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Negativity and anti-social attention seeking among narcissists on Twitter: A linguistic analysis by Jennifer Golbeck

Abstract

A linguistic analysis shows differences in the way narcissistic and non-narcissistic users communicate on Twitter. Because narcissism is marked by attention-seeking, and is related to negativity and perceived victimization, we hypothesized that narcissists would use more words about anger and negative emotions. Conversely, we further hypothesized that they would use fewer words about social interaction and positive emotions. An analysis of over 1,000 users supported these hypotheses.

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1. Introduction

Social media has become an integral part of communication and Internet use. The vast majority of Americans (and Internet users in many other countries) use social media; 71 percent of U.S. Internet users are on Facebook, and 23 percent are on Twitter (Duggan, *et al.*, 2015). In the process of posting and interacting, people reveal a lot about themselves. Analysis of their behavior, personal attributes, and language use has been used to understand political preferences (Golbeck and Hansen, 2014), personality traits (Golbeck, Robles, Edmondson, *et al.*, 2011; Youyou, *et al.*, 2015), relationship strength (Gilbert and Karahalios, 2009), and depression (De Choudhury, Gamon, *et al.*, 2013; De Choudhury, Counts, *et al.*, 2013), to name just a few. Psycholinguistic traits have been especially useful in many of these studies.

Narcissism is a personality trait that is marked by a need to be the center of attention, feelings of superiority, and a sense of entitlement. On social media, where people publicly vie for attention and express themselves, we expected to see linguistic differences between narcissistic and non-narcissistic users. In particular, we expect that narcissists will use language that is negative and anti-social.

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We explore this on Twitter, one of the most popular (and most public) social media platforms.

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2. Related work

2.1. Linguistic analysis and narcissism

One of the most common linguistic attributes analyzed regarding narcissism is that of personal pronouns. Many have considered first person singular pronoun use (*i.e.*, "I") to be a marker of narcissism. However, a new study (Carey, *et al.*, 2015) has shown that across many contexts, languages, and sites, there is no relationship between the two. Therefore, we chose not to consider first person pronoun use as a feature in this research.

DeWall, *et al.* (2011) analyzed essays from non-social media sources, and found a positive relationship between narcissism and anti-social writing. They developed an "antisocial word use index", which combined counts of swear words and angry words. We incorporated this in our research.

Narcissism has been connected to greater use of swear words (DeWall, *et al.*, 2011; Holtzman, *et al.*, 2010), shame words (McGregor, 2010), and more agentic statements (Hart, *et al.*, 2011).

1.2. Linguistic analysis of social media

There has been a great deal of linguistic analysis related to personality traits, including narcissism. However, Twitter posts are distinct in two important ways.

First, they are intended for a public audience — and users know it when they make a post. Thus, they provide insight into how people portray themselves to the broader world, revealing how they might be trying to manipulate or influence readers.

Second, Twitter posts are short: 140 characters. In order to analyze the text a user posts, researchers collect many posts into a single "document" and run an analysis on that. This means the document we analyze has many words, but they are a collection of potentially unrelated thoughts. This is quite different from an essay or journal entry (more typical texts for linguistic analysis), which represent a more cohesive narrative.

Linguistic analysis has been applied to social media in a variety of ways, especially to profile users and predict information about their relationships and personality traits. These studies primarily used the Linguistic Inquiry and Word Count (LIWC) (Pennebaker, *et al.*, 2001) tool, which we also use in this project.

Research on Facebook (Golbeck, Robles, *et al.*, 2011) and Twitter (Golbeck, Robles, Edmondson, *et al.*, 2011) used LIWC to analyze users text in order to predict users' Big Five personality traits. The tool was also used to analyze Facebook text as part of an application that predicted tie strength between users (Gilbert and Karahalios, 2009).

Researchers also found that linguistic analysis of a pregnant woman's Twitter posts could predict, with over 75 percent accuracy, whether she would develop postpartum depression once she gave birth.

1.3. Narcissism in social media

A few studies have looked at narcissism and how it manifests in social media. Two of these projects analyzed user behavior, including the type of profiles photos people post:

- Buffardi and Campbell (2008) showed that narcissistic users were more active in online communities, more self-promotional, and that they used sexier photos.
- A followup study (DeWall, *et al.*, 2011) included a linguistic component, and showed that narcissistic users who employed fewer first person singular pronouns (*i.e.*, less use of "I") in their personal description used sexier profile photos.

Although DeWall, *et al.* (2011) used a linguistic analysis, our approach is quite different. Their study analyzed text from the "About Me" section of 80 subjects' Facebook profiles. The "About Me" text on Facebook is typically quite short; a previous study (Golbeck, Robles, Edmondson, *et al.*, 2011; Golbeck, Robles, *et al.*, 2011) found that 62 percent of users have no text in this box, and the rest averaged only 10.8 words. Thus, the "About Me" simply cannot allow a deep linguistic analysis. (Those researchers added an additional study of longer, non-social media text to their results.)

Our analysis of Twitter provides access to much more text from many more subjects. We use over 1,100 subjects who had at least 1,000 words in their timelines. Twitter is a text-heavy environment; our subjects averaged 2,442 words in the posts we collected. This allowed us to do a deeper statistical analysis and discover direct relationships between language and narcissism in the data.

Researchers have also tried to *predict* narcissism (and other traits). An attempt to predict “dark triad” personality traits (narcissism, Machiavellianism, and psychopathy) was unable to determine someone’s personality traits by analyzing their Twitter behavior (Sumner, *et al.*, 2012). However, they did find some relationships between personality and linguistic attributes. These include use of punctuation related to conversation on Twitter, and words related to sex.



3. Theory

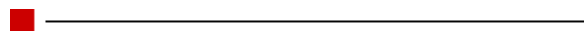
In our linguistic analysis of how narcissism manifests on Twitter, we have built our hypotheses based on existing work that indicates narcissists may use anti-social or other negative language in their online interactions.

Previous research has shown that narcissism was positively related to perceived victimization (McCullough, *et al.*, 2003). When narcissists don’t receive attention (or other things to which they feel entitled), they perceive themselves as victims of the people who are withholding from them. Previous research found this manifested in journaling (McCullough, *et al.*, 2003), and we theorize similar expressions may be present on Twitter. Perceived victimization could manifest linguistically in more expressions of negative emotions and anger, and fewer expressions of positive emotions.

Research has also shown that narcissism is related to negative affectivity as well (McCullough, *et al.*, 2003; Clark, *et al.*, 2010). Thus, we hypothesize narcissistic subjects will have more negative affective language and less positive affective language.

To gain attention, narcissists have also been shown to resort to anti-social behavior. As mentioned above, previous work has shown that can manifest in cursing.

We also theorize that anti-social behavior, combined with a need to draw personal focus, may lead to narcissistic subjects spending less time discussing social interactions.



4. Method

4.1. Participants

Subjects were recruited from a popular psychology Web site and asked to participate in this study without compensation. All gave consent for their public Twitter data to be used in the present research. While over 3,100 people responded to our request, we ended up with 1,028 after filtering out users with private profiles, inaccessible user names, those with fewer than 1,000 words total, and people with fewer than 50 percent of their words in the English LIWC dictionary (essentially, a filter for subjects who were not tweeting primarily in English).

Because we only used Twitter data, no demographic information was available about the subjects.

4.2. Materials and procedure

Subjects participated online. They provided their Twitter user name and completed the Single Item Narcissism Scale (SINS) (Konrath, *et al.*, 2014).

SINS uses a single question to replace the traditional 40-question narcissistic personality inventory (NPI) (Raskin and Hall, 1981):

To what extent do you agree with this statement: “I am a narcissist”? (Note: The word ‘narcissist’ means egotistical, self-focused, and vain.)

Subjects answer using a seven-point Likert scale, with one indicating “not very true of me” and seven indicating “very true of me”. The SINS creators showed that it yielded results that were statistically equivalent to those from the NPI.

The short format makes it ideal for Internet research, where holding subjects' attention is especially difficult. All of our subjects completed the SINS ($M=3.096$, $SD=1.554$).

Using the Twitter API, we collected the text from the subjects' last 200 posts. These included 2,730,404 total words, with a mean 2,442 words per person ($SD=1,788$) We analyzed this linguistic content using the Linguistic Inquiry and Word Count (LIWC) tool (Pennebaker, *et al.*, 2001). This tool is widely used for psycholinguistic analysis is well-validated in the literature. It calculates word counts (or the percentage of words) in a document from 81 different categories, including things like swear words, different types of pronouns, types of emotional words, and words related to social interaction.

In this research, we were interested only in LIWC categories that related to our hypotheses, so we selected a subset of categories for our focus:

- *Swear words*: This included 33 swear words or variants, ranging from mildly offensive (e.g., "butt" and "suck") to the very profane.
- *Affective processes*: These words deal with feelings. They include positive and negative emotions, along with sub-categories of negative emotions that include anger, sadness, and anxiety.
- *Social processes*: These words relate to relationships with others. They include sub-categories for friends, family, and human-related words.

As mentioned above, we also replicated the measure of anti-social words introduced in DeWall, *et al.* (2011) that combines frequencies of words related to anger with curse words. In total, we analyzed 14 linguistic categories and sub-categories.

5. Results

We predicted narcissistic and non-narcissistic subjects would show differences in their use of pronouns, and that narcissistic subjects would use more swear words and fewer positive emotion words. We looked for frequency differences across all the LIWC language features.

We separated subjects into two groups:

- *High narcissism (HN)*, for users with narcissism scores at least one standard deviation above the mean, and
- *Low narcissism (LN)*, for users with narcissism scores at least one standard deviation below the mean.

This follows the procedure used in previous research on narcissism and social media (DeWall, *et al.*, 2011). The result was that the HN group had individuals with SINS scores of five and above, and the LN group had subjects with a SINS score of one.

We then ran a Student's *t*-test comparing the frequency with which each group used each language feature. Significance was set at $p<0.05$. Because we made comparisons across 14 categories, we used a Bonferroni correction to determine significance. This essentially required $p<0.0036$ for significance.

After this statistical correction, we found a number of significant differences between the HN and LN groups across these social and anti-social word categories. Values are shown in [Table 1](#). Correlation coefficients are included in this table as well. While no correlations are especially strong, all are statistically significant.

Table 1: Frequency use for language categories between high (HN) and low (LN) narcissism scoring subjects.
 Note: All values are significantly different for $p<0.05$ with Bonferroni correction; a * indicates significance for Bonferroni-corrected $p<0.01$. Significantly large values are **bolded**. Pearson correlations (ρ) are all statistically significant.

Category	LN	HN	ρ	Examples
*Swear	0.20	0.38	0.16	
*Social processes	9.36	8.52	-0.10	<i>mate, talk, they, child</i>
Positive emotion	5.33	4.83	-0.08	<i>love, nice, sweet</i>

Negative emotion	1.99	2.28	0.13	<i>love, nice, sweet</i>
*Anger	0.74	0.95	0.15	<i>hate, kill, annoyed</i>
*Antisocial Word Use Index	0.95	1.33	0.16	<i>(swear+anger)</i>

5.1. Swear words

HN subjects used significantly more swear words than LN, with nearly double the frequency. This is in line with previous results that show narcissists curse more (Holtzman, *et al.*, 2010; DeWall, *et al.*, 2011).

4.2. Social processes

This category of words contains pronouns and verbs that reflect social interaction (18. Pennebaker, *et al.*, 2001). The LN group used significantly more words about social processes than the HN group. LIWC includes sub-categories of these words, which include "Family", "Friends", and "Humans". We found no significant differences in these categories.

4.3. Affective processes

This group of words relate to use of positive and negative emotion words. The HN group used significantly fewer positive emotion words, and significantly more negative emotion words, than the LN group. LIWC also offers three sub-categories of negative emotions: "Anger", "Anxiety", and "Sad". HN subjects also used significantly more Anger words, and we found no significant differences in the use of Anxiety and Sad words.

4.4. Antisocial Word Use Index

The Antisocial Word Use Index was introduced in DeWall, *et al.* (2011) and combines the frequency counts for swear words and anger words. We computed that statistic and found the HN group uses significantly more of these anti-social words.



6. Discussion

To summarize, we found that subjects with high narcissism scores were significantly more likely to use curse words, negative emotion words, anger words, and anti-social words. They were significantly less likely to use positive emotion words or to discuss social processes (*i.e.*, human interaction). On every word category we considered, we found narcissistic users to be more negative, aggressive, and less socially engaged.

If narcissists are employing some of these strategies to get attention, is it working? We found some evidence that anti-social language on Twitter does indeed relate to increased attention.

There are two major ways a user can see the attention his or her posts are getting on Twitter: *favorites* and *retweets*. Favorites are similar to Facebook "likes", indicating someone else likes the tweet. Retweets are when a user shares someone else's post on his or her own timeline.

We separated tweets from our subjects by those that contained anti-social words (anger words and curse words) and those that did not. Tweets with anti-social words were favorited significantly more often (39.0 percent of the time vs. 35.0 percent for tweets without these words, $p < 0.05$). Thus, by this measure, people did receive more attention when they used language that might be considered attention-seeking.

There was no significant difference in the number of retweets based on anti-social word use.

Our study is limited by the fact that we used a simple, self-reported narcissism scale in the SINS. While it was the ideal choice for an online, social media-related study, there are deeper questions that would benefit from an external narcissism analysis and a more nuanced understanding of subjects' narcissism.

The results we presented here have implications for researchers moving forward in a number of ways. As mentioned in the opening of this paper, psycholinguistic analysis of social media has been a powerful tool for inferring personal attributes from social media. These results highlight

specific language features that may be most useful to incorporate into algorithms going forward. They could be used to predict narcissism directly, or to control for it when predicting other personal attributes.


For researchers who study online behavior, these relationships also provide insight into why users may behave in a certain way. As an extreme example, research has shown that Internet trolls tend to be narcissistic (among other negative personality traits) (Buckels, *et al.*, 2014). Recognizing the linguistic features that narcissists use could prove useful in the development of tools to recognize and filter out trolling or other negative messages. This is not to say that all narcissists are posting negative content; rather, users who post highly negative content are often narcissistic — and recognizing the narcissistic language traits can be one component of identifying these bad users.

For personality researchers, these results also lead to interesting questions about narcissists behavior on social media in particular. We did not see evidence among other language features that there were any differences in language use that could be linked to these grandiosity-oriented attributes. Is this because bragging and self-promotion are narcissistic behaviors off-line, but not necessarily on social media, where people are naturally posting about themselves? Are there other forms of narcissistic attention-seeking in positive ways that we did not find in these results? Does social media appeal to covert narcissists more than overt narcissists? We noticed traces that may stem from perceived victimization and negativity. Do those manifest elsewhere on social media, or are there linguistic markers of other narcissistic attitudes that we can detect in public social media posts?

These are all open questions that can illuminate the interplay between individual personality and the social media environment.



7. Conclusion

The key finding from this research is that narcissists express themselves differently on Twitter. They use more negative and anti-social words than non-narcissistic users, which aligns with previous results on linguistic characteristics of attention-seeking, perceived victimization, and negativity. These results contribute to our understanding of user motivations and desires on social media. Better knowledge about individual differences and their effect on communication can help researchers to better analyze social media interactions, and improve them. 

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