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The User's Communication Patterns on a Mobile Social Network Site

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Introduction

- Given the phenomenal online/mobile social network activities, previous studies have been exploring
    - A social network structure (the interactivity among users and their network formation) (Ansari et al. 2011; Choudhury et al. 2010)
    - The managerial implication of the social relations as its economic outcome (Barrot and Albers 2008; Godes and Mayzlin 2004; Iyengar et al. 2011; Trusov et al. 2009)
- Social networking sites basically provide numerous communication venues/platforms (e.g., chat, message, group message and blogging)
- The interaction among diverse communication channels
    - Andersson et al. 2009; Garbacz and Thompson 2007; Miravete 2002; Taylor and Kridel 1990
- We focus on the multiple communication channels in a SNS

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Communication Channels

- Chat
  - checking the online status of another user
  - creating chat session
  - inviting the user
- Message
  - It is analogous to an email
- Group message
  - Users form/ join groups to share the same interests and activities in a SNS
  - Share informative or entertaining contents with the set of users
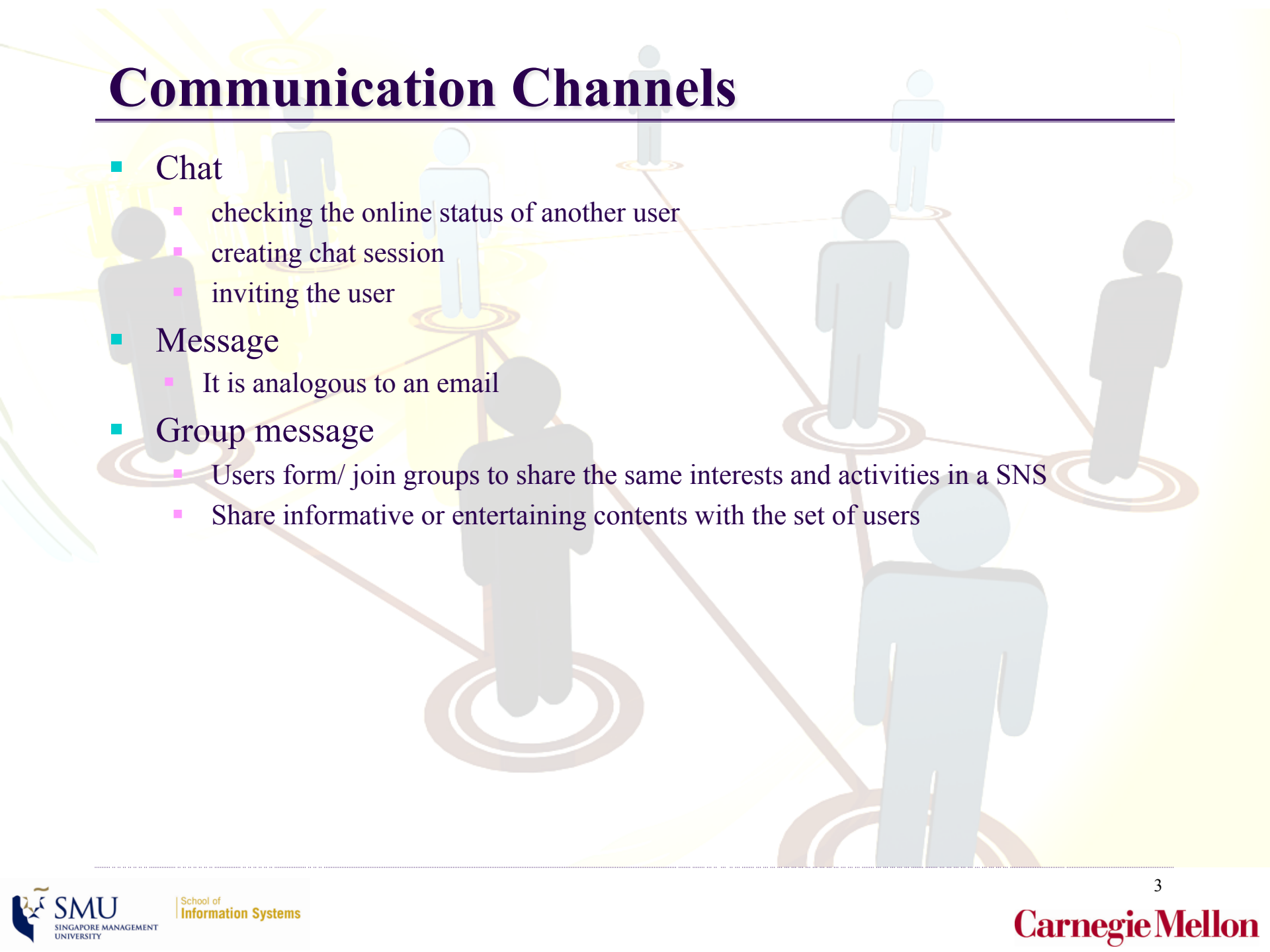
Research Goals

- Understanding how users communicate through diverse communication channels in a SNS
- Examining the role of network structure
- Tracing the dynamics of channel choice structure over time and their variations across users

Data

- We collected the data from a mobile social networking site which has around 4.8 million registered users worldwide

- We randomly selected several users and then we traced users who are connected with the pre-selected users anytime during our research period of 20 months (from March 2011 to October 2012)

- We recorded all the connections and tie strength among the chosen users every month

- We traced the local network size and whole network size

Measurements

- Chat link ($Chat_{ijt}$): how many chat sessions two users have engaged in together at time t by matching user IDs and chat session IDs

- Message link ($Message_{ijt}$): the number of messages user i sent to user j at time t

- Group message link ($GroupMessage_{ijt}$): the number of group message a user i sends in all the groups users i and j are affiliated with together at time t

- Testimonial link: user i can post a comment (or evaluation, information) toward user j for public

Methodology

- Structural autocorrelation due to the lack of independence among observations that is very common in network data biases the estimates (Krackhardt 1988)

- Correlated random effects model (Ansari et al. 2011; Hoff 2005)

- Multiple regression quadratic assignment procedure (MRQAP) methods (Dekker et al. 2007)

- The system of structural equations
    - Potential asymmetric dependency across channels (Nair et al. 2010).
    - The different set of regressors on the right-hand-side

Models

$$Chat_{ijt} = \alpha_0 + \alpha_1 Message_{ijt} + \alpha_2 GroupMessage_{ijt}$$
$$+\alpha_3 ChatActivity_{it-1} + \alpha_4 ChatActivity_{jt-1}$$
$$+\alpha_5 LocalNetworkSize_{it} + \alpha_6 LocalNetworkSize_{jt}$$
$$+\alpha_7 TimeSinceSignup_{it} + \alpha_8 TimeSinceSignup_{it}^2 + \tau_{ij}(\text{or } \zeta_i) + \delta_t + u_{ijt}$$

$$Message_{ijt} = \beta_0 + \beta_1 Chat_{ijt} + \beta_2 GroupMessage_{ijt} + \beta_3 Message_{jit}$$
$$+\beta_4 MessageSent_{it} + \beta_5 MessageReceived_{it}$$
$$+\beta_6 TimeSinceSignup_{it} + \beta_7 TimeSinceSignup_{it}^2 + \eta_{ij}(\text{or } \lambda_i) + \psi_t + \varepsilon_{ijt}$$

$$GroupMessage_{ijt} = \gamma_0 + \gamma_1 Chat_{ijt} + \gamma_2 Message_{ijt} + \gamma_3 Group_{ijt}$$
$$+\gamma_4 GroupActivity_{it} + \gamma_5 GroupActivity_{jt}$$
$$+\gamma_6 TimeSinceSignup_{it} + \gamma_7 TimeSinceSignup_{it}^2$$
$$+\chi_{ij}(\text{or } \nu_i) + \pi_t + \mu_{ijt}$$

Estimation Results 1

- All the coefficients of tie strength ($Chat_{ijt}$, $Message_{ijt}$, and $GroupMessage_{ijt}$) are significant
- The direction of the cross effects between any two channels varies by combination
  - Negative interdependency for "chat and message" and positive interdependency for "chat and group message" and "message and group message
- The cross effects are symmetric in terms of influential direction

Estimation Results 2
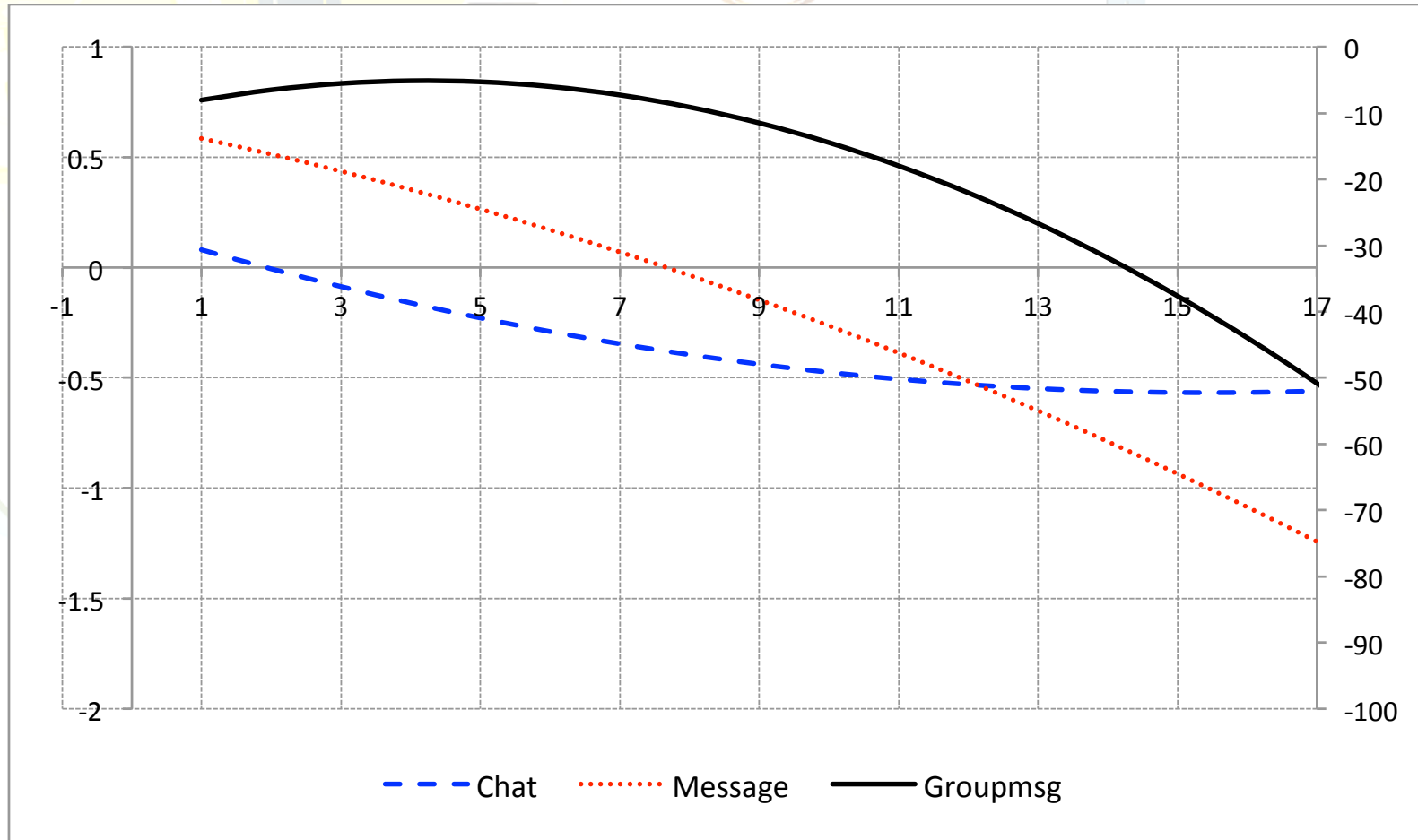
Estimation Results 3

- The relationship between local network size and tie strength varies by communication channel

- The whole network size ($WholeChatSize_t$, $WholeMessageSize_t$, and $WholeGroupMsgSize_{t)}$ positively affect a user's tie strength in all the channels

- Blogging has a negative impact on the tie strength in chat but it has positive impact on the other two communication channel

- The old users prefer message and group message to chat

Experimental Evaluation

- We predict the WOM effects based on users' connections on both (1) a communication channel and (2) multiple communication channels

$$Testimonial_{ijt} = \delta_0 + \delta_1 Chat_{ijt} + \delta_2 Message_{ijt} + \delta_3 Group_{ijt}$$
$$+\delta_4 CumulChat_{jit-1} + CumulMessage_{jit-1} + CumulGroupMessage_{jit-1}$$
$$+\delta_6 TestimonialActivity_{it} + \delta_7 TestimonialReceived_{jt}$$
$$+\delta_8 TimeSinceLinkage_{ijt} + \delta_9 TimeSinceLinkage_{ijt}^2$$
$$+\delta_{10} Blog_{it} + \alpha_{11} Blog_{jt} + k_{ij} + v_t + e_{ijt}$$

	Model 4	Chat	Message	Group message
N	505569	505569	505569	505569
Log Likelihood	-206376.55	-206429.29	-206504.14	-206513.75
Number of parameters	31	27	27	27
Likelihood ratio test, $\chi^2(4)$		105.48 ($p<0.000$)	255.18 ($p<0.000$)	274.41 ($p<0.000$)
BIC	-413160.24	-413213.18	-413362.88	-413382.10
AIC	412815.10	412912.58	413062.28	413081.50

Limitation and Future Research Direction

- Our models do not disentangle the situation-based contexts due to a lack of data (e.g., what contents are conveyed and the sequence of communication channels)

- Non-message-based interactions
  - Picture and video sharing (Flicker.com and YouTube.com)
  - Music recommendation (Last.fm)
  - News voting (Digg.com)
  - Social bookmarking (del.icio.us)

Thank you

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