

E: Imperfect information, part 1

Extend analysis to handle information that may be incorrect

Key intuition:

Information *reduces* but does not eliminate uncertainty

Example 1: testing a used car

Car price is \$2500

Car condition is uncertain:

State	Probability	Value
Good (G)	30%	\$4000
Bad (B)	70%	\$1000

Test is available:

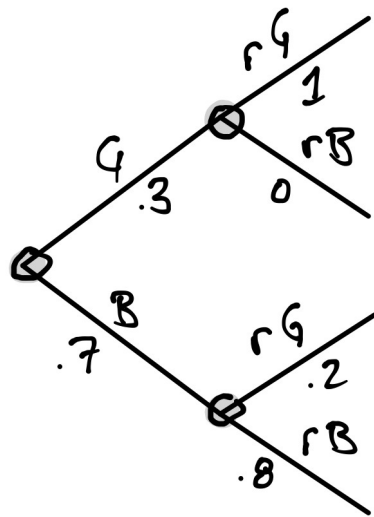
Costs \$100

• Reports whether the car is good (rG = "reports G") or bad (rB)

Test characteristics:

- **Never reports problems in good cars**
Never says rB if car is G
No false positives
- **Misses problems in bad cars 20% of the time**
May report rG when car is B
Some *false negatives*

Report is thus a random event $\Rightarrow$ **chance node**
 Depends on true condition so it's **to the right** in the tree:

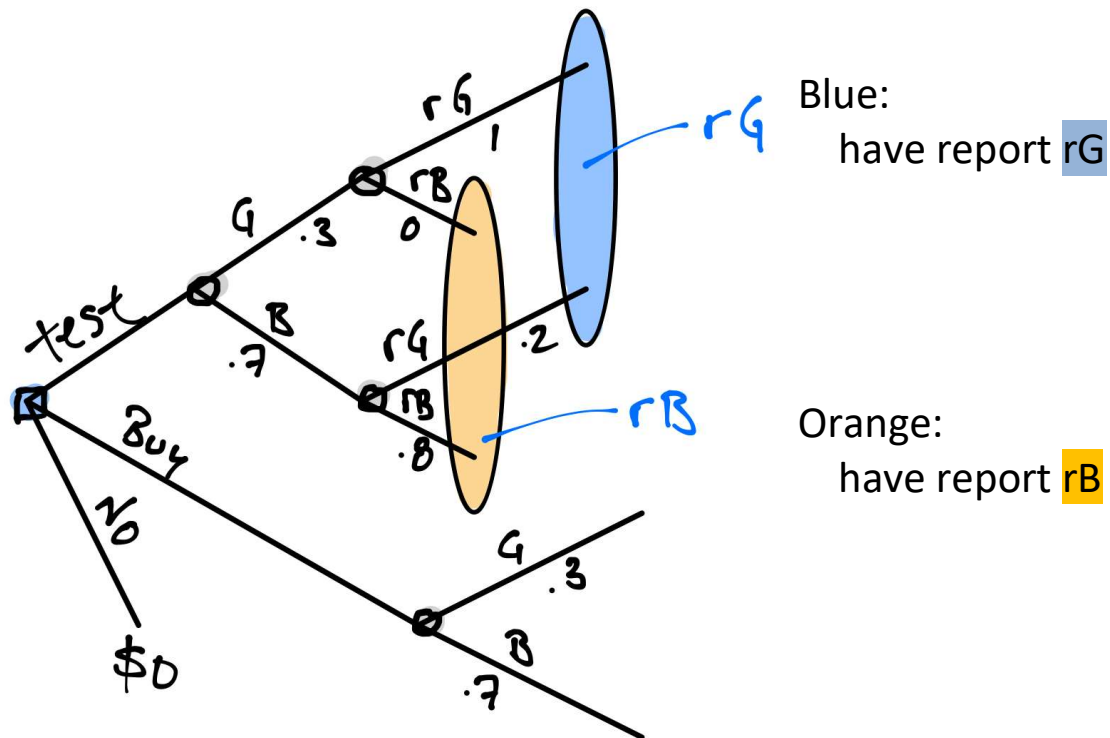


Expressing as a table:

True state	Report	Prob of report
G	rG	100%
	rB	0%
B	rG	20%
	rB	80%

Start building the decision tree:

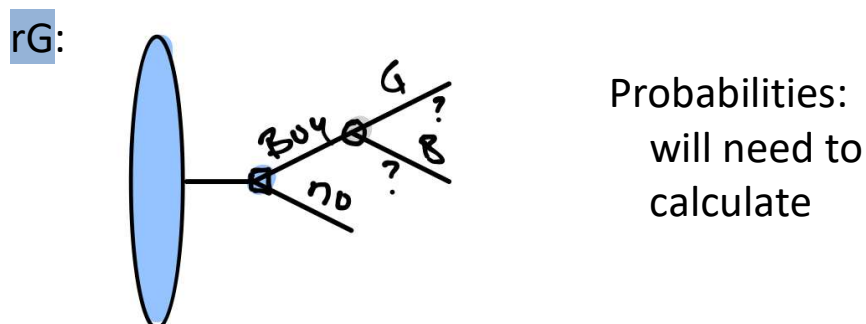
Two information sets:



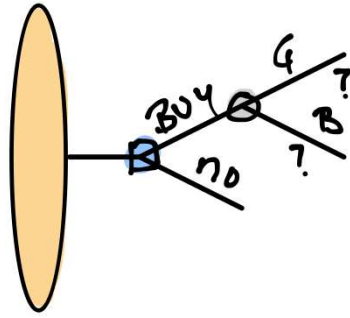
After test results received:

Report rG : *Uncertain*: car *might* be bad -- a B car *might* get rG
 Report rB : *Certain*: car is *definitely* bad -- a G car *never* gets rB

In **either** case, next node is decision **whether to buy**:



rB:

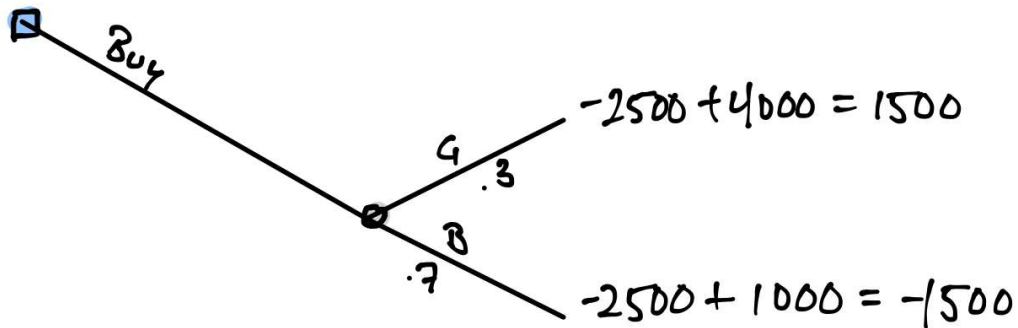


Probabilities:

pr G = 0

pr B = 100%

Evaluate buy-without-testing branch to simplify tree:



$$EV = 0.3 * 1500 + 0.7 * (-1500) = -600$$

Don't buy (without the test)

Analysis will continue in part 2