Life, Family, and Peers on Transport

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Kyoto University
Kitamura as a “sensei”

Welcome to the family

What are you doing?

Get it together

Now that’s interesting
Fridays with Kitamura

- Social and environmental concerns
- People’s opinions and attitudes
- Stages of life
- The built environment
Where People Live

- Built Environment: Fukui, K.
  - Population
  - Commercial
  - Employment
  - Household
  - Individuals
  - Automobile ownership
People Getting Around

- Activity engagement: Susilo
- Cohorts: Maeda
- Lifecycle: Sun
- Children: Waygood
The Short-term Variability and the Long-term Changes of Individual Spatial Behavior in Urban Areas

2002/2005 Student: Yusak Octavius Susilo (UWE, Bristol, UK)

• Aims: Exploring the variability and the changes of the way individual compose their activity-travel engagements and their spatial movement in short & long term periods

• Methods:
  – Introduce model frameworks of how individual compose their travel and their activity space
  – Estimate with simultaneous equation models over time (from day-to-day basis and long term period)
  – Explore the impacts of individual heterogeneity, internal and external causes and trends of changes

• Data used: Osaka Metropolitan Area person-trip dataset and Mobidrive six-week travel diary
Results

1. The individual activity space variability is highly influenced by individual’s out-of-home commitments, their work and home locations as well as their unique preferences.

2. Unobserved heterogeneity and difference commitments across individuals are found as a major component that accounts for the variability of their centroid locations on weekdays.

3. The urban residents have expanded their travel and activities engagement as well as their action space over the 20–year period. In last 20 year period, transit users have superior action space than other mode users.

4. The structural relationships underlying their activity-travel patterns were not stable over time. Auto commuters, transit commuters and non-commuters are exhibit different tendencies of change, highly influenced by their commute mode characteristics.

5. The stability test has revealed that only the under-specified model is transferable over periods.
Cohorts: Maeda

- People are influenced by the era that they grow up in.
- This will affect their attitudes and beliefs.
- Those will affect their transportation mode use.
Lifecycle Stages: Sun

- At different stages of one’s life, there are different values and restrictions.
- If the population of an area remains the same,
  - Is just cohort differences between built environments?
- No
  - Separating out households into lifecycle stages.
  - Built environment explains more of the difference.
Children

- More vulnerable to built environment deficiencies for non-motorized travel.
- Compact development and children
  - Opinions on modes
  - Characterize travel
  - Role of built environment and people on:
    - Independent travel
    - Exercise
Children Results

- Personal: Opinions don’t matter, but differ by density.
- Societal: Overrides built environment
- Built environment:
  - Affects distances -> important for non-motorized
  - Affects interaction
- People
  - Knowing your neighbors
  - Traveling with other youth
- Exercise
  - Independent travel important
Thank you

Any Questions?
World View: Sakamoto

- individualists, egalitarians, hierarchists and fatalists.
- strongly associated with attitudes toward:
  - public policies, residential location preferences, health and environmental consciousness.
- Marketing: identify individuals to whom various mobility management measures would be effective.
- Factors exhibit strong correlations with age or sex, basic demographic variables.
Dake’s Worldview Categories

- Collectivism
- Individualism
- Egalitarianism
- Hierarchism
- Individualist
- Fatalist
- Egalitarianism
- Hierarchism
Distinguishing the Built Environments

• Population
  – Population density
  – Diurnal population change
  – Population concentration
Distinguishing the Built Environments

- Commercial
  - Office density
  - Retail shop density
  - Supermarket density
  - Service density
Distinguishing the Built Environments

- Employment
  - Employment rate change
  - Employment rate
  - Commuter percentage
Distinguishing the Built Environments

- Household
  - Single person household percentage
  - Average household size
Distinguishing the Built Environments

- Individuals
  - Youth and Elderly percentages
  - Average age
Distinguishing the Built Environments

- Automobile ownership
Five Built Environments
Highly Commercial
Mixed Commercial
Mixed Residential
Autonomous
Unurbanized
Household Lifecycle Stages

- Younger single
- Younger childless couple
- Pre-school nuclear
- Young school nuclear
- Older school nuclear
- All adults
- Older childless couple
- Older single
- Single parent
- Others
Household Automobile-Use by Built Environment Type over Four Decades

- Highly Commercial Area
- Mixed Commercial Area
- Mixed Residential Area
- Autonomous Area
- Unurbanized area

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Summary of Trend

- Higher density areas saw less growth in automobile’s share of trips.
- Is it because young families move out and only the older people who grew-up walking remain?
Household Automobile-Use by Lifecycle across the Built Environments (2000)
Household Automobile-Use by Lifecycle across the Built Environments (2000)
## ANOVA Results

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Household Trip Number by Lifecycle across the Built Environments (2000)

- Younger single
- Preschool nuclear
- Older school nuclear
- Older childless couple
- Single parent

- Highly Commercial area
- Mixed Commercial area
- Mixed Residential area
- Autonomous area
- Unurbanized area
Household Trip Number by Lifecycle across the Built Environments (2000)
Conclusions

• The built environment explains more of the changes seen than household lifecycle stage.
  – Greatest increases in low density areas.
  – Similar reduced car use is seen within the same built environment, not household lifecycle stage.
  – Similar trip generation is seen within household lifecycle stage, not the built environment.

• For a area-wide TOD-like built environment, higher density areas have restricted car use.
Model Systems for Non-Commuters

Time Budget

No. of Non Work Visits ($v_{NW}$)

Time for Non Work Activity ($t_{NW}$)

No. of Trip Chain ($n_c$)

No. of Trips ($n_T$)

Total Travel Time ($t_T$)

\[
\begin{align*}
    t_{NW} &= f_{t_{NW}}(R, W) \\
    v_{NW} &= f_{v_{NW}}(t_{NW}, R, W) \\
    n_c &= f_{n_c}(v_{NW}, R, W) \\
    n_T &= v + n_c \\
    t_T &= f_{t_T}(n_T, R, W)
\end{align*}
\]
Model Systems for Commuters

Individual Daily Time Budget for Activity and Travel

Given:
- Work Activity Time
- No. of Work Visits
- Commute Distance

Non-Work Activity Time ($f_{NW}$)

Number of Non-Work Visit ($n_{NW}$)

Number of Trip ($n_{C}$)

Total Number of Trip per Day ($n_{T}$)

Total Travel Time Expenditure per Day ($t_{T}$)

\[
\begin{align*}
t_{NW} &= f_{t_{NW}} (d_{X}, t_{W}, v_{W}, R, W) \\
v_{NW} &= f_{v_{NW}} (t_{NW}, d_{X}, R, W) \\
n_{C} &= f_{n_{C}} (v_{NW}, v_{W}, d_{X}, R, W) \\
n_{T} &= v + n_{C} = v_{W} + v_{NW} + n_{C} \\
t_{T} &= f_{t_{T}} (n_{T}, d_{X}, R, W)
\end{align*}
\]
The Concept of the Second Moment

The individual action space represented by:

1. The distance of activities location centroid from home locations ($I_H$)
2. The diversification of activity locations toward the centroid location ($I_C$)
Related publications

- And still one at drafting stage (has been on-hold for sometime), hopefully will be presented and published at the forthcoming TRB annual meeting.
Ryuichi is a teacher who never despise anybody, no matter how weak and inexperienced the student is (like me). Despite of his tight schedules, he always have time to tailored his approach based on each students’ ability and personality.

I really miss him as a teacher, a father and a very good friend …