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Travel Behavior Analysis & discrete Choice Models

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Why I chose Kitamura's lab to study in?

- ü Under graduate,

- I took Kitamura-sensei's class "Transportation Engineering"

- ü "behavior analysis approach".

- ü His humor and joke capt

- ü I chose "Kitamura lab."

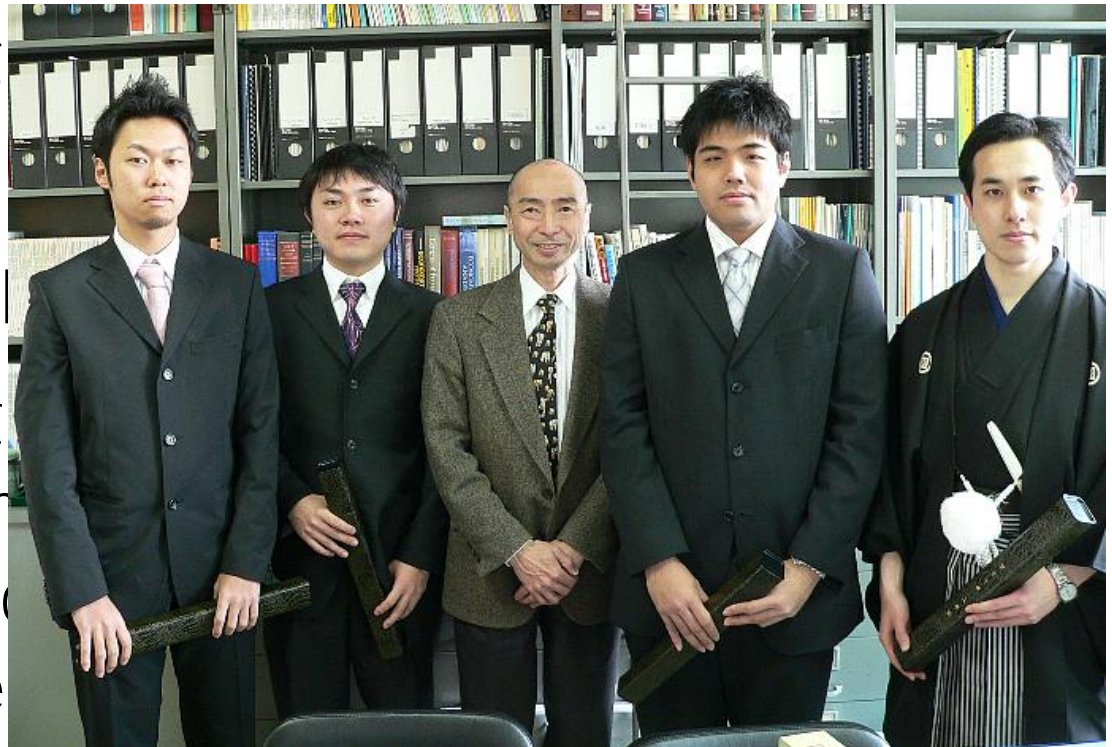
- ü I studied for 5 years with

- OD estimation (Geost

- Traffic flow simulation

- Land price model (Ge

- Discrete choice mode



When we achieved our goals, Kitamura-sensei always gave us a big smile

Critical Thinking

Every spring, Kitamura sensei told new comers.

“Please learn the critical thinking!!”

News, Books, Text books, Papers

“Is that true??”

“Critical Thinking” is necessary for researchers.

All work and no Play makes Jack a dull boy



Foot Ball tournament @ Kyoto Univ.

Presentation Topics

1. Travel Behavior Analysis

<Departure time under uncertainty>

- **safety margin** (considering travel time uncertainty)
Kengo USHIWAKA, 2004
- **the cognitive travel time** (focused on the heuristics)
Atsushi NAGAKUBO, 2006

2. Discrete Choice Models

- **the property of “Mixed logit models”**
Shusaku NAKAI, 2007, 2008

The Analysis of Safety Margin Considering Travel Time Uncertainty

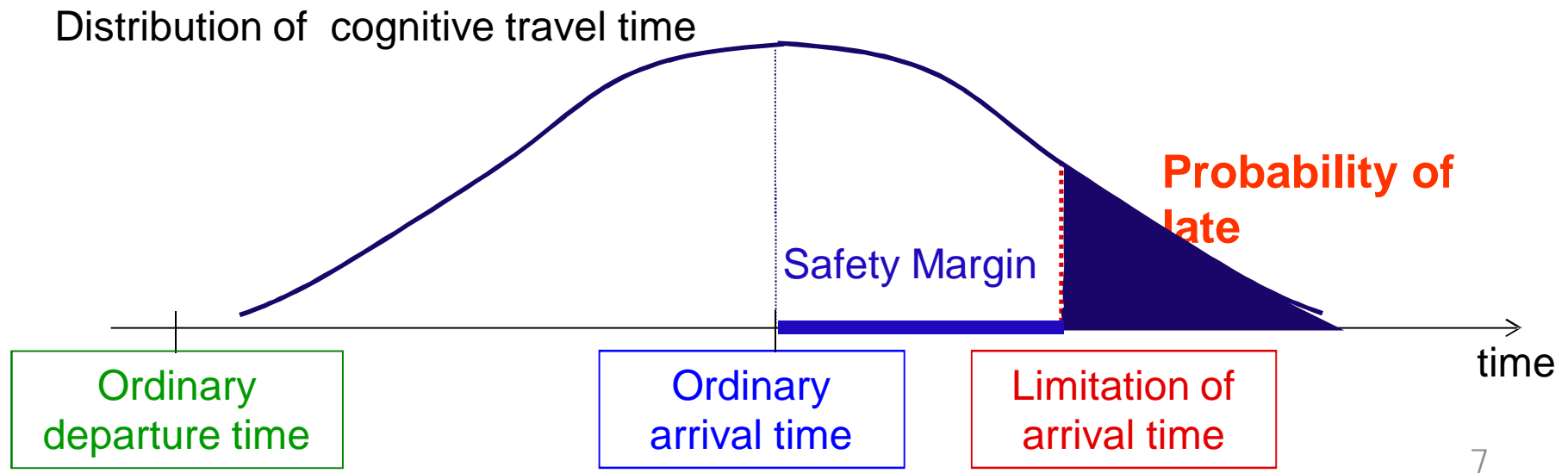
Kengo USHIWAKA

2004

Questions

How will commuters perceive “uncertainty” in travel time?

How will the “safety margins” are related with the perception?



Data & Summary Kengo USHIWAKA(2004)

Data: 6 weeks diary questionnaire (commuter)
SP data (Cognitive travel time)

Findings:

The cognition of uncertainty as expressed by difference between the maximum and minimum travel time that experienced by daily commuting has little to do with the variance of reported travel time.

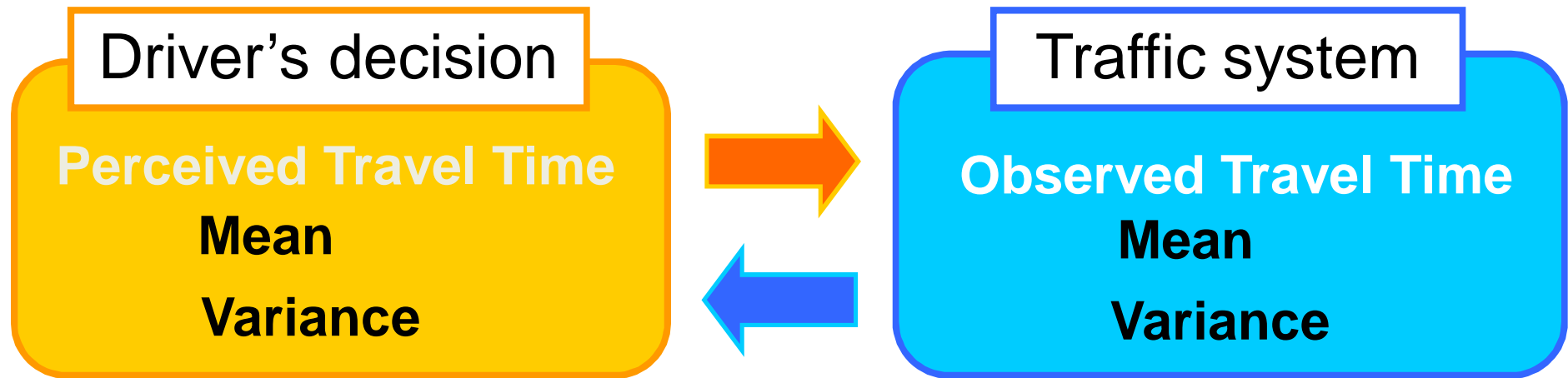
The size of safety margin is a function of the difference between the maximum and minimum travel times.

Analysis of the Cognitive Travel Time Focused on the Heuristics

Atsushi NAGAKUBO

2006

objectives

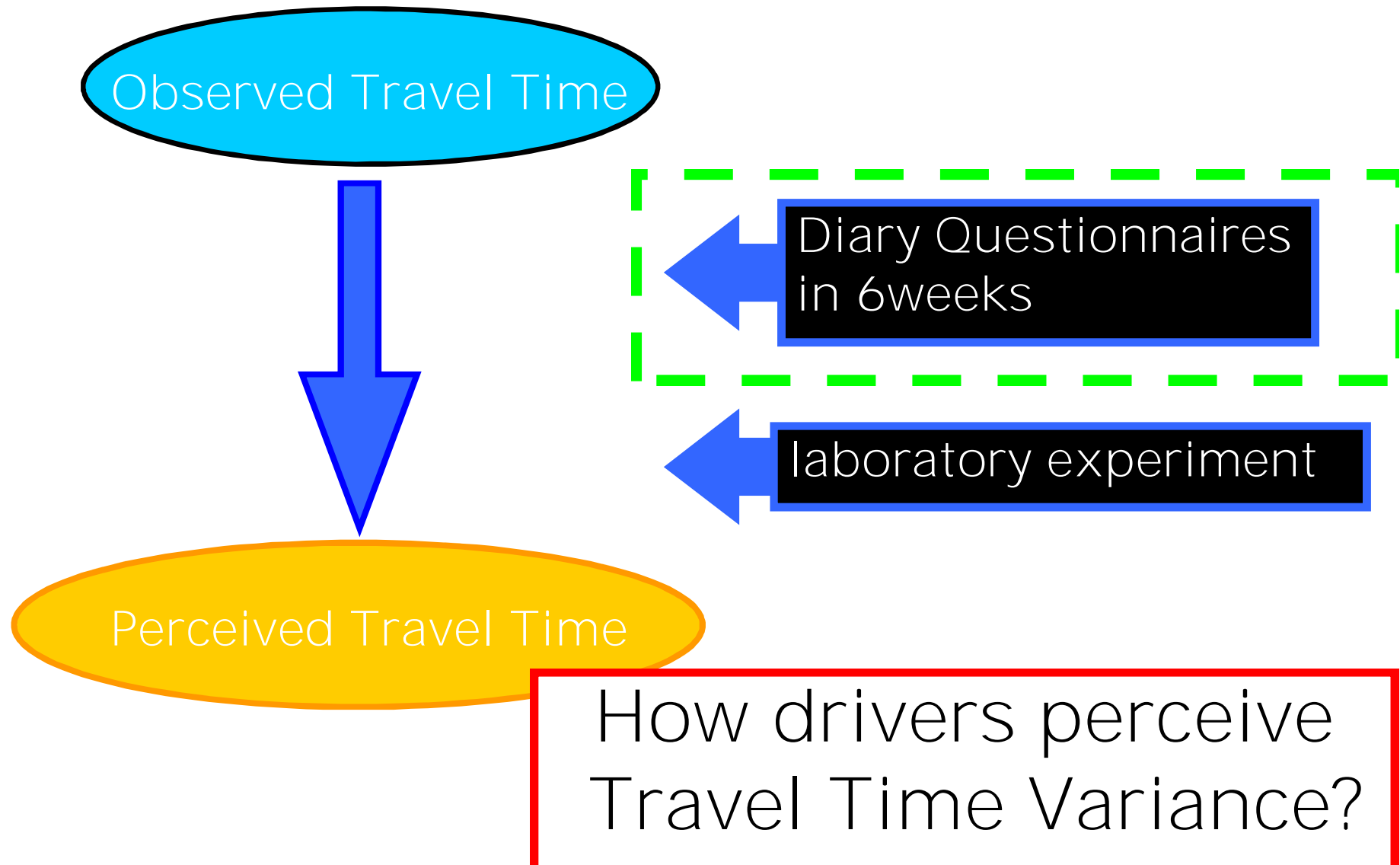


But, past researches considered partly.

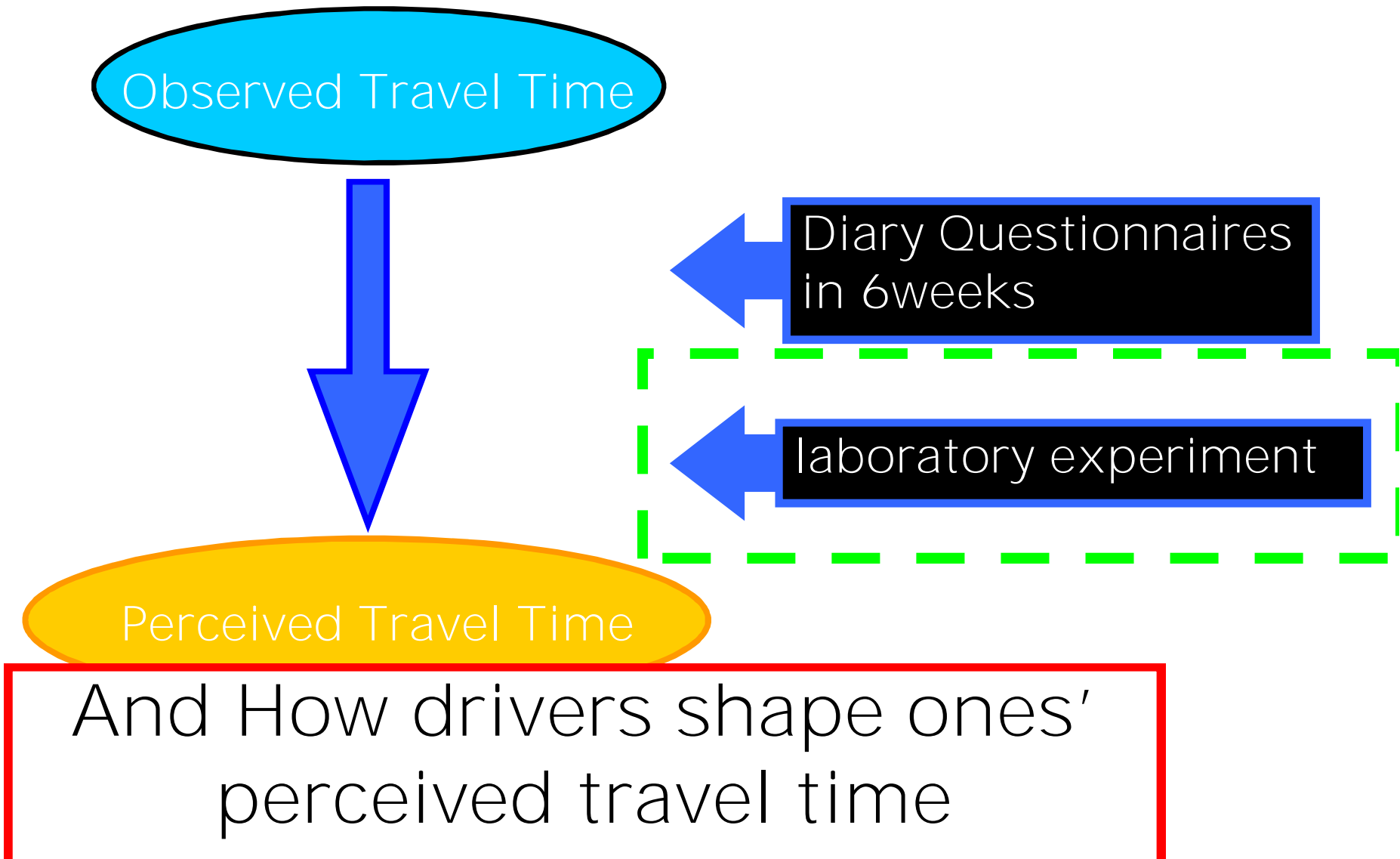
How drivers perceive
Travel Time Variance?

And How drivers shape ones'
perceived travel time

Outline of Analyses



Outline of Analyses



summary

From the result of
Diary Questionnaires in 6 weeks

Commuters don't perceive the
actual travel time variance well.

From the result of
laboratory experiment

**Perceived travel time is altered
before and after habituation.**

◀ In this study, it is indicated that
when we analysis the traffic behavior,
perceived travel time is very significant.

On the Stability of Mixed Logit Models

Shusaku NAKAI

2008

Problems

**First,
researcher must specify the utility function.**

People can't know the correlation of **unobserved** term among alternatives.

**People can't know
what type of utility function should be specified.**

Verification of the property:

Model's relative goodness-of-fitting

the value of true population parameters:

never known

Objective

Verify the identification problems
of non-IIA models.

- Focus on
- Identification of the parameters,
 - Correlation coefficient of error terms,
 - Specification of the error structure.

By using the simulated discrete choice data



the value of **true** population parameters: **known**
Structure of the utility function: **known**



1st step: Mixed logit models

The flow of verification

Simulated discrete choice data



Estimate the parameters of MXL

Estimate the same parameters
By using the several data sets



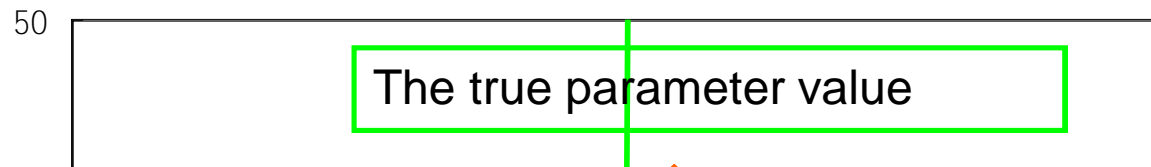
Comparison with
the value of **true** population parameters

accuracy and estimability

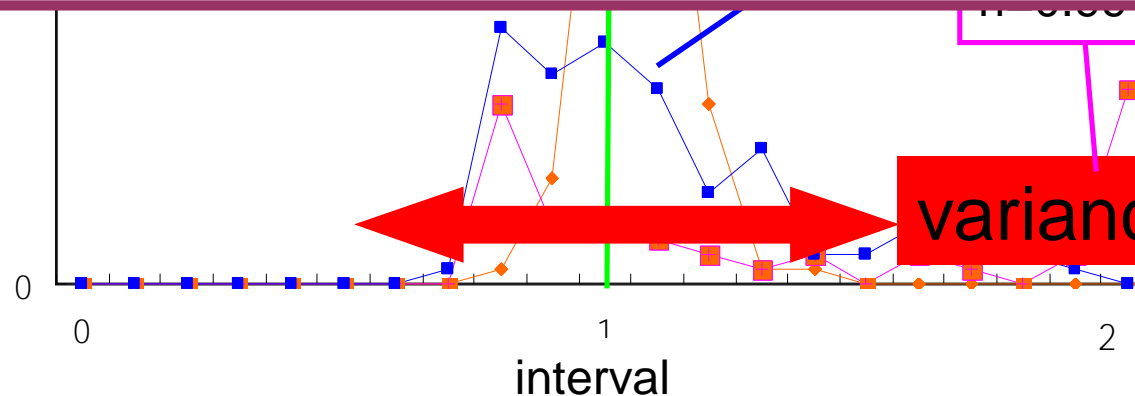
Result of parameter estimates

Frequency distribution

(parameter estimates \hat{a} for explanatory variables)



Compared with the true parameter value,
When the error correlation coefficient approaches 1.0,
the accuracy of estimations become lower.



Conclusion

When the **strong correlation** exists among the alternatives,

- Parameter estimates fluctuate hard.
- Estimation encounters difficulties.

When the error correlation coefficient approaches 1.0,

- the accuracy of estimations become lower.

Thank you for your attention!



Laboratory Experiment

This is simulation of attending school on a laboratory PC

1. The explanation of simulated circumstances of

The home-to-school distance and class starting time
subject.



2. The subject was prompted to indicate a dep

3. Repeat the process 2 - 5, 40 times.

That is, subject experienced attending school
during 40 simulated days

4. h

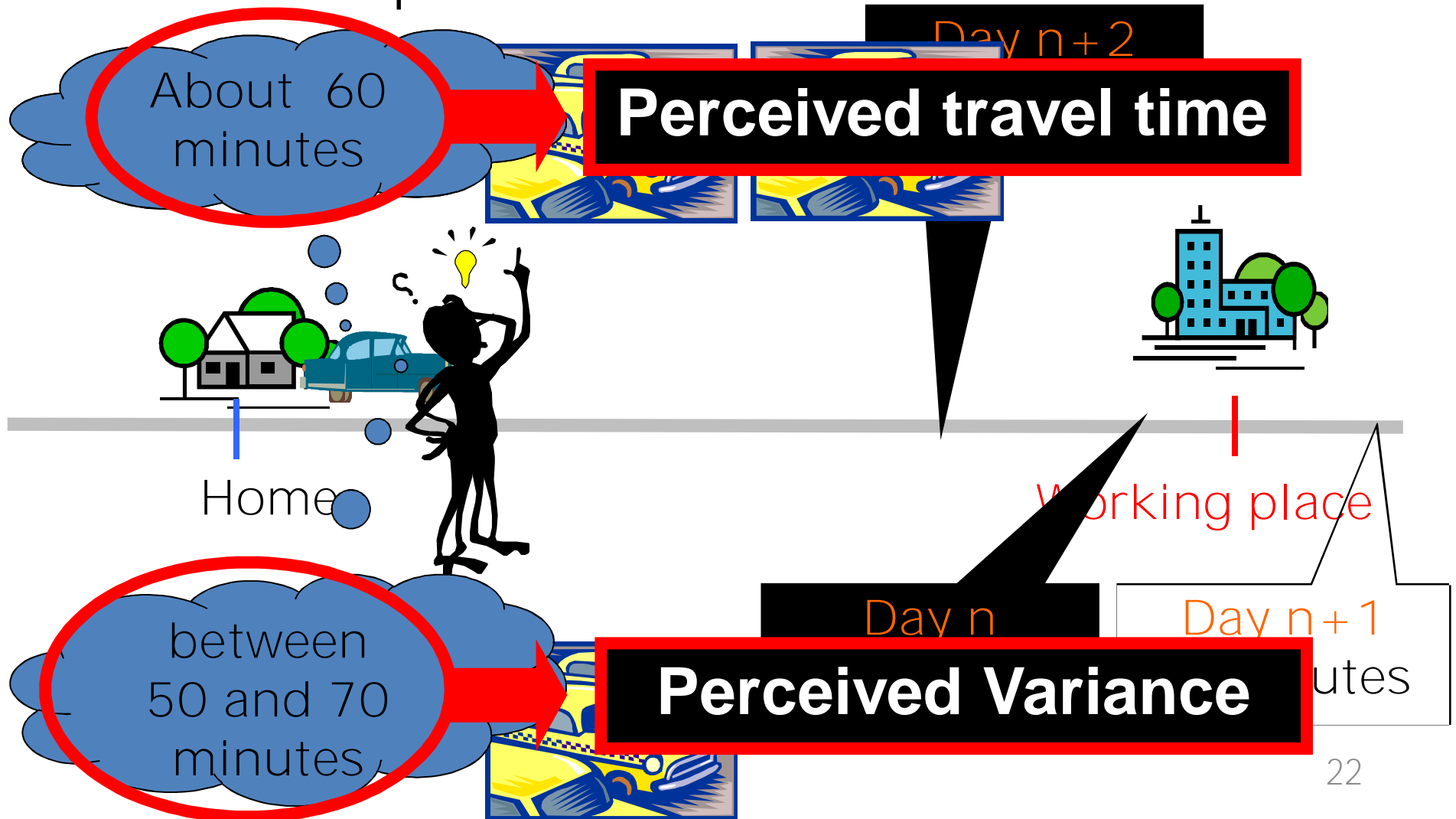
were displayed on the monitor

5. Answer about the Perceived travel time

how long do you think it takes to travel from home to school?

Traveler's Perception

For example...



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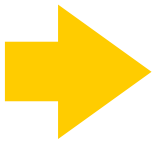
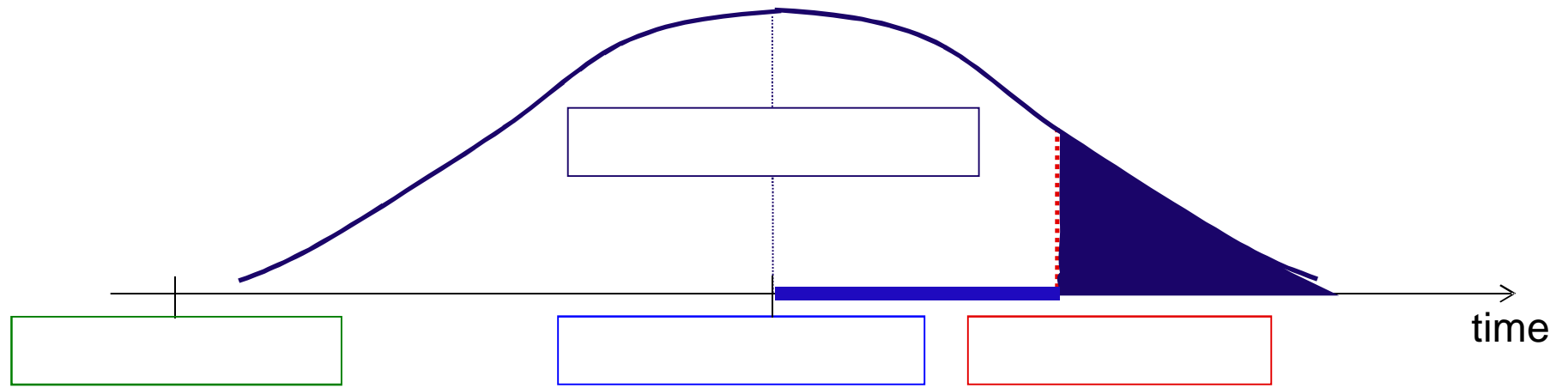
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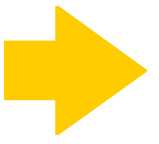
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1 26 3 5

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Hall, 1983



Psychology

< Habitualization >

After repeating the same decision over, some elements of the decision process are suppressed and a simplified decision process is adopted.

1. the number of decision alternatives taken into consideration decreases
2. decision making becomes quicker

Hypothesis

Habitualization in departure time decision implies fixation of the perceived distribution of travel times.

Concept

No experience



repeating

habitualization

