Youth Activity-Travel Behavior with Mobile Communications in Japan

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Implications of Information and Communications Technologies for Travel Behavior of Teens: What Does the Future Hold?
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Outline

- Mobile communications in Japan
- My research interests
- Case studies of two persons’ communications
  - Meeting appointment and waiting behavior using mobile phone
  - Communications behavior of young couples
Mobile Communications in Japan

• Mobile phone has rapidly become widespread.
  – Number of subscription of mobile phone is 94 million (penetration rate: 73%) in Nov. 2004.
  – Number of subscription of mobile phone with Internet access is 73 million (78%) in Nov. 2004.

• Mobile phone has so many functions: e-mail, Internet access, camera, listening to music, watching movie, playing game, TV phone, GPS, route navigation, credit card, etc.

• Young people use mobile phone anytime and anywhere, also while traveling.
I like mobile phone! I know how to use this.

Oh my god! Don’t call anyone!
What I have been doing

- Activity-based analysis of travel behavior based on “space-time prism” constraints
- Data collection of activity-travel scheduling/patterns using positioning technologies (GPS, GSM, etc.) and GIS
- Telecommunications could be also a demand derived from the desire to participate in activities in “cyberspace”.
My Research Interests in Telecommunications and Travel

- To investigate the way telecommunication use affects individual activity scheduling and travel behavior
- To investigate the reason why activities are scheduled and rescheduled (i.e. by one’s discretion or by communications)
- To update the theory of “space-time accessibility” to “virtual accessibility” incorporating activities engaged in cyberspace, including activities while traveling
- To investigate the relationships between real/virtual accessibility and activity-travel behavior
Extending the Concept of Accessibility

• Space accessibility
  – The ease to access to destination in space dimension

• Space-time accessibility
  – The ease to participate in activities in space and time

• Virtual accessibility
  – The ease to participate in activities in space and time and cyberspace
Virtual Accessibility

- Virtual accessibility: \( A = f(c_k, a_k, t_k) \)

  \( c_k \): cost for participating in activities at opportunity \( k \)
  (including travel cost)
  - Telecommunication cost, device literacy, etc.

  \( a_k \): attractiveness of opportunity \( k \)
  - The partner, contents of information obtained, etc.

  \( t_k \): available time at opportunity \( k \)
  - Available time for telecommunications
  - Introducing space-time constraints in real space
    where telecommunications device is available
Activity Schedule and Space-Time Path Including Telecommunications
Data to be Collected to Analyze Activity Scheduling Behavior with Telecommunications

- Activity diary with pre-planned activities and space-time constraints
  - activity type, start/end time, location, accompanied persons, travel mode
- Telecommunications diary
  - time, send/receipt, the contents, the partner, medium, the way it affects an activity scheduling (addition, deletion or modification of activities)
- Travel trajectory
  - by GPS, GSM, etc.
Dynamic Change of One Day Activity Schedule by Telecommunications
Case Studies of Two Persons’ Communications

- Meeting appointment and waiting behavior using mobile phone
- Communications behavior of young couples
Case Study 1: Meeting Appointment and Waiting Behavior

• Background and research questions
  – Dramatic change in “meeting behavior”
  – How should we evaluate “waiting spaces” in cities?

• Objective
  – To investigate the way of making an meeting appointment and waiting behavior of young people using mobile phone
Change in Waiting Behavior Before and After the Introduction of Mobile Phone

- **Phone call**: Time window which they can communicate with each other
- **t0**, **t1**, **t2**, **t3**, **t4**, **t5**: Time points
- **A**, **X**, **B space**: Locations
- **So angry! Bad activity!**
- **So happy! Good activity!**
- **Not worried about when B will arrive**
- **Worried about when B will arrive**
Meeting Appointment and Waiting Behavior

• Survey
  – January 2004: on-site interviewing survey
  – 87 young couples who made an appointment to meet at or around the Shinjuku railway station in Tokyo

• Data
  – Activity and telecommunications diary from making the appointment to actual meeting
Conclusions of Case Study 1

- Mobile phones have provided the option of communicating changes in meeting location and time to the partner.
- Waiting behavior vary depending on the timing to know the partner’s late arrival.
- People do activities while waiting for the partner and more than half of them do activities not at the pre-planned waiting spot but at shops around the spot.
Conclusions of Case Study 1 (contd.)

• When knowing the partner’s late arrival and the expected waiting time will increase, individual characteristics and the length of the expected waiting time affect activity choice while waiting.
• The results suggest that evaluation method of waiting spaces should be reconsidered, because people’s waiting behavior has dramatically changed.
Case Study 2: Communications Behavior of Young Couples

• Background and research questions
  – Are young couples, who cannot meet frequently but can telecommunicate, satisfied with their communications?
  – How can we prevent decrease in the number of children?

• Objective
  – To investigate interaction between face-to-face meeting and telecommunications of young couples (substitution or complementation?)
Meeting

Time when two persons can communicate with each other

Individual X | Cyber space | Individual Y

Telephone

Time when Individual A can use telecommunication

Time when Individual B can use telecommunication

Individual X | Cyber space | Individual Y
Communications Behavior of Young Couples

• Survey
  – In Nov. to Dec. 2003 (4 weeks): paper-based questionnaire survey and the subsequent depth interview survey
  – 15 young couples living in Tokyo (4 of them live together)

• Data
  – Activity diary with pre-planned activities and satisfaction level
  – Telecommunications diary ((mobile) phone and (mobile) e-mail)
  – Activity locations in GIS
  – Attitude toward their communications
- his activity location
- his home
- his office
## Frequency of Mobile Communications and the Partner

<table>
<thead>
<tr>
<th></th>
<th>Mobile phone</th>
<th>Mobile e-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Live separately (N=22)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency (/day)</td>
<td>1.7</td>
<td>3.5</td>
</tr>
<tr>
<td>% with boyfriend/girlfriend</td>
<td>48%</td>
<td>81%</td>
</tr>
<tr>
<td><strong>Live together (N=8)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency (/day)</td>
<td>0.7</td>
<td>3.5</td>
</tr>
<tr>
<td>% with boyfriend/girlfriend</td>
<td>60%</td>
<td>86%</td>
</tr>
</tbody>
</table>
Future Analyses of Case Study 2 (if possible)

- Relationships between the amount of face-to-face meeting and the amount of telecommunications
- Activity locations of each base stations (home and work) and of meeting together
- Relationships between communications and real/virtual accessibility
- Relationships between communications and satisfaction level of daily life
Future Research to be Addressed

- Telecommunications and activity-travel analysis
  - What kind of behavior is important?
  - How can we model dynamic scheduling behavior?
- Data collection
  - What kind of survey method should we apply for obtaining information about detailed and wide variety of telecommunication use which affect activity scheduling?
  - How can we prepare database of opportunities in cyberspace?
- How will cities change and what kind of cities should we aim at in the future?
Thank you for your attention! Welcome your comments!

I thank to the collaborators, Mr. Takayuki Hirano for “Waiting Behavior” and Ms. Yukari Niwa for “Couple Communications.”