# CHIP-5
## Concepts and history in psychology

Types of explanation (cont.)

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



## Argument structures

This set of slides is about argument structures.

There is not one single structure for scientific arguments;

Disciplines often focus on only one or two formats: but is this a weakness?
Can the convention holding sway in a given discipline at a given time obstruct or prevent progress?
What about psychology?



## Reminder: the Newtonian triad

1) A theory

2) Calculation / prediction: generate testable consequences from the theory. (A theory that can explain anything implies we shouldn't think any more, or learn any more.)

3) Observation, experiment

Some schemas:
- Falsifiability —> must be able to do 2, then 3
- Induction —> take existing 3 and generate 1.
- Similarly the method of examples and counterexamples uses existing 3 to check 1: allows tests of theories without new 3. E.g. my arguments about emotion.



## Argument schemas (0)

*This slide may or may not belong here; or earlier lecture?*

Four classes of inference (reasoning, argument types):

1. Deduction: Certain; usually from general to particular
2. Induction: from cases to a generalisation (never certain)
3. Abduction: to the best explanation: (SherlockH)
4. Transcendental: necessary explanation. Arguing what must be true of all possible cases/worlds.



## Argument schemas (1)

Kuhn focussed on non-rational aspects of actual scientific research communities.

Disciplines often focus on only one or two formats for scientific arguments: but is this a weakness?
Can the convention holding sway in a given discipline at a given time obstruct or prevent progress?

Ted Nield pointed out (for geology) how a discipline at a particular time may only allow one of the possible argument types to be published, and this sometimes obstructs the publication of vital arguments. This kind of restriction is, say, semi-rational: a convention based on methodological problems but perhaps adhered to too rigidly.



## Nield on Geology's Argument schemas

Nield (2007) has a bit on the influence of argument schemas in Geology and its obstruction to accepting the theory of continental drift and plate tectonics.

The Americans admired induction: real practical and objective fact gathering, from which generalisations might cautiously be made later; and despised grand European theorising from an armchair, which added no observations (no empirical content) and discarded evidence that didn't fit. (pp. 131-3)

Couldn't get US funding if it said it was testing deductions from theories, only if it looked like induction: getting new information and discussing it against multiple theories. (pp. 143-5)

## Argument schemas (2)

E.g. Darwin's book "Origin of species"
- Proposed one theory, discussed all the supporting evidence
- But surely it had no experimental support, testing?

1) Later biologists do do evolutionary experimental work e.g. given a hypothesis that urban moths are soot-coloured, they might artificially colour moths and look at differential predation.

2) We need to recognise that some disciplines may publish more than one kind of argument schema. E.g. a grand theory, then experimental tests of its predictions.

3) The importance of grand theories is that they look at large collections of evidence as a whole, and seek to find a single synthesis that accommodates it all.
Paul Nurse's point that many "cranks" e.g. climate change deniers are essentially selecting just a few observations that suit their view. This is legitimate from the viewpoint of counterexample arguments; but ….

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## Some argument schemas (3)

Obs = observation/dataset
th. = (general) theory
hyp = (specific) hypothesis / prediction
The new element being published is in red
**=>** shows the conclusion, if any, being asserted.

a) Propose one grand theory, discuss all the supporting evidence (Darwin) [1 th., <= N obs.]

b) Theory vs. theory (Popper). Decisive experiments. Two theories, one observation. [2 th., 1 obs. **=>** 1 th.]

c) Report one set of observations, discuss multiple alternative theories to explain them. [N th. 1 obs.]

d) Publish observations without theory? [0 th. 1 obs.]

(LT seating DOI: 10.1119/1.1845987) E.g. lecture theatre seating

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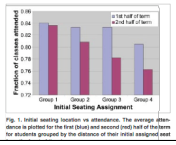
## Lecture theatre seating

Students were randomly assigned seating for a course (reversed at mid-semester)
Significant effect on eventual course grade of whether in front quarter vs. back quarter in the first half of term.
This is a case, rare in psych., of an observation with NO theory or hypothesis. The authors are physicists: perhaps with an appreciation of the difference between a fact and a theory.

Perkins,K.K. and Wieman,C.E. (2005) "The Surprising Impact of Seat Location on Student Performance" *The Physics Teacher* vol.43 January pp.30-33

Attendance:—>



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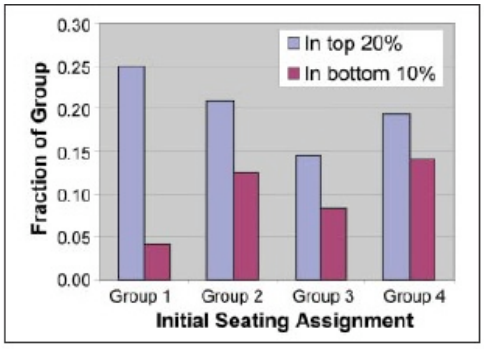
## Lecture theatre seating: Course grades

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## Some argument schemas (4)

e) Propose one hypothesis, discuss evidence for and against (CT)
[ 1 hyp, <= N obs.]

f) Pure deduction (theory extension) (a lot of theoretical physics) e.g. Hawkins, black holes. [ 1 hyp. <= 1 th.]
? e.g. cognitive dissonance

g) Explanation of an old phenomenon (old puzzle), showing which deduction from an existing theory explains it. (Feynman, sprites, cosmic ray flashes) [1 obs, 1 hyp, 1 th.] (Abduction)

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## Argument schemas (5)

Veyne suggests that History and (Weberian) Sociology are almost identical, but that:

- History centres on events, uses theories to explain the observations
[g] Take event (an obs.), select one theory, then explain (like Feynman)
[ 1obs, 1 hyp, 1 theory]
[b] Or perhaps contrast 2 theories, like Popper [1 obs, 2 th. ]

- [a] Sociology centres on a theory, uses /selects events to illustrate or prove it.
[cf. Darwin: 1 th. N obs.]

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## Argument schemas (6)

What of psychology?

It tends to do theory in literature review articles [a]

It does do a few decisive experiments, choosing between 2 theories. [b]

It is bad at publishing unexplained phenomena (but: visual illusions) [d]

It doesn't do much of any of the schemas above. Instead ...

[x] It most often seems to publish lab reports: assert a theory, assert the experiment tests it, assert the results confirm the theory. [ 1 obs, 1 hyp, => 1 theory]

The most common weak point, it seems to me, is "prediction": establishing a reliable link between the theory and how it is operationalised (into a hypothesis) in the experiment. The giant leaps from the actual expt. manipulation to the theoretical description of what matters about the difference in the treatments.