

Exploratory Model Building

Toward Agent-Based Economics

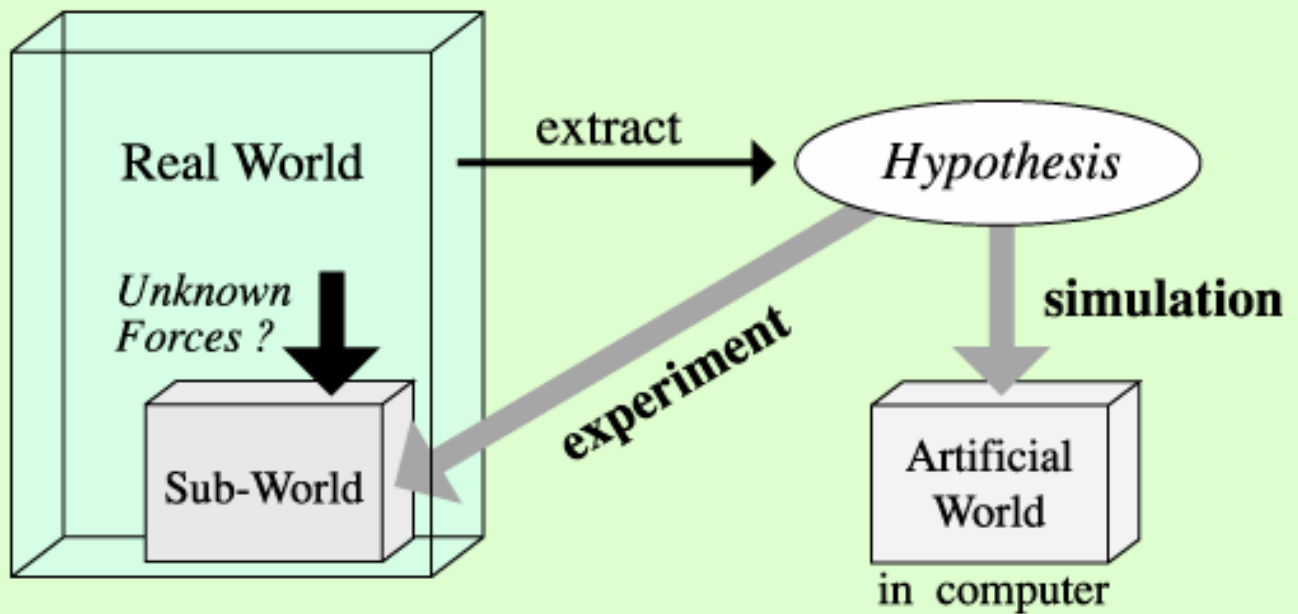
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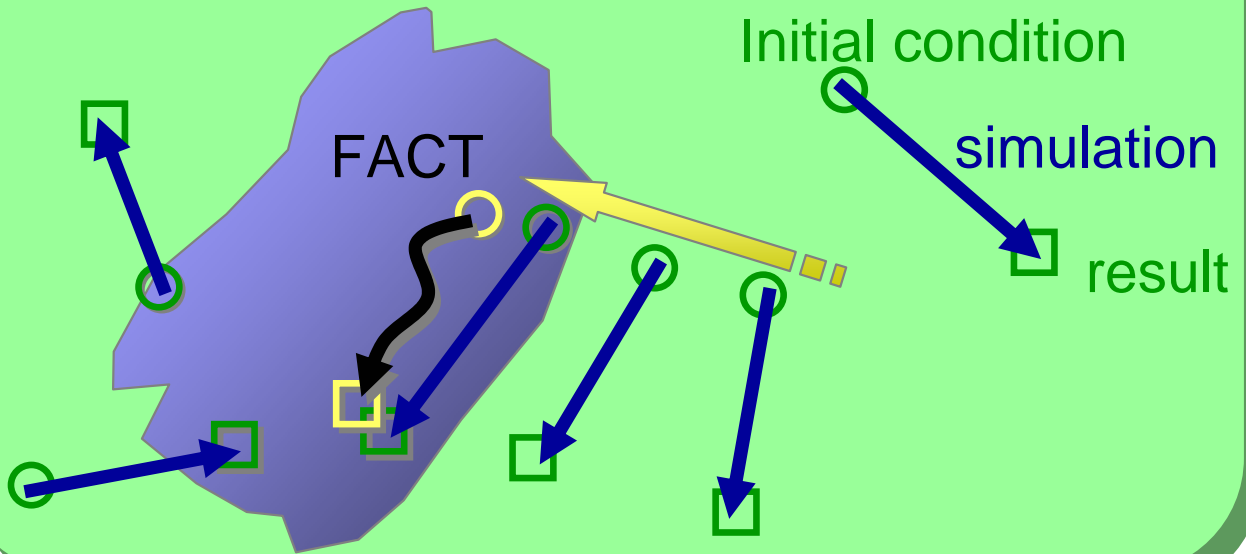
Simulation is ...



How Building Reality?

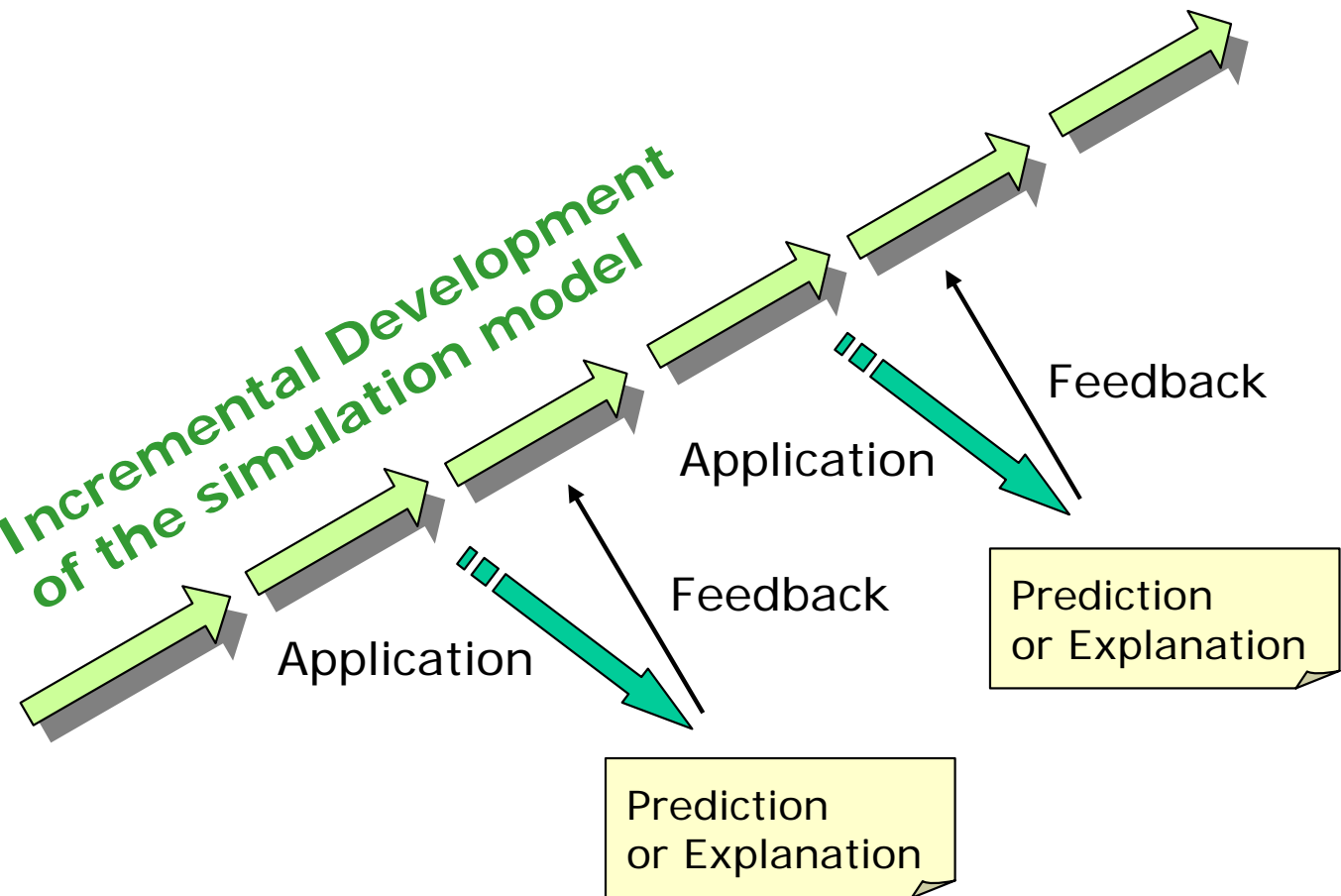
Possible World

Model and
Initial condition



Incremental Development of the simulation model

From the macroscopic viewpoint,



Exploratory Model Building

From the microscopic viewpoint,

-
- Model Building
 - Model Specification
 - Specification of initial settings
 - Parameter Estimation
 - Model Validation

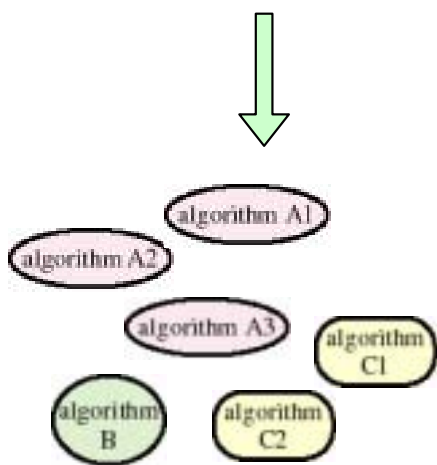
Phase 1



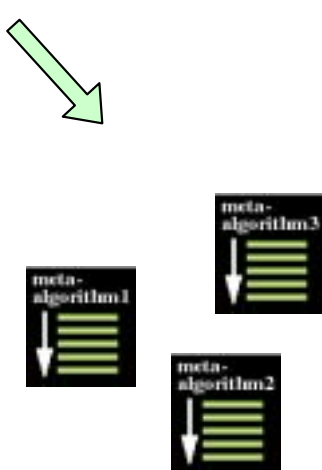
Model Building

- *cognitive science*
- *social psychology*
- *consumer behavior*
- *marketing science*
- *management science*
- *artificial intelligence*

- *reinforcement learning*
- *neural network*



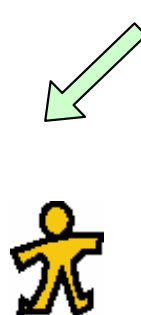
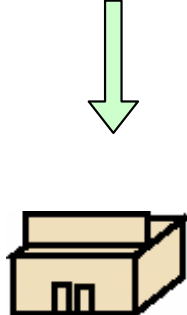
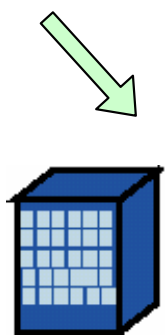
algorithm model component



meta-algorithm Model component



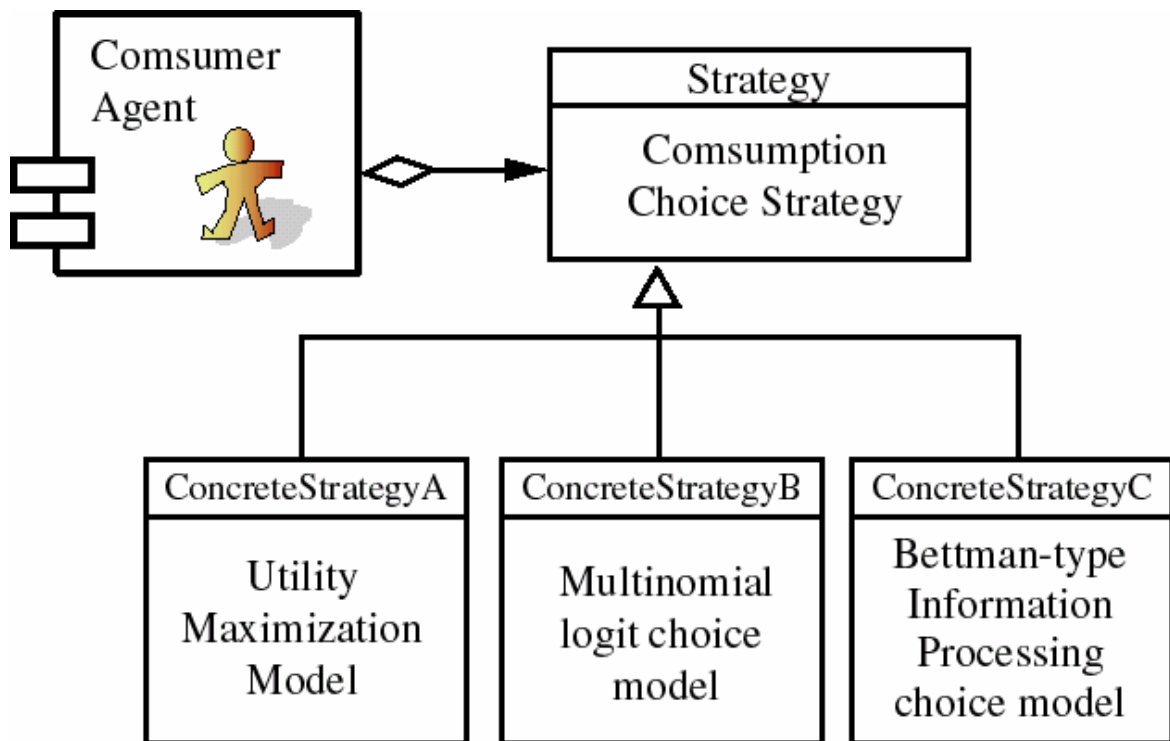
adaptive component



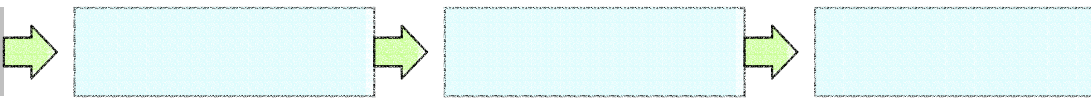
agent model



There are some alternative models.

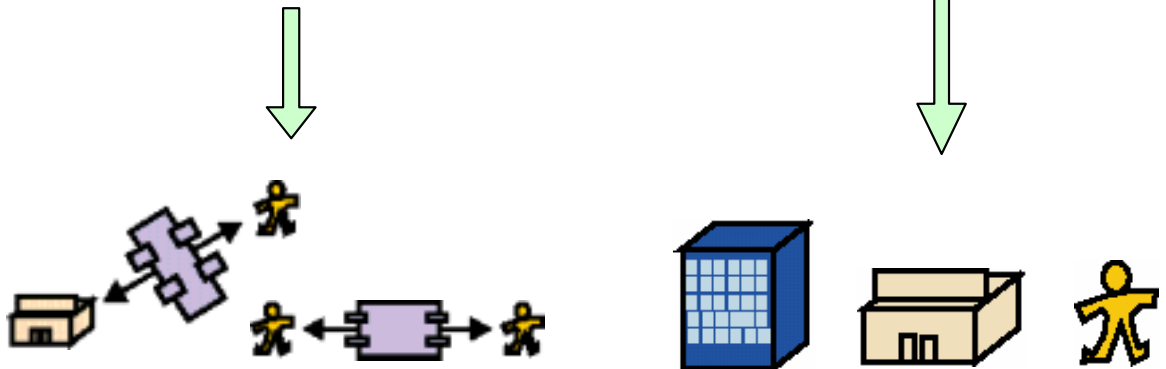


Phase 1



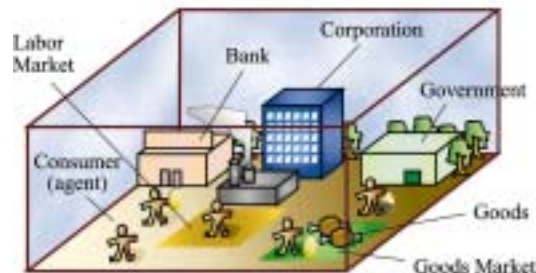
Model Building

- *communication studies*
- *social network analysis*
- *Sociology*
- *distributed artificial intelligence*



relation model component

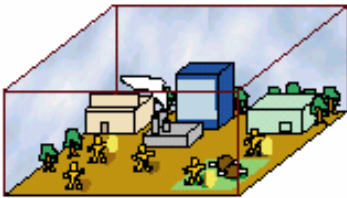
agent model component



composed

Phase 2

Model Specification



composed
social model



- * *constant values*
- * *initial values of known parameters*
- * *data set for adaptive component*

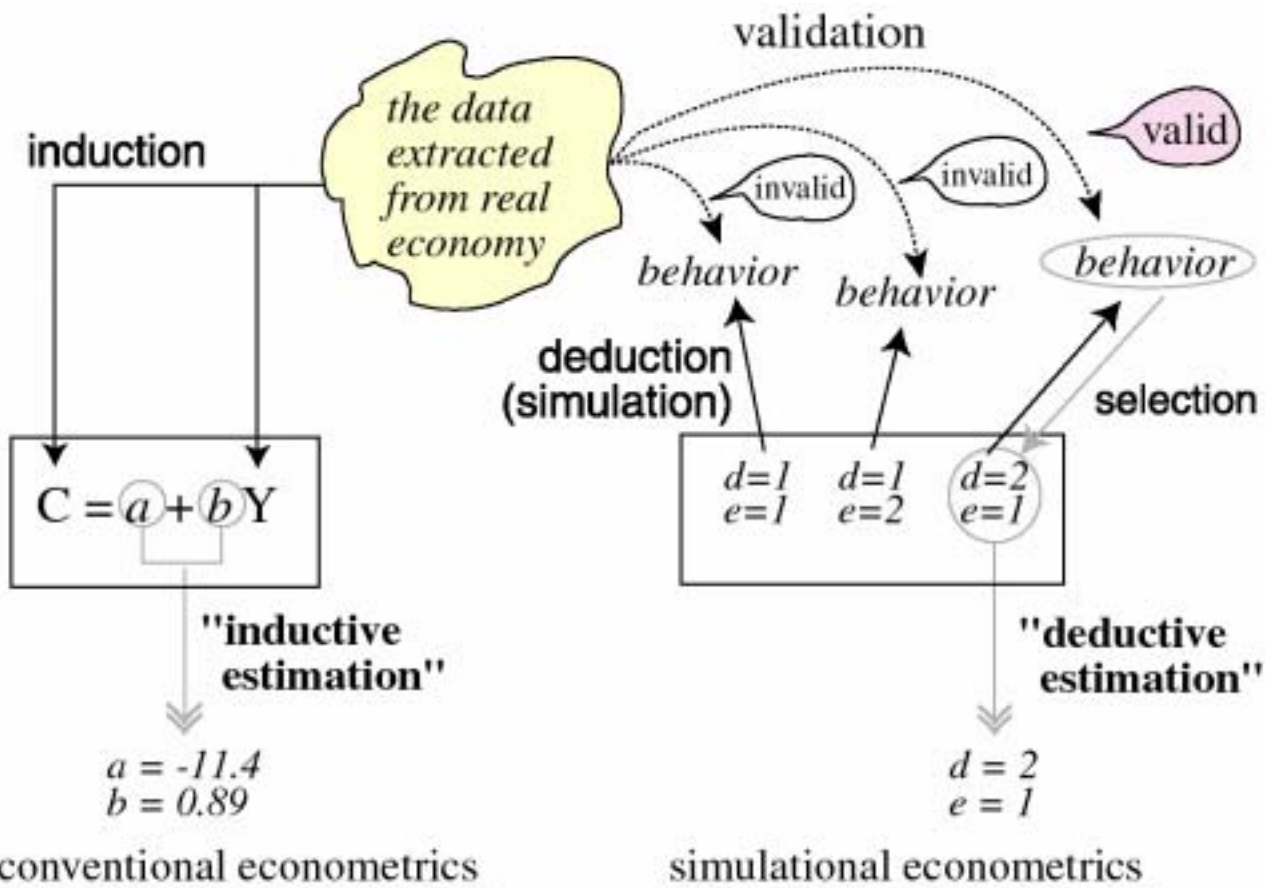


composed model
with the values of
known parameters

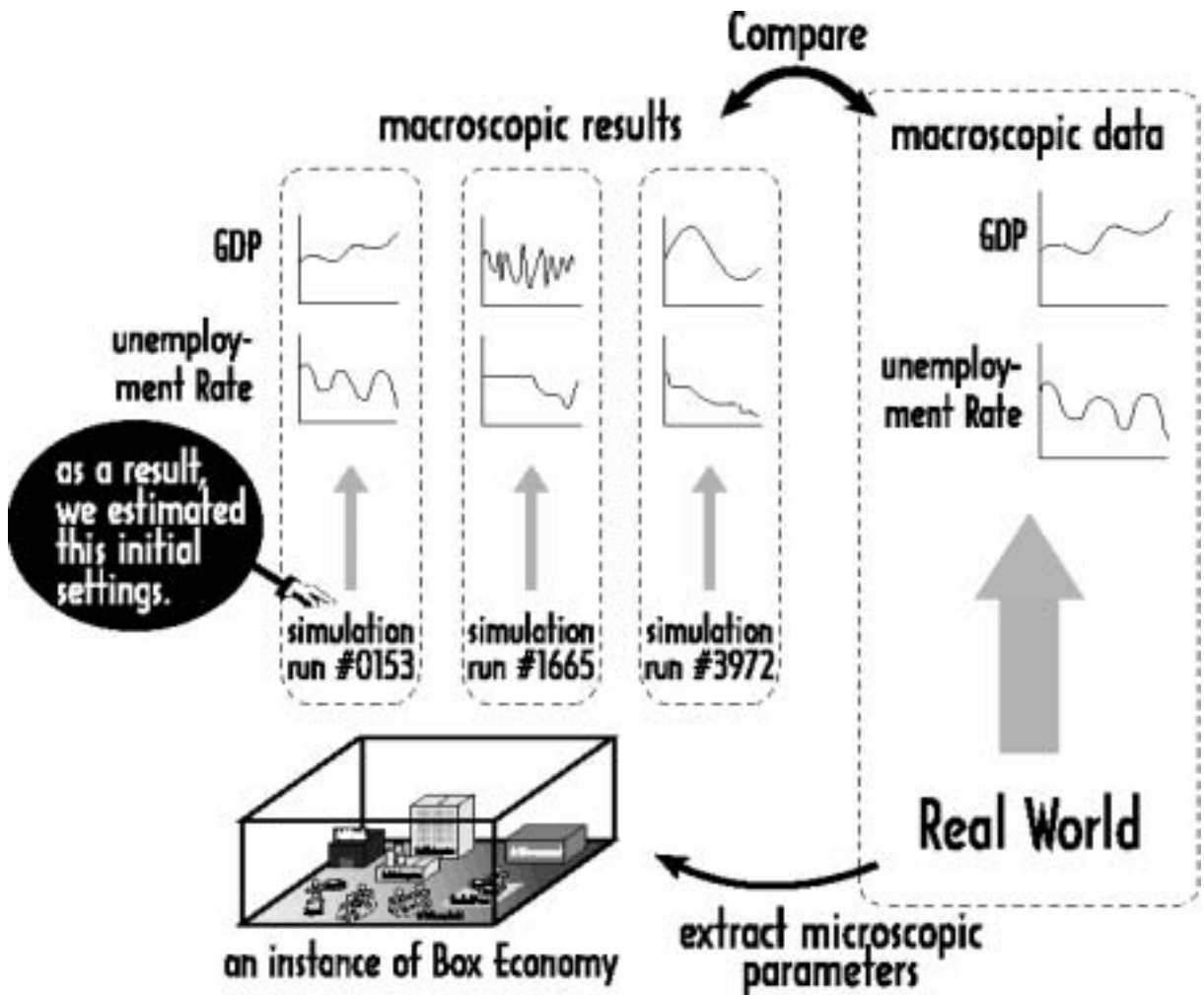
Parameter Estimation

**Inductive
Parameter Estimation**

**Deductive
Parameter Estimation**

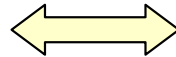
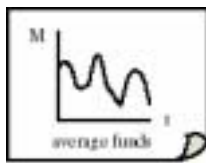


Deductive Estimation (for Parameter or Model)



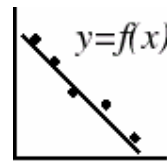
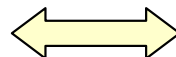
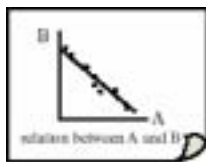
Model Validation

- Comparison with observed data



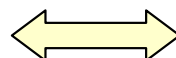
observed
data

- Comparison with other economic theories

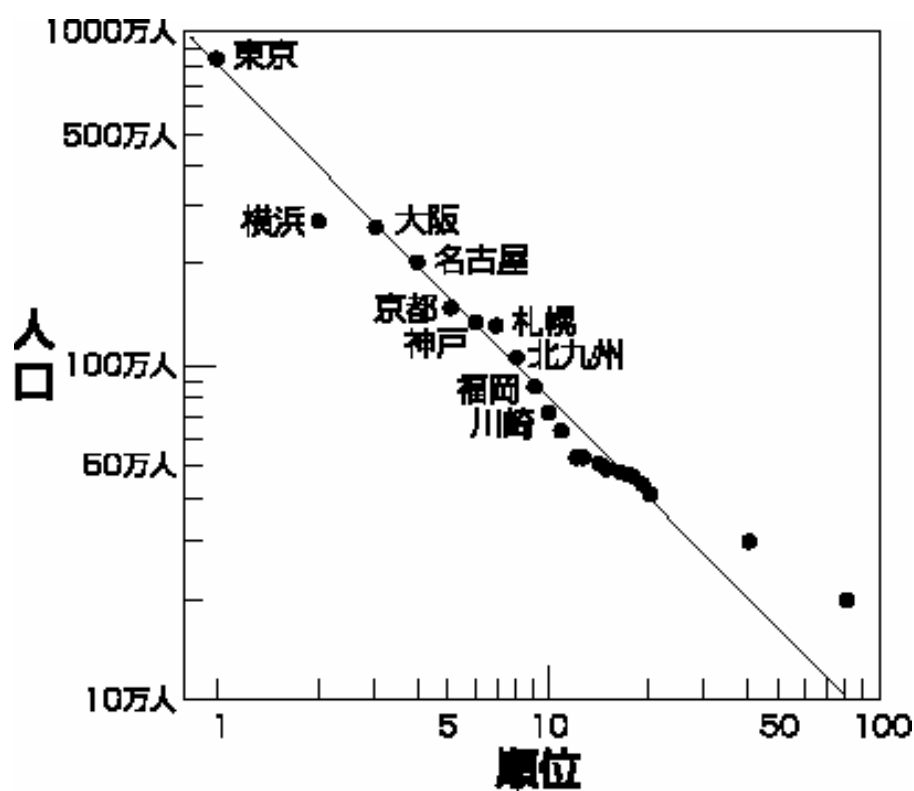
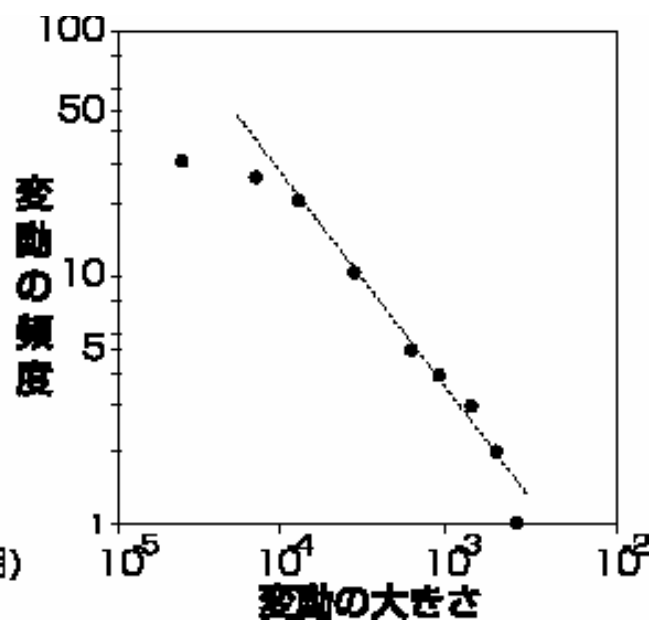
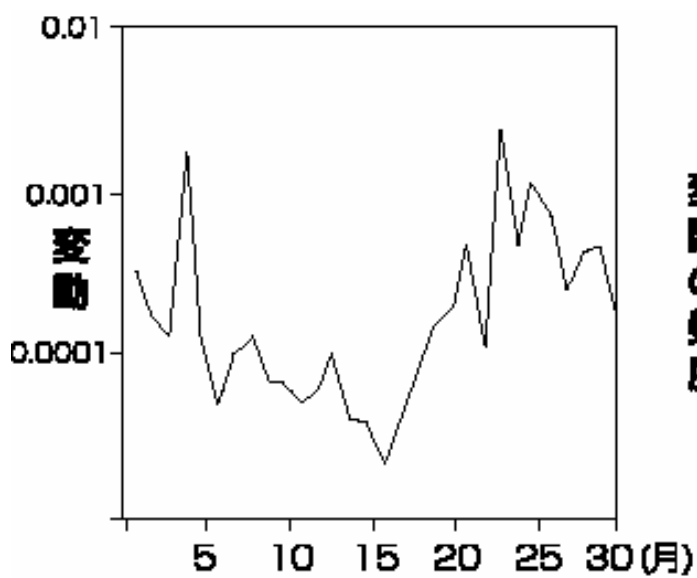


other economic
theories

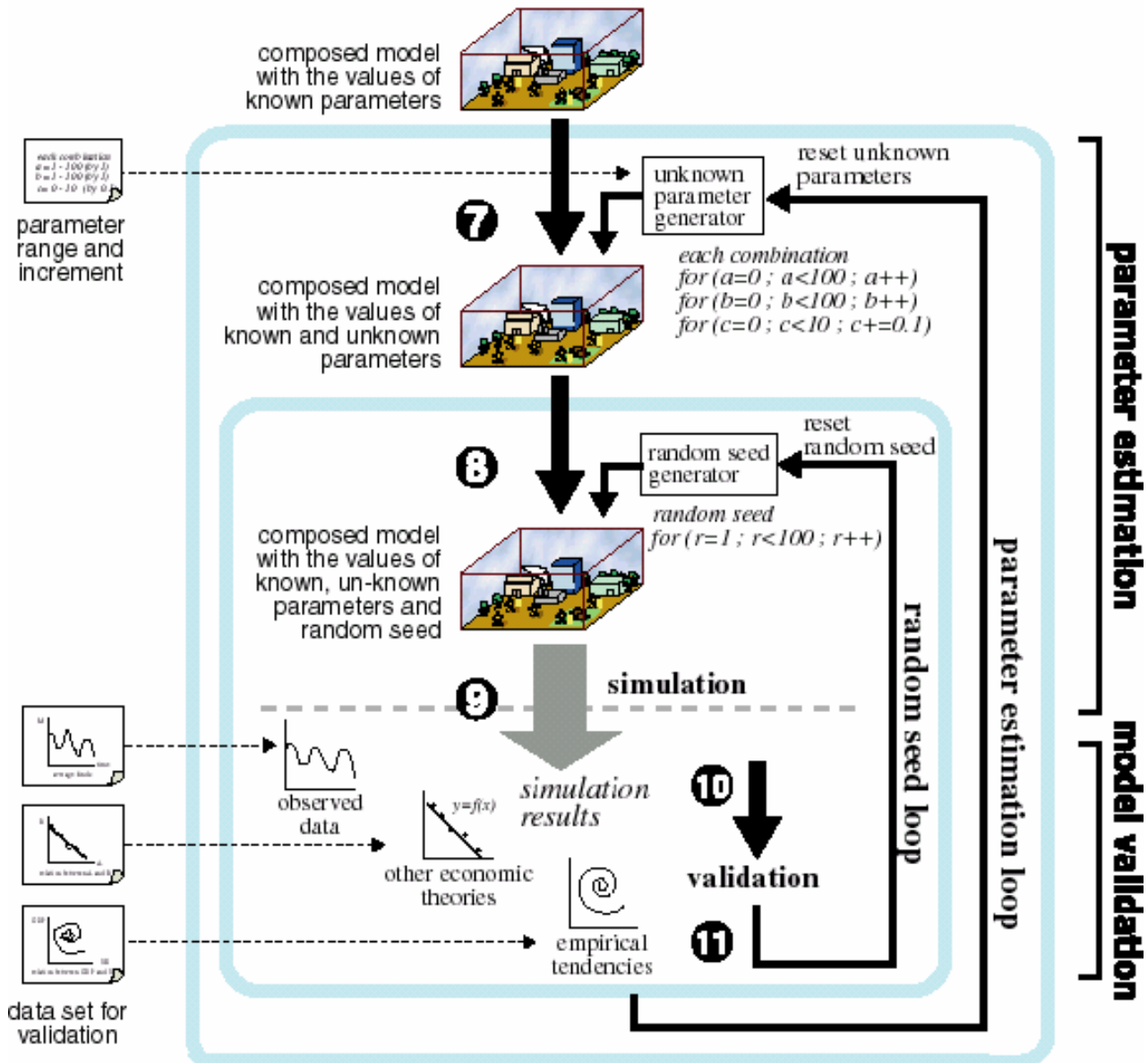
- Comparison with empirical tendencies

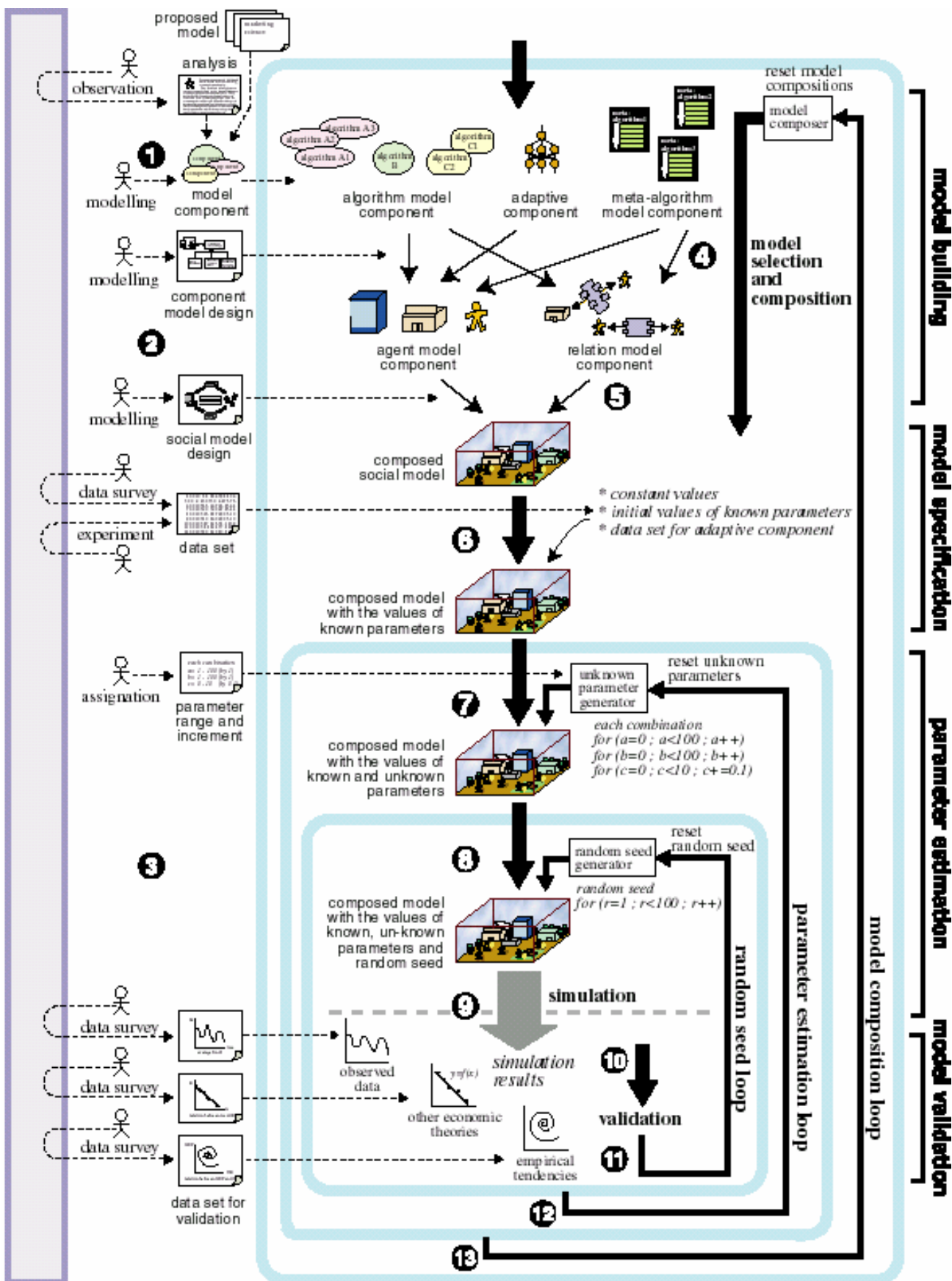


empirical
tendencies



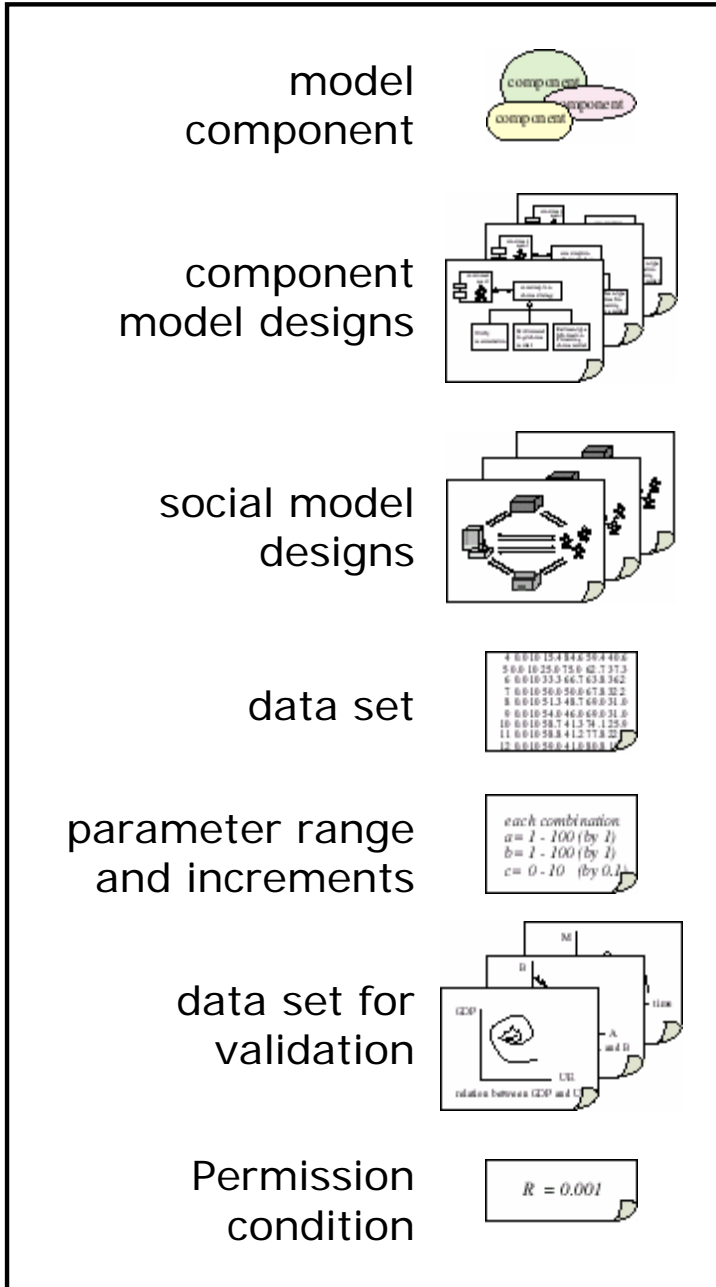
Parameter Estimation and Model Validation



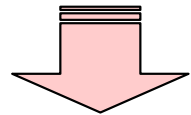


Automatic Model Estimation System

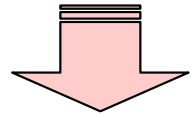
inputs



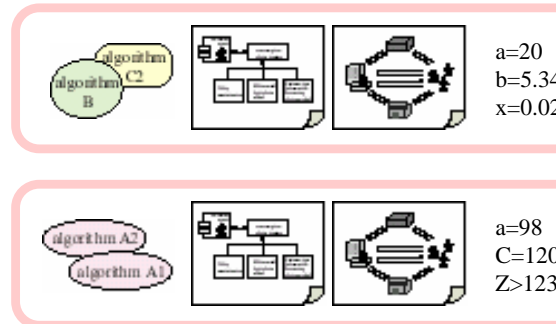
simulation user



automatic model estimation system



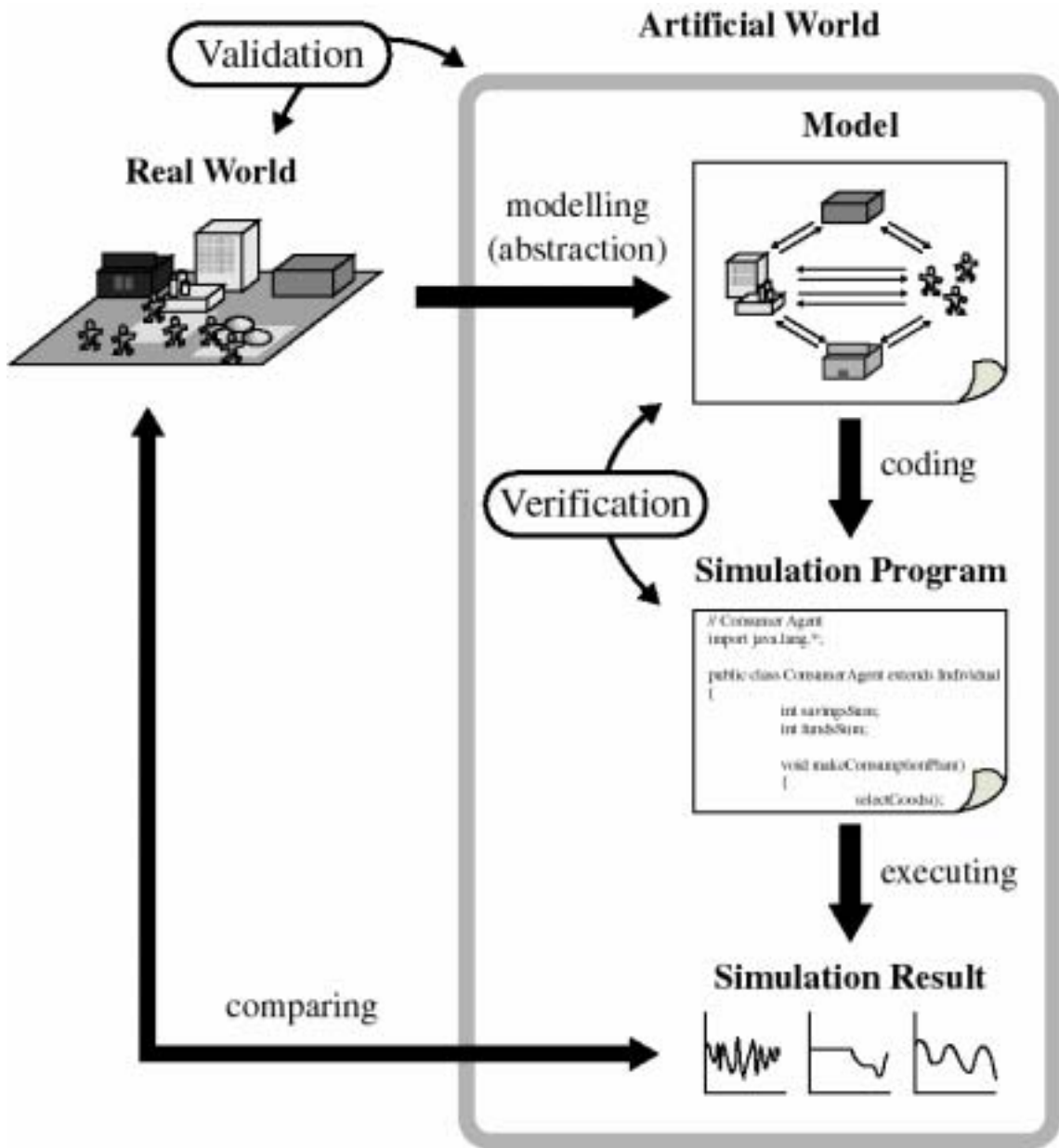
outputs



some combinations of model settings



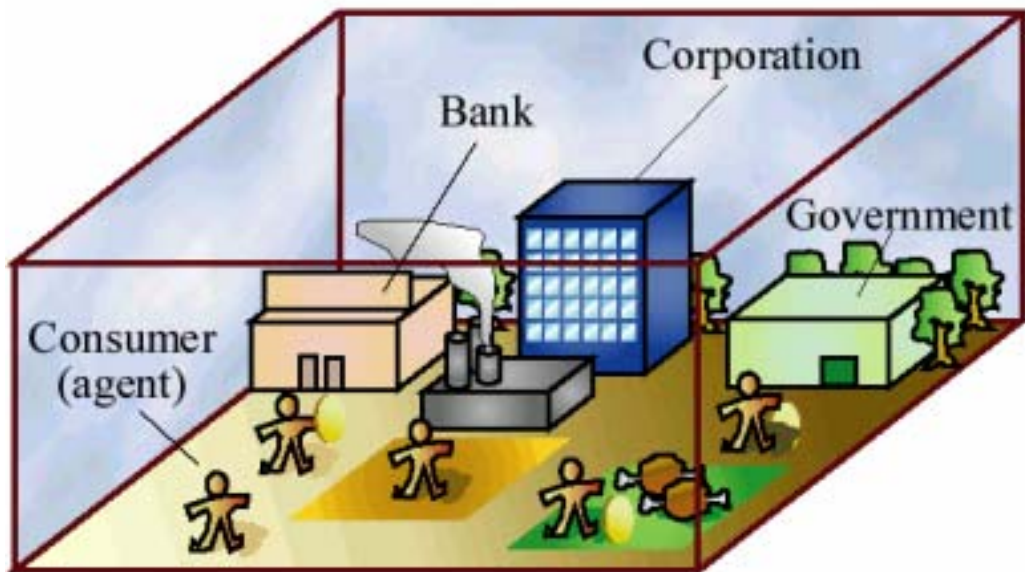
For success with social simulation



“Neo-Instrumentalism”

- Instrumentalism
- +
- Extensibility of model
- Reality of the assumptions

Open the Black Box !



Boxed Economy Model

= miniature of the entire economy