Career Seminar

session 1

Anastasia Bezerianos

Anastasia

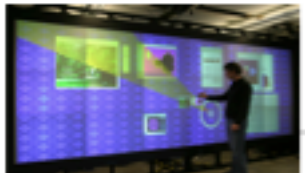
Assistant Professor at Université Paris-Sud
Member of the ILDA (Interacting with Large Data) &
HCC (Human Centred Computing)

Research discipline:
Computer Science

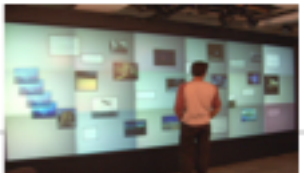
Education:
BSc - University of Piraeus, Greece
MSc, PhD - University of Toronto, Canada

Positions:
Developer, Greece
Researcher, National ICT Australia (NICTA)
Industrial Chair at École Centrale Paris on Business Intelligence
Assistant Professor Université Paris-Sud

Interaction


remote information


layout management


change blindness

Collaboration


information access

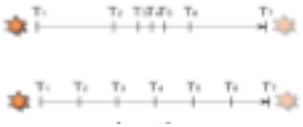

coordination


infrastructure


mobiles and walls in collaboration

Evaluation

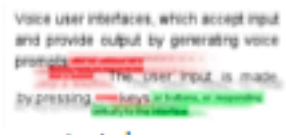

graph reading


animation

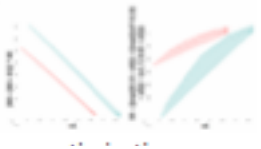

sketchiness

InfoVis and Visual Analysis


graph exploration


text changes


annotation use


optimization

Perception


dual-scale reading


changes in perception on walls


hybrid visualizations

Internships

Your professors are in teams that offer a number of internships every year
but also accept students with their own ideas / topics.
Never too early to start looking and contacting.

E.g., ILDA (Interacting with Large Data) https://ilda.saclay.inria.fr/

Topics:
Collaboration using large displays and/or augment reality
Tangible and gestural interaction, object fabrication
Information visualization, in particular:
interaction techniques for exploration, geovisualization
with particular users (neuroscientists, journalists, etc)

More in Nov, but if you are particularly interested in a topic, contact us!

Who are you?

Background:

education: CS, design, psy, business, other? HCI / DS?

experience: study, research, industry?

Career Seminar Program

Our goal is to help you succeed …

Learn critical skills that help you
- find and critique research findings
- read, write and present research work

… your final projects and/or theses should impress, not depress, your advisors!

You should also consider your future:
- Research? Industry? Startup? Consulting?

Career seminar

Includes everything from
philosophical discussions to practical activities

for example …

Career seminar

Philosophy:

What is Human Computer Interaction? What is Data Science?
How do we learn from HCI & DS research?

What is the scientific method?
What constitutes proof?
Which research methods do we use?
How do we tell what's 'good' and what's not?

Career seminar

Philosophy:

- How do we learn from HCI & DS research?

Process:

- How do you do research in HCI & DS?
  - Finding a research topic
  - Planning research activities: Masters and Ph.D. levels
  - HCI: Build theory, design novel interaction, understand users
  - DS: Build theory, design novel algorithms, extract knowledge

- What kinds of jobs need an HCI or DS degree?
  - Daily life for different types of jobs
  - Advantages and disadvantages

How does HCI research work?

Philosophy:

- How do we learn from HCI & DS research?

Process:

- How do you do research in HCI & DS?

Publication:

- How do you publish your research?
  - What are the types of research publications?
  - How is a research article different from other publications?
  - What are the key publications?
  - Bibliometrics: evaluating publications and authors
  - Choosing a lifetime publication strategy
  - What is the submission process? What is peer review?
  - Plagiarism

Becoming a researcher…

Philosophy:
- How do we learn from HCI & DS research?

Process:
- How do you do research in HCI & DS?

Publication:
- How do you publish research?

Politics:
- How does it *really* work?
  - What happens in a program committee meeting?
  - How will people evaluate your C.V. or resume?
  - Trade-offs between industry, startups and academia
  - Finding grants and other research support
  - Finding or creating your research community

Becoming a researcher…

Philosophy:
- How do we learn from HCI research?

Process:
- How do you do research in HCI?

Publication:
- How do you publish research?

Politics:
- How does it *really* work?

Practice:
- Hands-on workshops

Writing:
- research articles
- reviews
- rebuttals

Presenting your work

Preparing a talk

Asking for a recommendation

Writing a CV

What would you like to include?

Any suggestions for specific topics,
guest presenters or
activities?

best: ecampus forum

alternatively email: carreer.seminar@gmail.com (yes with the typo)
Use [CareerSeminar] in the title !!

Disclaimer …

In this 1st session we will revisit some concepts
from the 1st year Winter School
(what is a literature review and how to read/skim papers)
… but will quickly move into new topics

Course Format

Course Format

Audience: Masters students Ph.D. students

Approach: Presentation (Anastasia or a guest)
Homework discussion/presentations
Hands-on activity

Emphasis on discussion, exercises and group/peer learning

Attendance and class participation make up 50% of your grade!
This includes handing-in assignments and discussing them

If you need to miss a class, tell us in advance

Practical Information

When: Fridays 09 – 12:30
Where: virtually (link shared)

Web: in e-campus https://ecampus.paris-saclay.fr/course/view.php?id=45973
(lectures, slides, assignment announcements)

Assignments: upload in ecampus,
AND have the pdf publicly available in class
(eg in google drive or dropbox) for your colleagues

Questions
Class Forum in campus
Email to: carreer.seminar@gmail.com Subject: [CareerSeminar] ….

Key websites

Course information:

https://ecampus.paris-saclay.fr/course/view.php?id=45973

Some Digital Libraries:

ACM CHI	https://dl.acm.org/event.cfm?id=RE151
IEEE VR	https://ieeexplore.ieee.org/xpl/conhome/1000791/all-proceedings
IEEE TVCG & VIS	https://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=2945
VLDB	https://link.springer.com/journal/778/volumes-and-issues
NeurIPS	https://papers.nips.cc/

but these are not all, we will discover them as we go along

Today session 1

Philosophy:

Natural Sciences vs. Sciences of the Artificial

Process:

Research Notebooks

Practice:

Reading the literature

What is Computer Science?

Natural Sciences
vs.
Sciences of the Artificial

What is Computer Science?

We are in a Computer Science department
(specializing in Human-Computer Interaction or Data Science)

So what is Computer Science?

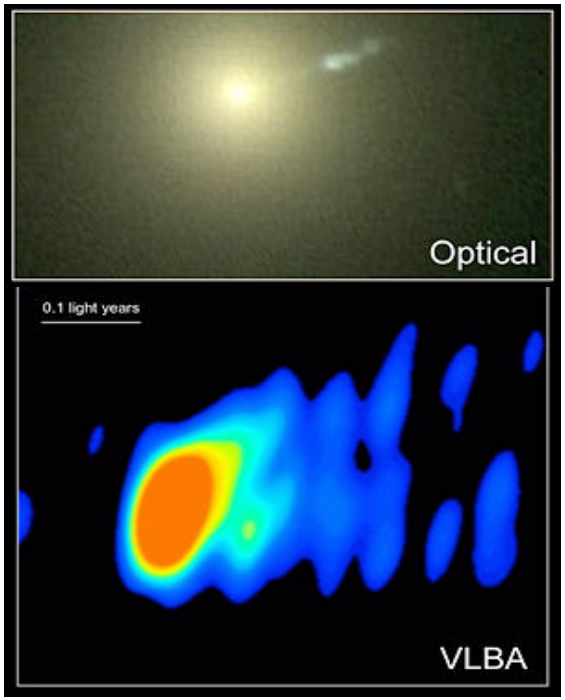
Historically our first challenge was to convince the other scientists
that computer science is actually a science…
(and for HCI that HCI is Computer Science)

What is computer science ?

Astronomy = Telescope Science ?

What is computer science ?

Astronomy ≠ Telescope Science
Astronomy = Science of the universe

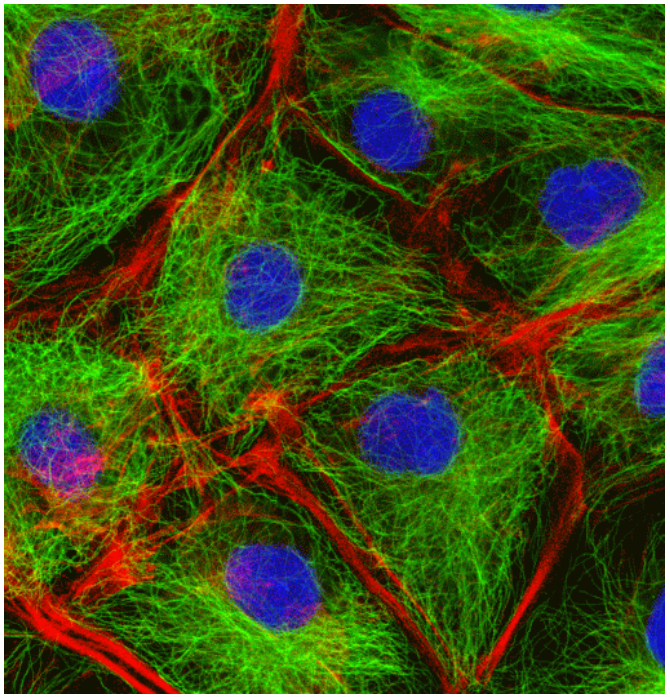


What is computer science ?

Astronomy	≠	Telescope Science
Biology	=	Microscope Science?

What is computer science ?

Astronomy	≠	Science of Telescopes
Biology	≠	Science of Microscopes
Biology	=	Life Science

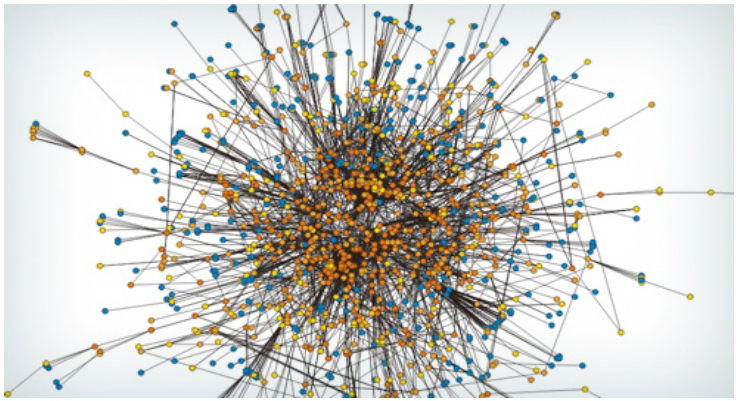


What is computer science ?

Astronomy	≠	Science of Telescopes
Biology	≠	Science of Microscopes
Computer Science	≠	Science of Computers

What is computer science ?

Astronomy	≠	Science of Telescopes
Biology	≠	Science of Microscopes
Computer Science	≠	Science of Computers
Computer Science	=	Science of Information



Information Science

- Information
  - An artificial phenomenon
  - A natural phenomenon

Computer Science

Information processing

Notion of computation: algorithm

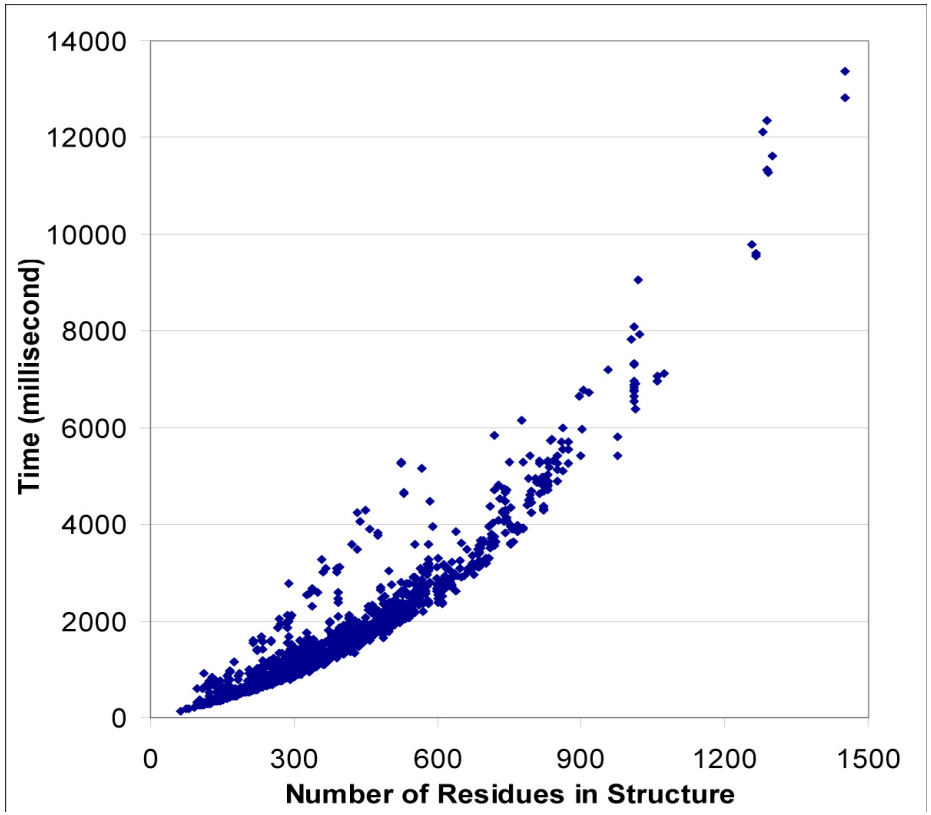
```
[1]    Read data (s, c, h, hb, d)
[2]    D_0 = 0
[3]    For t = 1 to T do D_t = D_{t-1} + d_t
[4]    F_0 = 0; F_1 = 999999.0;
[5]    For j = 1 to m do
[6]      M_1j = s_1j + c_1j d_1
[7]      if (M_1j < F_1) then F_1 = M_1j
       EndFor
[8]    For t = 2 to T do
[9]      F_t = 999999.0
[10]     For j = 1 to m do
[11]       For k = 0 to t-1 do
[12]         If (k+1=t) then aux = M_1j
[13]         Else Begin
[14]              aux = 999999.0;
[15]              For i = k+1 to t do
[16]                EB = 0
[17]                For l = k+1 to i-1 do EB = EB + hb_l (D_l - D_k)
[18]                EF = 0
[19]                For l = i to t do EF = EF + h_l (D_t - D_l)
[20]                Temp = s_ij + c_ij (D_l - D_k) + EF + EB;
[21]                If (Temp < aux) then aux = Temp;
                  EndFor
            EndElse
[22]        If (aux + F_k < F_t) then F_t = aux + F_k
          EndFor
        EndFor
      EndFor
```

Figure 4 – Parallel production centers algorithm (PPCA).

Computer Science

Information processing

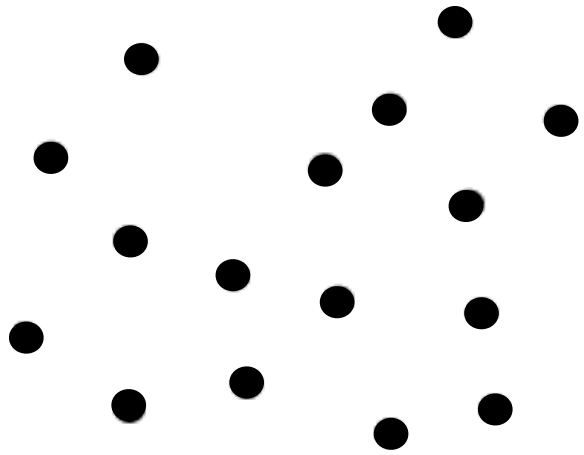
- Notion of computation: algorithm
- Execution cost for an algorithm:
  - in time
  - in memory
  - in bandwidth
  - in communication
  - …



Computer Science

Information processing

- Notion of computation: algorithm
- Execution cost for an algorithm:
- Problems are too complex:
  - Exponential cost
- Example:
  - Travelling salesman problem:
    - The shortest path passes through all the points



Computer Science

Information processing

Notion of computation: algorithm

Execution cost for an algorithm:

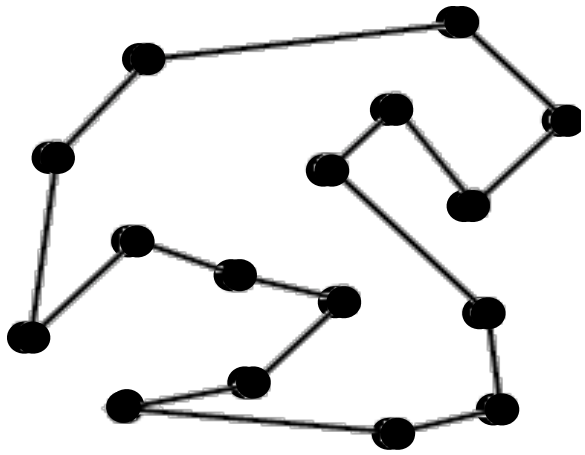
Problems are too complex:

Exponential cost

Example:

Travelling salesman problem:

The shortest path passes through all the points (several are NP complete)



Computer Science

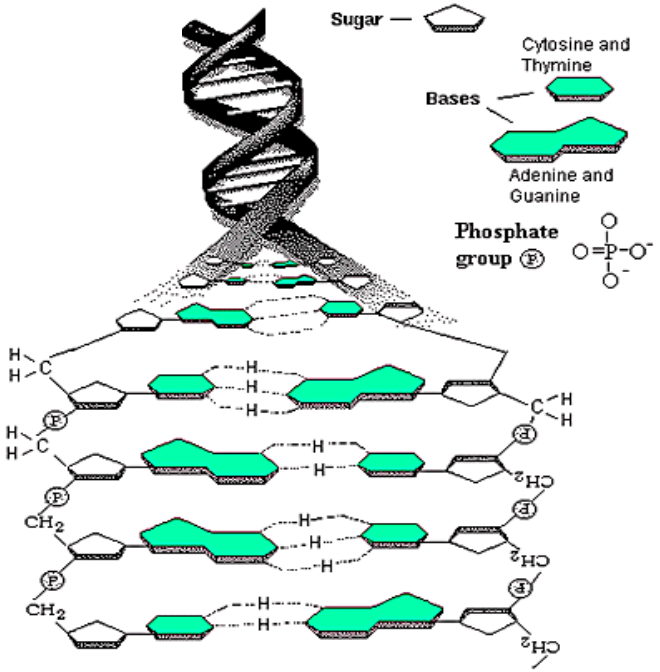
Information

A natural phenomenon

DNA:

information used by organisms

to generate new organisms



Computer Science

Information

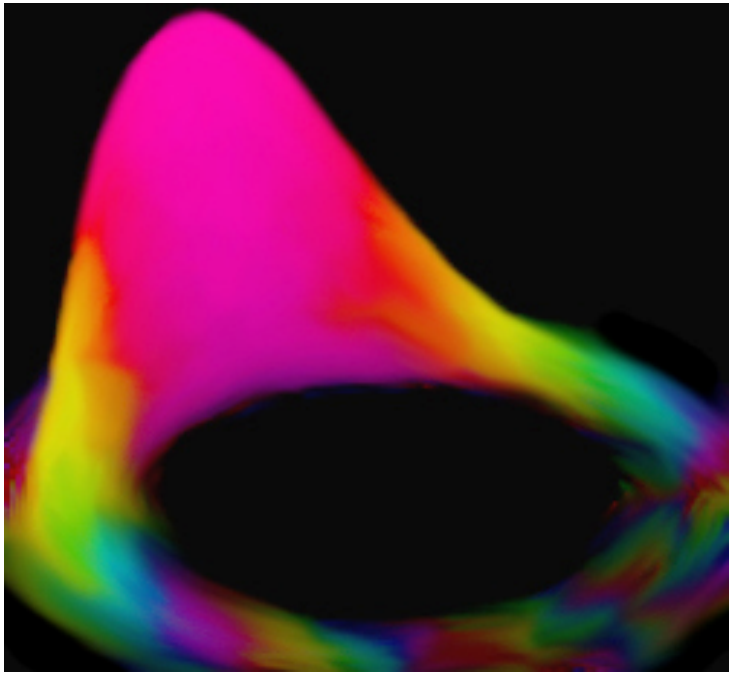
A natural phenomenon

DNA:

information used by organisms
to generate new organisms

Quantum waves:

Carry information that
produces physical effects



Computer Science

Aspects

- Theoretical
  - models, algorithms
- Empirical
  - experiments, tests
- Technical
  - architectures, systems

Competing paradigms

Computer as *tool*

First person interfaces
Empower users

Human-Computer Interaction

Computer as *servant*

Second person interfaces
Delegate tasks

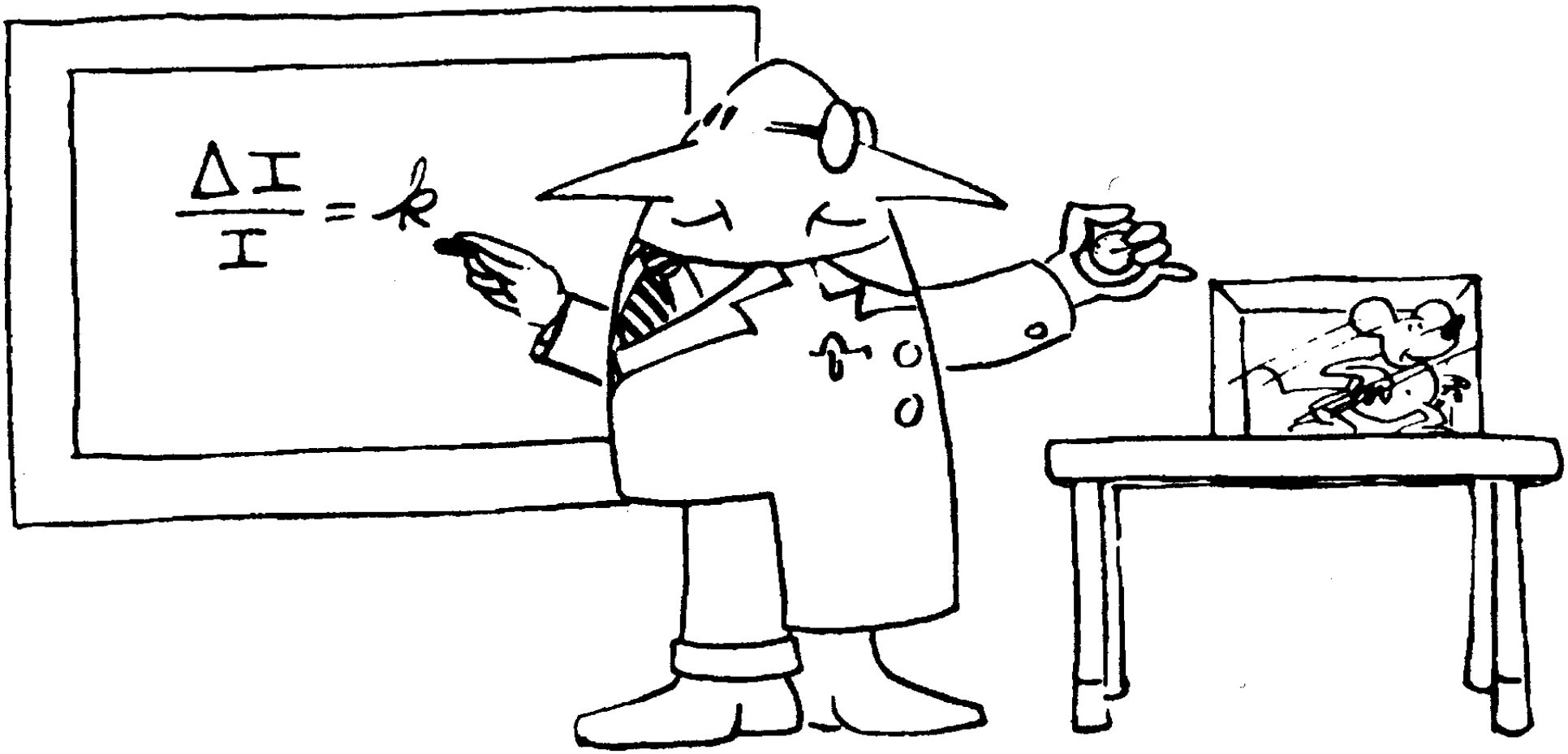
Artificial Intelligence

Computer as *medium*

Third person interfaces
Communicate

Mediated Communication, Social Media

Evidence: Theory vs. Empirical data



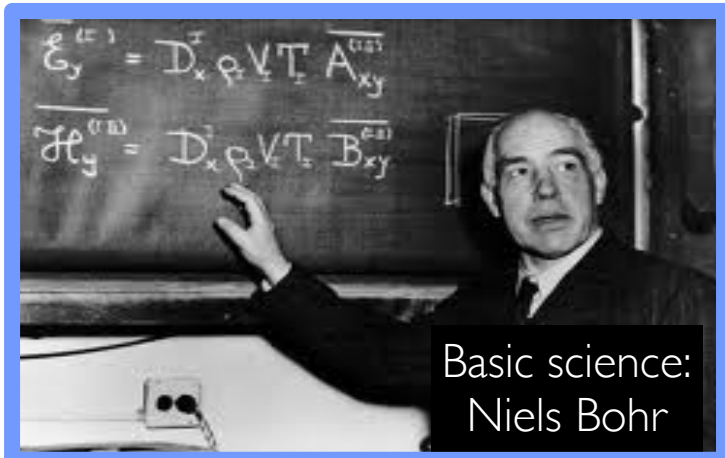
Pasteur's quadrant

Donald Stokes (1997)

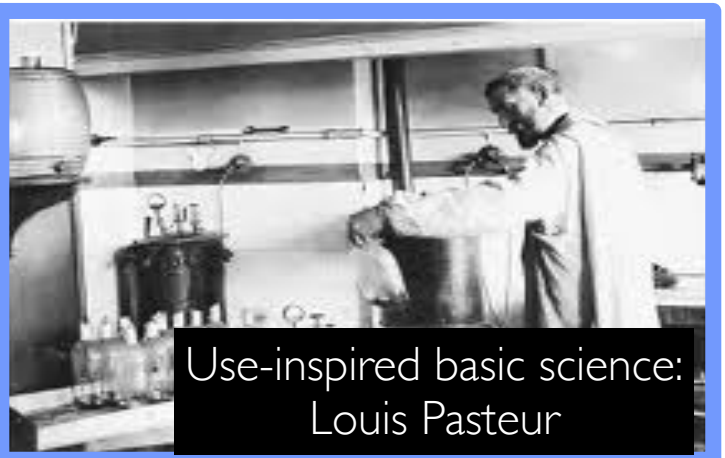
Seek fundamental understanding

High

Low

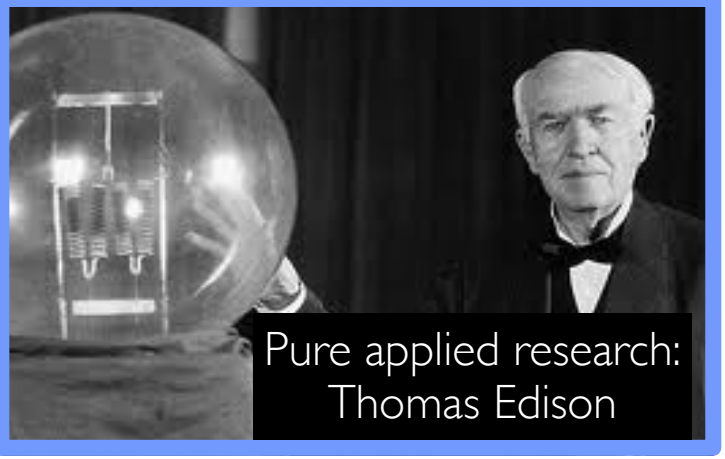


Basic science: Niels Bohr



Use-inspired basic science: Louis Pasteur

Non-science

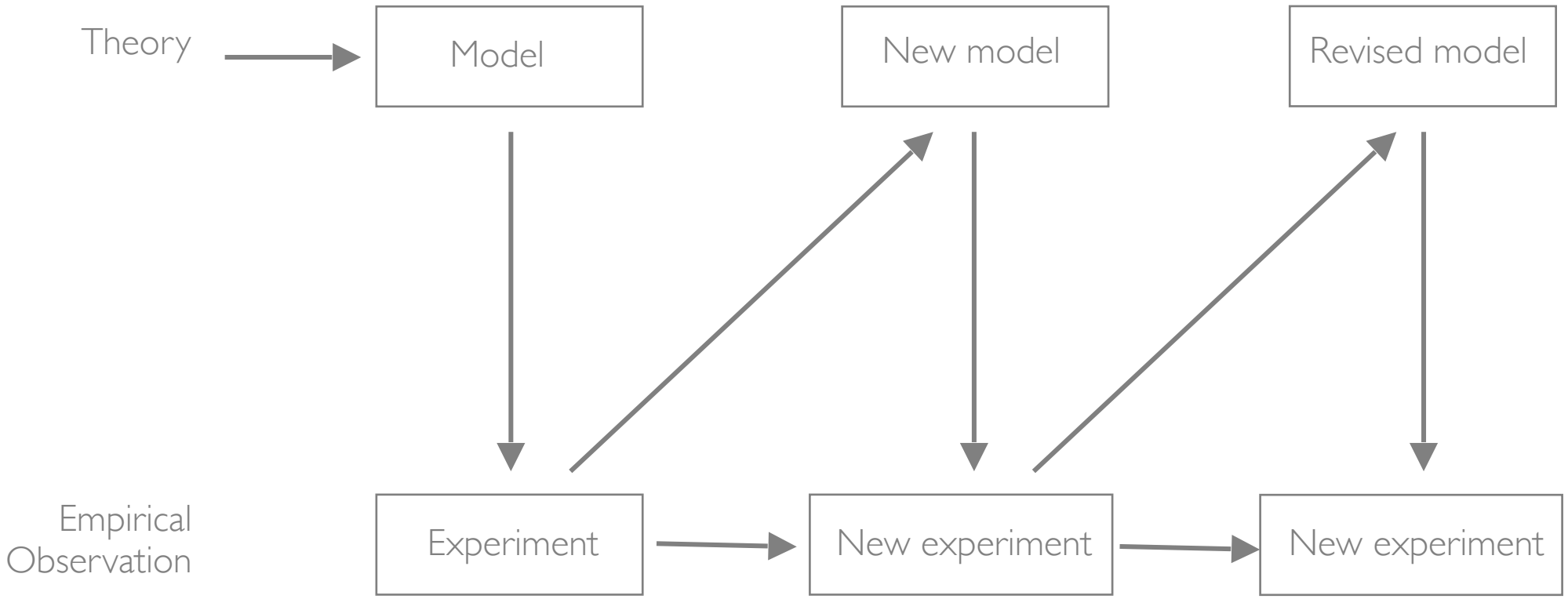


Pure applied research: Thomas Edison

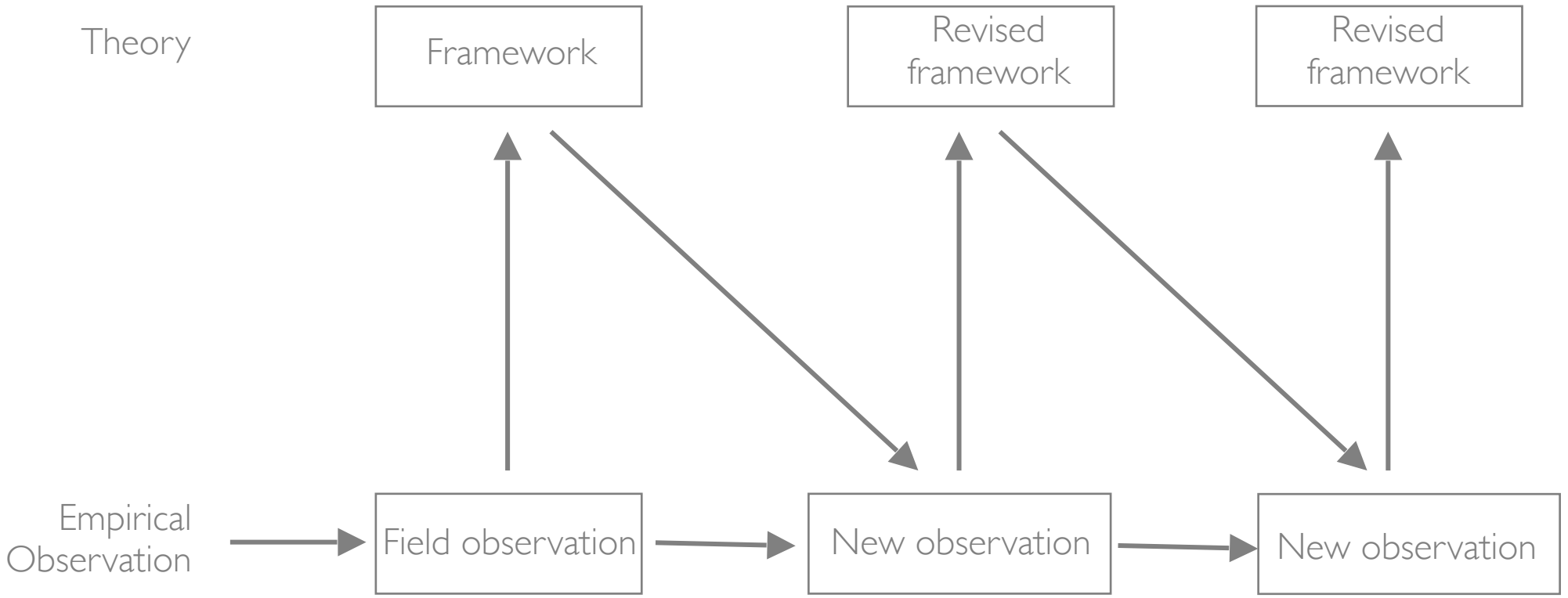
Low *High*

Seek immediate applications

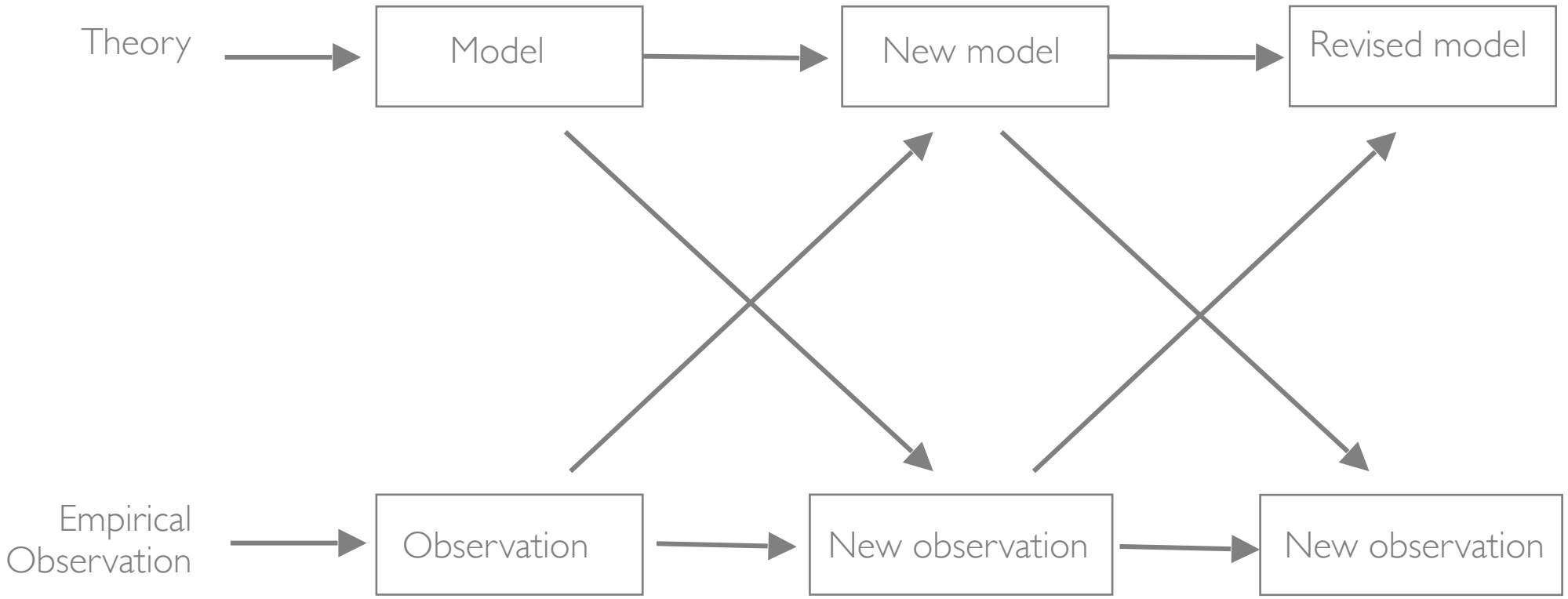
Psychology: Theory, experiment, new experiment, …



Astrophysics: Observation, theory, new observation

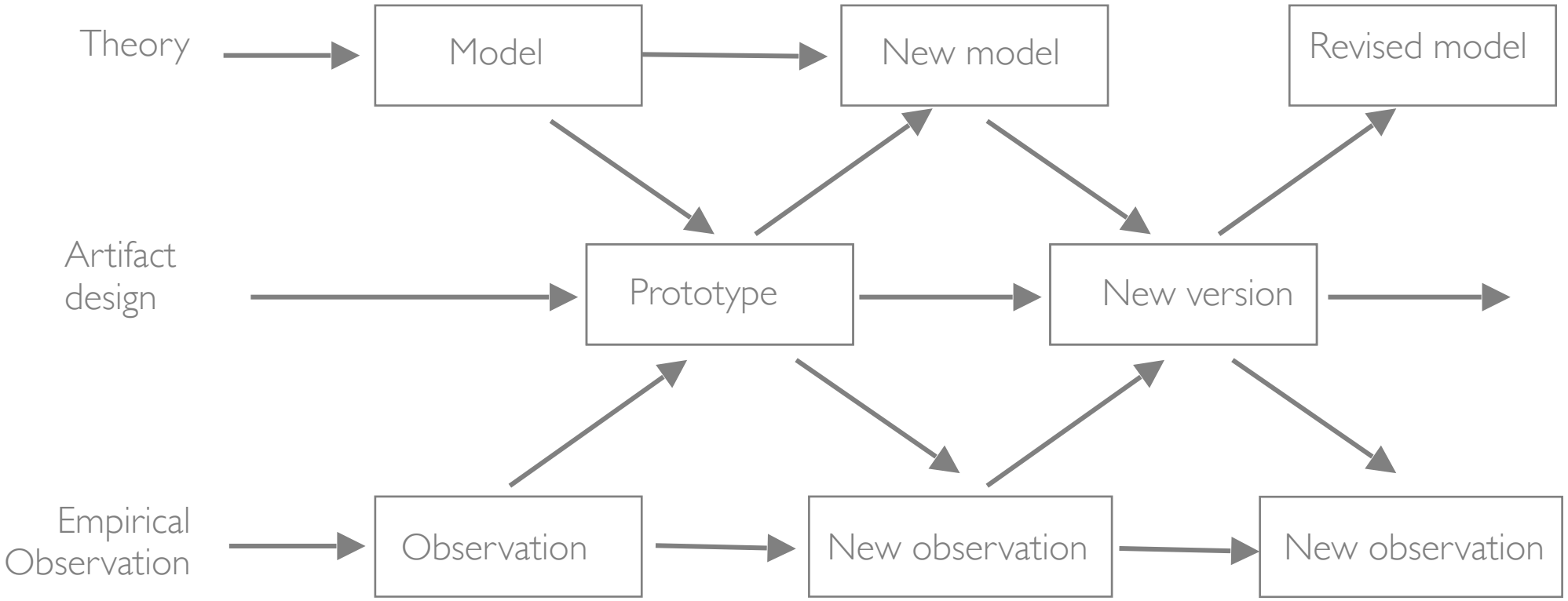


General scientific approach



What happens when you build what you study?

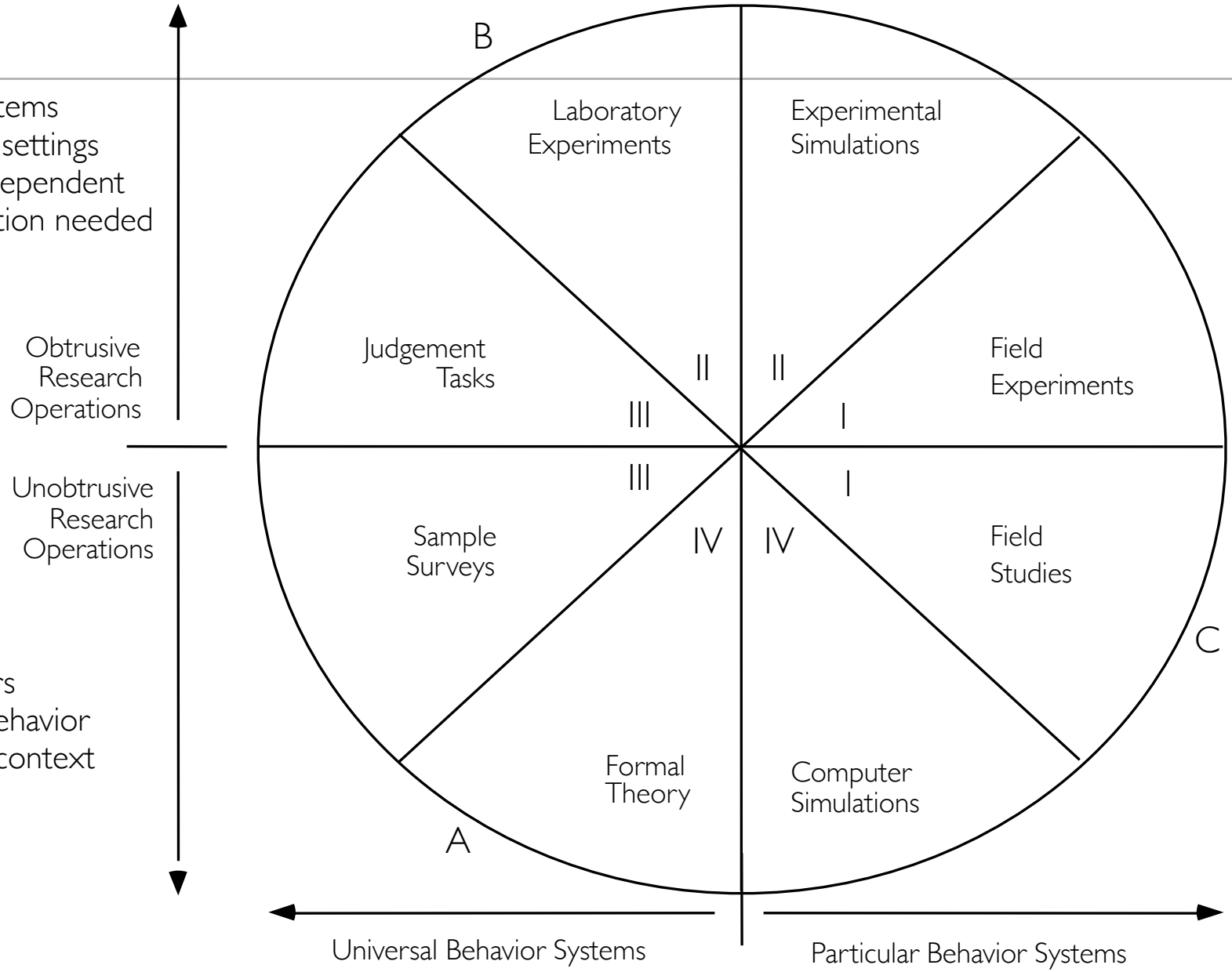
Human-Computer Interaction & Data Science cross disciplines



Research Trade-offs

P.Runkel & J.McGrath, 1972

I. Settings in natural systems
II. Contrived or created settings
III. Behavior not setting dependent
IV. No behavior observation needed



Major concern may be:
A. Generality over actors
B. Precise measure of behavior
C. System character of context

Research Trade-offs

Runkel & McGrath, 1972

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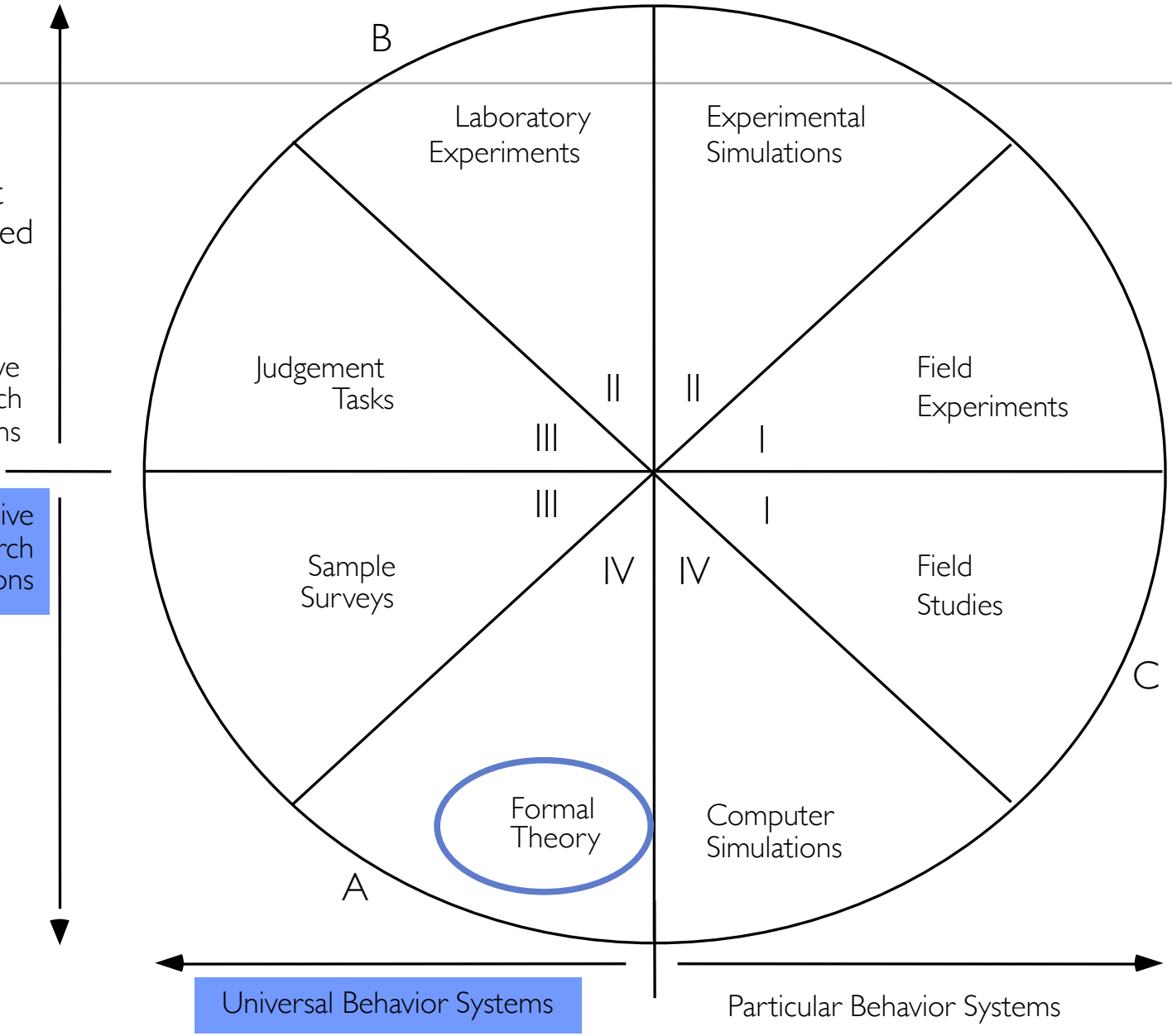

Major concern may be:

A. Generality over actors
B. Precise measure of behavior
C. Behavior in context

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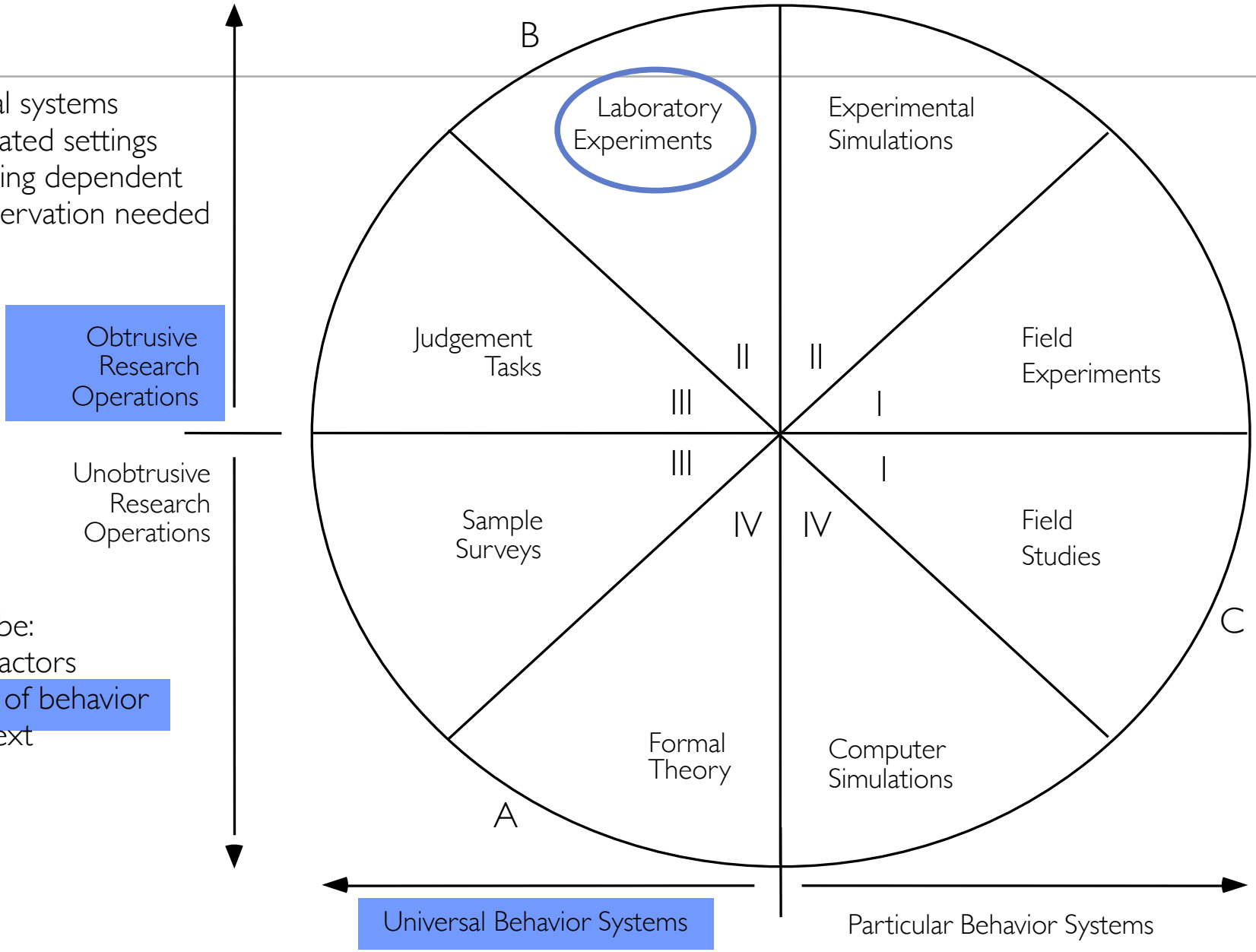

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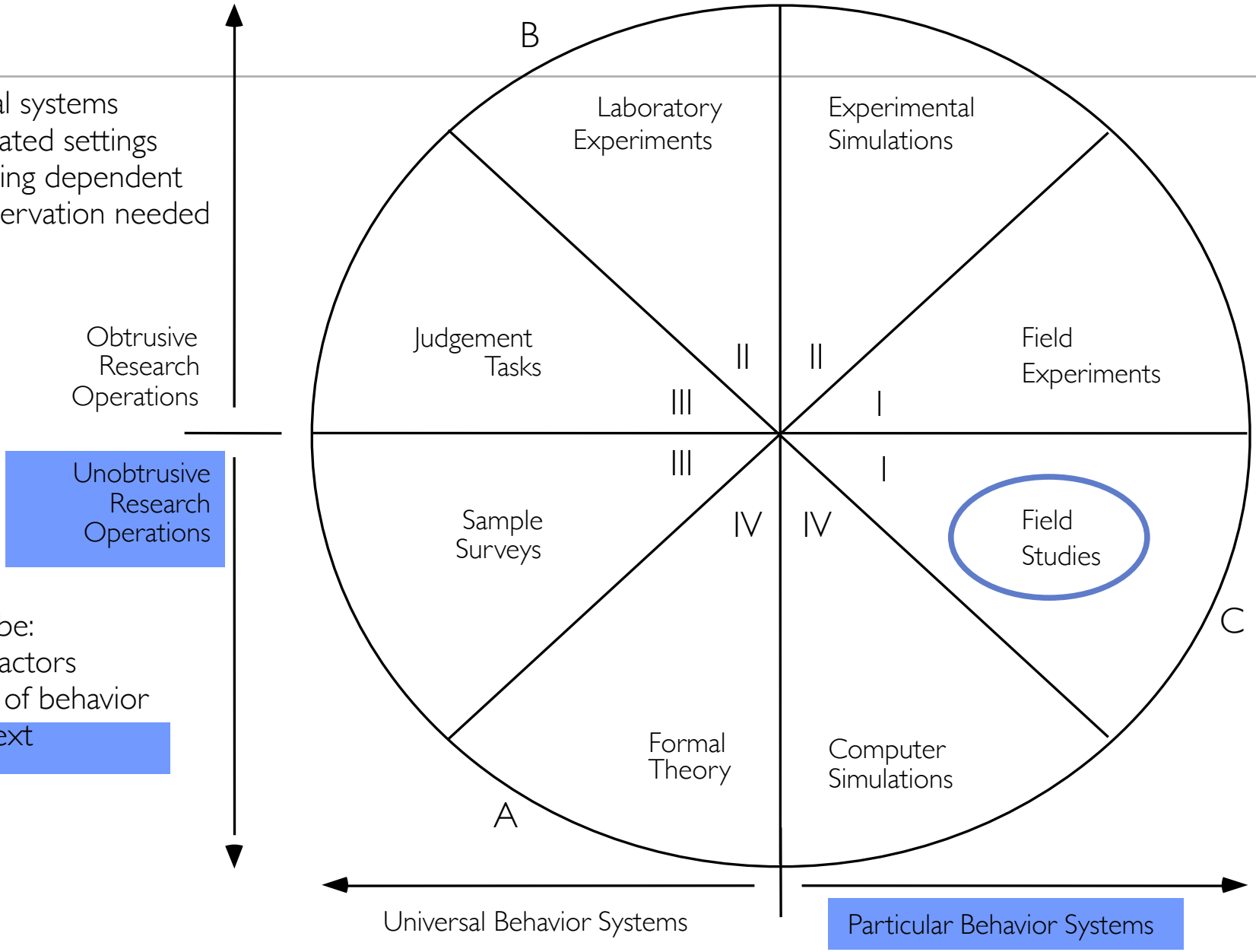


Major concern may be:
A. Generality over actors
B. Precise measure of behavior
C. Behavior in context

Research Process

Research Process: In theory

Define a problem
Read the literature
Explore alternatives
Propose a plan of attack
Develop a solution
Validate the solution
Publish the findings

From: Five Research Questions

Research Process: In Reality

Much messier.

You write as if everything happened in the correct order,

but research is about dealing with surprises

HCI research process

from an idea …

… to a paper

HCI research process

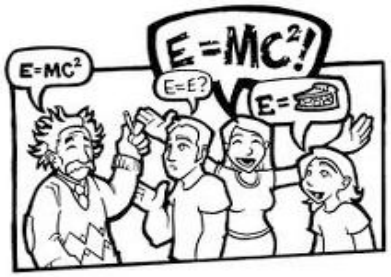
get an idea

participatory design to
avoid toy problems

HCI research process

get an idea

develop theory



participatory design to avoid toy problems

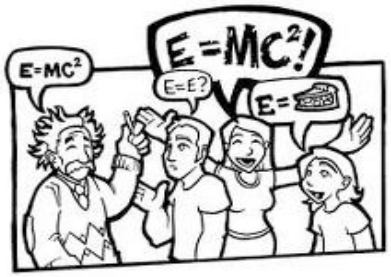
Fitts' law, human perception

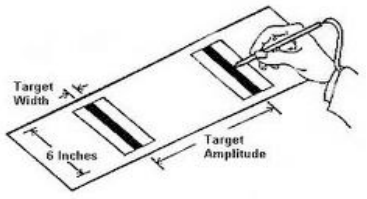
HCI research process

get an idea

develop theory

operationalize





participatory design to avoid toy problems

Fitts' law, human perception

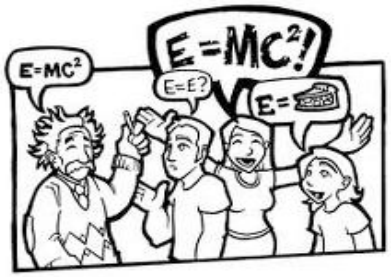
extract key features

HCI research process

get an idea

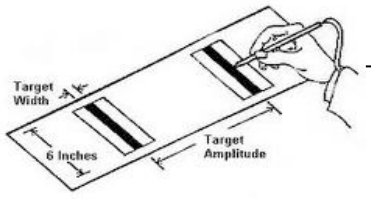
participatory design to avoid toy problems

develop theory



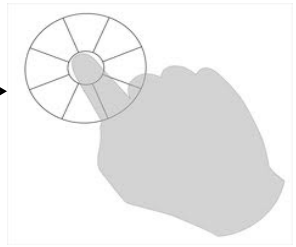
Fitts' law, human perception

operationalize



extract key features

build system



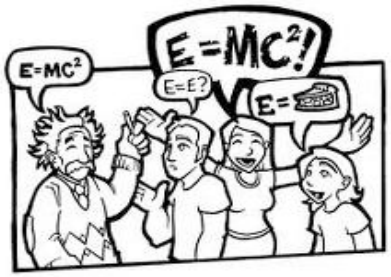
develop working prototypes

HCI research process

get an idea

participatory design to avoid toy problems

develop theory



Fitts' law, human perception

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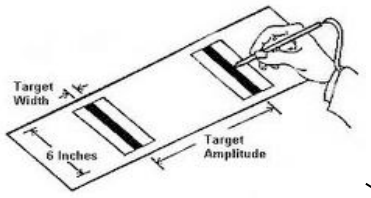

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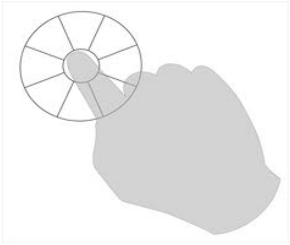
build system



develop working prototypes

design experiment

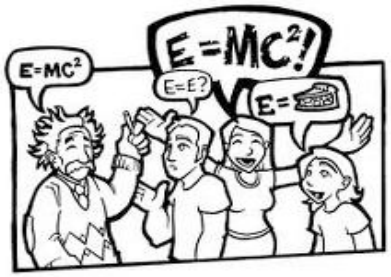
no standard benchmarks

HCI research process

get an idea

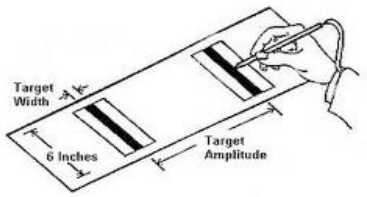
participatory design to avoid toy problems

develop theory



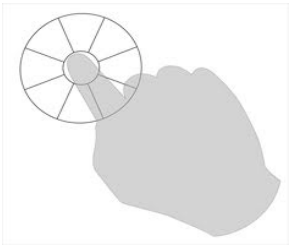
Fitts' law, human perception

operationalize



extract key features

build system



develop working prototypes

run experiment

controlled lab studies, longitudinal field studies

design experiment

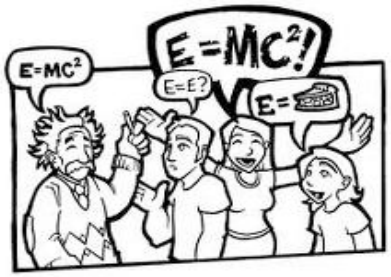
no standard benchmarks

HCI research process

get an idea

participatory design to avoid toy problems

develop theory



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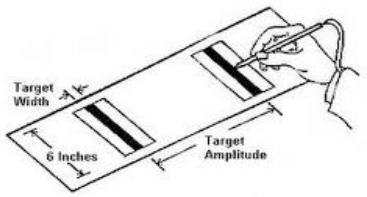
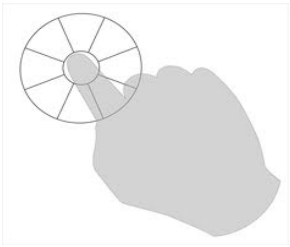


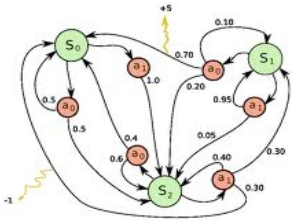
extract key features

build system



develop working prototypes

analyze results



quantitative and qualitative

run experiment

controlled lab studies, longitudinal field studies

design experiment

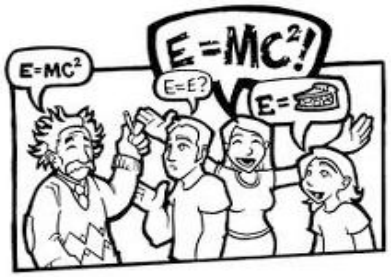
no standard benchmarks

research process

get an idea

participatory design to avoid toy problems

develop theory



Fitts' law, human perception

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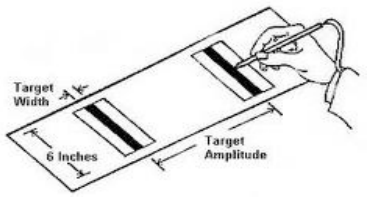
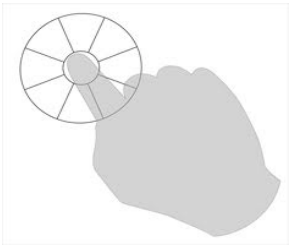


extract key features

build system

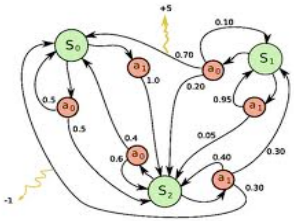


develop working prototypes

frame paper

key insights to generalize

analyze results



quantitative and qualitative

run experiment

controlled lab studies, longitudinal field studies

design experiment

no standard benchmarks

Reading the Research Literature

Research Literature … is not 'literature'

What is the research literature?

- Technical, not literary, writing

Each article focuses on making an argument:

- Introduce a problem
- Identify who else has done related work
- Perform an activity that adds to the field
- Provide a clear, replicable description
- Justify the results

Research literature

Why do we read the research literature?

Find an interesting research question
Understand or learn about a domain
Find specific work related to a topic of interest
Find arguments for or against methodologies, approaches, etc.
Position our work among others

Reading the research literature

Where do you start?

Identify the key publications in your field
- Conferences? Journals?

Find 'best papers':
- What makes them great?

Find influential authors:
- Where do they publish?

Searching for *Related Work*

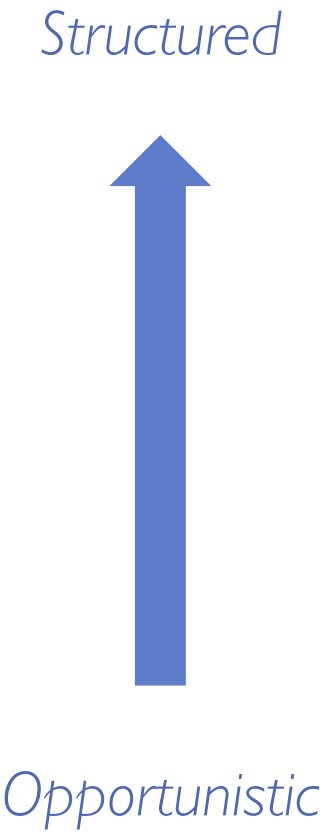
Where do we find articles relevant to a particular project?

Structured search:

- Articles cited by a relevant paper
- Highly cited articles
- Ph.D. thesis 'related work' section

Opportunistic discovery:

- Keyword web search
- On-line conference talk or video
- Recommendations
- Browsing authors' or lab web pages
- Browsing journal and conference proceedings



How to read a research article

How do you read an article?

Different ways, multiple times!

First, skim it — Is it worth reading?

if yes, read it in depth — Will you cite it? Review it? Use it?

if yes, re-read and take notes

Some papers require multiple reads

Skimming papers

Many papers are interesting …
    but you cannot read them all

Skim papers quickly to decide if it is worth reading for
    relevant background or related to your work

Read abstract, skim the figures, check references
    What are the key nouns and verbs?
    What is the evidence?
    Does the paper make sense?

Consider how you skim a paper …
    should affect how you write a paper

How to *read* a research article

Ask yourself:

What was their motivation?	research question? real-world problem? technical challenge?
What is their contribution?	interaction technique? algorithm? methodology? infrastructure? insight about (human or algo.) behavior?
How did they do it?	designed system or algorithm? developed new theory? trained a new model? observed people?
How did they justify it?	implementation? experiment? field study? mathematical argument? benchmark? theorem proof?

How to *read* a research article

What is your opinion?

Key points? Do you believe it?

What questions are you left with?

What would you ask the author?

Does the paper suggest directions for future research?

for the authors? for you?

How does it relate to your own work?

motivation, inspiration, similarities/differences

Archiving and note-taking

As you read more papers, you will forget details
- Take notes and archive them in your notebook

Find a system to store research articles!
- Develop a clear, consistent naming scheme

For each paper:
- Record the reference: author, date, title, publication, pages
- Key take-away message: what is relevant to your work?
- Additional comments: idea/solution, contribution,
- Add questions/comments in margins

Write a literature review

"Related Work" = Literature review

Select papers related to your topic, organized by:
theme, methodology, technology or …

Summarize key points of each paper, according to:
research question, target audience, solution, method

Explain why each paper is relevant and not sufficient

Cite papers correctly
NEVER plagiarize!
If you reuse their words, "*quote them explicitly*"

Assignment #1: Find and Report on a 'best paper'

Due: before end of Thu 16 Sep (all assignments due on Thu 23:59)

1. Choose a 'best paper' in HCI or DS (at least five years old)
   Provide the full reference, using ACM style
2. First skim, then read the paper carefully
   Take notes in your notebook
3. Summarize the paper (factual)
   What is the key contribution?
   What was the impact of the paper?
4. What do you think about the paper? (opinion)
   What surprised you?
   What did you like best?
   What did you not like?

Assignments #1:

All assignments due on Thu night (23:59)

1. Upload your assignment in ecampus

2. Have the pdf with you during class (eg google drive, dropbox)

Why both? Trace of your submission (1)

Share with your colleagues for peer review and learning (2)

Research Notebooks

Research Notebooks:

You should use one!!

Research Notebooks

READ	References, Abstracts, Keywords Quotable quotes … with page numbers
THINK	Ideas, Observations, Problems, Surprises Course insights, Research meetings
DO	Details of: Experiments, Analyses, Procedures Create: Keywords, Highlights, Index
REREAD	Mark Keywords, Highlight, Question Create an index

Always include the date!

Optional Formats

Paper	More disciplined Allows sketching No technical problems (battery/internet) Keep with you all the time
Electronic	Faster typing (for some) Easier to read Easier to search Convenient when already on-line Reusable text (but be careful of plagiarism)
Hybrid	Paper and electronic… but have one that is primary

Assignment #2: Start a research notebook

Due: before next week (i.e., 16 Sep at 23:59)
and every week after that !!!
Who: everyone!

Create your personal research notebook
Choose paper, electronic or hybrid

For the rest of the term,
Keep track of what you read
Sketch and record ideas
DATE every entry
Add KEYWORDS to every entry

Continue to use your notebook for the rest of the semester
and BRING it in your classes (also submit every week an entry)

Assignments #2:

Due every Thu night (23:59)

1. We have an ongoing assignment (notebook)

2. Every week in your directory for this assignment, add an update of your notebook

   (e.g., a screenshot of a new online note, a picture of a new physical/paper notebook page)

   name your entry every week: **LASTNAME_Firstname-date**

(entries are dated, so upload one per week and don't leave them to upload at the end of class! Name the files using the date as well)

Influential authors

Fred Brooks	The Mythical Man Month
Vannevar Bush	As We May Think
James Gleick	The Information
Daniel Kahneman	Thinking Fast and Slow
Thomas Kuhn	Structure of Scientific Revolutions
Bruno Latour	Science in Action
Robert Merton	Sociology of Science
Karl Popper	Logic of Scientific Discovery
Runkel & McGrath	Judgement Calls in Research
Claude Shannon	Information Theory
Herbert Simon	Sciences of the Artificial
Strunk & White	Elements of Style
Tukey & Mosteller	Exploratory Data Analysis
Mark Weiser	Ubiquitous Computing