facebook

Center of Attention
How Facebook Users Allocate Attention across Friends

Lars Backstrom[1], Eytan Bakshy[1,2], Jon Kleinberg[3], Tom Lento[1], Itamar Rosenn[1]

Facebook[1]
School of Information - University of Michigan[2]
Department of Computer Science - Cornell University[3]

Wednesday, July 20, 2011

Outline

- Motivation and introduction

- Data and quantities of interest

- Balance of attention

  - Relation to activity and network size

  - Individual variation

  - Intergroup variation

- Temporal shifts in attention

- Conclusion

Motivation and Introduction

Motivation

- How does attention to our important friends change as online social networks become larger and more active?

- Urban experience:

  - Milgram (1970): more interactions diminishes time spent interacting with any one individual

  - Mayhew and Levinger (1976): model assumes a uniform decrease in attention as a function of interaction volume

- Not a priori obvious how increased number of interactions or network size impacts the amount of attention given to any particular individual

The Angle

- Our Claim:

  - Attention is allocated differently across friends

  - Increased activity does not necessarily mean core contacts receive less attention

- Measure what % of attention is allocated toward a core set of friends

  - Requires complete information about all interactions

- Consider both communication and observation interactions

Data and Setup

Data

- 16M heavily engaged users on Facebook

- All interactions over one year (2010):

  - Communication

    - messages sent

    - comments given

    - wall posts left

  - Observation

    - profile views

    - photo views

Quantities of Interest

- a_k: Fraction of attention devoted to rank k friend

- f_k: Fraction of attention devoted to top n friends

- Activity: total number of interactions along a modality

- Network size: number of users interacted with

Volume of Activity

- Approximately 1 order of magnitude more observation than communication interactions

- Plot data in terms of activity percentile
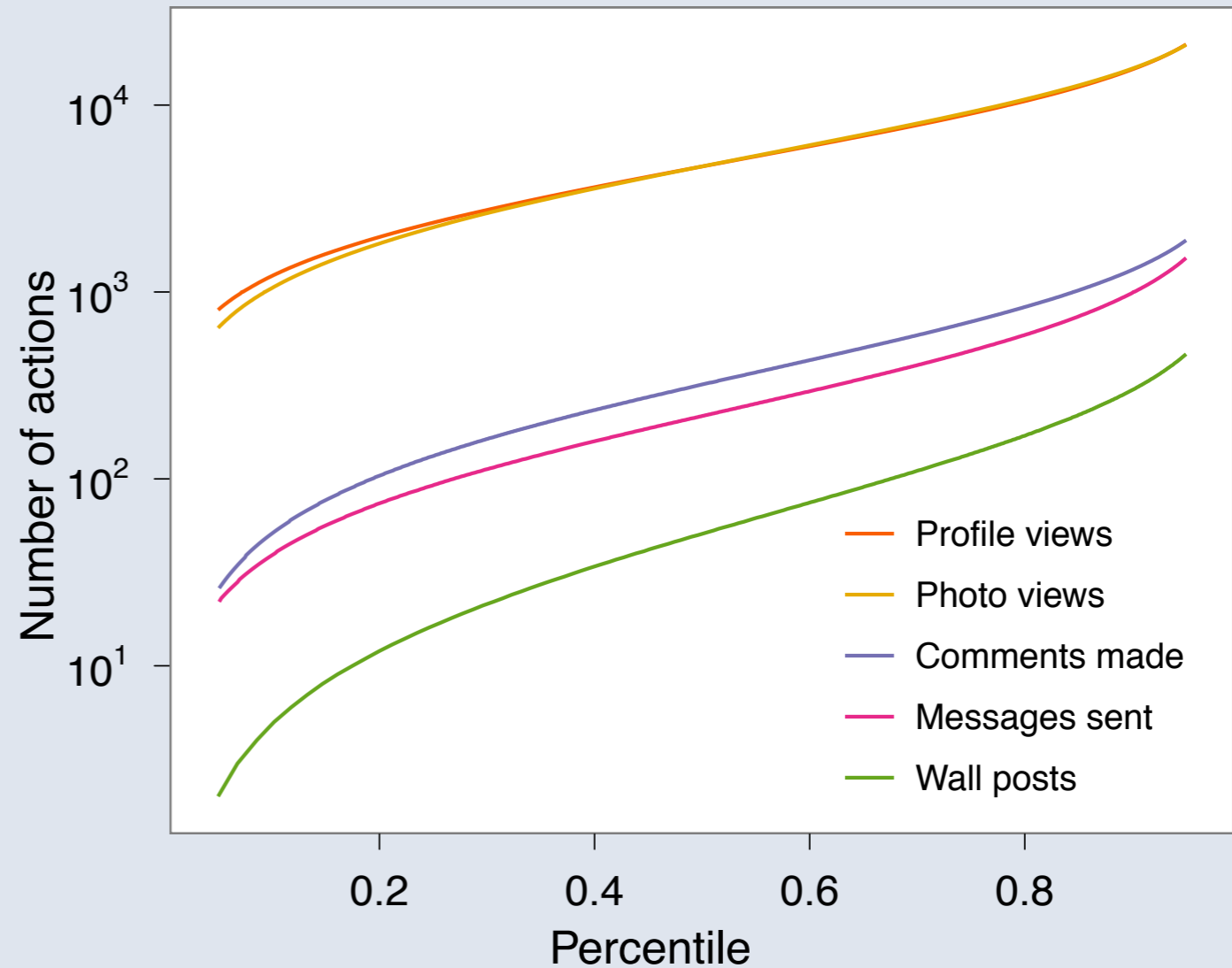
Attention (a_k) by Rank

- Average attention toward top kth friend decreases rapidly with k ($a_k \sim k^{-0.75}$)

- More attention given to top communication friends compared to observation friends
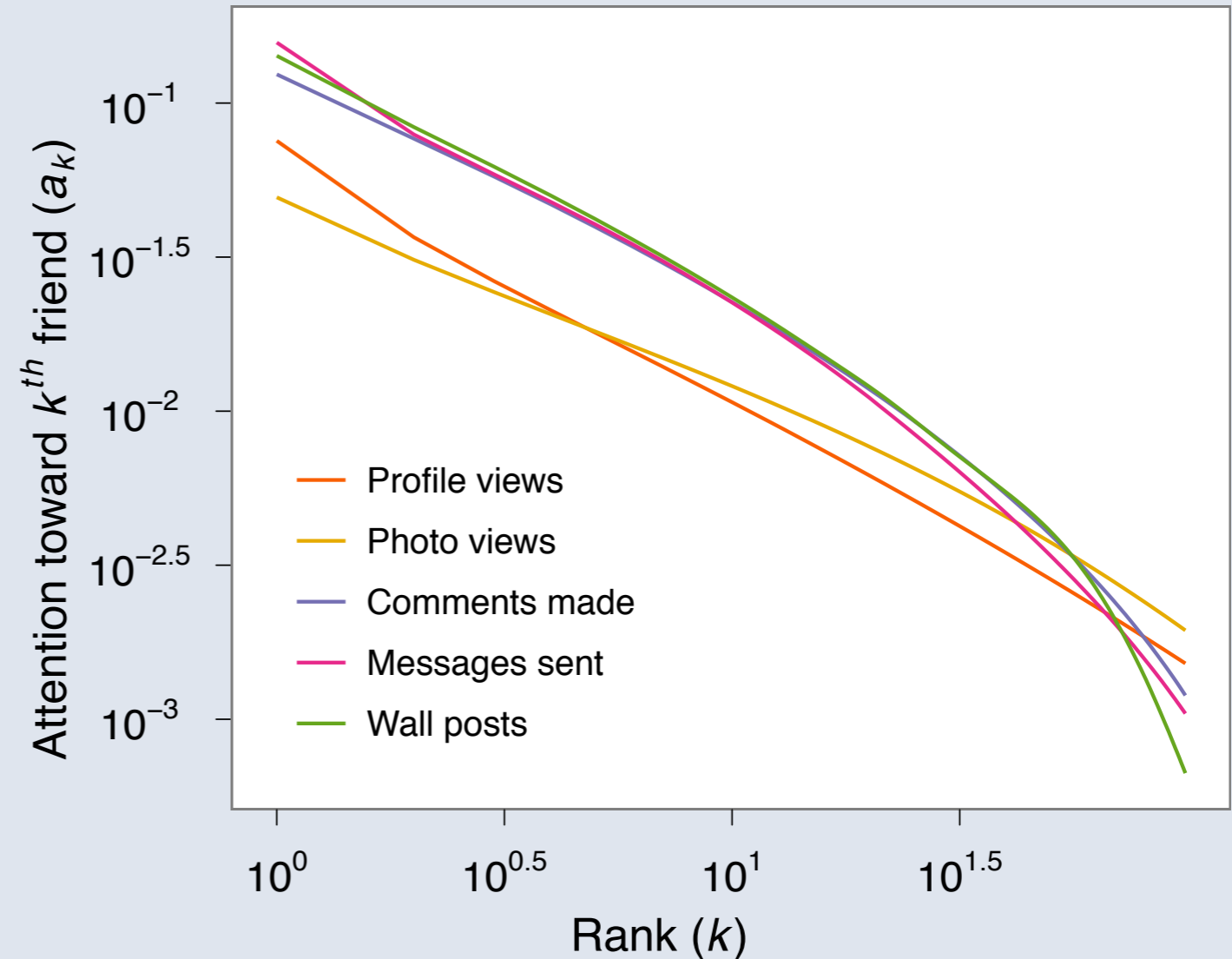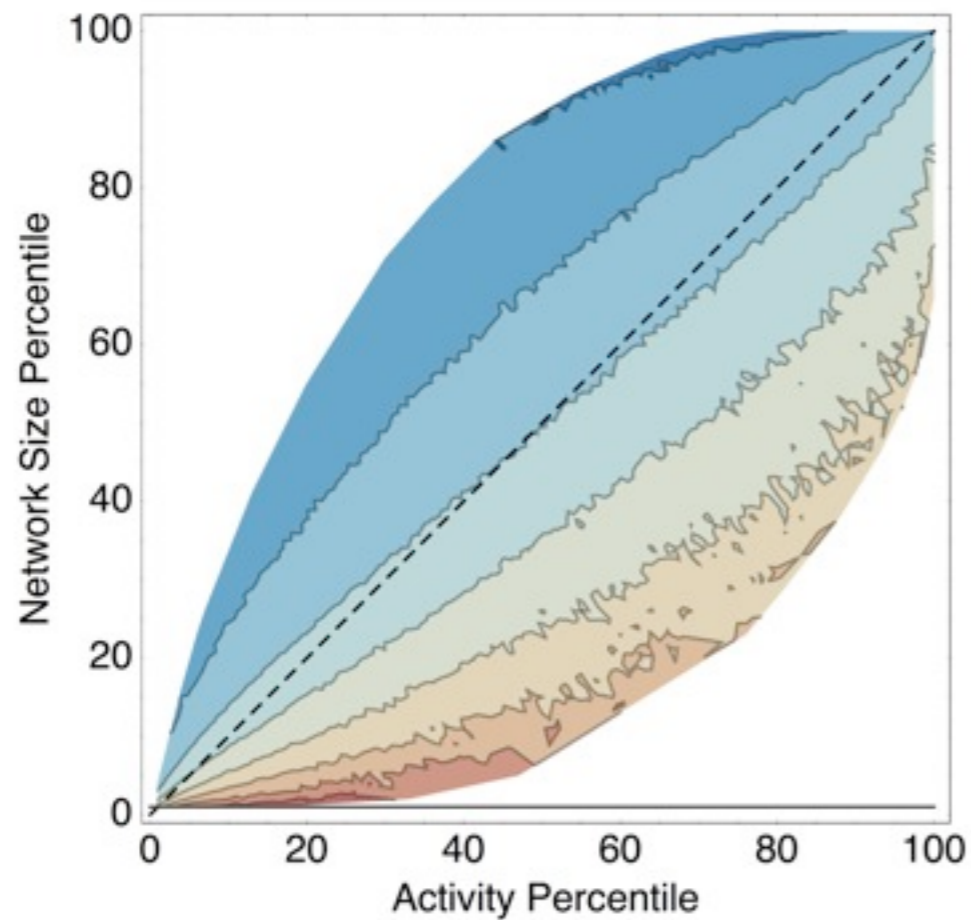
The Balance of Attention

Attention and Activity

- Consider the total fraction of attention given to top 15 friends

- Large increases in activity level do not lead to large changes in how much attention is allocated to top k friends
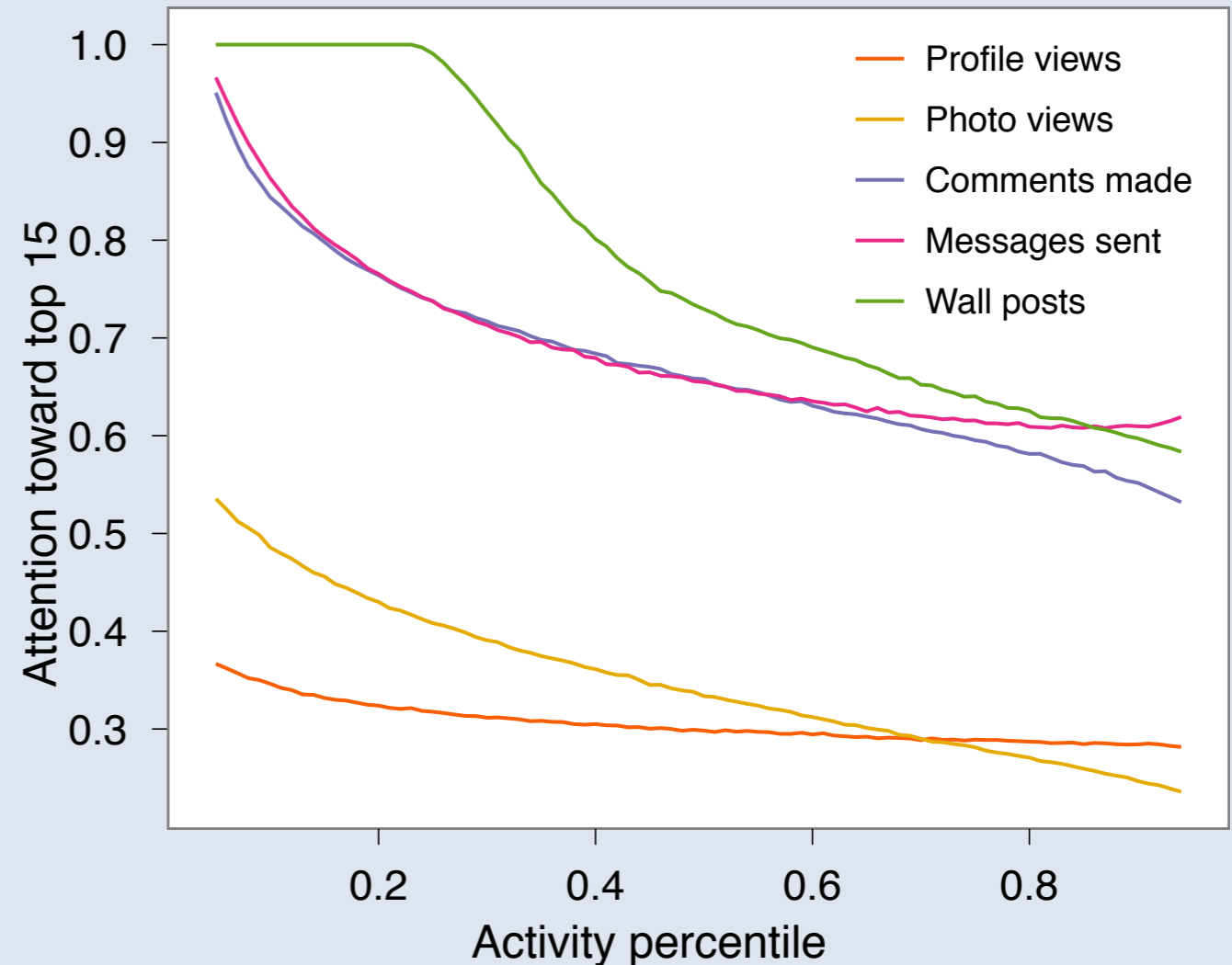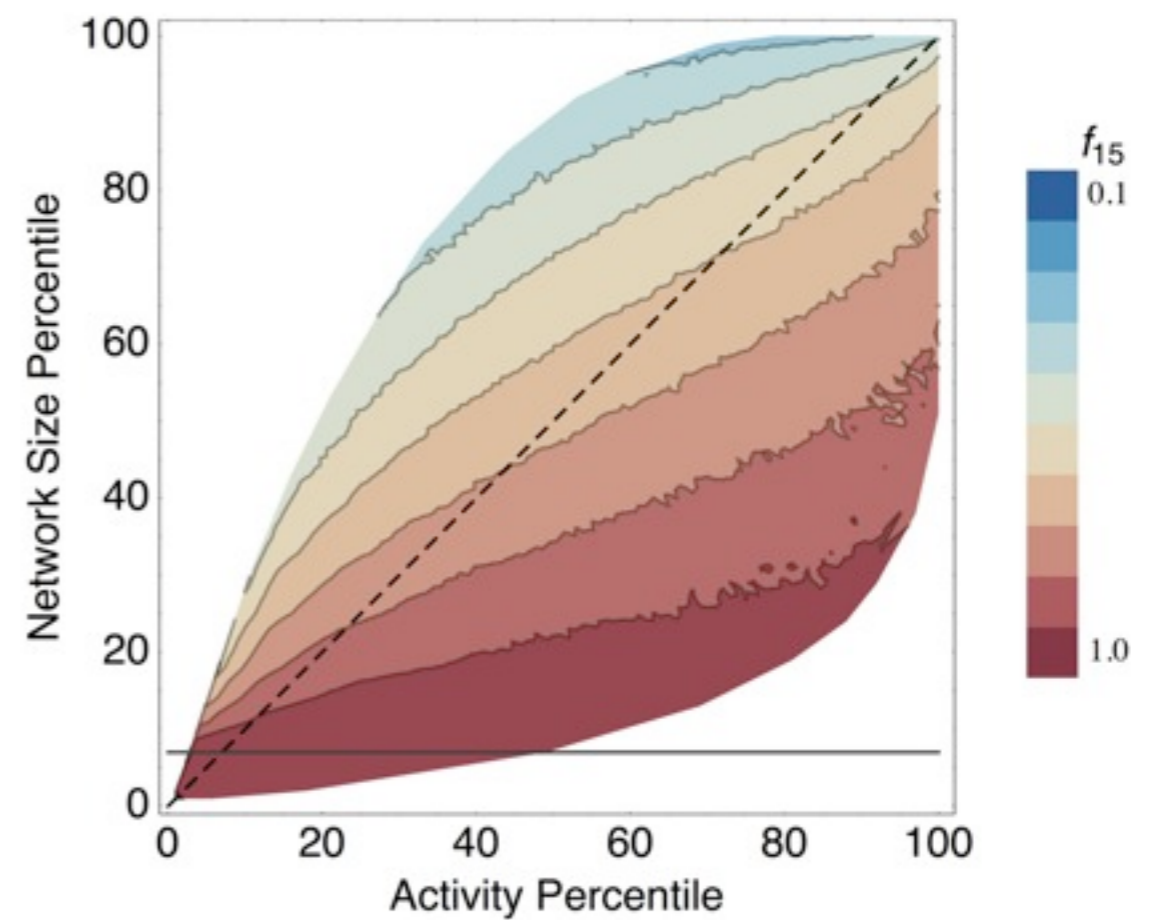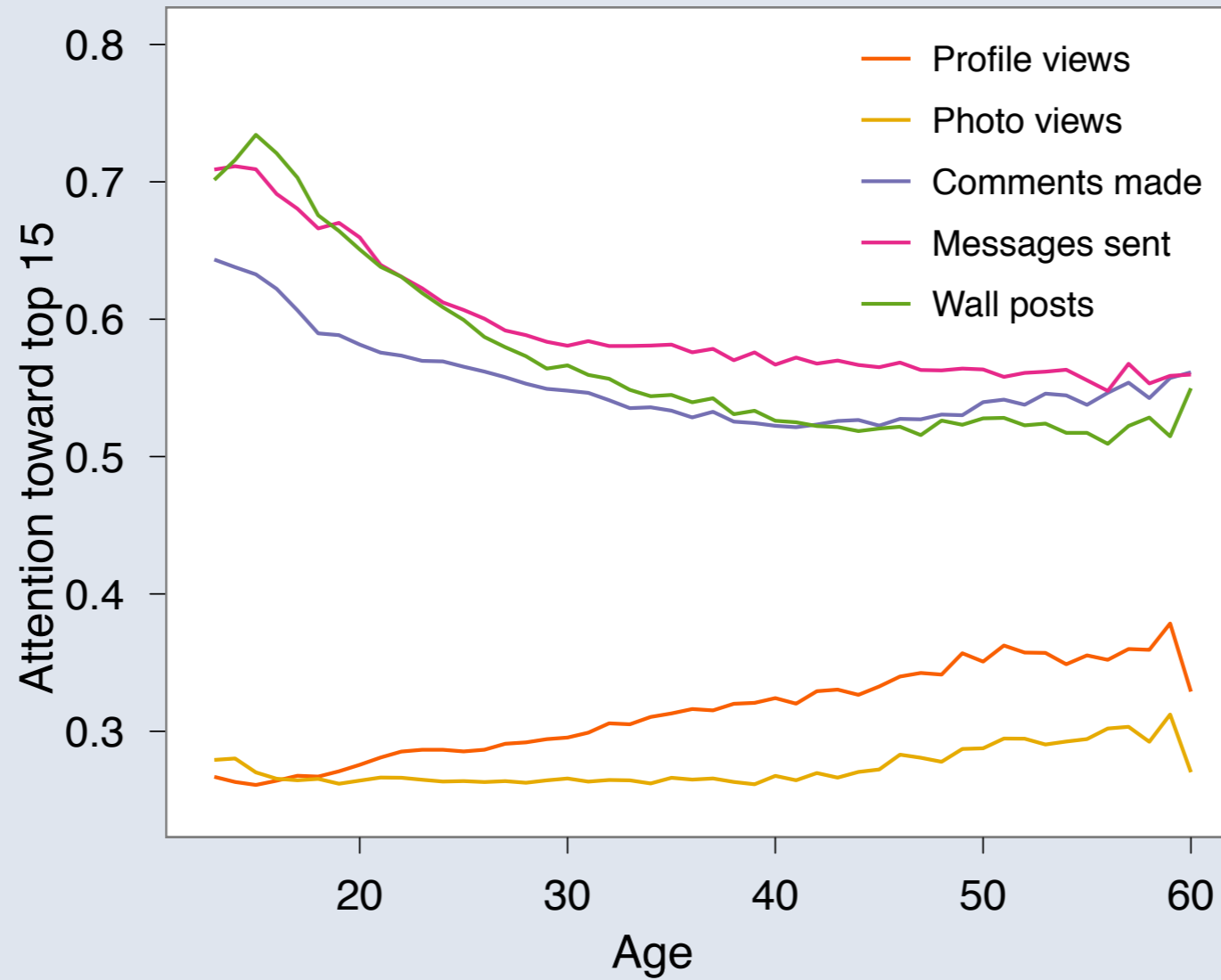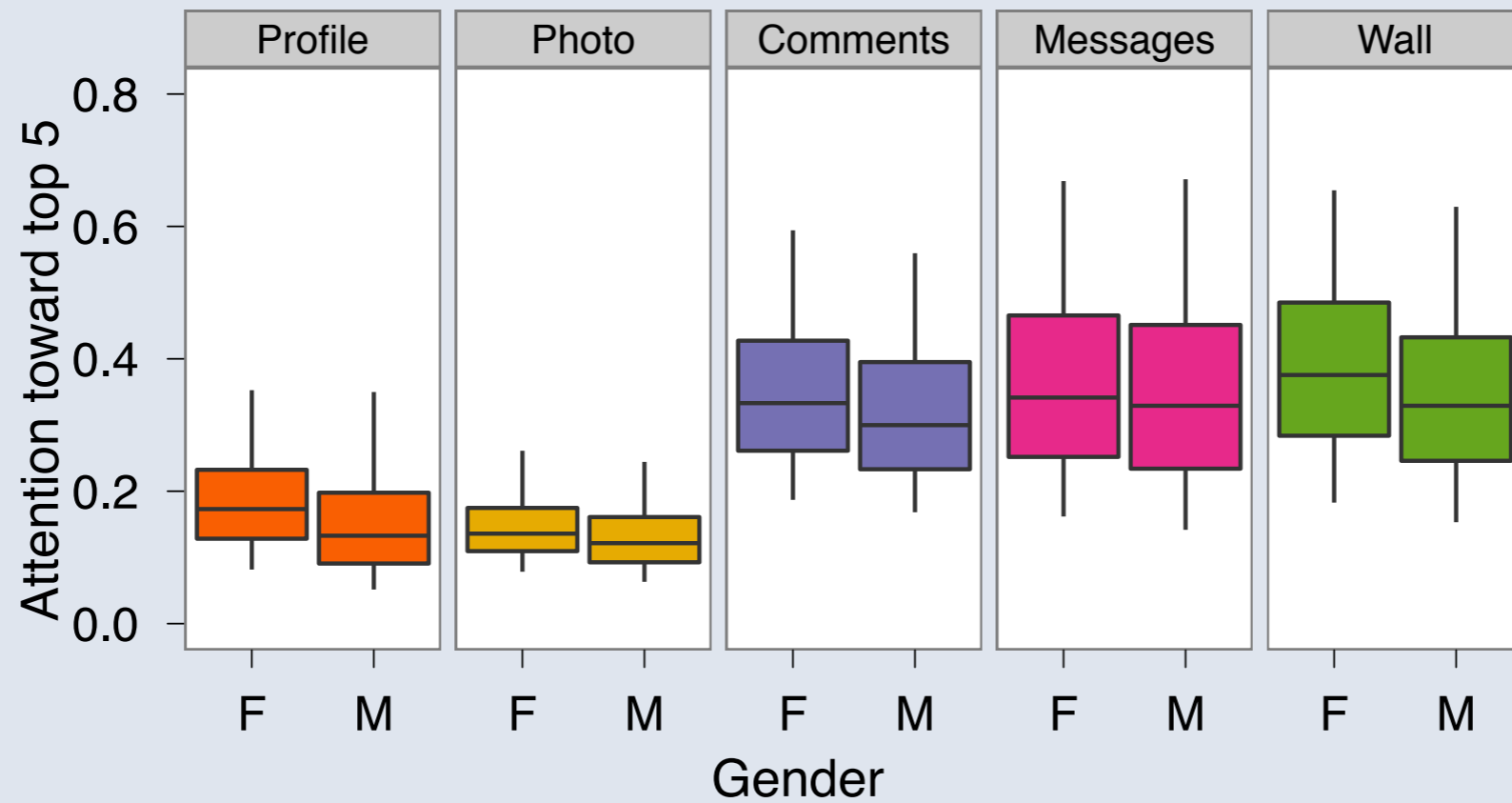
Activity and Network Size

Profile views

Comments

Individual Variation

Age

Gender

Distributional Differences in Gender

Number of Contacts

Comments

	Median	Mean
F	73	89
M	60	78
F/M	1.2x	1.1x

Profile views

	Median	Mean
F	918	1,196
M	1,063	1,458
F/M	0.9x	0.8x

Number of Actions

Comments

	Median	Mean
F	388	638
M	245	473
F/M	1.5x	1.3x

Profile views

	Median	Mean
F	4,719	7,194
M	4,201	6,361
F/M	1.1x	1.1x

Explaining Individual Variation

- Gender and age differences can be explained by different underlying distributions of network size and activity level

Linear model of f_5 as a function of individual characteristics

	Intercept	Network Size	Activity	Age	Male	R²
Profile	0.18	-0.53	0.44	0.03	0.02	0.38
Photo	0.20	-0.47	0.21	-0.01	0.01	0.53
Comment	0.43	-0.81	0.41	-0.03	-0.01	0.67
Message	0.44	-0.87	0.48	0.03	0.00	0.59
Wall	0.51	-1.48	0.92	-0.02	0.00	0.62

N = 1,037,885; p < 0.0001

continuous covariates are given in centered percentiles

Intergroup Variation

Gender-Gender Interactions

- Females exhibit strong gender homophily in communication

  - Females send 68% of their messages to females

  - Males send only 53% to females

- Males and females both direct 60% of their profile views to females

Attention Between Genders - Messages

- Consider each individuals' male and female target network separately

- Attention more concentrated along across-gender communication, dispersed along within gender communication
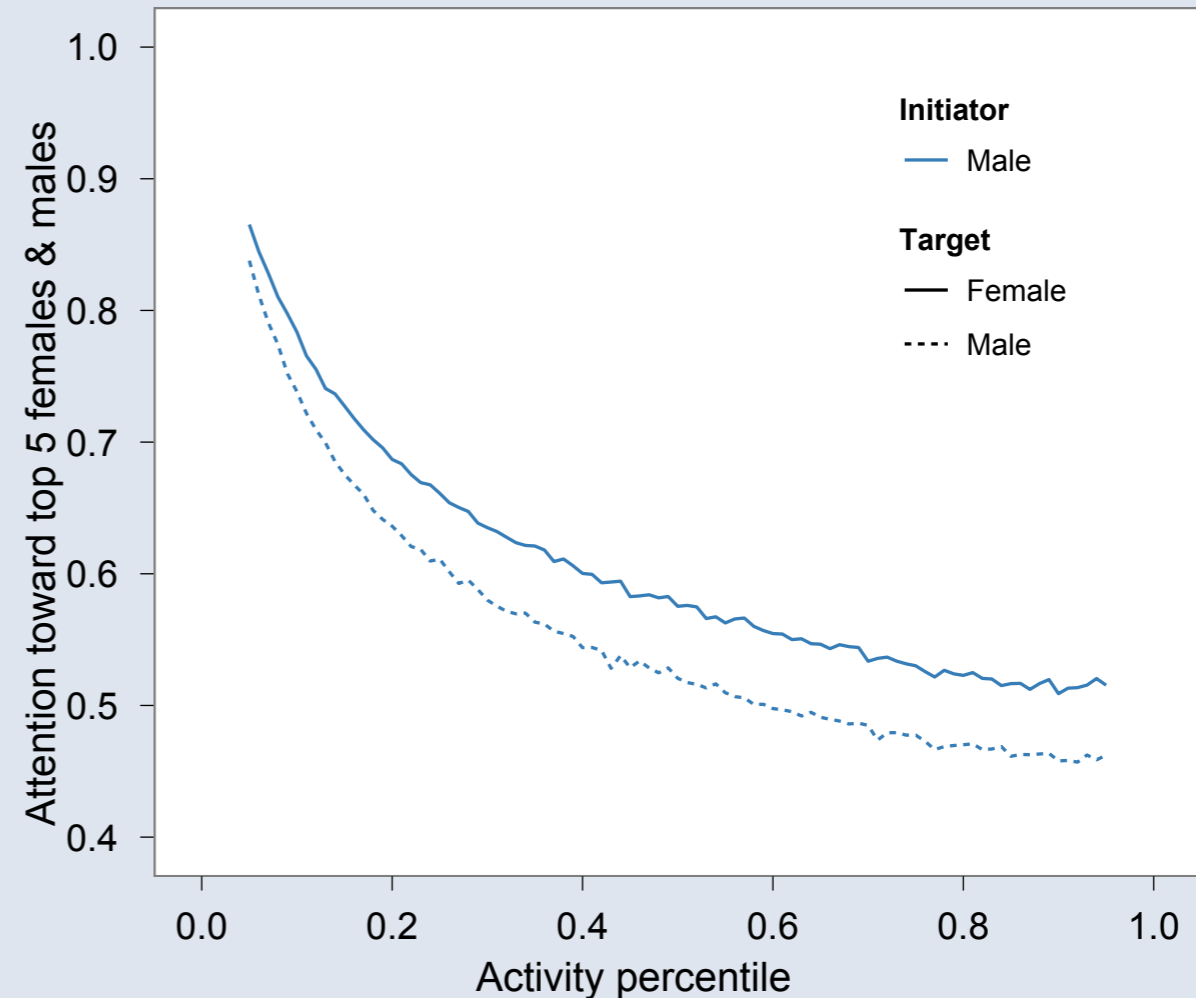
Attention Between Genders - Messages

- Consider each individuals' male and female target network separately

- Attention more concentrated along across-gender communication, dispersed along within gender communication

- Effect is stronger for females
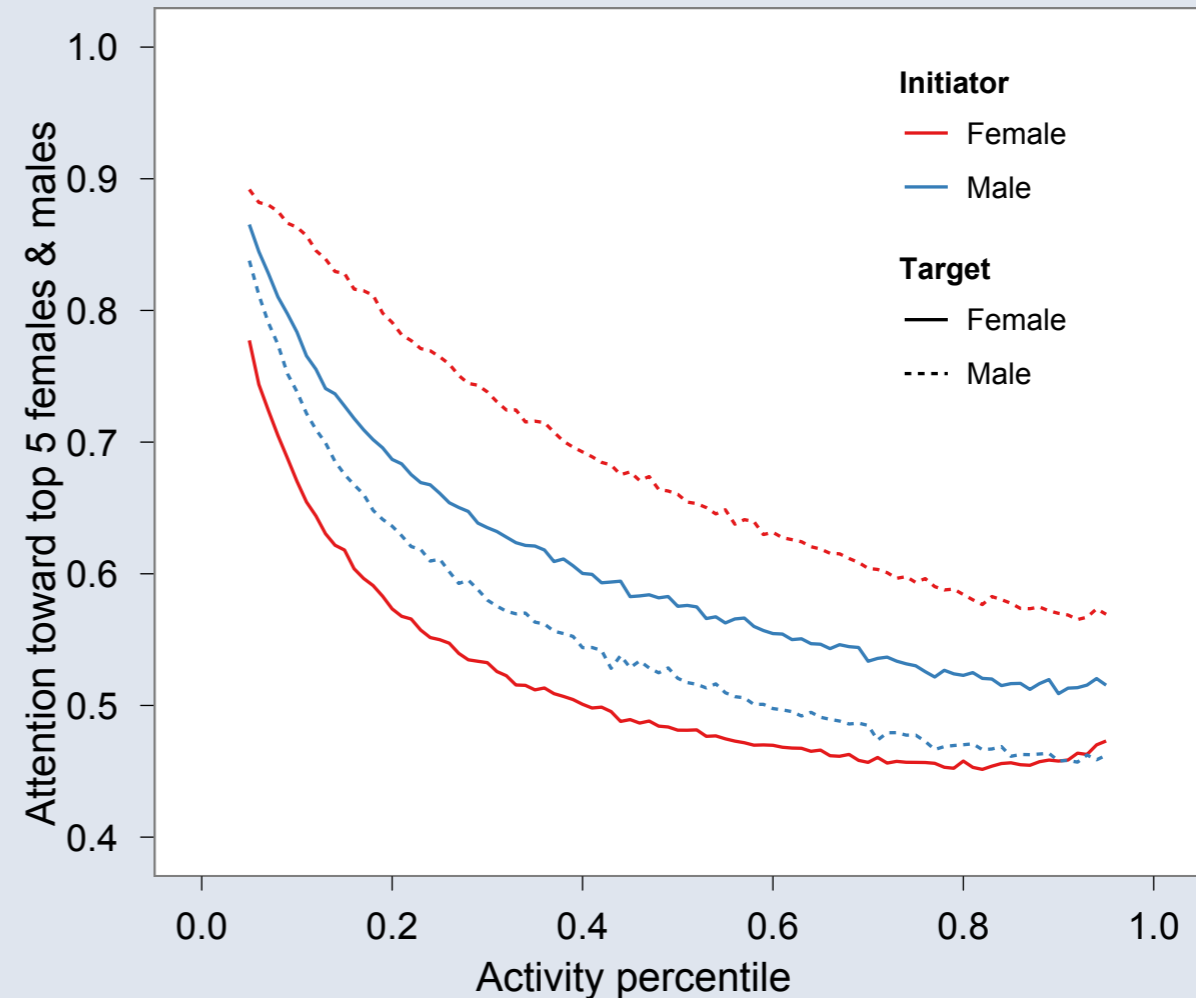
Attention Between Genders - Profile Views

- Females and males have similar focus in attention when viewing females

- Focus is much higher for females viewing male profiles
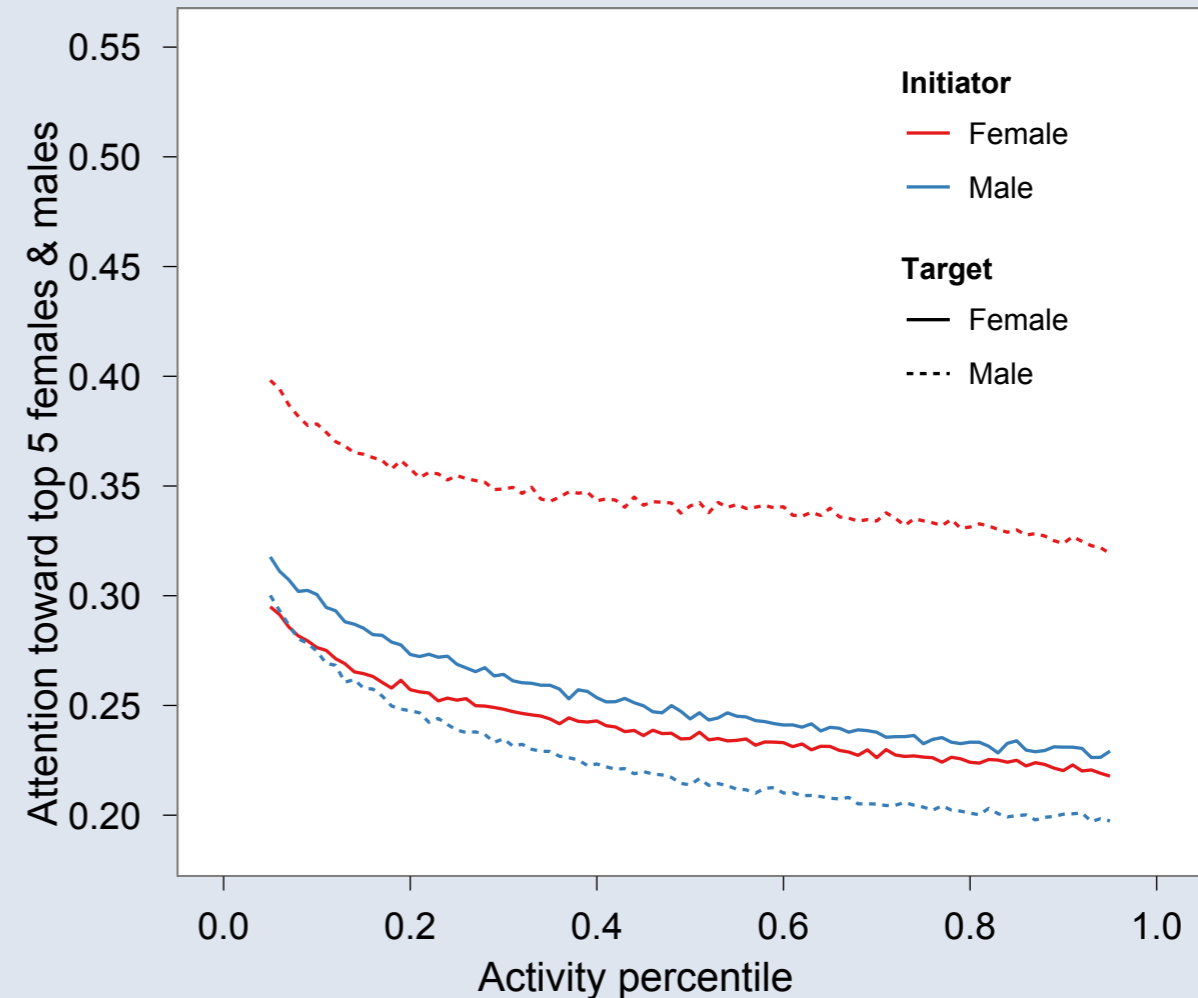
Best Friends... Forever?

- Do more interactions lead to less stable relationships?

- Measure number of top-10 friends that remain top-10 from one two-month period to the next

- Comments and profile views most stable, potentially as a result of feed
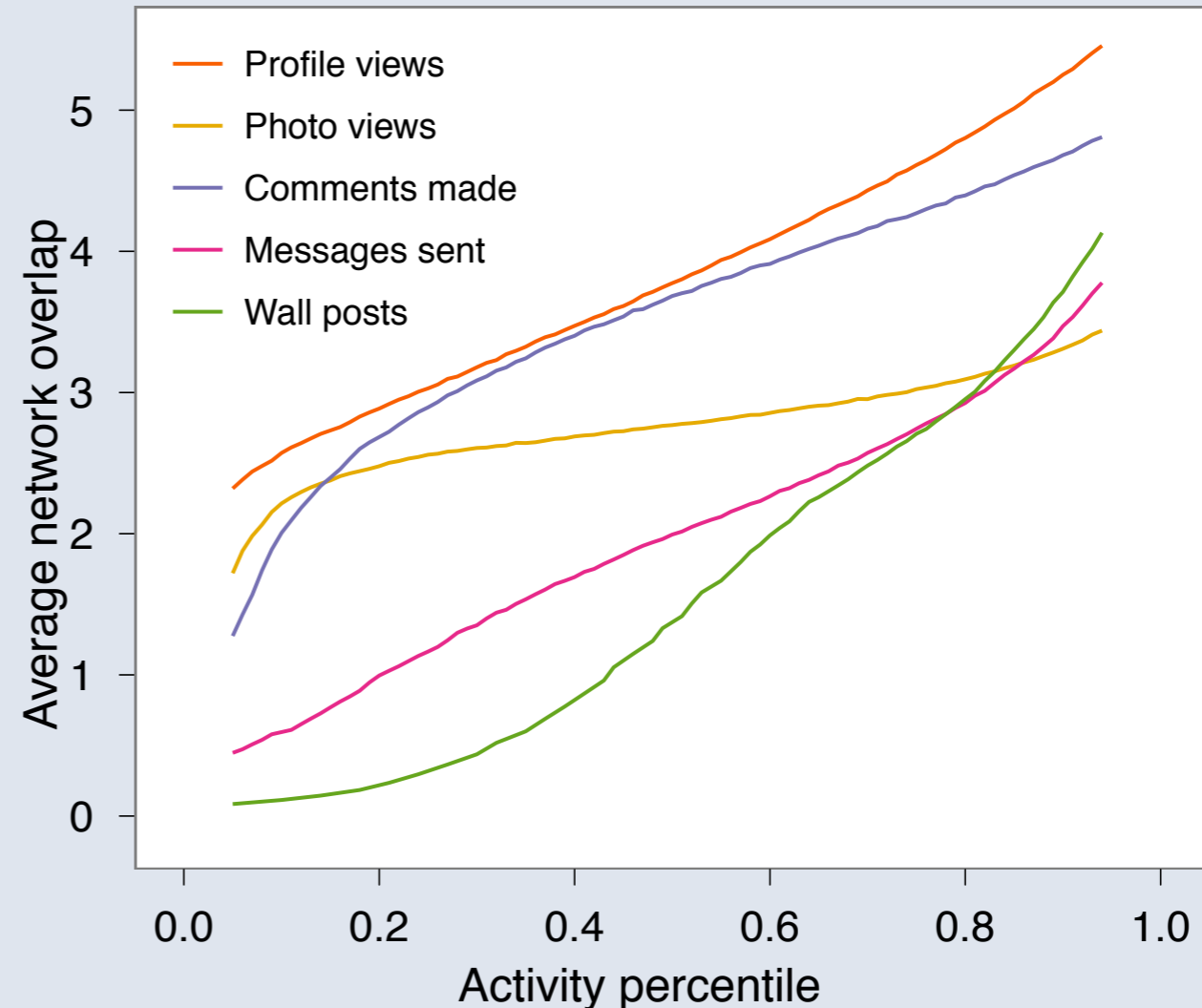
Conclusion

- Proposed a measure of attention based on how an individual distributes her interactions among friends

  - Allows for easy comparison between among different modalities

- How an individual divides their attention is a stable property of the individual, and is different across age and gender

  - Differences can be partly captured by activity and network size

- Attention is divided differently within and between genders

- Greater levels of activity are associated with stability

Wednesday, July 20, 2011

Thanks

- Collaborators:

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Questions?