LEVELS OF CONSTRAINT AND RESEARCH DESIGN

The idea of levels of constraint and research designs and their relationship to Research Objectives and Questions
The knowledge continuum

TENACITY  INTUITION  AUTHORITY  RATIONALISM  EMPIRICISM  SCIENCE

Adequacy of information
LOW  HIGH
Evidence
LOW  HIGH
Structure
LOW  HIGH
e etc., etc.
LOW  HIGH
The knowledge continuum

TENACITY  INTUITION  AUTHORITY  RATIONALISM  EMPIRICISM  SCIENCE

Adequacy of information
LOW  HIGH
Evidence
LOW  HIGH
Structure
LOW  HIGH
etc., etc.
LOW  BAD

GOOD
### The knowledge continuum

<table>
<thead>
<tr>
<th>TENACITY</th>
<th>INTUITION</th>
<th>AUTHORITY</th>
<th>RATIONALISM</th>
<th>EMPIRICISM</th>
<th>SCIENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adequacy of information</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
</tr>
<tr>
<td>LOW</td>
</tr>
<tr>
<td>LOW</td>
</tr>
<tr>
<td>LOW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
</tr>
<tr>
<td>HIGH</td>
</tr>
<tr>
<td>LOW</td>
</tr>
<tr>
<td>HIGH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
</tr>
<tr>
<td>HIGH</td>
</tr>
<tr>
<td>LOW</td>
</tr>
<tr>
<td>HIGH</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>etc., etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
</tr>
<tr>
<td>HIGH</td>
</tr>
<tr>
<td>LOW</td>
</tr>
<tr>
<td>HIGH</td>
</tr>
</tbody>
</table>
We “concluded”

- Science places a high demand on evidence.

What we will see today is

- HOW and WHY we collect that evidence dictates WHAT we can say with it.
Or, put another way:

- Science is a “high demand” pursuit of knowledge.
- It is fueled by questions and facts.
- The type of questions you ask determines the types of facts you can uncover.
- What determines the type of questions?
How do you know which variables or attributes to measure?”

- Knowledge, experience, theory!
- For example, a person with training as a mountain climber, with access to equipment will prefer to climb very differently from a novice.
Thus . . .

- Both climbers make it to the top of their respective mountains, using different tools and methods. Both had quality experiences. Both operated appropriate to their contexts and ability. Both would be out of place in the others’ environment.

- So it is with research!
So it is with research!

- You match what you already know about the topic of study with what you would like to learn, and decide on an appropriate course of action that you follow for all the steps of the research process.
- That course of action is defined by THE LEVEL OF CONSTRAINT you are willing to accept.
How much you want to know

LOTS

FORGET IT

HIGH

CONSTRAINT

LOW

CONSTRAINT

WHY

BOTHER?

LITTLE

How much you do know

LOTS

LITTLE
CONSTRAINT

- LOW CONSTRAINT:
  fairly general findings; unrefined decisions about questions and procedures; context.

- HIGH CONSTRAINT:
  very specific findings; refined ideas; precise hypotheses; detailed procedures; complex analyses; “causality.”
CONTRAINT

- Neither is inherently BETTER than the other, but one is more APPROPRIATE for the conditions.
- If you haven’t asked it yet, you are probably wondering “constraint on what?”
As the research questions become more complex, demanding and precise the activities in each phase become correspondingly complex, demanding and precise.

To cope we impose constraints on our performance and we begin to lose flexibility but gain control over the situation.
INCREASINGLY CONSTRAINED

LOW

NATURALISTIC

CASE-STUDY

CORRELATIONAL

DIFFERENTIAL

EXPERIMENTAL

HIGH
Naturalistic

- Study of object behavior in natural settings.
- No manipulation of objects or the settings.
- Bound by objectives, not hypotheses.
- Focus can shift as situation demands.
- Flexible; common in early stages of knowledge acquisition, but can be the final stage!
Naturalistic
Case-study

- Some researcher intervention (e.g., asking questions).
- Some flexibility to shift focus.
- Typically each case in the study is subject to more-or-less the same “testing.”
- Multiple sources of information
- Many more variables than cases
Case-study #1
Correlational

- Setting can range from natural to artificial.
- Focus is on quantifying the relationship between two or more pre-selected variables.
- Each variable is measured in a precise and identical way for each case (person).
Caffeine consumption and grades

Correlational
Differential

- A direct comparison between two or more mutually exclusive groups of subjects.
- Groups are categorized on the basis of one or more subject variables (independent variables) that are NOT under researcher control, and that pre-exist.
- Dependent variable/s are measured exactly and precisely across all groups.
Differential
Experimental

- Comparisons are made under highly **controlled** conditions.
- Subjects are **assigned** to each type of condition in an unbiased manner, usually matched or random.
- Although causality can sometimes be inferred, results may not be applicable outside of the experimental setting.
TIME 0: PRE-TEST

CONTROL

TREATMENT #1

TREATMENT #2

TREATMENT #3

Experimental
TIME 1: TREATMENT GIVEN

CONTROL decaffeinated

JOLT

COKE

COFFEE

Experimental
TIME 3: POST-TEST (The “RESULTS”)

Experimental
Are there other plausible explanations?

- Maybe the presence/absence of sugar was responsible; or the amount of citric acid.
- We call these RIVAL hypotheses. They help explain the effects of extraneous variables on the dependent variable.
- Extraneous variables are independent variables that we did NOT control. They weaken our conclusions, but they provide a starting point for the next experiments!
There’s more . . .

- Goal/ purpose
- Problem Statement
- Research objective
- Questions
- Hypotheses
- Operationalization & Measurement
- Data Capture
Goal: Determine the effects of higher user fees on visitation rates at Hog Heaven National Park.

Objectives:

- Measure visitation under current fee structure.
- Identify the user markets represented by current visitors.
- Repeat for new fee structure.
Objectives (continued):

- Use contingent-valuation to assess potential change in visitation.
- Predict which market segments are most likely to change under new fee regimes.
- Identify strategies to prevent loss of market share.
A research question is a problem or a statement that is in need of a solution or answer.

A hypothesis is a proposed answer to the research question.
Break the question down into its sub-components

Do families with young children make more use of city parks than families with college-aged children?

- Specificity
- Simplification
- Direction

Who uses parks?

- Vague
- A research IDEA
The sub-components of a question

- Do families with young children make more use of city parks than families with college-aged children?

This gives us an idea of what we can observe or measure (what DATA we will be collecting)
Research Hypotheses

- Are in declarative form.
- Unambiguously identify and describe a relationship between two or more variables.
- Are empirically testable.
- Are NOT the same as statistical hypotheses.
- Derive from literature and/or empiricism.
For example

- Fee increases greater than $5 per visit will result in a greater than 10 percent reduction in use by visitors with family incomes below $25,000.
• Each goal can have one or more objective.
• Each objective can have one or more research question and hypothesis.
• Each research question can have one or more hypothesis.
Research questions and hypotheses are design-specific

- What do people do when it snows a lot in Moscow?
- Why do some people not know how to drive in the snow?
- Is the amount of previous experience driving in snow related to a person's enjoyment of winter conditions?
and ..

- **CSS** students are more skilled snow drivers than **ECB** students.
- A Ford Taurus with an automatic transmission will handle worse in snow than will an identical car with a manual transmission (regardless of driver characteristics, skill level and experience).