

The Structure of Online Relationship Markets

Elizabeth Bruch
Department of Sociology & Complex Systems
University of Michigan

[Joint work with Mark Newman, Physics and Complex Systems, U-Michigan]

August 24, 2015
Chicago, IL



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

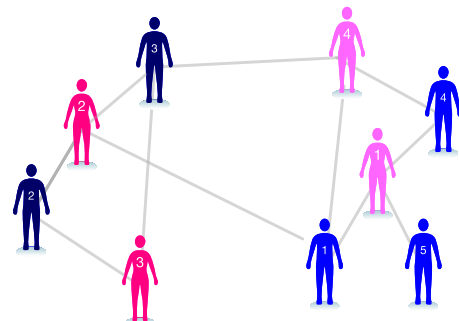
–Some people are more desirable than others

Limit to Reach

–Desirable people sought by, but unavailable to, less desirable others

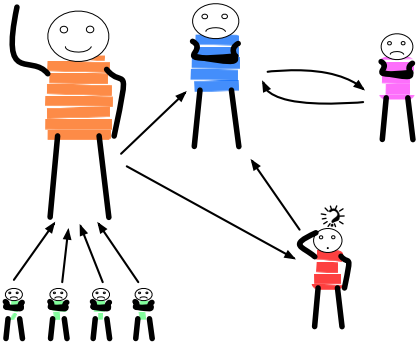
DATA & MEASURES

Market Position: *Discrete*



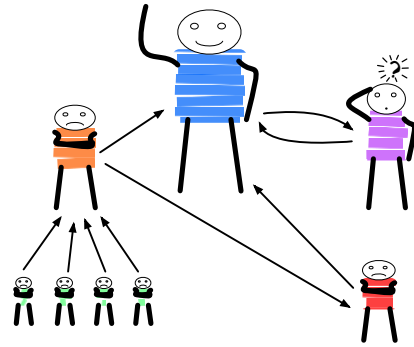
degree corrected stochastic block models

Measuring Market Desirability



Note: Arrows denote messages. Person size proportional to desirability.

Weighting by Status of Sender



Note: Page rank measure. Weighted by desirability of sender.

Online Dating Data

Among Most Popular US Sites (> 4M active users)

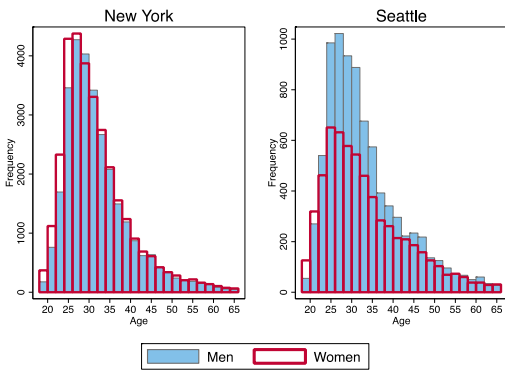
- Free website aimed at general population
- Wide range of relationship types
- On average: young, coastal, urbane
- Straight users activity in January 2014



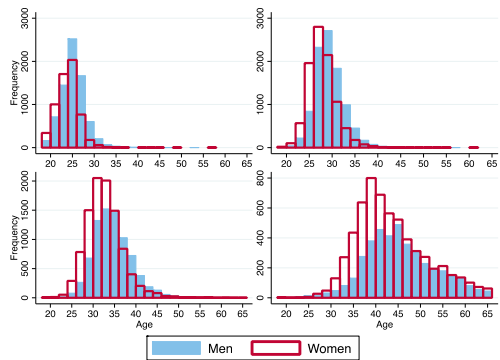
	New York		Seattle	
	Men	Women	Men	Women
Age	32	32	33	33
Msgs Received	81	100	16	43
Total	50,618	44,009	12,682	9,233
% of Market	47	53	58	42

SEX RATIOS & MARKET SHIFTING

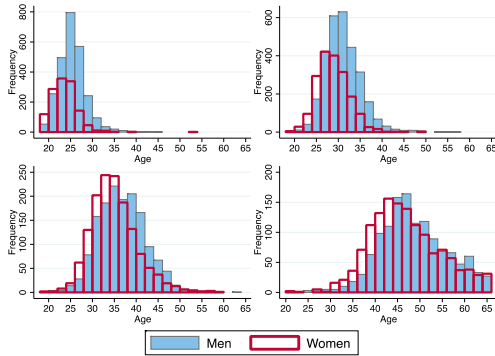
Age Distribution



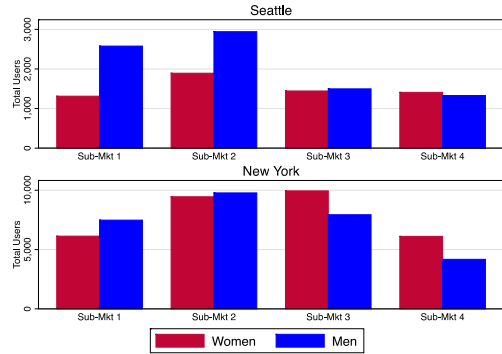
Market Shifting, New York



Market Shifting, Seattle

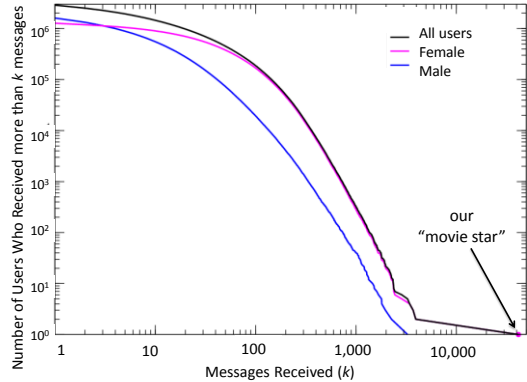


Sex Ratio by Sub-Market



DO LEAGUES EXIST?

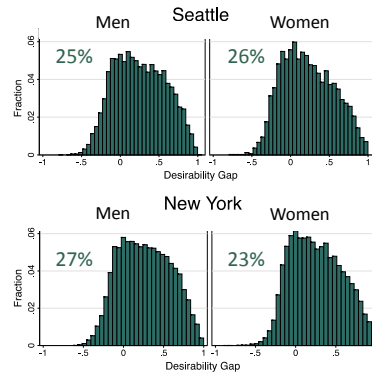
A Hierarchy of Desirability



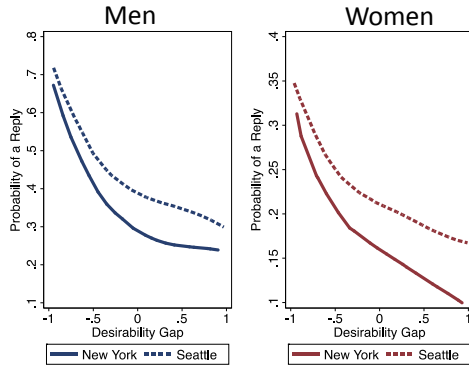
Determining the Desirability Gap

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



Limits to Reach



Summary

Age is a major factor structuring sub-markets, but not 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