

# Introduction to key concepts in choice modelling



**Key concepts  
& study plan**



**Experimental  
design**



**Data collection  
& processing**



**Model specification  
& estimation**



**Interpretation  
& application**

# Introduction to key concepts in choice modelling

## Outline

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- ❑ Why do we model choices?
- ❑ How do we model choices?
- ❑ Four key components of a choice model

# Why do we model choices?



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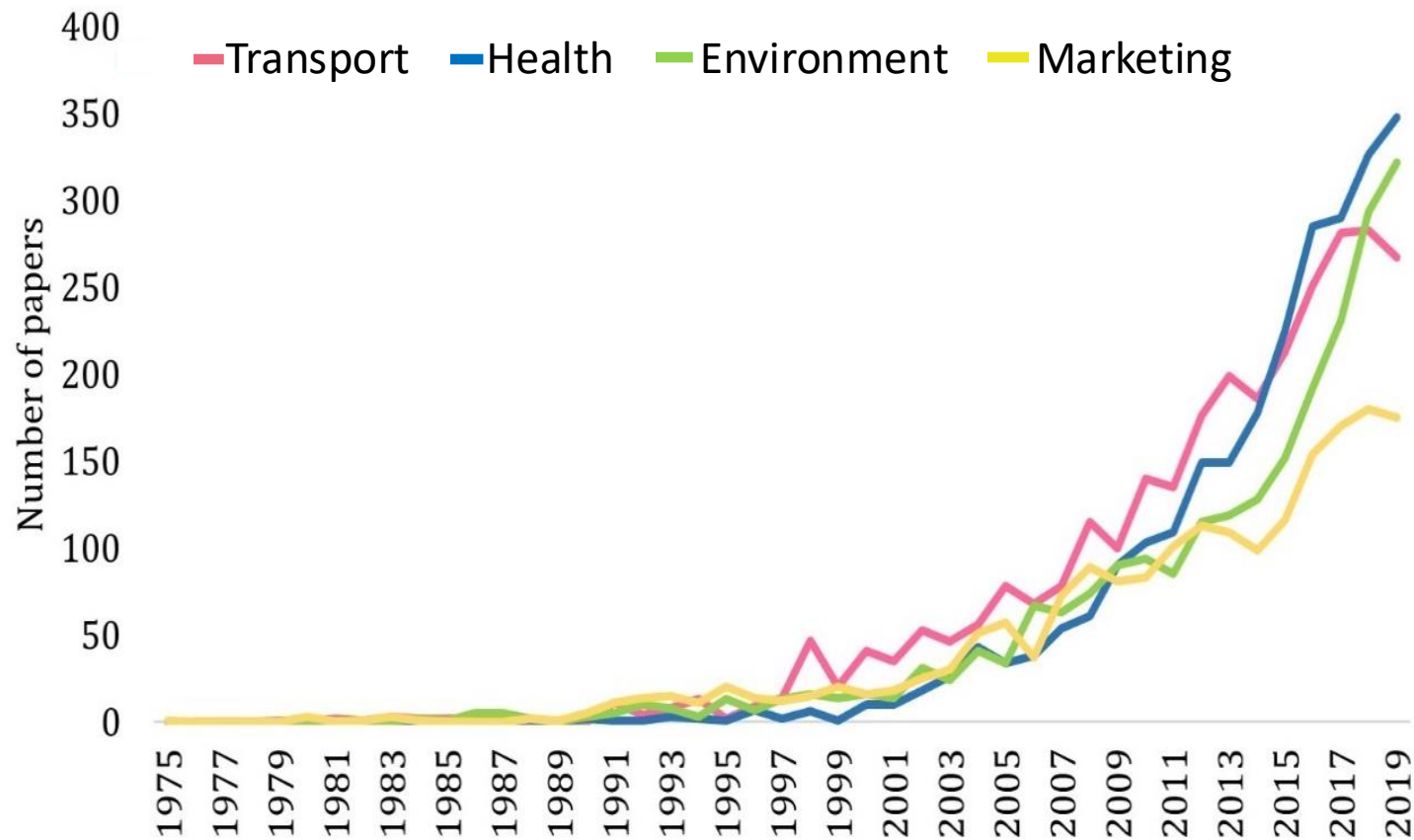
**Model specification  
& estimation**



**Interpretation  
& application**

# Why do we model choices?

## Choice modelling studies increasingly popular



[Source: Haghani et al. 2021; J. Choice Model.]

# Why do we model choices?

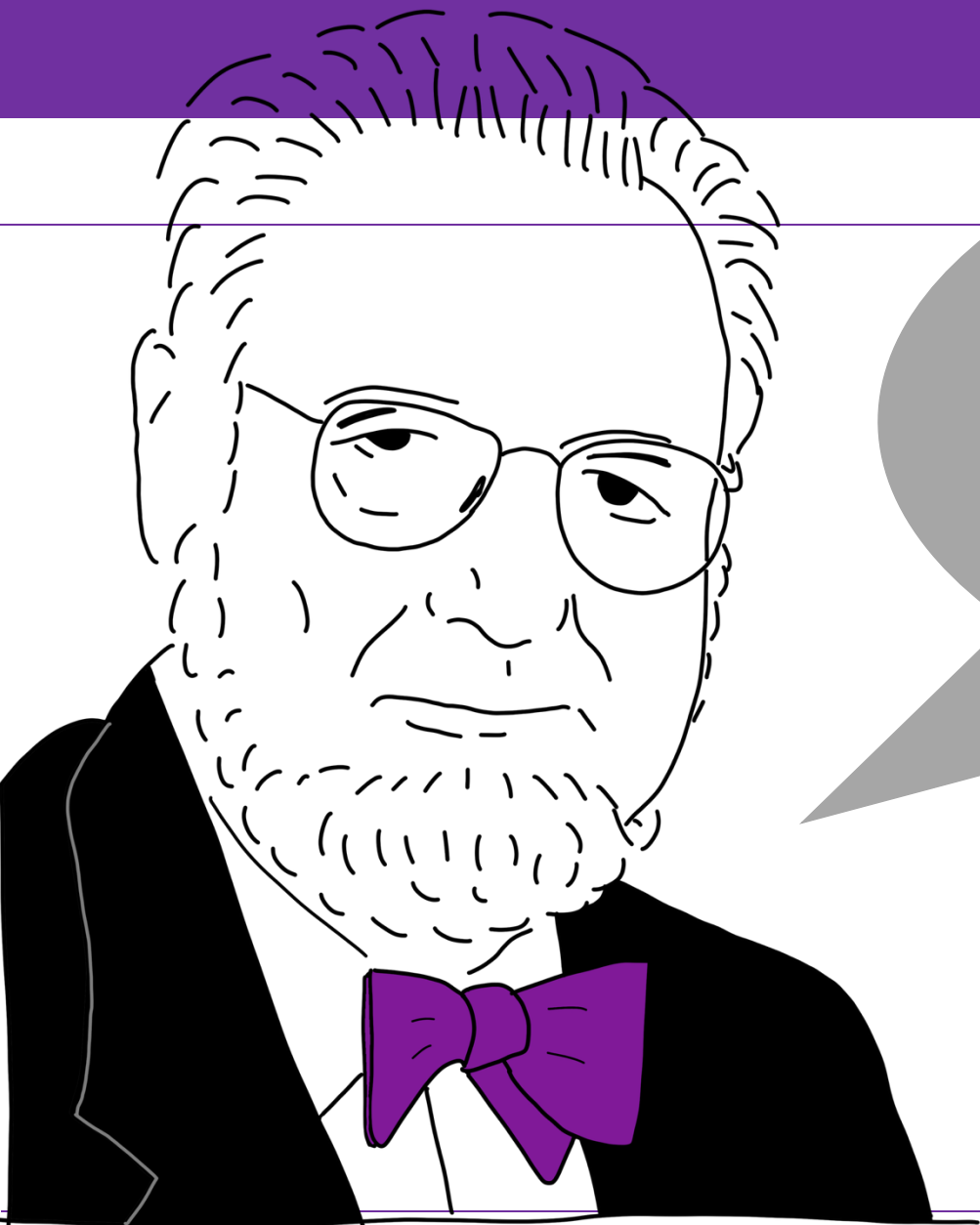
## Two main reasons for using choice modelling

1. Understanding choice behaviour
  2. Forecasting demand
- ❑ Historically, key focus was demand prediction
  - ❑ Over time, understanding choice behaviour came to dominate (in some fields)
  - ❑ In practice, ability of a model to do both is important!

# Why do we model choices?

## Why is understanding choice behaviour relevant?

- ❑ Consumer have wishes, needs, values and preferences
  - about products, goods and services
- ❑ Consumer perspective is an important input for product, goods and service decision-making
- ❑ Ignoring this will end up in products, goods and services not being used



Drugs don't work in patients who  
don't take them

C. Everett Koop

# Why do we model choices?

## Understanding choice behaviour: possible insights

Alternative B > Alternative A?

Willingness To Pay?

Willingness To Wait?

Maximum Acceptable Risk?

Minimum Required Benefit?

Relative Importance of  
Alternatives'  
Characteristics?

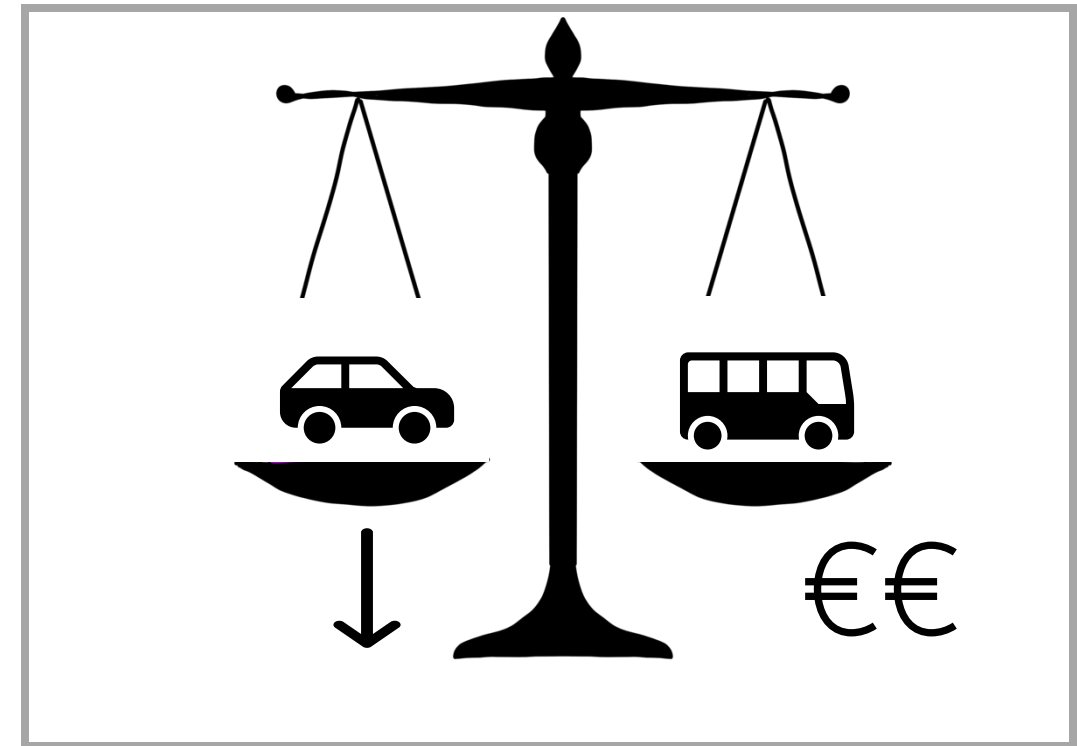
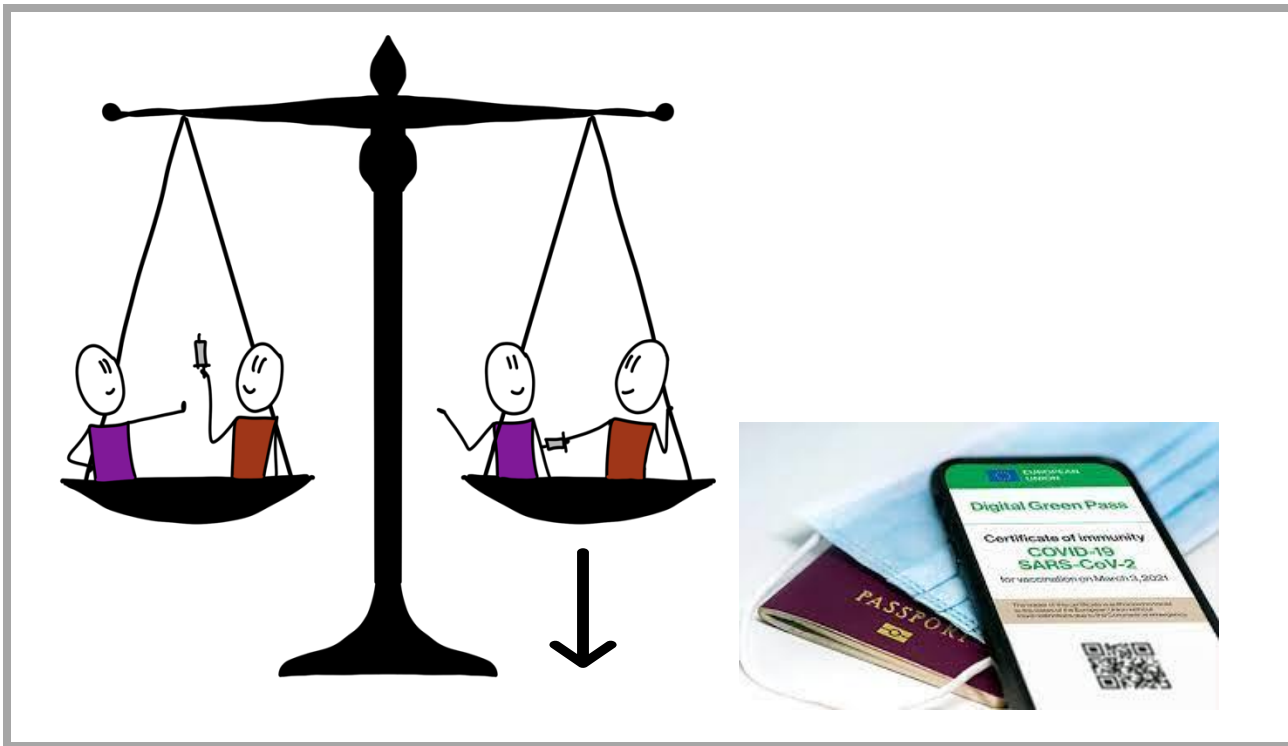
Etc.



# Why do we model choices?

## Forecasting demand

- ❑ Avoids poor decision-making, trial-and-error implementation and demand-supply imbalance
- ❑ Insights into elasticities → measures how demand responds to a change in a characteristic



# How do we model choices?



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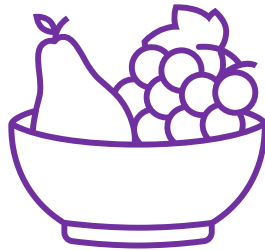
**Interpretation  
& application**

# How do we model choices?

## RP and SP

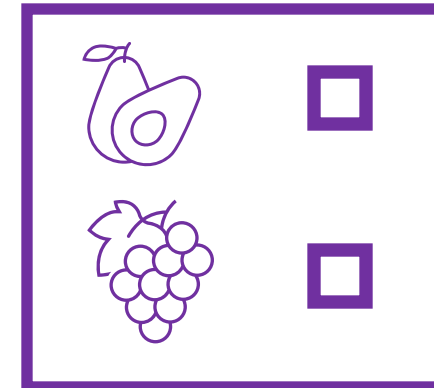
### Revealed preference (RP)

Actual choices in real life



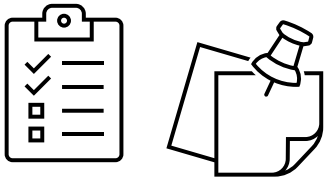
### Stated preference (SP)

Hypothetical choices in an experiment



# How do we model choices?

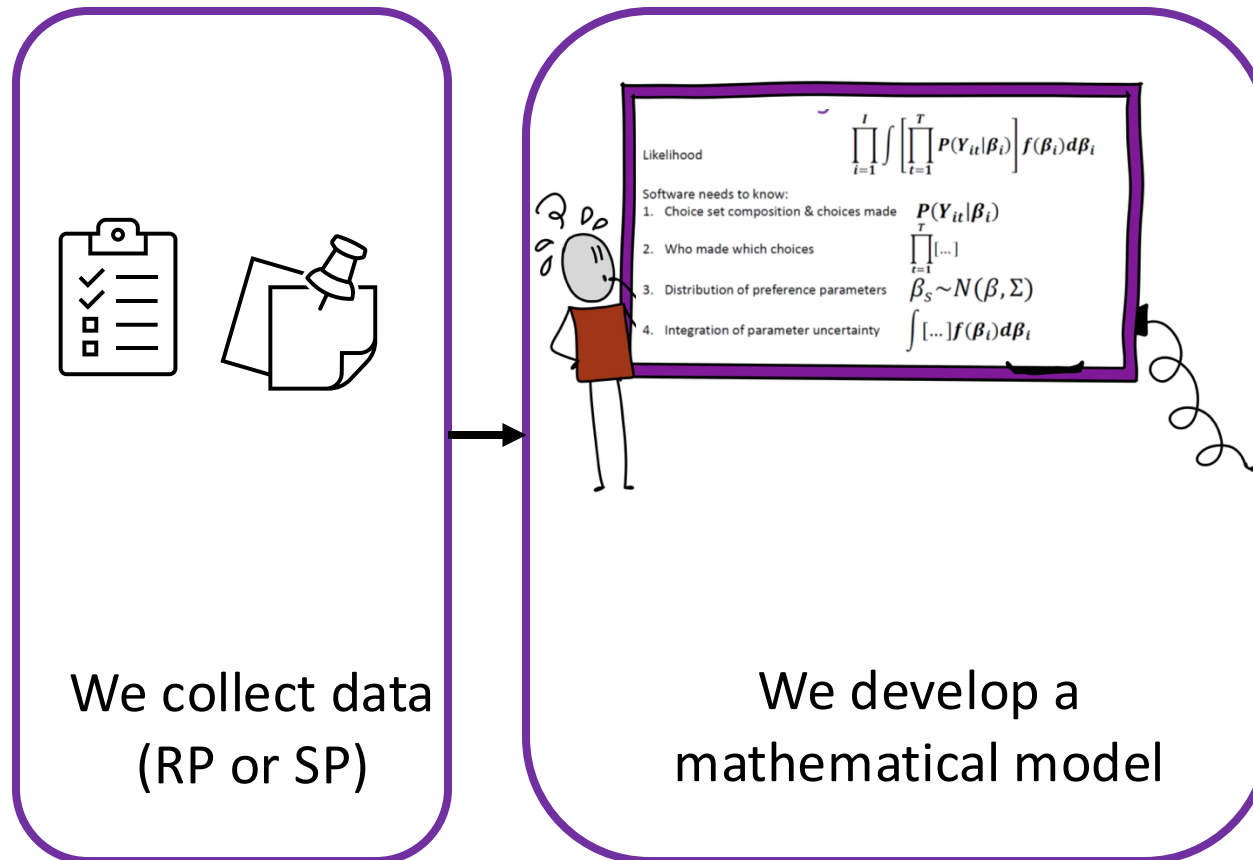
## Steps in the choice modelling process



We collect data  
(RP or SP)

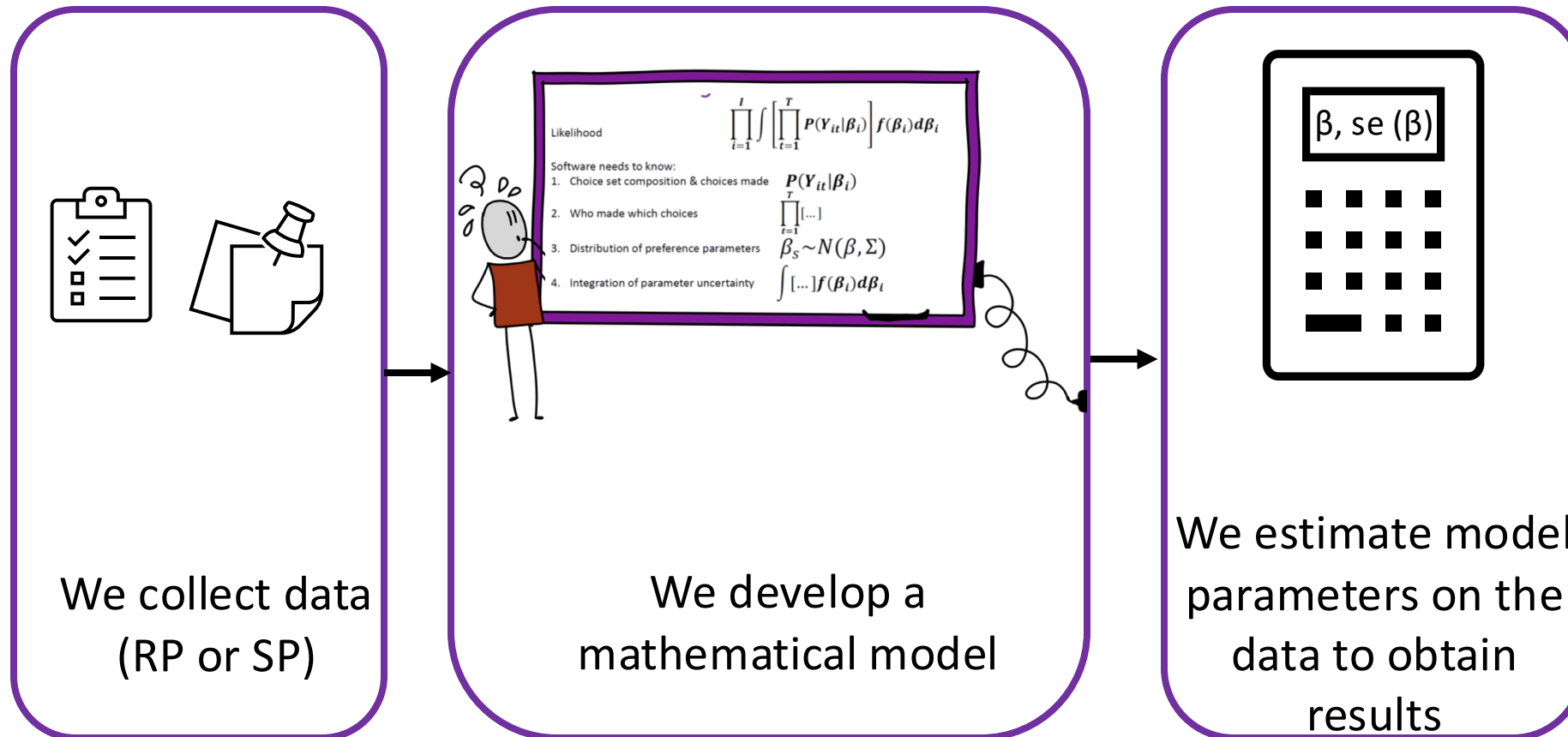
# How do we model choices?

## Steps in the choice modelling process



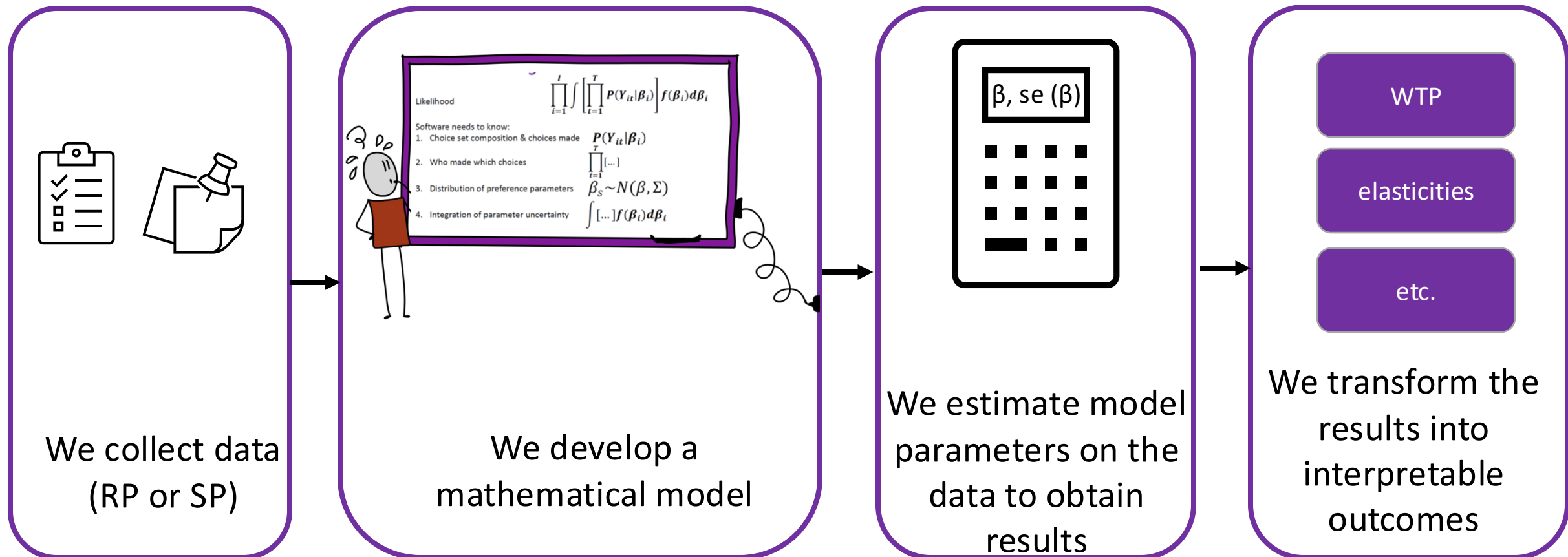
# How do we model choices?

## Steps in the choice modelling process



# How do we model choices?

## Steps in the choice modelling process



# Four key components of a choice model



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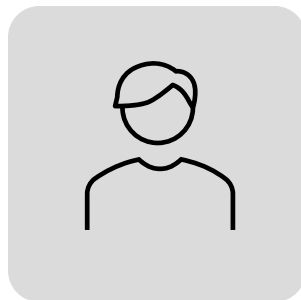
# Four key components of a choice model

As a choice modeller, you need to define ...

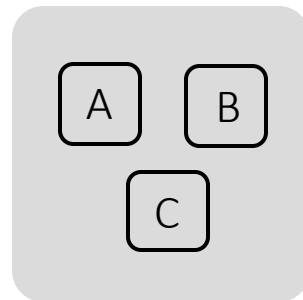
1. Choice context
2. Decision maker
3. Choice set
4. Decision rule



Choice context



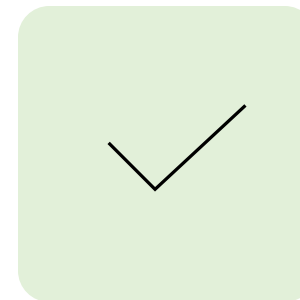
Decision-maker



Choice set



Decision rule



Choice

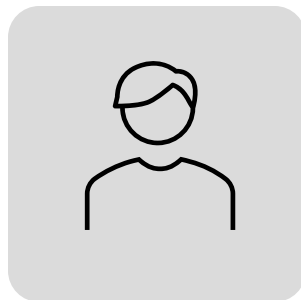
# Four key components of a choice model

## Some components are more difficult to define

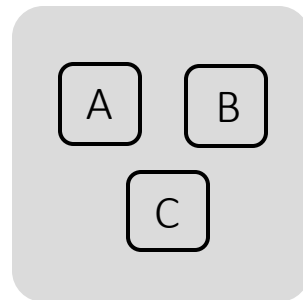
1. Choice context MOSTLY STRAIGHTFORWARD
2. Decision maker MOSTLY STRAIGHTFORWARD
3. Choice set REQUIRES SOME ATTENTION
4. Decision rule REQUIRES CAREFUL CONSIDERATION



Choice context



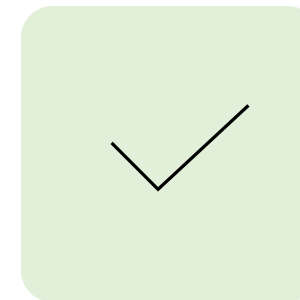
Decision-maker



Choice set



Decision rule



Choice

# Four key components of a choice model

## Choice context (scenario)

- Situation in which choice information is obtained and decision is made
- Examples
  - Buying a laptop for using at home
  - Choosing a treatment for illness
  - Purchasing a new family car
  - Flying overseas for holidays

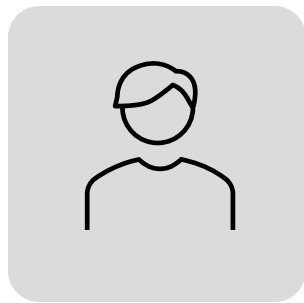


Choice context

# Four key components of a choice model

## Decision-maker

- ❑ Entity who makes a choice
- ❑ Almost always single individual
- ❑ Some studies look at group decision-making



Decision-maker

# Four key components of a choice model

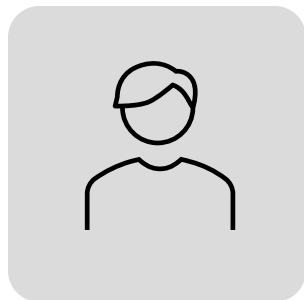
## Decision-maker

### □ Examples

- Consumer
- Traveller
- Patient
- Policy maker
- Company director



Be aware that a decision-maker could also be more than one person; e.g. in household decision-making

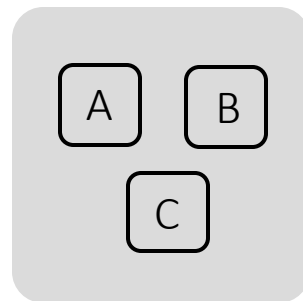


Decision-maker

# Four key components of a choice model

## Choice set

- Set of possible alternatives in a choice task from which a decision-maker is expected to choose



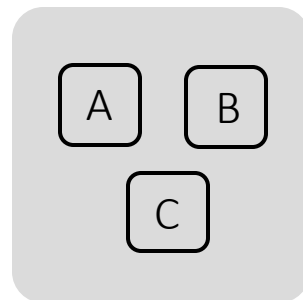
Choice set

# Four key components of a choice model

## Choice set

### □ Examples

- Apple, Samsung, Huawei
- Surgery, chemotherapy, immunotherapy
- Route A, Route B
- Sedan, convertible, sports car, SUV
- Current policy, new environmental policy



Choice set

# Four key components of a choice model

## Decision rule

- ❑ Behavioural process of choosing an alternative
  - Mathematical approximation of real behaviour
  - Knowing the most appropriate decision rule a priori is not easy
    - to be discussed in detail later



Decision rule



# Four key components of a choice model

## Decision rule

- Examples
  - Compensatory
  - Elimination-by-aspects
  - Lexicographic



Decision rule

# Summary



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# Summary

## In summary

