

Competition among memes in a world with limited attention

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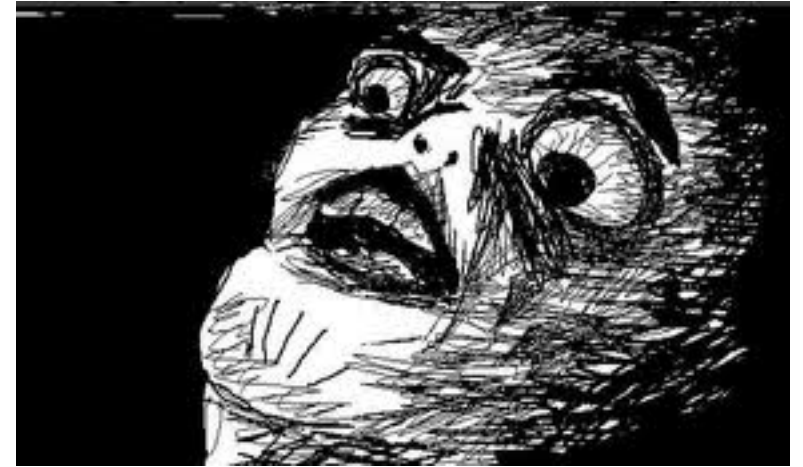
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Nature Scientific Report, 2012



#EpicTweets

#TheEpicTweet



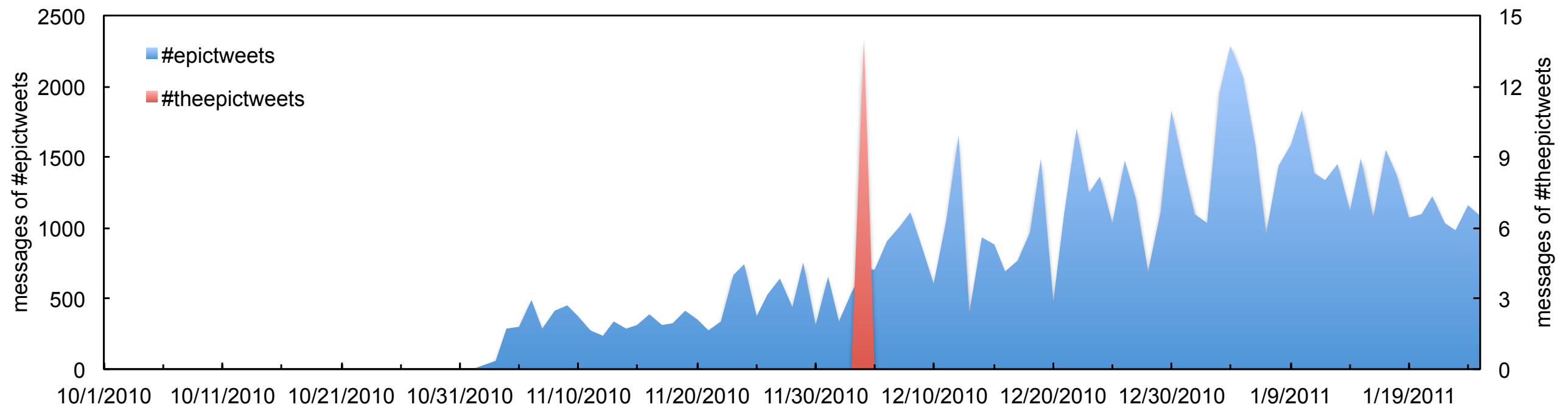
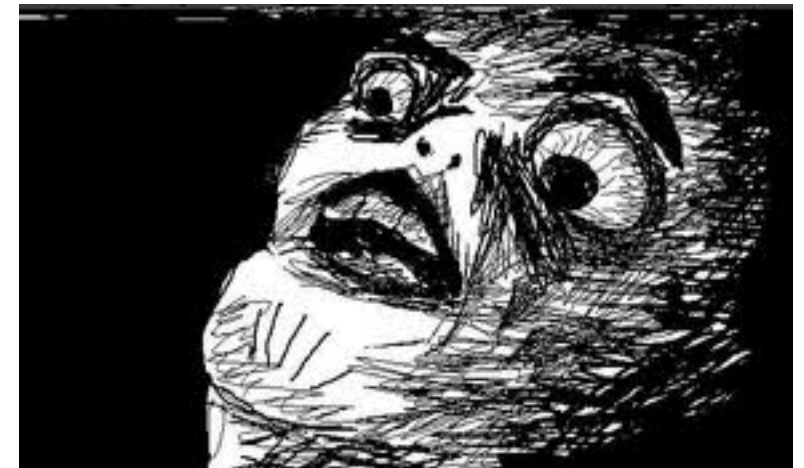
Which hashtag is more popular?

#EpicTweets

66,376 RT

#TheEpicTweet

14 RT



#BieberThing

#BieberFact



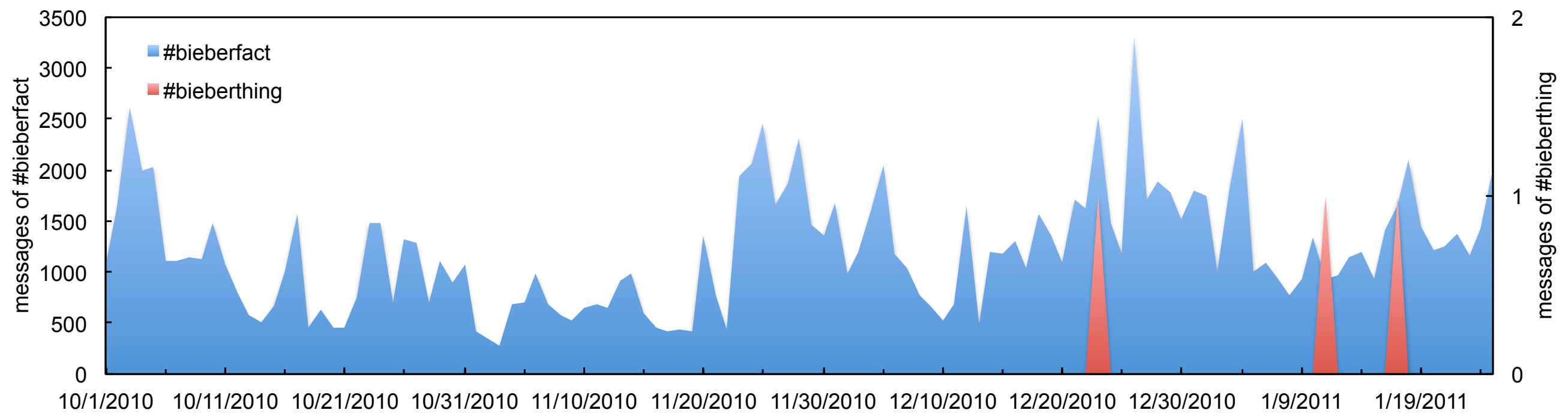
Which hashtag is more popular?

#BieberThing

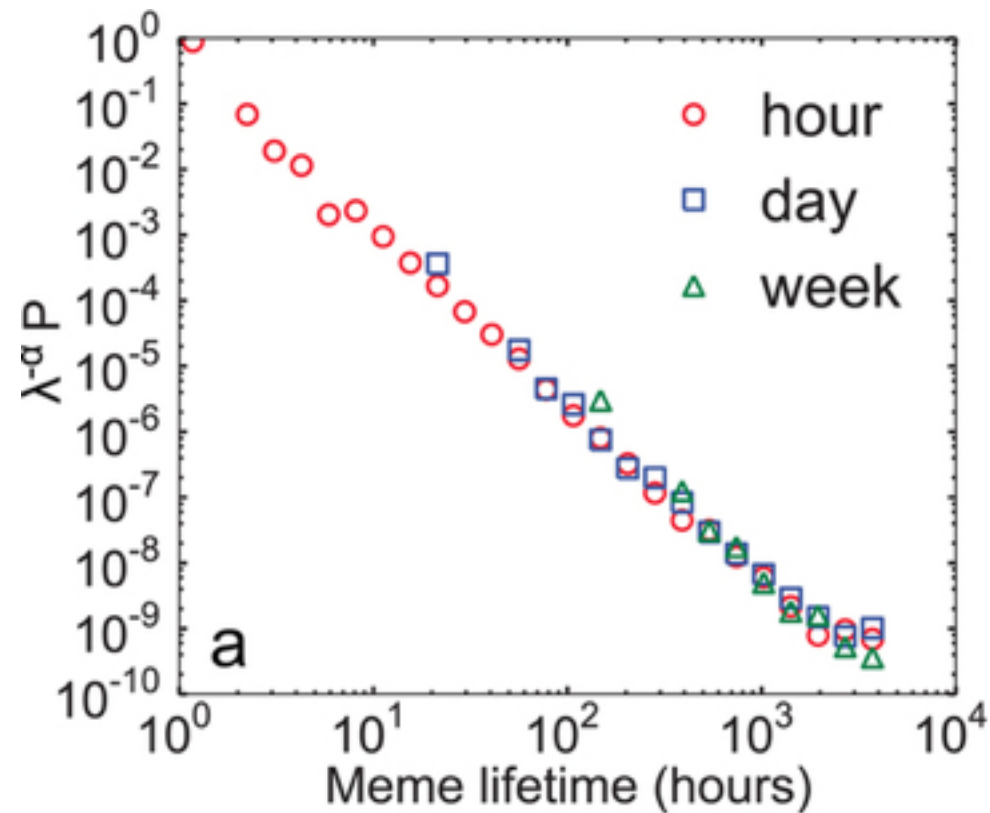
18 RT

#BieberFact

97,523 RT



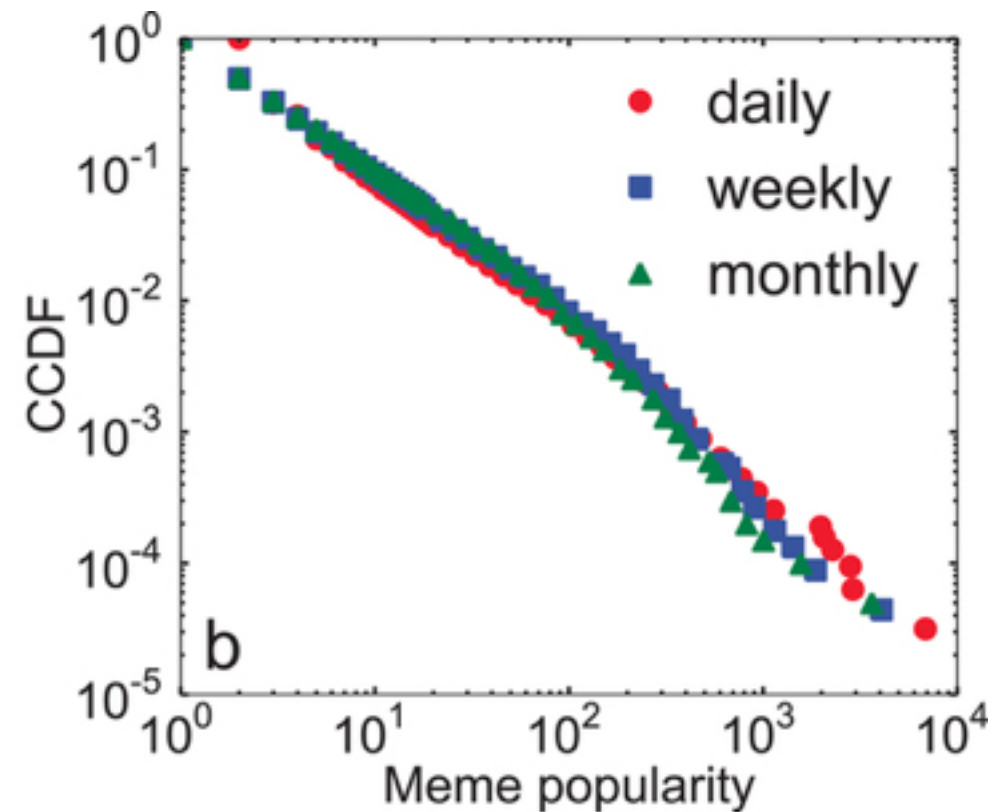
They are similar, and
they are competing!



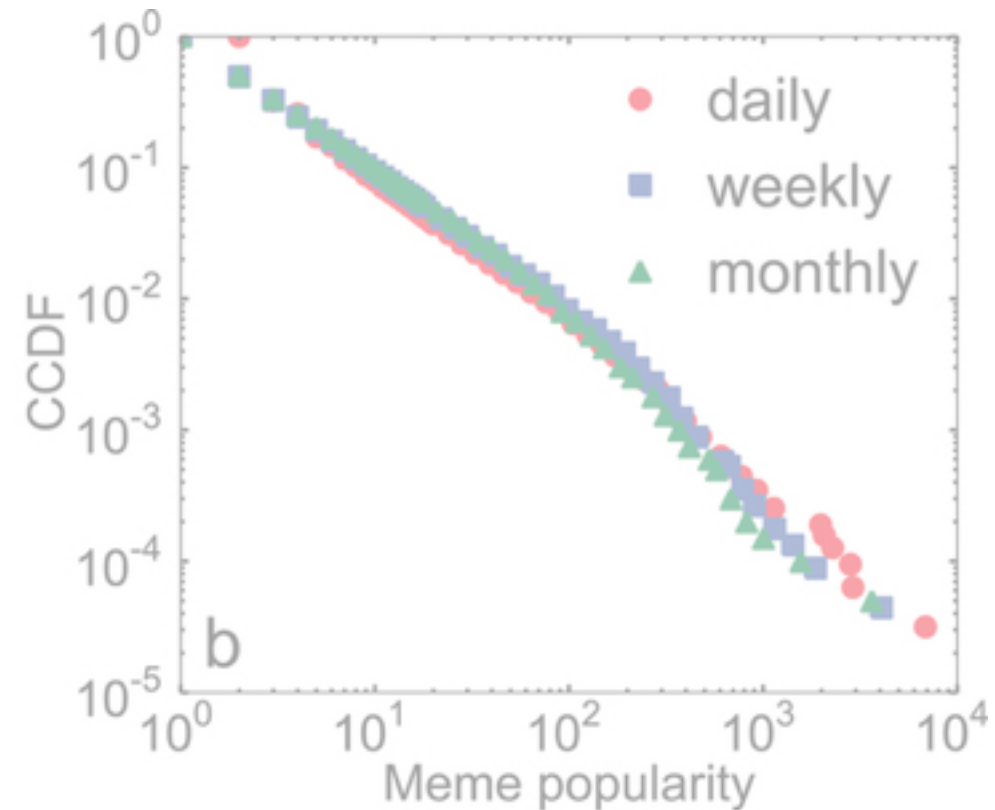
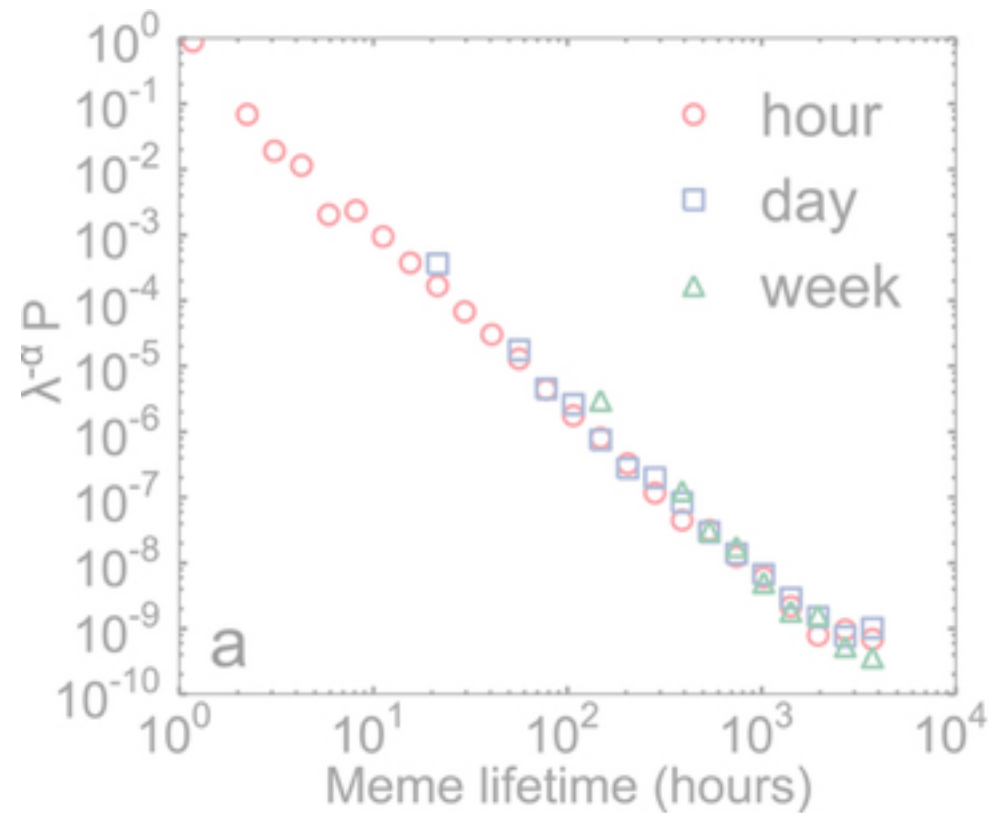
Meme lifetime is the maximum number of consecutive time units.

Competition is fierce.
Only a few memes are long-lived;
most are short-lived.

Meme popularity is the number of tweets containing the meme.



Competition is fierce.
Only a few memes widely spread;
most do not.



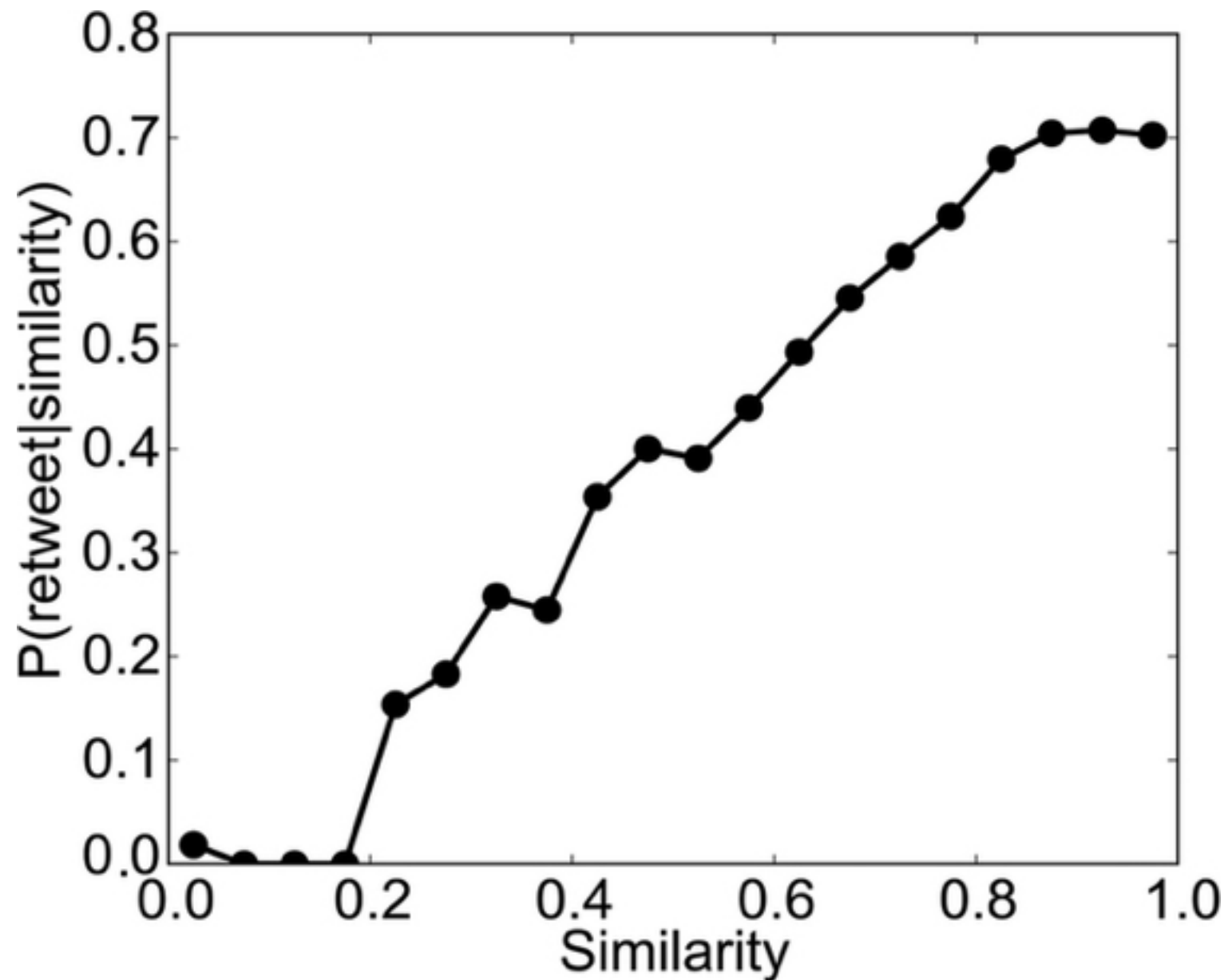
How to represent the **competition**?

How to prove that the competition has an **important** role in shaping these two distributions?

Let's design a model.

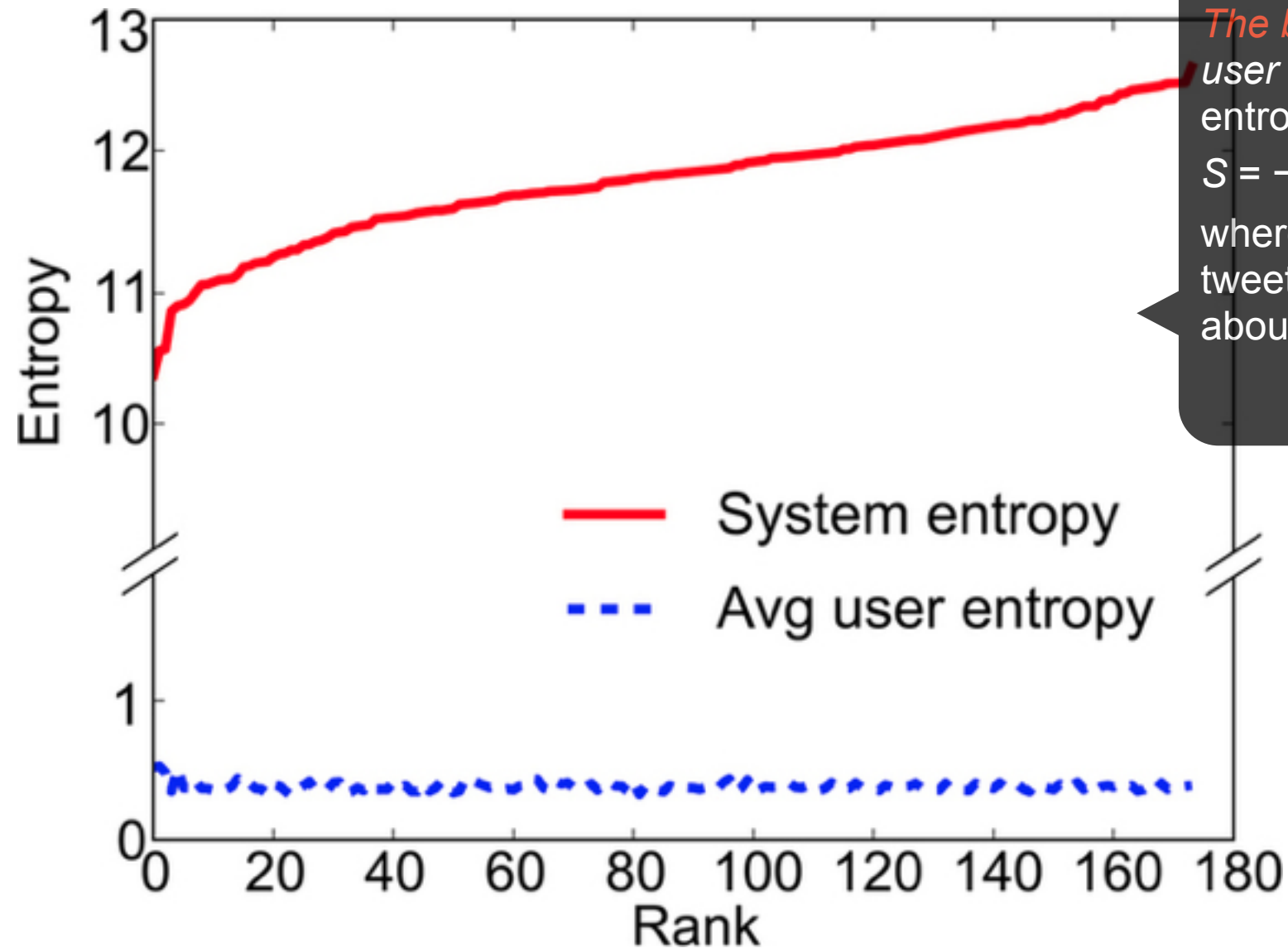
But what should it incorporate?

User has memory (attention)



Users are more likely to retweet memes about which they posted in the past.

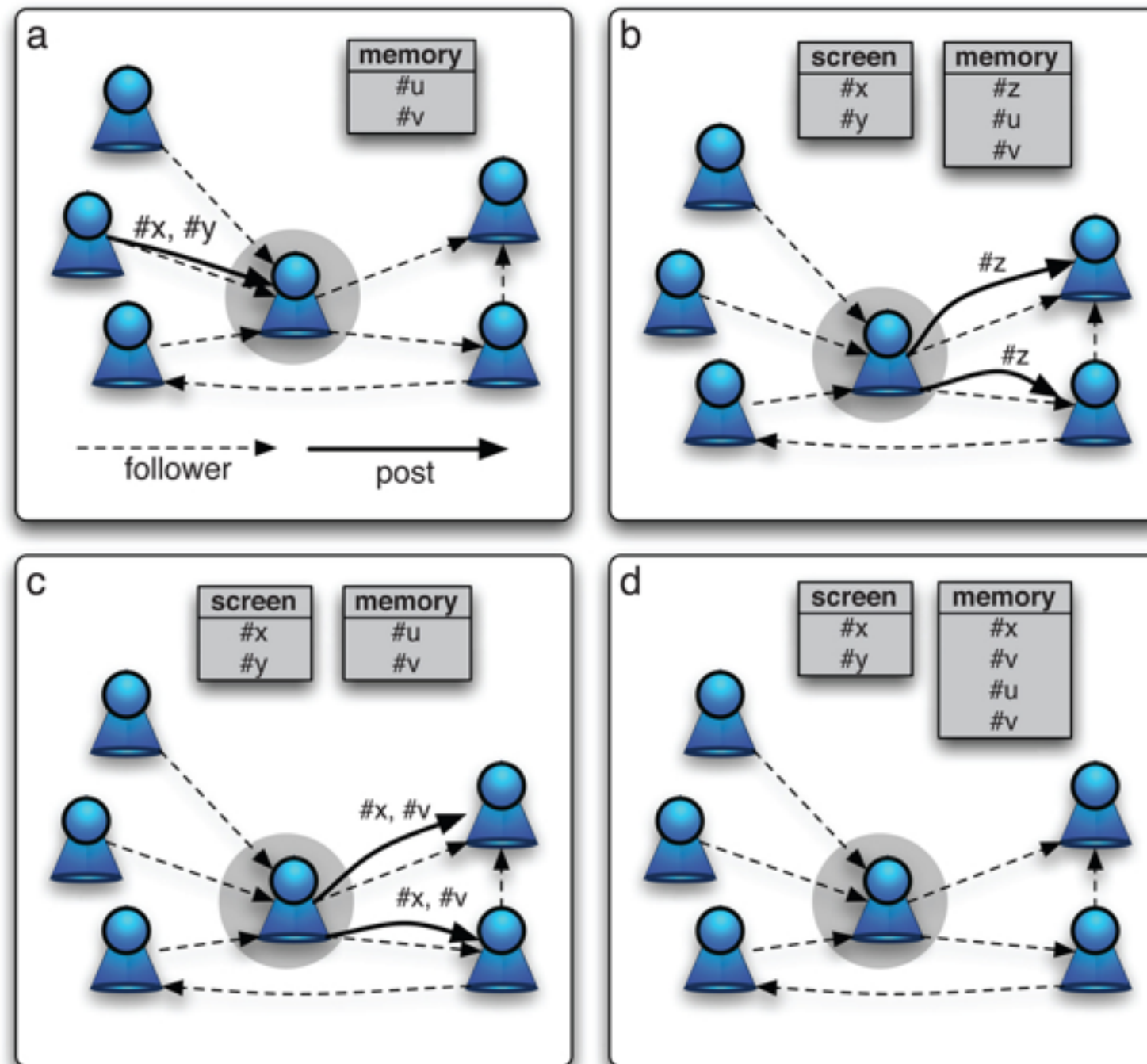
User memory (attention) is bound



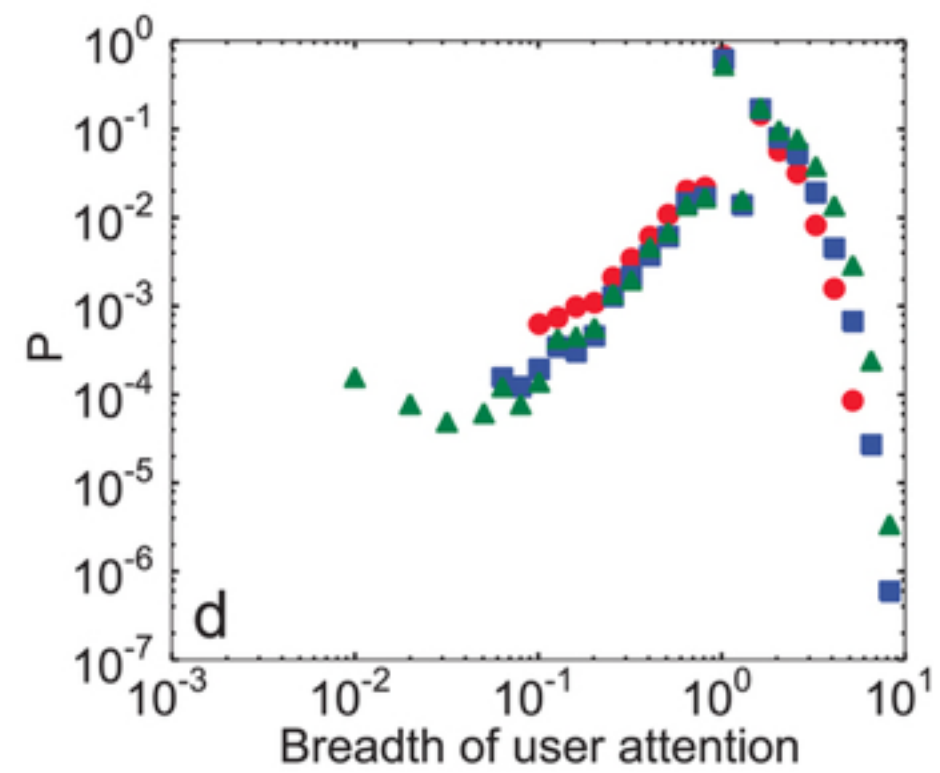
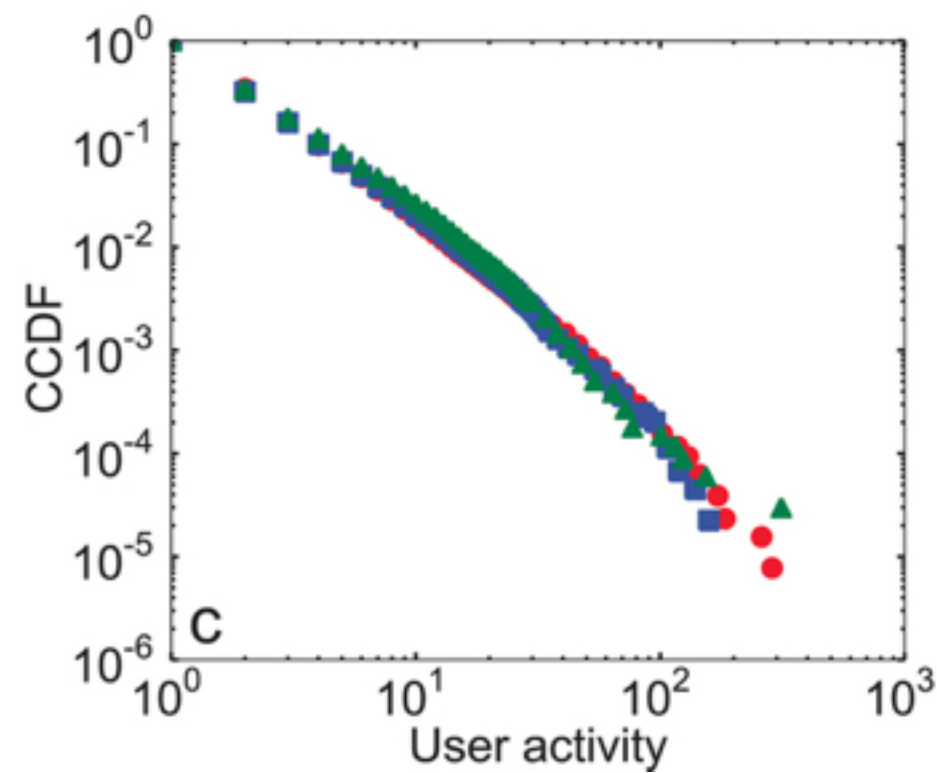
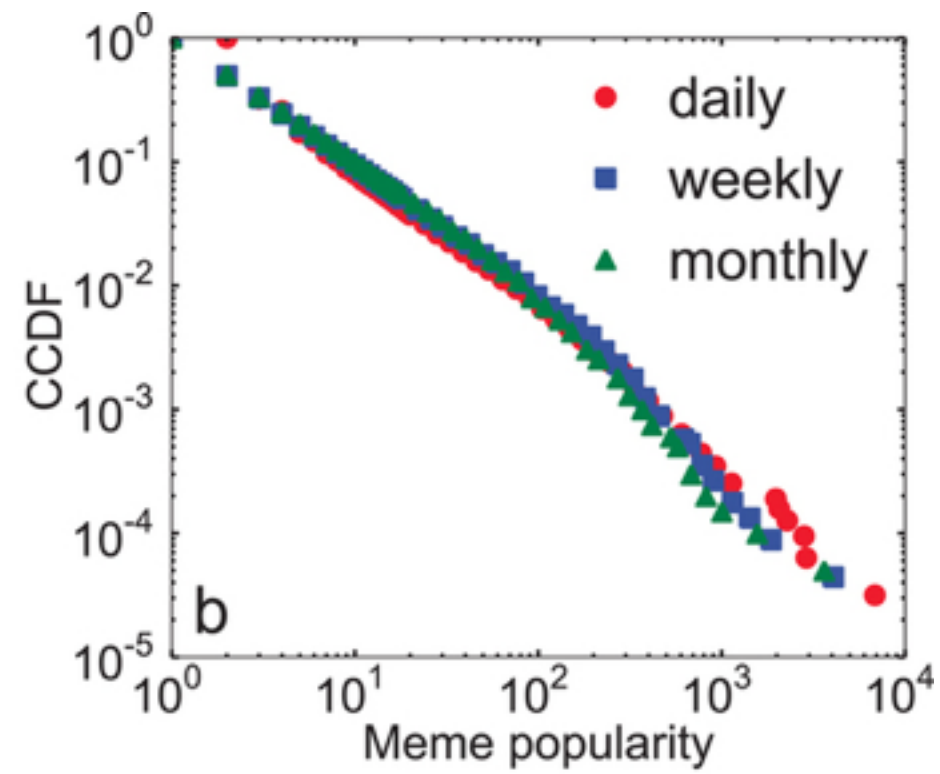
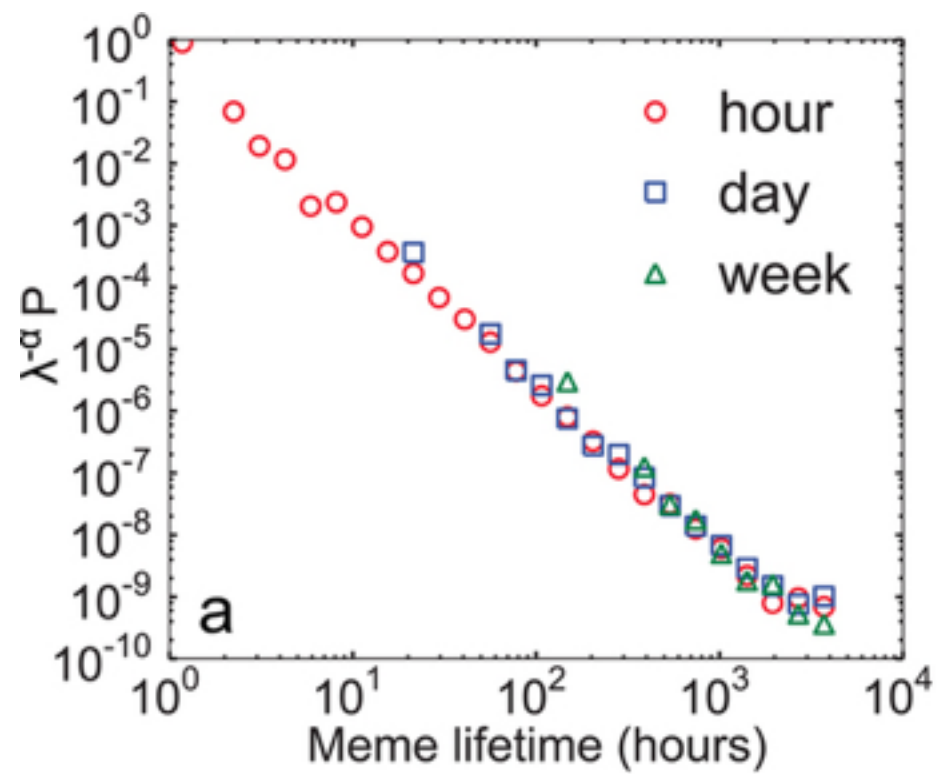
The breadth of attention of a user through Shannon entropy
 $S = -\sum_i f(i) \log f(i)$
where $f(i)$ is the proportion of tweets generated by the user about meme i .

Individual attention is independent from the system diversity.

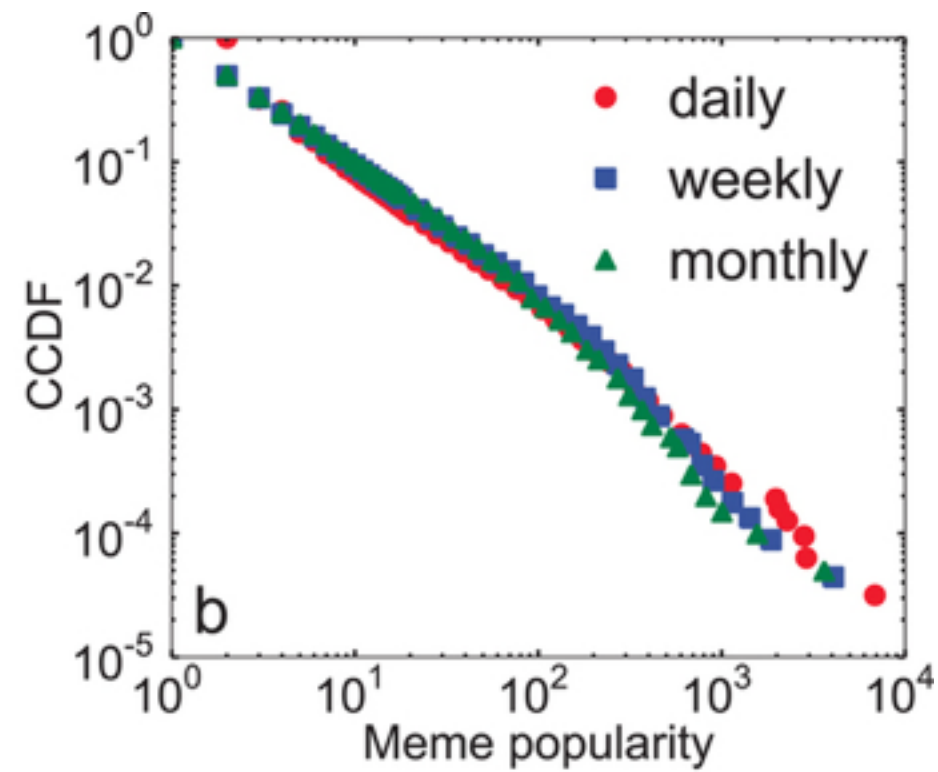
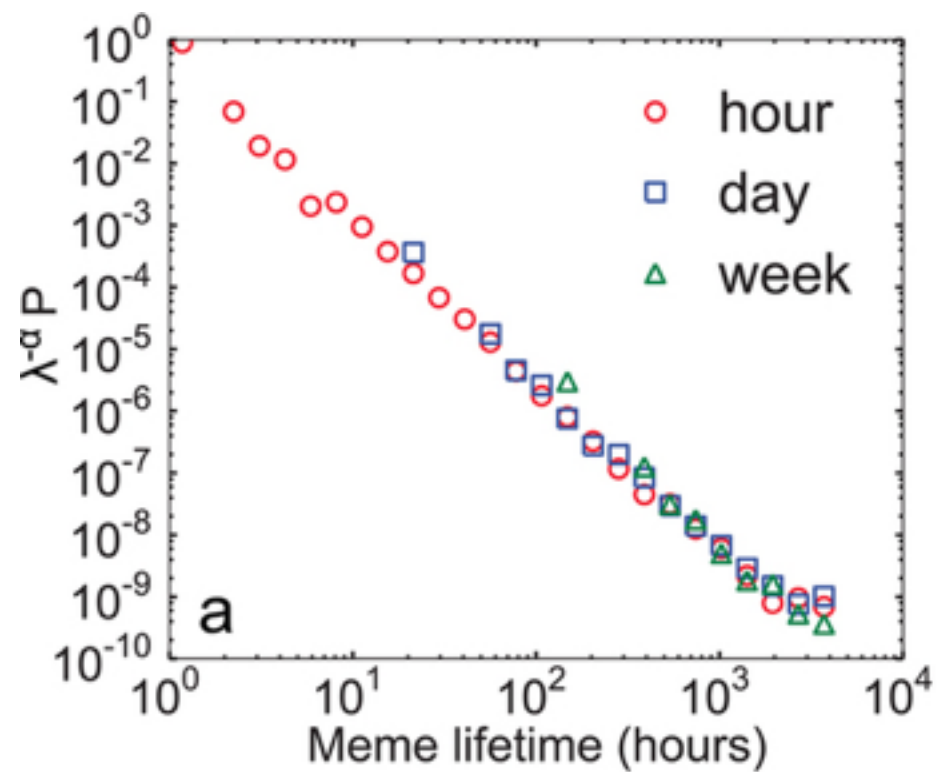
Here comes the Model



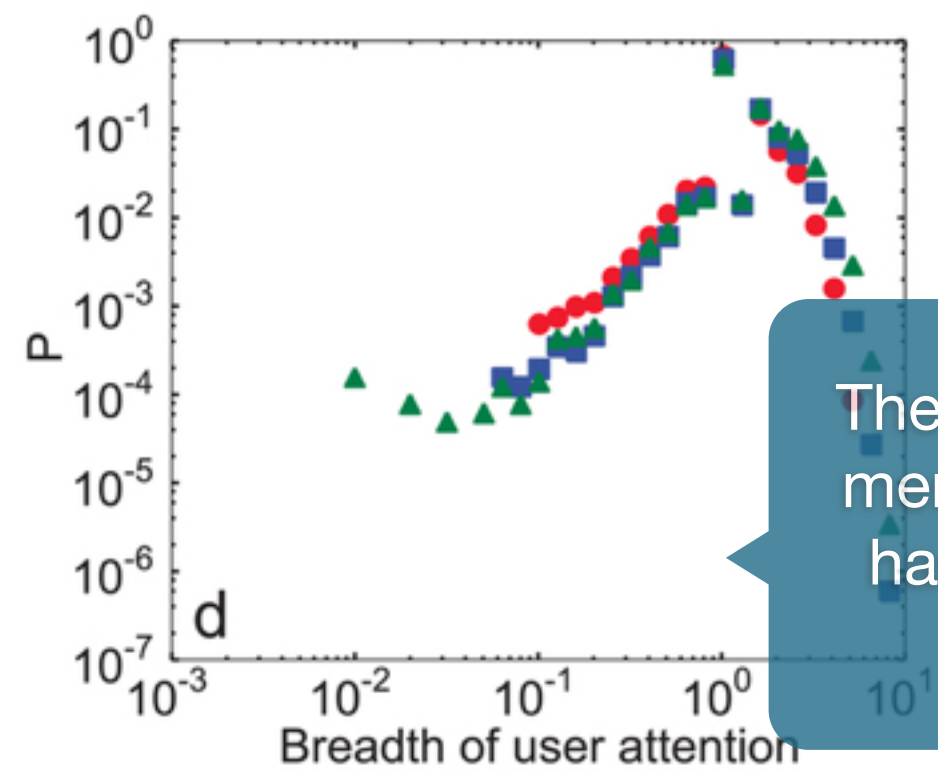
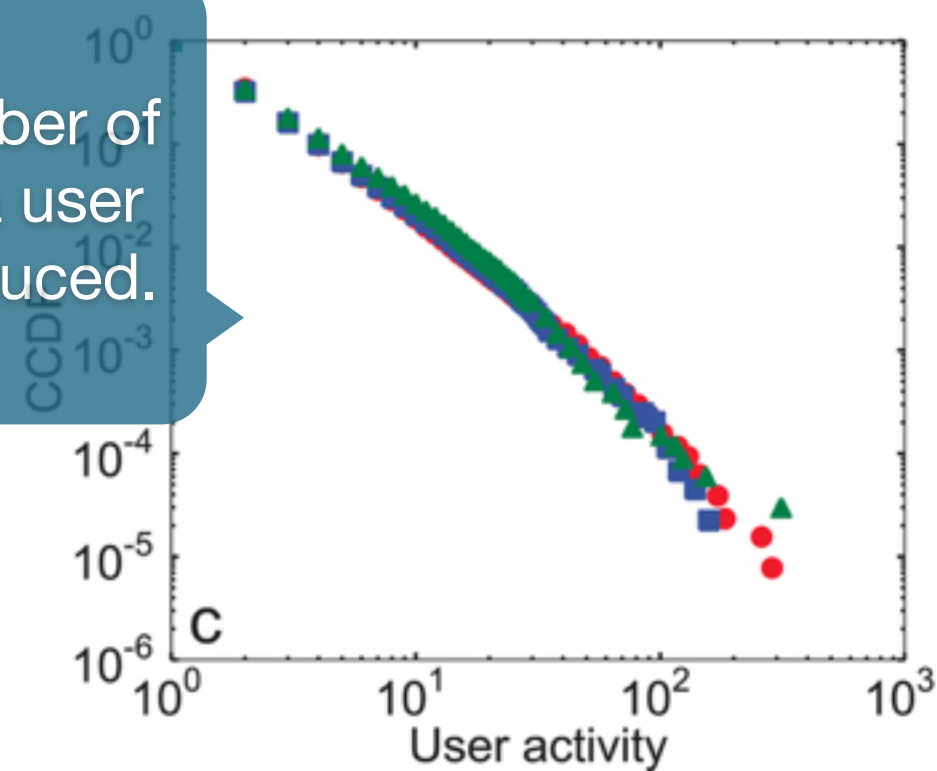
Each user has a memory and a screen, both with limited size. (a) Memes are propagated along follower links. (b) The memes received by a user appear on the screen. With probability p_n , the user posts a new meme, which is stored in memory. (c) Otherwise, with probability $1 - p_n$, the user scans the screen. Each meme x in the screen catches the user's attention with probability p_r . Then with probability p_m a random meme from memory is triggered, or x is retweeted with probability $1 - p_m$. (d) All memes posted by the user are also stored in memory.



Features to reproduce

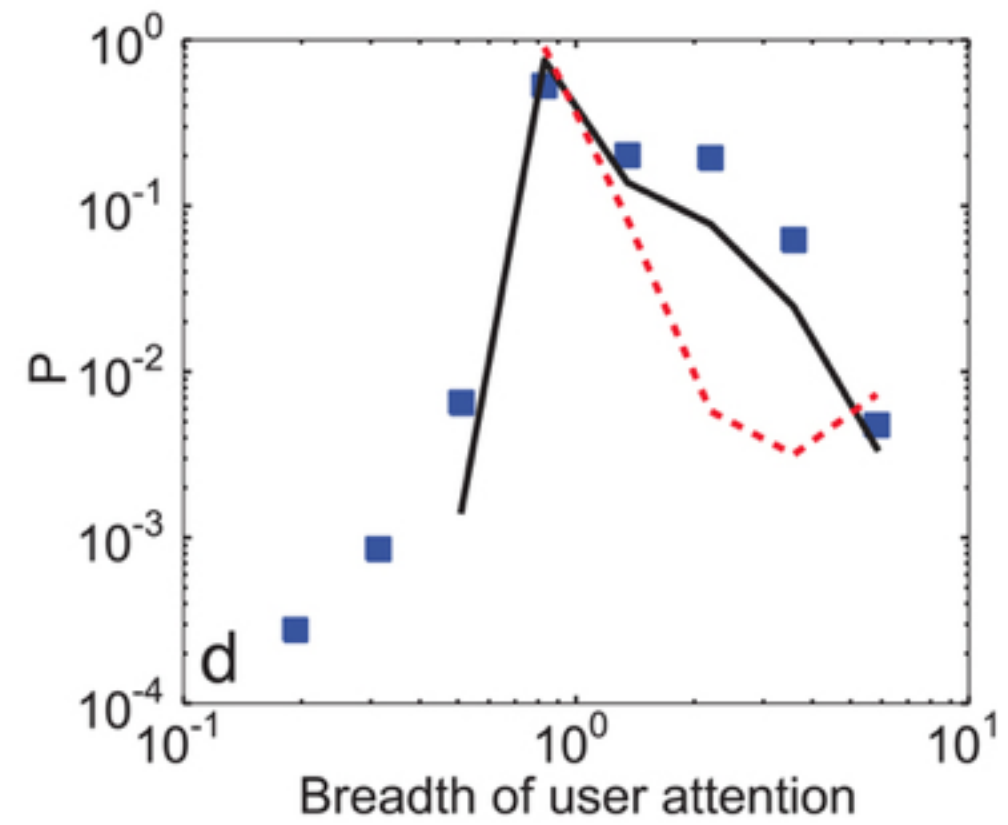
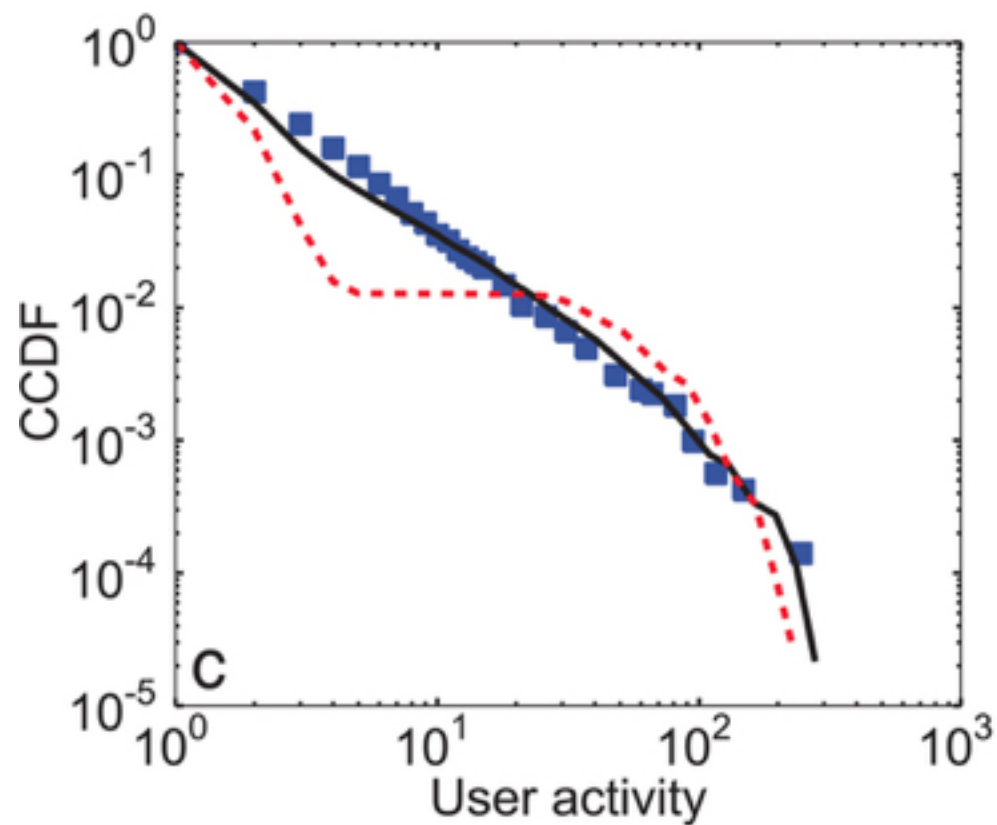
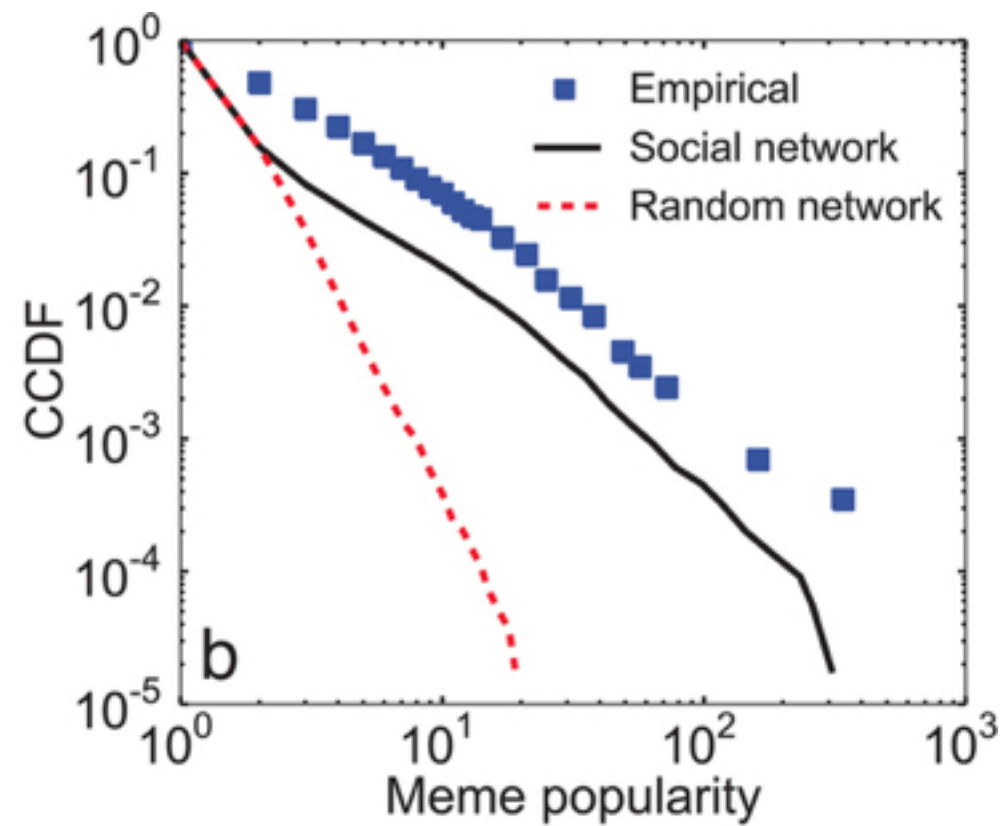
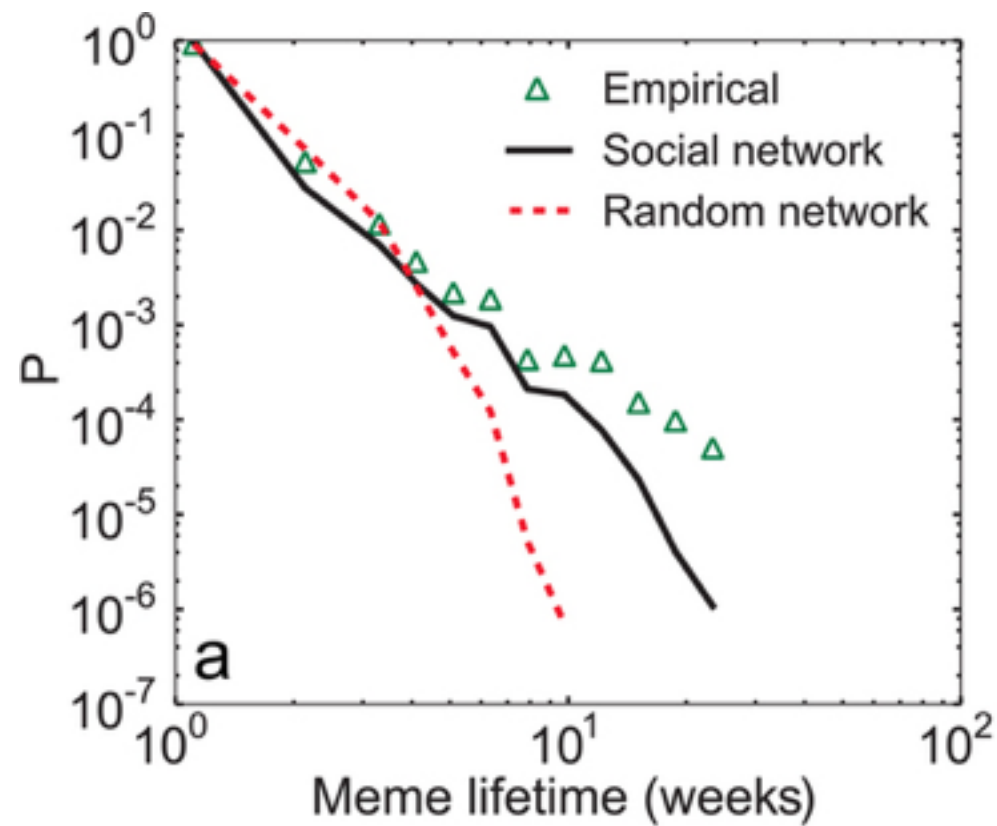


The number of tweets a user has produced.

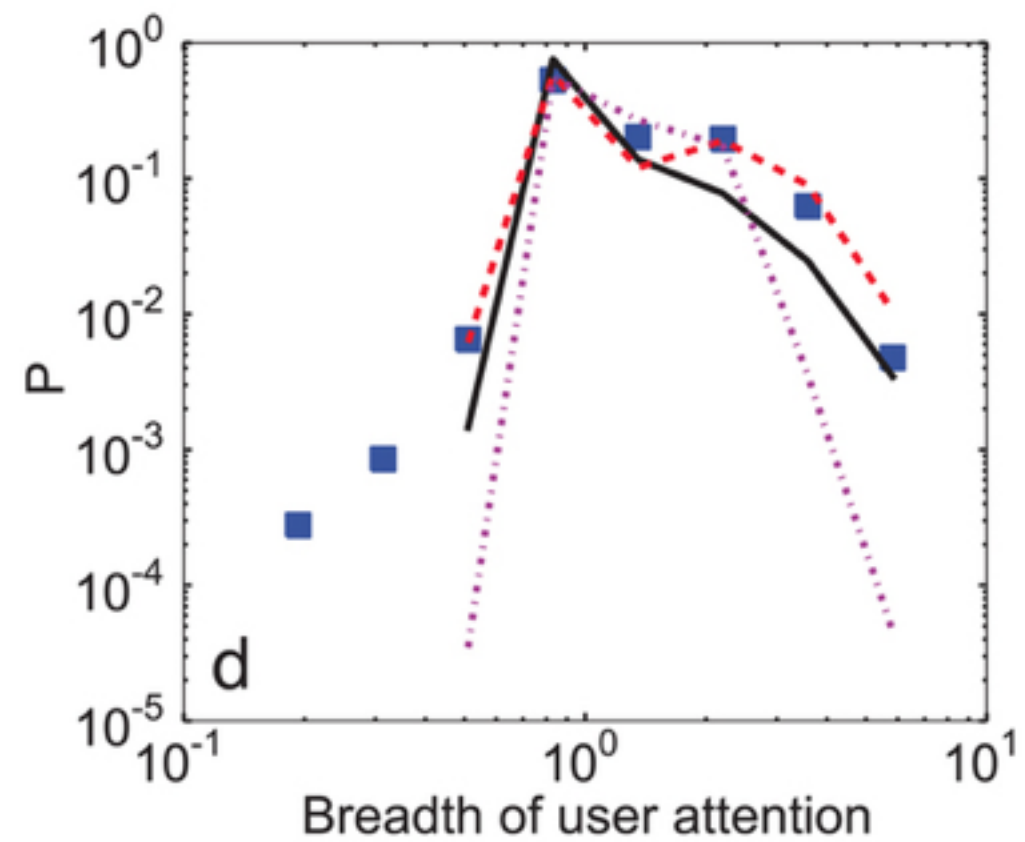
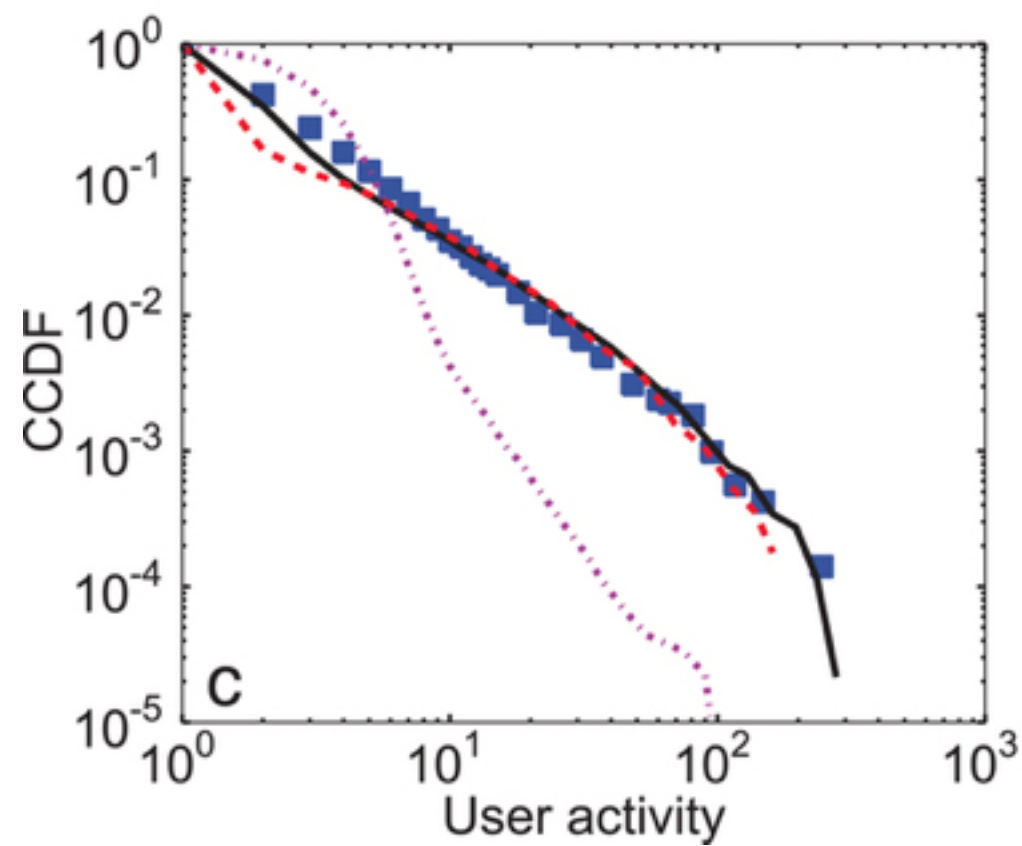
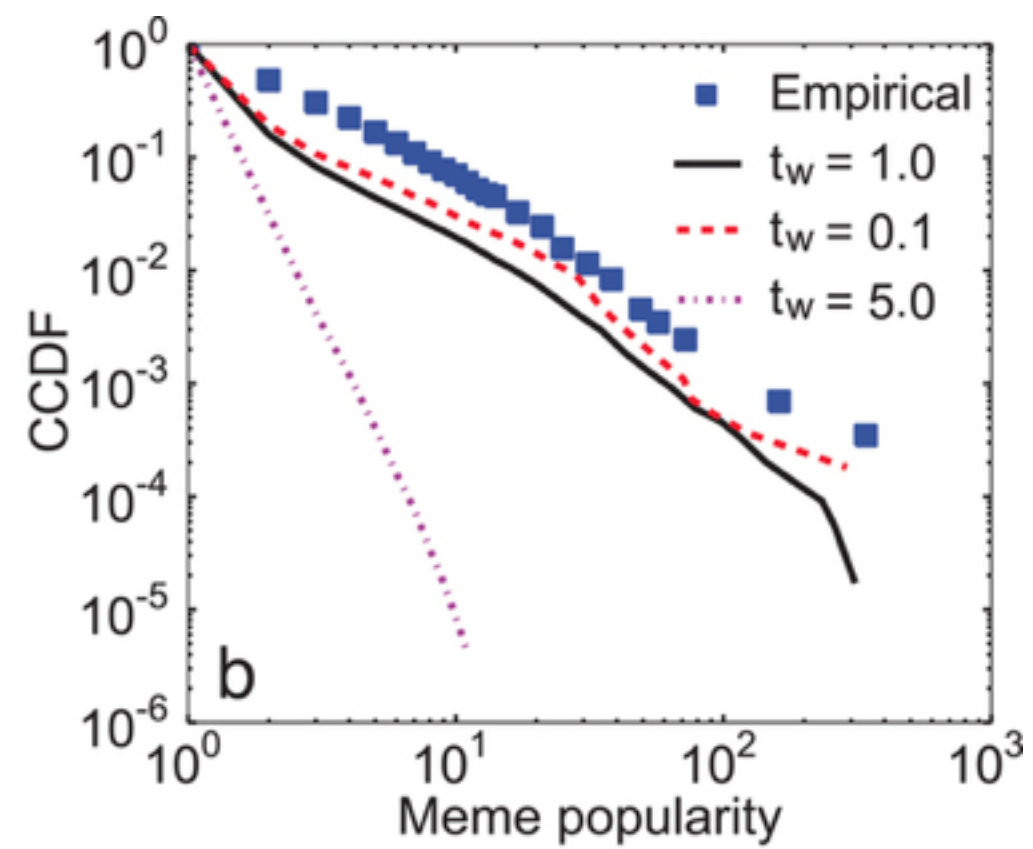
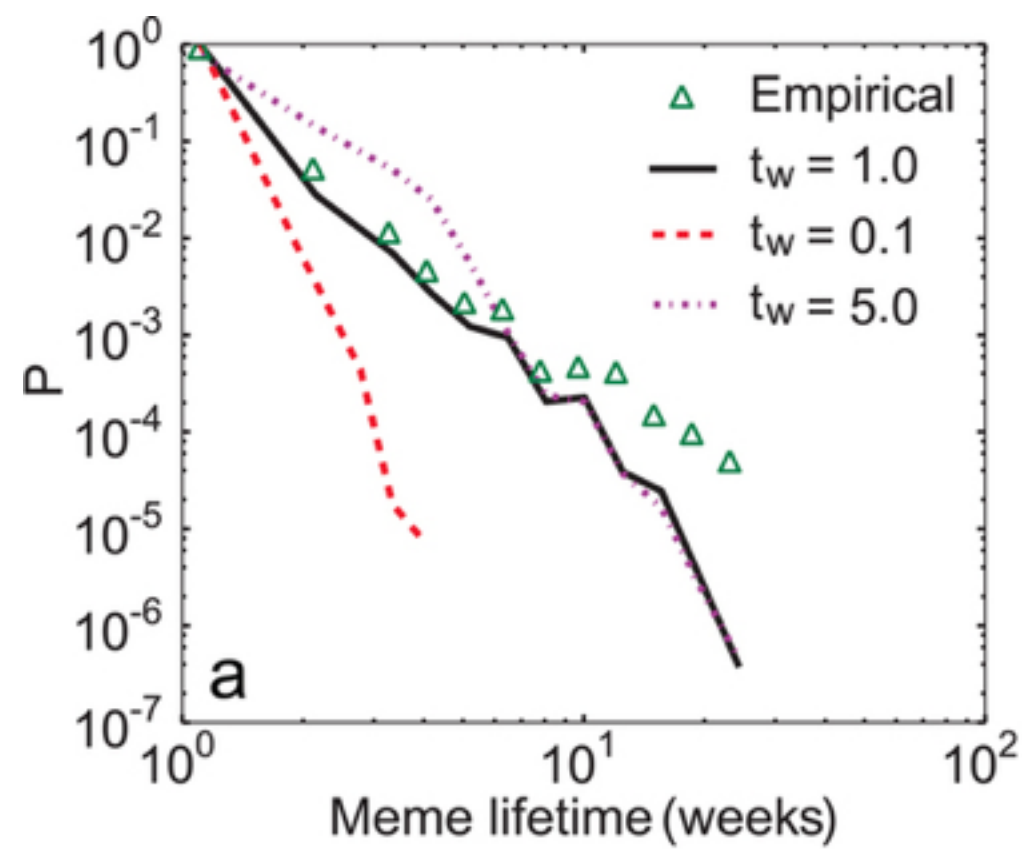


The entropy of memes a user has tweeted about.

Features to reproduce



Social network structure matters!



Competition matters!

Without assuming different intrinsic values among ideas, we can explain the heterogeneity of meme popularity, lifetime and user activity by a combination of

- (1) the social network structure and
- (2) the competition among memes for limited user attention.





Thank you!