NETWORK EFFECTS AND “VIRALITY”

David R. Bell
Xinmei Zhang and Yongge Dai Professor
Overview

• Benefits that arise from "network effects" and how we can leverage networks (as discussed in a prior lecture)

• Two key ideas around viral features: of products and of content

• Baking in “network effects” and / or building viral products and content are key imperatives in the digital economy, especially when it comes to acquisition and retention of customers

• We’ll examine some important ideas from research

• And we’ll conclude with an exercise
Key Questions

- What are “network effects” and how can marketers build them and benefit from them?
- Can we bake viral features into products, and if so, which type of features (active or passive) work better?
- Can we create content that is more likely to “go viral” and if so, what’s the “formula”?
Network Effects: Example of Metcalfe’s Law

• Key facts:
  – Value of a network is proportional to the square of the connected user base
  – Size increases linearly, value increases much faster
  – For $n$ individuals, value is proportional to $n(n-1)/2$
Network Effects in Practice

• Non-customers are more likely to become customers when:
  – The experience of an individual gets **better** when the network gets **bigger**
  – Current customers can easily share their experience
  – The act of sharing delivers an intrinsic or extrinsic reward
Ideas from the “Old Economy”

• Word-of-mouth (WOM) is the most effective form of marketing and critical for customer acquisition

• WOM accelerates when
  – Product / service is outstanding
  – Users can “show and tell”
  – There’s a focal attribute around which one can build a story
  – Senders and recipients of WOM share circumstances
Social Visibility (Product and Content)
The Principle

- The ease with which ideas and information can be shared is a critical feature of the digital economy
  - MIT study (viral features of products)
  - Wharton research framework (properties of viral content)
Viral Features of Products

Figure 1  Graphical Representation of the Experimental Comparison

<table>
<thead>
<tr>
<th>Baseline group</th>
<th>Passive-broadcast group</th>
<th>Active-personalized group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friends of baseline group</td>
<td>Friends of passive-broadcast group</td>
<td>Friends of active-personalized group</td>
</tr>
</tbody>
</table>
Study Findings

• Relative to the control group the two groups with viral features showed:
  – A greater number of peer adopters
  – Faster adoption by peers
  – Deeper adoption by peers

• In comparing passive versus active viral features
  – Active has a higher marginal impact
  – But … passive has a higher total impact

• And, customers with viral features use the product more!
Viral Features of Content: STEPPS

Volvo Commercial
Study Findings

• **Social Currency**
  – Sharers of information like to look good by association, appear to be smart and “in the know”

• **Triggers**
  – Information that is top of mind or ”in the background” is more likely to be shared

• **Emotion**
  – High arousal emotions like excitement and awe stimulate people and encourage them to share
Study Findings

• **Public**
  – Whatever is more socially observable is more likely to be shared

• **Practical Value**
  – People share information and insights that they believe will help the recipients

• **Stories**
  – It’s important to wrap everything together in a memorable narrative!
Exercise
SOCIAL ADVERTISING AND SOCIAL TARGETING

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Wharton | UNIVERSITY of PENNSYLVANIA | ONLINE
Overview

• Can advertising and targeting effectiveness be increased by knowledge of social relationships?

• Our two key principles are homophily and influence

• Our goal as (digital) marketers is to understand how to leverage social relationships among existing and potential customers

• We’ll explore key findings from research
  – MIT study (social advertising)
  – Microsoft study (social targeting)

• And we’ll conclude with an exercise
Networks, Targeting and Advertising
Social Advertising

• Ads are targeted to potential customers on the basis of connections in a social network
  – Leverage knowledge of who is connected to whom (exploit homophily)
  – Tailor content with information relevant to the social relationship (overlay influence)

• Connection to other lectures
  – Networks
  – Advertising and media consumption
A Social Advertisement

“Incorporates user interactions that the consumer has agreed to display and be shared … the resulting ad displays the user’s persona within the ad content.”
Experimental Setup
### Controlled Experiment

<table>
<thead>
<tr>
<th>Condition</th>
<th>Baseline: Only Shown Baseline text</th>
<th>Social Variant: Shown all 5 texts from Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Untargeted</td>
<td>All people in US over age of 18 who are not fans of the non-profit already.</td>
<td>All people in US over age of 18 who are friends of the non-profit’s supporters who are not fans of the non-profit already.</td>
</tr>
<tr>
<td>Charity</td>
<td>All people in US over age of 18 who state affinity with charities on their Facebook profile who are not fans of the non-profit already.</td>
<td>All people in US over age of 18 who state affinity with charities on their Facebook profile who are friends of the non-profit’s supporters who are not fans of the non-profit already.</td>
</tr>
<tr>
<td>Education</td>
<td>All people in US over age of 18 who state affinity with education on their Facebook profile who are not fans of the non-profit already.</td>
<td>All people in US over age of 18 who state affinity with education on their Facebook profile who are friends of the non-profit’s supporters who are not fans of the non-profit already.</td>
</tr>
</tbody>
</table>
## Controlled Experiment

<table>
<thead>
<tr>
<th>Condition</th>
<th>Ad-Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>Help girls in East Africa change their lives through education.</td>
</tr>
<tr>
<td>Be like your friend</td>
<td>Be like your friend. Help girls in East Africa change their lives through education.</td>
</tr>
<tr>
<td>Don’t be left out.</td>
<td>Don’t be left out. Help girls in East Africa change their lives through education.</td>
</tr>
<tr>
<td>Your friend knows</td>
<td>Your friend knows this is a good cause. Help girls in East Africa change their lives through education.</td>
</tr>
<tr>
<td>Learn from your friend.</td>
<td>Learn from your friend. Help girls in East Africa change their lives through education.</td>
</tr>
</tbody>
</table>
Finding 1: Social Targeting

Figure 2: Social advertising is effective
More Findings

• So, what explains the success of social advertising?
  – Homophily!

• The next question: Can influence can be layered on top of the social advertisement?
  – Baseline case
  – “Be like your friend”
  – “Don’t be left out”
  – “Your friend knows”
  – “Learn from your friend”
**Finding 2: Influence**

<table>
<thead>
<tr>
<th>Table 7: Social Advertising is Less Effective if an Advertiser is Too Explicit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All</strong></td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>SocialTargeting_Endorsement</td>
</tr>
<tr>
<td>SocialTargeting</td>
</tr>
<tr>
<td>SocialTargeting_Endorsement × Explicit</td>
</tr>
<tr>
<td>Untargeted</td>
</tr>
<tr>
<td>SocialTargeting_Endorsement × Don’t be left out</td>
</tr>
<tr>
<td>SocialTargeting_Endorsement × Be like your friend</td>
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<tr>
<td>SocialTargeting_Endorsement × Learn from your friend</td>
</tr>
<tr>
<td>SocialTargeting_Endorsement × Your friend knows</td>
</tr>
<tr>
<td>SocialTargeting × Explicit</td>
</tr>
<tr>
<td>Date Controls</td>
</tr>
<tr>
<td>Observations</td>
</tr>
<tr>
<td>Log-Likelihood</td>
</tr>
<tr>
<td>R-Squared</td>
</tr>
</tbody>
</table>

Estimates. Dependent variable is the average daily click-through rate of ads that did not display the endorsement. Robust standard errors. * p < 0.10, ** p < 0.05, *** p < 0.01
From Social Advertising to Social Targeting

• So, we just saw that firms can benefit from social advertising, but that they need to be careful about trying to do too much overt influence.

• In **social targeting** we ask: Can knowledge of social relationships help us find “better” kinds of customers?
  – If so, then for what kinds of products?
  – And, is **social targeting** better than more conventional methods such as **demographic targeting**?
  – Finally: What if one had very detailed individual level data on a customer’s buying patterns and history?
Context
Demographic Targeting: Purchasing

Figure 2: Distribution of age and sex in the retail domain and how both variables relate to probability of adoption (purchase in the latter, six-month prediction period). The area of each point is proportional to the number of individuals in the corresponding category.
Demographic Targeting: Fantasy Sports

**Figure 3** Distribution of age and sex in the recreational league domain and the relationship of both variables to probability of adoption (participation in the subsequent season). The area of each point is proportional to the number of individuals in the corresponding category.
Social Targeting

(a) Probability of purchasing at the department store in the second period related to the number of social contacts one has who shopped at the store in the first period.

Number of contacts who previously made purchases

(b) Probability of joining the fantasy football league in 2009 related to the number of social contacts one has who joined in the previous year.

Number of contacts who participated previously
Questions

Q1: Why do the circles get smaller the as the number of adopting contacts increases?

Q2: Why is the adoption line steeper for fantasy sports?
Observations and New Questions

- **Demographics** are somewhat help
- **Social contacts matter**—contacts of adopters and significantly more likely to adopt!
  - Is the effect more prevalent for certain kinds of products?
  - And, is social targeting better than more conventional methods such as demographic targeting?
  - Finally: What if one had data on past behavior or very detailed individual level data on a customer’s buying patterns and history?
Summary

• **Social advertising is effective**
  – Due to homophily (but be careful in trying to “push” influence

• **Social targeting is effective**
  – “The mere connection to an individual who has previously taken an action is indicative of a higher than average propensity to act oneself”
  – This implies that we might not have to always care about “disentangling homophily and contagion” (we can still benefit from improved predictions about behavior)
Exercise
MEDIA AND COMMUNICATION PLATFORMS AND PERSUASION

David R. Bell
Xinmei Zhang and Yongge Dai Professor
Overview

• Is content that’s more viral also more persuasive?
• What motivates individuals to participate on social platforms?
• Our goal as (digital) marketers (and individuals) is to understand how to create content that **maximizes** on both dimensions
• We’ll explore key findings from research
  – MIT study (persuasion)
  – Columbia study on micro-blogging
  – Boston University study on social conformity
Sharing and Persuasive Content and
“In order to make content more ”shareable” or viral, creators and firms might need to sacrifice some elements of content that potentially damage persuasiveness.”

You can watch the latest ”top viral videos” here http://www.visiblemeasures.com/insights/charts/adage/
Persuasion Study

• Over 400 videos collected from a host of contents
  – Consumer packaged goods, electronics, fashion apparel, food (primarily fast food)
• Main variables of interest are
  – Total views that were observed (including sharing, copies, other derivatives and memes)
  – Comments that were generated and measures of persuasiveness from over 25,000 brand surveys
  – **Dependent variables**—purchase intent and recall
Findings

• Advertising works 😊!
  – Exposure alone (to video advertising seeded on social sites) increases purchase intent by about 7%
  – **But** …
  – The average amount of persuasion was **higher** for ads that had fewer than the median views
  – So **persuasion loss** kicks in … (in the study at around 3-4 million views)
Findings (Alternative Hypotheses)

• “Wear out”
  – The same individual watching the video multiple times
• Too many parody memes
  – Scorn / shock / mock were all controlled for
• Too many platforms seeded
  – Again, was controlled for …
Example
## Table 7: Correlation of ad characteristics with total views and comments ratio

<table>
<thead>
<tr>
<th></th>
<th>Total Views</th>
<th>Total Comments:Total Views Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outrageous Rating</td>
<td>0.103***</td>
<td>-0.0191**</td>
</tr>
<tr>
<td>Provocative Rating</td>
<td>0.110***</td>
<td>-0.0381***</td>
</tr>
<tr>
<td>Funny Rating</td>
<td>0.0734***</td>
<td>0.0131*</td>
</tr>
<tr>
<td>Visual Appeal Rating</td>
<td>0.0384***</td>
<td>0.0203**</td>
</tr>
</tbody>
</table>

Raw Correlations shown between various Ad Characteristic Ratings and Total Views in Column (1) and the ratio of Total comments: Total Views in Column (2). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. 

Comments and Execution
Personal Content Study

• Real users on Twitter were endowed with more followers
  – The researchers manipulated the number of followers that real
    users had, to see how they reacted

• There are many places you can go to check your own level of
  influence or “platform self worth”
  – https://klout.com/home
  – https://www.brandwatch.com/
Depends on “Where You Start”

\[ P_i = \frac{U(\text{intrinsic})}{U(\text{intrinsic}) + U(\text{image})} \]

Average value = .25
Median value = .12
"All of us are stars and deserve the right to twinkle"

However …

- **Culture** and **individual differences** (distinctiveness principle) might matter too …
Research Study

• [http://www.kaixin001.com/](http://www.kaixin001.com/)
• Users could
  – Decorate virtual houses
  – Invite friends to visit these houses
  – Visit their friends’ houses
• Three experimental conditions …
Findings

**Condition A** “Most popular color among your **friends**”

**Condition C** “Most popular color among **all users**”

When majority choice becomes more popular with friends, **subjects diverge**
Findings

**Condition A** “Most popular color among your friends”

**Condition B** “Most popular color among your friends plus, don’t forget to show your house”

Subjects are even less likely to choose popular color when reminded choices are visible … except when adoption approaches unanimity (extreme pressure to conform)
MEDIA PLATFORMS, UGC, AND SENTIMENT

David R. Bell
Xinmei Zhang and Yongge Dai Professor
Overview

• How does sentiment differ across the major new media channels, broadcast media, social networking sites, and micro-blogs?

• What contributes to persuasiveness and stickiness of user generated content?

• Our goal as (digital) marketers is understand, precisely how platform and creative source drive affect and engagement

• We’ll explore key findings from research
  – York University (sentiment and platforms)
  – Innsbruck University (source credibility)
  – US study (YouTube stars) + Interview

• And we’ll conclude with an exercise
Platforms and Sentiment
Findings on Sentiment

• **Broadcast Media (YouTube)**
  – Brands play a “supporting” rather than central role” (75-25 rule)

• **SNS and Microblog (Facebook and Twitter)**
  – More likely to turn “negative” … why?

• **Microblogs**
  – Useful platforms for proactive brands
A Segue to UGC

Tyler Oakley—Warby Parker (https://www.warbyparker.com/) example http://www.youtube.com/watch?v=yZ1iTo9Wjrc (starting 2:04)
Study

• Random sample of 150 videos
• Research question: Do viewer perceptions of source trustworthiness and expertise differ when the think content is UGC or AGC?

• Experimental manipulation
  – Videos were either AGC or UGC
  – Videos were either high or low quality
Findings
Study

• Random sample of 140 videos
• Research question: To what extent is the **diffusion** and **spreading** of user generated video content affected by
  – The network structure of the creator (reach and strength)
  – Content characteristics (what is said)
  – Creator characteristics (age, gender, history of content generation)
A Segue to the Findings

Findings

Network Structure

- Size: each additional 100 subscribers contributes 2% increase in diffusion
- Connectivity: positive effect but negative quadratic … as connectivity rises extent of contagion increases then decreases …
  - Implication: a highly clustered network may not allow information to travel too far beyond it
Findings

**Content characteristics**

- Entertainment or educational value: each additional point (on 10-point scale) contributes 3-4% increase in diffusion
- Quality: each additional point (on 5-point scale) contributes 12-13% increase in diffusion

**User Characteristics**

- Experience: every 10 prior pieces of content lead to 7% increase in diffusion, every additional 100 views 1-2 increase in diffusion
TRADITIONAL AND ORGANIC CELEBRITY

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ONLINE
Observation

"In a celebrity-driven culture it is inevitable that people would become viewed—and view themselves—as brands"
Overview

• Why do firms engage celebrities over a variety?
• What are the characteristics of “organic celebrity” and how do they differ from “real celebrity”?
• Our goal as (digital) marketers is to identify individuals and platforms that deliver the maximum benefit for our brands and narrative?
• We’ll explore key findings from research
  – Classic study on celebrity
  – New research on properties of organic celebrity
Classical and Modern Views on “Celebrity”

• **Classical communication theory**—a minority, “the influentials” exert disproportionate influence over others and once these individuals are targeted or deployed … a large scale “chain reaction” takes place and influence cascades
  – *Can you think of an example?*

• **Modern view**—Interpersonal relationships among “ordinary” individuals actually matters much more
  – *Can you think of an example?*

• **Modern view corollary**—Subject specific expertise …
Traditional Celebrity

• Check out the following advertisement with the famous basketball player, Shaquille O’Neal [http://www.ispot.tv/ad/7otY/buick-lacrosse-featuring-shaquille-oneal](http://www.ispot.tv/ad/7otY/buick-lacrosse-featuring-shaquille-oneal) “More than expected”

• Research says
  – Positive transfer is more likely when there is congruence between the endorser and product (Swiss watches)
  – Positive transfer is more likely when the endorser is sincere (unnamed actress was a vegetarian yet endorsed the National Beef Council!)
  – Economic analysis of 110 campaigns shows positive effect on stock prices
Traditional and Organic Celebrity Combined

• 6 million Twitter users
• Three key measures
  – “In degree influence” or, number of followers
  – “content influence” or, number of retweets
  – “affective influence” or, number of mentions
  – Shaq, NYT, Ashton
Findings

Table 1: Spearman’s rank correlation coefficients

<table>
<thead>
<tr>
<th>Correlation</th>
<th>All</th>
<th>Top 10%</th>
<th>Top 1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indegree vs retweets</td>
<td>0.549</td>
<td>0.122</td>
<td>0.109</td>
</tr>
<tr>
<td>Indegree vs mentions</td>
<td>0.638</td>
<td>0.286</td>
<td>0.309</td>
</tr>
<tr>
<td>Retweets vs mentions</td>
<td>0.580</td>
<td>0.638</td>
<td>0.605</td>
</tr>
</tbody>
</table>

”Fame” (in-degree), “Interesting” (retweets), “Positive Affect” (mentions)
Truly Organic

The Pioneer Woman

Confessions of a Pioneer Woman
Sep. 24, 2012 | Longhorn Haku

My name is Ree
I'm a desperate housewife. I live in this country. I channel Lucille Ball, Vivien Leigh, and Ethel Merman. Welcome to my frontier!

Find The Pioneer Woman on:

New Butter Friends

I love butter. This is a fact that is well established, well known, well proven, and well demonstrated. My fridge is filled with not sticks of butter, but pounds. As an ingredient, I believe in butter. Butter is a church of which I am a member. If butter ran for president, I would vote for it. It adds color, flavor, beauty, and joy to absolutely everything I cook.

It adds meaning to my days.

Purpose to my life.

What I'm trying to tell you is this, ladies and gentlemen: I wouldn't want to live in a world in which butter didn't exist.

Have I mentioned lately that I love butter?
Traditional and Organic Celebrity and Topics

- Do certain individuals have "outsized" influence over particular topics?
- Three different domains
  - Political—Iranian presidential election or, number of followers
  - Medical—H1N1 (so called "swine flu")
  - Pop culture—the passing of Michael Jackson

- Each topic reached around 20,000,000 people and about 14,000 people discussed all three topics
Findings
Key Ideas

- “Popular” users are not necessarily influential in spawning either mentions or retweets
- Some influential users have significant influence over a variety of topics which implies that
  - Local opinion leaders could be used to spread information outside their direct area of expertise
  - We should target the “top” people in our domain
- Influence cannot be gained spontaneously but requires “concerted effort”
Two Examples ("Real Celebrity")
Exercise: Compare and Contrast (Honest Company vs. Michelle Phan)

- [http://michellephan.com](http://michellephan.com) and [https://www.ipsy.com](https://www.ipsy.com)
- With …
- [https://www.honest.com](https://www.honest.com) and [https://en.wikipedia.org/wiki/Jessica_Alba](https://en.wikipedia.org/wiki/Jessica_Alba)
- Some reading