Articulating the Activity-Based Paradigm:
Reflections on the contributions of Ryuichi Kitamura

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Introduction

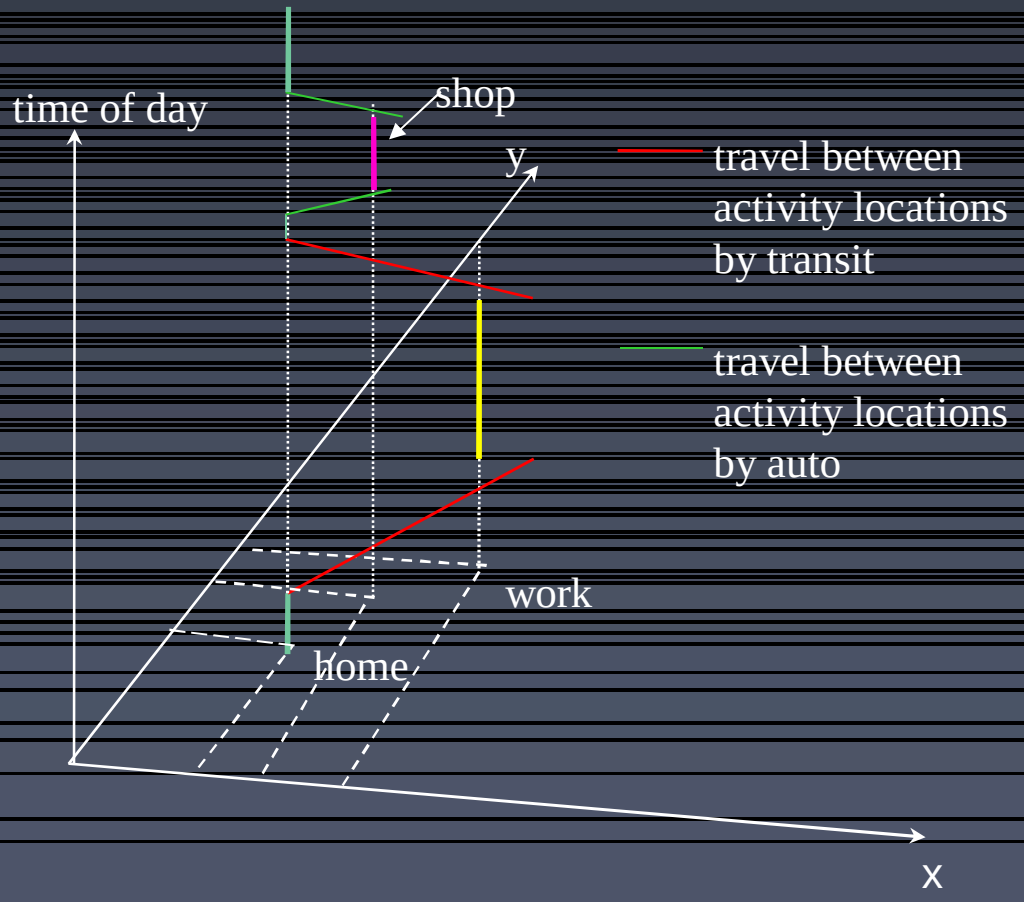
Ryuichi Kitamura was a pioneer in both the analysis and modelling of travel behaviour within the activity-based paradigm; indeed he was a major contributor to the articulation of this paradigm. Among his many contributions, ones that stand out for me include:

- An insistence upon *activity* as the foundation for our work.
- An appreciation for the *dynamic* nature of activity/travel.
- A recognition of the advantages of *microsimulation.*

Putting "activity" into activity-based models

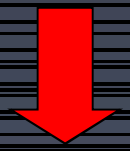
"What makes a model activity-based?"

Question asked by Ryuichi at a TRB Annual Meeting.

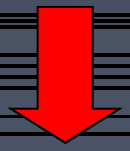


Beyond Tours

TRIPS



TOURS



ACTIVITY

Many current models are really tour-based in design rather than truly activity-based. While clearly operationally successful, possible limitations of such models include:

- The range of tour types & complexity is generally predetermined.
- Incorporating household-level interactions & constraints is difficult.
- Implementation generally involves deeply nested logit models.

Beyond Tours, cont'd

Ryuichi worked towards developing a more fundamental understanding of our need to participate in out-of-home activities and the travel that thereby results. This work recognized that:

- Choice occurs within time-space (& other) constraints (the choice context)
- We need to understand the motivations for activity engagement

In particular, he always observed and analyzed behaviour prior to trying to model it.

Towards Activity-Based Models

We still don't know enough about:

- Activity generation.
- Location choice.
- "Utility" of activities / how choice occurs among competing activities within.

The activity-based approach does not solve these problems *per se*, but it does provide a conceptual framework/paradigm within which these questions can be usefully addressed.

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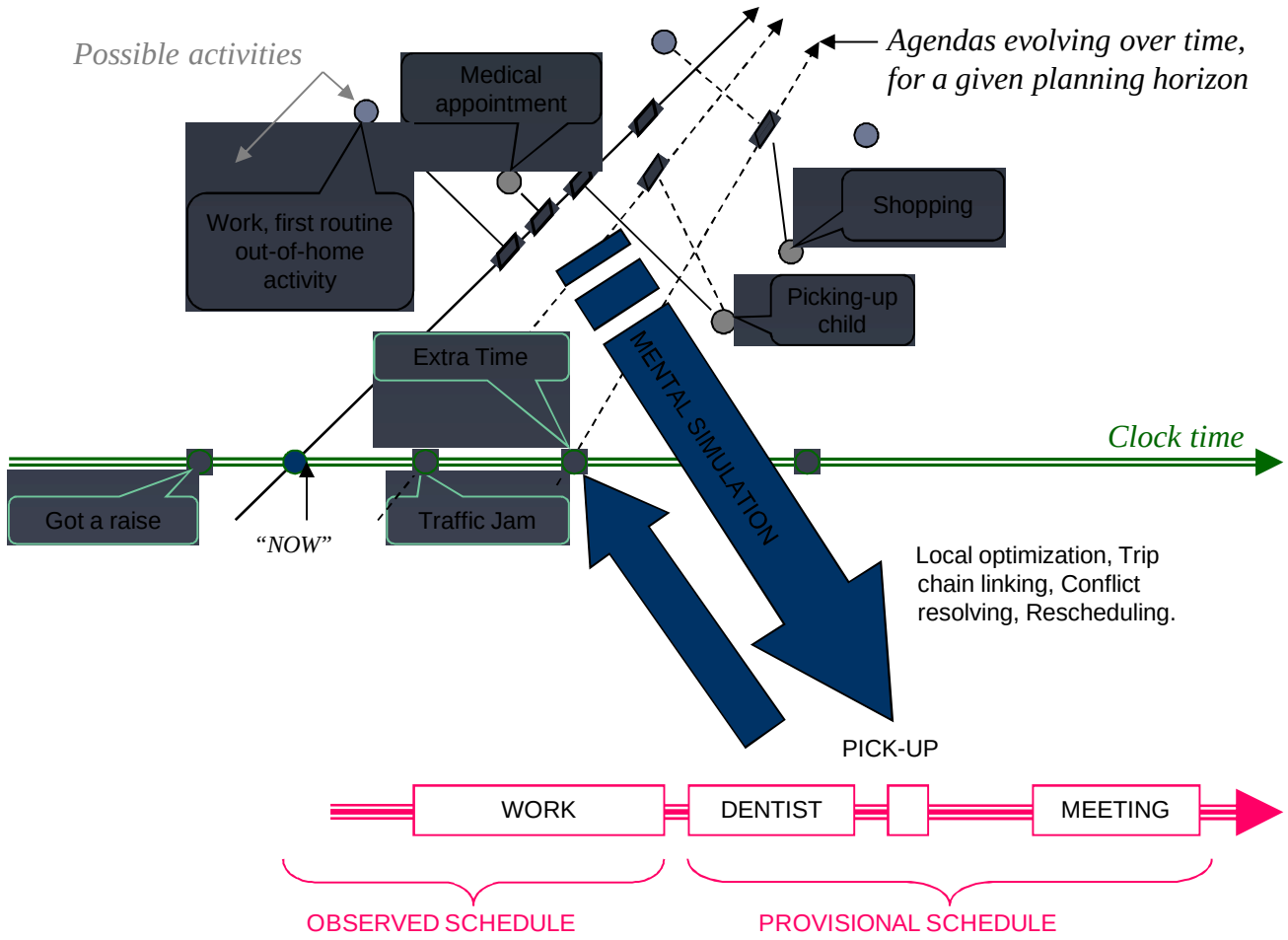
Dynamics



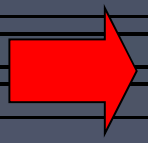
"Why don't we just acknowledge that there is no such thing as equilibrium."

Ryuichi, during a discussion at the First U.S. Conference on Panels for Transportation Planning", Lake Arrowhead, Cal., October, 1992

Dynamics, cont'd

The activity-based paradigm brought time into travel behavior analysis/modelling:

- *When* do activities occur?
- *Duration* of activities?
- *Sequencing* of activities?
- *Frequency* of activities?



Links to time-use literature/concepts.

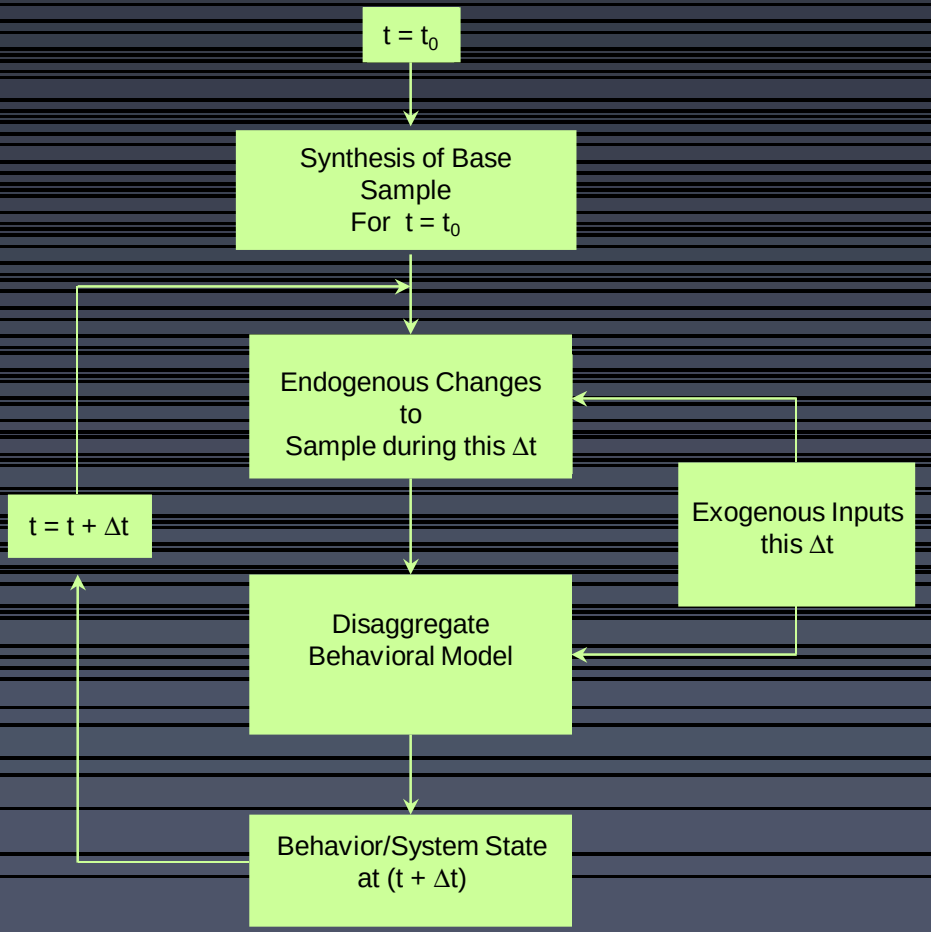
Dynamics, cont'd

Other temporal issues exist, however that we are still wrestling with:

- Relationship between short- (daily activity/travel) and long-run activities (housing, jobs, cars, education, …).
- Dynamics of activity scheduling/rescheduling.
- What exactly are we trying to model?
  - There are still very strong equilibrium/stabilization assumptions in our models that may not be completely compatible with the "behavioural" stories we tell about them.

Microsimulation

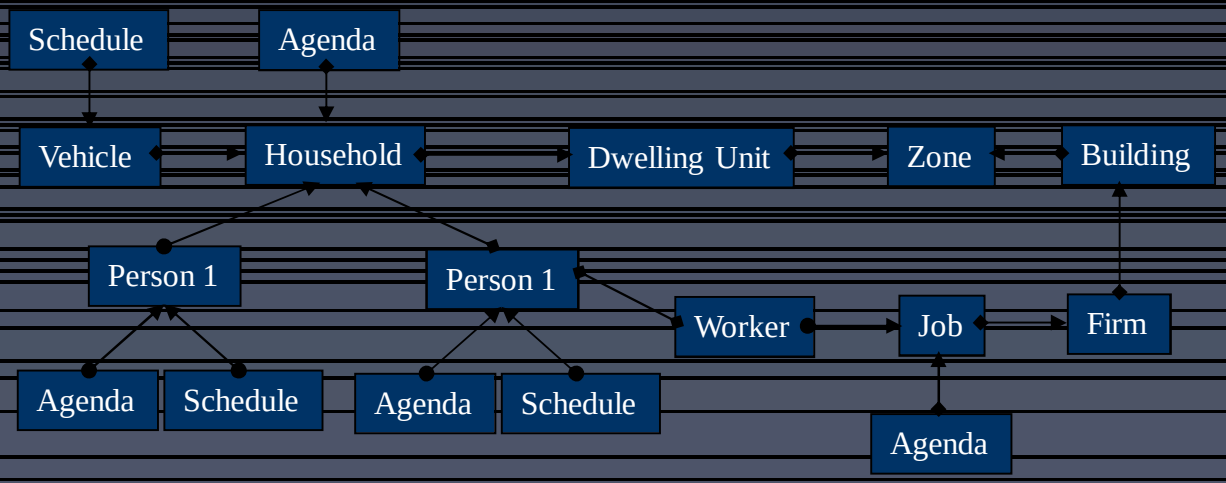
Ryuichi (along with his many brilliant students & co-conspirators) was an early adopter of microsimulation as the "obvious" computational framework for implementing dynamic, disaggregate models of activity/travel behavior.

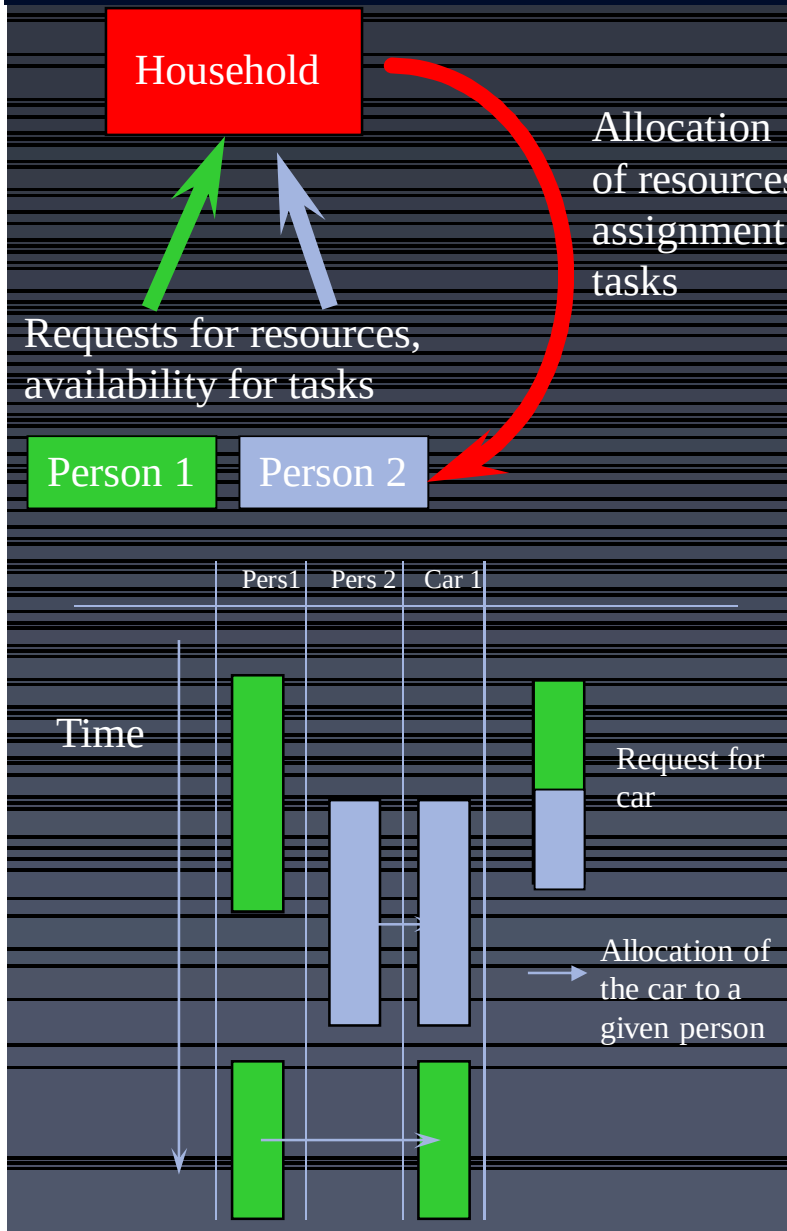


Microsimulation, cont'd

Microsimulation is essential for agent-based modelling, which, in turn, is the natural framework for activity-based modelling.

An *agent* is an autonomous entity that perceives the world around it, acts within its world, and (potentially) learns and adapts based on its experiences.





Agent-Based Microsimulation

In all our work, we find that as the fidelity of our models improves (with respect to context/constraints, the household within which persons live, attributes of the agent and the choice set, …) the better we are able to parsimoniously explain behaviour.

The Legacy & the Challenge

We work in a challenging field; we typically aspire to:

- Behavioral/theoretical soundness (understanding)
- Empirical/econometric rigour (scientific hypothesis testing)
- Practical application (policy analysis; intervening into the world)

Ryuichi was adept in moving between these various worlds.

The Legacy & the Challenge

So much of our analysis and so many of our models (especially in operational practice) are still relatively “reduced form” / partial in nature. We are still struggling to achieve a more “structural” / comprehensive / fundamental representation of behavior.

Ryuichi understood this and worked towards this goal.

The Legacy & Challenge, cont'd

We must build upon and continue Ryuichi's work to find improved, policy-sensitive, behavioral models that will help us find sustainable paths into the future.