

**#Bigbirds Never Die:
Understanding Social Dynamics of
Hashtag Adoption**

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Hashtag

 → #icwsm13

The ecology of
content adoption

Bigbird at debate I



21:52:54 **#OccupySesameStreet**
#SupportBigBird we are the 47%

21:51:54 The entire election is now about who will
save Big Bird. **#supportbigbird** #debates

21:46:37 RT @BIGBIRD:Yo Mitt Romney, Sesame Street is brought
to you today by the letters F U! #debates **#SupportBigBird**

21:28:50 Cut PBS? Nooooooooooooooi **#SaveBigBird**

21:28:20 @MittRomney says he will cut funding to PBS
even thou he likes Lehrer and **#bigbird** #debates

21:28:18 How you cut **#BigBird**
though #Romney...Wtf??? Smh

21:28:15 **#savebigbird** #debate

21:28:12 Romney stopping subsidy to PBS
telling the host that?! wooo **#BigBird**

21:28:12 **#bigbird2012**



↑
start

2 hours

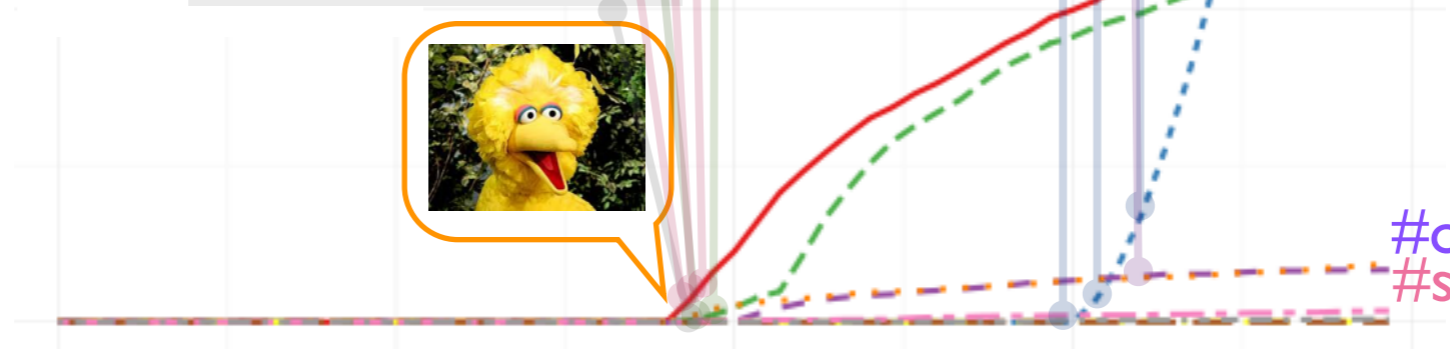
01:00 01:15 01:30 01:45 02:00

#supportbigbird

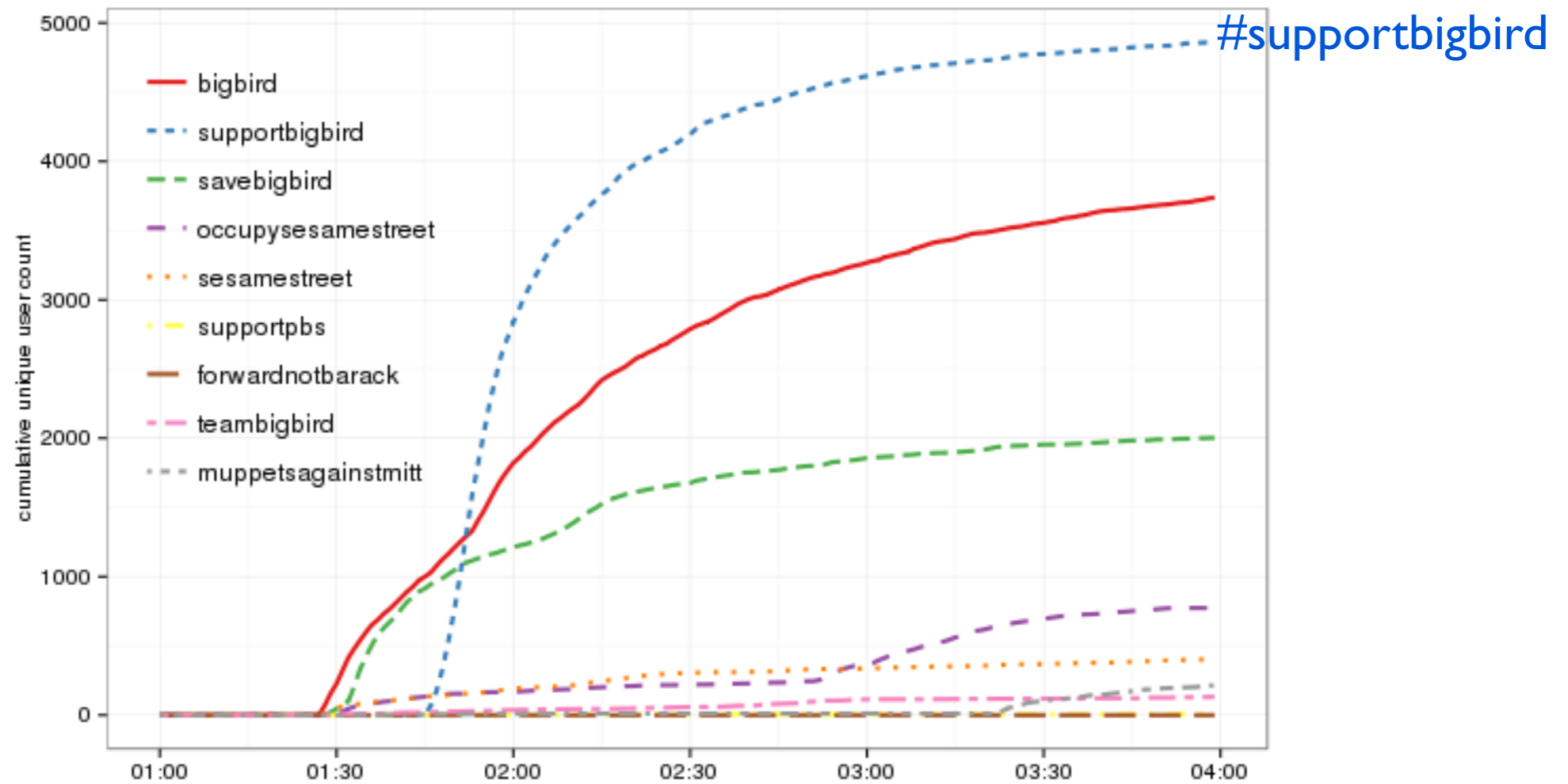
#bigbird

#savebigbird

#occupysesamestreet
#sesamestreet

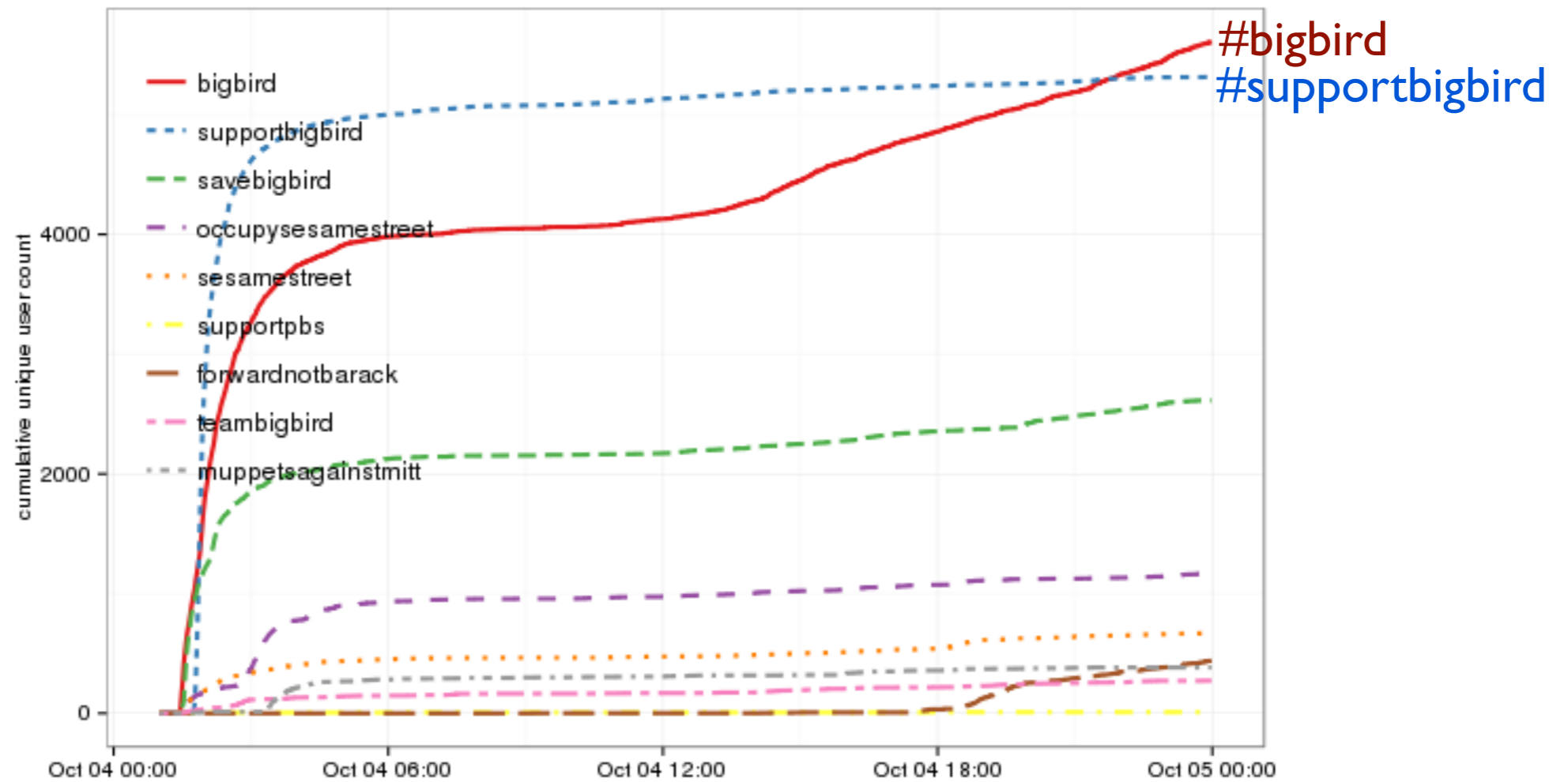


Bigbird at debate I



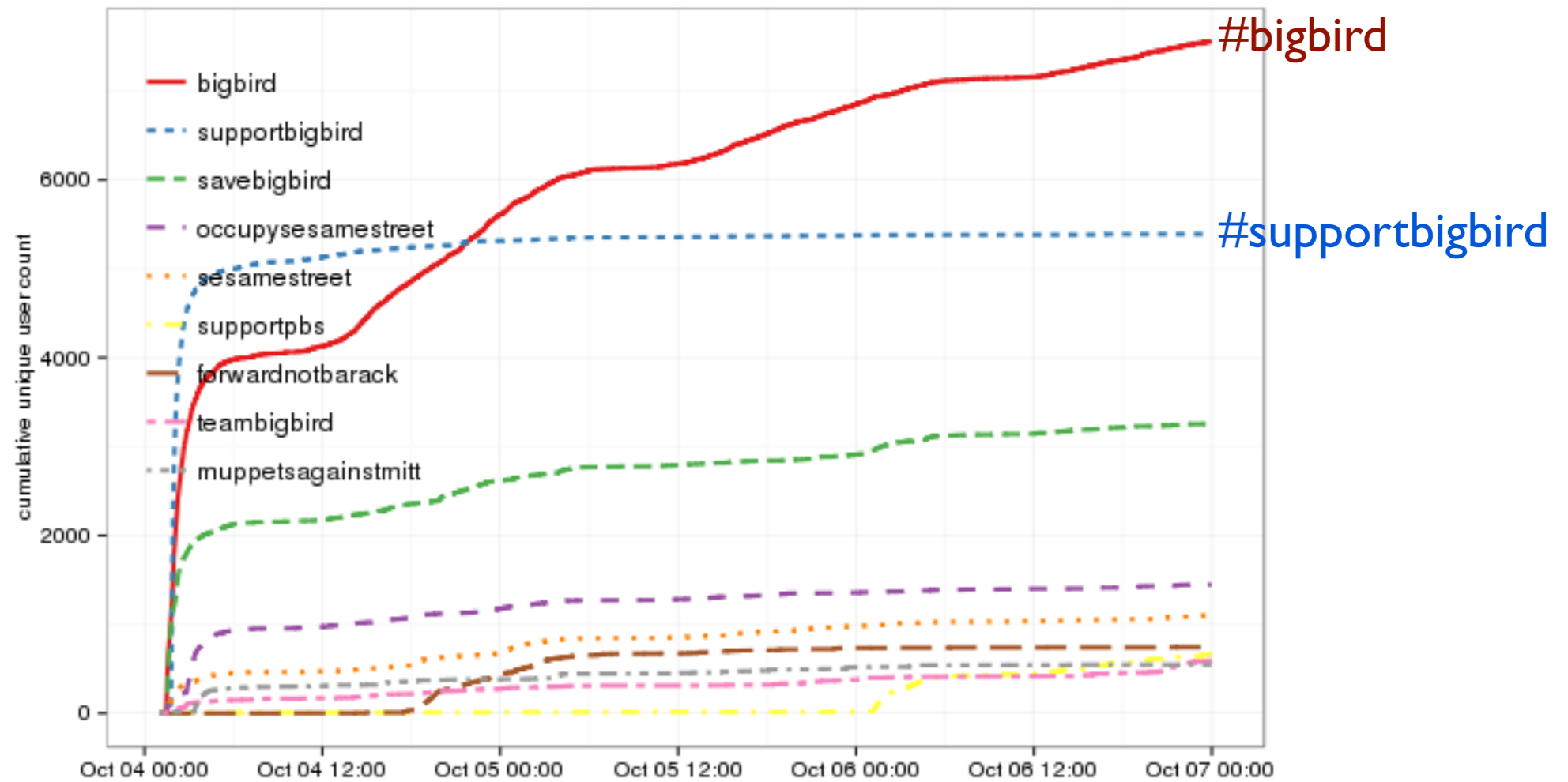
4 hours

Bigbird at debate I



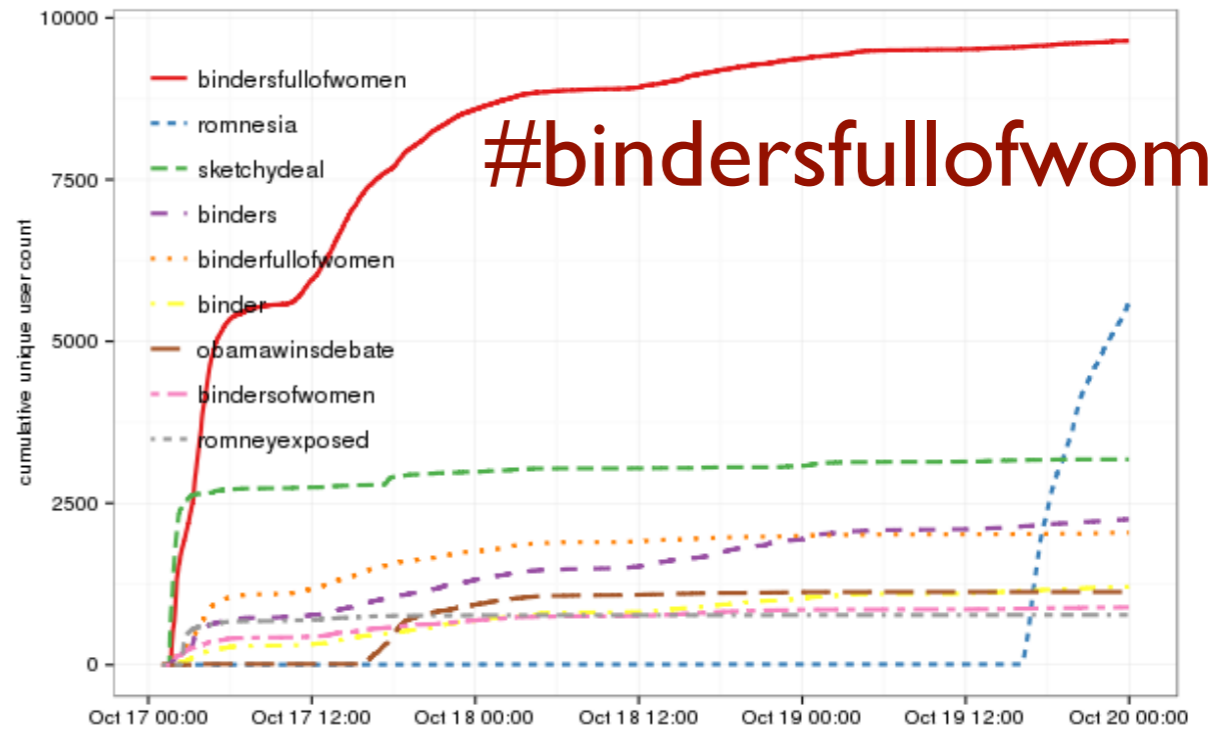
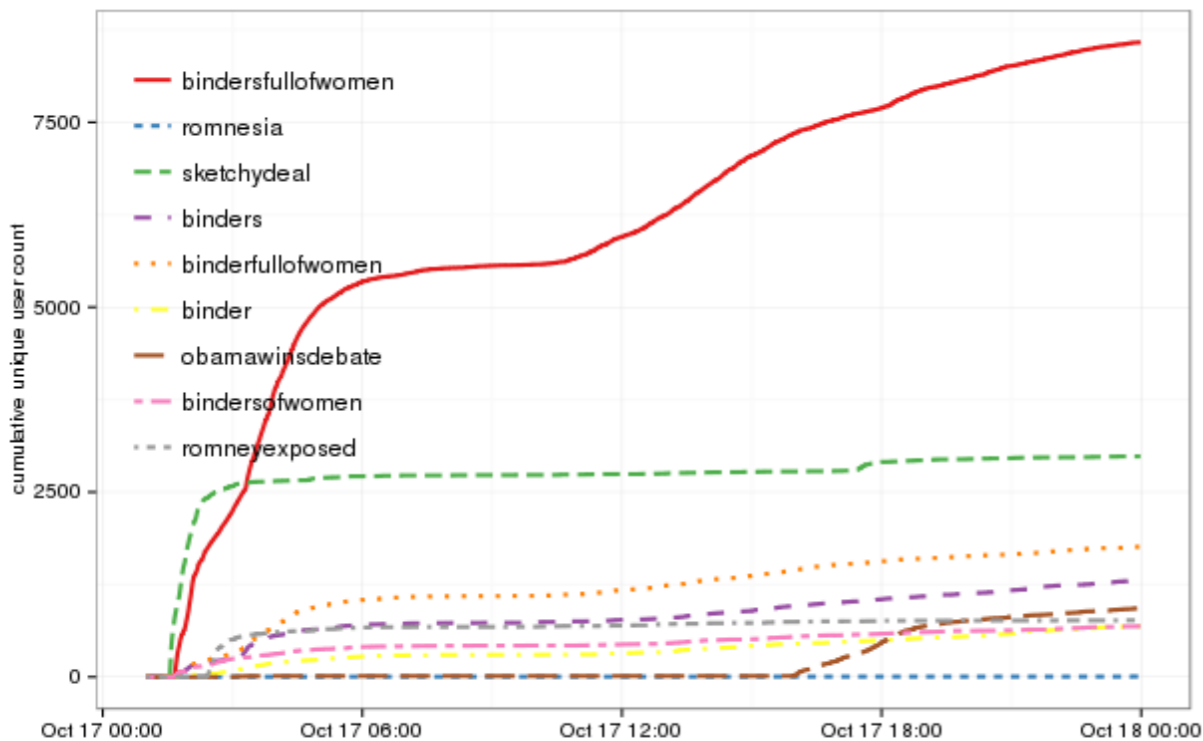
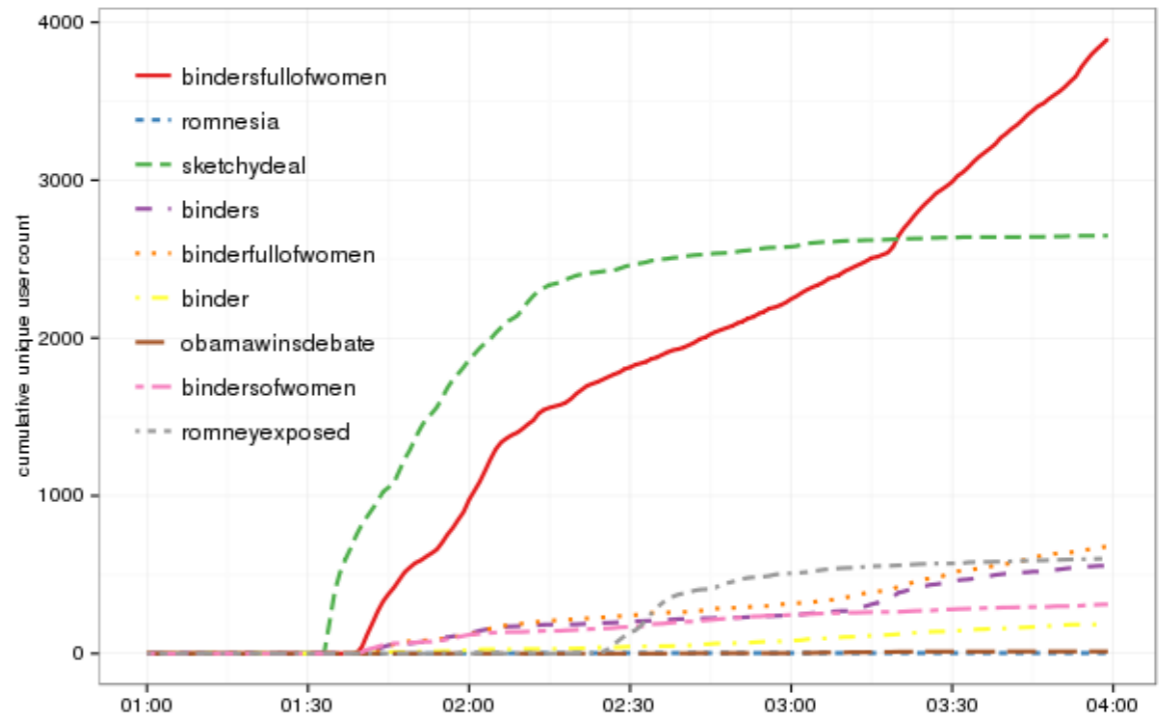
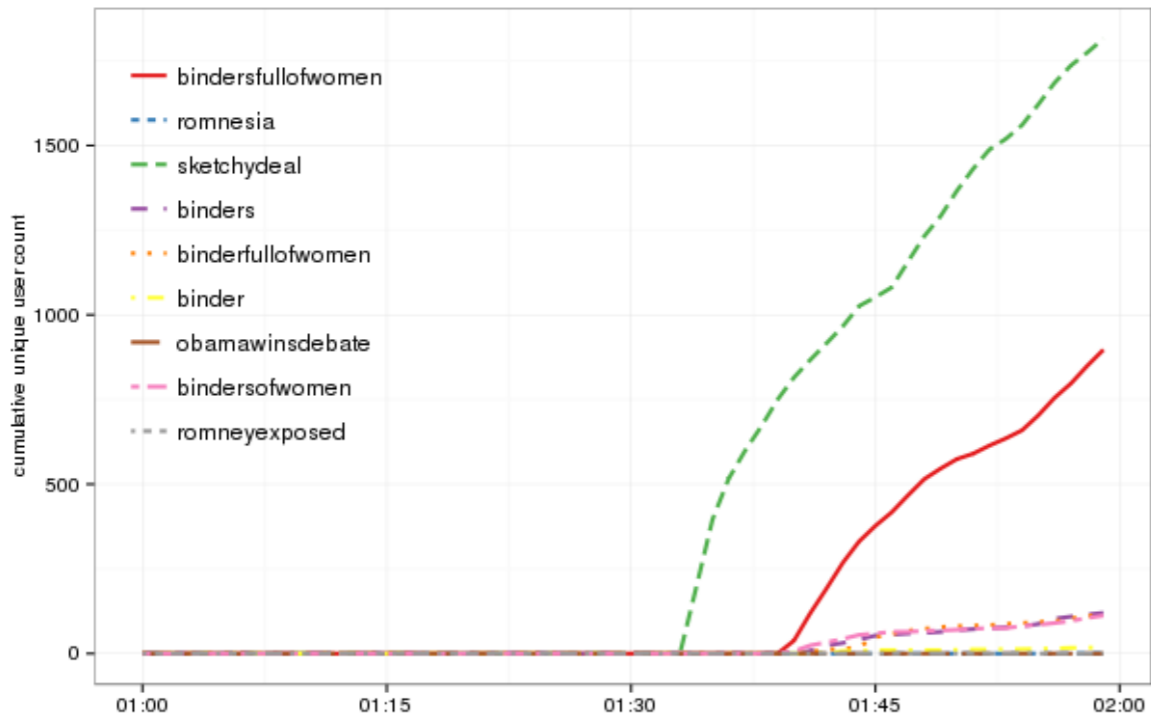
24 hours

Bigbird at debate I



72 hours

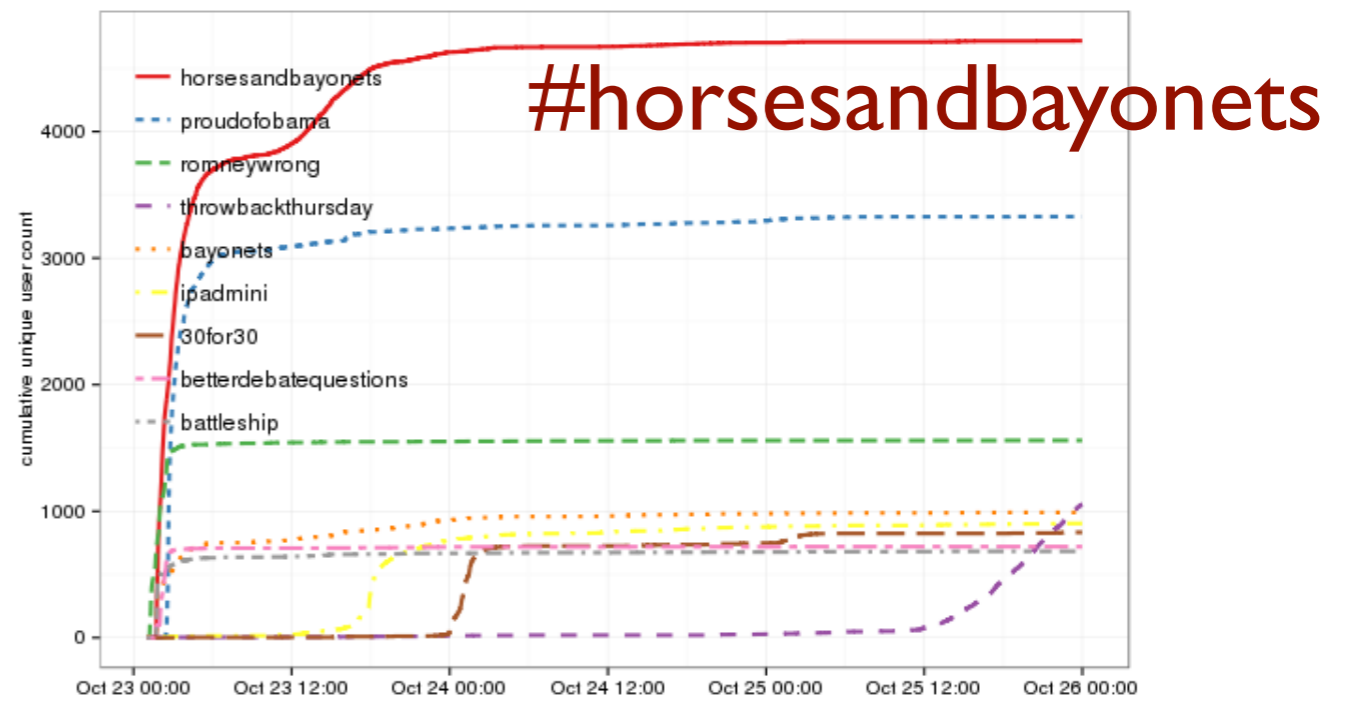
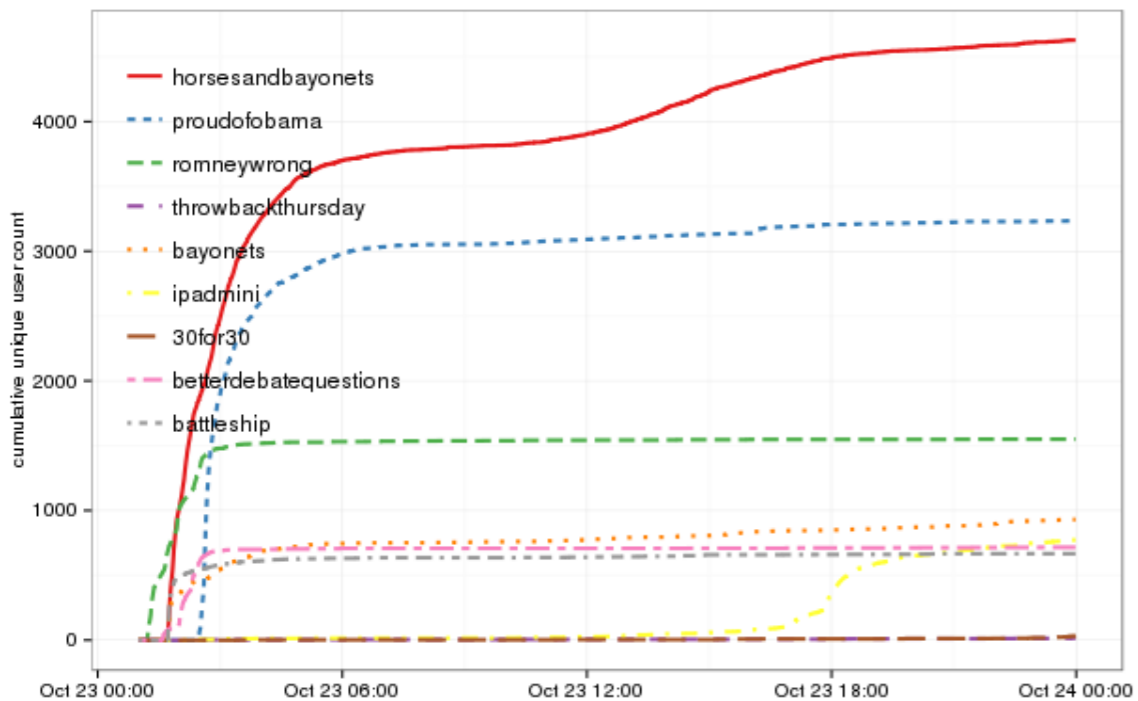
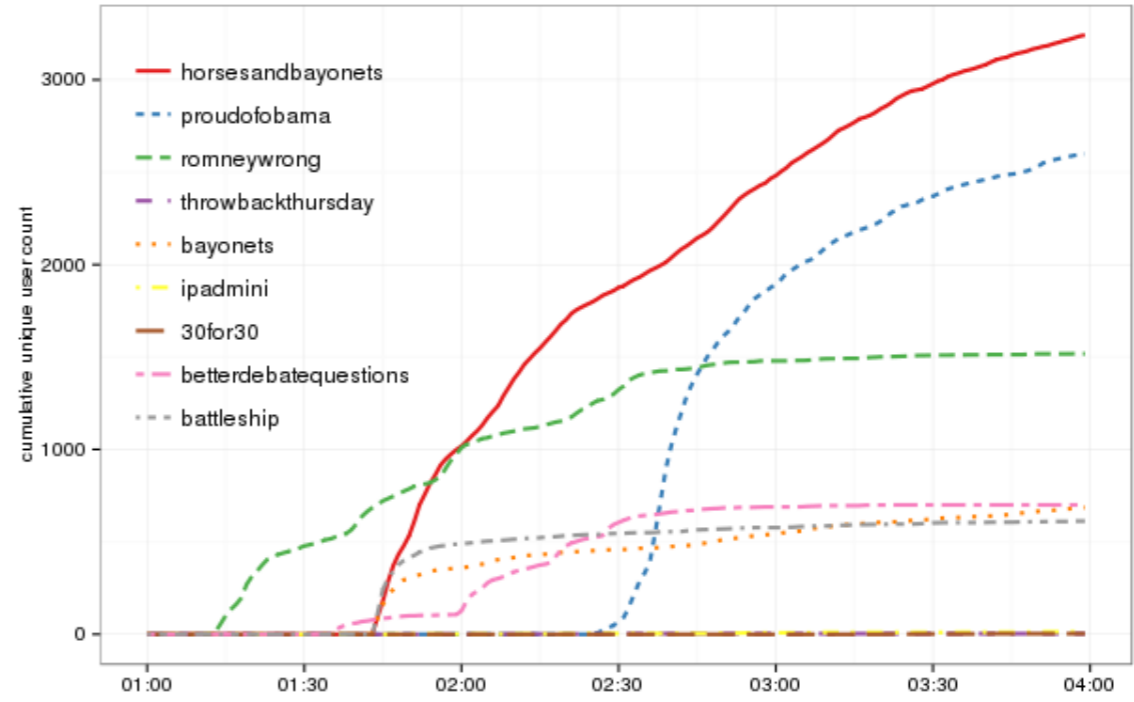
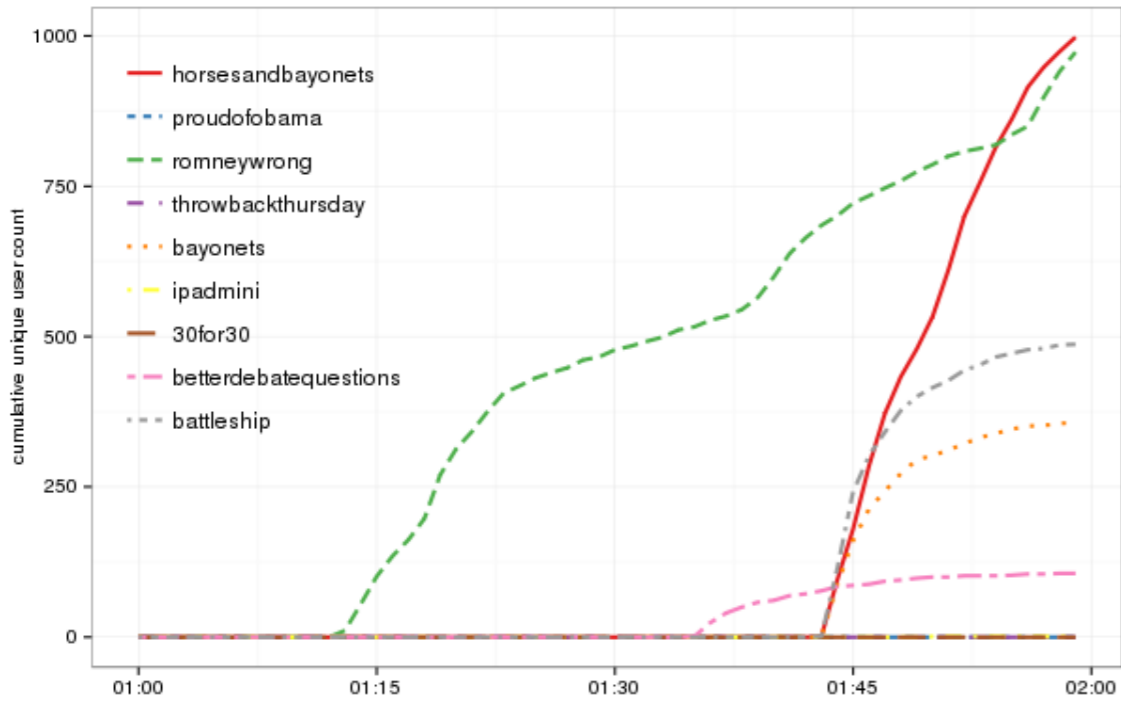
Binders at debate 2



#bindersfullofwomen

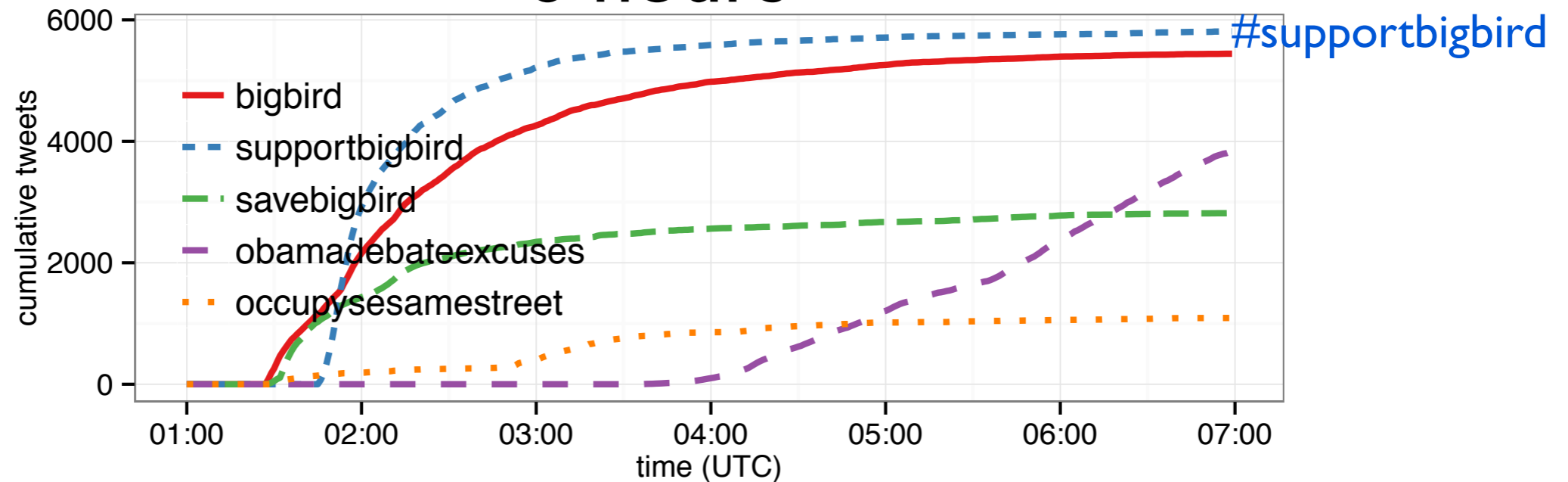


Bayonets at debate 3

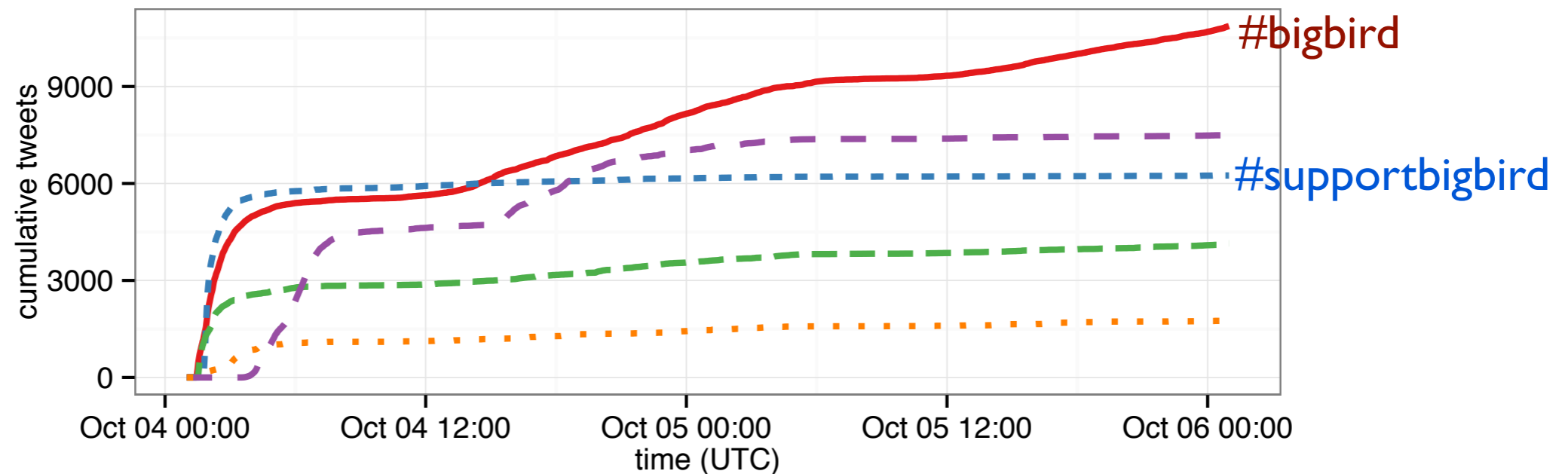


Short- v. long-term dynamics

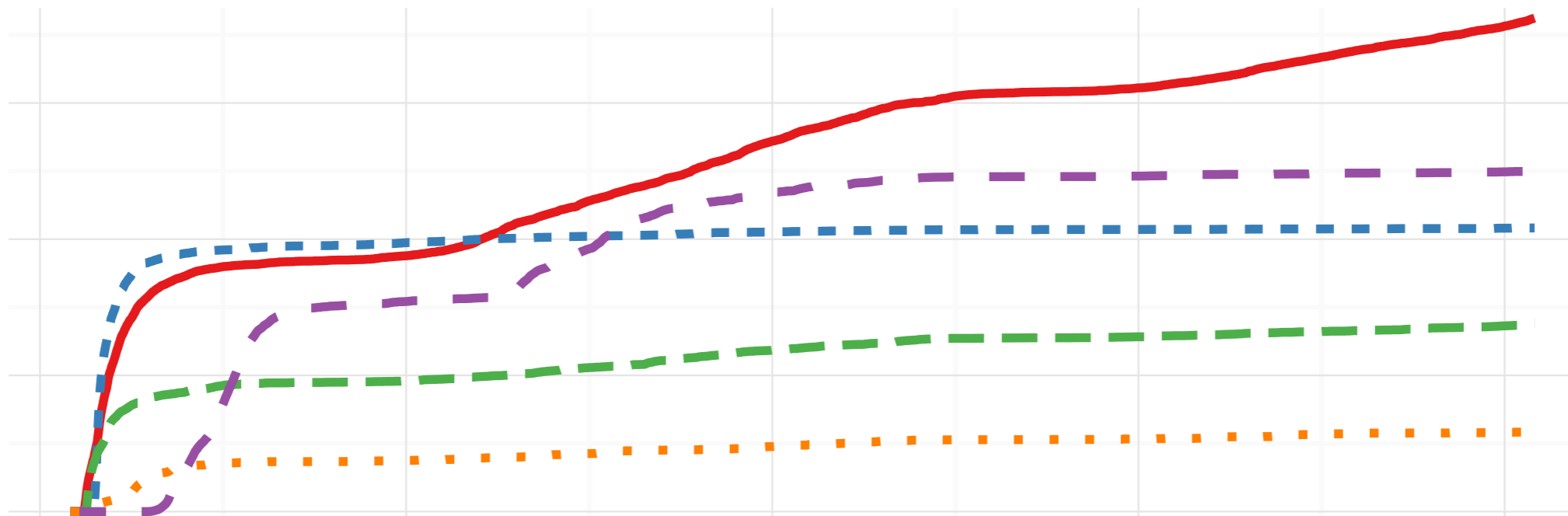
6 hours



48 hours



What determine the dynamics of novel hashtag adoption?



Challenge

Ideally, we want to experiment!

In real situation: complex endogenous
confounding factors

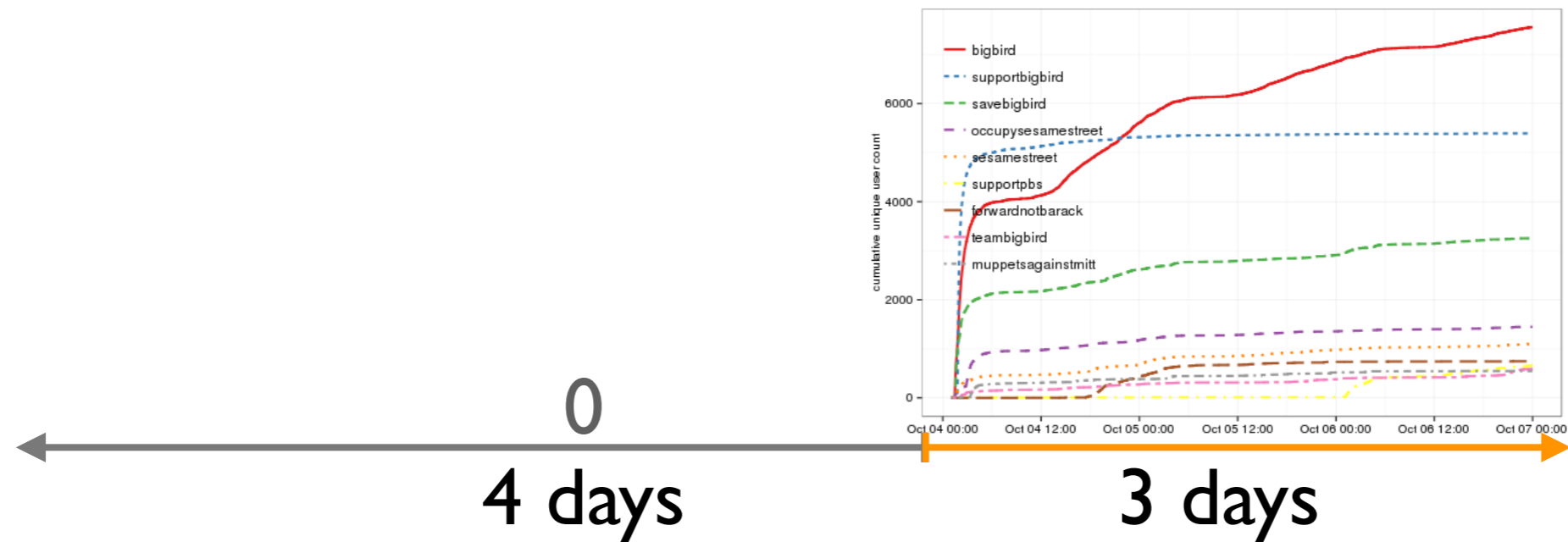
Relevance

Social contagion

What if...

external force that maxes out the effect
of known confounders

Approach



Debate number	1	2 (Vice Presidential)	3	4
Debate starting time	3 Oct. 21:00	11 Oct. 21:00	16 Oct. 21:00	22 Oct. 21:00
Tweet volume at peak	3,268,918	2,388,963	3,608,291	2,415,703
Unique users at peak	174,297	155,739	181,329	152,538
“Novel” hashtags	92,432	58,165	91,705	77,526
“Pop” hashtags	75	57	82	42
Tracking conclusion time	7 Oct. 02:00	15 Oct. 02:00	20 Oct. 02:00	26 Oct. 02:00

Hypotheses

What factors would contribute to hashtag's growth and persistence?

Construct

Variable

H1 ***audiences***

followers

hashtags are more likely to grow and persist with more audiences

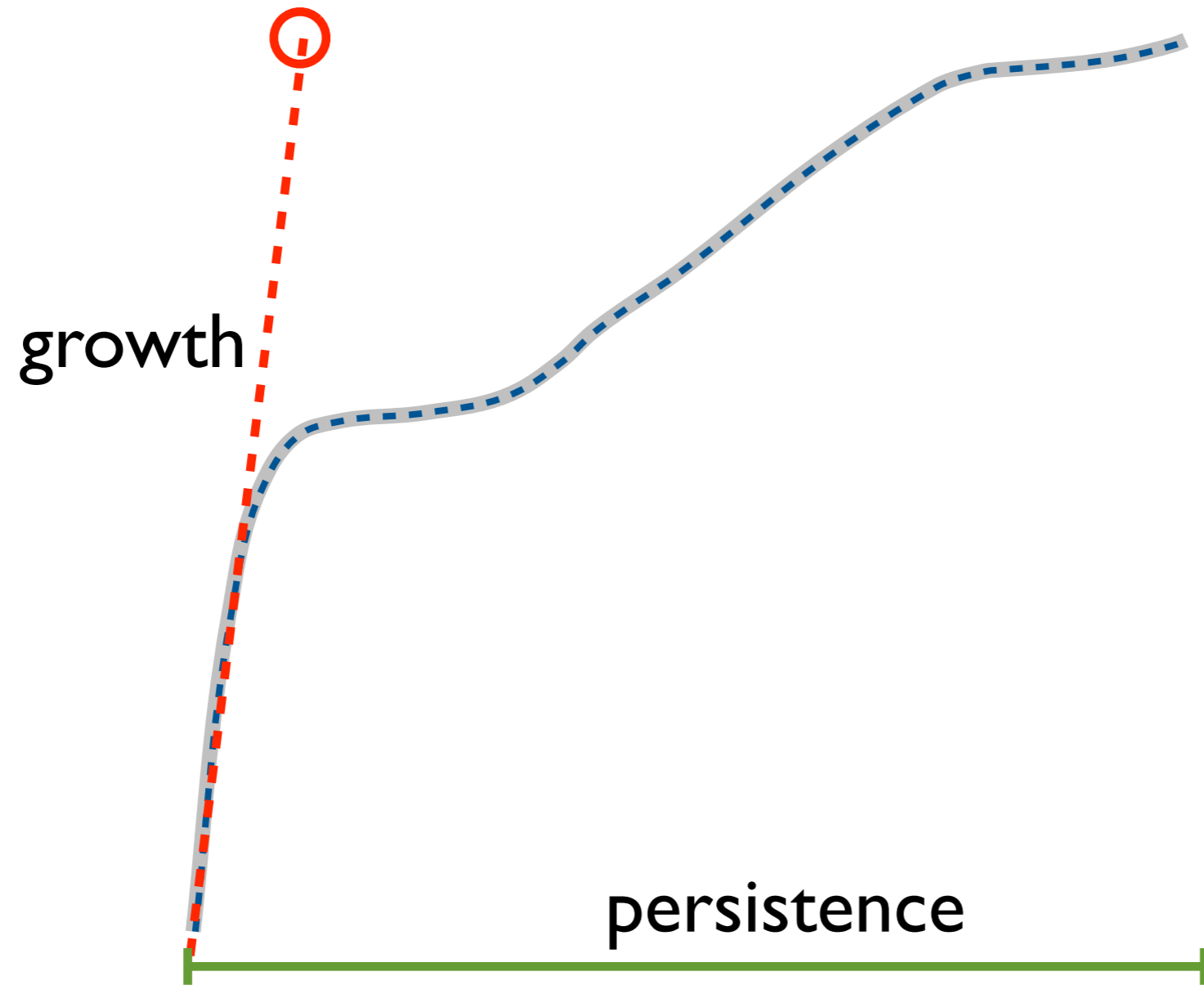
Hypotheses

What factors would contribute to hashtag's growth and persistence?

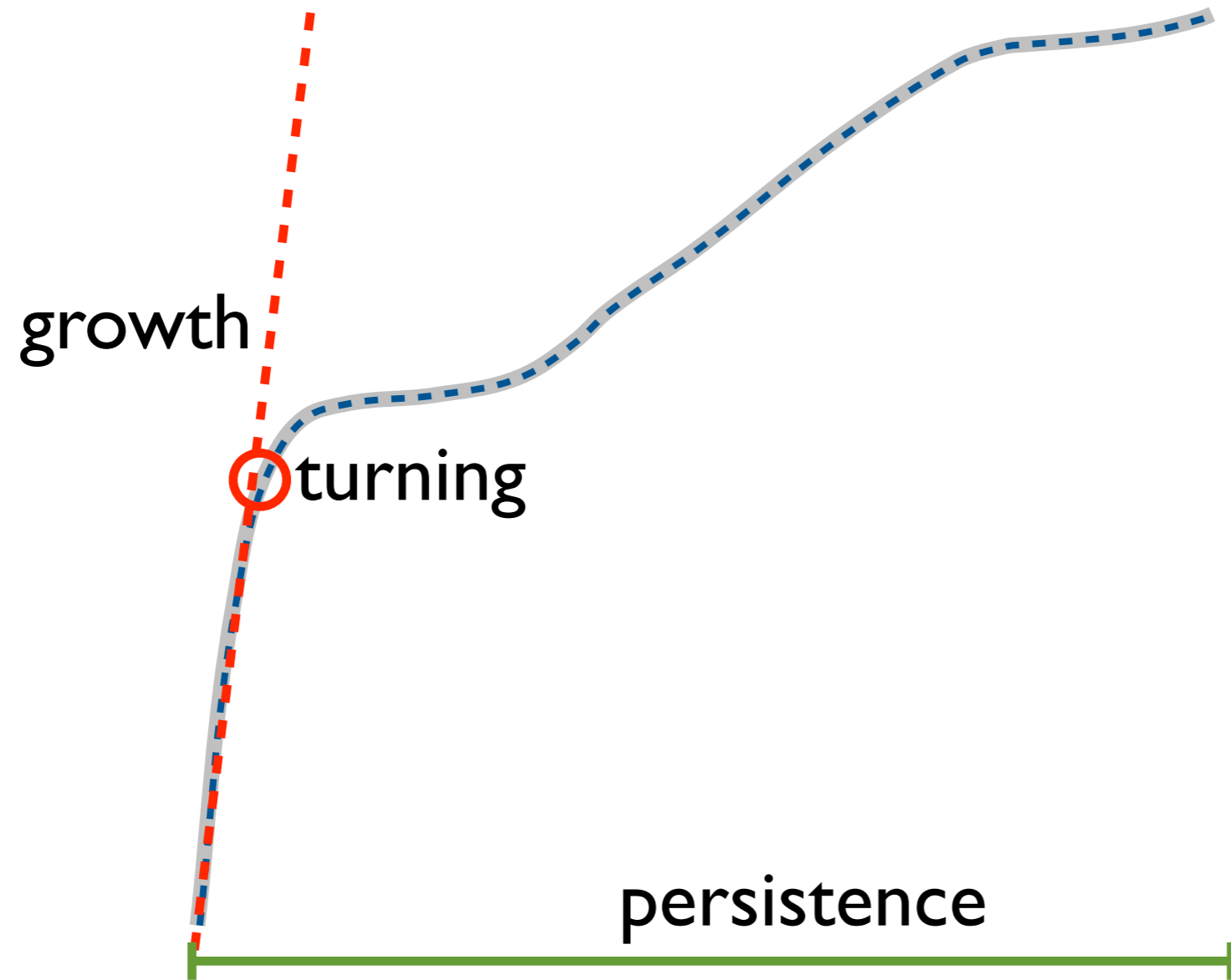
	<i>Construct</i>	<i>Variable</i>
H1	<i>audiences</i>	<i>followers</i>
H2	better match a. <i>fitness</i> b. <i>interactivity</i> c. <i>diversity</i>	<i>retweet</i> <i>reply</i> <i>unique sources</i>

hashtags are more likely to grow and persist with larger audiences, better match

Characterize hashtag life

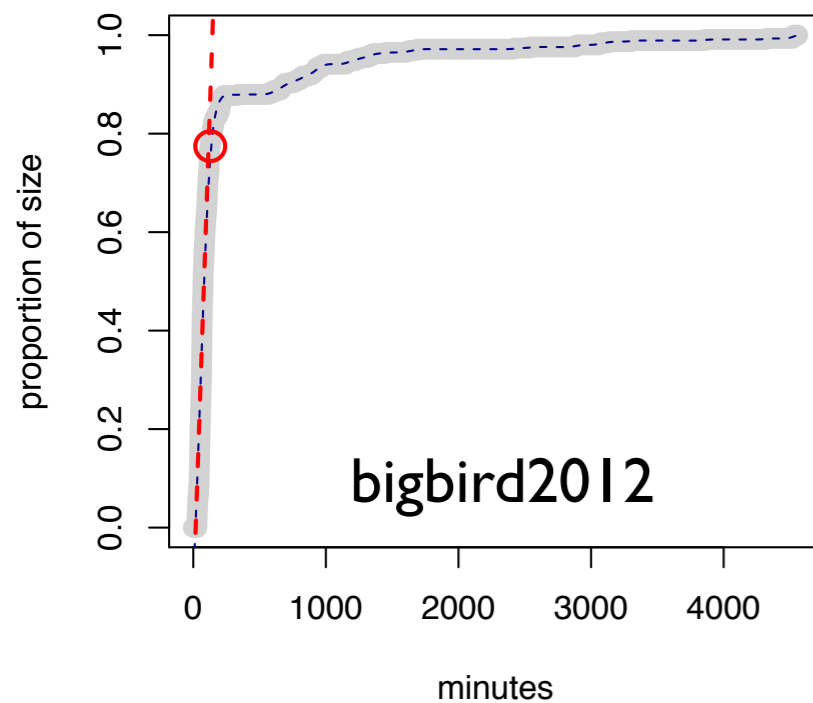


Characterize hashtag life

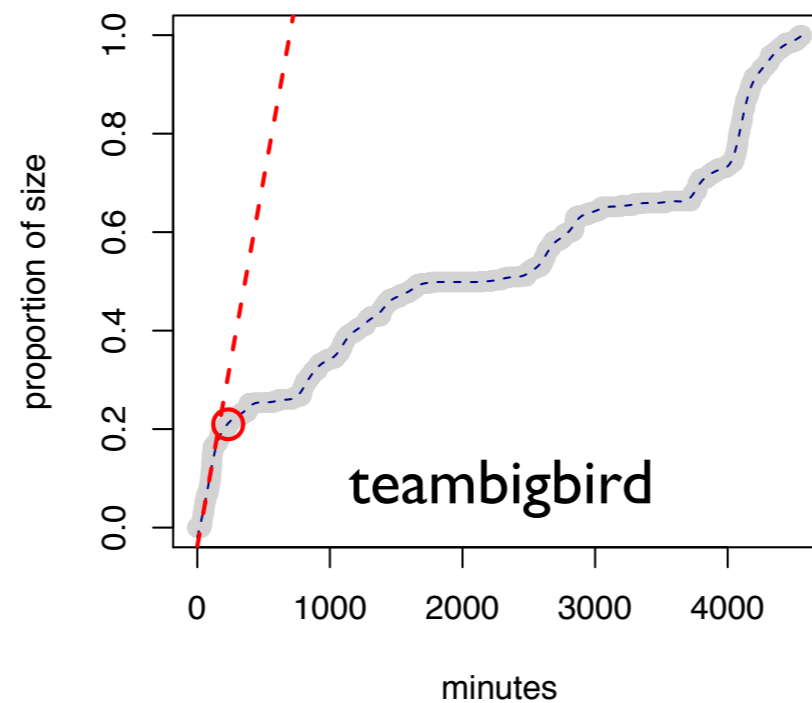


Prototypical hashtag life

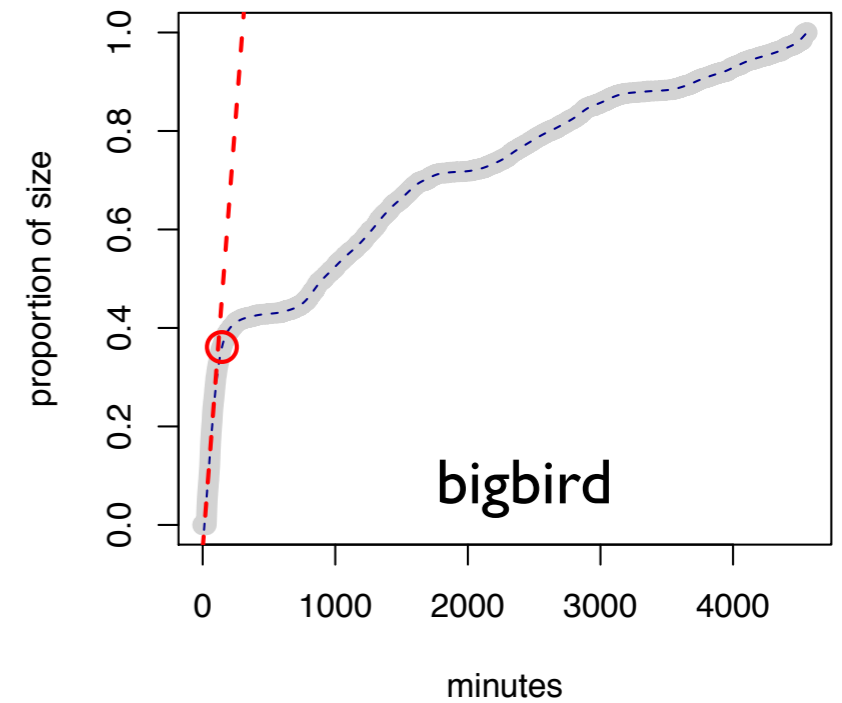
high growth



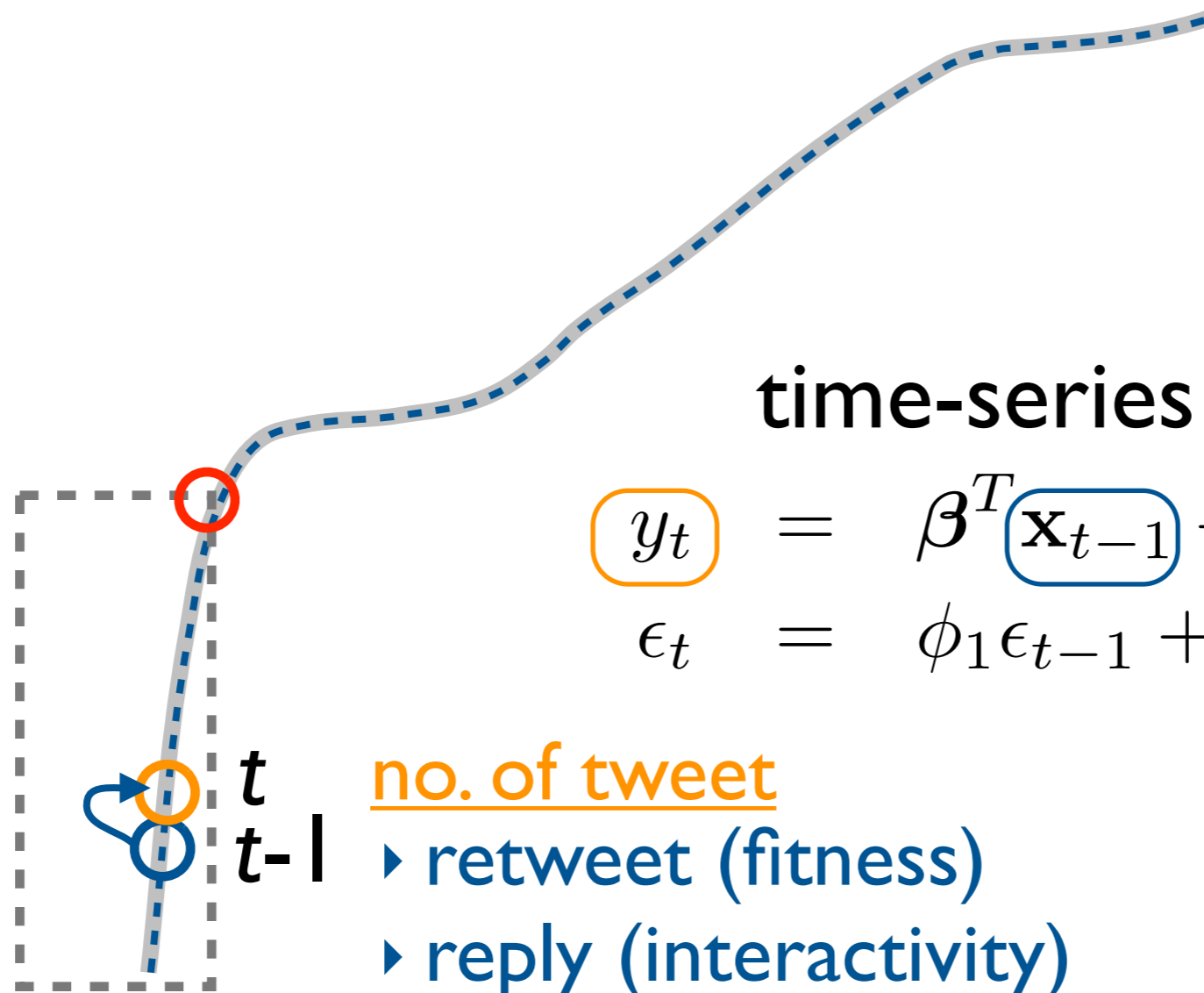
high persistence



high growth & persistence



Growth model



time-series model

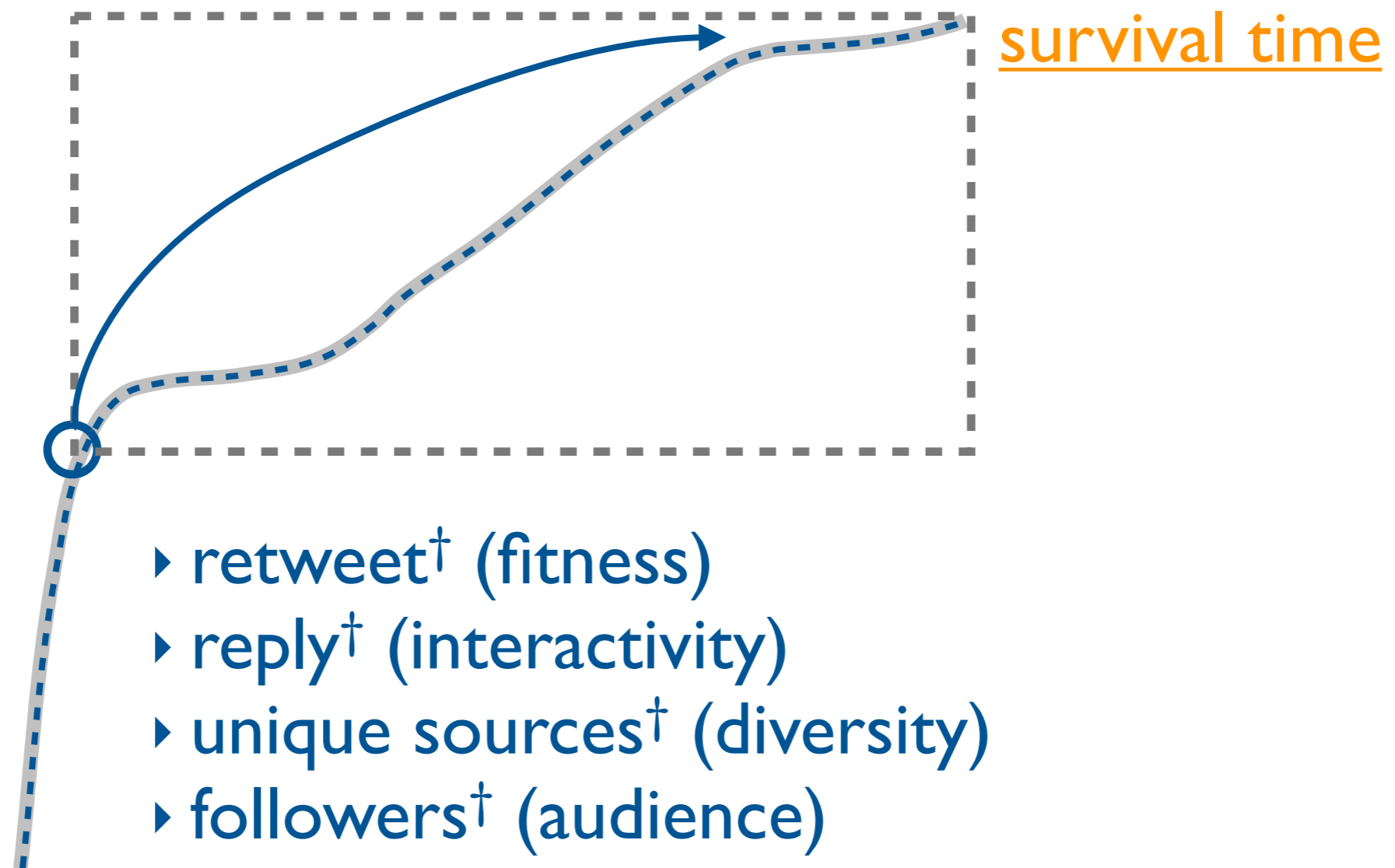
$$y_t = \beta^T \mathbf{x}_{t-1} + \epsilon_t$$

$$\epsilon_t = \phi_1 \epsilon_{t-1} + \phi_2 \epsilon_{t-2} + \nu + \psi \nu_{t-1}$$

no. of tweet

- ▶ retweet (fitness)
- ▶ reply (interactivity)
- ▶ unique sources[†] (diversity)
- ▶ followers[†] (audience)

Persistence model

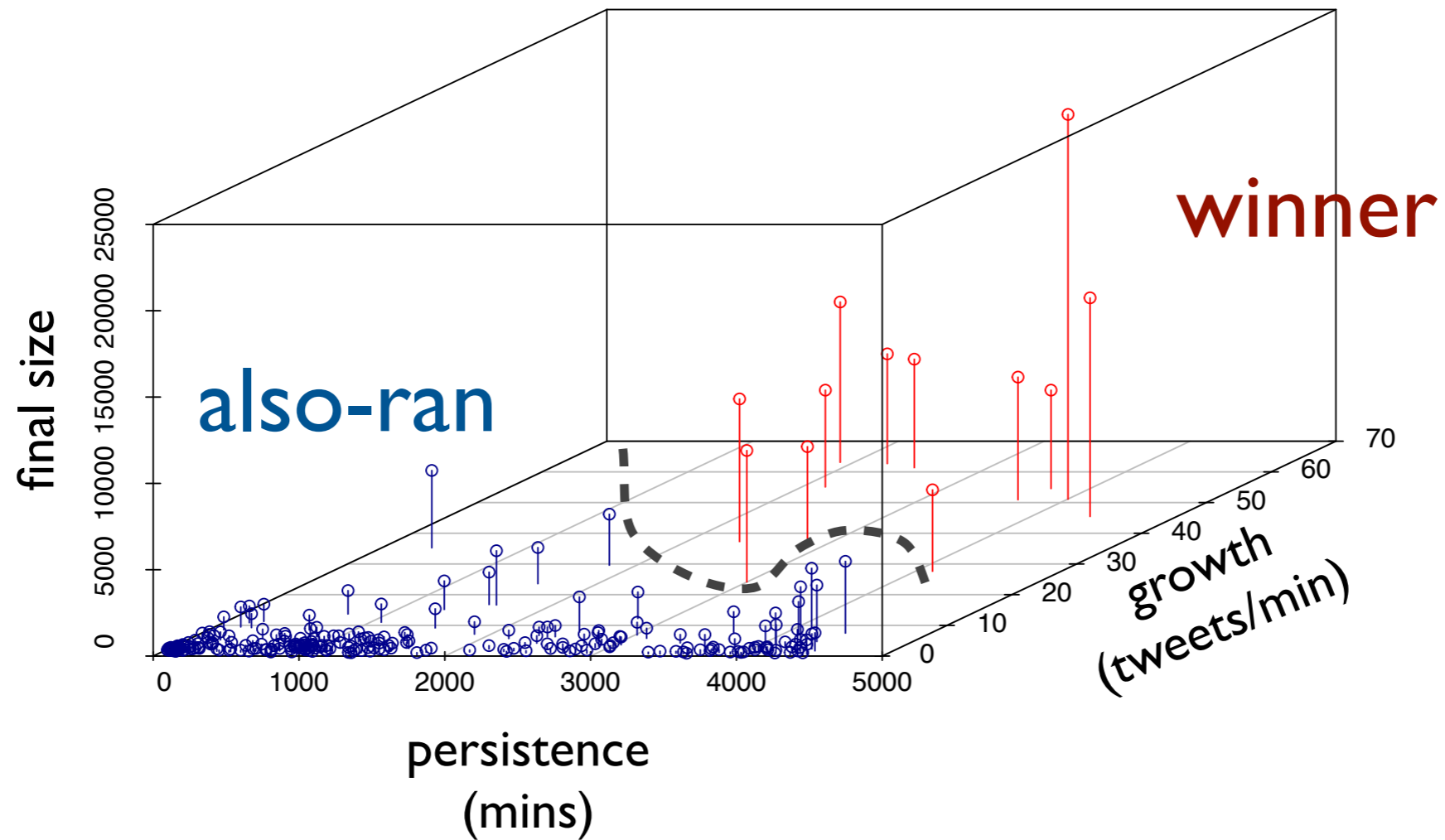


hazard ratio model

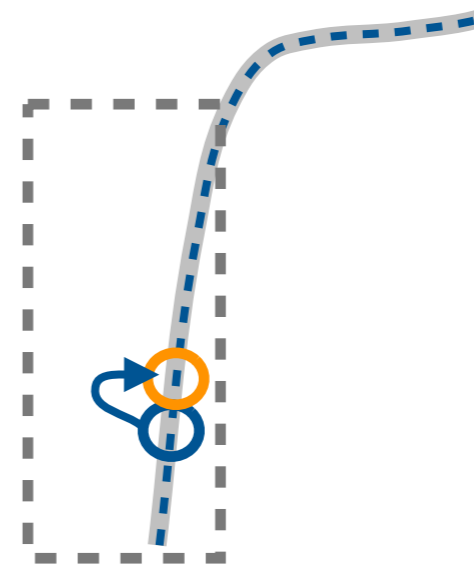
$$h(t) = h_0(t) \exp(\beta^T \mathbf{x})$$

Findings

Growth v. persistence

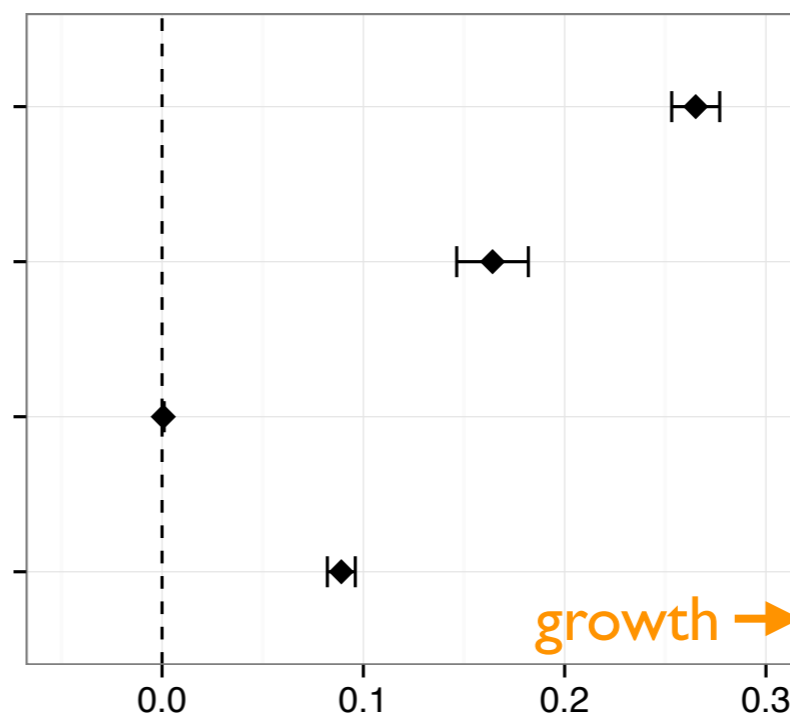
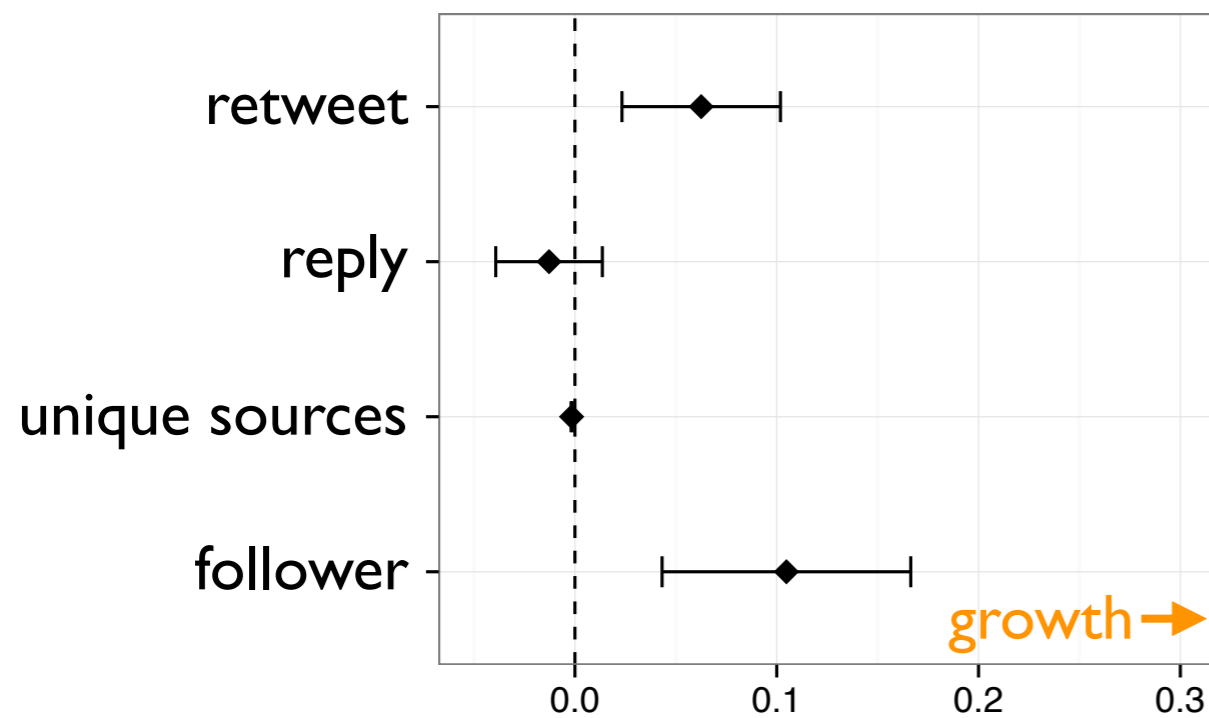


Growth model



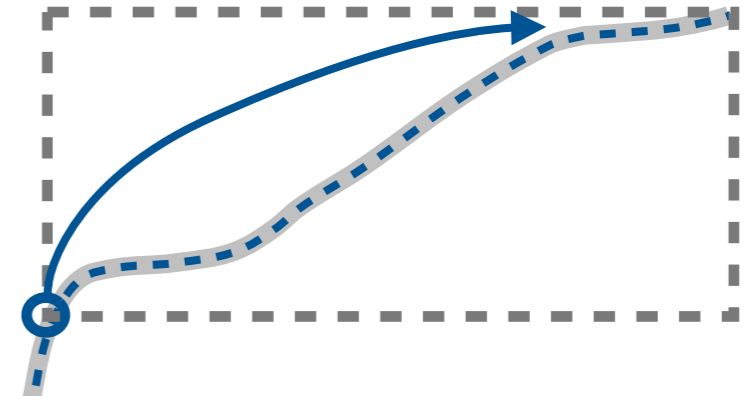
winner

also-ran



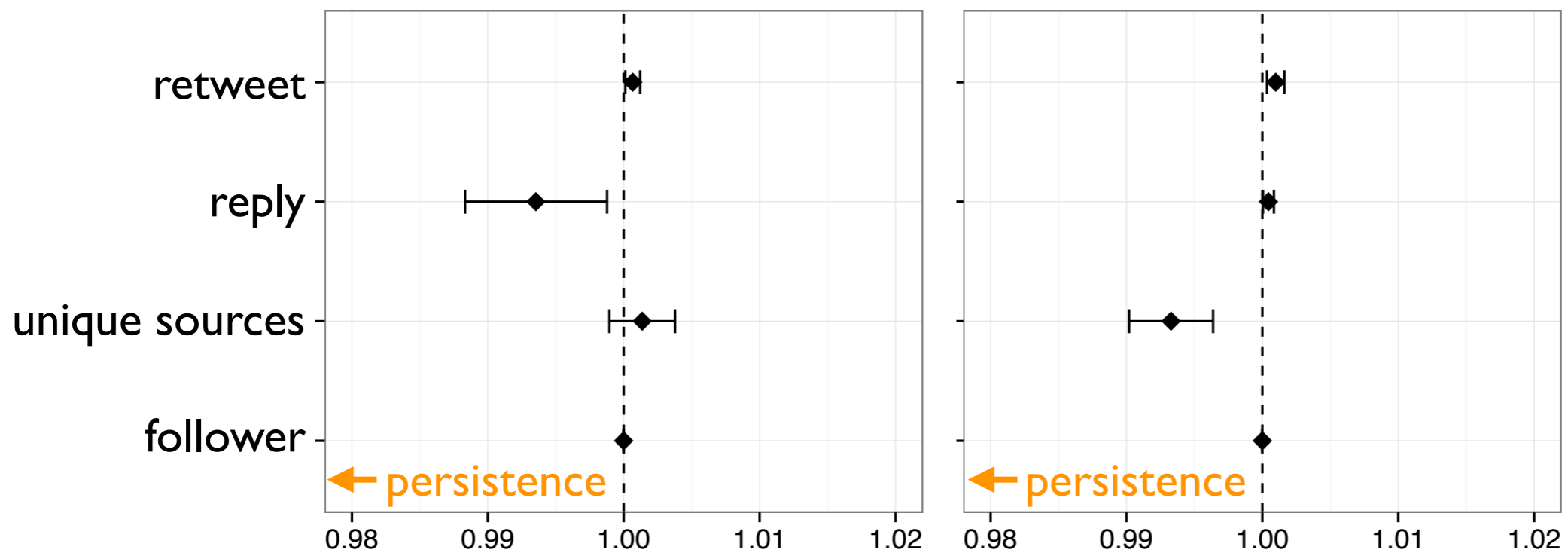
hashtags grow by high *fitness* (*retweet*) and large *audience* (*follower*)
interactivity (*reply*) brings additional growth to **also-rans**

Persistence model



winner

also-ran



initial *fitness* (*retweet*) become a drag
interactivity (*reply*) and *diversity* (*unique sources*) help

Summary

- ▶ Characterization of hashtag life-cycle
- ▶ Statistical analyses of growth and persistence reveal factors for relative success of hashtags
- ▶ Retweets and audience size contribute to faster hashtag adoption
- ▶ Replies and diversity support the hashtag persistence

Next steps

- ▶ Examine platform-specific contextual factors
- ▶ Generalizability to other large-scale media events
- ▶ Further examination in social revolution contexts
- ▶ Models for hashtag adoption
- ▶ Influence process across different media

Take home

Making sense of observed big data via exogenous shocks

Collective activity dominated by elites

First-mover advantage is limited by the lack of interactivity and diversity

Social media as a form of public sphere which can limit or empower collective actors



Drew
Margolin



Brian
Keegan



Andrea
Baronchelli



David
Lazer

Thanks!

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