

# CHIP-2

## Concepts and history in psychology

Steve Draper, Glasgow University

<http://www.psy.gla.ac.uk/~steve/courses/chip.html>

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## Part 2:

### Experiments

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### Research questions for homework

1. What are the cases (the kinds of cases) where experiment is not used in psychology.  
How do the objections apply to each or not?
2. Does experiment have the same power if you don't manipulate causality, but just select different types of people for the two groups (e.g. different personality types)?
3. What examples can you think of or find, where statistics act like a telescope: to see things that otherwise we could never know.

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### Why experiment? (1)

The triad only requires observation, data, empirical studies for its 3rd leg. Why do some people (especially in psychology) think experiments are strongly preferred for the role of observation?

Aristotle's biology. Everything but the experiment (spontaneous generation of flies) [Armand Leroi]

Expt. does 2 things:

- A] Isolates one factor from all others
- B] Establishes causal direction.

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### Why experiment? (2)

A] Isolating one factor from all others

Expt. isolates one factor and varies it independently [the independent variable], and shows the links of that factor independently of others.

For these purposes, demonstrating causation is only useful as one means to the end.

If you have established what factors are independently active, then you can consider creating new combinations which haven't occurred naturally (at least in your samples).

We never know all the factors.

*Does this work even if it is not you manipulating, but pre-selecting subsets of people? [Homework 2]*

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### Why experiment? (3)

B] Demonstrating causal direction.

Correlation vs. experiment.  
Fixes the direction of causation.

So how important is experiment? [ethology]

BUT: .....

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## Why experiment? (4)

But: there are few experiments in astrophysics, or evolution, or epidemiology. So there is a lot of science that doesn't use expt.

Bertrand Russell: the most advanced science does NOT talk about causes but relationships. So arguably, causation is what engineers need to know, but isn't important in most pure science.

Causation (apart from establishing the independence of factors) is for applied projects?

*In what areas does psychology NOT use experiment? Is this OK? Homework 1]*

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## Part 3:

### Kuhn, critical thinking, RMS

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## Kuhn

Thomas Kuhn "The structure of scientific revolutions"  
Buzzword "Paradigms"

In fact in real life scientists can be very slow to abandon disproved theories. Why?

- Personal vanity, inability to change ideas, ...
  - Science as sociology, anthropology [Read Bruno Latour]
- Kuhn was vastly more important to social scientists than to physicists

But perhaps there is a different angle on this: CT, RMS ....

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## "Reason maintenance systems"

A little considered everyday mental activity, which is also a version of critical thinking aimed at decision making under uncertainty, is "RMS": maintaining provisional knowledge as a network of linked ideas. When contradiction is detected, this is adjusted by finding an assumption that can be abandoned to retain the maximum overall probability of the revised net.

We do it to understand everyday stories.

In CT we do it to give our best overall judgement on balance.

In science, it would lead to what Kuhn described: it takes more than one little data point usually to abandon a big network that explains a lot.

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