

# Spreading Phenomena

## Social Networks Analysis and Graph Algorithms

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



Universitat  
Pompeu Fabra  
*Barcelona*

# Sources

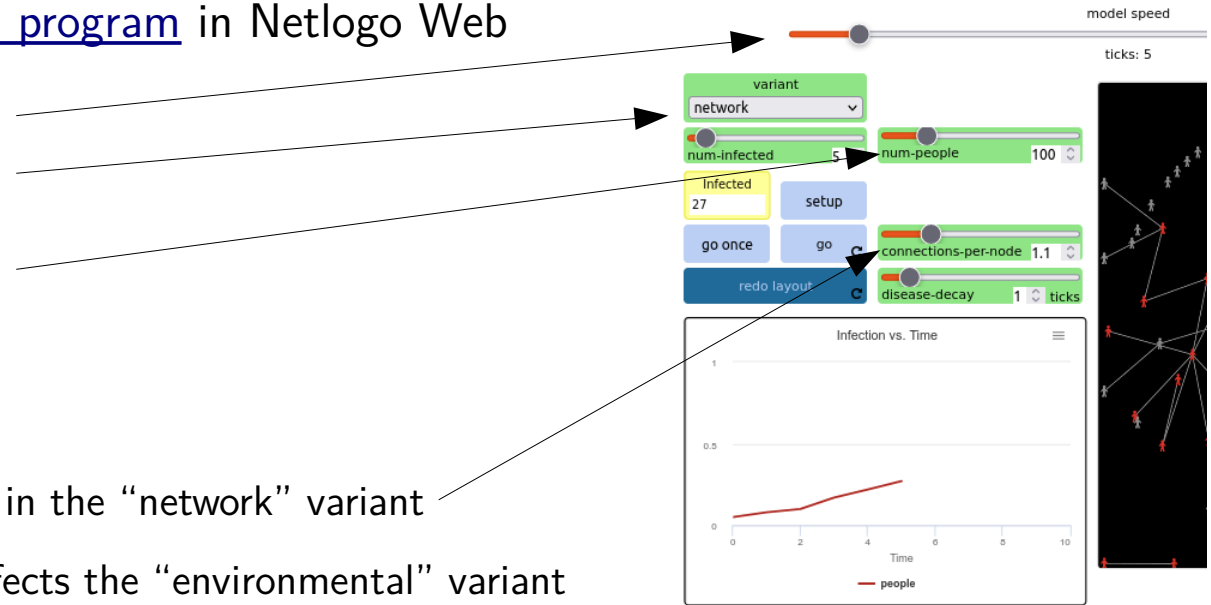
- D. Easley and J. Kleinberg (2010). Networks, Crowds, and Markets — [Chapter 19](#)
- C. Castillo, W. Chen, L. V. S. Lakshmanan (2012). Information and Influence Spread in Social Networks, [KDD Tutorial](#).
- F. Menczer, S. Fortunato, and C. A. Davis. A First Course in Network Science. Cambridge University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

# Exercise

## Spread of Disease

Go to [netlogoweb.org/launch](http://netlogoweb.org/launch) and select:  
“IABM Textbook / chapter 6 / Spread of Disease”

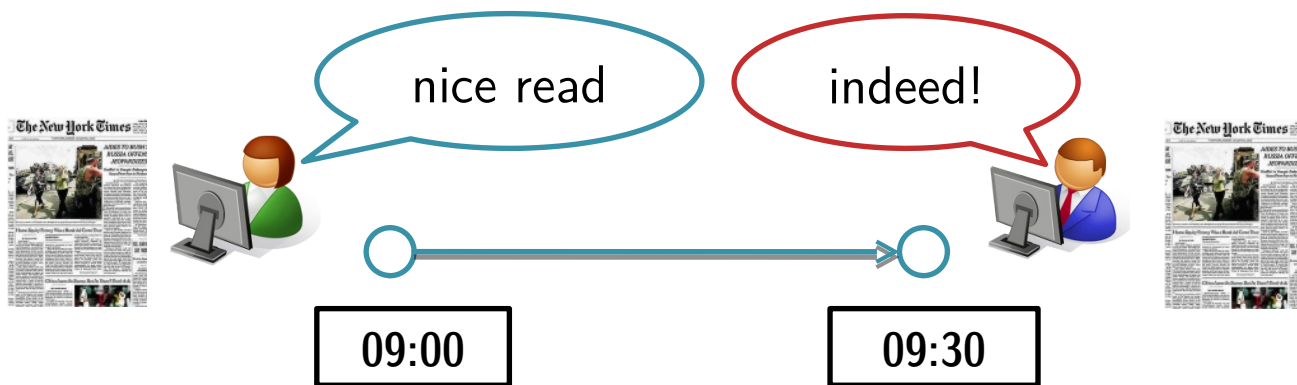
- Execute the [“Spread of Disease” program](#) in Netlogo Web
  - Slow down model speed
  - Choose one variant
  - Select num-people 100
  - Click “set-up”
  - Click “go”
  - Play with “connections-per-node” in the “network” variant
  - Note that “disease-decay” only affects the “environmental” variant
- Indicate what the three variants do (network, mobile, environmental)



Pin board: <https://upfbarcelona.padlet.org/chato/k5zn9l4itg3axw3s>



# Social influence on a network



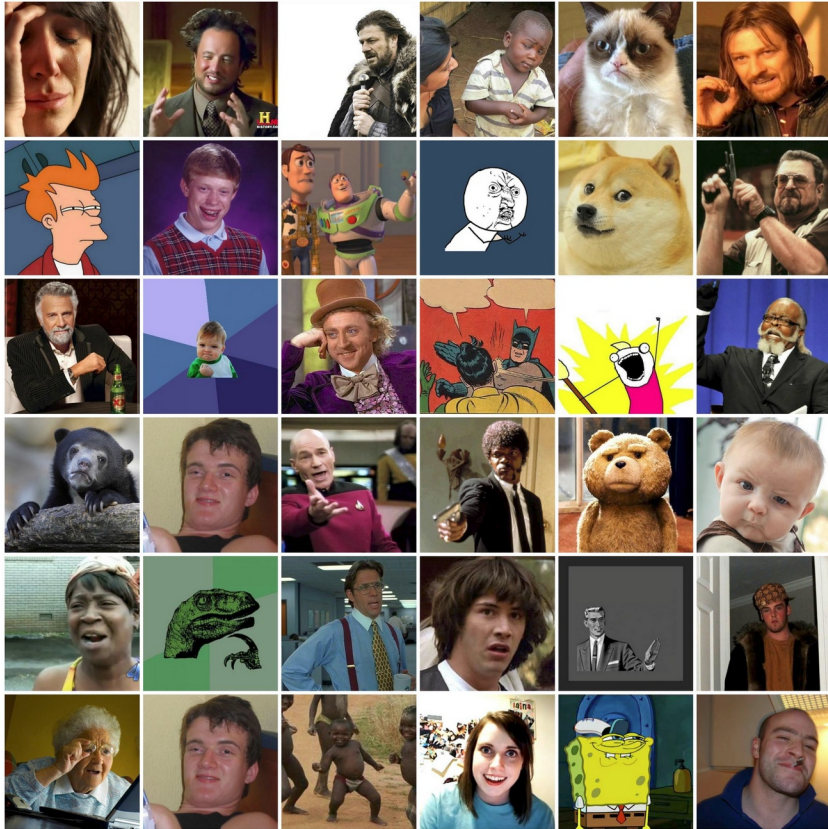
People are connected and perform actions

↓  
friends, fans,  
followers, ...

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

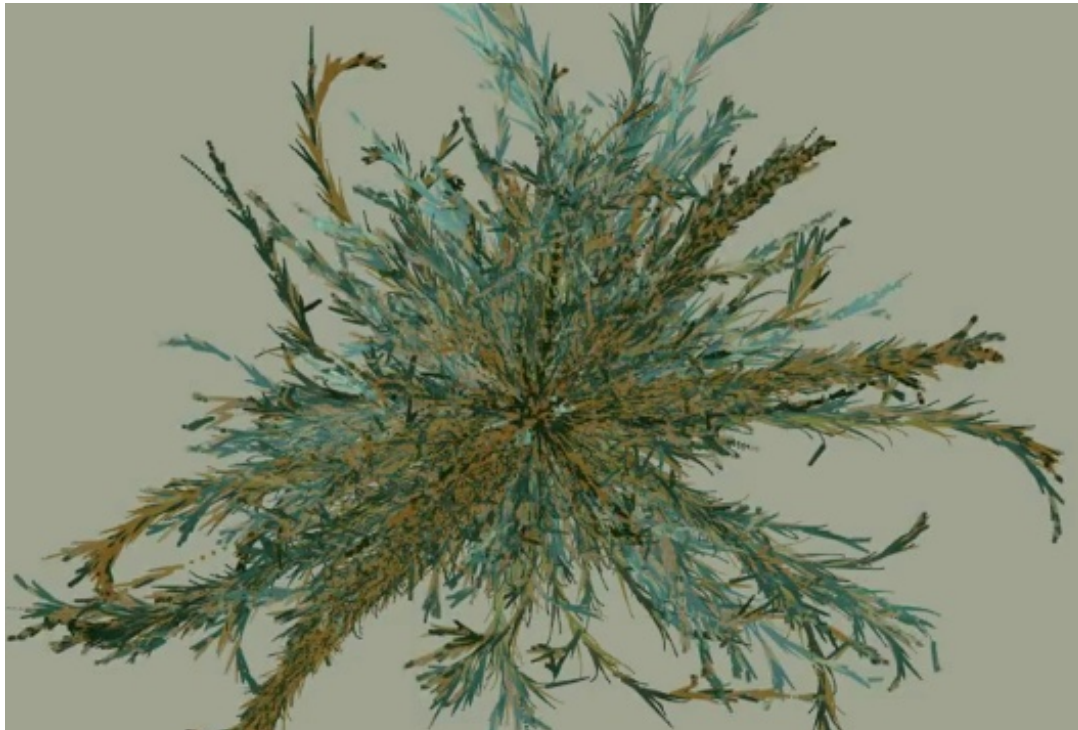
# “The Selfish Gene” by Richard Dawkins (1976)

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

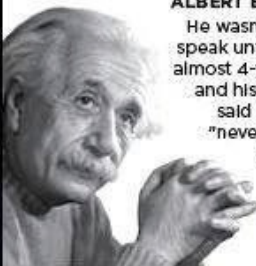
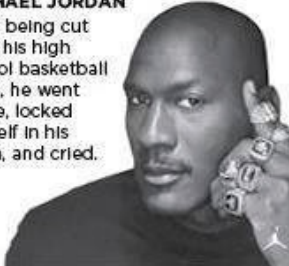

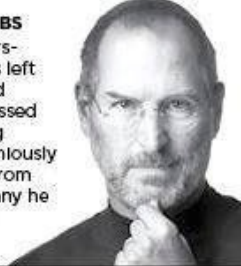




# Spread of a Meme

## ("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

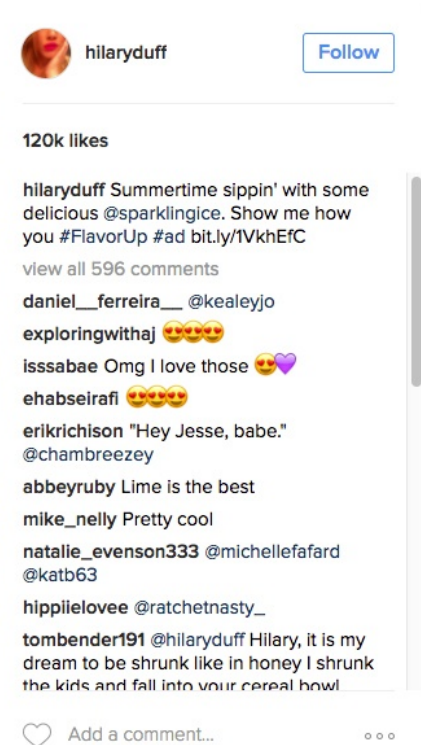
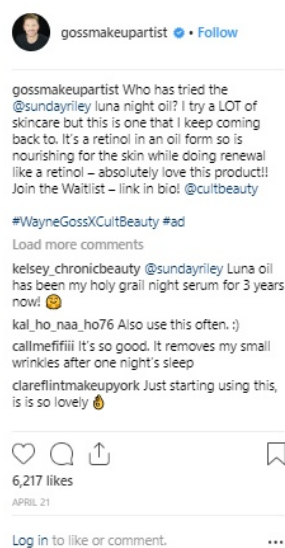
LAST UPDATED 7/31/2022, 8:00:25 AM

- |   |   |   |
|---|---|---|
| 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.

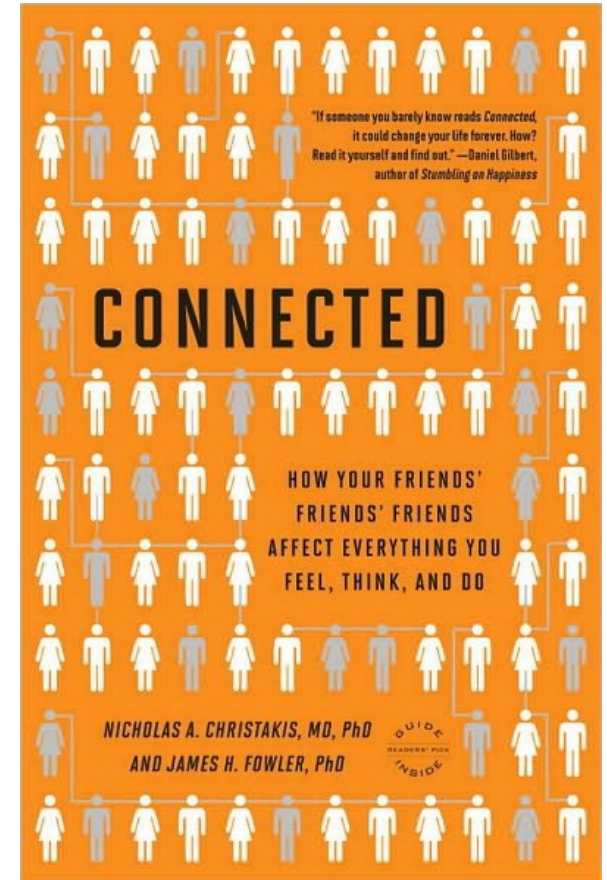




*“Influencers” and  
their sponsored posts*

# 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



# Exercise

Find examples of spreading phenomena

What else propagates in a contagion-like manner?

Pin board: <https://upfbarcelona.padlet.org/chato/a0xnaoohsfc117nl>

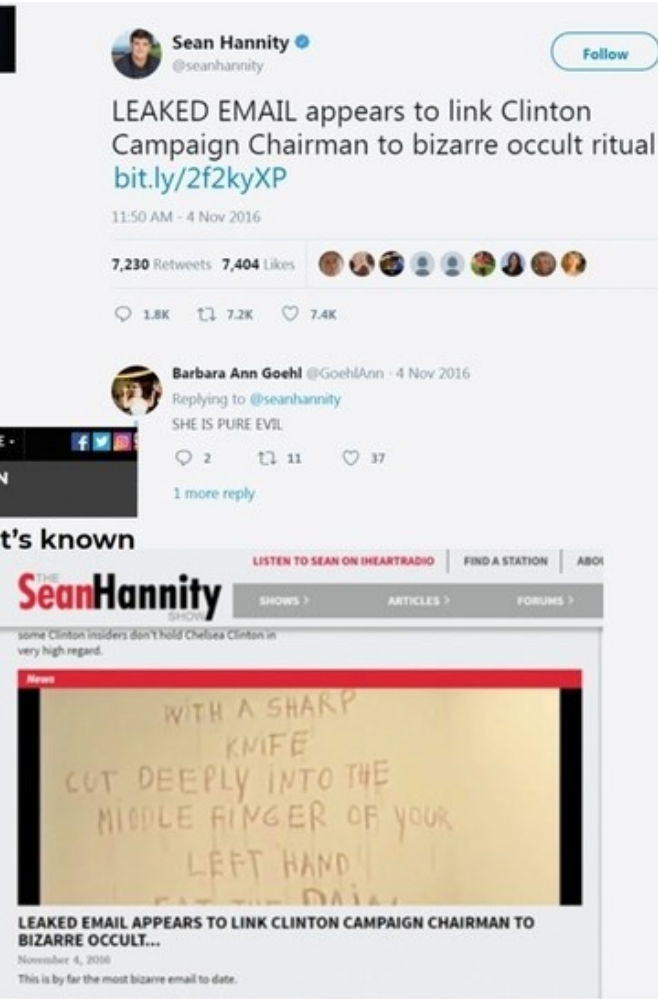


# News, misinformation, and collective action

# 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.



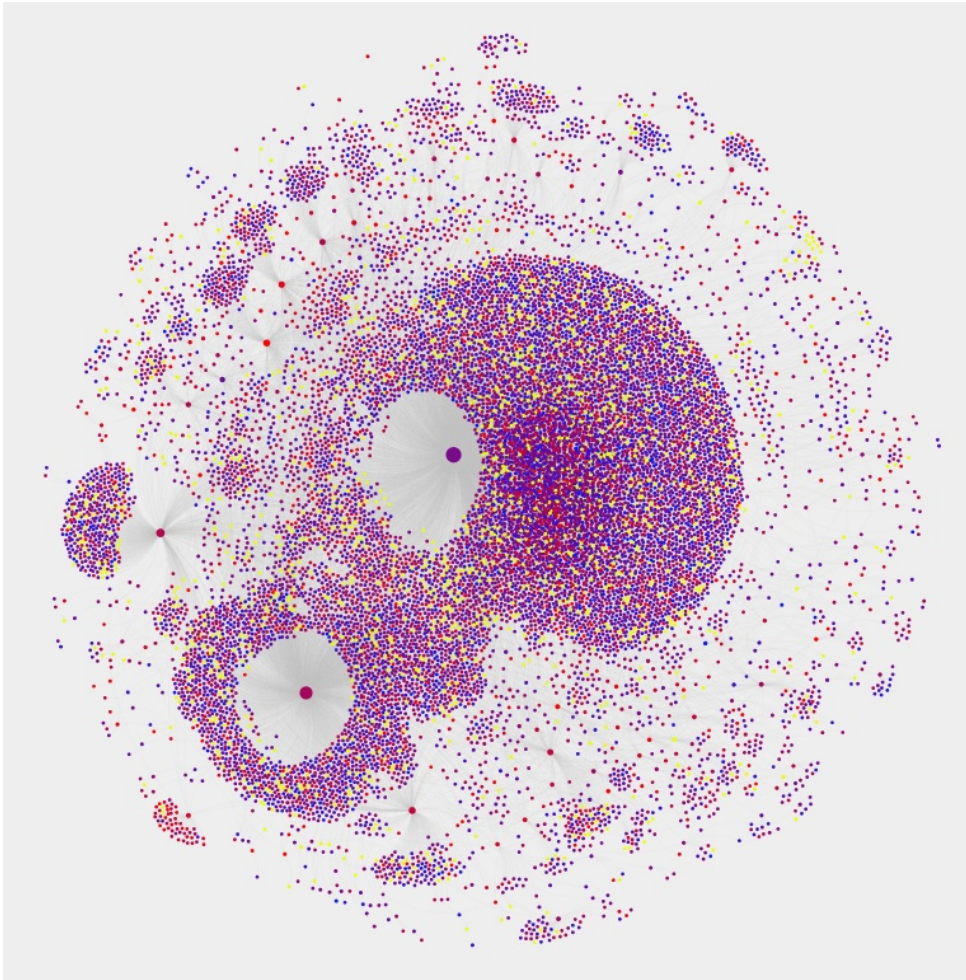


# Fake news spread

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/>





A stylized black and white graphic illustration of a woman's face in profile, looking upwards. The face is partially obscured by a large, solid black hand with fingers spread, which holds a small white heart. Above the face, the text "NI UNA MENOS" is written in a bold, hand-drawn, sans-serif font. The background is a solid light gray.



Colors based on communities detected through modularization optimization

# Summary

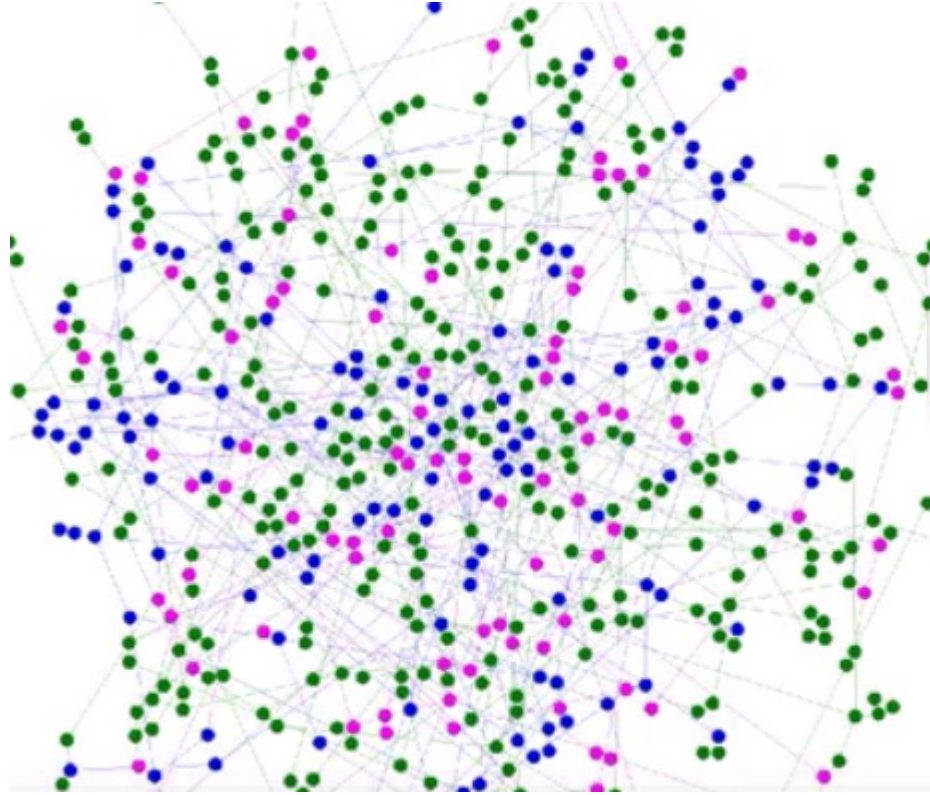
# Things to remember

- 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>