The Structure of Online Relationship Markets

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Today’s Presentation

1. Use network of messages on major online dating site to examine online dating market structure:
   - **Sub-markets:** messages cluster within subgroups
   - **Leagues:** hierarchies within or between subgroups

2. Determine whether sub-markets and leagues differ across cities that vary in the ratio of men to women:
   - **New York:** Predominantly female market
   - **Seattle:** Predominantly male market

Dimensions of Market Structure

**Market Position (sub-markets)**
- Put people together who message one another
  - **Message initiation:** aspirational view of the market
  - **Message reply:** realistic view, conditional on initiation

**Market Desirability (popularity)**
- Overall demand for a particular mate
- Determined by preferences & supply of mates

For Leagues to Exist

**Hierarchy of Desirability**
- Some people are more desirable than others

**Limit to Reach**
- Desirable people sought by, but unavailable to, less desirable others

DATA & MEASURES

Market Position: **Discrete**

degree corrected stochastic block models
Online Dating Data

Among Most Popular US Sites (> 4M active users)
- Free website aimed at general population
- Wide range of relationship types
- On average: young, coastal, urbane
- Straight users activity in January 2014

<table>
<thead>
<tr>
<th>New York</th>
<th>Seattle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>Age</td>
<td>32</td>
</tr>
<tr>
<td>Msgs Received</td>
<td>81</td>
</tr>
<tr>
<td>Total</td>
<td>50,618</td>
</tr>
<tr>
<td>% of Market</td>
<td>47</td>
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</tbody>
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SEX RATIOS & MARKET SHIFTING

Age Distribution

Market Shifting, New York
DO LEAGUES EXIST?

Determining the Desirability Gap

1. Calculate desirability percentiles
   - Percentile PageRank scores within men and within women
     - Desirability relative to members of the same sex
     - Allows us to ask questions like:
       - Does the median woman message the median man?

2. Calculate difference in desirability percentiles of users who sent & received initial messages
   - Desirability of receiver – Desirability of sender
   - Varies from -1 to 1
     - 0 = no difference in relative desirability
     - > 0 = receiver more desirable than sender
     - < 0 = sender more desirable than receiver

Reaching Up in Initial Message

- Men
- Seattle
- Women

- Men
- New York
- Women
Limits to Reach

Men

Women

Probability of a Reply

Desirability Gap

Summary

Age is a major factor structuring sub-markets, but no the only factor

– Results not shown: racial sorting into sub-markets as well

Sex imbalances distributed unevenly across market

– End result of market shifting

– Excess of ...
  • men leads to surplus of men in younger markets
  • women leads to surplus of women in older markets

Evidence that leagues exist

– Tendency for people to message “up” market food chain
– Probability of reply varies with desirability gap