

Driving the movement toward activity-based approach for the better understanding of trip chaining behavior

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THE ROOT OF RYUICHI'S JOURNEYS

- The root where **Ryuichi** had been brought up was abundant in academic resources.
 - There was a research laboratory like a treasure box in Kyoto University, that is, Professor SASAKI's lab.
 - Since 1960s, Professor SASAKI had been leading a lot of the drivers who were much inquisitive as to travel demand modeling, traffic flow theory and transportation planning.
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THE TRIP CHAIN TREE IN SASAKI'S LAB

- n Many senior researchers were thinking as birds were singing in the trip chain tree in 1970s.
- n SASAKI (1971): Estimation of Person Trip Pattern through Markov Chain, (in 5th Transpn. &Traffic Flow Sympo.)
- n KONDO (1974): Estimation of Person Trip Pattern and Modal Split, (in 6th Transpn. &Traffic Flow Sympo.)
- n KITAMURA & LAM (1981): Time Dependent Markov Renewal Model of Trip Chaining, (in 8th Transpn. &Traffic Flow Sympo.)

TRIP CHAIN RESEARCHES; TRENDS IN 70S

- Markovian models were frequently used to represent the linkage between trip purposes or between the facilities at trip ends.
 - They were also applied to an estimation of travel pattern and modal split (Sasaki, 1971; Kondo, 1974).
 - It had been criticized that simple Markov process had shown not to represent trip making “*behavior*”. Two Markovian assumptions, (time-homogeneity and history-dependency, had been in doubt and denied. (Kitamura, 1983).
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TRIP CHAIN RESEARCHES; TRENDS IN 70S (continued)

- Application of Markov renewal process models had been proposed for a more elaborate representation of trip chaining behavior. (Lerman, 1979).
 - Kitamura & Lam (1984) had developed to generalize a time dependent, probabilistic process, assuming that the decision underlying trip chaining was determined by factors related to the time of day.
 - As practical application of those Markovian approaches had not materialized, some studies turned to and developed utility-based models of trip chaining. (Adler & Ben-Akiva, 1979; Horowitz, 1980)
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TOWARD ACTIVITY-BASED APPROACH

- Hanson (1979) reviewed trip chain research in the 70s and concluded that a more reasonable approach is to construct any number of modestly conceived models addressing selected aspects of urban-travel linkages.
 - Jones (1981) pointed out that the 70s entered the era of diversification in methodology of travel behavior and this was due to the emphasis on an evaluation of relatively short and local transport policy making in urban areas.
 - The conclusive discussion at TSU Oxford conference in 1981 confirmed that an activity-based approach should aim to understand human activity mechanism taking the temporal and spatial constraints into consideration. (See Carpenter & Jones, 1983)
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TOWARD ACTIVITY-BASED APPROACH (continued)

- The activity-based approach to travel demand analysis has its root in time geography and human activity analysis. (See Hagerstrand, 1970)
 - The main subjects are as follows; interdependencies among household members in daily activities, life cycle stage, and time-space paths and their related constraints. (For example, Chapin, 1974; Damm, 1982)
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TOWARD ACTIVITY-BASED APPROACH (continued)

- Linking a utility-maximizing approach with an activity-based one, Adler & Ben-Akiva (1979) developed a trip chain model while viewing the decision for non-work travel behavior as a choice from a set of feasible daily paths.
 - **KITAMURA** & KERMANSCHAN (1983 and 1984) also developed a sequential model of interdependent activity and destination choice behavior.
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MORE ACCELERATED DRIVING IN 80'S

- **Ryuichi** emphasized to identify the causality in factors determining the decision of trip chain behavior.
 - He also succeeded to expand dimension of the decision into both time and space axes: A remarkable shift from a trip chain (or linked trips) to an individual time-space path.
 - In addition, he developed the tools and methods required for the better understanding of trip chain *behavior*.
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MORE ACCELERATED DRIVING IN 80'S (continued)

- o Issues on a variety of factors determining the decision underlying activity and travel linkages:
 - n Interdependencies among household members and their effects: Ex. LCS (life cycle stage) and activity patterns (See [Kitamura](#) & Kostyniuk, 1982)
 - n Activity linkages in time space path: Ex. Time allocation between obligatory and discretionary activities ([Kitamura](#), 1984).
 - n Linking of non-work activities to work activities and the causal analysis (Kondo & [Kitamura](#), 1987; Nishii & [Kitamura](#), 1988; and [Kitamura](#), Nishii & Goulias, 1990)
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MORE ACCELERATED DRIVING IN 80'S (continued)

- o Ryuichi also provided us the modeling and survey methods which are effective for activity based approaches:
 - n Causal analysis method: Ex. Application of statistical methods, Path analysis (Nishii & Kitamura, 1988), Log-linear model (Kitamura, Nishii & Goulias, 1990), and LISREL models in 90s.
 - n Survey method: development of a panel data survey as multi-timing activity diary surveying methods in 90s
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CONCLUSIVE REMARK

- One of **Ryuichi**'s great achievements is that he established a milestone of trip chain researches.
 - This means that our travel behavior analyses could be based on 'really behavioral' framework for the better understanding of human activity sequences.
 - Since 90s, he had driven the movement toward more sophisticated activity-based approach. It is therefore noted that we have to push forward to the goal he pointed out for us.
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