

Interpreting Evidence Examples

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 craniofacial morphology (face shape)?

Hypothesis: Differences in craniofacial morphology are mostly due to variation in regulatory regions of the genome, not variation in protein coding sequences.

Prediction: Mutations in regulatory sequences of genes expressed in the developing face should affect craniofacial morphology less severely than mutations in the protein coding sequence of the genes they regulate.

Experiment: Delete a regulatory sequence in mice and measure adult facial morphology compared to normal mice. In a separate experiment, delete a gene controlled by the same regulatory sequence and measure adult facial morphology compared to normal mice.

Observation: Deletion of the regulatory sequence resulted in non-pathological, but significant changes in adult facial morphology. Deletion of the corresponding gene resulted in severe craniofacial defects.

Conclusions:

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

Hypothesis: The rate of neurogenesis (new neuron production) decreases with age while memory stability increases with age.

Predictions: Older mice should have slower neurogenesis and should be able to remember better.

Experiments: Use staining for markers of neuron maturity, synapse maturity and active cell division to compare the amount of neurogenesis in infant and adult mice. Compare memory stability in infant and adult mice using context fear conditioning memory tests.

Observations: There are more immature neurons and immature synapses in infant than in adult mice. There are also more actively dividing cells in infant than adult mice. Context fear memory was maintained for the duration of the study (28 days) in adult mice, but was lost in infant mice after only 1 day. However, infants and adults both respond to the initial fear conditioning the same way (as measured by shock reactivity).

Conclusions: