Why data scientists like *Models*

Domains and definitions

Applied Data Science
INFO I-590
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What kind of models?

- Scientific Models
- Statistical Models
- Predictive Models
- … and more.

Fashion models?

Twiggy and
Kate Moss

Barbie and Ken dolls:
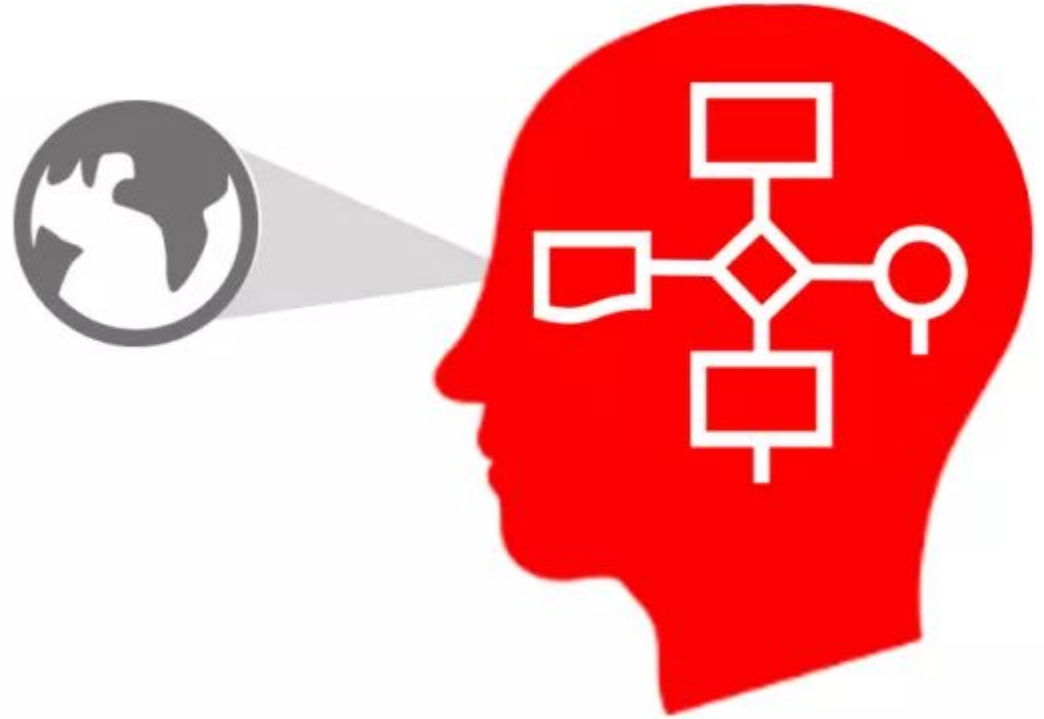# Models of fashion models?

~ 1955

~ 2018

What is a model?

- Substitute
- Representation
- Proxy
- Simulation
- Pretender
- Virtual thing
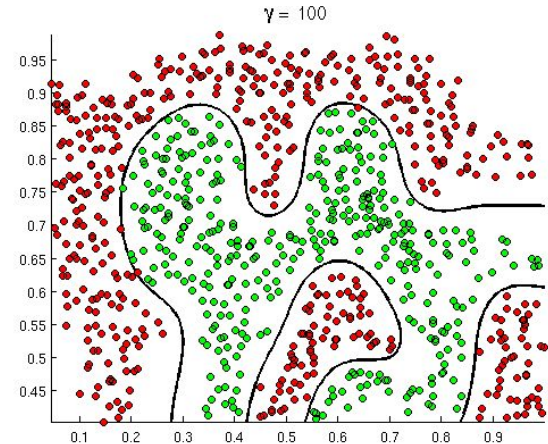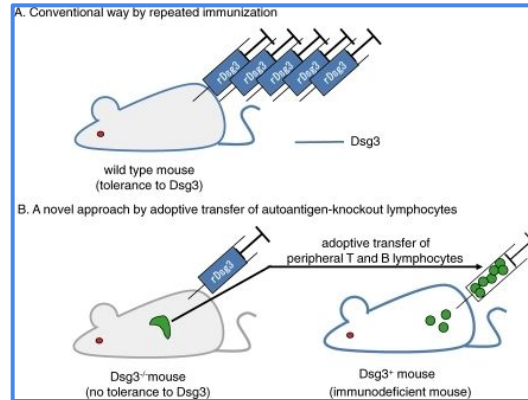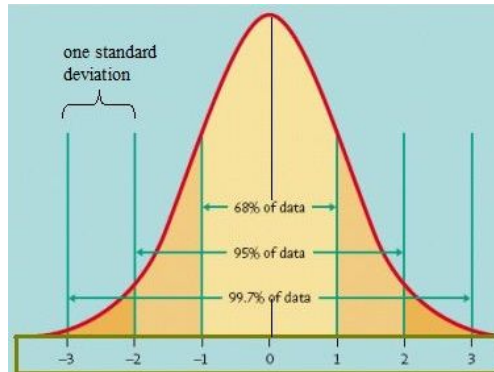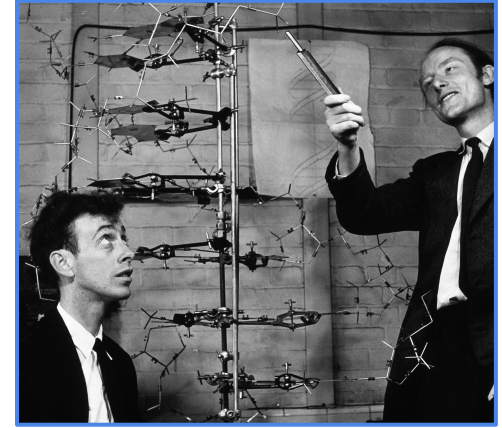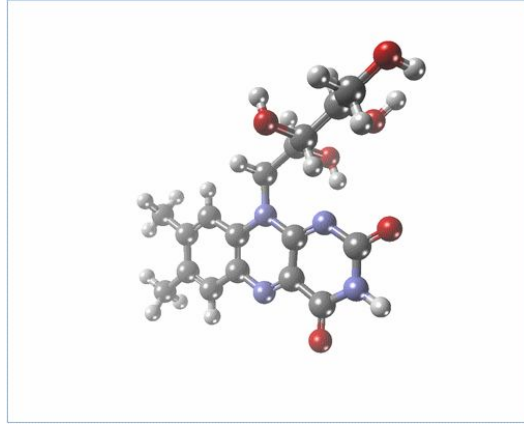- Idealized thing
- Simplified thing

What is a model?

- Concept
- Framework
- System of belief
- Understanding
- Mental construct
- Mental model

What kind of models?
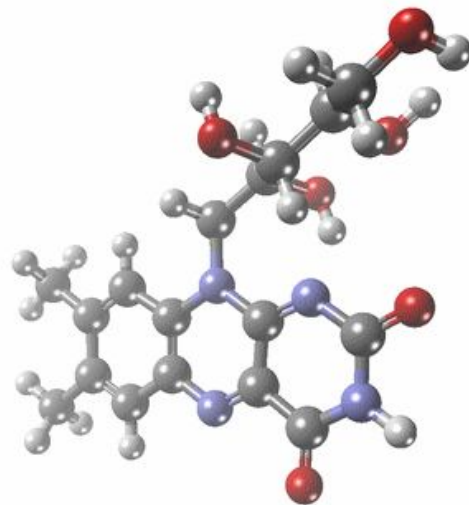
Physical models

Patient model for medical training
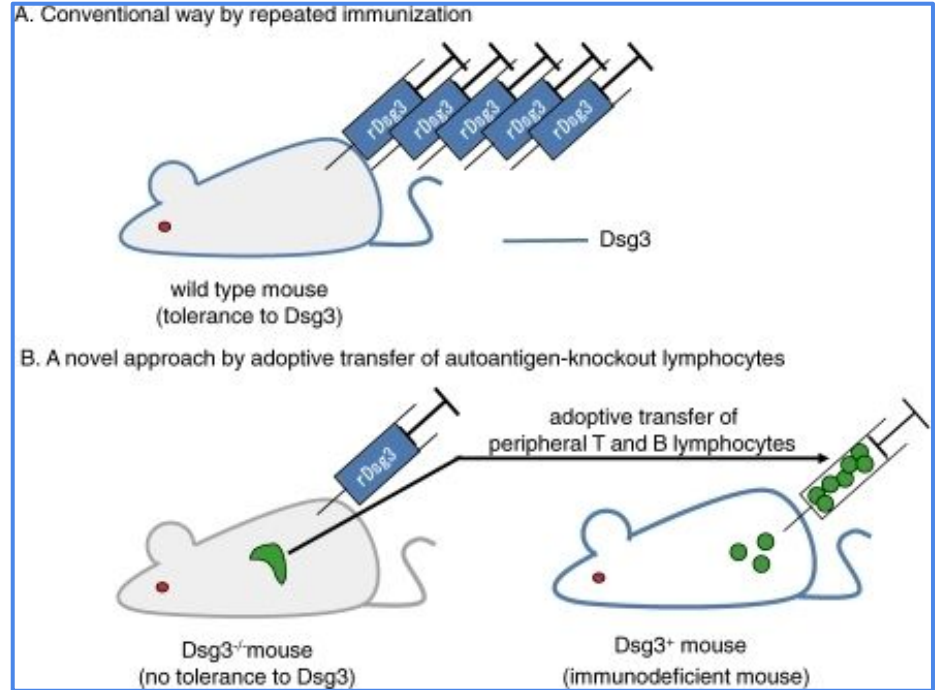
Watson and Crick with their DNA model, ~ 1955

Computational models

Riboflavin, a.k.a.
vitamin B2,
molecular graph
data structure, via
3D graphics.

Animal models

Medical research utilizes "animal models" as substitutes for humans.

A. Conventional way by repeated immunization

rDsg3 rDsg3 rDsg3 rDsg3 rDsg3

—— Dsg3

wild type mouse
(tolerance to Dsg3)

B. A novel approach by adoptive transfer of autoantigen-knockout lymphocytes

rDsg3

adoptive transfer of
peripheral T and B lymphocytes

Dsg3⁻/⁻ mouse
(no tolerance to Dsg3)

Dsg3⁺ mouse
(immunodeficient mouse)

What kind of models?

A "statistical model" may refer to the assumed population distribution of a particular measure. More generally the statistical model may include the mathematical system involved in hypothesis testing, confidence interval generation, etc.
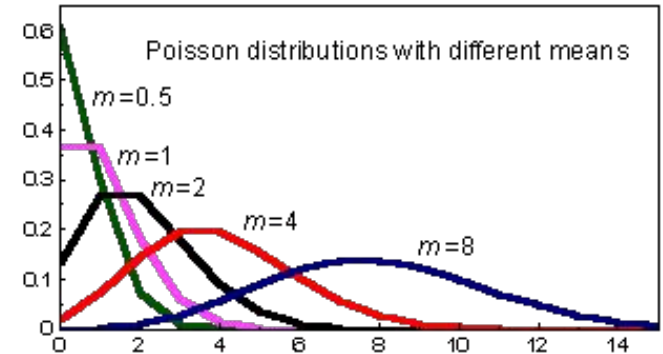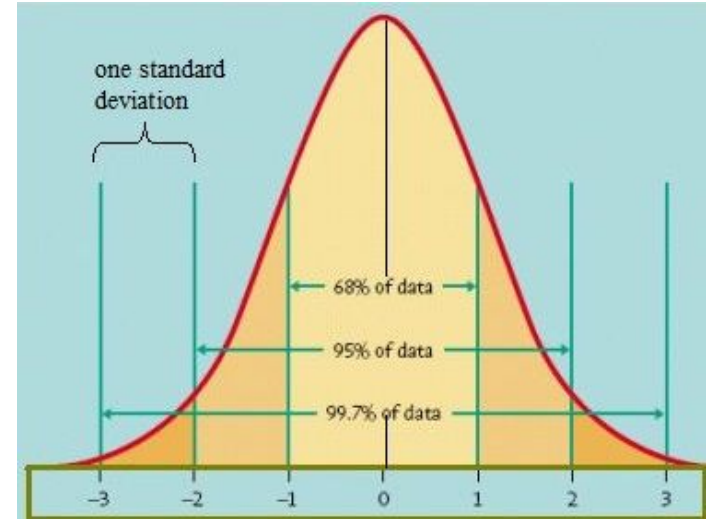
Predictive models

Usually statistics or machine learning based, predicting numerical or categorical outputs, for examples, from input features.
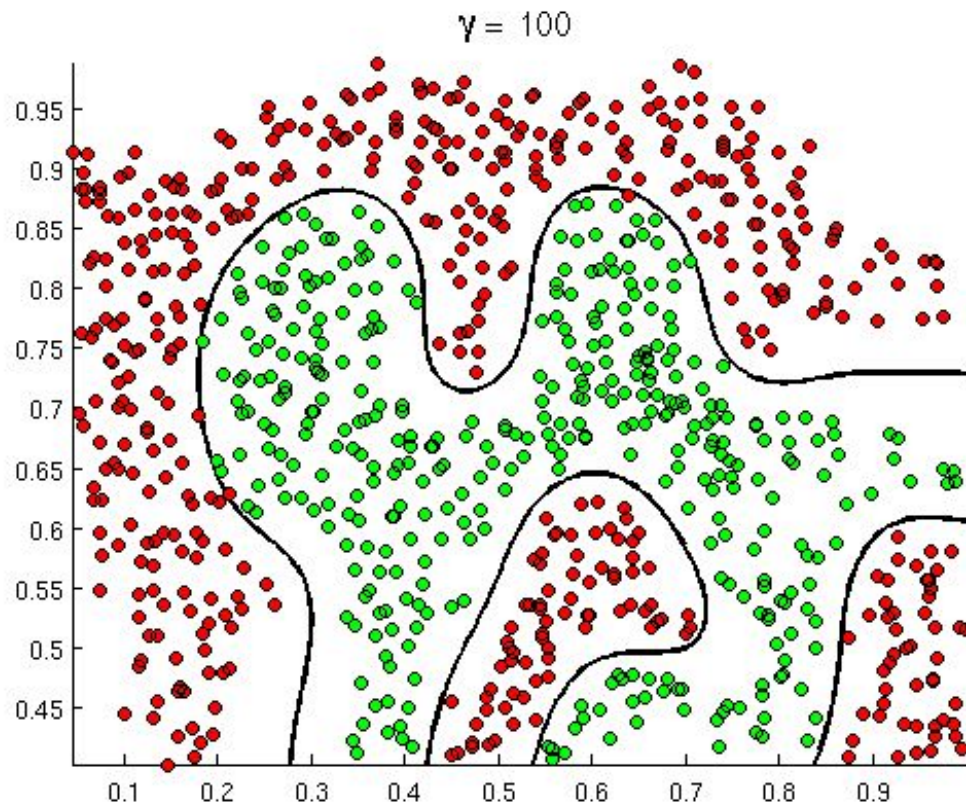
Models: In summary

Models of all sorts serve to connect **reality** with **thought**, to assist in cognition.