Modeling simultaneous choices in transportation

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Mode choice

A multifactorial choice :

- socio-economic characteristics : age, gender, number of cars...
- spatial characteristics : density, diversity, access to infrastructures and services, public transportation level of service, parking...
- trip characteristics : purpose, distance, time, cost...
- psychological characteristics : habits, way of life, perceptions...

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➜ spatial and trip characteristics : related to residential location
➜ cost : related to the possession of a transit pass

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- Is the residential location, and the associated urban environment and distance to activities :
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- And concerning number of cars and possession of a transit pass ?

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Example

A person who does not like to drive will choose more easily to live close to his work or a station to have the possibility to choose alternative modes to the car.

Research question

How to model simultaneously choices, which involve qualitative discret and count variables ? And taking into account the influence of both observed and unobserved (latent) variables ?

Why is it important ?

- A joint model ...

Principle

- Objective :
  - reflect the (causal ?) relationship between the variables
  - capture the "bundling" of choices
- Intuition
  - model the choice dimensions together in a joint equations modeling framework
  - account for correlated unobserved psychological variables as well as possible structural effects

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Choice experiment (SP data)

	Option A	Option B	Option C
Transport mode			
Comfort	Seat not guaranteed	Seat guaranteed	
Travel time	1h00	1h15	50 minutes
Travel cost	10 € / trip	8 € / trip	9 € / trip

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- Efficient bayesien design

Psychometrics : technique of psychological measurement

QUESTIONS OPINION

Pour chacune des affirmations suivantes, merci d'indiquer dans quelle mesure vous êtes d'accord ou non.

A set of directions on how to respond to the items

	Pas du tout d'accord	Pas d'accord	Neutre	Plutôt d'accord	Complètement d'accord	Non réponse
L'équilibre de la nature est fragile	○	○	◉	○	○	○
Chacun doit être libre d'utiliser sa voiture quand il veut et où il veut	○	○	◉	○	○	○
Nous avons besoin de construire plus de parkings en centre-ville	○	○	◉	○	○	○
Le prix de l'essence devrait être augmenté pour réduire les bouchons et la pollution	○	○	◉	○	○	○
Les pouvoirs publics ont le droit de réduire l'utilisation de la voiture pour préserver l'environnement et la qualité de vie	○	○	◉	○	○	○
Nous allons au-devant d'une catastrophe écologique majeure	○	○	◉	○	○	○
La soi-disant « crise écologique » et ses conséquences pour l'Homme sont très exagérées	○	○	◉	○	○	○
Nous avons besoin de plus de transports en commun même si cela implique d'augmenter les impôts	○	○	◉	○	○	○

A set of response alternatives

Question suivante

A list of items designed to elicit particular kinds of responses

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- Perceptions and feelings towards public transport ($\alpha = 0.86$)
    - Perceived behavioral control
    - Perceived use of time
    - Feelings

Example : Feelings in public transport

Never (1) to often (5) [?]

Item	Definition
Feel1	I feel a sense of freedom.
Feel2	It puts me in a good mood.
Feel3	I feel comfortable and at ease.
Feel4	I feel I could meet people and get into conversation with them.
Feel5	I feel I'm doing something, I feel useful.
Feel6	I find the people, noise and smells disagreeable.
Feel7	I feel stressed.
Feel8	I feel harassed.