

Interpreting Evidence Conclusions

Determine whether the following examples illustrate:

- 1) Inductive logic, deductive logic, both or neither.
- 2) Necessity, sufficiency, both or neither.

Example 1: What's the genetic origin of variation in face shape (craniofacial morphology)?

Conclusions:

Inductive reasoning: deleting one regulatory sequence supported the original broad hypothesis statement.

Deductive reasoning: deleting a corresponding coding region resulted in severe defects, providing evidence against an alternate hypothesis (variation in protein coding regions can account for variation in craniofacial morphology)

Necessity of enhancers for proper craniofacial morphology is debatable.

Sufficiency of enhancers for non-pathological variation in craniofacial morphology was shown.

Example 2: Why don't we remember being born?

Conclusions:

- Correlations:
- 1) More immature neurons & immature synapses in infant mice
 - 2) More actively dividing cells in infant than in adult mice
 - 3) Old mice retain memory of fear longer than young mice

The amount of neurogenesis decreases with the age of a mouse.

Inductive reasoning: The amount of neurogenesis affects the ability to retain memories.

Can this evidence be re-interpreted as supporting necessity/sufficiency of the premises for the conclusions?

Sometimes an ideal experiment or result can't be achieved, but the available evidence may provide enough support for a hypothesis to be accepted as true. Different fields have different standards for accepting correlative evidence as supporting causality. In this case, the correlation between neurogenesis and fear conditioning does not supply causal evidence because we haven't ruled out two obvious alternatives. Even though it may not yet be possible, experimental manipulation of neurogenesis in adult mice (speeding it up/slowing it down) could be used to refine the hypothesis by determining whether fear conditioning is maintained because of; 1) the low neurogenesis rate or 2) maturity of neurons and synapses in adults.