Mobile Ad Effectiveness: Hyper-Contextual Targeting with Crowdedness
STANDING IN AN ELEVATOR
WITH A STRANGER

TAKE OUT YOUR PHONE AND
PRETEND TO TEXT SOMEONE
Mobile Targeting Motivation

• Ad spending: $100B by 2018

• Key: reach consumers when and where most receptive

eMarketer 2014
Mobile Technology

- Portability = Real-time Targeting

- GPS, Wi-Fi, Bluetooth, iBeacon = Geo-Targeting
Mobile Targeting with Crowdedness

• Mobile technology can gauge crowdedness on-the-go
Research Objective

(1) How does crowdedness affect consumer response to mobile targeting?

(2) What drives the results?
Research Design

• **Ideal** test of crowding effects:
  • randomize crowdedness

• **Our** test:
  • field data measuring crowdedness with mobile technology
Measuring Crowdedness

Passengers/m²: mobile users connect to subway-specific cellular line
Overview of Results

• Crowding positively affects mobile ad purchase
  • Crowding invades space so people turn inwards

• Results opposite of crowding literature
  • Crowding in retail stores decreases purchases
  • May be a different manifestation of avoidance

Harrel et al. 1980; Zhang et al. 2014
Overview of Results

• Paradox of crowded environment
  • Noise *distracts* consumer attention to ads
  • But, crowding *boosts* attention to *signal* of mobile ads

Bart et al. 2014; Ghose and Han 2014
Prior Research

Mobile Marketing

Crowdedness
Mobile Research

• Mobile internet search behavior

• Coupon redemption rates

• Time and location
  (*my forthcoming Management Science paper)

• Geographic mobility

Ghose et al. 2013; Molitor et al. 2014; Luo et al. 2014; Ghose and Han 2011
Mobile Research

- In-store mobile promotions
- Product characteristics
- Cross-platform synergies
- Environmental factors

Hui et al. 2013; Bart et al. 2014; Ghose et al. 2014; Molitor et al. 2013
Crowdedness Research

• Disease and juvenile delinquency

• Stress, frustration, hostility

• Felt loss of control

Schmitt 1966; Collette and Webb 1976; Zimbardo 1969
Crowdedness Research

- Avoidance behaviors
- Threatened sense of uniqueness
- Risk aversion

Harrell et al. 1980; Xu et al. 2012; Meang et al. 2013
Field Data (Quasi-field experiments)

- Business Weekday
- Weekend Day
- Exogenous Crowding
Measuring Crowdedness

- **passengers/m²**: Subway mobile users connect to subway-specific cellular line
Parts 1 & 2

• Targeted subway population: 2 million commuters

• **Sample size:** pushed to 10,360 mobiles
  • Weekday and weekend
Mobile Message

- 20 Minute Expiration

- Promotional Discount

Missed a call and want to know from whom? Subscribe to [Wireless Service Provider's] missed call alert package and receive SMS notification of the calls you missed! Only ¥9 for 3 months! Get ¥3 off if you reply “Y” to this SMS within 20 minutes!
Self-Selection Threats

(1) Peak hours vs. non-peak hours of crowdedness
   • 5 times (7:30-8:30, 10-12, 14-16, 17:30-18:30, 21-22 hrs)
   • Subway station and direction

(2) Weekdays and weekends
Self-Selection Threats (cont’d)

(3) Randomization

- Excluded users who had the service or received the SMS already
- *Randomized* remaining users and pushed SMS.

(4) Personal mobile usage habits

- ARPU
- MOU
- SMS
- GPRS
Additional Self-Selection Approaches

- Same-train-same-time subsample analysis
Additional Self-Selection Approaches

- Propensity score matching
Effect of Crowdedness

<table>
<thead>
<tr>
<th>Crowdedness as Passengers/m²</th>
<th>Purchase Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.91</td>
<td>2.5</td>
</tr>
<tr>
<td>1.96</td>
<td>2.7</td>
</tr>
<tr>
<td>3.05</td>
<td>2.9</td>
</tr>
<tr>
<td>4.02</td>
<td>3.1</td>
</tr>
<tr>
<td>4.97</td>
<td>4.1</td>
</tr>
</tbody>
</table>

- 16% increase from 0.91 to 1.96
- 49.5% increase from 3.05 to 4.97
Endogeneity Threat

- Identification with street closures
Street Closure Crowdedness

<table>
<thead>
<tr>
<th>Crowdedness as Passengers/m²</th>
<th>Purchase Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.11</td>
<td>1.0%</td>
</tr>
<tr>
<td>2.72</td>
<td>1.5%</td>
</tr>
<tr>
<td>3.05</td>
<td>2.0%</td>
</tr>
<tr>
<td>3.54</td>
<td>2.5%</td>
</tr>
<tr>
<td>3.99</td>
<td>3.0%</td>
</tr>
<tr>
<td>4.13</td>
<td>3.5%</td>
</tr>
<tr>
<td>Parameter</td>
<td>Model 1</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>Crowdedness</strong></td>
<td></td>
</tr>
<tr>
<td>×</td>
<td></td>
</tr>
<tr>
<td><strong>Street Closures</strong></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Crowdedness</strong></td>
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</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Street Closures</strong></td>
<td>-0.120</td>
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<tr>
<td></td>
<td>(.117)</td>
</tr>
<tr>
<td><strong>Ln(ARPU)</strong></td>
<td>0.301**</td>
</tr>
<tr>
<td></td>
<td>(.118)</td>
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<tr>
<td><strong>Ln(MOU)</strong></td>
<td>-0.043</td>
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<tr>
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<td>(.065)</td>
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<tr>
<td><strong>Ln(SMS)</strong></td>
<td>0.014</td>
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<tr>
<td></td>
<td>(.069)</td>
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<tr>
<td><strong>Ln(GPRS)</strong></td>
<td>-0.001</td>
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<td></td>
<td>(.024)</td>
</tr>
<tr>
<td><strong>Day(weekday) Effects</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Train (time cycle) Effects</strong></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>11,960</td>
</tr>
</tbody>
</table>
Endogeneity Threat

Identification with unanticipated train delays
Train Delay Crowdedness

Purchase Rate

Crowdedness as Passengers/m²

4.0% 4.5% 5.0% 5.5% 6.0% 6.5% 7.0% 7.5%

3.04 3.14 3.63 4.71

25
## Lower Threshold

Subsample with Low Crowdedness (under 2 passengers/m²)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Model 1</th>
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<tbody>
<tr>
<td>Crowdedness</td>
<td>-0.084</td>
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<tr>
<td>Mobile Behaviors</td>
<td>Yes</td>
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<tr>
<td>Day(weekday) Effects</td>
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<tr>
<td>Train (time cycle) Effects</td>
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<tr>
<td>Observations</td>
<td>2,886</td>
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</tbody>
</table>
Upper Threshold
More Evidence with Field Surveys

- **Participants:** 300 Purchasers & non-purchasers

- **Survey Response:** 240 of 300 mobile users = 80%.

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**Mobile Immersion**

- Crowdedness → Immersion: \(0.465^{***}\)
- Immersion → Involvement: \(1.375^{***}\)
- Involvement → Purchase: \(152^{*}\)
THANK YOU!

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