



Marketing Using Social Networks: Practice and Theory

Alan L. Montgomery
Associate Professor
**The University of Hong Kong &
Carnegie Mellon University**

email: alanmontgomery@cmu.edu

All Rights Reserved, © 2012 Alan Montgomery
Do not distribute or reproduce without Alan Montgomery's Permission



Lecture Outline

- Practice
 - Marketing Usage of Social Media
 - Measuring Social Media Influence
- Theory
 - Homophily or Influence? An empirical analysis of purchase within a social network
 - Problem
 - Framework
 - Results

2



Marketing Usage of Social Media



Types of social media

- Discussion Forums
 - Amazon, eBay, Usenet Groups, epinions
- Blogs
 - Blogger, blog, Tumblr, Weebly, Xanga, LiveJournal, WordPress
- Wiki's
 - Wikipedia, Knol
- Social Networks
 - SixDegrees.com (early effort in 1997, shutdown in 2000)
 - Open Social Networks: MySpace, Facebook, Bebo, Club Penguin
 - Vertical Network Sites: LinkedIn
 - Mobile social networks: Dodgeball
- Video-, photo-, and news-sharing sites
 - FlickrR, YouTube, Digg

4

Marketing use of Social Media

- Forrester Research reports US online advertising spending in 2009 was approximately \$25b or 12% of overall advertising budgets
- Most of the online budget went to search and display advertising
- Social media is only \$560m or less than 3% of the US online advertising budget in 2009
- Expected to almost triple to \$1.76b by 2013

5

BzzAgent: HTC Windows 7

- **Goal:** Increase Awareness, Drive recommendations, drive trial
- **Strategy:** Sample Experience
1000 T-Mobile or AT&T customers (age 18-49 who were not current i-Phone users) were given a free HTC phone to try out
- **Results:** Reach, High-Volume Activity, Brand Perception
 - Reached 234,000+ people via in-person and digital conversations
 - Each Agent influenced 235 conversations
 - Drove activity among core HTC segment: 25-34 year olds, influenced 499 Facebook posts and 651 Tweets
 - Increased brand opinion by 36 percentage points
 - Increase advocacy levels by 85 percentage points



Source: <http://www.bzzagent.com/blog/post/htc/>

6

Coke and the 2008 Beijing Olympics

• Challenge

As the official sponsor of the Olympic Games, Coca-Cola needs to find an innovative way to amplify the brand message by connecting young targets to celebrate the first ever Olympics in China, and to bond the brand tightly to this special moment.

• Approach

At the night of March 24, 2008, Coca-Cola China launched a breakthrough digital activation on QQ Instant Messenger (iCoke.qq.com, the IM platform with the largest user base in China), the first ever Coca-Cola Olympic Virtual Torch Relay ("VTR" for short).



http://awards.wwwins.com/2009spikes/ico_votr.htm

7

OldSpice on YouTube and Twitter

- Old Spice body wash sales increased 107% in one month due to social media marketing (55% over past three months).



8

Ford Fiesta

- Ford used a campaign centered on user-generated content to generate buzz and interest around the US launch of its Fiesta model.
- 100 individuals test-drove a Ford Fiesta for six months
- Document their experiences and travels in the car on social media networks
- Content was personalized and authentic since it came from actual users
- Ford generated a 50,000 member email list to further promote the car



9

Nike+

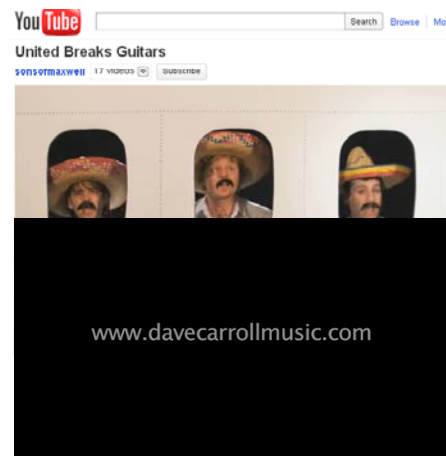
- Nike+ community allows users to track their runs and challenge friends to distance and time running competitions.
- In Feb 2011, it had more than 2 million members who logged in over 336million miles.
- Sponsors the Human Race 10K
- According to SportsOneSource, Nike's share of running shoes increased from 48% in 2006 to 61% in 2008

Relevant	Personalized	Interactive	Integrated	Authentic
• Community is centered around consumer's passion for running.	• Customized home page tracks a runner's individual progress and statistics.	• Challenges, forums, and Facebook feeds allow consumers to connect with each other.	• Nike employees are active participants in the community through blogs and forums.	• Community is consistent with Nike's overall brand positioning.

10

"United Breaks Guitars"

- Dave Carroll, who had been making a modest living as a musician performing pop-folk music with his band, Sons of Maxwell
- On March 31, 2008, Carroll and members of the band were flying from their hometown of Halifax, Canada, for a week of shows in Omaha, Nebraska
- During a connection in Chicago, other passengers aboard the flight noticed some very rough handling of cargo, and Carroll's bandmates watched helplessly as Dave's \$3,500 Taylor guitar was mishandled by United's baggage handlers.



Social Networks

"This new organizational framework for online communities transformed the earlier topic-driven models like forums to user-centric networks...with the individual at the center of their own community. This more accurately mirrors unmediated social structures, where 'the world is composed of networks, not groups', D.M. Boyd and N.B. Ellison (2007), *Journal of Computer Mediated Communication*

12

Reluctance by Some Brands to Use Social Media

- Cost and time
 - Companies fear that social media may require too many creative staff and too much time
- Knowledge risk
 - Senior managers are less familiar with new media, so they avoid it
- Incentive structure
 - Advertising firms with traditional media expertise have strong incentives to maintain the current fee structure
- Measurement
 - Gross rating points and click-through rates are more comfortable measures than page views or engagement
- Loss of control
 - Marketers are accustomed to taking a top-down approach to brand positioning and fear loss control of their brands

Source: Sunil Gupta, Kristen Armstrong, and Zachary Clayton (2011) 13

Measuring Social Media Influence

Using Blogs to Detect Market Structure

Message #1199 Civic vs. Corolla by mcmanus Jul 21, 2007 (4:05 pm)
 Yes DrFill, the Honda car model is sporty, reliable, and economical vs the Corolla that is just reliable and economical. Ironically its Toyota that is supplying 1.8L turbo ... Neon to his 16 year old brother. I drove it about 130 miles today. Boy does that put all this Civic vs. Corolla back in perspective! The Neon is very crudely designed and built, with no low ...

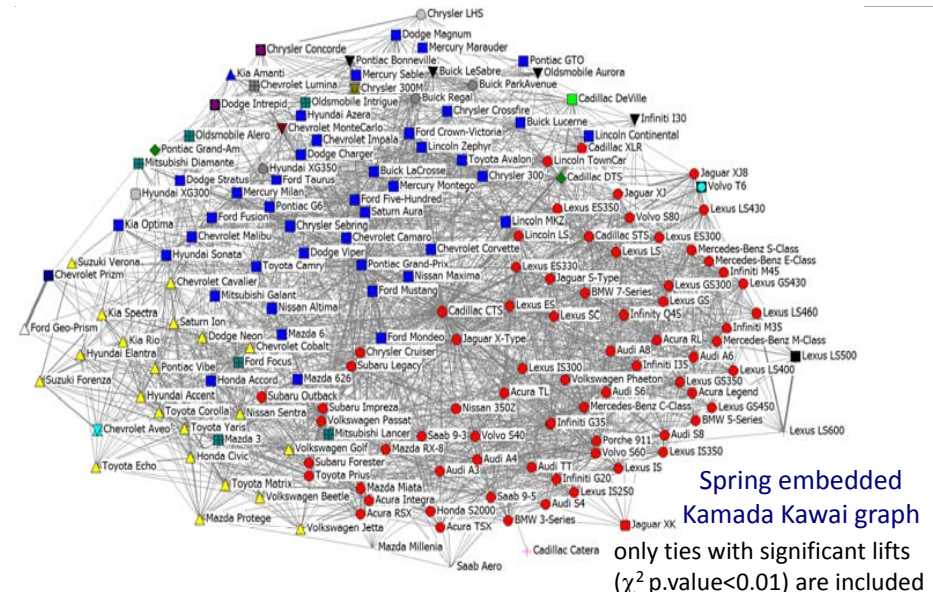
Audi A6 Audi A6 Honda Civic Honda Civic Toyota Corolla Toyota Corolla	Honda Civic Toyota Corolla Audi 6 Toyota Corolla Audi A6 Honda Civic	252 101 252 2762 101 2762
--	---	--

Associative Network

	Audi A6	Honda Civic	Toyota Corolla
Audi A6	---	252	101
Honda Civic	252	---	2762
Toyota Corolla	101	2762	---

Source: Netzer, Feldman, Fresko and Goldenberg (2011) "Mine Your Own Business"

The Car Models Network



HokeyPokey.in

A Social Media Experience for an Indian Ice Cream Parlor

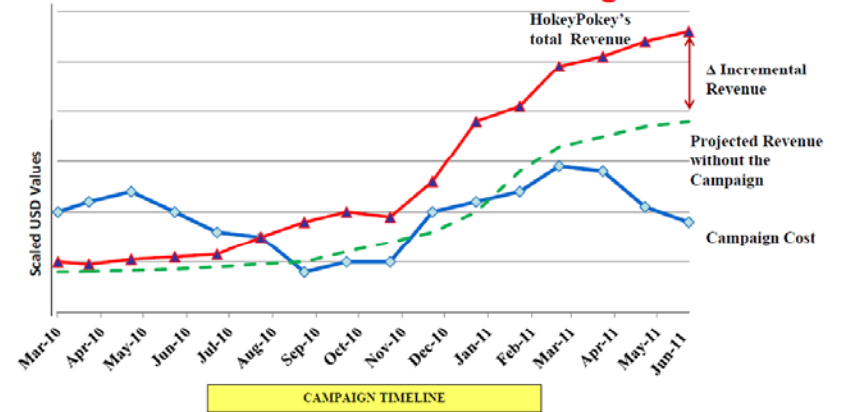
- Goal
 - How to use social media to help this ice cream parlor to market itself?
- Method
 - Quantify individual's influence in a social network
 - Predict impact of customer's influence
 - Measure net value of the individual's influence
- Implementation
 - "Creations on the Wall"
 - "Share your brownies"



17

Source: V. Kumar et al "Creating a Measurable Social Media Marketing Strategy for Hokey Pokey"

Social Media Performance vs. Cost of Investing



www.drjkumar.com

24

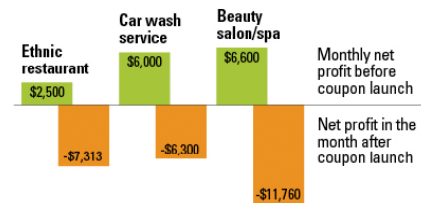
www.hokeypokey.in

Source: <http://techtv.mit.edu/collections/isms:2635/videos/18090-hokey-pokey>

Perils of Social Coupons

HOW A SOCIAL COUPON CAMPAIGN AFFECTED THREE BUSINESSES

Each of the three businesses sustained a substantial loss immediately after the social coupon launch.



- Can substantially increase new customers
- However, the margin of these new customers is very low (Groupon charges 50% of promotion cost)
- Can take over a year – perhaps even 8 years for beauty salon (if the customer is retained) to recover from initial losses

Source: Kumar and Rajan (2012) "Social Coupons as a Marketing Strategy", Journal of the Academy of Marketing Science

19

Using Social Media to Influence Activity



- Disney/ABC wants to know how social media reflects and influences consumers' television viewing
- Goal is to develop metrics of social media to predict and influence audience viewership
- Ultimately wish to influence viewership

20

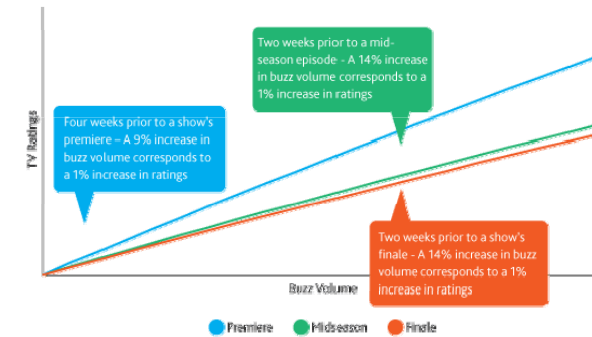
Example of Social Media Feeds for "Revenge"

Source	Subject
Twitter	This show is awesome! I hope it gets picked up for a full season. http://t.co/YjLz5EMG @GetGlue @Revenge
Grey's Anatomy's Facebook Wall	Now that all my summer shows are finished, all I have looking forward to is The Vampire Diaries, Modern Family, Gossip Girl, Castle, Revenge and ofcourse Grey's Anatomy.....only 7 more days for Grey's Anatomy - Special Two-Hour Season Premiere Event!!!! :))
Twitter	#Revenge could possibly be my new favorite show
TheNest	What Fall Shows Are Going to Make It?
Twitter	@Gabriel_Mann @Revenge ahhh I can't wait! Already obsessed with the show!!
Twitter	@miklyn12 I'm loving this show so far! #Revenge
Twitter	@smashleybell Can't wait to watch Revenge on my DVR! Hope to feature more of you on The Vogue Diaries! Love your style!
Twitter	@Revenge ahh already intense #RevengeABC a great start to the new fall shows:)
Twitter	Out of all of the shows I've started watching this fall @Revenge is my favorite. Intrigue, subterfuge, and an amazing cast!
Twitter	But I have watched the first 20 minutes of Revenge, which is about as terrible and CWesque as one might expect.

Is this a causal relationship?

The Relationship between Online Buzz and TV Ratings

Ratings among persons aged 18-34



Source: NMI Incite and Nielsen

incite nielsen

22

Source: http://blog.nielsen.com/nielsenwire/online_mobile/the-relationship-between-social-media-buzz-and-tv-ratings/

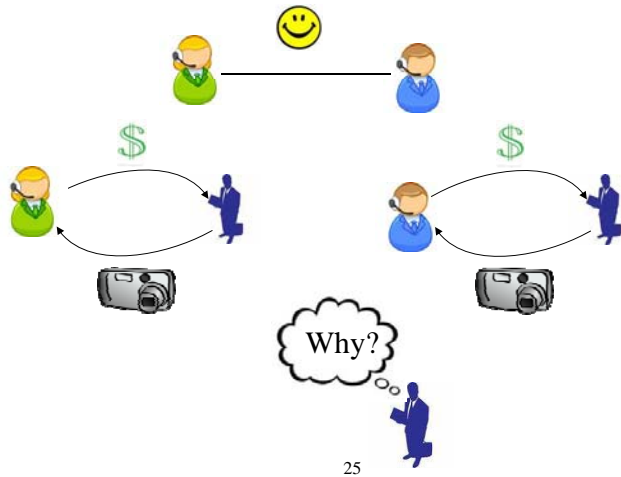
Homophily or Influence? An Empirical Analysis of Purchase within a Social Network

Liye Ma, Alan Montgomery, and Ramayya
Krishnan

23

Problem

Research Question

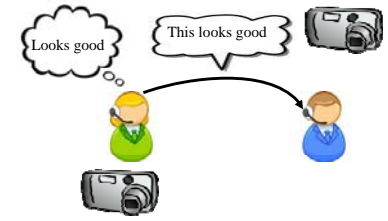


Potential Reasons

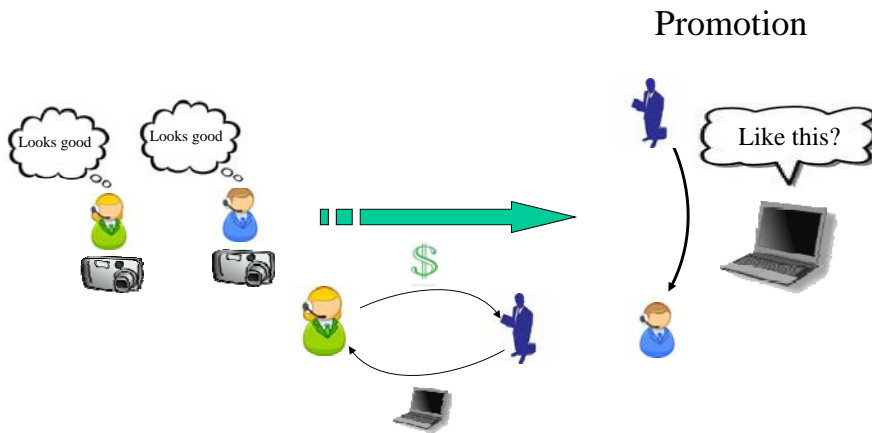
Homophily



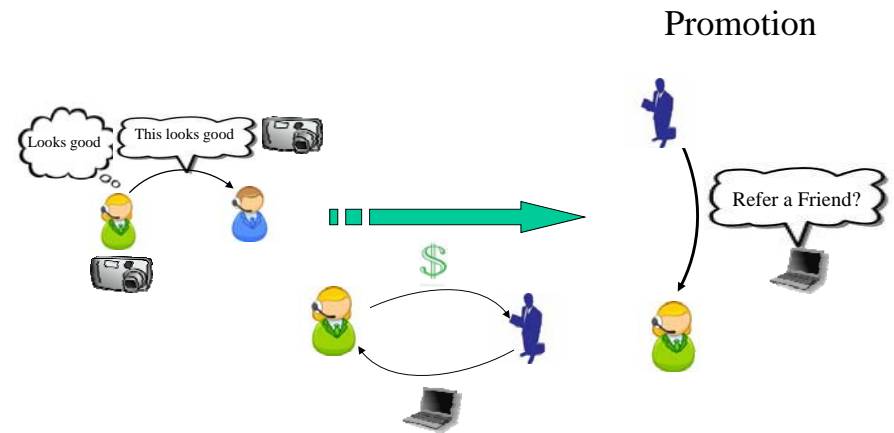
Influence



Why Do We Care?



Why Do We Care?





Research Objective

- Quantify the effect of homophily and social influence in consumer's purchase decision.

29



It Can Be Tricky...

- Manski (1993)
 - *Correlated effects*
 - *Endogenous effects*
 - Exogenous effects

 - *Identification!*

30



Data



What Data Do We Need?

- Consumers who are connected ...
- Communicate with one another...
- And purchase products...
- Over time...

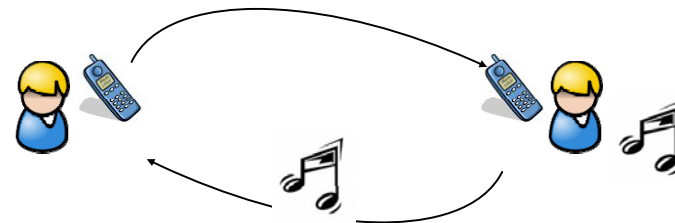
- *Identification*: homophily is static, while influence is dynamic, contingent on communication.

32

Data

- Obtained from a large Indian telecom company
 - Over 3-month period
 - Cell-phone call records of more than 3.7 million users with 300 million phones calls in a major city
- Observe:
 - Caller phone number
 - Callee phone number
 - Date and time of call
 - Length of the conversation
 - The purchase records of caller-ringback-tones (CRBT)

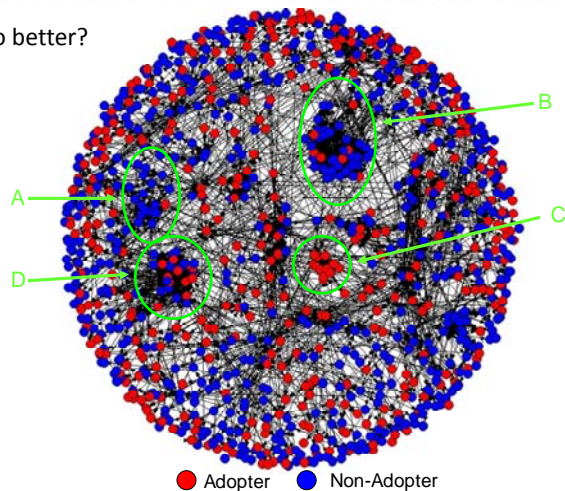
Product – CRBT



Caller ringback tones

Data – Preliminary Analysis

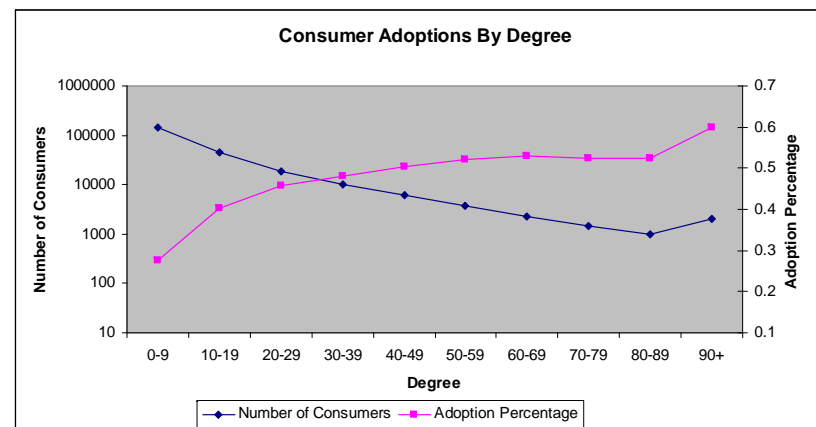
Can we do better?



● Adopter ● Non-Adopter

Maybe, but needs modeling now

Data – Preliminary Analysis



Node degree helps a lot (need for social network)!

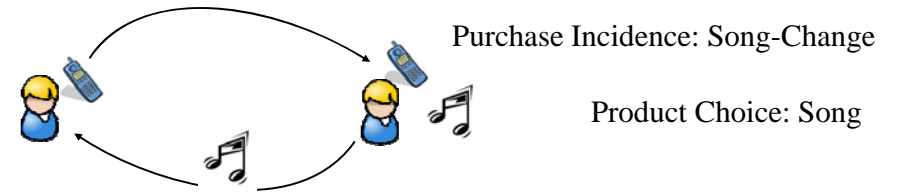


Model



Exposure To Influence

If A calls B, and B has a certain CRBT, then we know A is exposed to it.



Smooth it out: $E_{gi,t,k} = \kappa_{gi}^{pi} E_{gi,t-1,k} + (1 - \kappa_{gi}^{pi}) \tilde{E}_{gi,t,k}$

smoothed exposure
parameter
“raw” exposure



Model

- G groups of consumers
- I consumers in each group
- T time periods
- J products



Consumer Decision – Purchase Incidence

Proportional hazard-rate, with time-varying coefficients

$$S_{gi}(t) = (1 + \lambda_{gi,t} \cdot t) \exp(-\lambda_{gi,t} \cdot t)$$

$$\lambda_{gi,\tau} = \lambda_{gi} \exp(\gamma_{gi,In} E_{gi,\tau,In} + \gamma_{gi,Out} E_{gi,\tau,Out})$$

Intrinsic purchase rate
“Susceptibility” to influence
Out-group exposure

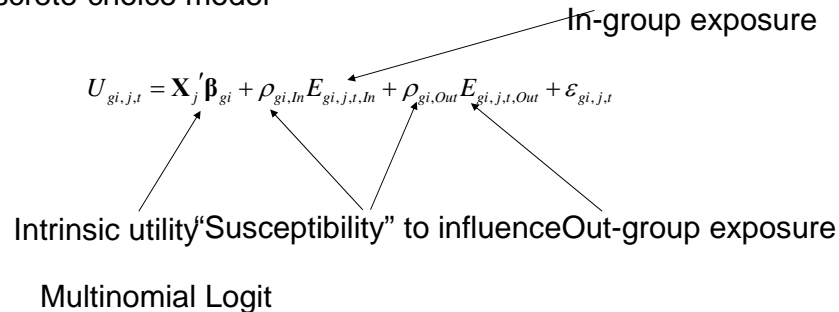
In-group exposure

“when-to-buy”

Consumer Decision – Product Choice

Discrete-choice model

$$U_{gi,j,t} = \mathbf{X}_j' \boldsymbol{\beta}_{gi} + \rho_{gi,In} E_{gi,j,t,In} + \rho_{gi,Out} E_{gi,j,t,Out} + \varepsilon_{gi,j,t}$$



“what-to-buy”

Homophily

In-group correlation of parameters

$$\theta_i \sim N(\bar{\theta}, \sigma_\theta^2) \implies \begin{pmatrix} \theta_{g1} \\ \dots \\ \theta_{gl} \end{pmatrix} \sim MVN \left(\begin{pmatrix} \bar{\theta} \\ \dots \\ \bar{\theta} \end{pmatrix}, \sigma_\theta^2 \begin{bmatrix} 1 & r_\theta & r_\theta \\ r_\theta & \dots & r_\theta \\ r_\theta & r_\theta & 1 \end{bmatrix} \right)$$

$r_\theta > 0$ Indicates homophily

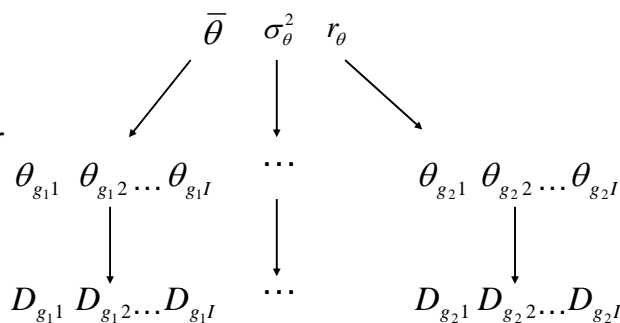
θ Each of the parameters: $\lambda \quad \gamma \quad \beta \quad \rho$

Hierarchical Bayesian Model

Population

Group/Consumer

Data



Model Summary

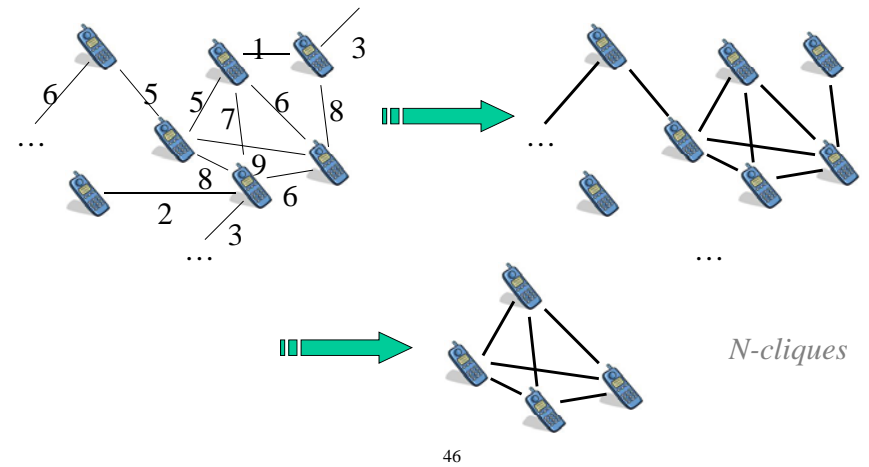
Two Components about consumer behavior

- When to purchase?
 - Proportional hazard model
 - Relates exposure to others within a group and outside of a group as well as baseline factors to predict when a purchase is made
- What to buy?
 - Multinomial choice model
 - Relates song characteristics as well as in-group and out-of-group exposure to which song genre's will be chosen
- Framed in a hierarchical Bayesian model to allow for individual variation

Results

45

Groups



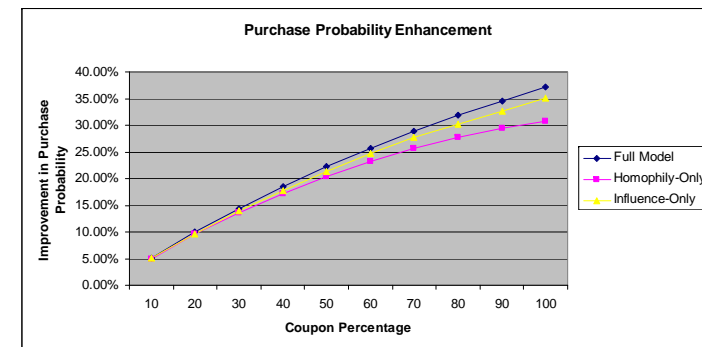
46

Findings

- Strong social influence effects in both purchase-timing and product-choice decisions
- If we distinguish influence of in-group versus out-group we find that former is more important in purchase timing, while the latter is more important in product choice decision
 - E.g., although customers are subject to influence by their friends, this may be moderated by a desire not be perceived as imitating
- Strong homophily effect in the product-choice decision, where customers who are close by tend to have similar product tastes as well as similar susceptibility to influence

47

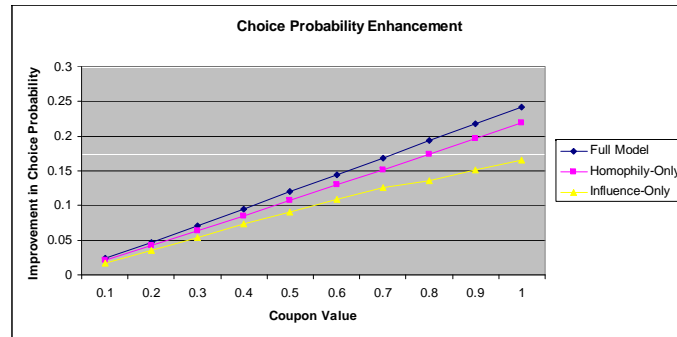
Policy Simulation



4-10% Improvement In Purchase Probability

48

Policy Simulation



12-35% Improvement In Product Choice Probability

49

Conclusions

50

Conclusions

- We are starting to see a shift in marketing emphasis on social media. This is not new, word-of-mouth has always been a dominate way of promotion
- What is different is that marketers can now directly measure it, participate in it on a massive scale, and influence it.
- Applications and research on social network influence is still early, but results show that it is impactful if used properly.
- It is critical to understand the difference between correlation and causality in this context. Both are present, but have very different implications.

51