The dark side of Facebook: Semantic representations of status updates predict the Dark Triad of personality

Danilo Garcia [a,b,c,]*, Sverker Sikström [d,]*

[a] Centre for Ethics, Law and Mental Health (CELAM), University of Gothenburg, Gothenburg, Sweden
[b] Institute of Neuroscience and Physiology, The Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden
[c] Network for Empowerment and Well-Being, University of Gothenburg, Gothenburg, Sweden
[d] Department of Psychology, Lund University, Lund, Sweden

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ABSTRACT

Using Latent Semantic Analysis, we quantified the semantic representations of Facebook status updates of 304 individuals in order to predict self-reported personality. We focused on, besides Neuroticism and Extraversion, the Dark Triad of personality: Psychopathy, Narcissism, and Machiavellianism. The semantic content of Facebook updates predicted Psychopathy and Narcissism. These updates had a more "odd" and negatively valanced content. Furthermore, Neuroticism, number of Facebook friends, and frequency of status updates were predictable from the status updates. Given that Facebook allows individuals to have major control in how they present themselves and draw benefits from these interactions, we conclude that the Dark Triad, involving socially malevolent behavior such as self-promotion, emotional coldness, duplicity, and aggressiveness, is manifested in Facebook status updates.

"Evelyn, I'm sorry. I just, uh... you're not terribly important to me"
[*American Psycho*]

"...there is only one thing in the world worse than being talked about, and that is not being talked about"
[*The Picture of Dorian Gray by Oscar Wilde*]

"It is double pleasure to deceive the deceiver"
[*Niccolò Machiavelli*]

"By giving people the power to share, we're making the world more transparent"

[*Mark Zuckerberg*]

1. Introduction

The recent years have seen a major revolution in how people interact with each other through the Internet. The social network Facebook is not only part of this revolution but also presents a unique opportunity for psychological research (for a review see Wilson, Gosling, & Graham, 2012). In Facebook, as in other social networks, individuals' activities (e.g., connecting to others, expressing preferences, status updates) provide observable data for studying human behavior (Wilson et al., 2012). Status updates, for example, are generally used to broadcast current states or make statements with own written words. Although these texts might be informative for investigating how people present themselves in Facebook, or other social interactions in the network, there are no quantitative studies focusing on status updates. In the present article we direct our attention to the question if the semantic representation of status updates predicts personality traits. Facebook is in fact a compelling forum to test this relationship because unlike other social networks (e.g., Badoo, Habbo), individuals in Facebook typically become friends online after being friends offline (Ross et al., 2009). Moreover, although some self-enhancement might be present in Facebook, individuals are generally presenting themselves fairly accurately to their offline selves (e.g., Back et al., 2010; see also Wilson et al., 2012).

Nevertheless, Buffardi and Campbell (2008) found that, by subjective coding of Facebook pages, narcissists engage in self-promotion on Facebook. Narcissism involves a grandiose yet fragile sense of the self (Ames, Rose, & Anderson, 2006) as well as an obsession with success and demands for admiration (for a review see Morf & Rhodewalt, 2001). The trait of Narcissism has been associated with the frequency of using Facebook (Buffardi & Campbell, 2008; Mehdizadeh, 2010; Ong et al., 2011) and with the number of friends on Facebook (Bergman, Fearrington, Davenport, & Bergman,

* Corresponding authors. Address: CELAM, Wallinsgatan 8, SE 431 41 Mölndal, Gothenburg, Sweden. Tel.: +46 733105153 (D. Garcia). Address: Department of Psychology, Lund University, Box 188, SE 221 00 Lund, Sweden (S. Sikström).
E-mail addresses: danilo.garcia@neuro.gu.se, danilo.garcia@euromail.se (D. Garcia), sverker.Sikstrom@psychology.lu.se (S. Sikström).

2011; Carpenter, 2012). Narcissism has been suggested as a socially aversive personality (Kowalski, 2001), which shares features with two specific "malevolent" personality traits: Psychopathy and Machiavellianism (Paulhus & Williams, 2002). Psychopathy involves high impulsivity and thrill-seeking along with low empathy and anxiety (Hare, 1985) and shows similar neurological activations to the personality trait of Psychoticism (Corr, 2010; see also Hare, 1981). For instance, Psychoticism as measured by the three-factor hierarchical model proposed by Eysenck (Eysenck & Eysenck, 1985) is better labeled "Psychopathy or "Impulsive Unsocialized Sensation Seeking" (Zuckerman, Kuhlman, Thornquist, & Kiers, 1991. See also Zuckerman, 1989, 1991). Machiavellianism is the cold manipulative personality and was originally derived from Machiavelli's original books (see Christie & Geis, 1970).

This "Dark Triad" involves socially malevolent behavior such as self-promotion, emotional coldness, duplicity, and aggressiveness (Paulhus & Williams, 2002). As detailed by Holtzman (2011), psychopaths, narcissists, and Machiavellians, are usually successful in brief interactions by taking advantage of people, successfully extracting resources, and committing crimes. For instance, two of the common internal motivations for using Facebook are increasing social capital (i.e., benefits from interaction with others) and fulfilling social-grooming needs such as gossip and monitoring members of one's social group (Wilson et al., 2012).

As in earlier studies investigating the relationship between personality and Facebook behavior (Amichai-Hamburger & Vinitzky, 2010; Ross et al., 2009) we also include Extraversion and Neuroticism in our analysis. Studies using behavior genetic approaches, however, show that the Dark Triad expands the current personality models (Veselka, Schermer, & Vernon, 2012). We suggest that focusing on the Dark Triad might offer new insights into how people are presenting themselves on Facebook and help to examine positive and negative impacts on society as suggested by Wilson and colleagues (2012). Moreover, in the present study, we quantify the semantic content in Facebook users' status updates to objectively investigate whether this semantic representation predicts self-reported personality traits. Giving the nature of Facebook, allowing individuals to have major control in how they present themselves and draw benefits from these interactions (i.e., increasing social capital and fulfilling social-grooming needs), we expected that the Dark Triad is manifested in the status updates.

2. Method

2.1. Participants and overview of the procedure

The participants (N = 304, age mean = 26.40 sd. = 7.52, 132 males and 172 females) were recruited through Amazons' Mechanical Turk (MTurk). MTurk allows data collectors to recruit participants (workers) online for completing different tasks in exchange for wages (see other demographics of the whole sample in the Supplementary Material online, Table S1). This method for data collection online has become more common during recent years and it is an empirical tested valid tool for conducting research in the social sciences (see Buhrmester, Kwang, & Gosling, 2011). Participants were recruited by the following criteria: resident of the USA and have a minimum of 15 own written status updates in her/his Facebook profile. Participants were paid a wage of two American dollars for completing the task and informed that the study was confidential and voluntary. First, the participants were presented with a battery of self-reports comprising the personality measures, demographics (e.g., age, gender, marital status), questions about their own Facebook profile (number of Facebook friends, how often the status was updated, and to estimate how much time they

spend on Facebook on a daily basis) and then to provide the latest 15 status updates from their own Facebook profile.

2.2. Semantic representation of status updates

The status update provided by the participants were not sufficiently large to construct a high quality representation, therefore, the semantic content of the status updates was quantified by using a semantic representation generated from Latent Semantic Analysis (LSA) applied on an English news corpus (for a detailed description of the English semantic space used here see Arvidsson, Sikström, and Werbart (2011). The semantic representation captures similarities in meaning, but tends to ignore other information related to the words. For example, semantic representation of plural and singular nouns tends to be similar (e.g., car – cars), as well as different tense of the same verb (e.g., go – went – gone), etc. Ambiguous words (e.g., the word *bank* in the context of "a bank on a river" versus a "bank that gives loan") tend to have semantic representation that is a mix between the different meanings of the word. Words with similar spellings, but different meanings (e.g., *mammon* and *mammoth*) tend to have unrelated semantic representations.

In order to create a semantic representation of the status updates, we simply added the semantic vectors representing all words in each participant's own status updates. The resulting vector was normalized to a length of one. We investigated whether the semantic representation of the status updates predicted personality measures by applying multiple linear regressions. A one-leave out procedure was used, so that the-to-be predicted semantic representation data-point was removed from the training set and only used for testing. Thus, a new training and testing was made for each subject. To avoid over fitting, only the most important/first dimensions in a semantic representation were used. The number of dimensions was set to the number that showed the highest correlation to the outcome variable in the training set, and these dimensions were applied in the test set.

We also calculated the valence of the status updates based on the semantic representation. This was done by first training one set of English words ranked for valence (ANEW, Bradley & Lang, 1999), and then applying the obtained regression coefficients on the semantic representation of the status updates. Finally, we measured the prototypical of the status updates, by measuring the semantic distance between the mean value of all status updates and a particular update, where the semantic distance is measured by the dot product between two semantic representations. All analysis of the semantic space was conducted using the Semantic program, which is a software specially designed for analyzing semantic representations that run in the Matlab environment (Sikström, n.d.).

2.3. Personality

The short version of the Eysenck Personality Questionnaire Revised (EPQR-S) was used to measure Extraversion (e.g., "Do you usually take the initiative in making new friends?"), Neuroticism (e.g., "Do you ever feel 'just miserable' for no reason?"), and Psychoticism (e.g., "Would you like other people to be afraid of you?") (Eysenck, Eysenck, & Barrett, 1985). The EPQR-S consists of 12 items for each trait (forced binary answers: *Yes* or *No*). The score for each of the personality traits was computed as the sum of the 12 items, with *yes* responses coded as 1 and *no* responses coded as 0. Thus, a high score represents high degree in each of the three personality traits. As stated in the Introduction section, Eysenck's Psychoticism scale is better labeled as Psychopathy (Zuckerman, 1989; Zuckerman, 1991). Hence, for the rest of the paper we refer to the Psychoticism scale as Psychopathy.

The short version of the Narcissistic Personality Inventory (NPI-16) was used to measure Narcissism (Ames et al., 2006). The NPI-16 consists of 16 pairs of items (one consistent and one inconsistent with narcissistic behavior in each pair) for what participants are instructed to choose, for each pair, one item that comes closest to describing their own feelings and beliefs about themselves. The Narcissism score was computed as the sum of the 16 items, with narcissism-consistent responses (e.g., "I really like to be the center of attention") coded as 1 and narcissism-inconsistent responses coded as 0 (e.g., "It makes me uncomfortable to be the center of attention"). Thus, a high score represents high degree of Narcissism.

The Mach-IV (Christie & Geis, 1970) was used to measure Machiavellianism. The Mach-IV consists of 20 items that reflect ways of thinking and opinions about people and different situations (e.g., "Never tell anyone the real reason you did something unless it is useful to do so"). Participants were requested to rate to what extent they agree with each statement on a 6-point Likert scale: 1 = *Strongly agree*, 6 = *Strongly disagree*. The Machiavellianism score was computed by summarizing the means across the 20 items, a high score representing high degree of Machiavellianism.

2.4. Facebook psychometric variables

Three basic Facebook variables (Number of friends, Frequency of status updates, and Time spent on Facebook) were measured by three simple questions: How many Facebook-friends do you have?, How often do you update your Facebook status? (5-point Likert scale: 1 = *Very rarely or never*, 5 = *Very often or always*), and How much time do you spend on Facebook on a daily basis? The Time on Facebook variable was computed to represent minutes/day.

2.5. Facebook status updates

Participants were requested to provide their 15 latest status updates by first downloading Mystatus (Nicholson, 2012) which is a Facebook application that allows the user to list her/his status updates chronologically. Participants were then requested to copy and paste each of the 15 statuses separately and provide the rest together as a whole text.

3. Results

All measures had acceptable reliability and expected moderate positive correlations were found between Psychopathy, Narcissism, and Machiavellianism. Moreover, Extraversion was positively correlated with the number of Facebook friends and the frequency individuals reported to update their status. Narcissism was also related to the number of Facebook friends and Extraversion, while Machiavellianism was negatively correlated with the time spent on Facebook and Neuroticism (see Table 1).

We investigated whether the semantic content of Facebook status updates predicted the personality measures. The results are presented as correlations between the predicted and empirical values, and *p*-values show the probability that correlations are positive. The semantic content of Facebook updates predicts Psychopathy ($r = .29$. $p < .001$), Narcissism ($r = .16$, $p = .003$), Neuroticism ($r = .10$, $p = .039$), number of Facebook friends ($r = .10$, $p = .039$) and frequency of status updates ($r = .13$, $p = .015$); however, no significant associations were found for Extraversion ($r = .10$, $p = .099$), Machiavellianism ($r = .05$, $p = .188$), and Time on Facebook ($r = .13$, $p = .015$). The semantic content of Facebook updates predicted Psychopathy also when Narcissism and Neuroticism were used as covariates ($r = 0.26$; $p < .001$); however, this was not true for Narcissism and Neuroticism when the other two corresponding personality variables were used as covariates, indicating that Psychopathy is the personality trait that is most dominantly predicted from the semantic content of status updates. Psychopathy and Narcissism were negatively correlated with valence ($r = −.10$ and $r = −.10$, respectively) and typicality ($r = −.11$ and $r = −.11$, respectively), indicating that people with high levels on these traits had more negatively valued words in their updates and had more "odd" semantic representations, compared to people with low values.

4. Discussion

The present study aimed to investigate if the semantic representation of status updates on Facebook predicted self-reported personality. The Dark Triad's personality traits involving socially malevolent behavior such as self-promotion, emotional coldness, duplicity, and aggressiveness were of special interest. Psychopaths and narcissists, the two Dark Triad profiles related to the statuses, are usually successful in brief interactions by taking advantage of people. We suggest that these specific traits might be expressed

Table 1
Inter-correlations between personality traits and Facebook psychometric scales (N = 304 for all variables with the exception of Time on Facebook = 245).

	1	2	3	4	5	6	7	8	9	10
Neuroticism (1)	–									
Extraversion (2)	−.36[***]	–								
Psychopathy (3)	.09	−.03	–							
Narcissism (4)	−.14[*]	.34[***]	.30[***]	–						
Machiavellianism (5)	.20[***]	−.05	.29[***]	.31[***]	–					
Number of Facebook friends (6)	−.06	.25[***]	−.08	.18[***]	−.04	–				
Frequency of status updates (7)	−.10	.21[***]	−.09	.04	−.09	.09	–			
Time on Facebook[▲] (8)	.02	.11	.02	.04	−.16[*]	.10	.22[***]	–		
Valence (9)	.013	.011	−.10[*,1]	−.10[*,1]	−.05	0.06	.06	−.04	–	
Typicality (10)	.03	−.05	−.11[*,1]	−.11[*,1]	−.04	0.06	.06	−.04	−.13[*,1]	–
Theoretical range	0–12	0–12	0–12	0–16	1–6	0–5000	N/A	1–1440	0–10	−1+1
Mean and sd (±)	6.08 ± 3.60	7.54 ± 3.73	3.23 ± 1.92	5. 94 ± 3.47	3.19 ± 0.53	302.54 ± 255.87	3.22 ± 1.03	150.63 ± 153.93	–	–
Cronbach's α	.84	.89	.50	.75	.64	N/A	N/A	N/A	N/A	N/A

[▲] Minutes/day.
[*] $p < .05$.
[***] $p < .001$.
[1] One-tailed.

in status updates because people usually are internally motivated to use Facebook in order to increase social capital (i.e., benefits from interaction with others) and fulfilling social-grooming needs such as gossip and monitoring members of the social group one is a part of (Wilson et al., 2012).

The present study also suggests that when people are interacting with others on Facebook, using status updates, they are expressing language related to the malevolent traits in the Dark Triad and related to neurotic behavior. The statuses generated by individuals scoring high in these traits seem to be "odd" in nature and of negative value. If so, the ones reading the status updates might experience the negative effects of social networking. Recent studies show that frequently using Facebook might be related to unhappiness (e.g., Chou & Edge, 2012; Denti et al., 2012). These findings have been interpreted as suggesting that social comparison might be at work, that is, users reading about other peoples' happy moments devalue their own life and feel unhappy. These studies, however, have not used status updates to disentangle whether happiness is actually expressed in the status updates or not.

The present study used LSA as a method for studying if narratives generated by Facebook users predicted their self-reported personality. Other studies have successfully used LSA to investigate if written memories of positive and negative events predict happiness (Garcia & Sikström, 2013a; Rosenberg, Sikström, & Garcia, 2013), Agency and Communion (Garcia et al., in press), and differences in reflections of real versus imagined experiences (Rosenberg, Sikström, & Garcia, in press). Using large text corpus, researchers have also investigated words recurrent in media articles in which the word "happiness" is present (Garcia & Sikström, 2013b; see also Dodds & Danforth, 2010; Dodds, Harris, Kloumann, Bliss, & Danforth, 2011). Hence, future studies could use LSA to investigate if the semantic representation of status updates predicts happiness in individuals and their social network in Facebook.

Finally, the question whether digital records of human behaviors such as Facebook status updates predict personality traits or if this association is the other way around is beyond the scope of the present study. Nevertheless, recent research suggests that personal attributes including sexual orientation, ethnicity, religious and political views, intelligence, happiness, use of addictive substances, age, gender, and the Big Five personality traits can be predicted by Facebook Likes (Kosinski, Stillwell, & Graepel, 2013). In other words, Facebook users' positive associations (or "Like") to online content (photos, friends' status updates, sports, musicians, books, etcetera) predict all of the personal attributes mentioned above. Together with the findings presented here, it is plausible to suggest that a Facebook user's personality traits might also be inferred using Facebook status updates.

5. Limitations

The results are limited to the fact that, outside the Dark Triad we only assessed two more personality traits: Extraversion and Neuroticism. Both of these traits are measured by the EPQR-S and are related to affective experience and attention to emotional cues (Lucas, 2008), therefore a logical part of the study. The inclusion of traits such as Agreeableness, Openness, and Conscientiousness could be useful in future studies.

Although it was explicitly stated in the Introduction and Method sections that Psychoticism, as measured by the EPQR-S, is better understood as the Psychopathy trait in the Dark Triad, it is important to point out that most studies use other measures to operationalize this trait (e.g., the Self-Report Psychopathy Scale-II and III by Levenson, Kiehl, & Fitzpatrick, 1995, respectively Paulhus,

Neumann, & Hare, in press). Nevertheless, while there is no evidence that the measure developed by Eysenck captures what is consensually understood as Psychoticism (i.e., schizophrenia), this scale captures exactly the same construct as the commonly used Psychopathy instruments. For other researchers who also have used the measure developed by Eysenck to operationalize Psychopathy in the Dark Triad see, for example, Linton and Power (2013).

6. Conclusion

In sum, two of the traits in the Dark Triad as well as Neuroticism were associated with the semantic representation of Facebook status updates. The Dark Triad link suggests that behavior such as self-promotion, emotional coldness, duplicity, and aggressiveness is expressed when individuals broadcast current states or make written statements in Facebook. This specific result stands in contrast to the lack of association between a social trait such as Extraversion and the status updates people write on Facebook. According to Burke and colleagues (2009) new members of Facebook usually monitor and adapt to what their Facebook friends are doing. In other words, social learning and social comparison influence users to conform to a certain type of behavior (Wilson et al., 2012) that might be related to the Dark Triad personality traits—less empathic and more self-enhancing type of behavior. Nevertheless, psychopaths and narcissists are usually successful in brief interactions by taking advantage of people. At the same time, users of Facebook report being motivated to use the social network in order to benefit from interaction with others, gossip and monitor members of their social group. It is then plausible to suggest that Facebook serves as a platform for social competition in which some users express their darkest traits.

"The question isn't, What do we want to know about people?, It's, What do people want to tell about themselves?"

[Mark Zuckerberg]

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.paid.2013.10.001.

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