

# Spreading Phenomena

## Social Networks Analysis and Graph Algorithms

Prof. Carlos “ChaTo” Castillo — <https://chato.cl/teach>

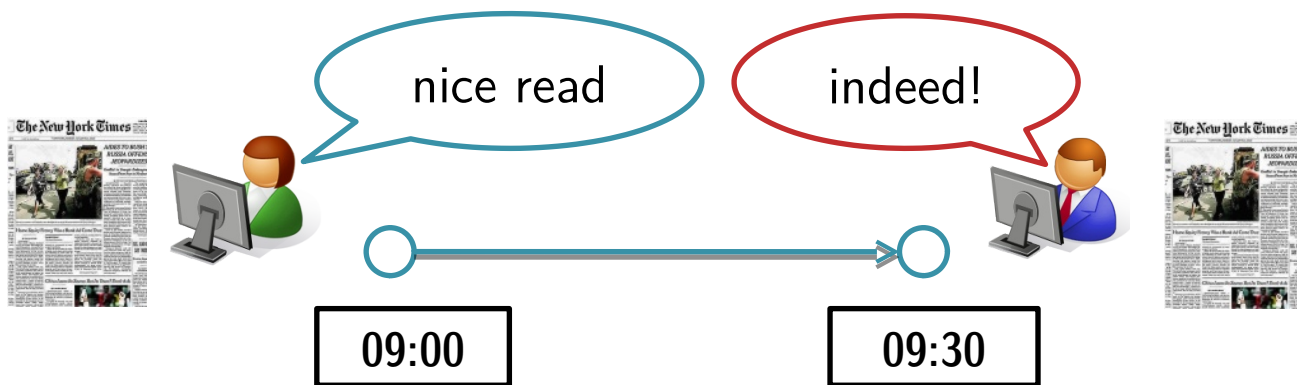


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# Sources

- D. Easley and J. Kleinberg (2010): Networks, Crowds, and Markets [Ch 19](#)
- C. Castillo, W. Chen, L. V. S. Lakshmanan (2012): Information and Influence Spread in Social Networks, [KDD Tutorial](#).
- F. Menczer, S. Fortunato, and C. A. Davis. A First Course in Network Science. Cambridge University Press, 2020. Chapter 7.

# Social influence



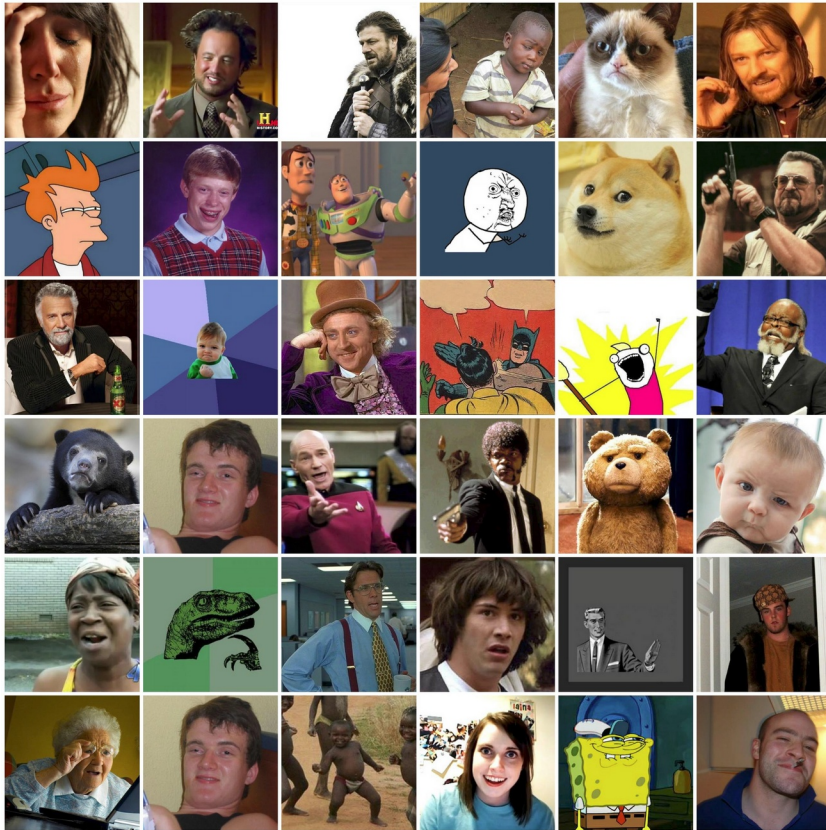
People are connected and perform actions

↓  
friends, fans,  
followers, ...

↓  
comment, link, like,  
share, stitch, duet, ...

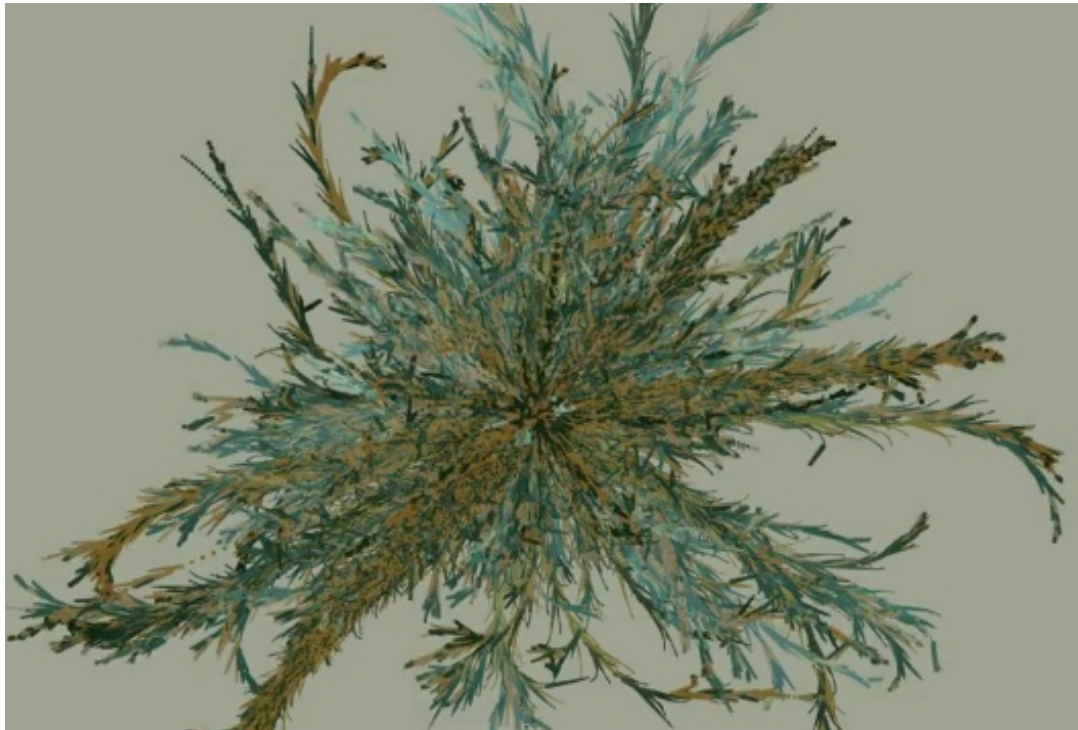
# “The Selfish Gene” by Richard Dawkins (1976)

## Chapter 11: “Memes: the new replicators”

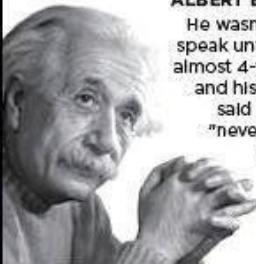
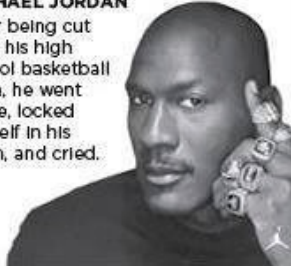

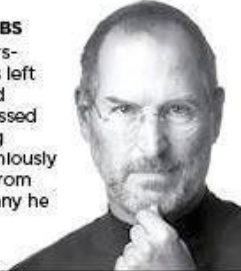




# Spread of a Meme

## ("Famous Failures")



<https://vimeo.com/50730795>






FAMOUS FAILURES	
 <p><b>ALBERT EINSTEIN</b> He wasn't able to speak until he was almost 4-years-old and his teachers said he would "never amount to much"</p>	 <p><b>MICHAEL JORDAN</b> After being cut from his high school basketball team, he went home, locked himself in his room, and cried.</p>
 <p><b>WALT DISNEY</b> Fired from a newspaper for "lacking imagination" and "having no original ideas."</p>	 <p><b>STEVE JOBS</b> At 30-years-old he was left devastated and depressed after being unceremoniously removed from the company he started.</p>
 <p><b>OPRAH WINFREY</b> Was demoted from her job as a news anchor because she "wasn't fit for television."</p>	 <p><b>THE BEATLES</b> Rejected by Decca Recording Studios, who said "We don't like their sound—they have no future in show business."</p>
<b>IF YOU'VE NEVER FAILED, YOU'VE NEVER TRIED ANYTHING NEW</b>	





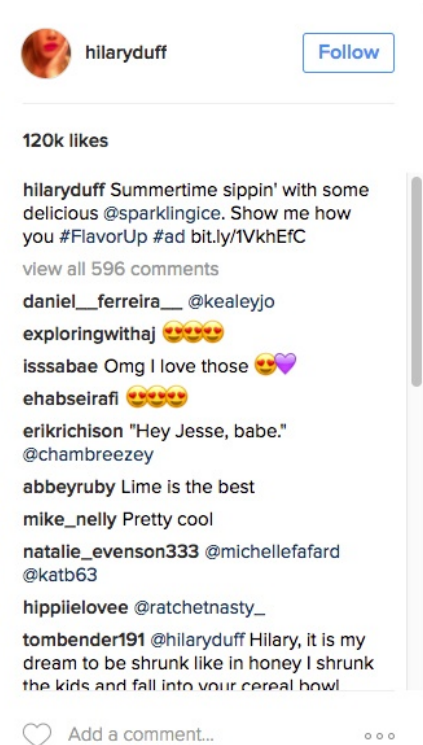
# Top TikTok Songs This Week

LAST UPDATED 7/31/2022, 8:00:25 AM

- |   |   |   |
|---|---|---|
| 1 | Kevin MacLeod & Kevin The Monkey<br><b>Monkeys Spinning Monkeys</b><br>— · 102.4M views · 202 popular videos          |  |
| 2 | anantavinnie<br><b>Left right x pak vong x rindu semalam x meneket...</b><br>▲ 51 · 103.2M views · 119 popular videos |  |
| 3 | WZ Beat<br><b>Beat Automotivo Tan Tan Tan Viral</b><br>▼ 1 · 52.2M views · 91 popular videos                          |  |
| 4 | Bizarrap & Quevedo<br><b>Quevedo: Bzrp Music Sessions, Vol. 52</b><br>▼ 1 · 29.2M views · 65 popular videos           |  |
| 5 | Luclover<br><b>L\$d</b><br>▲ 3 · 41.1M views · 64 popular videos  |  |



Various forms of “trend”:  
music/audio that is re-  
used, stitches, side-by-  
side “duets”,  
actions/challenges, etc.

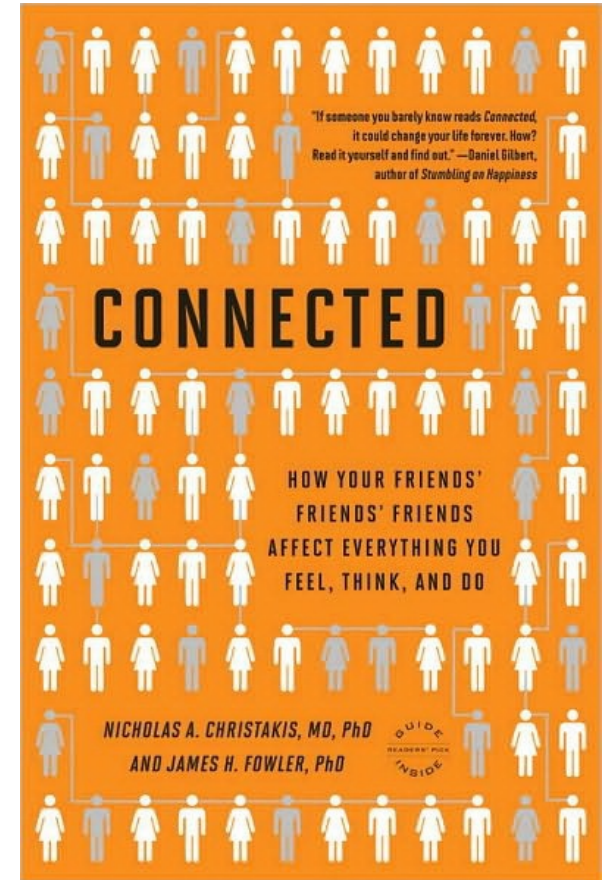


*“Influencers” and  
their sponsored posts*



# Non-trivial examples

- **Back pain:** spread from West to East in Germany after fall of Berlin Wall
- **Suicide:** well known to spread throughout communities on occasion
- **Sexual “scripts”:** expected sequences of behaviors during intimate situations
- **Politics:** the denser your connections, the more intense your convictions



# What else?

What else propagates in a contagion-like manner?

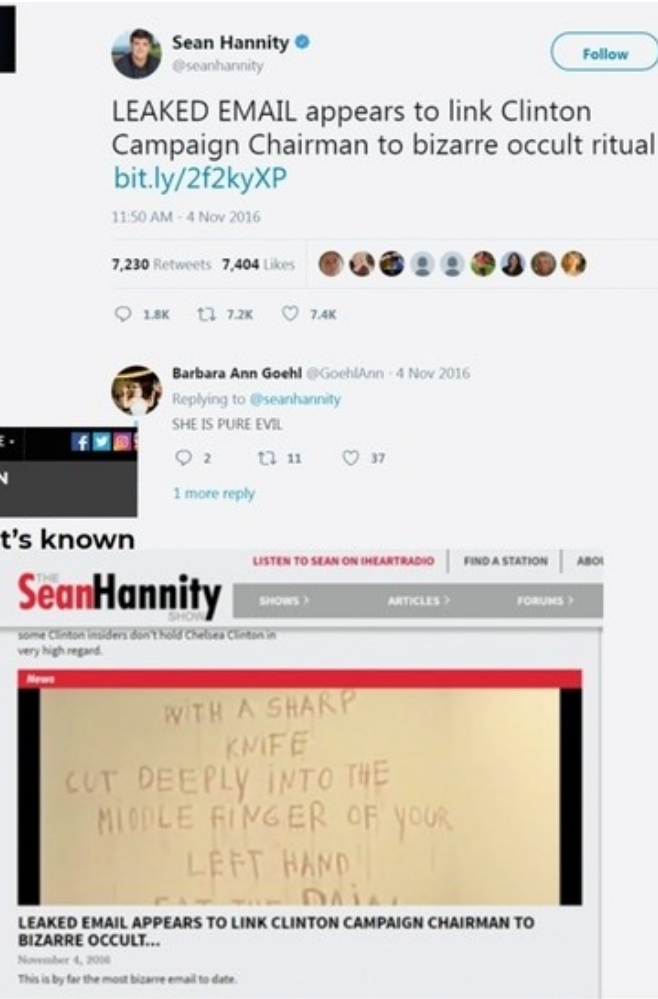
Answer in Nearpod Collaborate  
<https://nearpod.com/student/>  
Code to be given during class

# News, misinformation, and collective action

# Fake news

**Fake news** about an occult ritual to which the campaign chairman of US presidential candidate Hillary Clinton was invited.

This was posted four days before the 2016 election, which was won by her opponent, Donald Trump.

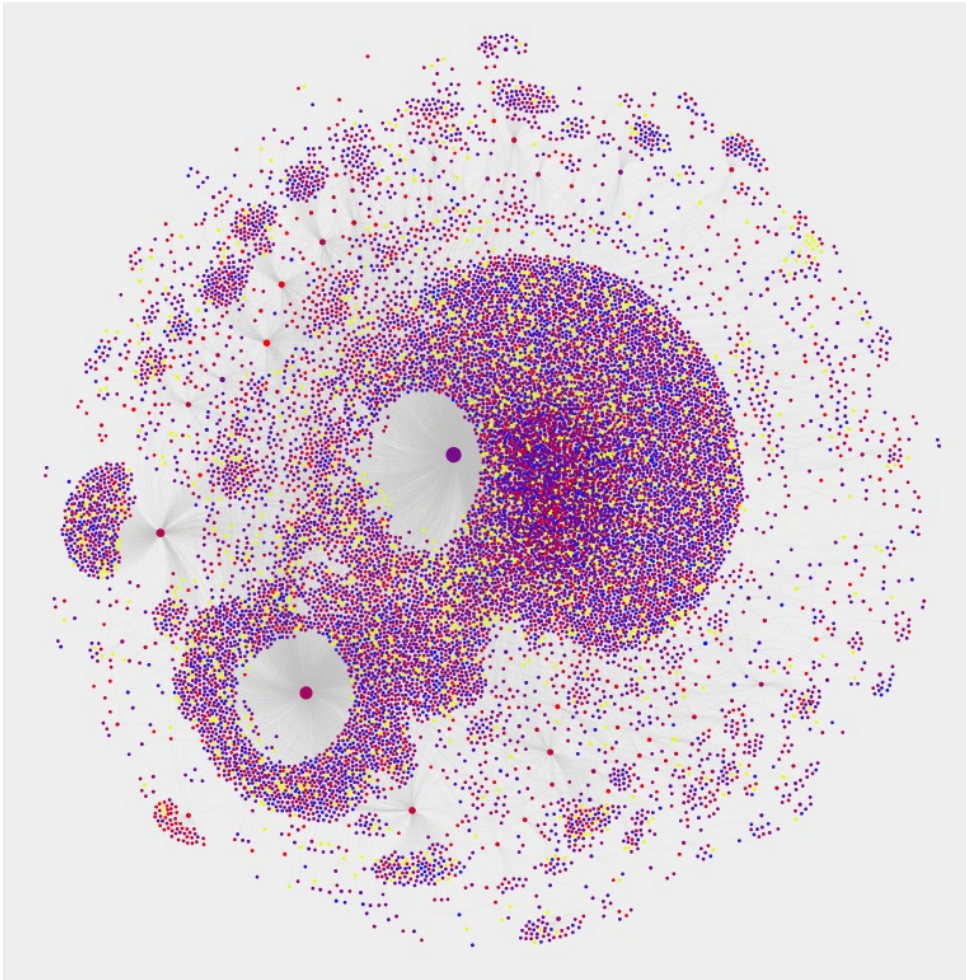


# Fake news spread

A combination of authentic (blue) and inauthentic (red) accounts, also known as bots. Yellow nodes were removed by Twitter and are probably also bots.

Interactive version:

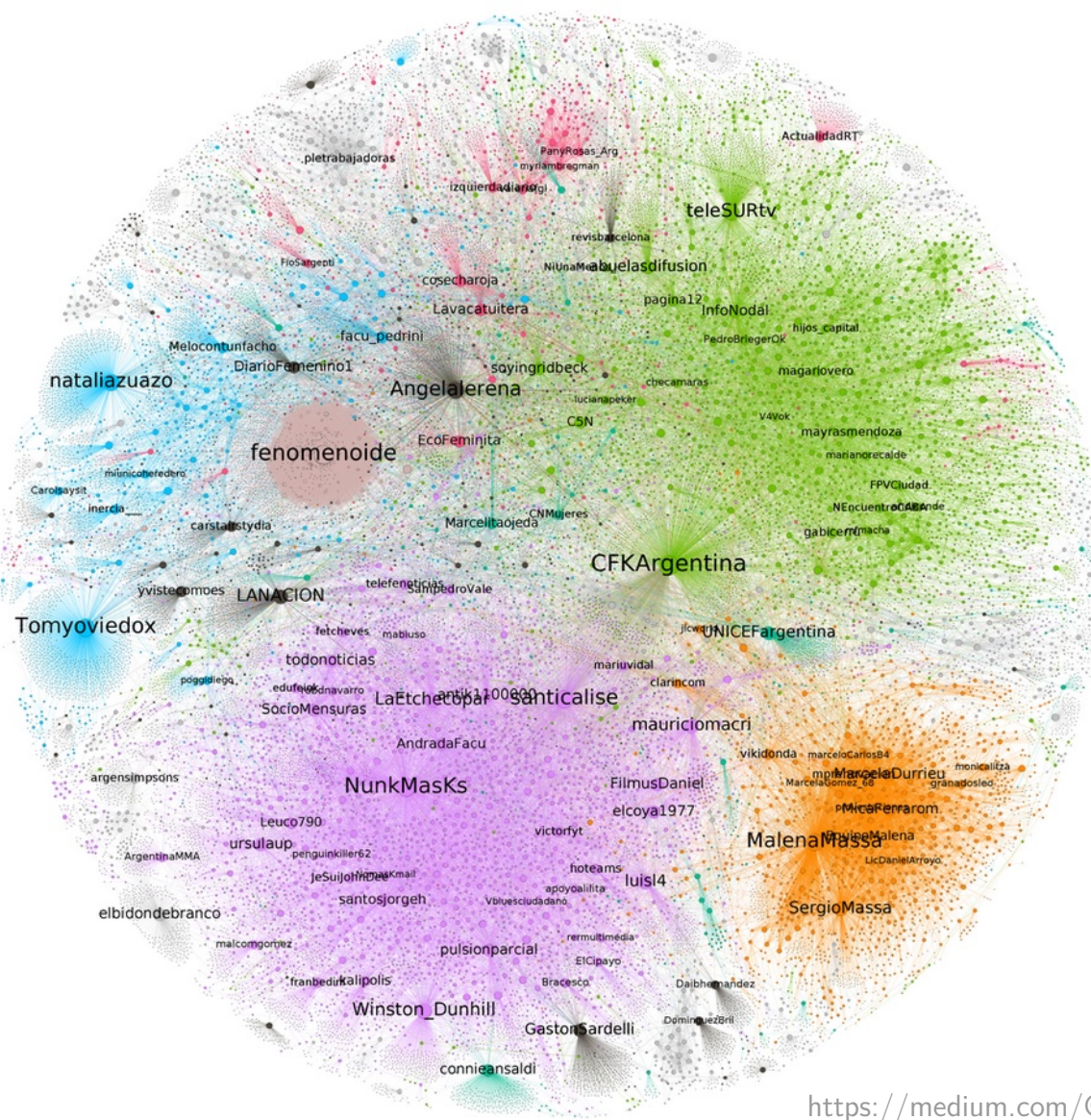
<https://iunetsci.github.io/HoaxyBots/>





# Collective action

Spread of the #NiUnaMenos hashtag: a movement against gender-based violence and femicide started in Argentina in 2015



Colors based on communities detected through modularization optimization

# Summary

# Things to remember

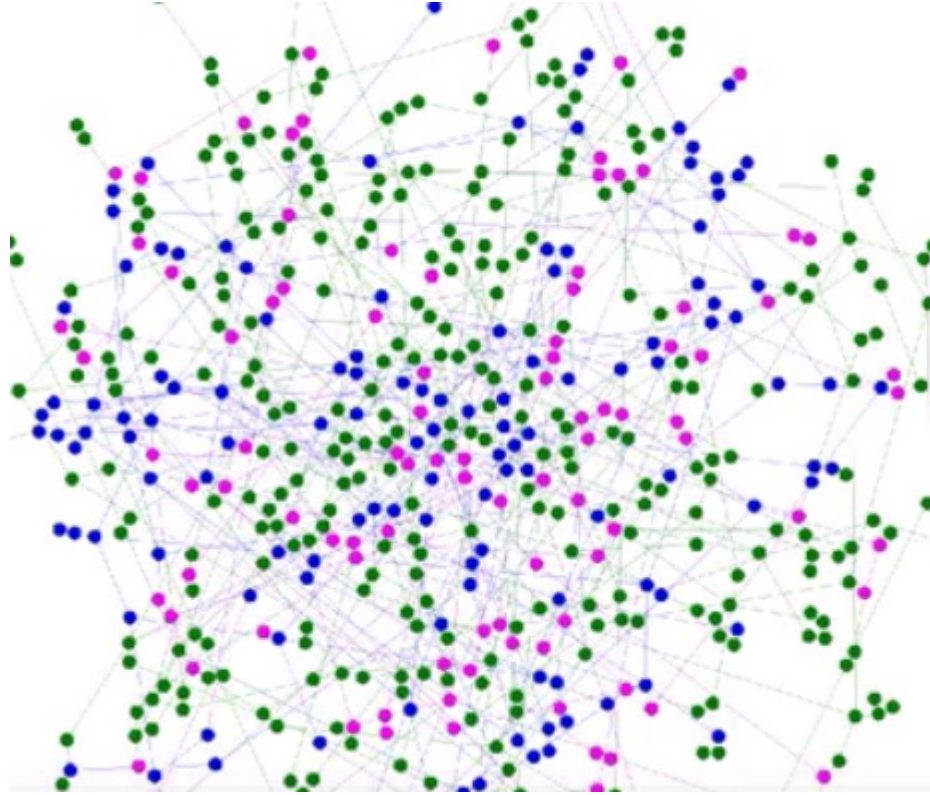
- Direct social influence is observed online when connected people perform an action in sequence
- A wide array of phenomena spread through networks, not only viruses and information

# Additional contents



**EXTRA**

# Simulated contagion in graph



<https://www.youtube.com/watch?v=WWTmRIDsydA>