Passenger behavior and use of travel time in multimodal door-to-door travel experience

Nathalie Lenoir, Isabelle Laplace
Ecole Nationale de l'Aviation Civile, Université de Toulouse, France

New trends?

- Research and studies on transport and mobility show that people behave in new ways
  - New services and products
  - Leading to new possibilities and practices

- This calls for a reappraisal of transport analysis and models
  - What does economic theory tell us?
  - What do recent surveys and empirical studies show?
  - What should we do?

Individuals consume goods

- In traditional microeconomic analysis (consumer theory)
  - Individual preferences are represented by a *utility function*
  - The arguments of this function are *goods consumed*, with no reference to *time spent* to consume them
- Time has come into play to explain labour supply, and later to analyse transport
  - To the extend that some economists got rid of goods altogether (Evans 1972), replacing them with *activities*
  - This has never become mainstream but is used in transport models

Value of time (savings)

- In individual utility, all activities are potential sources of satisfaction or dissatisfaction
  - Some activities would be assigned as little time as possible: they are a cause of disutility
  - For those activities, saving time has a value: *value of time savings*

- This is the way transport has traditionally be seen: people would rather be elsewhere, and do something else.
  - Value of time (savings) is widely used in transport studies and transport investment appraisal

Transport modelling

- Modelling of individual behaviour is difficult
  - If only because data is scarce
  - Each activity has its own value for the individual: too complicated!
- Transport models have focused on two elements of individual's utility
  - Cost of transport
  - Time spent in transport
  - Other elements have often been neglected or overlooked
- To the extent that the generalized cost of transport has been defined
  - Sum of cost and time (through value of time)

Are we being too critical?

- Not all models are that simple
  - *Mode choice models* can take into account cost and characteristics of each mode, time spent, but also socio-economic variables
  - Estimated values of time (savings) can be mode and group specific
- But mode choice models require detailed individual data
  - it is not always possible to estimate such models
- And they are based on the same assumptions
  - travel time is only seen as **lost time**
  - Everything outside of the transport choice is irrelevent (no reallocation of time gained or lost)

What about multimodal travels?

- All trips except trips by car are multimodal
  - Many urban trips but also long distance trips (trains, air transport)
  - People organise highly individualised travels (heterogeneous demand)
  - Stringing several transport modes becomes easier with ICT
- To analyse a multimodal trip you cannot simply add the travel times and costs
  - People consider the total door-to-door time but also…
  - … the distribution of time spent in different situations (access, egress, waiting time…)
  - … transfers which are often stressful, and a cause of disutility
  - … reliability of connections

Limits of the concept

- The use of the value of time led to transport policies focused on average travel speed
  - In order to reduce the generalized cost of transport
  - …by minimizing the time "lost" in transport
- *Although* **other dimensions** could be as important
  - Quality, ease of use, comfort and all elements of the travelling experience
  - Reliability: importance of travel time variance (rather than mean travel time)
- *Although* travel does not always leads to a disutility
  - Travel time can be **productive**: positive utility rather than negative (time lost)
  - With the new technologies people can perform activities while traveling

Other dimensions: The travelling experience

- What you can do while travelling, and the way you perceive the experience depends on the "quality" of travel time
  - Other factors which enter the individual utility
- General practical aspects of travelling: convenience, comfort, predictability, flexibility
- "Affective" factors: feeling evoked by travelling (stress, excitement, pleasure, control, relaxation, fear, etc.)
  - leisure travelers consider relaxation and an absence of stress to be as important as flexibility and convenience (Anable and Gatersleben, 2005)
  - Habit can also play a role

Other dimensions: Travel reliability

- Research shows that mode reliability influences
  - Mode choice, route choice, willingness to pay
  - Van Loon et al. (2011), Li et al (2017)
- The question of reliability impacts the acceptance of multimodal travels
  - Shakenbos et al. (2016), Clauss and Döpe (2016)
- To the point that traveller can accept longer trip if they are more reliable
  - Mishra et al. (2017)

$\Rightarrow$ Importance of travel time **variation** in transport models

Productive travel time: What can you do while travelling?

- Read? Sleep? Eat? Drink? Talk with others? Play games? Listen to music?
  - None of this sounds exotic (except when driving, perhaps…)
- Productive travel time use is a reality
  - Survey in Britain (2004): more than half of travellers consider travel time to be of "some use".
  - This has long been a reality in public transports
  - A wider range of options today, with the development of ICT (Ettema and Verschuren, 2008): work, read, send messages

- But not all time is productive
  - Waiting time, check-in time…

Role of ICT

- Better use of travel time:
  - even tiny slivers of time can be used (Lyons and Urry, 2005)
  - Specific and personal activities
- Easier organization of travels
  - Through real-time information
  - Especially when trips are multimodal

  ⇒ We need to study and estimate to what extent ICT use on the move will influence the pool of social practices

So finally what is important?

Gather data, design surveys, improve models

- At the passenger level
  - Travel perceptions (comfort, crowding, stress levels…)
  - Passenger behavior: what does he do (can he do) while traveling?

  ⇒ Surveys
- At the transport mode level
  - Level of comfort, safety
  - Mode reliability, quality of interchanges (for multimodal trips)

  ⇒ Travel mode operating data

Conclusion

- Research (and practice?) has to go beyond « travel time savings »
- Travel analysis should be
  - Multimodal
  - Exploring the role of travel modes attributes for each mode and in combination
  - Exploring the role of relationships between modes and multimodal linking
  - Exploring the impact of travel experience and of travel habits
  - Exploring the role of perception (affective factors)
  - Looking at the impact of ICT on travel time and individual organisation of trips
- This requires detailed information that could be obtained through surveys, travel operators data and traces of digital activities