GST-07 Models and Reality

Formal Description

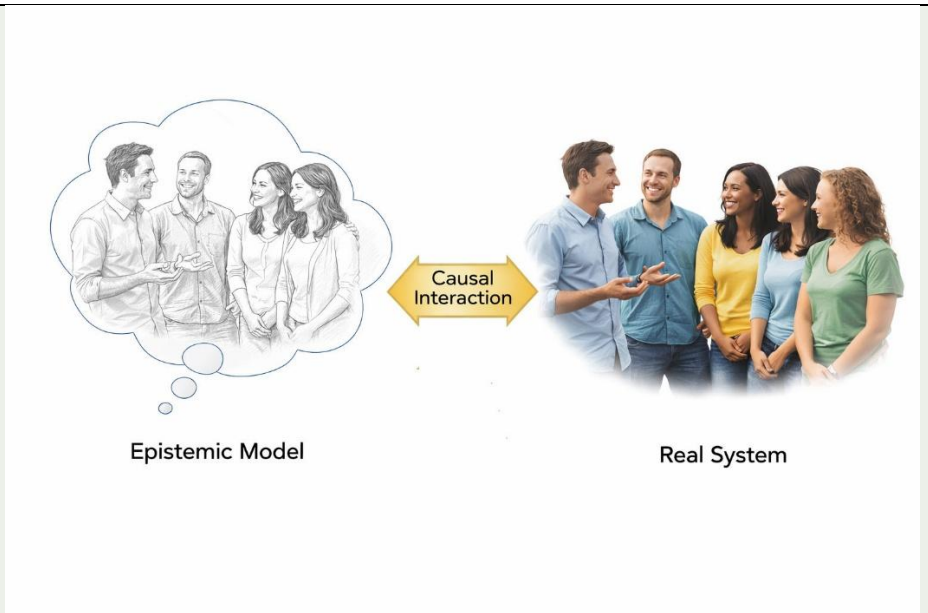
Models are simplified representations of real systems that capture selected aspects of their structure and behaviour while omitting others.
All models are therefore selective, reflecting the constraints of perception, cognition, and purpose.
While models may be sufficiently accurate to support effective action, they are never complete representations of the systems they describe.
The omission of elements from a model may have consequences if those elements exert causal influence on system behaviour.

Plain English Explanation

We never interact with reality directly. We interact via our understanding of it.
That understanding takes the form of models: maps, diagrams, theories, and mental pictures. These models simplify reality so that we can make sense of it and act effectively.
However, every model leaves something out.
A simple way to see this is to compare a pencil sketch with a photograph of the same scene. The sketch may capture the main features, but it will not include every detail. Some of what is left out may not matter, but sometimes it does.
This means that models are always:

- useful but incomplete
- accurate in some respects, but not in others

In many situations, simplified models work well because they capture what is most important. But if important factors are omitted, decisions based on those models can lead to unexpected or unintended outcomes.



Example 1 – Maps and Navigation
A road map simplifies reality by showing roads, distances, and directions, but it omits many details such as terrain, traffic conditions, or temporary closures.
If those omitted factors become important, the map may no longer be sufficient for effective navigation.

Example 2 – Economic Models
Economic models often simplify human behaviour by assuming rational decision-making.
However, real human behaviour includes emotions, social influences, and biases. When these are omitted, the model may fail to predict real-world outcomes accurately.

Example 3 – Social Perception
A person may form a simplified model of a group or organisation based on limited information.
If important individuals, relationships, or dynamics are omitted from that model, decisions based on it may lead to misunderstandings or conflict.

Provenance and Links
The relationship between models and reality has been a central concern in philosophy and science:

- Plato – distinction between appearances and underlying reality (forms vs representations)
- Galileo Galilei – use of mathematical models to describe physical phenomena
- Isaac Newton – development of simplified mathematical laws to model motion and gravity
- Ernst Mach – emphasis on models as economical descriptions of observations
- Karl Popper – models and theories as provisional and subject to testing and revision
- Thomas Kuhn – paradigm shifts and changing scientific models
- Nancy Cartwright – models as idealised representations that work in limited domains

In contemporary science, models are understood as simplified, purpose-driven representations of complex systems.
In EFGST, models are treated as physical processes within cognitive systems that selectively represent aspects of reality, necessarily involving omission and simplification.

Practical Exercise
Choose a model you are familiar with (e.g. a map, scientific theory, organisational chart, or personal understanding of a situation).

1. What aspects of reality does the model represent well?
2. What aspects does it leave out?
3. Could any of the omitted elements influence outcomes?
4. How might decisions based on this model go wrong?