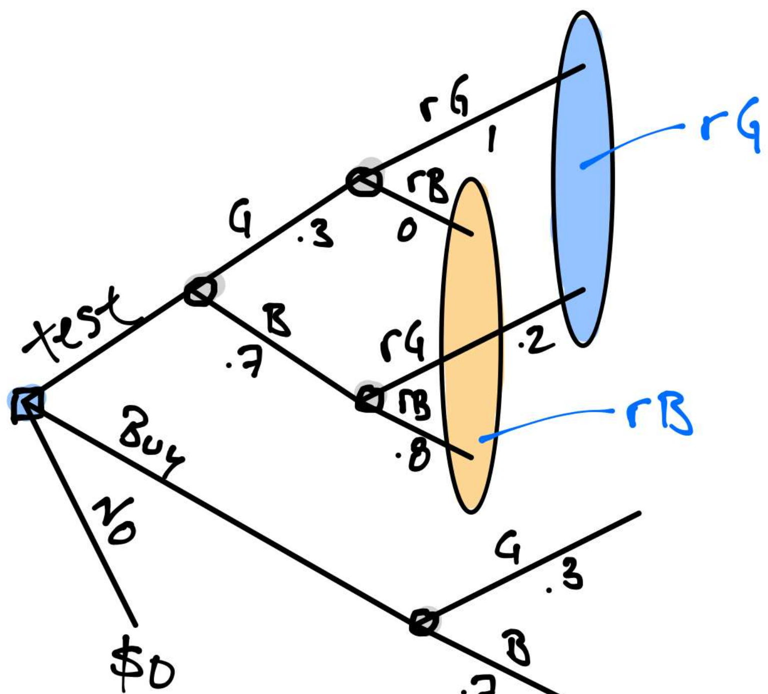
E: Imperfect information, part 2

Continuing the analysis:

Started building the tree for the test:



EV = -600

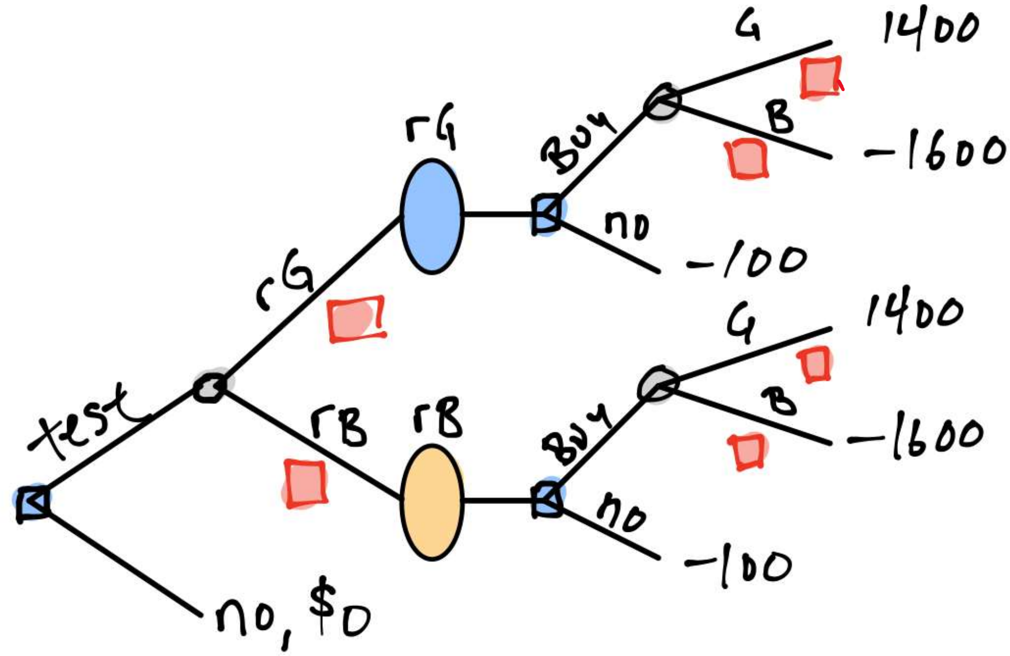
Can help to redraw tree from buyer's perspective:

Three key end payoffs:

Test, buy car, car is G: -100 - 2500 + 4000 = 1400

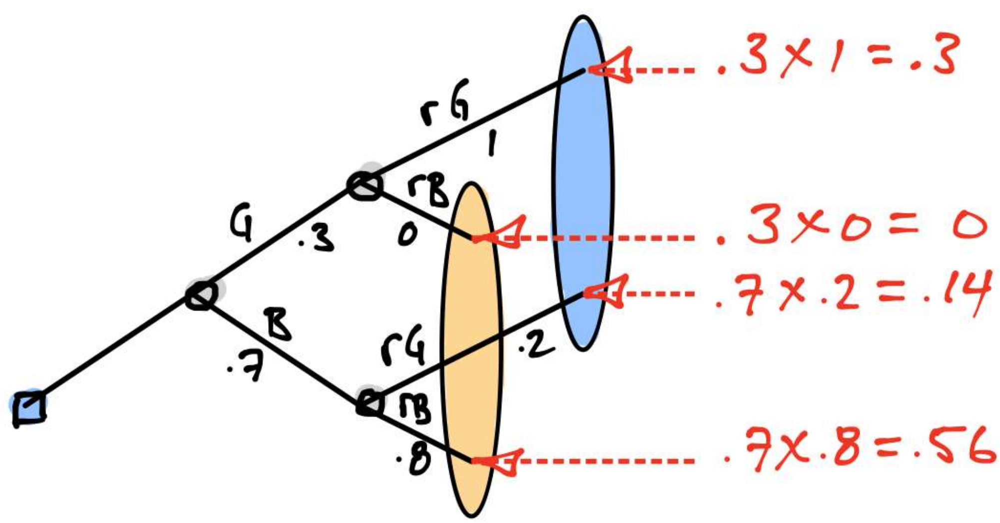
Test, buy car, car is B: -100 - 2500 + 1000 = -1600

Test, don't buy car -100 = -100



Red boxes: probabilities to be determined

Step 1: **unconditional** probabilities of individual information set endpoints:



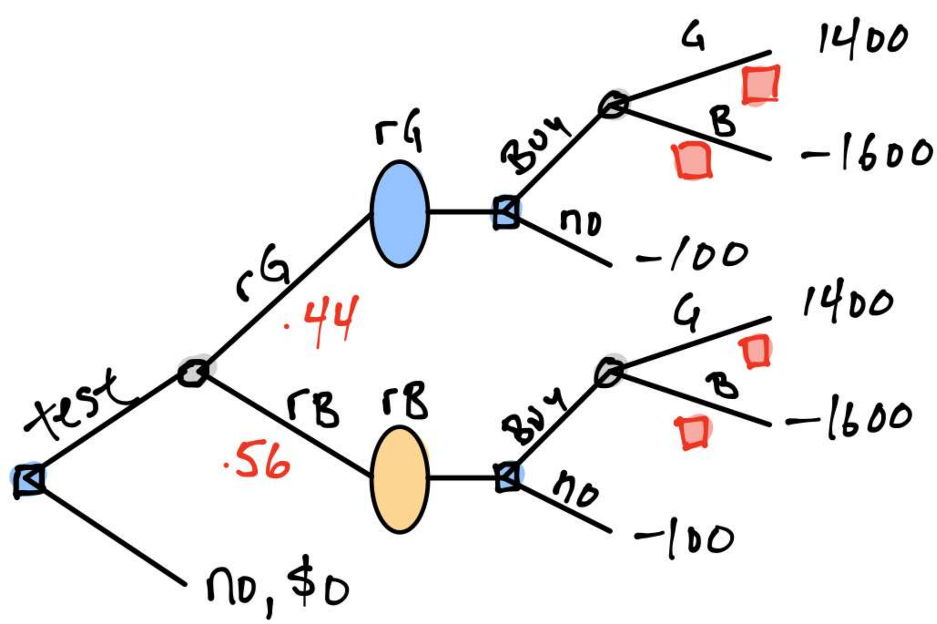
Checking the sum: 0.3 + 0 + 0.14 + 0.56 = 1

Step 2: probabilities of information sets rG, rB:

probability of rG: 0.3 + 0.14 = 0.44
probability of rB: 0 + 0.56 = 0.56

Checking the sum: 0.44 + 0.56 = 1

Adding to the tree:



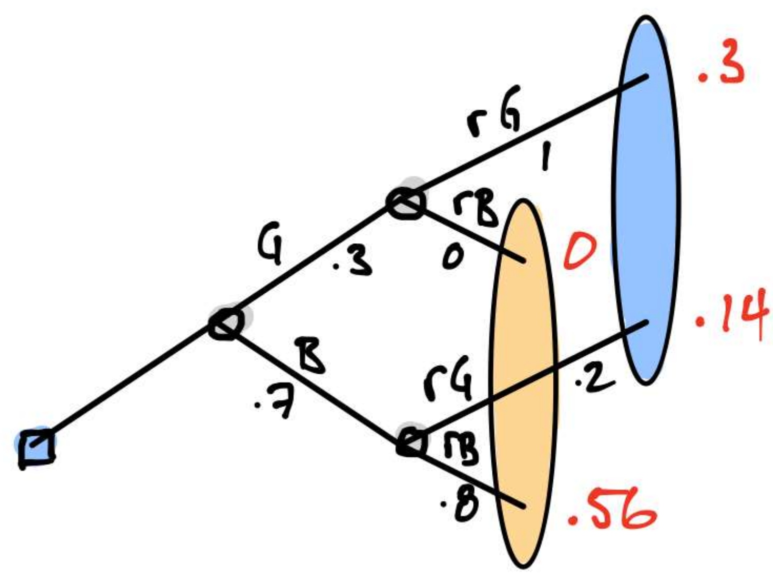
Step 3: calculate **conditional** probabilities after rG and rB:

Conditional probability:
Probability of **true state** given **reported state**

Example:
Probability car is actually **good** (G) when **reported good** (rG)
Formally, an application of Bayes' Rule

Equal to the **share of G cars** in **those with rG reports**

Find from original tree:



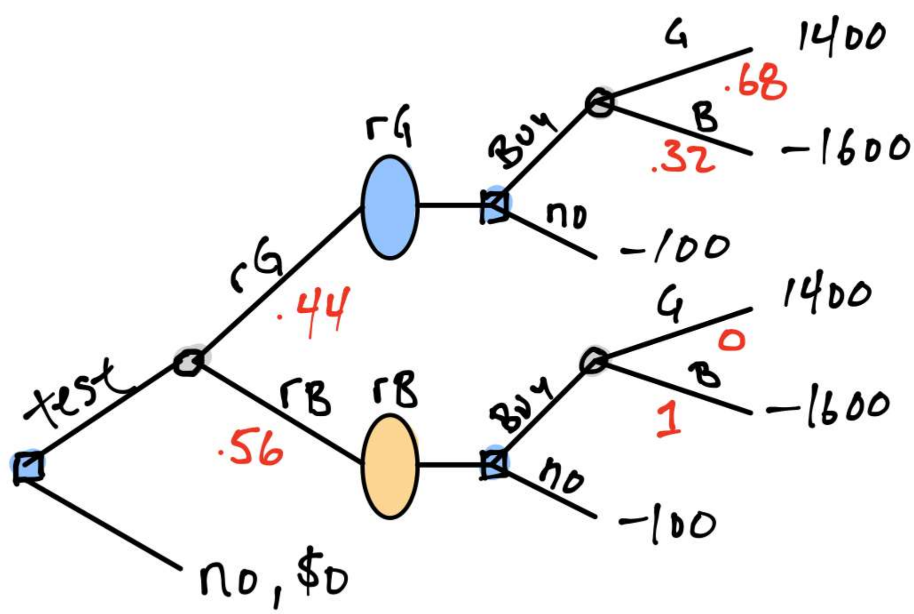
Prob G if rG:
0.3/0.44 = 0.68

Prob B if rG:
0.14/0.44 = 0.32

Prob G if rB:
0/0.56 = 0

Prob B if rB:
0.56/0.56 = 1

Adding to the buyer's view:

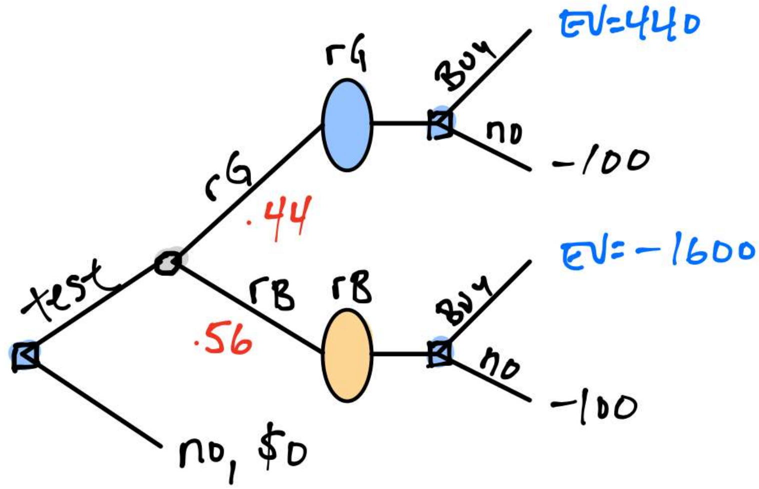


Step 4: evaluate finished tree:

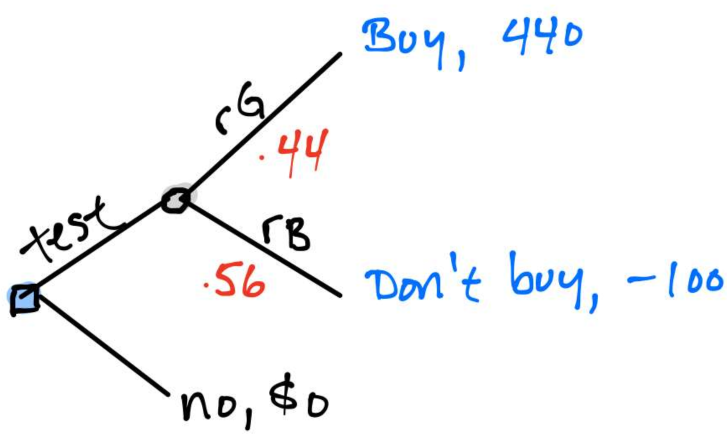
Computing EVs at right:

Buy if rG: 0.68*1400 + 0.32*(-1600) = **440**
Buy if rB: 0*1400 + 1*(-1600) = **-1600**

Updating the tree:

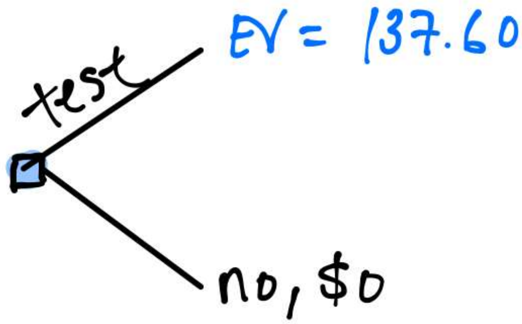


Evaluating right-most choice nodes:



Evaluating again gives the EV of the test:

EV = 0.44*440 + 0.56*(-100) = 137.6



Conclusion:

Buy the test