19.1 Thinking, problem solving and intelligence: evidence and transfer

Name: _____ Class: _____ Date: _____ **Total: 8 marks**

KEY WORDS availability heuristic • representativeness heuristic

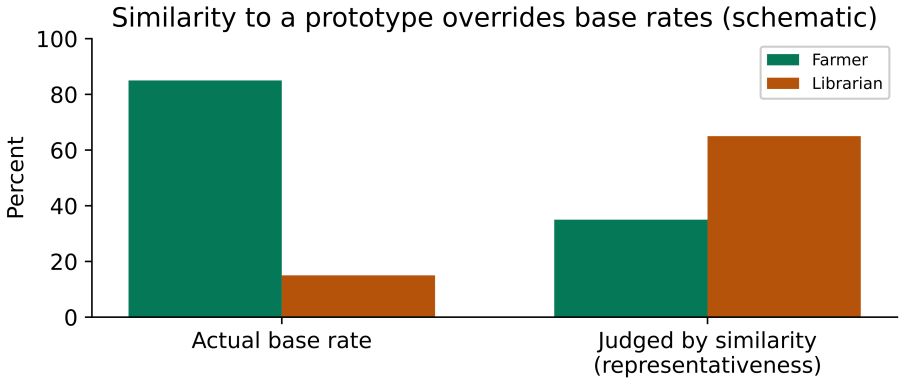
Objective

Distinguish concepts, schemas and scripts as representations; Compare algorithms, heuristics and their characteristic biases; Evaluate intelligence theories and what test scores support. Original practice and authored marking guidance.

1 Key knowledge and worked examples

availability heuristic : Estimating frequency or likelihood by how easily examples come to mind. **representativeness heuristic** : Judging probability by similarity to a prototype, neglecting base rates.

An algorithm follows steps that guarantee a solution for its specified problem class when correctly applied. A heuristic is an efficient shortcut that may fail. Representativeness judges similarity and can neglect base rates; availability uses ease of recall and can confuse memorable with frequent. Mental set and functional fixedness constrain which solutions are considered. Intelligence tests measure performances under particular conditions and require validity and fairness evidence for their use.



Worked case. A description fits a rare occupation. A pupil chooses it without checking how many people have each occupation. Identify the reasoning risk.

Representativeness can override base-rate information: similarity to a stereotype does not by itself determine probability. Combine relevant likelihood information with prior frequencies if available. A vivid description supplies neither a population count nor proof of group traits.

2 Practice

2.1 After heavy news coverage of plane crashes, a person judges air travel deadlier than driving. This best illustrates: [1]

A. anchoring B. the availability heuristic C. functional fixedness D. the serial position effect E. proactive interference

2.2 A quiet, bookish stranger is judged more likely to be a librarian than a farmer, although farmers vastly outnumber librarians. The error is: [1]

A. anchoring on the description B. representativeness neglecting base rates C. confirmation bias D. framing E. mental set

2.3 Revisit the worked case. State one conclusion its evidence supports and one stronger conclusion it does not support. Explain the difference. [2]

3 Exam-style questions

3.1 A method works on nine puzzles and fails on a tenth with different constraints. Explain how to decide whether the method is an algorithm or heuristic and propose a response. Give the interpretation, supporting reasoning, a relevant alternative or limitation, and an appropriate check. [4]

Solutions

2.1 Answer: B. Vivid, easily recalled examples inflate the judged frequency. The other options do not satisfy the stated defining conditions.

2.2 Answer: B. Similarity to the librarian prototype overrides the low base rate of librarians. Compare the exact process, design or evidence, rather than an associated keyword.

2.3 Use the worked case evidence to support a bounded claim and explain why a causal, universal or stronger claim needs additional evidence. The claim must fit the specific design and observed process.

3.1 Check its stated domain and guarantee, not the number of past successes. A heuristic may be useful without guaranteeing a solution; an algorithm may fail if applied outside its domain or implemented incorrectly. Re-read the constraints, represent the new problem and test alternative operations rather than repeat the old method mechanically. Award B1 each (authored) for the interpretation, its reasoning, a relevant limitation/alternative and an appropriate check, up to four points. Accept a different justified answer satisfying these demands.