WHOSE MODEL IS IT ANYWAY?

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"…Similarly the possibility of describing the world by means of Newtonian mechanics tells us nothing about the world: but what does tell us something about it is the precise way in which it is possible to describe it by these means. We are told something about the world by the fact that it can be described more simply with one system of mechanics than with another."

Ludwig Wittgenstein (1974, , TLP 6.342, p. 68)

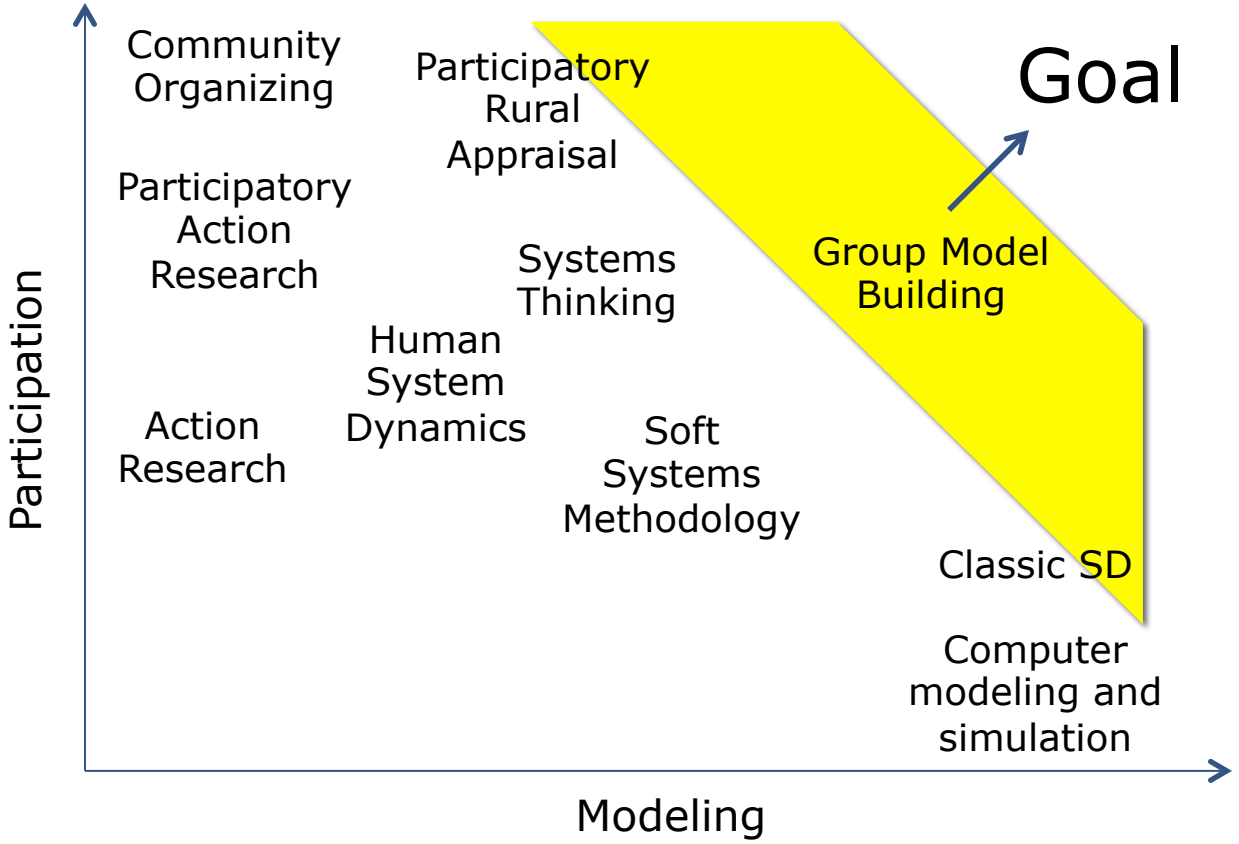
"…Today's knowledge about something is not necessarily the same tomorrow. Knowledge is changed to the extent that reality also moves and changes. Then theory also does the same. It's not something stabilized, immobilized."

Paulo Freire (Horton and Freire 1990, p. 101)

"One way to focus on this problem is to discover that we have no conception of objectivity that enables us to distinguish the scientifically 'best descriptions and explanations' from those that fit most closely (intentionally or not) with the assumptions that elites in the West do not want critically examined."

Sandra Harding (1991, p. 97)

Modeling and participation



What do we mean by “participation” and “model”?

Participation

- Interviews or key informants
- Involved in selecting problem
- Helped conceptualized model
- Interacted with model
- Helped formulate equations
- Made decisions about modeling process, model formulation, data, analysis, and implementation

Model

- Diagram
- Physical models
- Causal map
- Stock and flow diagram
- Functional forms
- System of equations
- Computer simulation
- Software code

Types of community involvement in GMB

- ***Community engaged***
- ***Community based***
- ***Community driven***

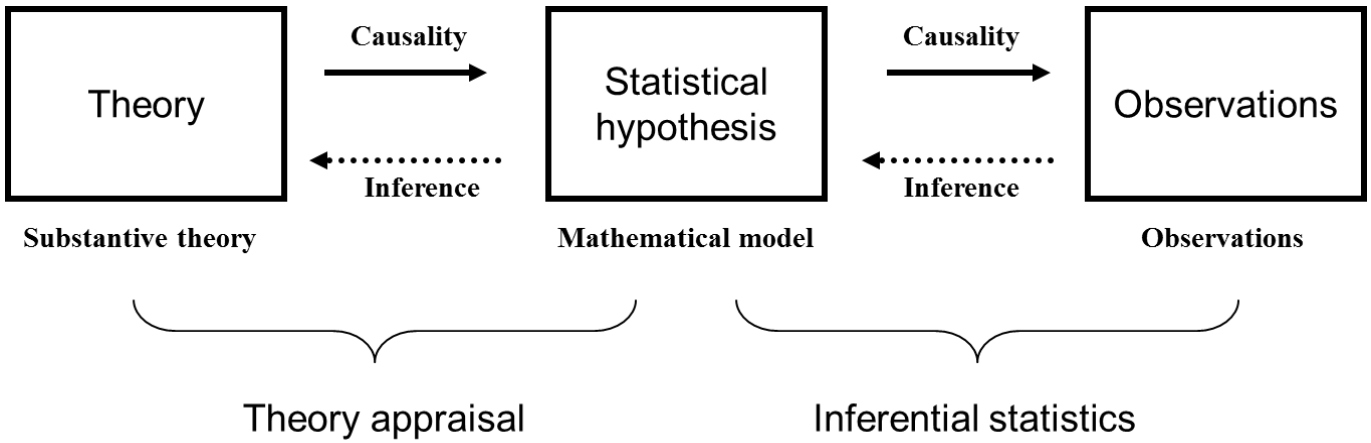
Motivation

- We tend to view the results of models that involved community representatives in the process *differently because of a presumed correspondence between their understanding of a situation and the model being analyzed and informing decision-making and action.*

- However, the relationship between 'participation' and 'model' may not be explicit.

- Practical implications:
  - Design of group model building sessions
  - Relevance of model to ocmmunity
  - Transfer of ownership and implementation of models

Need for better mathematical models of theories



Adapted from Meehl, P. E. (1990). Appraising and amending theories: The strategy of Lakatosian defense and two principles that warrant it. *Psychological Inquiry, 1*(2), 108-141.

Progressively stronger specifications of theory

1. Type of entity postulated (substance, structure, event, state, disposition, field)
2. Compositional, developmental, or efficient-causal connections between the entities in (1)
3. Signs of derivatives of functional dynamic laws in (2)
4. Ordering relationships among the derivatives in (2)
5. Signs of mixed partial derivatives ("interactions") in (2)
6. Function forms (e.g., linear? logarithmic? exponential?) in (2)
7. Trans-situationality of parameters in (6)
8. Quantitative relations among parameters in (6)
9. Numerical values of parameters in (6)

Adapted from Meehl, P. E. (1990). Appraising and amending theories: The strategy of Lakatosian defense and two principles that warrant it. *Psychological Inquiry, 1*(2), 108-141.

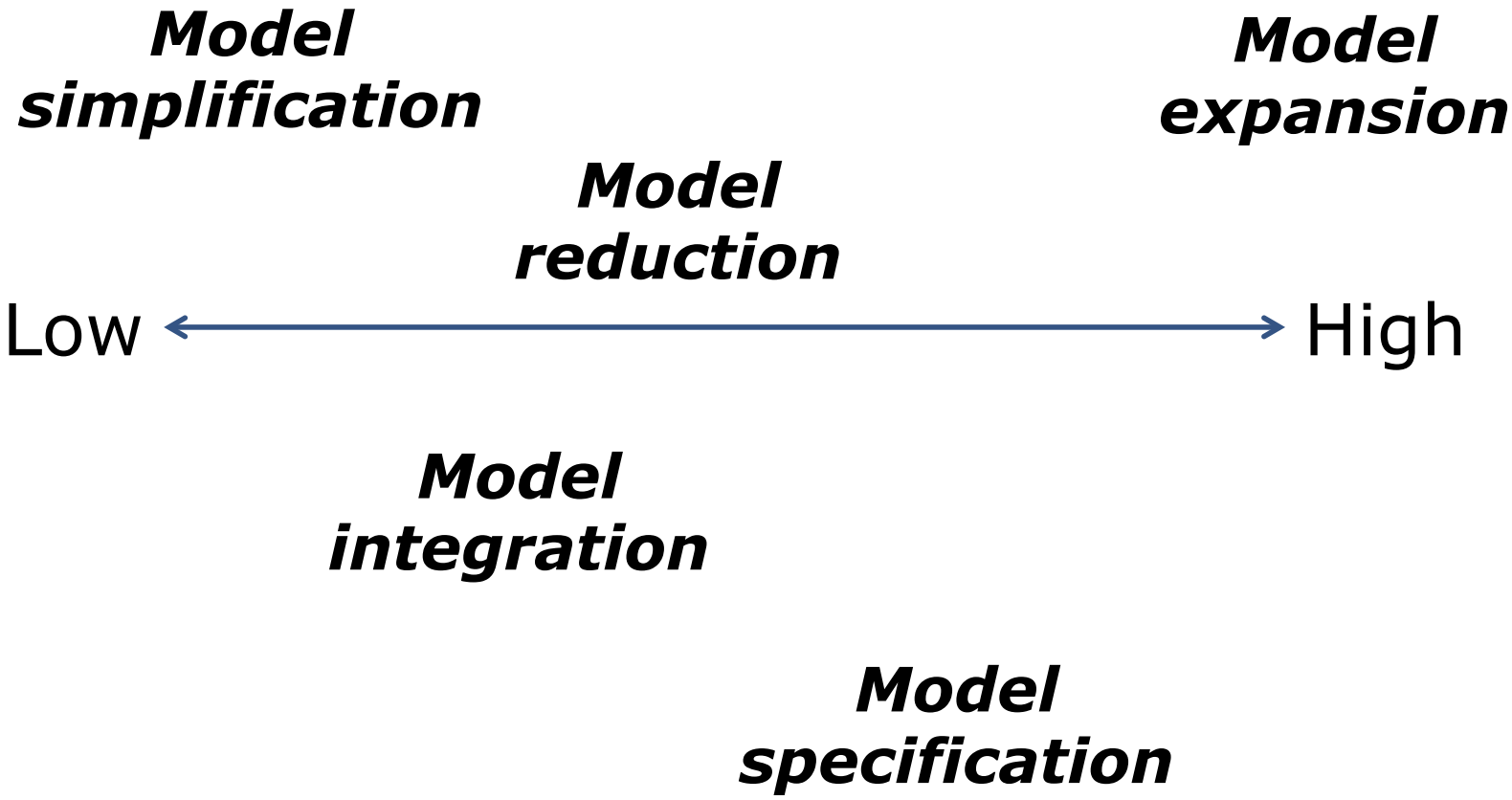
Definitions

- ***Model:***
  - A model is a nomological network with theory specification at level *j* using Meehl's framework. The current status a theory specification or model *M is* the *i-th* iteration at level *j* of theory specification by $M_{i,j}$.
- ***Strong equivalence:***
  - Two models are *strongly equivalent* if they have the same logical implications for equivalent parameters over a given set of conditions.
- ***Weak equivalence:***
  - Two models are *weakly equivalent* if they can have the same logical implications while allowing the parameters to vary over a given set of conditions.
- ***Model entailment:***
  - Model $M_{i,j}$ entails $N_{l,m}$ if and only if $N_{l,m}$ being false makes $M_{i,j}$ false

Operations

- ***Model expansion:***
  - Adding model structure to an existing model while keeping the model at the same level of theory specification.
- ***Model integration:***
  - Taking two or more models at the same level of theory specification and combining their structures to create a new third model
- ***Model reduction:***
  - Eliminating model structures and creating a new model at the same level of theory specification such that the resulting model is entailed in the original model.
- ***Model specification:***
  - Increasing the level theory specification.
- ***Model simplification:***
  - Decreasing the level of theory specification.

Degree of participation expected



Conclusions and next steps

- Expectations about which modeling operations happen where can be classified in categories that help groups make decisions
  - Modeling decisions left to modelers
  - Modeling decisions left to core modeling group
  - Modeling decisions only happening with community
- Decisions that are delegated to specific team members:
  - Larger group can describe decision and review criteria
  - Larger group can define what the teams members have consent to work on
- Develop formalism further to model and understand dynamics of participatory modeling

Thank you!

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