

1. *Modelling*

1.1 *Overview*

A. What is a model?

B. What is a good model?

A. A model:

- a simplified picture of a part of the real world.
- has some of the real world's attributes, but not all.
- a picture simpler than reality.

We construct models in order to explain and understand.

Three Rules of Thumb for Model Building:

- Think “process”.
- Develop interesting implications.
- Look for generality.

Judge models using: truth, beauty, justice.

Interplay between the real world, world of æsthetics, world of ethics, and the model world.

Prices, Costs, and Values → Profits

We use verbal, graphical, and algebraic models of how consumers, firms, and markets work.

We assume rationality: that economic actors (consumers and firms) will not consistently behave in their worst interests.

Not a predictive model of how individuals act, but robust in aggregate.

1.2 Modelling

Speculations about human behaviour/social and organisation interactions.

Explore the arts of

- developing
- elaborating
- contemplating
- testing
- revising

models of behaviour.

What is a model?

- We can have several models of the same thing, depending on which aspects we want to emphasise.
- Models are constructs to explain and appreciate the real world.

Need **skills** of:

- **abstracting** from reality
- squeezing **implications** out
- **evaluating** a model

We can produce more complex behaviour than we are capable of understanding:

the behaviour of a baby baffles a psychologist (and vice versa)

If we cannot understand individual behaviour, then how are we to understand social/bureaucratic behaviour?

Familiar models:

- individual choice under uncertainty
- exchange
- adaptation
- diffusion
- transition
- demography

1.3 *Model of the Model-Building Process*

1. Observe some facts.
2. Speculate about processes that might have produced such observations.
3. Deduce other:
results
implications
consequences
predictions

— from the model: “If the speculated process is correct, what else would it imply?”
4. Are these **true**? If not, speculate on other models/processes.

Case 1: Contact and Friendship.

Why are some people friends and not others?

e.g. In a hall of residence,
lists of friends

Observe: friends live close together.

Process?

Write down a possible process that might produce the observed result.

Speculations:

1. previous friends chose to live together
if had lists of friends from previous year, then fewer clusters of friends, why?
observe: friendship patterns among first, second, and third years → no difference in clusters (against expectation)
2. friendships develop through contact and common background, given a potential for friendship

Write down what changes in these friendship clusters over time.

through the year a strengthening of clusters of friends observe? yes.

Generalisation

We want to include earlier predictions but find a more general model that predicts new behaviours as well, more widely.

Can we generalise this?

- beyond the university?
- communication → friendship?
- enemies as well as friends?

Case 2: Responsibility Changes

If, in a committee, people in authority tend to moderate their beliefs and actions as a result of confrontation with the actual consequences of their beliefs and of exposure to alternative ideas, then

- politically good to include “extremists”
 - seen to represent faction
 - moderate own views

1.4 *Three Rules of Thumb*

1. Think “process”

A good model is almost always a statement about a process. Many bad models fail because they have no sense of process. When you build a model, look at it for a moment and see whether it has some statement of process.

2. Develop interesting implications

Much of the *fun* in model building comes in finding interesting implications in your models. A good strategy for producing interesting predictions: look for natural experiments.

3. Look for generality

Look for generality. Ordinarily, the more situations a model applies to, the better it is and the greater the variety of possible implications.

Example:

absent-minded academic forgets to bring handouts to class.
why?

1. because
 - (1) teaching isn't important to her, research is, or
 - (2) professor have single-minded attention to important problems, not bringing handouts to class
2. so (1) if valued students better → less forgetful
 - (2) if problems are easier or solved → less forgetful
- ∴ (2) just as forgetful in research and teaching
 - (1) less forgetful with graduate students/research assistants
3. Generalise: busy people forget things

1.5 Evaluation of Speculative Models

- I. Truth
- II. Beauty
- III. Justice

Justice: be aware of a responsibility to society beyond the “search for truth”.

Beauty:

- Simplicity
- Fertility (predictions/assumptions)
- Surprise

e.g. Parental preference for sons.

Rule: “stop having kids when sons outnumber daughters”

→ for society: more girls than boys, but

for most couples: more sons than daughters.

Truth:

- correct (or more correct) models
- requires clever, responsible detective work to find the truth
(aim for objectivity, but face subjectivity if it exists)
- test derivatives, not assumptions
- predicting is not equivalent to understanding, necessarily

Circular Models:

- a. “when the rain-dance ceremony is properly performed, and all the participants have pure hearts, then it will rain” — testable?
- b. “people pursue their own self-interest”
— don’t predict values from behaviour and then predict the same behaviour from the values just derived.
- c. Monty Python’s “the man who claims he can send bricks to sleep”

Critical Experiments:

compare alternative models
the same question → different answers: critical.

The Case of the Stupid Question

e.g. “a surfer asked a stupid question in class”

Speculations:

1. not enough time to study
2. success on the board is sufficient for her
3. jealous of her prowess at surfing, the rest of us look down on her classroom performance and interpret her questions as “stupid”

Implications:

	1	2	3
Q1: will athletes ask stupid questions out of season?	no	yes	yes
Q2: will athletes ask stupid questions in places that don't emphasise athletics?	yes	no	no
Q3: will athletes who don't look like athletes ask stupid questions?	yes	yes	no

The Importance Of Being Wrong

- evaluate rather than defend (avoid “falling in love” with the model)
- delight in finding fault — be skeptical and playful
- always think of alternative models