Tapping Into the Mental Models of Another Discipline to Promote Interdisciplinary Research

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Team Science & the Science of Team Science (SciTS)

Review of published research since 1947:

- Teams increasingly dominate solo scientists in the production of high impact, highly-cited science
- Teams are gaining in size
- Teams are increasingly located across disciplinary boundaries

Borner, K, 2010

Promotion of Team Science

CTSA

TREC

TTURC

OBSSR

Types of Collaboration

- Multi-disciplinary
- Interdisciplinary
- Interprofessional
- Transdisciplinary

Rosenfeld, 1992

Interdisciplinarity

- Seeking the views of others
- Making your own views known to others
- Willingness to change your mind based on the views of others

The goal is to capitalize on our differences.

How can we do this better and more efficiently?

Factors Associated with Interdisciplinary Team Science

- **Leadership**
- **Management Structure**
- **Good Communication Skills**
- **Trust and Respect**
- **Impetus (a motivation) that brings the team together**

Making your thinking known to others and understanding the thinking of others: **Sharing our Mental Models**

- Metaphors expose our conceptual models

Keeping people healthy in society is like…

Communicating Across Cultures: Shared Mental Models

- Mental Models
- Ladder of Inference
- Advocacy and Inquiry

"culture"

"Culture is defined as a pattern of learned, group-related perception—including both verbal and nonverbal language attitudes, values, belief system and disbelief systems, and behavior."

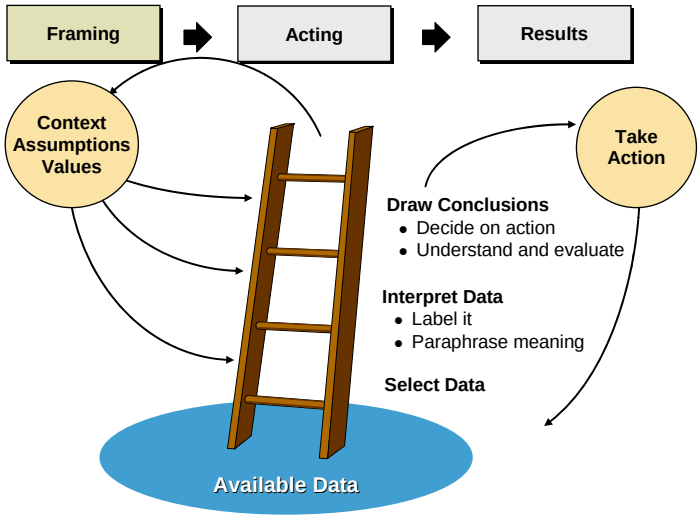
M.R. Singer
Intercultural Communication: A Perceptual Approach
1987

Mental Model

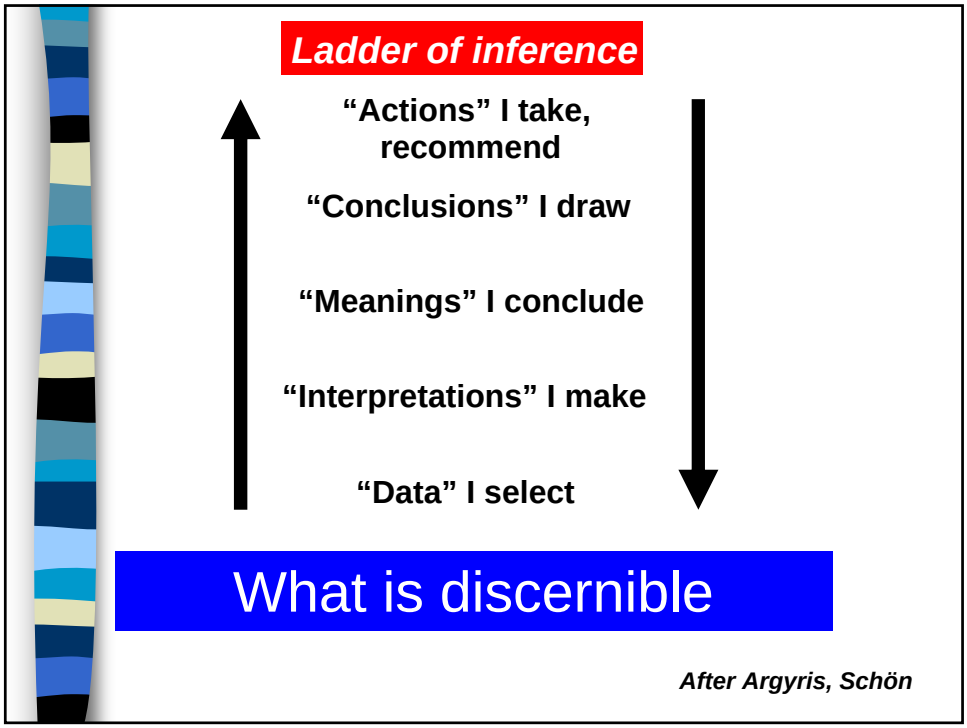
An internal representation of someone's thought processes for how something works in the real world.

Our mental models shape our behavior and define our approach to solving problems and carrying out our tasks.

Ladder of Inference: Key Steps



Key Point: "Show Your Work"



Using the Ladder of Inference

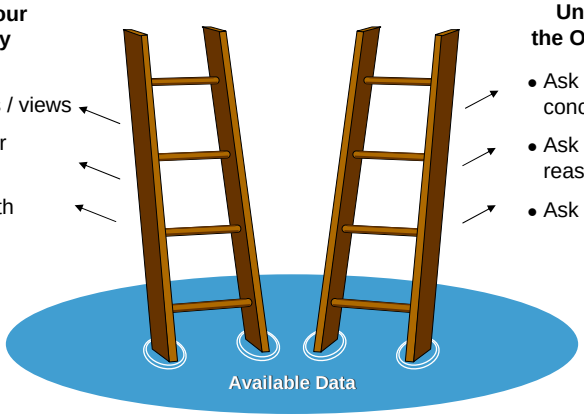
1. Identify the conclusions someone is making
2. Ask for the data that lead to the conclusion
3. Inquire into the reasoning that connects data and conclusion
4. Infer a possible belief or assumption
5. State your inference and test it with the person

Breaking Out of the Trap

Your Ladder | **Other's Ladder**

***Advocate* Your Views Fully**

- State your conclusions / views
- Explain your reasoning
- Illustrate with examples



***Inquire* to Understand the Other's View**

- Ask for the other's conclusion / views
- Ask for the other's reasoning
- Ask for examples

Breaking out of "dueling logics" involves balancing high quality ***Advocacy*** and ***Inquiry***

Balancing Advocacy and Inquiry

- State views directly
- Present views in testable chunks
- Present conclusions as options
- Share reasoning and examples

- Test your understanding
- Explore other's reasoning
- Solicit a range of views
- Encourage challenge

Advocating | **Inquiring**

Key Point: "Strong Ideas, Open to Influence"

Advocacy that Promotes Learning

- Gives available data
- Shares reasoning and examples
- Summarizes and reflects understanding of others' views
- States conclusions as options to be explored
- Makes causal corrections clear
- Presents views in testable chunks

Advocacy that Limits Learning

- Doesn't supply data
- Doesn't supply reasoning
- Doesn't reflect understanding of others' views
- Layers many ideas
- Leaves out connections
- States conclusions as if obviously true

Inquiry that Promotes Learning

- Probes others' views
- Helps others fill in the gaps in expressed views
- Encourages challenge of own and others' views
- Explores and challenges assumptions
- Explores relationships and differences between views

Inquiry that Limits Learning

- Asks leading questions
- Asks closed questions
- Discourages challenges
- Doesn't Inquire

Understanding Language Differences across Disciplines: Broudy's Suggestions

- **Important to understand Observational Categories and Meanings of Key Terms**
- **What are some of the key terms that are used differently in nursing, psychology, and medicine? In engineering and medicine?**

Shifting Frames

- Imagine a new framing
  - *"I could be missing something"*
  - *"He or she might have good reason"*
- Act as if the new frame is true
  - Do things to make the new frame come true
  - Ask for the other's perspective
- Reflect on results with others
  - See data to disconfirm original frame
  - Ask others to help you see what you don't see

What are the Competencies regarding Team Science Collaborations?

- Kristine Gebbie, 2007

The Science of Team Science (SciTS)

- Shen,B. 2008
- Stokols, D. 2006; 2008
- Hall, K. 2008
- Borner, K. 2010