Decision Making

Stephen Gilbert

https://youtu.be/Cv6tuzHUuuk?t=8s
What explains how people make decisions?
Dr. Ray Gilbert

“People do things that make sense to them at the time.”
The Nature of Truth: Epistemology

“Bearding”
PHILOSOPHICAL FRAMEWORKS

Paradigms/Epistemologies, Theoretical Perspectives, and Methodology

Slides by Dr. Joanne Marshall
RESEARCH FRAMEWORK
Derived from Crotty, 1998

- Philosophy
- Paradigm or Epistemology
- Theoretical Perspective
- Methodology
- Methods
PHILOSOPHY FIRST
PHILOSOPHY INFORMS PARADIGMS
"Paradigms shape research at its most basic level; worldviews frame the type of questions asked and what the answers might look like."

PHILOSOPHICAL FRAMEWORKS

- “Paradigm shift”
- Positivism vs. Postmodernism (philosophical paradigm)
- Objectivism vs. Constructionism (Epistemology)
POSITIVISM

Auguste Comte (19th c.)
System of philosophical and religious doctrines
Scientific inquiry must rely on observable data
POSTMODERNISM

- Artistic, philosophical, and cultural movement
- Resists universals and encourages fractured, fluid and multiple perspectives.
• World exists in objectively knowable, singular, natural law-abiding reality
• Goal of science is to predict & control - applies across contexts
PHILOSOPHY OF POSTMODERNISM → CONSTRUCTIONIST PARADIGM

- Naturalistic, Hermeneutic, Interpretive
  - People interact with each other and the world in complicated, context-specific ways to construct knowledge
  - Knowledge / reality is social
<table>
<thead>
<tr>
<th>PHILOSOPHICAL FRAMEWORKS</th>
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<tbody>
<tr>
<td>Positivism</td>
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<td>Objectivism</td>
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<td>Control</td>
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Vygotsky & Situated Action by Lucy Suchman
Why is this HCI?

We build tools to help people act on the world, which involves making decisions.
Decision Making Steps
Dan Ariely

Are we in control of our own decisions?

Hidden Forces That Shape Our Decisions

Predictably Irrational

DAN ARIELY

TED
The Nature of Truth: Epistemology

**Correspondence**

Accuracy  
Empirical  
Environment focus  
“Does it match the world?”  
Plato, Aristotle  
One Truth

Reading flight gauges  
Weather prediction  
Childbed fever (after germs)  
Newtonian physics

**Coherence**

Goodness of Process  
Consistency  
Rationality  
“Does it match our model?”  
Kant  
More than one truth

Prepping for landing  
Playing chess  
Childbed fever (before germs)  
Quantum physics

Relationship to ethics ([http://www.justiceharvard.org/](http://www.justiceharvard.org/))
“May I see the manual
I don’t see ‘Nemo’.
Did you mean Oregon?

Sandy

Unfortunatly the hurricane was canceled.

Manuel
Victor-Manuel

“How big is the window?

“Was the hurricane canceled?

I have a gambling
problem who should I
call ”

I found 6 casinos.

Tap the one you want to call:

Auburn Way South
Muckleshoot Indian... 9.0 miles

52 reviews

Gilbert, SPIRE - EIT 2019
Decision Making on the Fly

Signs in the Corner Activity
Brunswik’s Lens Model

It’s two faces.

It’s a vase.

the individual matters

Correspondence
Brunswik’s Lens Model
Are operator’s judgments correlated with actual states?

Correspondence

Alex Kirlik
Signal Detection Theory

- Miss
- Hit
- Correct reject
- False alarm
- False negatives
- True negatives
- True positives
- False positives
- How many selected items are relevant?
- How many relevant items are selected?

Precision = \frac{\text{true positives}}{\text{true positives} + \text{false positives}}

Recall = \frac{\text{true positives}}{\text{true positives} + \text{false negatives}}

Gilbert, SPIRE-EIT 2019
Naturalistic Decision Making

Poorly structured problems

Expertise:
knowledge
cue processing differs for novices & experts
experience

All about judgment of the situation.
NDM

Hybrid environment can mess with this.
Heuristics & Biases

Attempts to model human judgment, even though it violates Bayesian thinking.

Availability – What can I remember?
Representativeness – How typical is it?
Framing – What’s the story?

Automation as a heuristic (can violate coherence)
More Heuristics

Recognition – If you recognize it, it’s better/bigger/more known.

Do what everyone else does

Default – Don’t change a default

Take-the-best & Tallying – validity of cues

Fast & Frugal Trees – Q&A, one outcome per Q

When do these work well vs. badly?
Summary

Decision making is hard to predict.

It probably requires both mental models and data from the world.

We haven’t solved it yet.