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 (truth), world of æsthetics (beauty), world of ethics (justice), and the model world.

Example: The firm —

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, how we will use the model.**

— **Models are constructs to explain and appreciate the real world.**

So ...

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 systemic/social/bureaucratic behaviour?

Six familiar models in the social sciences:

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

Each is treated by March & Lave.

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:**

   o results

   o implications

   o consequences

   o 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?

What is a possible process that might produce the observed result?

Two Speculations about Process:

1. **previous friends chose to live together**

   implies **if had lists of friends from previous year, then fewer clusters of friends, why?**

   observe: friendship patterns among first, second, and third years $\rightarrow$ no difference in clusters (against expectation)

2. **friendships develop through contact and common background, given a potential for friendship**

   What changes in these friendship clusters over time?

   implies **through the year a strengthening of clusters of friends**

   observe this? 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 $\rightarrow$ 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**

Case 3:

An "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 $\rightarrow$ less forgetful, or**
   (2) if problems are easier or solved $\rightarrow$ less forgetful

$\therefore$ **(2)** *implies* **just as forgetful in research and teaching**
(1) *implies* **less forgetful with graduate students/research assistants**

3. **Generalise: busy people forget things**

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

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, or parsimony**
- **Fertility (many predictions/assumptions)**
- **Surprise!**

e.g. Parental preference for sons.

Rule: "stop having kids when sons outnumber daughters"

A Surprise —

→ **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

Beware 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
with the same question → different answers:
critical.

4. The Case of the Stupid Question

e.g. "a surfer asked a stupid question in class"

Speculations:

A. **not enough time to study**
B. **success on the board is sufficient for her**
C. **jealous of her prowess at surfing, the rest of us look down on her classroom performance and interpret her questions as "stupid"**

How do the Implications Differ?

	Speculation A	Speculation B	Speculation C
Q1: will athletes ask stupid questions out of season?	no	yes	yes
Q2: will athletes ask stupid questions in places that don't emphasise althetics?	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 then defend (avoid "falling in love" with your model)**
- **delight in finding fault — be skeptical and playful**
- **always think of alternative models**