (Karimi & Ferreira, 2016).

This is an active area of research with emerging analysis methodologies such as *'soft word comparison'* (Gong, Shin, & Poellabauer, 2018) and *'second order soft co-occurrences'* (Razavi, Matwin, De Koninck, & Amini, 2014). Both of these approaches are theoretical methodologies based on emerging machine learning technologies and are not replicable without significant engineering work, though adoption could be expected in the near future.

2.7. Introduction to prosocial behaviour

Research into the community changes that are affected by prosocial activity must begin by ensuring the activity meets the definition of prosocial behaviour. This is an aspect of prosocial psychology that has matured rapidly in the last 30 years. The widest referenced definition is that used in -'The heuristics of Prosocial Organisation Behaviour' which states that they are --"a*cts carried out to produce and maintain the well-being and integrity of others*" (Brief & Motowidlo, 1986; p.710). A more recent definition by Simpson and Willer (2015) suggests that a prosocial behaviour is --"*an individual behavior that benefits one or more others"* (Simpson & Willer, 2015; p.44). Based on this definition, the act of thanking someone, is a prosocial act because it is a gesture of gratitude that would improve the wellbeing of others.

2.8. Prosocial behaviour in communities

The impact that prosocial activity has on communities, in an offline context, has been linked to a positive influence on the subjective view of the self of a community (Stürmer & Snyder, 2009). This change can be tracked for a significant duration after the behaviour has been completed with some analysis suggesting it is permanent (Stürmer & Snyder, 2009). Unfortunately, the study of the game behaviour impact of gameplay extensively focuses on aggression and behavioural disorders (Anderson, 2014). It has been said that this research has come at the cost of other areas of analysis (Huesmann, 2010). Thus, this could partly explain why there is limited research done on prosocial behaviour and its effect on game players.

In an experimental analysis done in 2009, it was found that people who played a game that included prosocial activities were more generous to their peers (Gentile, Anderson, Yukawa, Ihori, Saleem, et al, 2009) after they finished playing. This was replicated in the 2014 study that demonstrated a correlation between prosocial gameplay and civic actions among teens (Anderson, 2014).

2.9. Prosocial behaviour motivation

The motivation behind prosocial activities is an area that has received a lot of attention over the last 15 years (Grant, 2008; Batson, Ahmad, Powell, Stocks, Shah, & Gardner, 2008; Grant, & Berg, 2012). Some models group the motivation into 3 areas; those of solidarity, defined as the appel and obligation to support and protect the welfare of others, reciprocity, defined as the willingness to help in exchange of something, and altruism , defined as acting with no expectation of reward and beyond social expectation, (Guttman, Siegal, Appel, & Bar-On, 2016). However, there is a growing body of work that suggests that altruism does not exist (Kurzban, Burton-Chellew, & West, 2015), due to research suggesting all prosocial activities could be seen as having a positive selfish motivation on the part of the participant. While this is still an

area of some discussion, when using this as a lens on prosocial behaviour one can view all prosocial activity as having a level of intrinsic personal satisfaction upon completion. When the act stops being motivated by solidarity and becomes motivated due to reciprocity, one would expect to see a change in the number of people involved and the culture around a prosocial activity, with different personalities being motivated at different levels by solidarity versus reciprocal rewards (Gerhart, & Fang, 2015). While there is research related to what happens when something that was intrinsically rewarding becomes extrinsically rewarding, there appears to be less on what happens if the extrinsic reward is then subsequently removed, leaving only the original intrinsic reward (List, Kepes, & McDaniel, 2017).

2.10. Fortnite

FortNite is an online game released by Epic in 2017 which saw an explosion of users in the first quarter of 2018 (Epic Games, 2017). The rapid growth led to it reaching the position of the most played game in the world, peaking with 78.3 Million unique players in August of 2018 (Fortnite Usage and Revenue Statistics, 2018).

FortNite is a game that uses the -'*Games as a Service*' business model (Hamari, Hanner, & Koivisto, 2017). This is an approach to game development and design that follows the principles of a low barrier to entry and ongoing new functionality added to the game. These improvements are designed to encourage the player to return to the game, with new and innovative functionality keeping the content from becoming formulaic (Hamari, Hanner, & Koivisto, 2017).

There is almost no academic peer-reviewed content available for FortNite in terms of any psychological analysis. There are, however, some, very limited papers related to it in the fields of Law (Brannon, 2018), Theology (Roth, 2018), and Engineering (Pohl, Harris, Balog, Clausen, Moran, & Brucks, 2017). For the purpose of this research, the actual content of FortNite is largely irrelevant, as the focus is looking at the community in the context of the changes to the game.

During the growth in the player base, online communities were created to cater to and discuss the game. The largest FortNite community is the r/FortNiteBR subreddit (R/FortNiteBR, n.d.) which, as of January 2019 has 988,705 subscribed members. These users have generated 10,395,533 comments between February 20th 2018, and February 20th 2019 (Baumgartner, n.d.)

2.11. Establishment of prosocial behaviour in FortNite

As part of its iterative release process, Fortnite introduced update Version 5.30 which was released on August 28th 2018 (V5.30 Content Update, 2018). This included the ability to say “thank you” to the bus driver (Figure 1). In the game, the bus driver is an invisible artificial intelligence based character that transports the players across the map. The act of thanking the bus driver, on initial introduction, gave the player no tangible benefit or reward and had no bearing on any tangible facet of the gameplay experience. This action is ubiquitous, it can be done in every single game and on every platform.

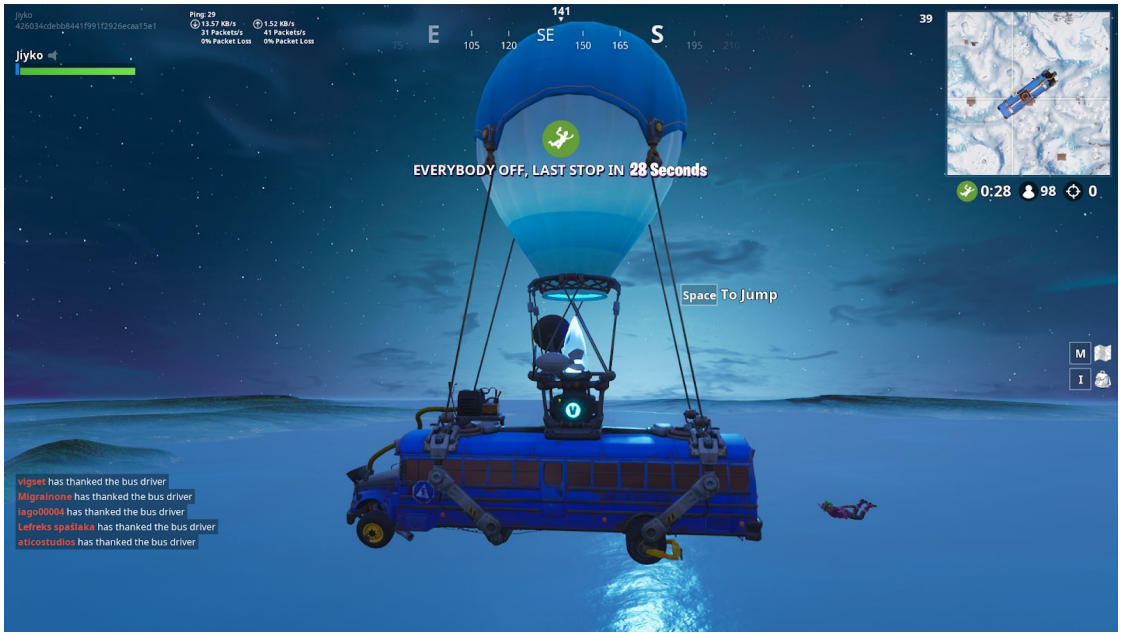

Figure 1; Players thanking the Bus Driver, text in the bottom left corner

In the last two weeks of December 2018 (14 Days of Fortnite, 2018), another update related to the bus driver was added to Fortnite. If the player thanked the bus driver 11 times they would unlock a new pickaxe (Figure 2) to use in the game. This was explicitly reciprocal, with only players that thanked the bus driver during this window ever getting the pickaxe (14 Days of Fortnite, 2018).

Figure 2; "Frozen Axe" Pickaxe

This creates a unique situation for an online community. Over the course of 8 months, the community went from no prosocial behaviour to a ubiquitous prosocial behaviour, then to a ubiquitous prosocial behaviour with explicit reciprocity. This change from no behaviour, to one based on solidarity, then to one based on reciprocity is what this research will focus on.

2.12. Why is this analysis important?

In software development, there are two separate, practical areas that are affected by the surrounding community. The first is financial and is supported by two aspects of revenue growth: the total number of units sold of a product can be correlated with an active online community (Manchanda, Packard, & Pattabhiramaiah, 2015) and a direct positive relationship between total individual spend per user and community engagement (Lin, & Sun, 2011). Through it important to acknowledge that the research has not yet demonstrated if this is correlative or causational.

The other area is the codependent aspect of community behaviours as they are affected by the in-game behaviours and vice versa (Zimmerman, 2017) . In the game Eve Online (Taylor, Bergstrom, Jenson, & de Castell, 2015), all team level activities are discussed outside the game in online forums before being enacted by players. This leads to the culture of the community driving how the game is played and, in turn, these actions form the environment for all players. The opposite can be demonstrated in the game World of Warcraft. The word "*kek*" emerged from the text obfuscation between different warring factions. This has lead to "*kek*" being used in the game's community and eventually joining the wider online lexicon (Root, 2016). Whether viewed from a financial point of view or a game design point of view, the importance of the community is clear.

2.13. Proposed Research Questions

Do the linguistic markers used by a community change over time?
Does a community demonstrate more positive emotion linguistic markers after a prosocial activity is added to the game?
Does a community demonstrate less negative emotion linguistic markers after a prosocial activity is added to the game?

2.14. Hypotheses

HPY 1 - An introduced Prosocial action can be correlated with an increased use of Positive Emotion linguistic markers in a community.

HPY 2 - An introduced Prosocial action can be correlated with a decreased use of Negative Emotional Tone linguistic markers in a community.

HPY 3 - An introduced extrinsic Reciprocity on an existing Prosocial action can be correlated with a reduction Positive Emotion linguistic markers.

3. Methodology

3.1. Design

In this study, the researcher will collect data from before and after the introduction of the prosocial in-game activity as well as after the reciprocation event. The text will be collected from comments, selected at random, within the FortNiteBR community on Reddit. There are three sets of data cohorts which are split between those made before the prosocial activity was introduced in the game (pre-August 23rd, 2018) and after (post-September 1st, 2018) as well as post reciprocation (post-January 1st, 2019). Those that do not reach the participant requirements were removed from the data set.

LIWC will be run on these collect data sets separately looking at the results of key dictionaries of Positive emotion and Negative emotion.

3.2. Participant Requirements and Ethics

Participants will not be included in the data unless they meet the qualifying inclusion criteria.

Participants must have:

1) 3 separate posts with a total combined word count of at least 150;
2) Posts must be made to the /r/FortniteBR subreddit where the conversation is exclusively related to Fortnite and where English is the default language; and
3) To be included in the pre-prosocial, posts must have been made before August 23rd, to be in the post-prosocial, posts must be between September 1st, 2018 and December 15th 2018; and to be in the post-reciprocity group, posts must have been made after January 1st 2019.

This research was approved under the Ethics A guidance of IADT. Submission detailed in Appendix B. An update was submitted to DTPEC in October regarding a change to the area of research and was also approved, detailed in Appendix C.

3.3. Procedure

The users are selected randomly from the FortniteBR subreddit. Their post history was read to ensure they meet the qualifying criteria. Not valid posts were filtered out based on the results of the pilot study, these included posts with text that the moderation team had edited or links to other web pages.
These posts are then grouped based on date and saved to the file storage. The username is converted to a hash to avoid duplicate readings and then deleted. The Researcher will then use a dictionary based software to identify the language markers for each time window. Once this is done the original text data will be deleted to make the data fully anonymous.

3.4. Measurement of Linguistic Markers

LIWC is a dictionary-based text analysis tool (Pennebaker, Boyd, Jordan, & Blackburn, 2015). It reviews the text and outputs 70+ variables related to different linguistic markers. See Appendix A for the list of dictionary titles. For this research, the analysis will focus on two dictionaries: those of Positive Emotion and Negative Emotion.

Table 2

Reliability scales for LIWC (Pennebaker, Boyd, Jordan, & Blackburn, 2015)

Category	**Abbrev**	**Examples Words in category**	**Internal Consistency (Uncorrected α)**	**Internal Consistency (Corrected α)**
Positive Emotion	posemo	love, nice, sweet	.23	.64
Negative Emotion	negemo	hurt, ugly, nasty	.744	.55

3.5. Statistical Analysis

A Linear Regression Analysis will be done to assess the variance of the linguistic markers between cohorts. This will look for the changes in the dependent variables, the results of LIWC, with the independent variables, the status in relation to the prosocial behaviour. The level of statistical significance is set to 0.05.

3.6. Pilot Study - Results and Changes

On February 1st the pilot study was run, it included 1,390 total participants, with 1,074 meeting the validity requirements, with 78,490 valid posts. Results were indicative but due to some data issues changes, were made to the data collection process:

- The removal of all posts with web links - These are posts that are copied every week and are not written manually.
- Intergroup user hash comparison to avoid duplicates - As the data sets were treated separately per day with usernames not saved, there were some users that appeared twice within the same dataset.
- The removal of all mod replaced posts - Some posts that do not meet the community standards are replaced with a template post.
- All Unicode characters were converted - the text pulled from the API had unconverted Unicode characters, these could not be interpreted by LIWC.
- More granular time scale tracked - The original groupings of cohorts led to a single statistic that covered a broad time window. In the final study, a single statistic will still be used but there will be smaller time windows for better descriptive analysis.

3.7. Data collection process

The corpus of data that was used is Pushshift.io (Michael, n.d.). Data was gathered, validated, and formatted for LIWC (Pennebaker, Boyd, Jordan, &

Blackburn, 2015) programmatically using a custom created open source tool called RDR (Ryan, 2019). Additional details on this tool are detailed in Appendix D.

4. Results

4.1 Descriptive Statistical information

During data collection, a sizable cohort of participants was observed (n=9,037), with a significant proportion (n=7,221) meeting the inclusion criteria (Appendix E). In total, the valid participants posted 1,245,829 times. After additional filtering based on the clarifications of the pilot study, there were 1,232,741 posts, with a total of 18,990,637 words. All raw statistical data is available in Appendix F with all dictionary results in Appendix G. These were broken into separate 2-week windows based on posting date and the windows were grouped into 3 cohorts.

4.1.1 Statistical information for the Pre Prosocial

The cohort of posts from June 1, 2018, to August 24, 2018, contained 8,523,001 total words. As detailed in Table 3 the positive emotion markers (posemo) had a min of 4.28 with a max of 4.34. As graphed in figure 3 the trendline for this pre-group trended slightly upward with an R squared of 0.166

Table 3

% of linguistic marker between June 1 - August 24

Start Date	**End Date**	**WC**	**posemo**	**negemo**
June 1, 2018	June 15, 2018	1321489	4.27	2.82
June 15, 2018	June 29, 2018	1566465	4.23	2.79
June 29, 2018	July 13, 2018	1740264	4.34	2.56
July 13, 2018	July 27, 2018	1412906	4.3	2.74
July 27, 2018	August 10, 2018	1388768	4.33	2.79
August 10, 2018	August 24, 2018	1093109	4.28	2.62

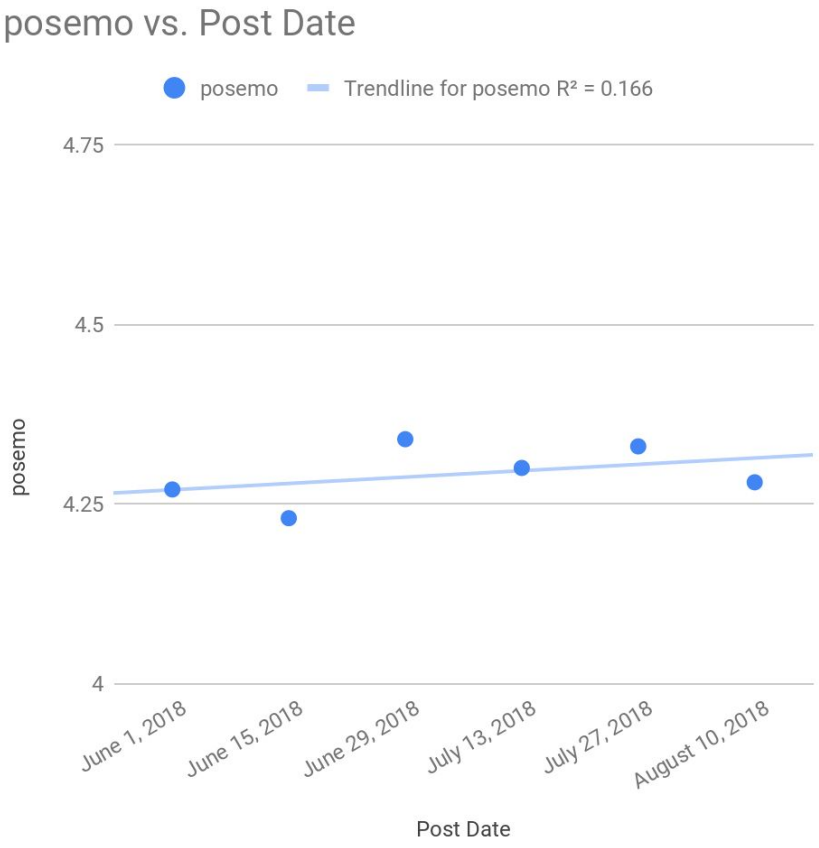

Figure 3; posemo trend for Pre Prosocial Cohort R2 = 0.166

4.1.2 Statistical information for the Post Prosocial

This cohort contains all recorded posts from August 28, 2018, to December 16, 2018, with 8,601,154 total words. Table 4 details the breakdown of linguistic marker usage during this time. For this cohort, there was an increase in the R squared of the trendline for posemo at 0.463 as detailed in figure 4.

Table 4

% of linguistic marker between August 28 - December 16

Start Date	End Date	WC	posemo	negemo
August 28, 2018	September 7, 2018	881949	4.43	2.56
September 7, 2018	September 21, 2018	1096372	4.34	2.6
September 21, 2018	October 5, 2018	1130552	4.35	2.61
October 5, 2018	October 19, 2018	976744	4.45	2.65
October 19, 2018	November 2, 2018	1113897	4.46	2.87
November 2, 2018	November 16, 2018	1031441	4.34	2.86
November 16, 2018	November 30, 2018	798263	4.51	2.81
November 30, 2018	December 14, 2018	886446	4.51	2.76
December 14, 2018	December 16, 2018	113916	4.54	2.89

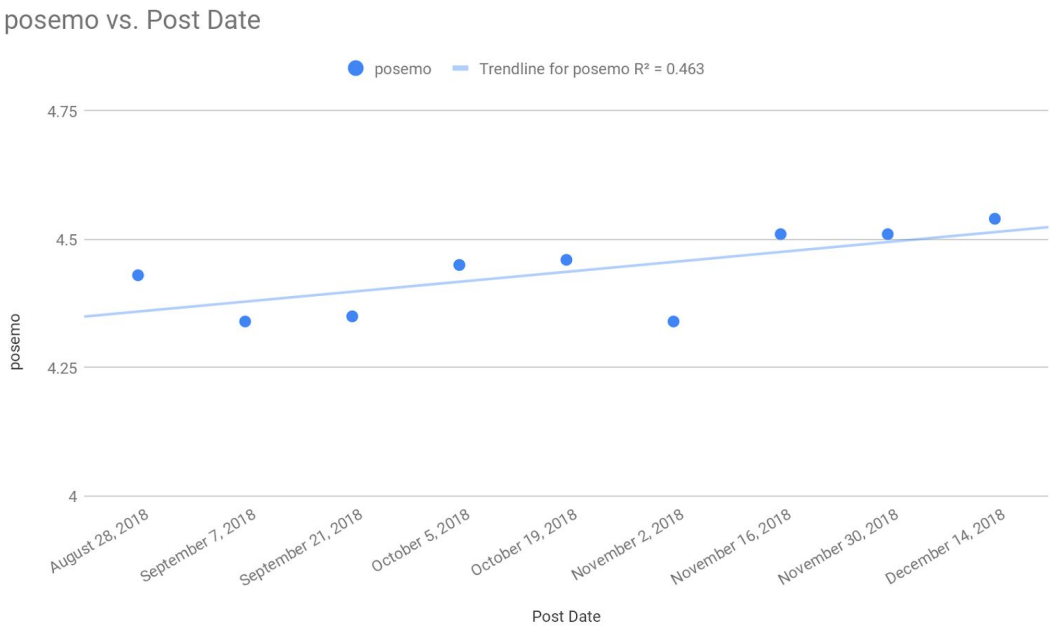

Figure 4; posemo trend for Post Prosocial Cohort R2 = 0.463

4.1.3 Statistical information for the Post Reciprocity

Finally, the post reciprocity introduction cohort which spanned December 20, 2018, to February 22, 2019. This contained 2,438,056 total Words as broken down in Table 5. The lower number of total words than other cohorts is attributable to three reasons. The first being that it was a smaller window for data gathering, slightly less than two months. The second is that due to the transient nature of users there was a lower percentage of qualifying users that had reached the word threshold. The last is that the popularity of Fortnite had peaked at this point with user numbers decreasing since August.

Table 5

% of linguistic marker between December 20 - February 22

Start Date	End Date	WC	posemo	negemo
December 20, 2018	December 28, 2018	367715	4.85	2.6
December 28, 2018	January 11, 2019	692960	4.62	2.81
January 11, 2019	January 25, 2019	546087	4.43	2.8
January 25, 2019	February 8, 2019	453876	4.49	2.54
February 8, 2019	February 22, 2019	377418	4.63	2.75

4.2 Statistical Analysis

A Regression Analysis was run on the gathered data, with the analysis being run twice to compare the pre-prosocial group with the post-prosocial group, then the post-prosocial group being compared with the post-reciprocity group for both the posemo and negemo linguistic markers. Statistical significance was set at <0.05.

Table 6

Descriptives of all data sets

	N	Minimum	Maximum	Mean	Std. Deviation
WC	20	113916.0000	1740264.000	949531.8500	431097.1478
posemo	20	4.2300	4.8500	4.435000	.1500000
negemo	20	2.5400	2.8900	2.721500	.1159980
Valid N (listwise)	20				

4.2.1. Posemotion Linguistic Marker Analysis

For the analysis of posemo linguistic markers, comparing the Pre-prosocial group with the prosocial group, the level of statistical significance (Table 7) was reached. The simple correlation of 0.756 indicates a high degree of correlation (Table 8). The resultant R squared indicates that 57% of the total variation in the posemo linguist markers can be explained by the independent variable.

Based on this dataset, HPY 1 (An introduced Prosocial action can be correlated with the increased use of Positive Emotion linguistic markers in a community) is demonstrated.

Table 7

ANOVA comparing the Pre-prosocial group with the prosocial group within posemo linguistic Library

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.076	1	.076	17.359	.001[b]
	Residual	.057	13	.004		
	Total	.132	14			

a. Dependent Variable: posemo

b. Predictors: (Constant), ProSocialStatus

Table 8

Regression model comparing the Pre-prosocial group with the prosocial group within posemo linguistic Library

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.756[a]	.572	.539	.06603

a. Predictors: (Constant), ProSocialStatus

In the analysis of posemo linguistic markers, comparing the prosocial group with the reciprocity group, the level of statistical significance (Table 9) was also reached, though at a lower level. The simple correlation is 0.608 (Table 10). The resultant R squared indicates that 37% of the total variation in the posemo linguist markers can be explained by the independent variable. Based on this data set, the inverse of HPY 3 (An introduced explicit Reciprocity of said Prosocial action can be correlated with a reduction Positive Emotion linguistic markers) is suggested to be true.

Table 9

ANOVA model comparing the prosocial group with the reciprocity group within posemo linguistic Library

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.090	1	.090	7.053	.021[b]
	Residual	.153	12	.013		
	Total	.243	13			

a. Dependent Variable: posemo

b. Predictors: (Constant), ProSocialStatus

Table 10

Regression model comparing the prosocial group with the reciprocity group within posemo linguistic Library

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.608[a]	.370	.318	.11296

a. Predictors: (Constant), ProSocialStatus

4.2.2. Negemotion Linguistic Marker Analysis

As detailed in Tables 11 and 12, the level of statistical significance for the negemo linguistic markers was not reached in either comparison. Based on this lack of statistical significance HPY 2 (An introduced Prosocial action can be correlated with a decreased use of Negative Emotional Tone linguistic markers in a community) was not demonstrated in this data set.

Table 11

ANOVA comparing the Preprosocial group with the prosocial group within negemo linguistic Library

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.001	1	.001	.051	.825[b]
	Residual	.192	13	.015		
	Total	.192	14			

a. Dependent Variable: negemo

b. Predictors: (Constant), ProSocialStatus

Table 12

ANOVA comparing the prosocial group with the reciprocity group within negemo linguistic Library

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.004	1	.004	.233	.638[b]
	Residual	.196	12	.016		
	Total	.200	13			

a. Dependent Variable: negemo

b. Predictors: (Constant), ProSocialStatus

5. Discussion

This research and data set demonstrated two interesting aspects of the psycholinguistics on an online community. Firstly that the addition of a prosocial act has a positive impact on the total percentage of positive emotion words used in an online community. It also showed the motivation behind this prosocial act has limited effect on linguistic change. On the other side of the coin, there was no change in negative emotion linguistic markers, which implies two things, that an increase in positive emotion does not correlate with a decreased use of negative emotion and that the introduction of a prosocial act does not correlate with a change in negative emotions. This holds significant meaning for a game company that wants to improve the quality of dialogue in its community or indirectly shape the nature of communications that surrounds it.

Looking at the stated research questions, the proposal that linguistic markers used by a community change over time, which is suggested by the existing research (Hamilton et al, 2017; Riverin & Stacey, 2008) was demonstrated in this dataset, with the trend line with an R squared of 0.166 (figure 3) detected in the preprosical group. Based on this existing research it is possible that there would have been a continued slow increase in positive emotion linguistic markers regardless of whether the act was introduced.

This research also bears out the expectations established in -"*The effects of prosocial video games on prosocial behaviors: International evidence from correlational, longitudinal, and experimental studies*" (Gentile et al, 2009) as discussed in the literature review. The community's involvement in a digital prosocial act had a measurable bearing on their behaviour in other areas, with the significant R squared of .539 for changes in the use of linguistic markers. The expected change in negative emotion linguistic markers was the area with the least existing supporting academic research. While a data set would have been expected to demonstrate a decrease based on the work in -*'Prosocial behavior mitigates the negative effects of stress in everyday life'* (Raposa,

Laws, & Ansell, 2016) this research was done in an offline context and the results are not directly comparable.

This work has several areas that can be both improved on and built upon. There is the possibility that a person might express a tone in their communication that does not reflect how they would actually act in the moment of gameplay. Limiting the data to only those that did the prosocial activity could produce different results. There are also uncontrolled variables in the form of seasonal changes in the community. A potential improvement could be made in normalising the tone changes during the same time across the entire site where the data was collected. Additional work could also be done to control for additional changes within the game. This includes the possibility that the introduction of the prosocial act accelerated a change that was already happening within the community.

There are a few areas of research that this work can be expanded into. The questions of whether this can be replicated for a non-game piece of software and if it can be replicated using in-app discussion instead of an external community merit additional analysis. There are also areas of behaviour that can be looked at, like were there any other changes due to the introduction of the prosocial activity? Did it attract a different player base after the introduction of the action? From a business point of view is a Prosocial community really the most profitable? Is the result replicable using a different psycholinguistic model? All of these areas merit additional research.

There is also a building body of research that shows emotions as the leading factor in the act of decision making (Lerner, Li, Valdesolo, & Kassam, 2015; Phelps, Lempert, & Sokol-Hessner, 2014). There is an opportunity for additional research that shows the causal relationship between emotion and the use of certain linguistic markers, as well as emotion and in-game behaviour.

6. Conclusion

This research has several implications for academics interested in psycholinguistics and prosocial behaviours in games as well as professionals working in the industry. Firstly, the methodology was intentionally designed to be highly replicable so it can be used by both academics and industry researchers. Both the software used to gather all data and the statistical models are available either from the original researchers or open source.

It contributes to current research exploring the psychology of video game design and how it affects those that play them, as well as the direct impact a game has on the shaping of dialogue in a community. The ongoing improvement of the methodology would have a significant impact on how a game designer could assess the knock on effects their design decisions have on the wellbeing of those in the community.

Thanks for reading.

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Appendix A - LIWC dictionaries list

Summary Variable	
	Analytical Thinking
	Clout
	Authentic
	Emotional Tone
Grammar Other	
	Regular verbs
	Adjectives
	Comparatives
	Interrogatives
	Numbers
	Quantifiers
	Affect Words
	Positive emotion
	Negative emotion
	Anxiety
	Anger
	Sadness
	Social Words
	Family
	Friends
	Female referents
	Male referents
Cognitive Processes	
	Insight
	Cause
	Discrepancies
	Tentativeness
	Certainty
	Differentiation
Perpetual Processes	
	Seeing
	Hearing
	Feeling
Core Drives and Needs	
	Affiliation
	Achievement
	Power
	Reward focus
	Risk/prevention focus

Time Orientation	
	Past focus
	Present focus
	Future focus
Relativity	
	Motion
	Space
	Time
Personal Concerns	
	Work
	Leisure
	Home
	Money
	Religion
	Death

Appendix A - Table 1 - List of LIWC dictionaries

Appendix B - Ethics Application

DEPARTMENT OF TECHNOLOGY AND PSYCHOLOGY
ETHICAL APPROVAL FORM A

Title of project Can Linguist markers predict in Game Behavior?

Name of researcher Seamus Ryan

Email contact N00172907@student.iadt.ie

Name of supervisor NA

		Yes	No	N/A
1	Will you describe the main research procedures to participants in advance, so that they are informed about what to expect?			x
2	Will you tell participants that their participation is voluntary?			x
3	Will you obtain written consent for participation (through a signed or 'ticked' consent form)?			x
4	If the research is observational, will you ask participants for their consent to being observed?			x
5	Will you tell participants that they may withdraw from the research at any time and for any reason?			x
6	With questionnaires, will you give participants the option of omitting questions they do not want to answer?			x
7	Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?			x
8	Will you debrief participants at the end of their participation (i.e., give them a brief explanation of the study)?			x
9	If your study involves people between 16 and 18 years, will you ensure that passive consent is obtained from parents/guardians, with active consent obtained from both the child and their school/organisation?			x
10	If your study involves people under 16 years, will you ensure that active consent is obtained from parents/guardians and that a parent/guardian or their nominee (such as a teacher) will be present throughout the data collection period?			x
11*	Does your study involve an external agency (e.g. for recruitment)?		x	
12	Is there any realistic risk of any participants experiencing either physical or psychological distress or discomfort?			x
13	Does your project involve work with animals?		x	
14	Do you plan to give individual feedback to participants regarding their scores on any task or scale?			x
15	Does your study examine any sensitive topics (such as, but not limited to, religion, sexuality, alcohol, crime, drugs, mental health, physical health)			x
16	Is your study designed to change the mental state of participants in any negative way (such as inducing aggression, frustration, etc.)			x
17	Will your project involve deliberately misleading participants in any way?			x

18	Do participants fall into any of the following special groups?	People with learning or communication difficulties			x
		Patients (either inpatient or outpatient)			x
		People in custody			x

If you have ticked **No** to any of questions 1 to 11, or **Yes** to any of questions 12 to 18 you should refer to the PSI Code of Professional Ethics and BPS Guidelines and consult with your supervisor without delay. You will need to fill in Ethical Approval Form B and submit it to the Department of Technology and Psychology Ethics Committee (DTPEC) in place of this form.

There is an obligation on the researcher to bring to the attention of the DTPEC any issues with ethical implications not clearly covered by the above checklist.

I consider that this project has **no** significant ethical implications to be brought before the DTPEC. I have read and understood the specific guidelines for completion of Ethics Application Forms. I am familiar with the PSI Code of Professional Ethics and BPS Guidelines (and have discussed them with my supervisor).

Signed  **Print Name** Seamus Ryan **Date** 28/04/02018

Applicant

I have discussed this project with my student, and I agree that it has no significant ethical implications to be brought before the DTPEC.

Signed Print Name Date
Supervisor

* If you are dealing with an external agency, you must submit a letter from that agency with the form A. The letter must provide contact details, and must show that they have agreed for you to carry out your research in their organization.

Appendix C - DTPEC Change Application

Student Name: Seamus Ryan

Student Number: N00172907

Supervisor: Dr. Dean McDonnell

Overview of Research: The purpose of this research is to identify if the linguistic markers that are used in a community are correlated with in-game behavior and vice versa. It is an observational study with a longitudinal data collection approach.
Reason for Change: The proposed game, LoL, was chosen due to its active and passionate community; it was also a community with a history and reputation of being particularly non-conformist in its tone. Over the last 4 months there has been a significant shift in the tone of the community as a result of accusations of sexual harassment and a toxic work culture at the company that makes the game. It is believed that this could confound the data gathered, as the company moves to change the dialog surrounding it's community.

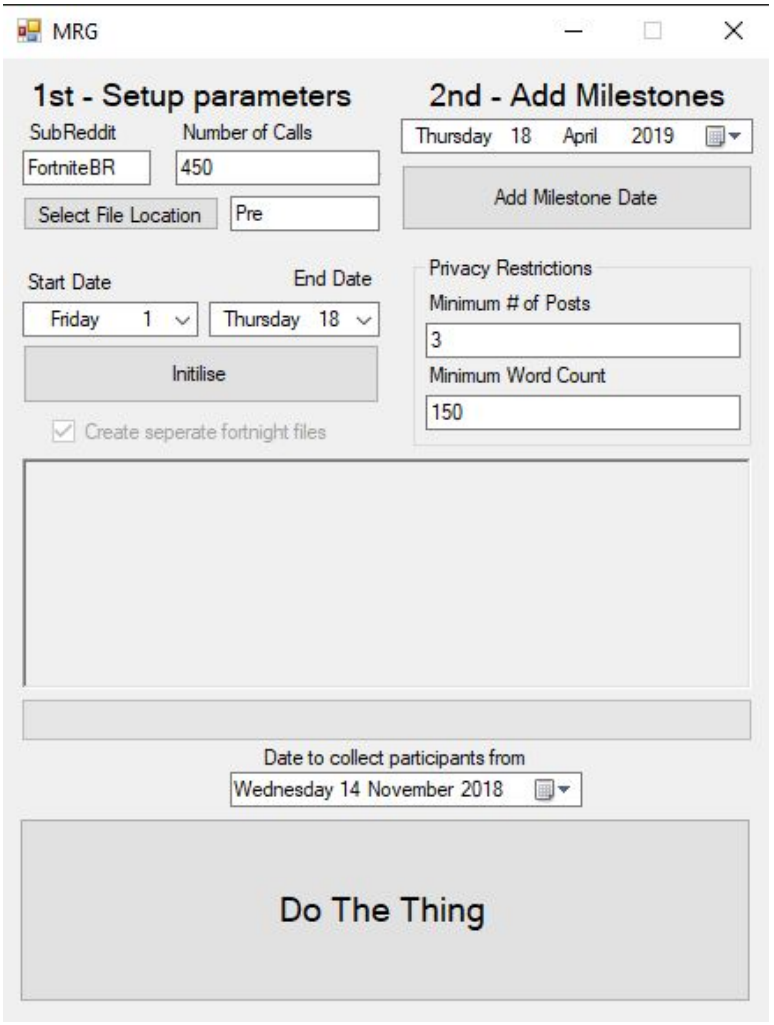
As a result, the game Fortnite is the suggested alternative; as it is considered a more family-orientated game with a similarly passionate community providing the same linguistic dataset.

Scope of Change Requested: There is little change in the scope or hypotheses in this research. As both games are similar in several ways, it is not expected to interfere with the scope of this project in any way. Data will no longer be gathered from the Lol player base or Lol forums. Data will instead be gathered in the exact same way as detailed previously from the Fortnite subreddit with the exact same ethical considerations and safeguards.

Appendix D - RDR info

Reddit Data Reader (RDR) is a custom Visual Basic application that read the Reddit post data from the pushshift API. When setting up the project setting the user sets a timeframe and key time milestones. These are the windows that the posts are filtered based on which are then filters the data based on set privacy settings.

LIWC groups data based on files, as such test should be grouped into the same file if it will be treated the same for linguistic marker querying. The source code is available at https://github.com/Jiyko/Reddit-Data-Reader-via-pushshift.



Appendix D - Figure 1 - The user interface of RDR

Appendix E - Exclusion criteria

For participants -

- 3 separate valid posts
- A total combined word count of at least 150
- Posts must be made to the /r/FortniteBR subreddit

For posts -

- All posts with web links are excluded
- All mod replaced posts are excluded

Timeboxes -

- Pre-prosocial posts must have been made between June 1 2018, and August 23rd 2018
- Post-prosocial posts must be between September 1st 2018 and December 15th 2018
- Post-reciprocity posts must between January 1st 2019 and December 15th 2018

Appendix F - Final LIWC Results Table

Pro Social Status	Start Date	End Date	WC	Analytic	Clout	Authentic	Tone	WPS
0	May 18, 2018	June 1, 2018	78153	41.31	52.46	41.03	56.36	15.88
0	June 1, 2018	June 15, 2018	1321489	39.72	51.55	43.89	53.07	16.15
0	June 15, 2018	June 29, 2018	1566465	39.13	52.81	43.83	52.69	16.3
0	June 29, 2018	July 13, 2018	1740264	39.5	49.31	47.54	59.33	16.36
0	July 13, 2018	July 27, 2018	1412906	39.12	51.17	42.3	55.2	16.67
0	July 27, 2018	August 10, 201	1388768	39.45	50.05	43.77	54.69	16.74
0	August 10, 201	August 24, 201	1093109	39.36	50.42	43.55	57.21	16.25
Excluded	August 24, 201	August 24, 201	25044	41.97	49.73	46.83	67.29	15
Excluded	August 24, 201	August 28, 201	346572	39.74	49.96	45.88	58.52	16.64
1	August 28, 201	September 7, 2	881949	39.34	50.41	43.65	61.19	16.56
1	September 7, 2	September 21,	1096372	38.15	48.47	43.6	58.73	17.06
1	September 21,	October 5, 201	1130552	39.28	49.94	44.45	58.62	16.46
1	October 5, 201	October 19, 20	976744	38.58	48.14	43.84	59.77	16.59
1	October 19, 20	November 2, 2(	1113897	38.93	50.59	43.21	55.75	16.23
1	November 2, 2(	November 16, 2	1031441	39.71	52.25	41.46	53.53	16.49
1	November 16, 2	November 30, 2	798263	38.45	50.27	41.22	57.86	16.4
1	November 30, 2	December 14, 2	886446	39.92	49.92	44.09	58.84	16.22
1	December 14, 2	December 16, 2	113916	42.57	53.97	42.02	57	16.68
Excluded	December 16, 2	December 20, 2	230670	37.7	49.1	43.1	61.28	16.25
2	December 20, 2	December 28, 2	367715	37.49	50.79	42.55	68.25	16.46
2	December 28, 2	January 11, 20	692960	38.91	50.99	41.02	60.09	16.32
2	January 11, 20	January 25, 20	546087	40.51	50.39	43.65	56.48	16.36
2	January 25, 20	February 8, 20	453876	40.16	48.84	45.76	62.77	16.43
2	February 8, 20	February 22, 2(	377418	40.34	50.85	44.35	61.4	16.14

Sixltr	Dic	verb	adj	compare	interrog	number	quant	affect
13.55	84.51	17.68	5.1	2.87	1.64	2.55	2.59	7.08
13.06	84.75	18.04	5.05	2.84	1.63	2.59	2.61	7.12
13.1	84.55	17.99	4.98	2.77	1.65	2.57	2.53	7.06
12.55	84.51	18.24	4.97	2.63	1.61	2.7	2.33	6.93
13.06	84.2	17.93	5.04	2.81	1.64	2.4	2.43	7.09
13.16	84.15	17.94	5.03	2.81	1.64	2.35	2.41	7.15
12.92	84.26	18	4.93	2.74	1.64	2.4	2.34	6.93
12.84	84.09	18.32	4.92	2.66	1.57	3.05	2.18	7.04
12.8	84.48	18.19	4.71	2.61	1.63	2.43	2.16	6.44
12.82	84.48	18.1	4.96	2.7	1.64	2.39	2.29	7.03
12.89	84.36	18.2	4.98	2.67	1.61	2.37	2.29	6.98
12.91	84.32	18.1	4.93	2.66	1.64	2.26	2.26	6.99
13.14	84.66	18.08	5.05	2.73	1.62	2.4	2.31	7.14
13.4	84.69	18.13	4.99	2.64	1.65	2.19	2.31	7.38
13.23	84.16	17.97	4.85	2.64	1.66	2.24	2.28	7.24
12.96	84.34	17.98	4.99	2.66	1.63	2.31	2.27	7.36
12.67	84.36	18	4.94	2.53	1.6	2.38	2.25	7.32
13.15	84.79	17.89	5.01	2.69	1.63	2.31	2.43	7.48
12.78	84.5	18.13	5.11	2.66	1.65	2.13	2.31	7.17
12.7	84.65	18.04	4.99	2.57	1.64	2.3	2.21	7.49
13.03	84.32	17.87	5.13	2.72	1.68	2.3	2.34	7.48
13.11	84.24	17.9	5.09	2.75	1.58	2.3	2.32	7.28
13.46	84.4	18.01	5.07	2.78	1.59	2.32	2.27	7.08
13.32	84.32	17.97	5.12	2.81	1.68	2.29	2.37	7.43

posemo	negemo	anx	anger	sad	social	family	friend	female	male	cogproc
4.33	2.71	0.14	1.49	0.35	9.21	0.1	0.41	0.14	0.82	14.1
4.27	2.82	0.17	1.44	0.36	9.18	0.1	0.41	0.1	0.83	13.87
4.23	2.79	0.17	1.45	0.36	9.4	0.1	0.44	0.12	0.84	13.76
4.34	2.56	0.15	1.33	0.37	8.78	0.13	0.45	0.14	0.99	13.43
4.3	2.74	0.15	1.41	0.36	9.09	0.12	0.43	0.11	0.98	13.63
4.33	2.79	0.15	1.37	0.37	8.98	0.11	0.4	0.12	0.9	13.61
4.28	2.62	0.16	1.29	0.33	8.97	0.12	0.43	0.13	1	13.58
4.61	2.42	0.18	1.09	0.29	8.28	0.08	0.42	0.11	1.03	13.07
4.07	2.34	0.15	1.09	0.32	8.72	0.1	0.37	0.12	0.91	13.29
4.43	2.56	0.15	1.24	0.36	8.97	0.14	0.44	0.13	1.01	13.48
4.34	2.6	0.17	1.3	0.35	8.79	0.13	0.39	0.19	0.99	13.36
4.35	2.61	0.17	1.3	0.34	8.91	0.14	0.41	0.18	0.98	13.27
4.45	2.65	0.15	1.35	0.36	8.79	0.12	0.4	0.15	0.95	13.41
4.46	2.87	0.17	1.41	0.4	9.15	0.14	0.41	0.15	0.91	13.43
4.34	2.86	0.17	1.42	0.41	9.25	0.12	0.42	0.14	1.05	13.33
4.51	2.81	0.15	1.42	0.36	9.12	0.14	0.41	0.13	1.06	13.51
4.51	2.76	0.18	1.4	0.38	8.89	0.13	0.44	0.13	0.96	13.11
4.54	2.89	0.17	1.39	0.39	9.45	0.12	0.43	0.08	0.83	13.3
4.5	2.63	0.15	1.31	0.38	9.06	0.14	0.4	0.16	1.03	13.32
4.85	2.6	0.16	1.28	0.35	9.27	0.16	0.45	0.16	1.13	13.24
4.62	2.81	0.16	1.38	0.39	9.31	0.12	0.42	0.16	0.96	13.63
4.43	2.8	0.15	1.42	0.38	9.02	0.11	0.41	0.16	0.9	13.37
4.49	2.54	0.16	1.22	0.38	8.79	0.12	0.45	0.11	0.94	13.3
4.63	2.75	0.15	1.41	0.38	9.03	0.11	0.46	0.11	0.84	13.35

insight	cause	discrep	tentat	certain	differ	percept	see	hear	feel	bio
1.97	2.31	2.31	3.46	1.71	4.38	2.19	0.98	0.52	0.59	1.26
1.94	2.25	2.2	3.41	1.75	4.42	2.31	1.02	0.53	0.64	1.28
1.93	2.23	2.2	3.39	1.72	4.37	2.37	1.07	0.56	0.62	1.29
1.94	2.09	2.11	3.38	1.67	4.21	2.66	1.3	0.56	0.69	1.43
1.92	2.2	2.14	3.32	1.71	4.32	2.4	1.07	0.59	0.63	1.35
1.88	2.26	2.09	3.29	1.72	4.33	2.4	1.03	0.62	0.65	1.37
1.97	2.19	2.14	3.37	1.65	4.27	2.58	1.15	0.6	0.71	1.52
1.96	2.13	1.98	3.19	1.65	4.11	2.88	1.43	0.47	0.87	1.77
1.94	2.02	2.15	3.46	1.66	4.16	2.82	1.16	0.74	0.81	1.52
1.98	2.15	2.05	3.34	1.7	4.23	2.7	1.18	0.66	0.74	1.48
1.95	2.11	2.06	3.19	1.71	4.24	2.69	1.19	0.63	0.77	1.51
2	2.1	2.01	3.24	1.64	4.16	2.76	1.27	0.66	0.71	1.53
1.95	2.15	2.08	3.23	1.66	4.24	2.68	1.25	0.58	0.74	1.6
1.93	2.18	2.07	3.23	1.69	4.24	2.51	1.13	0.62	0.63	1.48
1.95	2.2	2.1	3.19	1.64	4.14	2.51	1.13	0.6	0.66	1.51
1.94	2.19	2.08	3.24	1.68	4.3	2.5	1.11	0.61	0.67	1.49
1.87	2.09	2.09	3.19	1.64	4.14	2.47	1.11	0.55	0.68	1.47
1.9	2.18	2.17	3.09	1.67	4.09	2.24	1	0.58	0.56	1.36
1.92	2.18	2.03	3.14	1.63	4.22	2.71	1.2	0.61	0.77	1.5
1.88	2.13	2.06	3.24	1.62	4.23	2.66	1.2	0.58	0.75	1.57
1.89	2.19	2.18	3.27	1.69	4.35	2.56	1.05	0.75	0.66	1.4
1.91	2.22	2.05	3.19	1.69	4.2	2.5	1.15	0.6	0.65	1.42
1.87	2.19	2.03	3.21	1.74	4.13	2.7	1.15	0.72	0.71	1.4
1.85	2.26	2.03	3.18	1.72	4.21	2.37	1.02	0.57	0.67	1.45

body	health	sexual	ingest	drives	affiliation	achieve	power	reward	risk	focuspast
0.68	0.22	0.22	0.1	7.29	1.89	2.02	2.05	2.08	0.51	3.08
0.68	0.21	0.21	0.12	7.2	1.77	1.89	1.96	2.17	0.57	3.15
0.67	0.22	0.21	0.13	7.19	1.87	1.82	1.99	2.14	0.55	3.09
0.77	0.22	0.21	0.17	6.72	1.71	1.62	1.87	2.04	0.47	3.57
0.68	0.25	0.2	0.16	7.03	1.77	1.79	1.94	2.11	0.53	3.38
0.72	0.25	0.19	0.16	6.94	1.75	1.74	1.9	2.04	0.57	3.33
0.81	0.25	0.18	0.21	6.8	1.72	1.67	1.83	2.01	0.55	3.39
1.03	0.24	0.14	0.28	6.62	1.53	1.82	1.79	1.92	0.5	3.47
0.89	0.21	0.17	0.18	6.44	1.57	1.51	1.75	1.94	0.51	3.73
0.82	0.24	0.18	0.18	6.85	1.73	1.67	1.88	2.08	0.53	3.56
0.83	0.25	0.19	0.17	6.67	1.71	1.54	1.91	1.98	0.51	3.7
0.85	0.24	0.2	0.19	6.7	1.74	1.54	1.86	1.97	0.49	3.6
0.94	0.25	0.2	0.15	6.92	1.8	1.71	1.85	2.08	0.5	3.56
0.76	0.25	0.22	0.17	6.87	1.88	1.56	1.82	1.97	0.53	3.52
0.76	0.27	0.2	0.21	6.85	1.89	1.52	1.83	1.95	0.55	3.59
0.74	0.28	0.2	0.22	6.84	1.77	1.61	1.83	2.04	0.54	3.49
0.73	0.27	0.22	0.16	6.87	1.83	1.56	1.84	2.03	0.54	3.51
0.63	0.29	0.19	0.17	7.44	2.13	1.69	1.93	2.11	0.61	3.78
0.83	0.23	0.19	0.17	6.68	1.74	1.54	1.78	2.05	0.52	3.53
0.85	0.25	0.19	0.2	6.73	1.8	1.58	1.78	2.03	0.52	3.59
0.71	0.26	0.19	0.16	7.13	1.83	1.77	1.93	2.12	0.58	3.43
0.71	0.29	0.19	0.19	7.09	1.86	1.77	1.95	2.01	0.55	3.56
0.72	0.25	0.18	0.18	7.08	1.86	1.8	1.99	1.99	0.52	3.64
0.76	0.25	0.2	0.17	7.46	2.03	1.94	1.99	2.12	0.52	3.47

focuspresent	focusfuture	relativ	motion	space	time	work	leisure	home	money	relig
12.5	1.24	12.26	1.8	6.02	4.65	1.2	2.08	0.07	0.77	0.16
12.8	1.34	12.47	1.76	6.02	4.91	1.24	2.13	0.08	0.71	0.14
12.73	1.39	12.55	1.71	5.95	5.07	1.23	2.04	0.08	0.77	0.14
12.56	1.45	12.95	1.74	5.99	5.41	1.06	1.78	0.08	0.83	0.17
12.49	1.29	12.38	1.74	5.78	5.05	1.17	1.95	0.07	0.73	0.17
12.55	1.27	12.46	1.72	5.83	5.1	1.18	2.07	0.08	0.67	0.17
12.56	1.28	12.46	1.75	5.86	5.02	1.18	1.91	0.08	0.78	0.18
12.81	1.4	12.99	1.89	6.01	5.3	1.14	1.55	0.05	0.67	0.25
12.38	1.41	12.79	1.89	5.92	5.13	1.09	1.71	0.08	0.96	0.21
12.46	1.35	12.34	1.72	5.74	5.05	1.17	1.97	0.09	0.91	0.18
12.41	1.34	12.35	1.73	5.54	5.29	1.1	1.99	0.08	0.99	0.2
12.47	1.29	12.42	1.76	5.71	5.11	1.07	1.97	0.12	0.75	0.2
12.48	1.27	12.2	1.69	5.58	5.14	1.22	1.96	0.09	0.95	0.2
12.58	1.28	12.37	1.86	5.63	5.07	1.09	1.9	0.1	0.74	0.18
12.32	1.23	12.38	1.84	5.7	5.02	1.04	1.95	0.09	0.66	0.2
12.48	1.19	12.03	1.74	5.56	4.9	1.14	1.92	0.08	0.71	0.2
12.52	1.28	12.52	1.8	5.62	5.22	1.02	1.88	0.09	0.65	0.24
12.01	1.1	12.5	1.77	5.76	5.12	1.08	2.04	0.07	0.5	0.29
12.56	1.3	12.22	1.7	5.44	5.28	1.09	1.89	0.08	1	0.28
12.52	1.2	12.14	1.61	5.61	5.08	1.11	1.94	0.12	0.79	0.3
12.47	1.15	12.05	1.67	5.64	4.9	1.11	2.06	0.09	0.6	0.19
12.4	1.23	12.37	1.72	5.68	5.13	1.16	2.03	0.07	0.58	0.17
12.37	1.26	12.56	1.66	5.85	5.19	1.28	2.13	0.09	0.66	0.17
12.57	1.29	12.6	1.79	5.69	5.3	1.3	2.21	0.08	0.71	0.18

death	informal	swear	netspeak	assent	nonflu	filler
0.37	2.8	0.71	1.27	0.61	0.26	0.07
0.39	2.76	0.7	1.25	0.58	0.26	0.07
0.36	2.87	0.73	1.35	0.58	0.26	0.07
0.31	3.19	0.75	1.55	0.67	0.29	0.07
0.39	2.93	0.68	1.42	0.63	0.25	0.07
0.37	2.93	0.7	1.43	0.6	0.28	0.07
0.34	3.03	0.69	1.52	0.61	0.27	0.08
0.31	2.96	0.6	1.37	0.75	0.3	0.09
0.28	2.96	0.63	1.49	0.63	0.31	0.07
0.32	3.11	0.69	1.54	0.64	0.3	0.07
0.3	3.16	0.71	1.59	0.65	0.3	0.07
0.3	3.23	0.71	1.58	0.68	0.32	0.07
0.37	3.18	0.71	1.59	0.66	0.29	0.08
0.46	3.13	0.75	1.51	0.66	0.28	0.07
0.42	3.2	0.73	1.56	0.68	0.31	0.07
0.37	3.34	0.75	1.68	0.69	0.3	0.07
0.35	3.53	0.75	1.65	0.9	0.29	0.06
0.33	2.98	0.68	1.45	0.65	0.27	0.06
0.28	3.31	0.76	1.66	0.67	0.3	0.07
0.33	3.46	0.73	1.74	0.74	0.34	0.08
0.35	3.03	0.68	1.49	0.64	0.28	0.07
0.52	3	0.73	1.45	0.62	0.28	0.07
0.37	3.01	0.69	1.48	0.63	0.27	0.07
0.4	3	0.73	1.5	0.58	0.28	0.07

Appendix G - Dictionary totals

ProSocialStatus		Range	Minimum	Maximum	Mean		Std. Deviation
		Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
0	Analytic	0.6	39.12	39.72	39.38	0.09406	0.23039
	Clout	3.5	49.31	52.81	50.885	0.50409	1.23476
	Authentic	5.24	42.3	47.54	44.1467	0.72085	1.76573
	Tone	6.64	52.69	59.33	55.365	1.03329	2.53104
	WPS	0.59	16.15	16.74	16.4117	0.09735	0.23845
	Sixltr	0.61	12.55	13.16	12.975	0.09091	0.22269
	Dic	0.6	84.15	84.75	84.4033	0.09646	0.23628
	verb	0.31	17.93	18.24	18.0233	0.04638	0.11361
	adj	0.12	4.93	5.05	5	0.01932	0.04733
	compare	0.21	2.63	2.84	2.7667	0.03084	0.07554
	interrog	0.04	1.61	1.65	1.635	0.00563	0.01378
	number	0.35	2.35	2.7	2.5017	0.05642	0.13819
	quant	0.28	2.33	2.61	2.4417	0.04475	0.10962
	affect	0.22	6.93	7.15	7.0467	0.03887	0.09522
	posemo	0.11	4.23	4.34	4.2917	0.01662	0.0407
	negemo	0.26	2.56	2.82	2.72	0.04313	0.10564
	anx	0.02	0.15	0.17	0.1583	0.00401	0.00983
	anger	0.16	1.29	1.45	1.3817	0.02587	0.06338
	sad	0.04	0.33	0.37	0.3583	0.00601	0.01472
	social	0.62	8.78	9.4	9.0667	0.08632	0.21144
	family	0.03	0.1	0.13	0.1133	0.00494	0.01211
	friend	0.05	0.4	0.45	0.4267	0.0076	0.01862
	female	0.04	0.1	0.14	0.12	0.00577	0.01414
	male	0.17	0.83	1	0.9233	0.03148	0.07711
	cogproc	0.44	13.43	13.87	13.6467	0.06211	0.15214
	insight	0.09	1.88	1.97	1.93	0.01211	0.02966
	cause	0.17	2.09	2.26	2.2033	0.02525	0.06186
	discrep	0.11	2.09	2.2	2.1467	0.01856	0.04546
	tentat	0.12	3.29	3.41	3.36	0.01862	0.04561
	certain	0.1	1.65	1.75	1.7033	0.01498	0.0367
	differ	0.21	4.21	4.42	4.32	0.03011	0.07376

	percept	0.35	2.31	2.66	2.4533	0.05536	0.1356
	see	0.28	1.02	1.3	1.1067	0.04295	0.1052
	hear	0.09	0.53	0.62	0.5767	0.01333	0.03266
	feel	0.09	0.62	0.71	0.6567	0.01453	0.03559
	bio	0.24	1.28	1.52	1.3733	0.03694	0.09048
	body	0.14	0.67	0.81	0.7217	0.0233	0.05707
	health	0.04	0.21	0.25	0.2333	0.0076	0.01862
	sexual	0.03	0.18	0.21	0.2	0.00516	0.01265
	ingest	0.09	0.12	0.21	0.1583	0.01302	0.03189
	drives	0.48	6.72	7.2	6.98	0.08095	0.19829
	affiliation	0.16	1.71	1.87	1.765	0.02335	0.05718
	achieve	0.27	1.62	1.89	1.755	0.04056	0.09935
	power	0.16	1.83	1.99	1.915	0.02432	0.05958
	reward	0.16	2.01	2.17	2.085	0.02617	0.06411
	risk	0.1	0.47	0.57	0.54	0.01528	0.03742
	focuspast	0.48	3.09	3.57	3.3183	0.07139	0.17486
	focuspresent	0.31	12.49	12.8	12.615	0.04945	0.12112
	focusfuture	0.18	1.27	1.45	1.3367	0.02917	0.07146
	relativ	0.57	12.38	12.95	12.545	0.08393	0.2056
	motion	0.05	1.71	1.76	1.7367	0.0076	0.01862
	space	0.24	5.78	6.02	5.905	0.03905	0.09566
	time	0.5	4.91	5.41	5.0933	0.06873	0.16836
	work	0.18	1.06	1.24	1.1767	0.02616	0.06408
	leisure	0.35	1.78	2.13	1.98	0.05164	0.12649
	home	0.01	0.07	0.08	0.0783	0.00167	0.00408
	money	0.16	0.67	0.83	0.7483	0.02315	0.05672
	relig	0.04	0.14	0.18	0.1617	0.00703	0.01722
	death	0.08	0.31	0.39	0.36	0.01265	0.03098
	informal	0.43	2.76	3.19	2.9517	0.0598	0.14648
	swear	0.07	0.68	0.75	0.7083	0.01078	0.02639
	netspeak	0.3	1.25	1.55	1.42	0.04502	0.11027
	assent	0.09	0.58	0.67	0.6117	0.014	0.0343
	nonflu	0.04	0.25	0.29	0.2683	0.00601	0.01472
	filler	0.01	0.07	0.08	0.0717	0.00167	0.00408

	Valid N (listwise)						
1	Analytic	4.42	38.15	42.57	39.4367	0.43747	1.31242
	Clout	5.83	48.14	53.97	50.44	0.59489	1.78468
	Authentic	3.23	41.22	44.45	43.06	0.396	1.188
	Tone	7.66	53.53	61.19	57.9211	0.75405	2.26216
	WPS	0.84	16.22	17.06	16.5211	0.08471	0.25414
	Sixltr	0.73	12.67	13.4	13.0189	0.07591	0.22773
	Dic	0.63	84.16	84.79	84.4622	0.06934	0.20801
	verb	0.31	17.89	18.2	18.05	0.0321	0.09631
	adj	0.2	4.85	5.05	4.9667	0.01893	0.05679
	compare	0.2	2.53	2.73	2.6578	0.01869	0.05608
	interrog	0.06	1.6	1.66	1.6311	0.00633	0.019
	number	0.21	2.19	2.4	2.3167	0.02483	0.0745
	quant	0.18	2.25	2.43	2.2989	0.01775	0.05326
	affect	0.5	6.98	7.48	7.2133	0.06189	0.18567
	posemo	0.2	4.34	4.54	4.4367	0.02593	0.07778
	negemo	0.33	2.56	2.89	2.7344	0.04343	0.1303
	anx	0.03	0.15	0.18	0.1644	0.00377	0.0113
	anger	0.18	1.24	1.42	1.3589	0.0217	0.06509
	sad	0.07	0.34	0.41	0.3722	0.00795	0.02386
	social	0.66	8.79	9.45	9.0356	0.07452	0.22356
	family	0.02	0.12	0.14	0.1311	0.00309	0.00928
	friend	0.05	0.39	0.44	0.4167	0.00577	0.01732
	female	0.11	0.08	0.19	0.1422	0.01064	0.03193
	male	0.23	0.83	1.06	0.9711	0.02366	0.07097
	cogproc	0.4	13.11	13.51	13.3556	0.04069	0.12208
	insight	0.13	1.87	2	1.9411	0.01296	0.03887
	cause	0.11	2.09	2.2	2.15	0.01374	0.04123
	discrep	0.16	2.01	2.17	2.0789	0.01438	0.04314
	tentat	0.25	3.09	3.34	3.2156	0.02199	0.06598
	certain	0.07	1.64	1.71	1.67	0.00898	0.02693
	differ	0.21	4.09	4.3	4.1978	0.02253	0.0676
	percept	0.52	2.24	2.76	2.5622	0.054	0.162
	see	0.27	1	1.27	1.1522	0.02722	0.08167
	hear	0.11	0.55	0.66	0.61	0.01236	0.03708

	feel	0.21	0.56	0.77	0.6844	0.02155	0.06464
	bio	0.24	1.36	1.6	1.4922	0.02107	0.0632
	body	0.31	0.63	0.94	0.7844	0.0293	0.08791
	health	0.05	0.24	0.29	0.26	0.00601	0.01803
	sexual	0.04	0.18	0.22	0.2	0.00441	0.01323
	ingest	0.07	0.15	0.22	0.18	0.00764	0.02291
	drives	0.77	6.67	7.44	6.89	0.07401	0.22204
	affiliation	0.42	1.71	2.13	1.8311	0.04299	0.12898
	achieve	0.19	1.52	1.71	1.6	0.02415	0.07246
	power	0.11	1.82	1.93	1.8611	0.01274	0.03822
	reward	0.16	1.95	2.11	2.0233	0.01944	0.05831
	risk	0.12	0.49	0.61	0.5333	0.01167	0.035
	focuspast	0.29	3.49	3.78	3.59	0.03149	0.09447
	focuspresent	0.57	12.01	12.58	12.4144	0.05588	0.16764
	focusfuture	0.25	1.1	1.35	1.2589	0.02574	0.07721
	relativ	0.49	12.03	12.52	12.3456	0.05034	0.15101
	motion	0.17	1.69	1.86	1.7678	0.01877	0.0563
	space	0.22	5.54	5.76	5.6489	0.02705	0.08115
	time	0.39	4.9	5.29	5.1022	0.0377	0.11311
	work	0.2	1.02	1.22	1.1033	0.02115	0.06344
	leisure	0.16	1.88	2.04	1.9533	0.01616	0.04848
	home	0.05	0.07	0.12	0.09	0.00471	0.01414
	money	0.49	0.5	0.99	0.7622	0.05325	0.15975
	relig	0.11	0.18	0.29	0.21	0.01155	0.03464
	death	0.16	0.3	0.46	0.3578	0.01809	0.05426
	informal	0.55	2.98	3.53	3.2067	0.05169	0.15508
	swear	0.07	0.68	0.75	0.72	0.00882	0.02646
	netspeak	0.23	1.45	1.68	1.5722	0.02308	0.06924
	assent	0.26	0.64	0.9	0.69	0.02682	0.08047
	nonflu	0.05	0.27	0.32	0.2956	0.00503	0.01509
	filler	0.02	0.06	0.08	0.0689	0.002	0.00601
	Valid N (listwise)						
2	Analytic	3.02	37.49	40.51	39.482	0.57218	1.27944

	Clout	2.15	48.84	50.99	50.372	0.39576	0.88494
	Authentic	4.74	41.02	45.76	43.466	0.80311	1.79581
	Tone	11.77	56.48	68.25	61.798	1.92263	4.29912
	WPS	0.32	16.14	16.46	16.342	0.05625	0.12578
	Sixltr	0.76	12.7	13.46	13.124	0.13041	0.2916
	Dic	0.41	84.24	84.65	84.386	0.07068	0.15805
	verb	0.17	17.87	18.04	17.958	0.03216	0.0719
	adj	0.14	4.99	5.13	5.08	0.0249	0.05568
	compare	0.24	2.57	2.81	2.726	0.04179	0.09343
	interrog	0.1	1.58	1.68	1.634	0.02135	0.04775
	number	0.03	2.29	2.32	2.302	0.0049	0.01095
	quant	0.16	2.21	2.37	2.302	0.02818	0.06301
	affect	0.41	7.08	7.49	7.352	0.07768	0.1737
	posemo	0.42	4.43	4.85	4.604	0.07236	0.1618
	negemo	0.27	2.54	2.81	2.7	0.05486	0.12268
	anx	0.01	0.15	0.16	0.156	0.00245	0.00548
	anger	0.2	1.22	1.42	1.342	0.03929	0.08786
	sad	0.04	0.35	0.39	0.376	0.00678	0.01517
	social	0.52	8.79	9.31	9.084	0.09464	0.21161
	family	0.05	0.11	0.16	0.124	0.00927	0.02074
	friend	0.05	0.41	0.46	0.438	0.0097	0.02168
	female	0.05	0.11	0.16	0.14	0.01225	0.02739
	male	0.29	0.84	1.13	0.954	0.04854	0.10854
	cogproc	0.39	13.24	13.63	13.378	0.06689	0.14957
	insight	0.06	1.85	1.91	1.88	0.01	0.02236
	cause	0.13	2.13	2.26	2.198	0.02131	0.04764
	discrep	0.15	2.03	2.18	2.07	0.02811	0.06285
	tentat	0.09	3.18	3.27	3.218	0.01655	0.03701
	certain	0.12	1.62	1.74	1.692	0.02035	0.0455
	differ	0.22	4.13	4.35	4.224	0.03572	0.07987
	percept	0.33	2.37	2.7	2.558	0.05886	0.13161
	see	0.18	1.02	1.2	1.114	0.03385	0.0757
	hear	0.18	0.57	0.75	0.644	0.03776	0.08444
	feel	0.1	0.65	0.75	0.688	0.01855	0.04147
	bio	0.17	1.4	1.57	1.448	0.03184	0.0712

	body	0.14	0.71	0.85	0.75	0.02665	0.05958
	health	0.04	0.25	0.29	0.26	0.00775	0.01732
	sexual	0.02	0.18	0.2	0.19	0.00316	0.00707
	ingest	0.04	0.16	0.2	0.18	0.00707	0.01581
	drives	0.73	6.73	7.46	7.098	0.11573	0.25879
	affiliation	0.23	1.8	2.03	1.876	0.04007	0.08961
	achieve	0.36	1.58	1.94	1.772	0.05739	0.12834
	power	0.21	1.78	1.99	1.928	0.03878	0.08672
	reward	0.13	1.99	2.12	2.054	0.02768	0.06189
	risk	0.06	0.52	0.58	0.538	0.012	0.02683
	focuspast	0.21	3.43	3.64	3.538	0.03865	0.08643
	focuspresent	0.2	12.37	12.57	12.466	0.03696	0.08264
	focusfuture	0.14	1.15	1.29	1.226	0.02421	0.05413
	relativ	0.55	12.05	12.6	12.344	0.10975	0.24542
	motion	0.18	1.61	1.79	1.69	0.0305	0.06819
	space	0.24	5.61	5.85	5.694	0.04155	0.0929
	time	0.4	4.9	5.3	5.12	0.06611	0.14782
	work	0.19	1.11	1.3	1.192	0.04116	0.09203
	leisure	0.27	1.94	2.21	2.074	0.04567	0.10213
	home	0.05	0.07	0.12	0.09	0.00837	0.01871
	money	0.21	0.58	0.79	0.668	0.03813	0.08526
	relig	0.13	0.17	0.3	0.202	0.02478	0.05541
	death	0.19	0.33	0.52	0.394	0.03356	0.07503
	informal	0.46	3	3.46	3.1	0.09017	0.20162
	swear	0.05	0.68	0.73	0.712	0.01114	0.0249
	netspeak	0.29	1.45	1.74	1.532	0.05267	0.11777
	assent	0.16	0.58	0.74	0.642	0.02653	0.05933
	nonflu	0.07	0.27	0.34	0.29	0.01265	0.02828
	filler	0.01	0.07	0.08	0.072	0.002	0.00447
	Valid N (listwise)						