



What Is Twitter, a Social Network or a News Media?

2009.12.17.

U of California, Santa Barbara

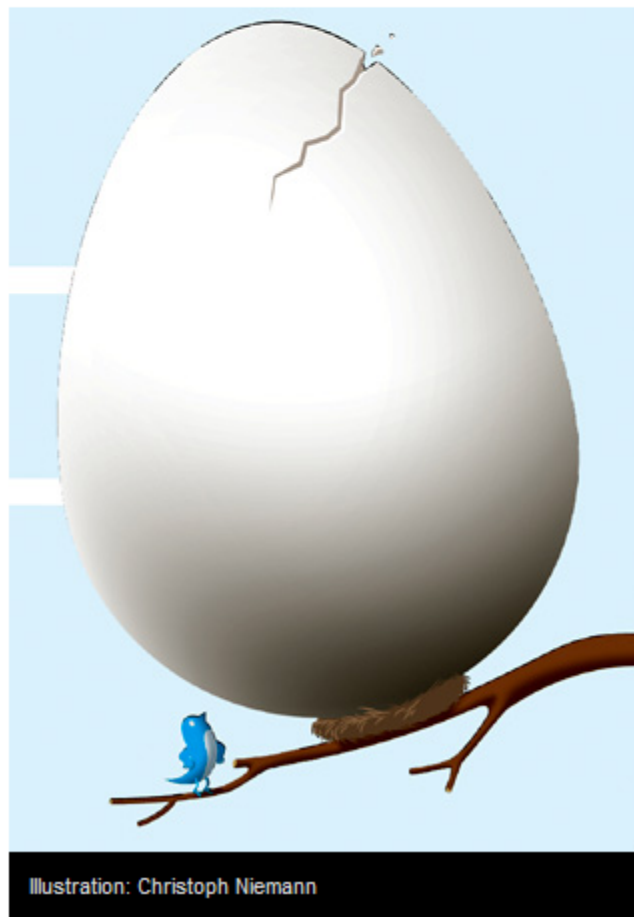
Haewoon Kwak, Changhyun Lee, Hosung Park, Sue Moon

Department of Computer Science

KAIST

Mob Rule! How Users Took Over Twitter

By Steven Levy  October 19, 2009 | 3:00 pm | [Wired Nov 2009](#)



Last August, the people who putatively run Twitter — the small crew that three years ago launched the world's fastest-growing communications medium — announced a relatively minor change in the way the site functions. The tweak would have a small effect on retweeting, the convention by which Twitter users repost someone else's informative or amusing message to their own Twitter followers. Retweets start with RT, for "retweet," and usually cite the first author by user ID. And, importantly, retweeters often add a word or two of commentary about the repeated content.

But there was a problem: Twitter itself didn't invent retweeting; it was created by Twitter users. In a blog post explaining the changes to retweets, the company's second-in-command, Biz Stone, called them "a great example of Twitter teaching us what it wants to be." The good news, he said, was that Twitter was building retweets right into the site's architecture. The bad news was that Project Retweet didn't make any provision for the commentary that users might like to add.

Twitter's Stepping Stones to Fame



twitter

[Home](#) [Profile](#) [Find People](#) [Settings](#) [Help](#) [Sign out](#)

<http://twitpic.com/135xa> - There's a plane in the Hudson. I'm on the ferry going to pick up the people. Crazy.

9:36 PM Jan 15th from TwitPic



jkrums
Janis Krums

© 2009 Twitter [About Us](#) [Contact](#) [Blog](#) [Status](#) [Apps](#) [API](#) [Search](#) [Help](#) [Jobs](#) [Terms](#) [Privacy](#)



Some Quotes on Twitter

- Almost 400 million users
- “If we had a billion users, that will be the pulse of the planet”
- “Are we building a new Internet?”

Questions We Raise

- Is Twitter a typical human social network?
- Is Twitter yet another news media?

What's happening?

140

Latest: @ikechoi Reluctant? Not at all. The award was thanks to all the fun I have working with brilliant minds - mostly students! ^^about 1 hour ago

update

Home



nytimesdining Mixing Meaty Cocktails With a Shot of Celebrity
<http://bit.ly/8qgVNu>
about 1 hour ago from web



nytimesdining Choice Tables: The Flavor of Bali, at Roadside Stands <http://bit.ly/6u3KC0>
about 1 hour ago from web



nytimesdining The Cheat: Not Eating Animals <http://bit.ly/8fd8h0>
about 1 hour ago from web



sbmoon @ikechoi Reluctant? Not at all. The award was thanks to all the fun I have working with brilliant minds - mostly students! ^^
about 1 hour ago from web In reply to ikechoi



sbmoon @danielequercia txn!
about 1 hour ago from web In reply to danielequercia



sbmoon Up at 3am packing to go home. It's 25F outside. _-::
about 1 hour ago from web



channyun "서울 버스" 아이폰 앱을 고등학생이 아닌 일반 (개발)업자가 만들었다면 어떻게 됐을까? 스크린 스크래핑은 사실상 문제가 되는 방식이니 고소 당하지 않았을까. ㅎㅎ
about 2 hours ago from web



sbmoon
216 tweets

65

143

13

following followers listed

Klout

n. a fun way to analyze the social web.

Home

@sbmoon

Direct Messages

14

Favorites

Search



Lists



Lists are timelines you build yourself, consisting of friends, family, co-workers, sports teams, you name it.

New list

Trending Topics



#nowplaying

#thoushallnot

Xmas

Avatar

Copenhagen

#uksnow

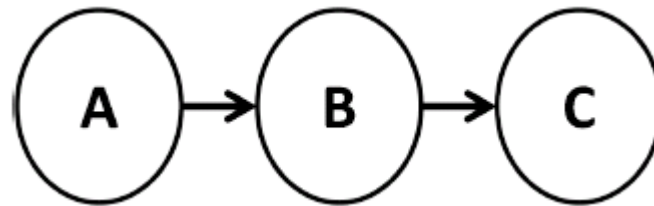
#omgfacts

Iron Man 2

#cop15

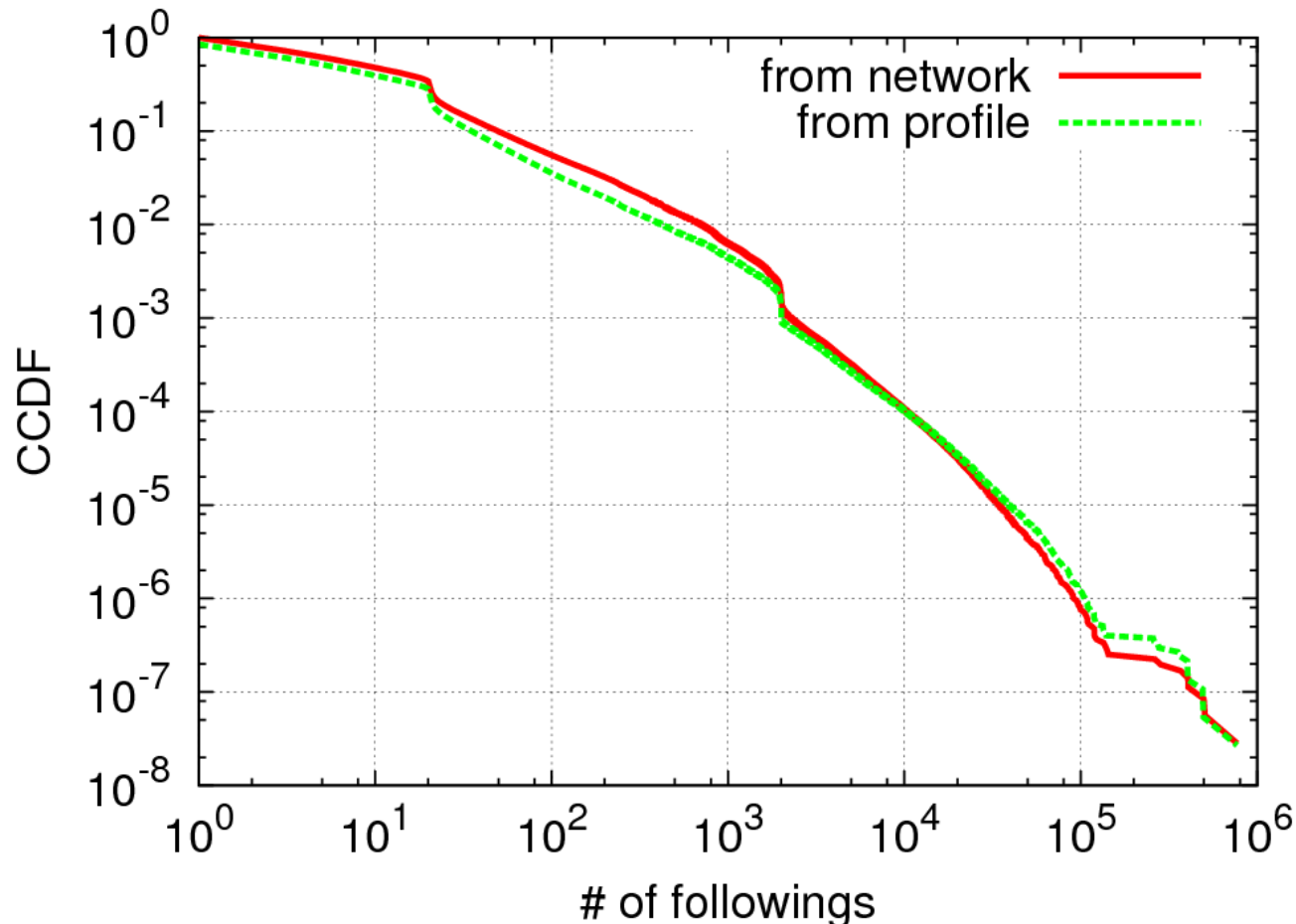
Snow

Following the Flow of Information

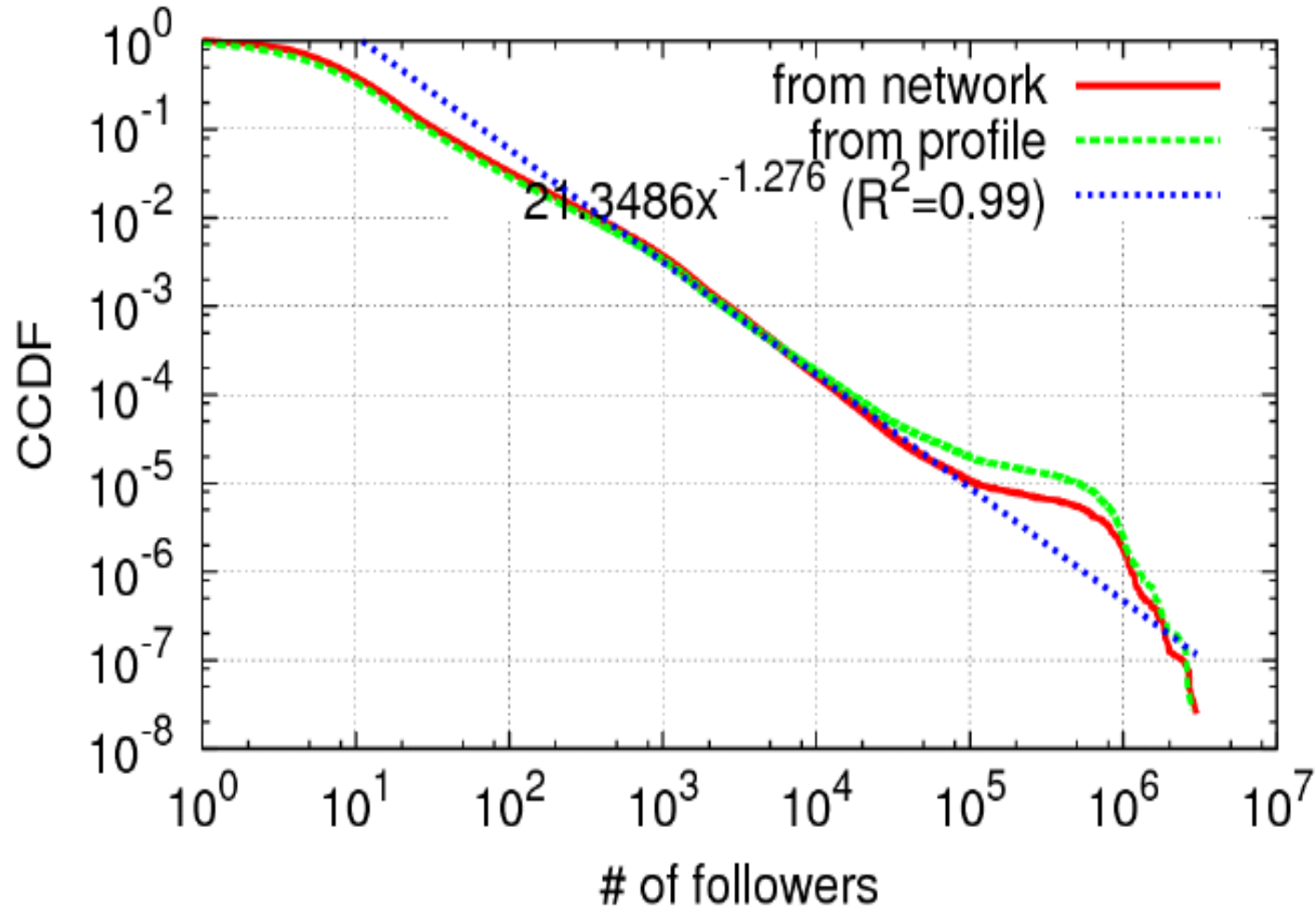


- B follows A and C follows B
- A's tweet is visible to B and B's tweet is to C
- A tweets and B may retweet

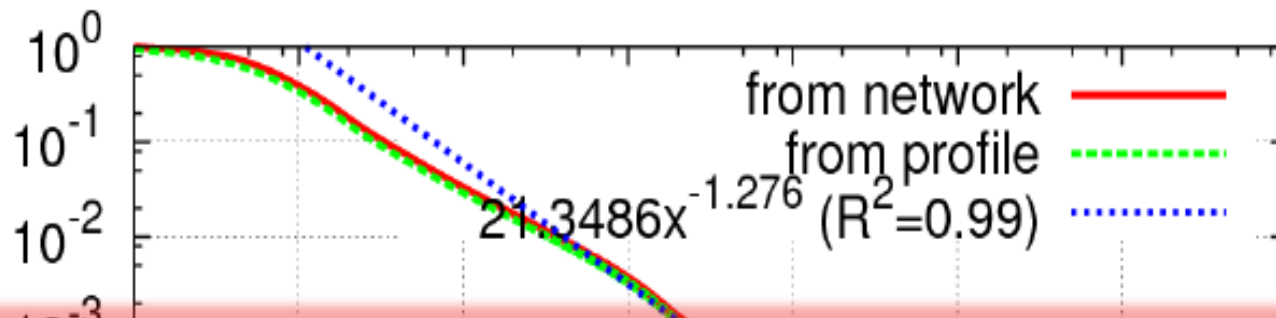
Run-of-the-Mill Check (I)



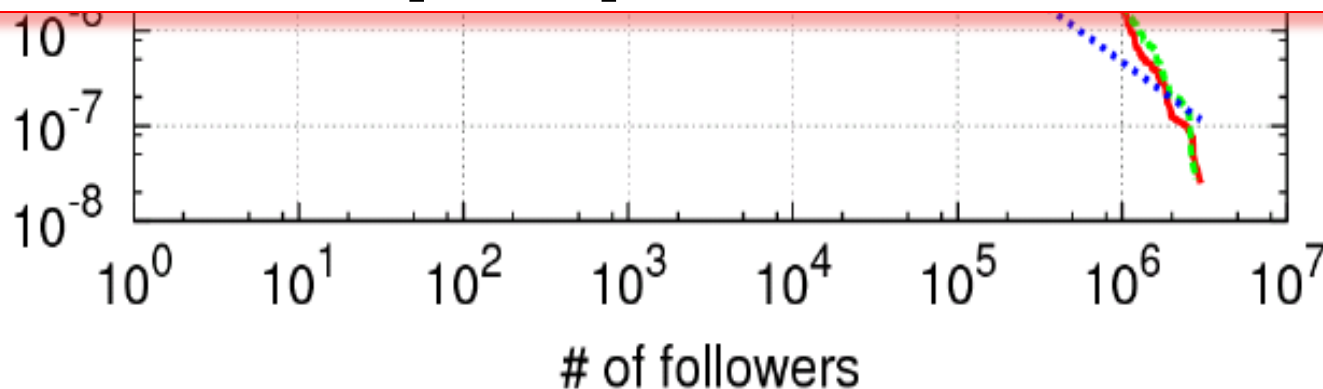
Run-of-the-Mill Check (II)



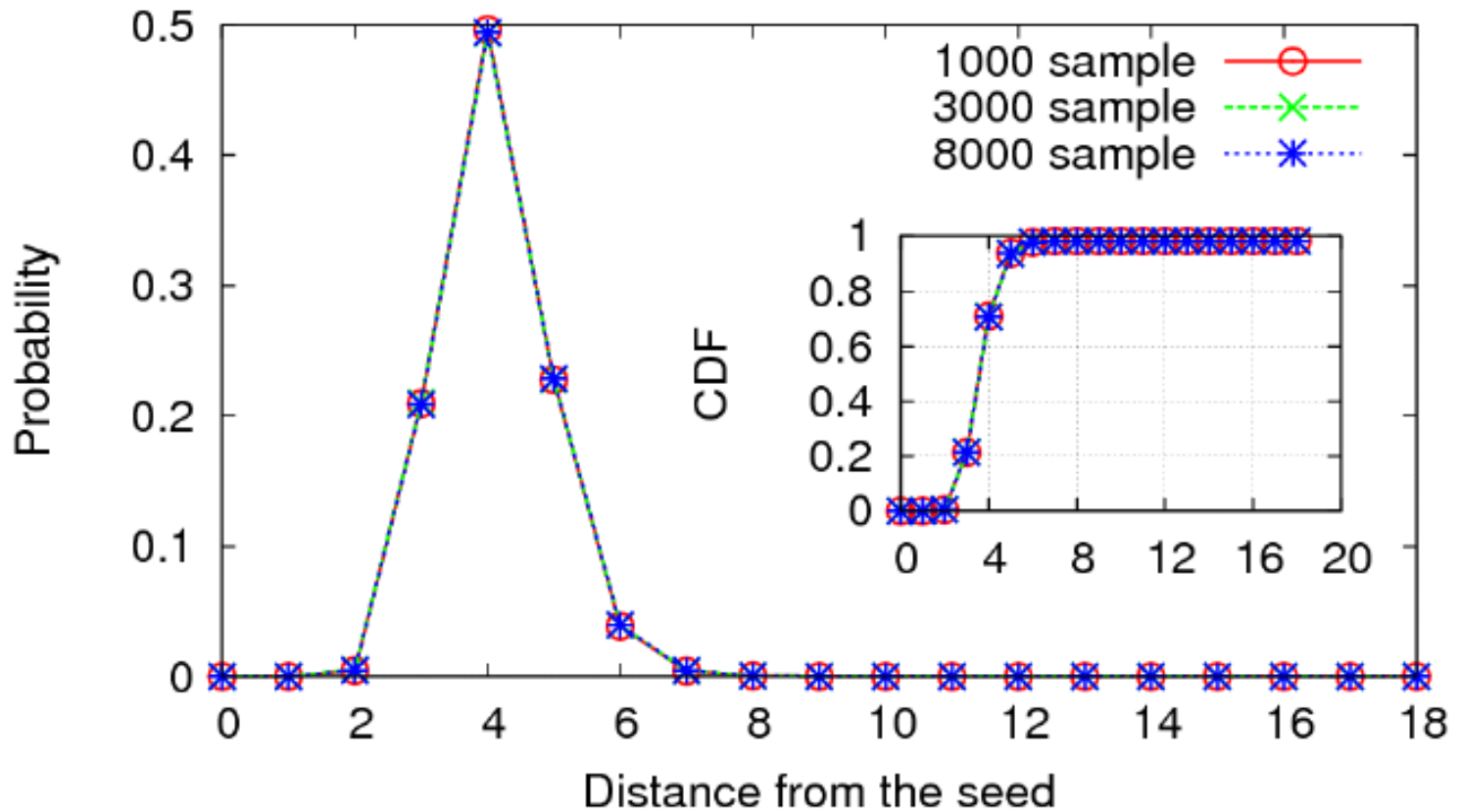
Run-of-the-Mill Check (II)



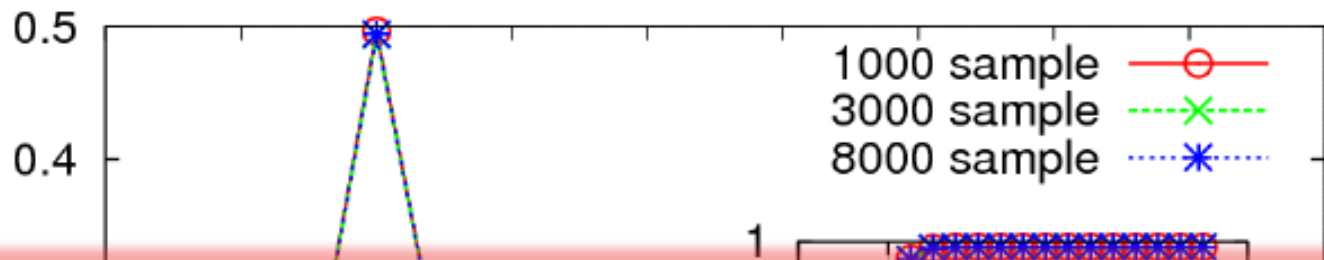
Degree distributions are not simple power-law



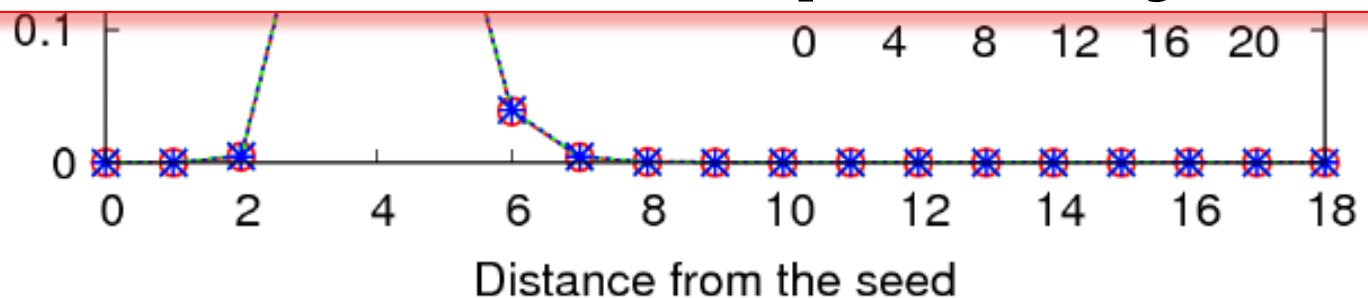
Six Degrees of Separation?



Six Degrees of Separation?



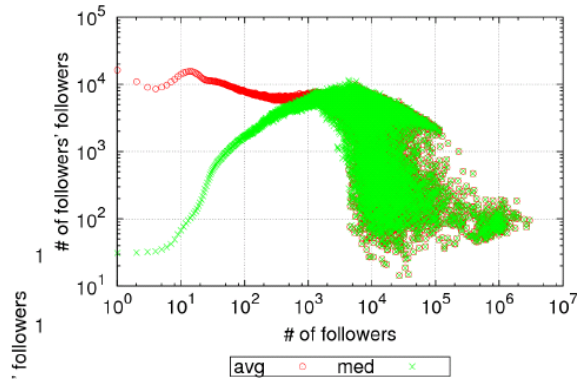
**98% of users are
6 or fewer hops away**



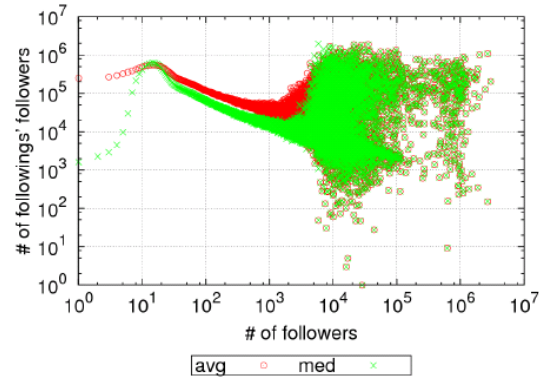
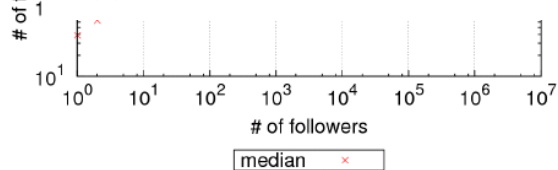
Birds of a Feather Twitter Together?

- Human networks are known to have assortativity
 - Quantitative expressions of BoF phenom
- What networks have assortativity?
 - Citation networks
- What networks do not?
 - Food web chain
 - Protein interaction network

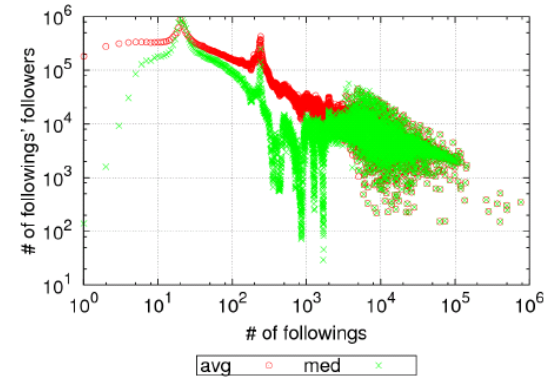
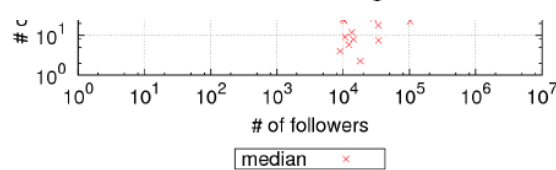
Answer to BoF Twitter Question:



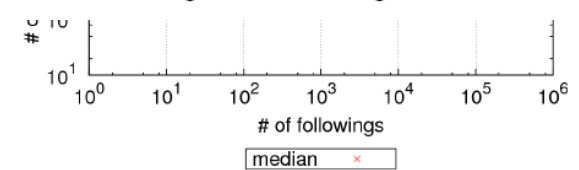
(a) follower vs. followers' followers



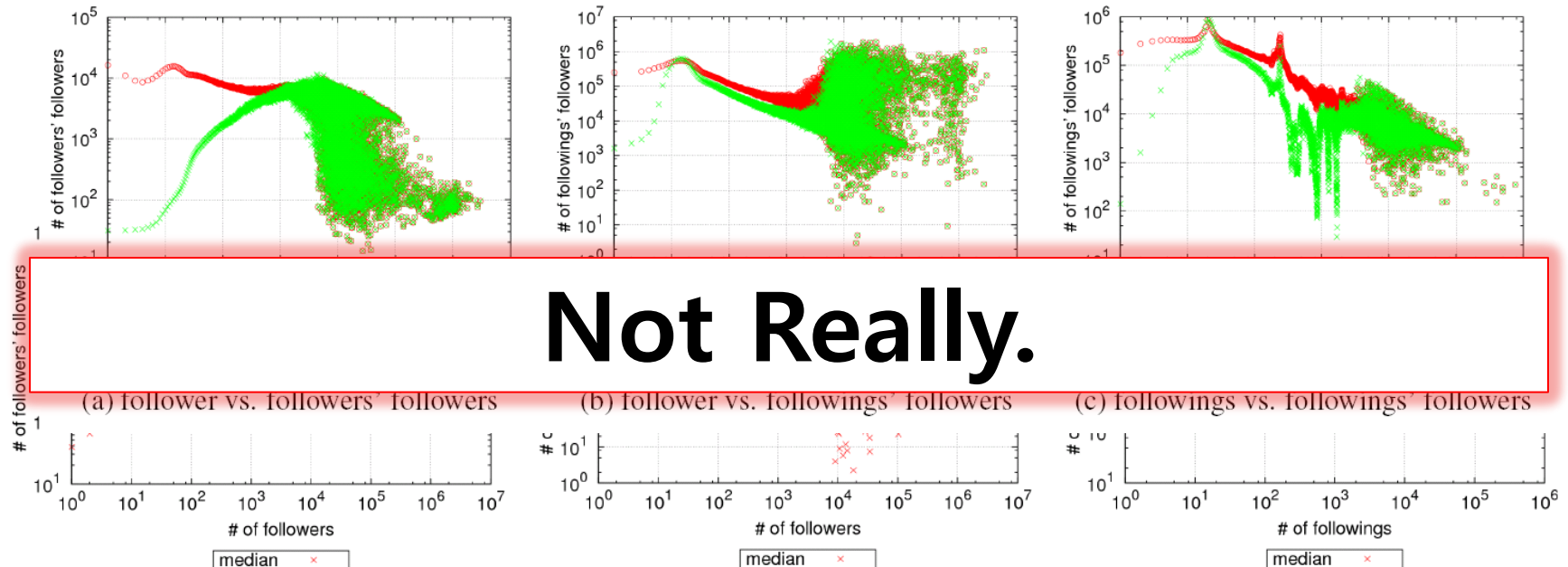
(b) follower vs. followings' followers



(c) followings vs. followings' followers



Answer to BoF Twitter Question:



Not Really.

(a) follower vs. followers' followers

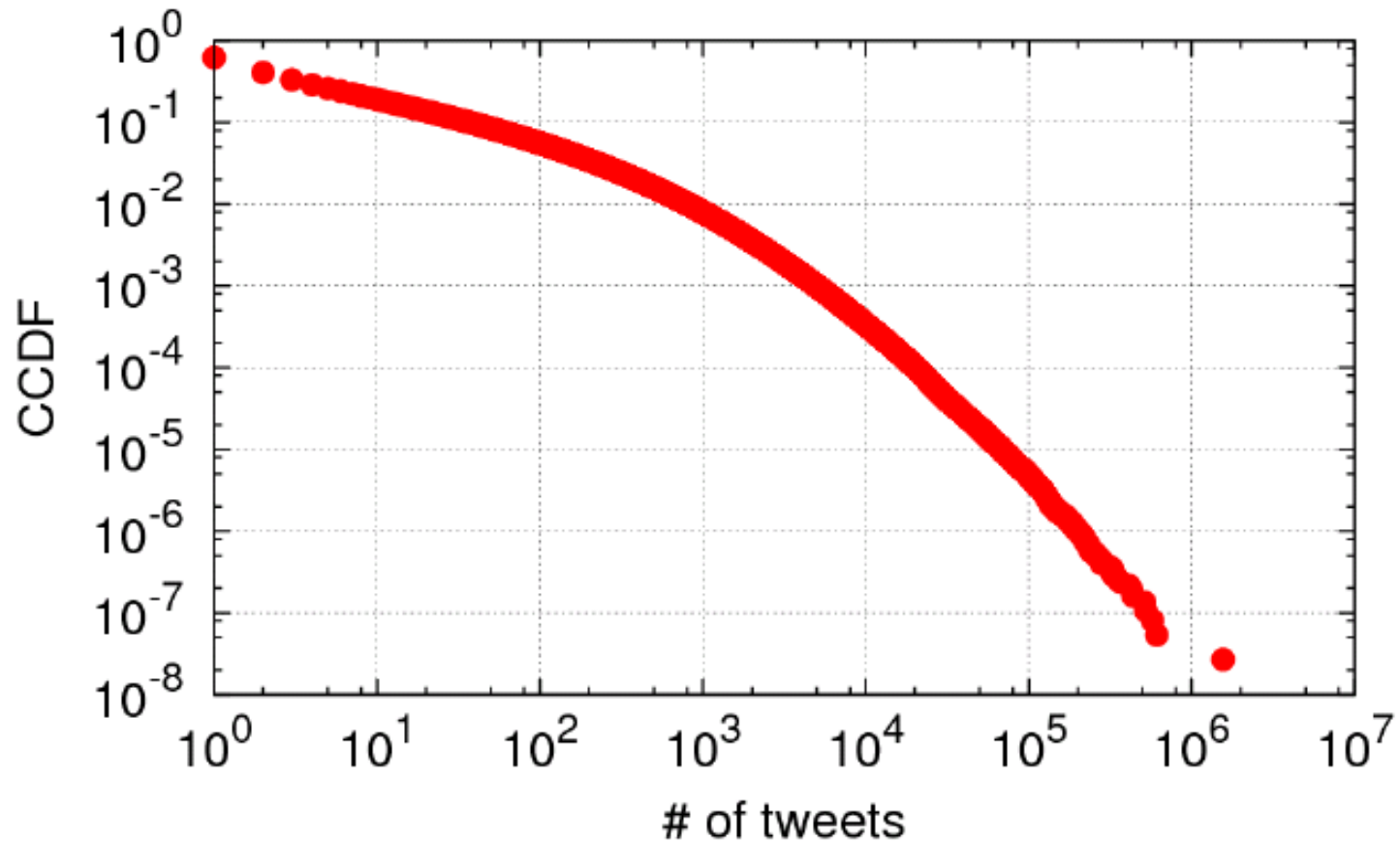
(b) follower vs. followings' followers

(c) followings vs. followings' followers

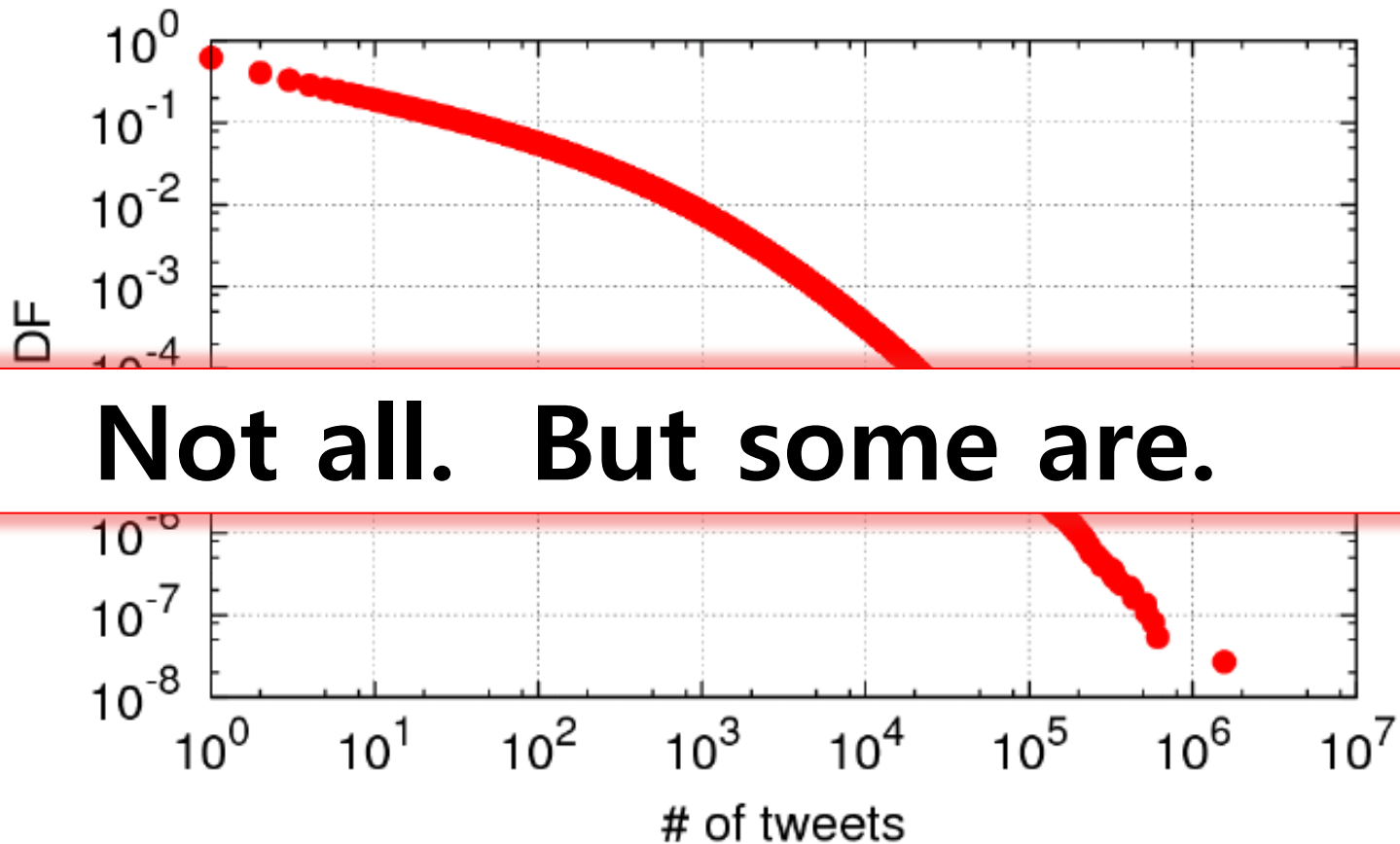
Questions We Raise

- Is Twitter a typical human social network?
 - No, not really
 - But they are very well connected!
- Is Twitter yet another news media?

Is everyone a broadcasting station?

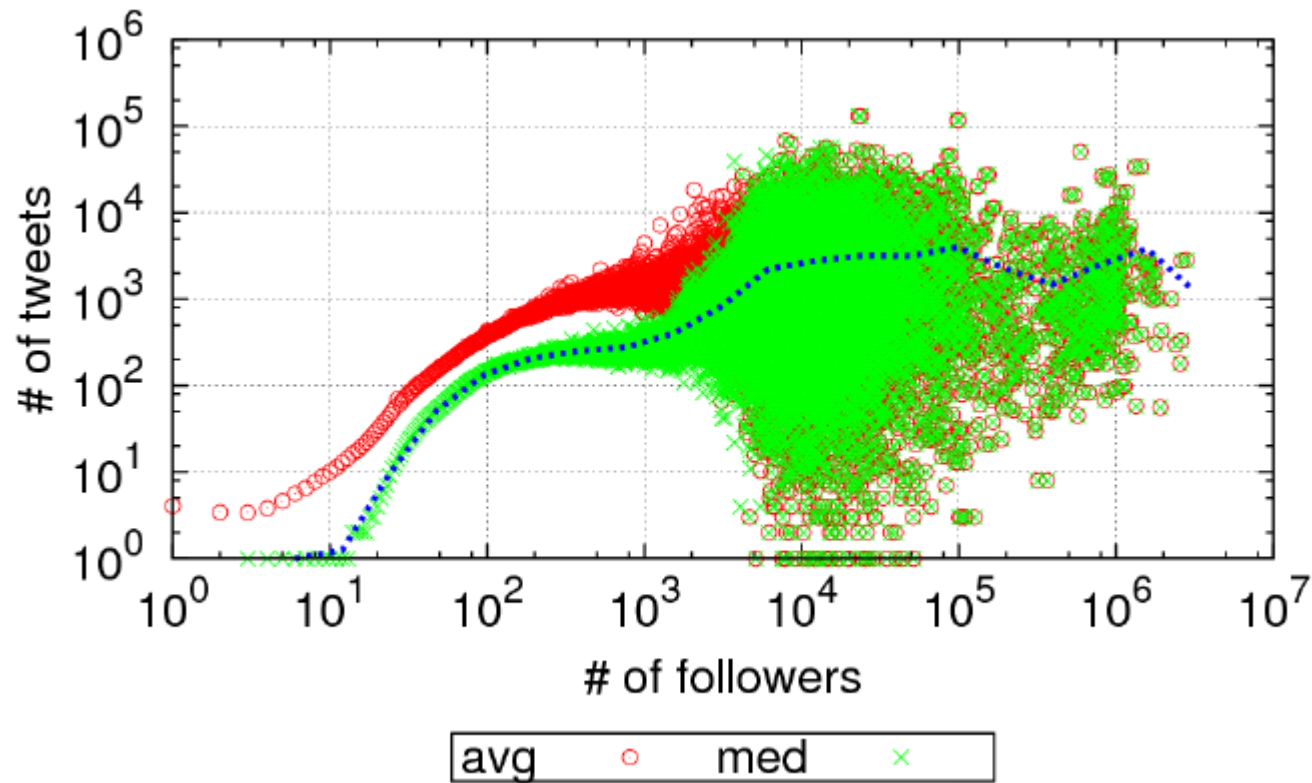


Is everyone a broadcasting station?

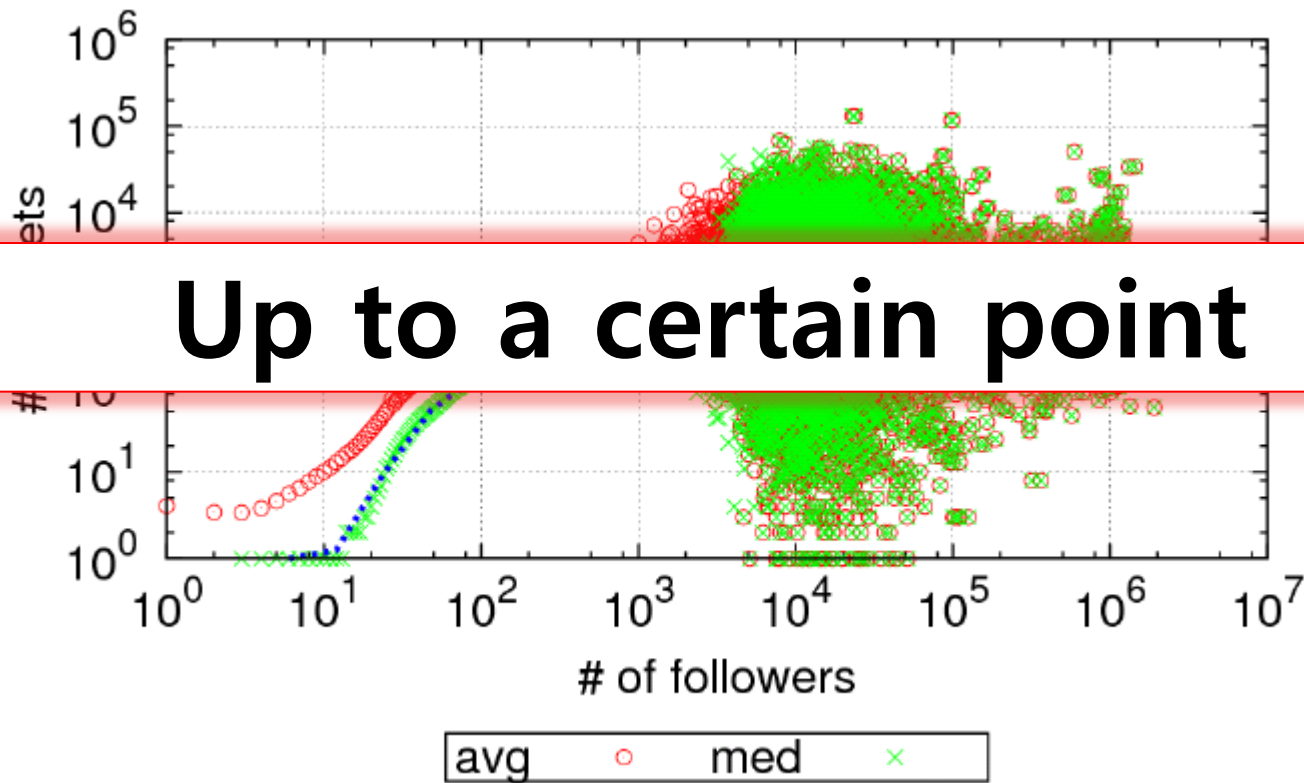


Not all. But some are.

Does peer pressure exist?



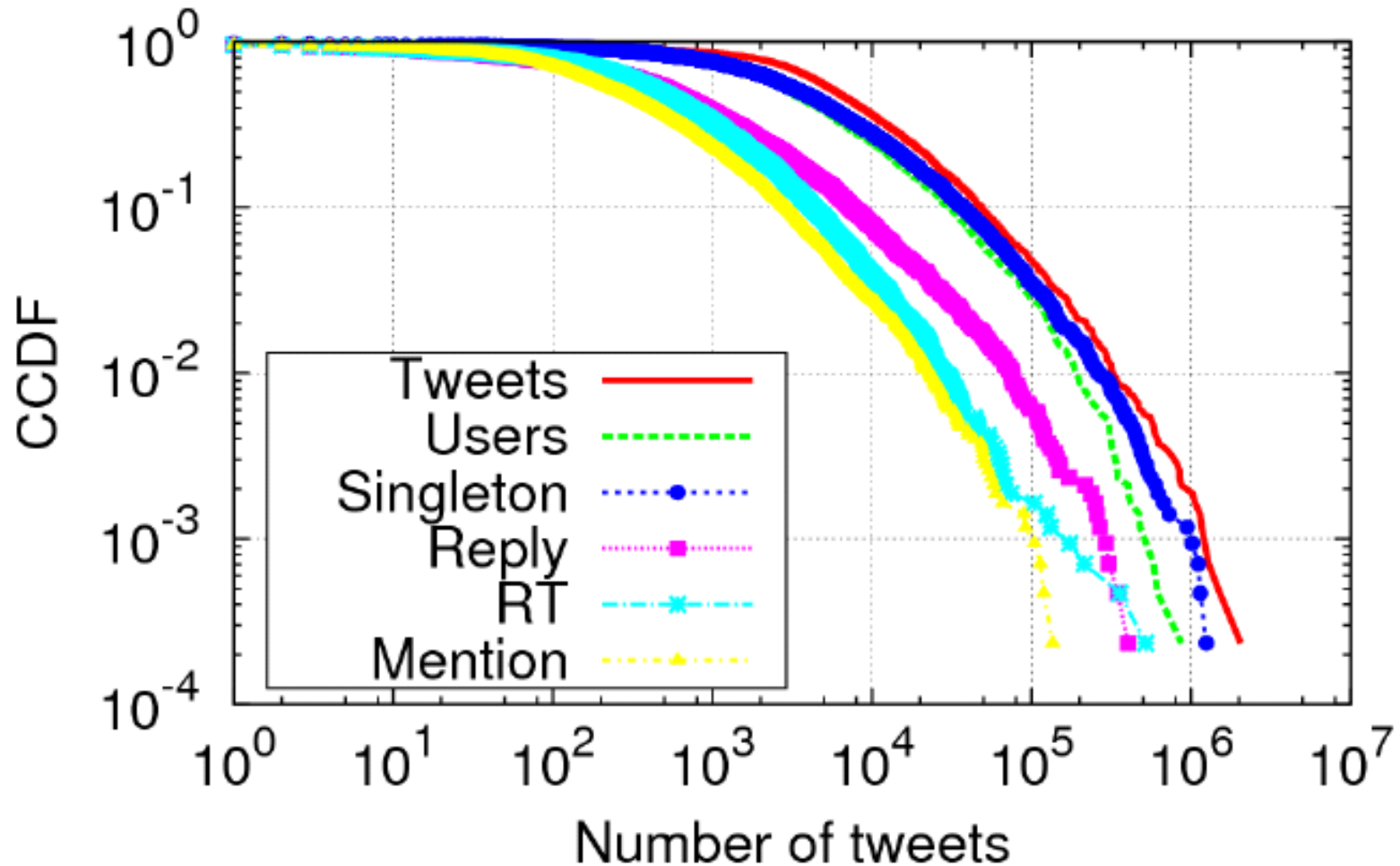
Does peer pressure exist?



Twitter Vocabulary

- Singleton
- Reply: “@coolcook do you have a good recipe...?”
- Mention: “I liked the recipe of @coolcook ...”
- Retweet: “The recipe was great! RT @coolcook time to roast your turkey!”

A Look at Trending Topics

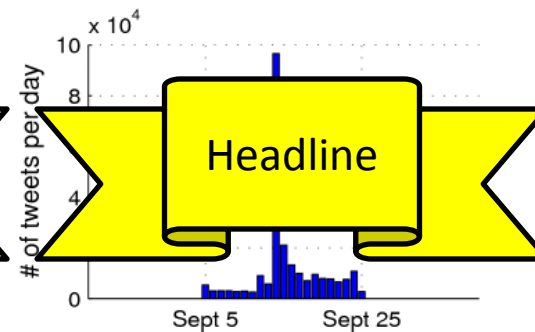
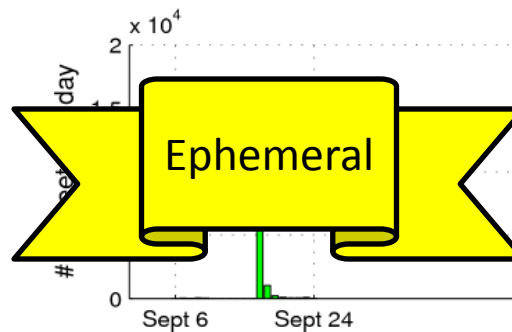


Categorization of News

Subcritical

Critical

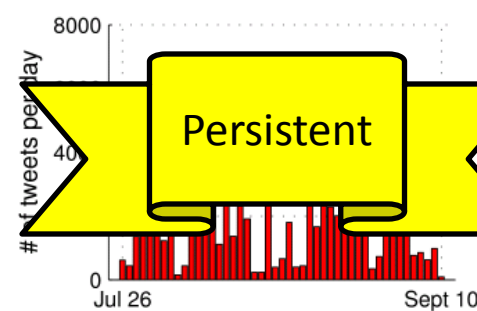
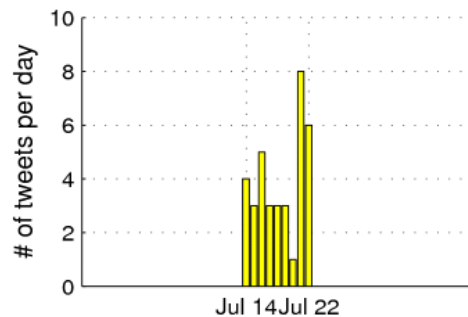
Exogenous



(a) Exogenous subcritical
(topic '#backintheday')

(b) Exogenous critical
(topic 'beyonce')

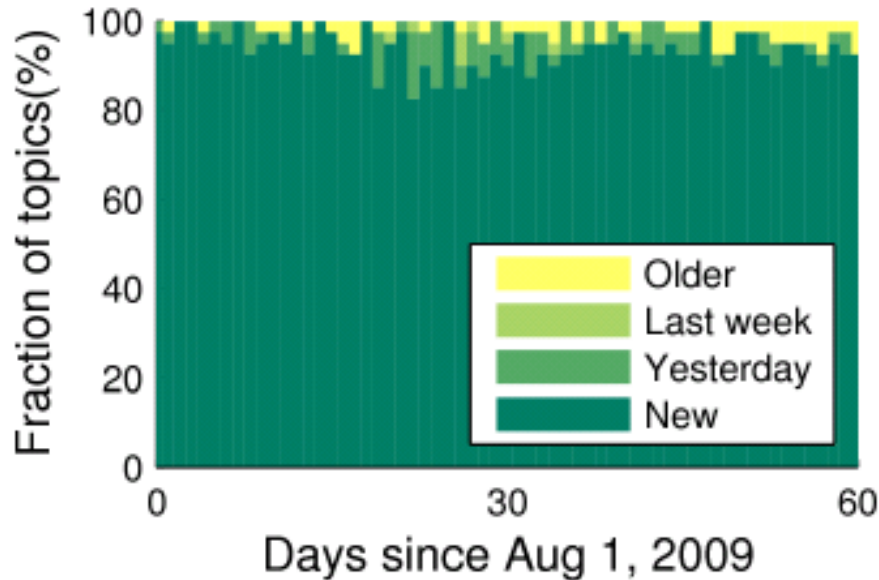
Endogenous



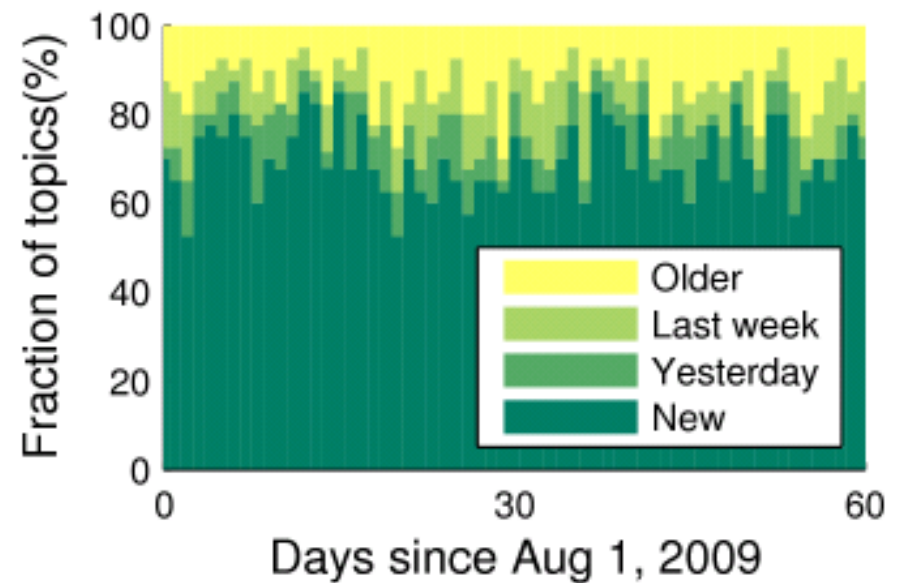
(c) Endogenous subcritical
(topic 'lynn harris')

(d) Endogenous critical
(topic '#redsox')

Google Trends vs Twitter Topics



(a) Google



(b) Twitter

Always faster than CNN Headline News?

- Typically in sports and accidents [1]



[20090605 15:43:28]

For those of you who are wondering, yes I'm cheering on Federer today. He's down a set now.

Federer beats Del Potro to keep dream alive

June 5, 2009 -- Updated 1932 GMT (0332 HKT)

(CNN) -- Set
sets to one o
Sunday's fin

[20090605 19:32:12]

federer fights back to keep dream alive



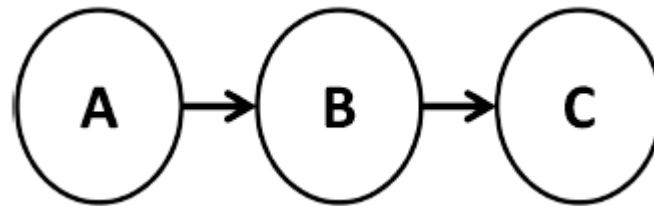
Roger Federer screams in joy after beating Juan Martin del Potro to reach the French Open final.

hours and 20 minutes.
Soderling in Sunday's

Swede Soderling, wh
sensation by knockin
and world number on
Fernando Gonzalez f
thrilling five-setter to
in Paris.

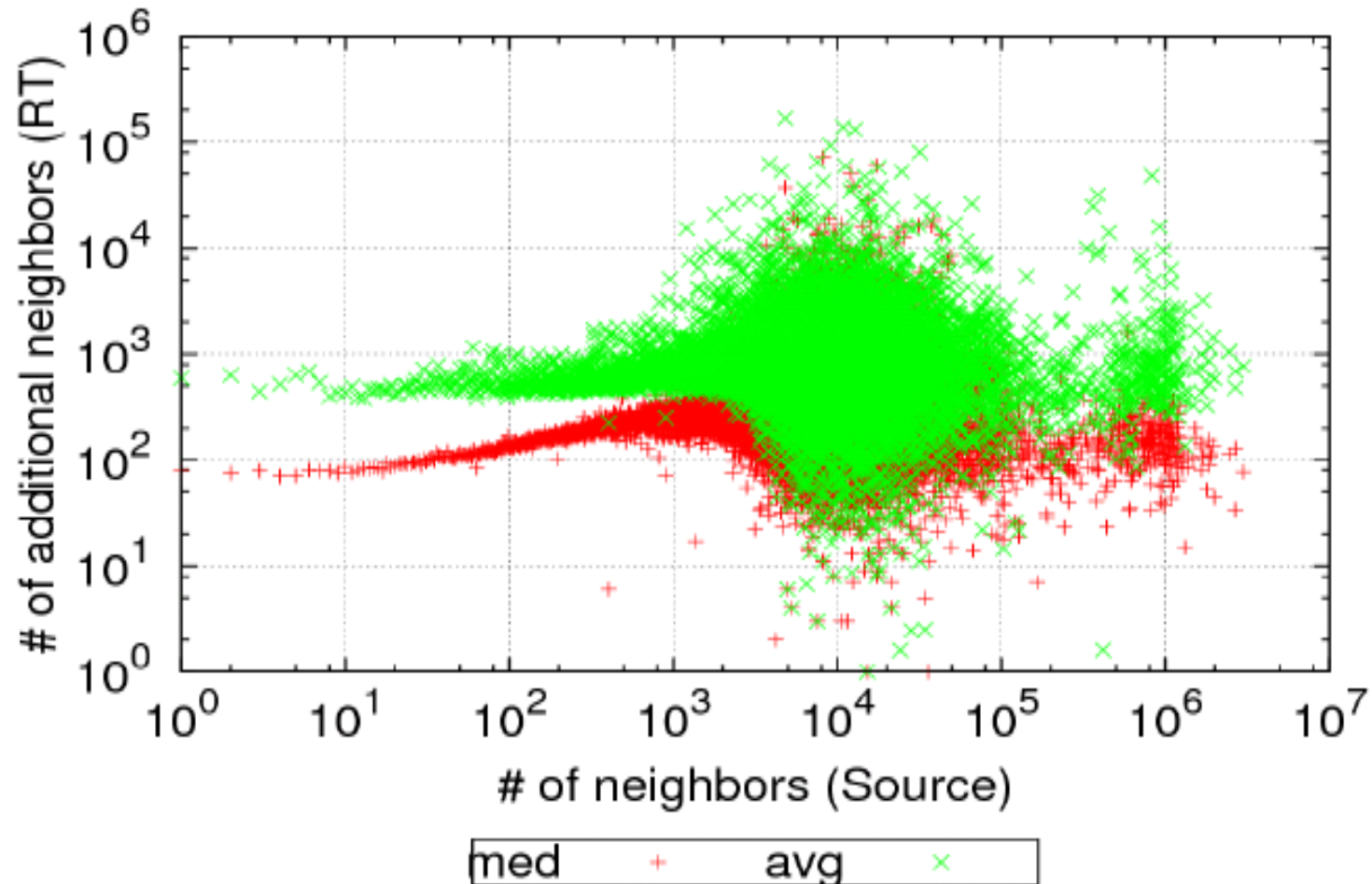
It was Federer's seco
tournament -- he was
Tommy Haas in the f
squeezed through to
without hitting too for

Trail of Retweet

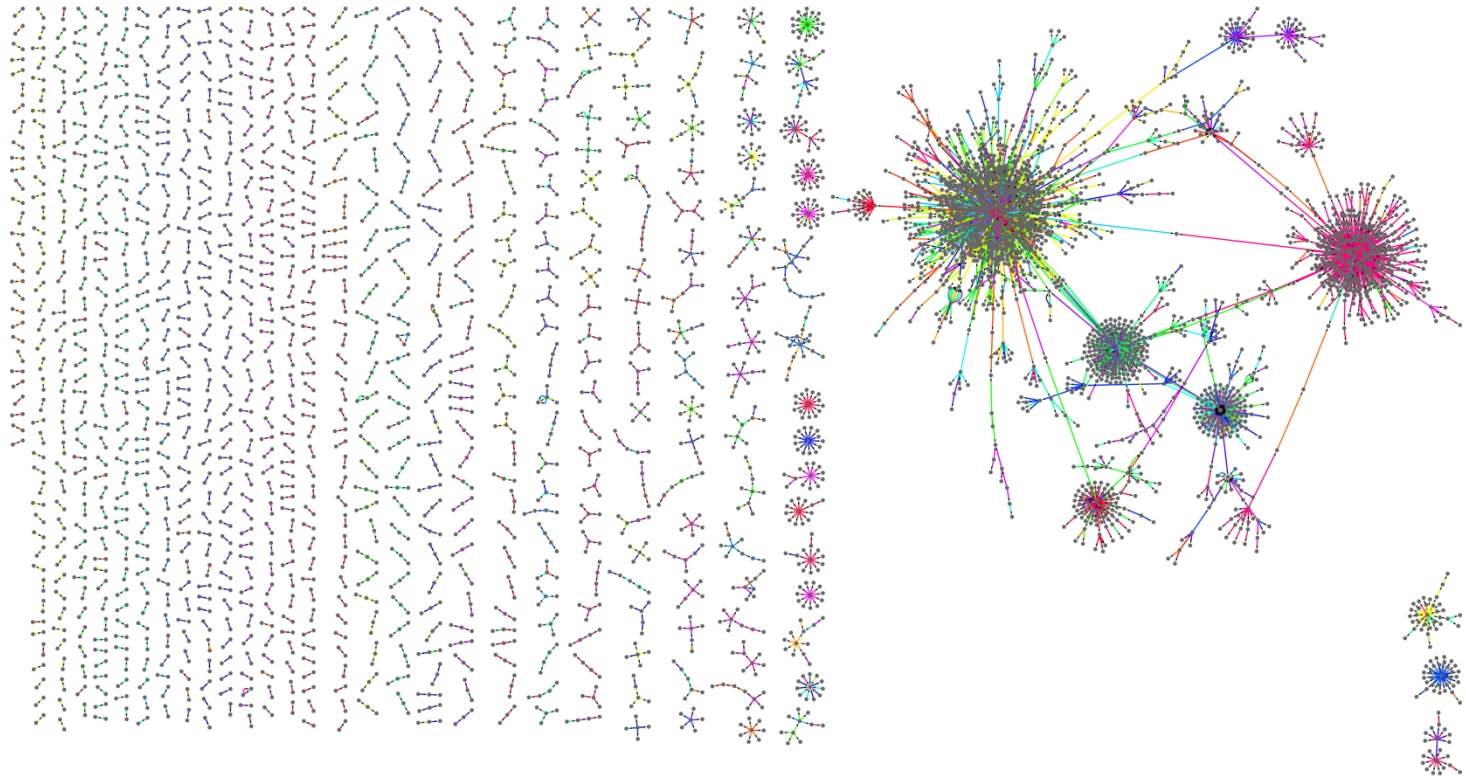


- A “UCSB rocks!!”
- B “Yeah!!!!!!! RT @UCSB rocks!!”
- C sees that B’s retweet

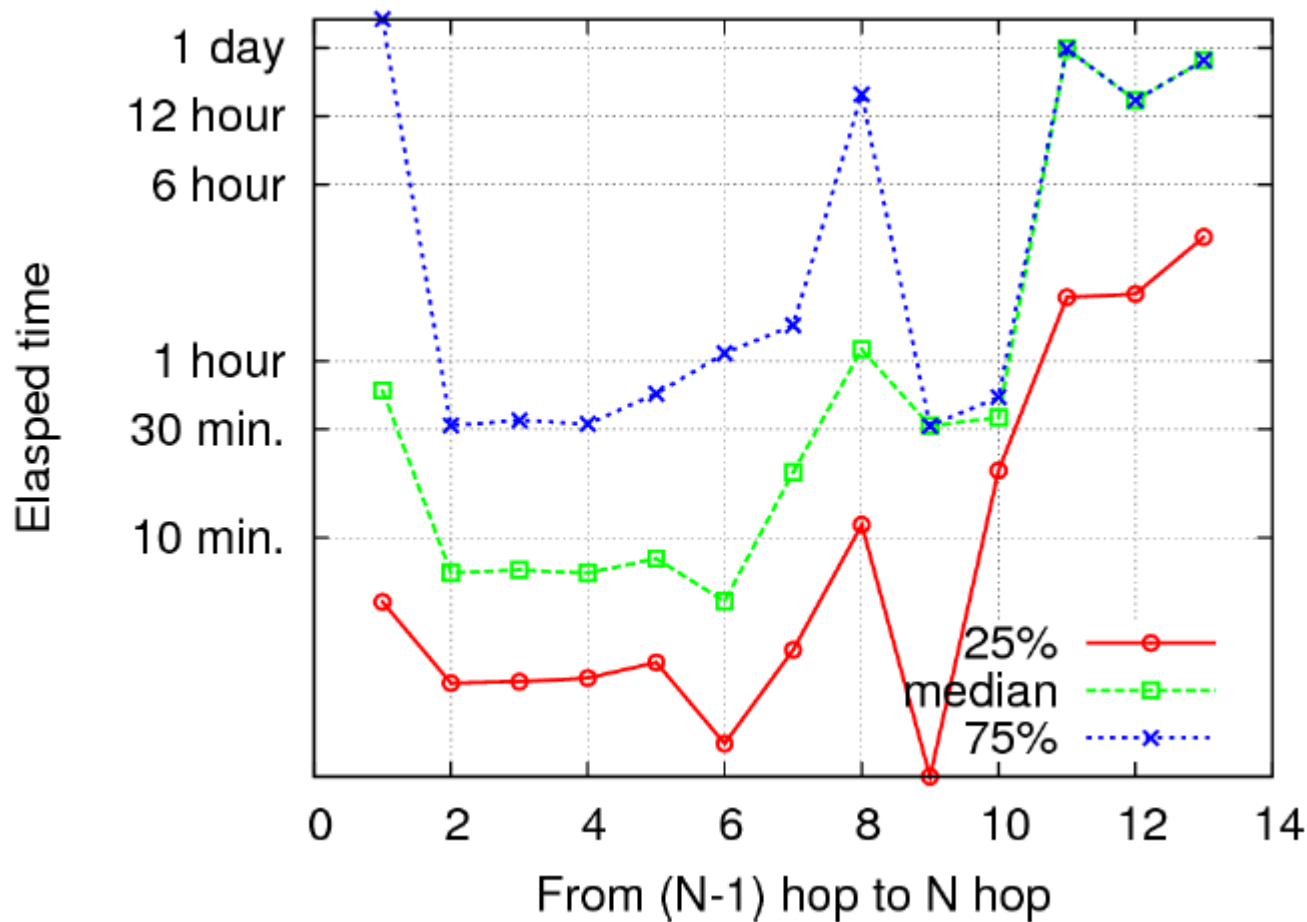
Audience Size of Retweets



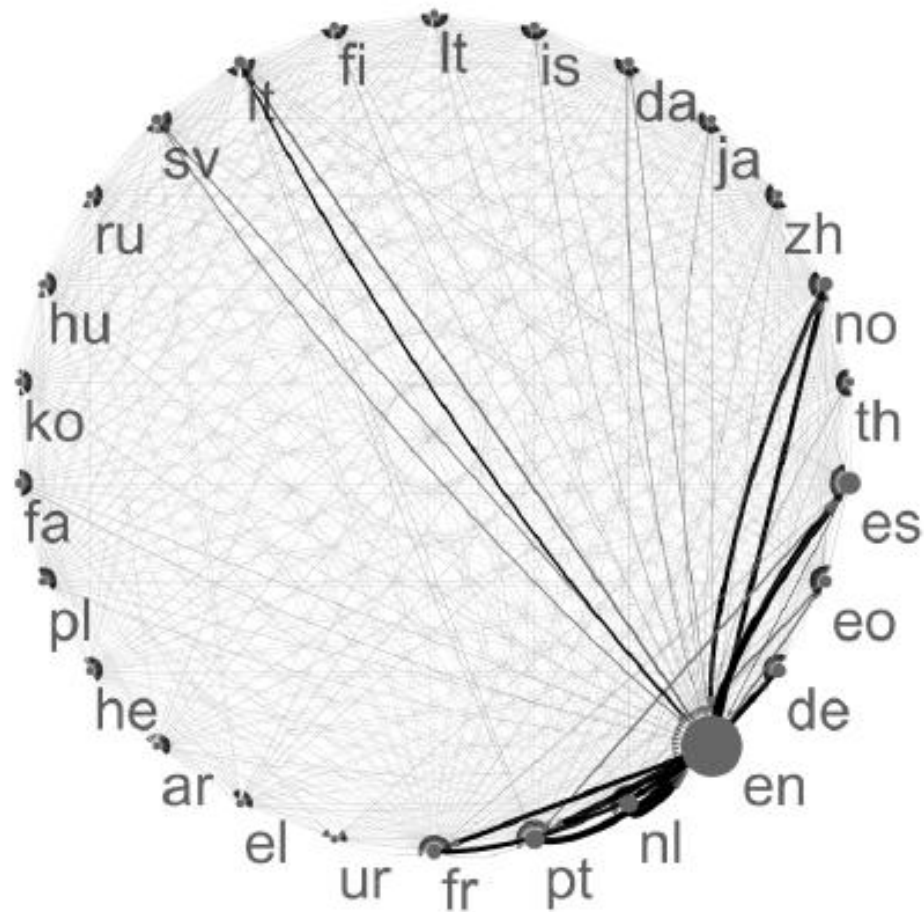
Forest of Retweets



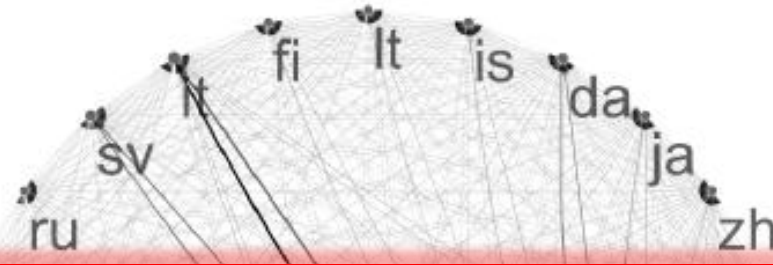
How soon do people retweet?



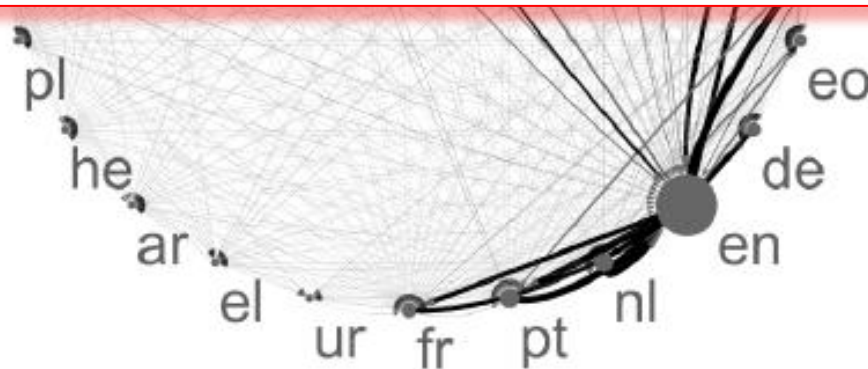
Language Transition



Language Transition



**Questions Remain:
What news and how fast**



Twitter User Ranking

By # of Followers

By PageRank

By # of Retweets

Rank	Ranking by # of followers			Ranking by PageRank in the following/follower network			Ranking by # of retweet in the diffusion network		
	ID	Name	Remark	ID	Name	Remark	ID	Name	Remark
1	aplusk	ashton kutcher	actor	aplusk	ashton kutcher	actor	mashable	Pete Cashmore	news on social media
2	britneyspears	Britney Spears	musician	BarackObama	Barack Obama	president of U.S.	BreakingNews	BNO News	news
3	TheEllenShow	Ellen DeGeneres	show host	cnnbrk	CNN Breaking News	news	tweetmeme	TweetMeme	news on Twitter
4	cnnbrk	CNN Breaking News	news	TheEllenShow	Ellen DeGeneres	show host	oxfordgirl	oxfordgirl	journalist
5	Oprah	Oprah Winfrey	show host	britneyspears	Britney Spears	musician	cnnbrk	CNN Breaking News	news
6	twitter	Twitter	subject of this paper	Oprah	Oprah Winfrey	show host	TechCrunch	Michael Arrington	news on technology
7	BarackObama	Barack Obama	president of U.S.	THE_REAL_SHAQ	THE_REAL_SHAQ	sports star	myfabulouslife	Fabulous	musician
8	RyanSeacrest	Ryan Seacrest	show host	johncmayer	John Mayer	musician	nytimes	The New York Times	news
9	THE_REAL_SHAQ	THE_REAL_SHAQ	sports star	twitter	Twitter	subject of this paper	lilduval	lil duval	comedian
10	KimKardashian	Kim Kardashian	model	RyanSeacrest	Ryan Seacrest	show host	IranRiggedElect	Iran	about Iran
11	johncmayer	John Mayer	musician	lancearmstrong	Lance Armstrong	sports star	espn	ESPN Sports News	news
12	mrskutcher	Demi Moore	actress	jimmyfallon	Jimmy Fallon	actor	persiankiwi	persiankiwi	about Iran
13	iamdiddy	iamdiddy	musician	iamdiddy	iamdiddy	musician	aplusk	ashton kutcher	actor
14	jimmyfallon	Jimmy Fallon	actor	mrskutcher	Demi Moore	actress	StopAhmadi	Raymond Jahan	about Iran
15	lancearmstrong	Lance Armstrong	sports star	PerezHilton	Perez Hilton	power blogger	Alyssa_Milano	Alyssa Milano	actress
16	algore	Al Gore	politician	nytimes	The New York Times	news	huffingtonpost	HuffingtonPost.com	news
17	mileycyrus	Miley Cyrus	actress / musician	mileycyrus	Miley Cyrus	actress / musician	iamdiddy	iamdiddy	musician
18	nytimes	The New York Times	news	stephenfry	Stephen Fry	actor	iranbaan	Fershteh Ghazi	about Iran
19	coldplay	Coldplay	musician	TheOnion	The Onion	news	nprnews	NPR News	news
20	TheOnion	The Onion	news	KimKardashian	Kim Kardashian	model	PerezHilton	Perez Hilton	power blogger

Twitter User Ranking

By # of Followers

By PageRank

By # of Retweets

Rank	Ranking by # of followers			Ranking by PageRank in the following/follower network			Ranking by # of retweet in the diffusion network		
	ID	Name	Remark	ID	Name	Remark	ID	Name	Remark
1	aplusk	ashton kutcher	actor	aplusk	ashton kutcher	actor	mashable	Pete Cashmore	news on social media
2	britneyspears	Britney Spears	musician	BarackObama	Barack Obama	president of U.S.	BreakingNews	BNO News	news

Twitter Is Fast with 2 Types of News:
Sports and Accidents

15	lancearmstrong	Lance Armstrong	sports star	PerezHilton	Perez Hilton	power blogger	Alyssa_Milano	Alyssa Milano	actress
16	algore	Al Gore	politician	nytimes	The New York Times	news	huffingtonpost	HuffingtonPost.com	news
17	mileycyrus	Miley Cyrus	actress / musician	mileycyrus	Miley Cyrus	actress / musician	iamdiddy	iamdiddy	musician
18	nytimes	The New York Times	news	stephenfry	Stephen Fry	actor	iranbaan	Fershteh Ghazi	about Iran
19	coldplay	Coldplay	musician	TheOnion	The Onion	news	nprnews	NPR News	news
20	TheOnion	The Onion	news	KimKardashian	Kim Kardashian	model	PerezHilton	Perez Hilton	power blogger

Questions We Raise

- Is Twitter a typical human social network?
 - No, not really
 - But they are very well connected!
- Is Twitter yet another news media?
 - In a way; a retweet reaches 1000+ on average