Hidden Agendas for Online Vaccination: Trolls, Bots & Misinformation
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The George Washington University
Twitter admits far more Russian bots posted on election than it had disclosed

Company says it removed more than 50,000 accounts and reported them to investigators, marking latest upward revision of figures

Twitter has admitted that more than 50,000 Russia-linked accounts used its service to post automated material about the 2016 US election – a far greater number than previously disclosed.
Malign Actors on Social Media are a Problem

- Practical: They can distort perceptions of public opinion
- Academic: They can distort attempts to measure public opinion
- National Security: They can be used to shape public opinion
What is a Bot?

• A device or piece of software that can execute commands, reply to messages, or perform routine tasks, as online searches, either automatically or with minimal human intervention. ¹

• In social networks, a bot is: An automated account, that is controlled by a program, automatically producing content, and interacting with other accounts.

¹ Dictionary.com
What is a troll?

- Typically, a human user
- Trolls thrive on ANGER and try to intentionally promote discord for the purpose of ridiculing or baiting others
- Trolls often misrepresent their agenda, hiding behind the anonymity of internet accounts

“Someone who posts inflammatory, extraneous, or off-topic messages in an online community, such as a forum, chat room, or blog, with the primary intent of provoking readers into an emotional response or of otherwise disrupting normal on-topic discussion.”

https://blog.politicsmeanspolitics.com/the-science-behind-internet-trolls-and-online-harassment-and-how-to-take-the-high-road-d0148caa2915
What is a cyborg?

- A cyborg is an account nominally controlled by a human that is occasionally taken over by a bot.
- Cyborgs may be used to assist trolls to post content.
- Legitimate users may also exhibit bot-like behavior if login credentials are stolen by malicious actors.
How many bots are there?

- A paper from University of Southern California and Indiana University suggests that 9% to 15% of Twitter accounts are in fact social bots rather than people.
- They extracted a large collection of features from data and metadata about Twitter users.
- The authors used these features to train models to identify bots.
- They used a dataset consisted of 15K bots using honeypots (discussed later) and 16K verified human accounts.
- Then they collected tweets from those accounts using the Twitter API.
- Facebook recently removed 3.2 billion (with a B) accounts.

What are the different bot types?

<table>
<thead>
<tr>
<th>“Good” Bots (self identified)</th>
<th>“Bad” Bots (violates TOS)</th>
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</thead>
<tbody>
<tr>
<td>Monitoring Bots</td>
<td>Spam Bots</td>
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<tr>
<td>Search Engine Crawler Bots</td>
<td>Scraper Bots</td>
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<td>Social Network Bots</td>
<td>Fake Followers</td>
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<td></td>
<td>Content Polluters</td>
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Pew Findings

- Broad definition of bots
  - “Accounts that can post content or interact with other users in an automated way and without direct human input”
- 66% of tweeted links to popular websites are shared by automated accounts
- Small number of highly active bots are responsible for significant proportion of share links.
  - 500 most active bots responsible for 22% tweeted links
- No clear political bias.

Legitimate bots

Many bots are not malicious users and, when identified, as such, may engage in helpful behaviors. Example:

**Twitter Bot Helps Chicago Officials Find Dirty Restaurants**

The bot led to 133 restaurant inspections and 21 shutdowns in a 10-month period.

*By Francis Diep   August 19, 2014*

The first, established November 2009 & entirely unofficial. Copyright details here: tinyurl.com/y1qby3, but still apparently imitated everywhere.

Up a tower.

Joined October 2009
Accidental Haiku
@accidental575
I am a robot / that finds haiku on Twitter /
made by accident

Accidental Haiku @accidental575 · Jul 2
Just writing to let /
everyone know I have a /
new profile picture /
#accidentalhaiku by @BHump_12

Brett Humphrey @BHump_12
Just writing to let everyone know I have a new profile picture

Who to follow: Auto Charts @AutoCharts
Dane DeHaan @dane2540
This Is Just to Say @JustSay_123
Malicious Bot Behaviors
**Image 1:** A vendor on a DDW marketplace advertises “1000+ TWITTER FOLLOWERS [USA][HQ]” at a price of $1.77 USD. The vendor claims to be able to provide an “unlimited number of Twitter followers” and offer the “cheapest prices on the market.”
Content Pollution -- spreading malware and spam

Many Twitter accounts include shortened URLs designed to disguise the destination. Can be used for spreading computer viruses, spam, and other malicious content.

https://www.pandasecurity.com/mediacenter/social-media/the-bots-on-twitter-arent-harmless-cybercriminals-use-them-to-steal-your-information/
Fake Followers

Buy Twitter Followers Now

It’s the easiest foolproof way to get active followers, period.

<table>
<thead>
<tr>
<th>500+ Followers</th>
<th>1,000+ Followers</th>
<th>2,500+ Followers</th>
<th>5,000+ Followers</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10</td>
<td>$17</td>
<td>$29</td>
<td>$49</td>
</tr>
</tbody>
</table>

1-2 Days        | Delivery 2-3 Days | Deliver in 5-7 Days | Delivery 10-14 Days |
Active & High Quality | Active & High Quality | Active & High Quality | Active & High Quality |

Order Now      | Order Now         | Order Now         | Order Now         |
Astroturfing

Grassroots: A bottom-up movement inspired by popular opinion

Astroturf: Fake grassroots

Bots are frequently used to create the false impression of grassroots support for a cause

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Trolling

Networks of bots may be used to harass users and attempt to disrupt adversaries’ activities


**Russian Twitter Bots Troll NATO**

Report says automated tweets targeting alliance military activities in E. Europe traced to Moscow trolls

BY: Bill Gertz  
September 1, 2017 3:55 pm

Seventy percent of Russian-language tweets targeting NATO military activities in Eastern Europe are generated by automated Russian trolls, according to a survey done by the military alliance.

“Two in three Twitter users who write in Russian about the NATO presence in Eastern Europe are robotic or ‘bot’ accounts,” the NATO Strategic Communications Centre of Excellence stated in a report made public this week.

The Russian bots sent 84 percent of all Russian language messages. English language tweets against the alliance also were found to be automated, with some 46 percent generated by automated Twitter accounts.

The report criticized the global social media platform for not doing enough to counter Russian bot activities on Twitter. “Our impression is that Twitter in Russian is policed less effectively than it is in English,” the report said.
The “50 cent army”

The Chinese government has been known to use internet trolls (paid 0.5 RMB per message) to disrupt anti-government messages.

Botnets to create echo chambers and false consensus

Networks of bots “botnets” retweet one another with the goal of creating “echo chambers” and otherwise creating the impression that many independent users agree on the content of a given message.

Who is Tweeting Anti-Vaccine Topics?

- Pew data suggest that there is broad consensus regarding the safety and efficacy of vaccination
- However, social media are a “hotbed” of anti-vaccine activity
- Are these media representative of actual opinions?
- Are bots amplifying the anti-vaccine discourse?
  - How would we know?
- Can we identify bot-like behavior relevant to vaccination?
#VaccinateUS results

- Unusual # appeared 25 times in the NBC Russian Troll dataset
- Searching Twitter on 2/20/2018 found only 5 appearances
  - Suggests users had been suspended and tweets purged
- Archival data revealed 253 messages with #VaccinateUS
  - Tweeted from over 100 different accounts
  - Accounts used common American names
    - Daniel Turner, Jessica Bowers, Kevin Scott, Kimberly Floyd, etc.
  - Geolocated in the United States
#VaccinateUS results

- Unusual in that it is used by both sides of “debate”
  - 43% Pro-Vaccine
  - 38% Anti-Vaccine
  - 18% Neutral
- Major themes mirror the actual discourse on Twitter
  - Pro: Vaccines Work; Anti-Vax is Stupid; Herd Immunity; Trust the government; Vaccine Safety
  - Anti: Parental Choice; Mistrust of Government; Anti Pharmaceuticals; Vaccines causing Autism; Natural Health is Better; Conspiracy Theories: Ingredients are toxic
- Some themes uncommon on Twitter
  - God’s Will; Class Comparisons; Animal Comparisons
#VaccinateUS Examples

• #VaccinateUS Mandatory #vaccines infringe upon constitutionally protected religious freedoms
• Did you know there was a secret government database of #vaccine-damaged children? #VaccinateUS
• Do you still treat your kids with leaves? No? And why don’t you #vaccinate them? Its medicine! #VaccinateUS
• if you’re meant to die—you will, no #vaccine will help you #VaccinateUS
• Don’t get #vaccines. Illuminati are behind it. #VaccinateUS
• Apparently only the elite get 'clean' #vaccines. And what do we, normal ppl, get?! #VaccinateUS
• Your kids are not your property! You have to #vaccinate them to protect them and all the others! #VaccinateUS
• #VaccinateUS CDC state that #vaccines are safe
• weird that such a huge amount of people refuse to #vaccinate their children #VaccinateUS
Hypotheses

- Do bots post about vaccines more than the average Twitter user?
- Are bots more likely to be pro-vaccine or anti-vaccine?

Methods
- Identified public lists of different types of bot and troll accounts
- Searched through vaccine stream for their tweets
- Examined relative proportions of neutral, pro-vaccine, and anti-vaccine tweets
- Used Bot-o-Meter API to measure the “bot scores” of 9,994 randomly sampled tweets
Russian Trolls are 22 times more likely to tweet about vaccines.

Trolls play both sides; content polluters and cyborgs are anti-vaccine

Conclusions

• The social media landscape combines automated and “sincere” account-holders

• These account holders may have a range of hidden-agendas.
  • State-sponsored trolling
  • Marketing alternative products
  • Spreading spam
  • Spreading malware

• Public health communicators must know and adapt to this changing landscape

• Questions?: broniatowski@gwu.edu