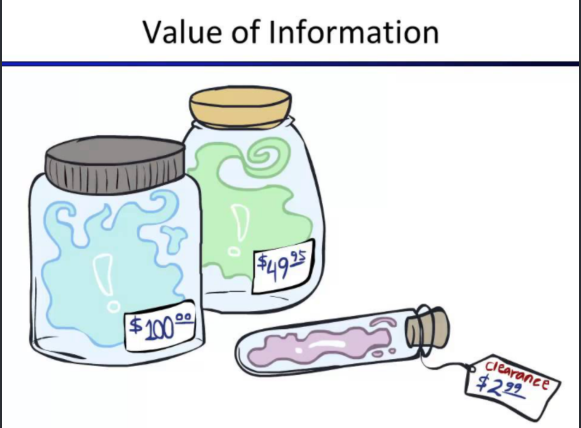
THE UNIVERSITY OF TEXAS AT AUSTIN
McCOMBS SCHOOL OF BUSINESS

Decision Trees 2

Lecture 21

STA 371G

What Is It Worth to Know More About an Uncertain Event?



Key topics for today

- Value of Information

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- Bevo: The Movie Example

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- Expected Value of Perfect Information

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- Expected Value of Imperfect Information

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- How much is information worth, and if it costs a given amount, should you purchase it?
- The expected value of perfect information, or EVPI, is the most you would be willing to pay for perfect information.

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- This leads to an investigation of the value of information

Example: Marketing Strategy for *Bevo: The Movie*

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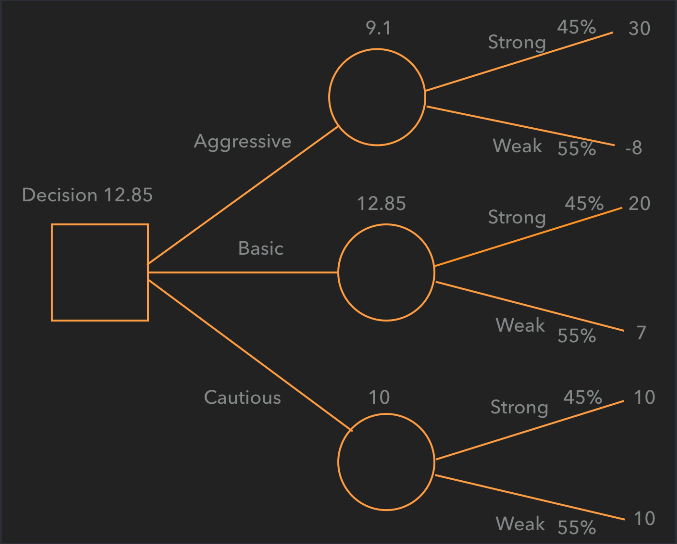
- (A) Aggressive: Large expenditures on television and print advertising.
- (B) Basic: More modest marketing campaign.
- (C) Cautious: Minimal marketing campaign.

Payoffs for *Bevo: The Movie*

The net payoffs depend on the market reaction to the film.

	Market Reaction	
Decisions	**Strong**	**Weak**
Aggressive	30	-8
Basic	20	7
Cautious	10	10
Probability	**0.45**	**0.55**

Decision Tree for *Bevo: The Movie*



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EVPI = (EV with perfect information) - (EV with no information)

Finding EVPI with a payoff table

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- $\text{EVPI} = 19 - 12.85 = 6.15$

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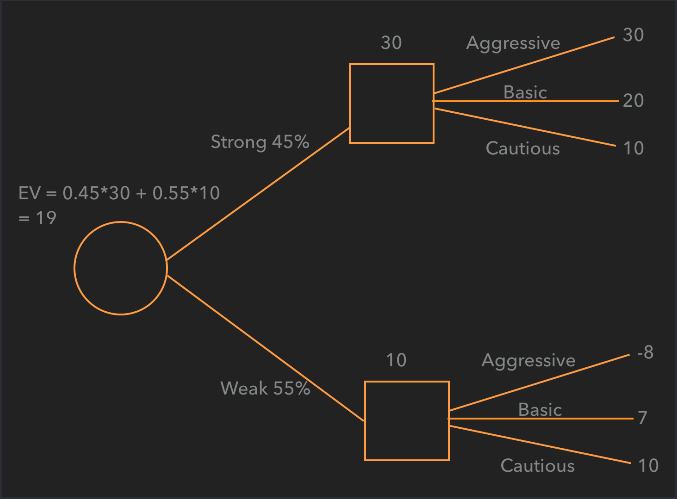
- Step 3: Compare the EV’s with and without the information

Finding EVPI with a decision tree



What about imperfect information?

Suppose that Myra the movie critic has a good record of picking winners.

- For movies where the audience reaction was strong, Myra has historically predicted that 70% of them would be strong.
- For movies where the audience reaction was weak, Myra has historically predicted that 80% of them would be weak.

Remember that the probability of a strong reaction is 45% and of a weak reaction is 55%.

Suppose S and W means the audience reaction was strong or weak, respectively, and PS and PW means that Myra's prediction was strong or weak, respectively. Let's translate what we know:

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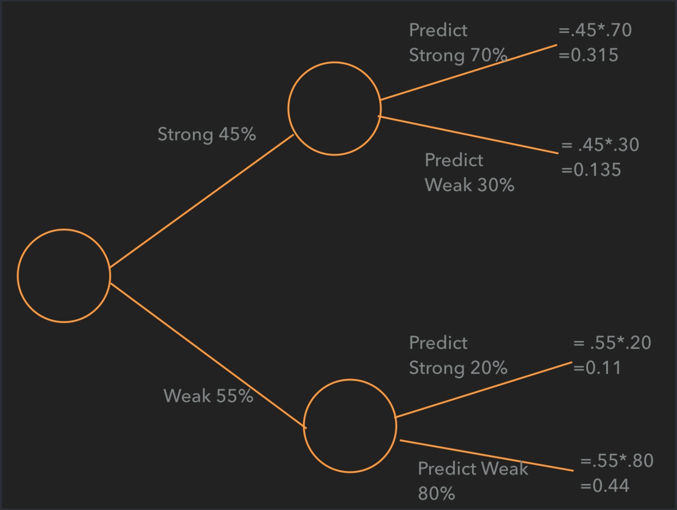
  $P(S) = .45, \qquad P(W) = .55$

Reverse the tree!



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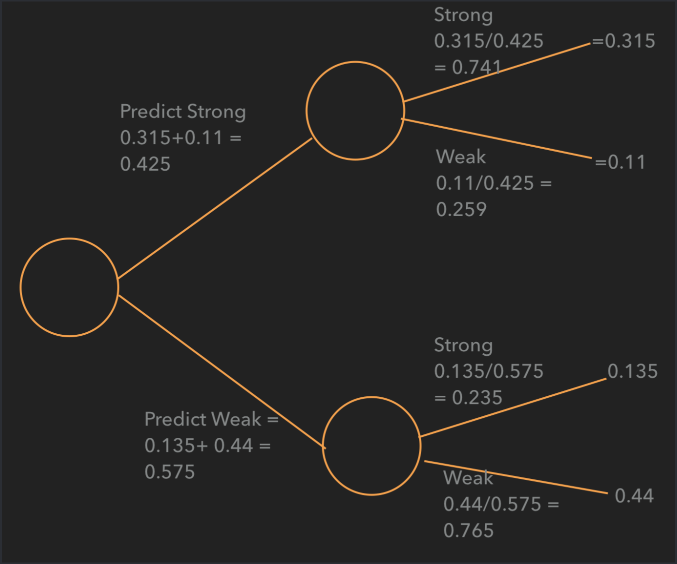
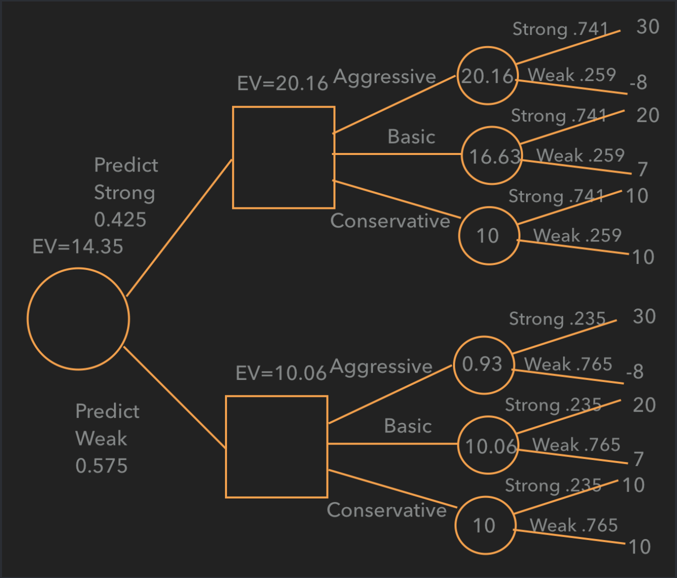


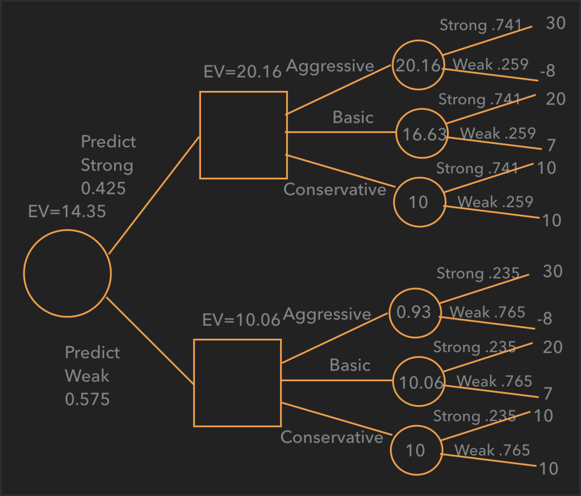
Tree with imperfect information



Myra’s information is worth paying for

It changes the decision and adds $14.35 - 12.85 = 1.5$ in value.

(Compare this to the 6.15 the clairvoyant’s prediction was worth.)



Things to remember about the value of information

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- Information has non-zero value if and only if it changes some decision
- Sometimes there is more than one correct way to draw a decision tree for a decision