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Players can devise *strategic moves* to manipulate the order of play to their advantage; see Lecture 14.

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Can trace different paths from the *initial node* to final payoffs at a *terminating node*.

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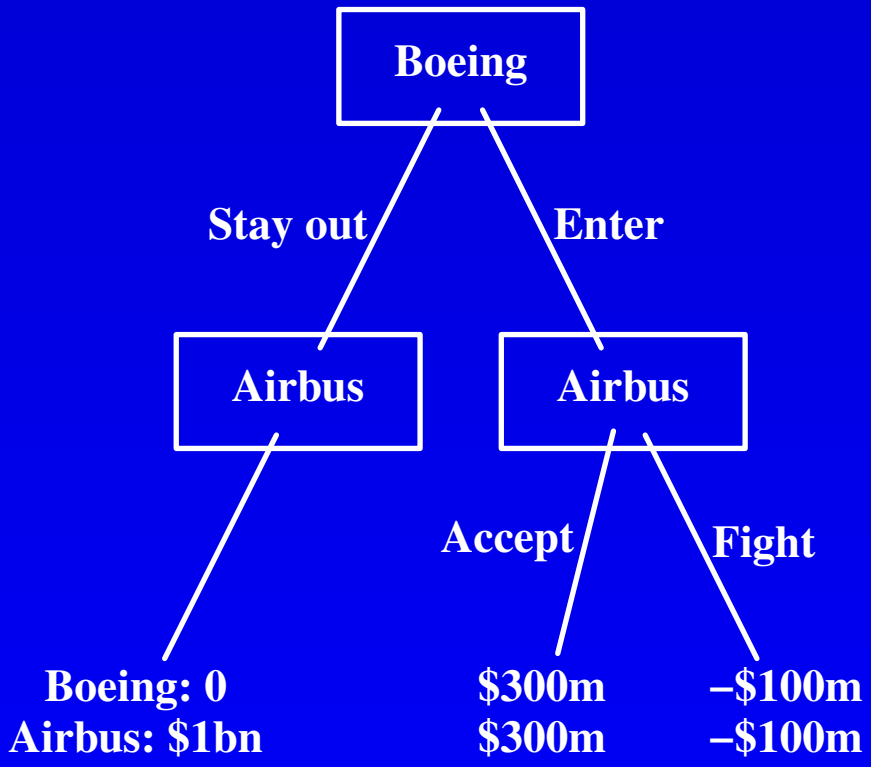
With a price war, each will lose $100 m.

A Game Tree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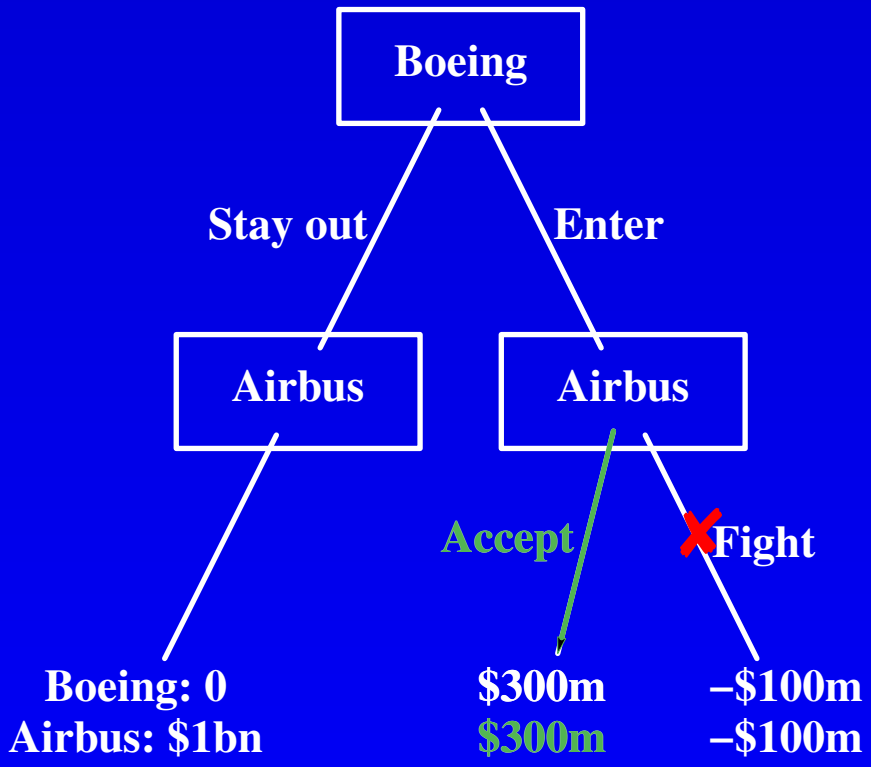
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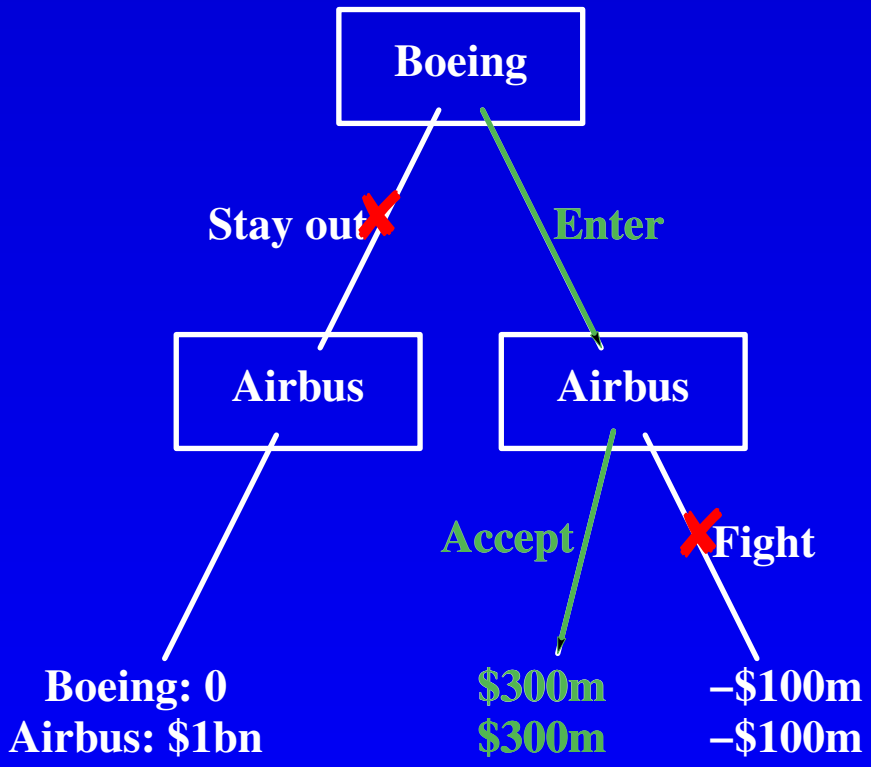
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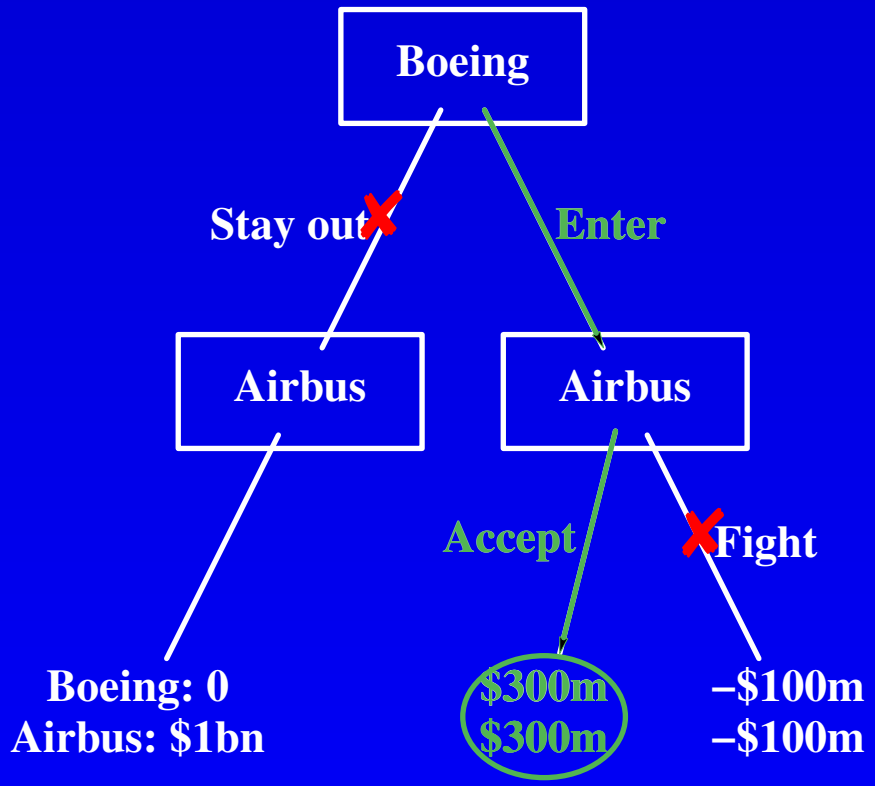

Q: How should Airbus respond?

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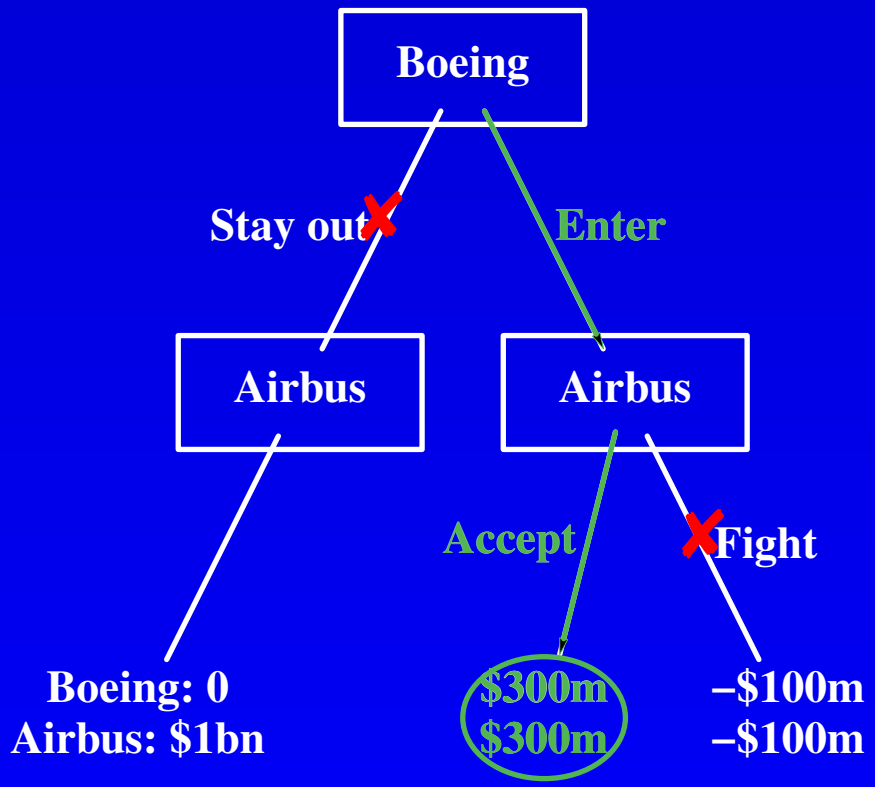

Q: How should Airbus respond?

∴ What should Boeing do?

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6. For each player, the collection of best decisions at each decision node of that player $\rightarrow$ best strategies of that player.

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In lecture 2 the two firms Alpha and Beta simultaneously made the capacity decision:

		Beta	
	DNE	Small	Large
DNE	\$18, \$18	\$15, \$20	\$9, \$18
Alpha Small	\$20, \$15	\$16, \$16	\$8, \$12
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N.E at (Small, Small).

Q: What if Alpha moved first?

The game tree, and first-mover advantage.

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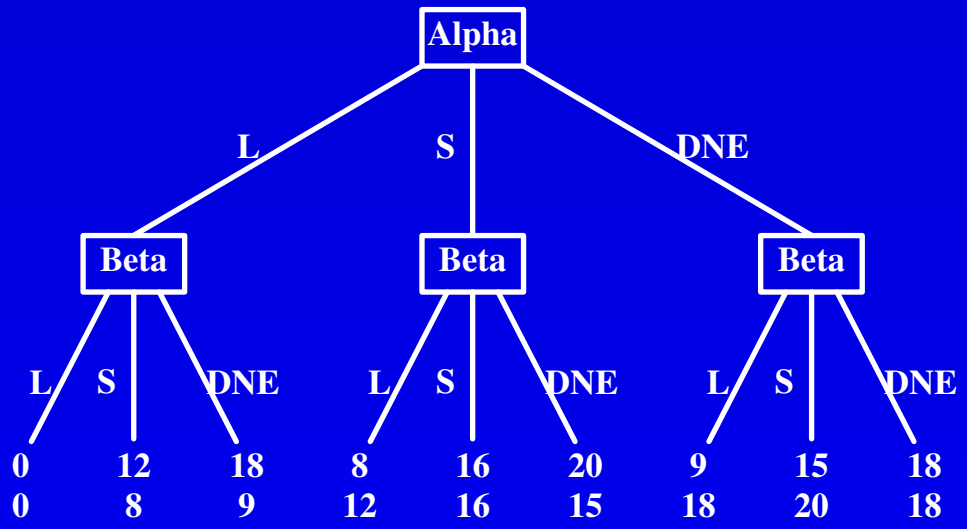

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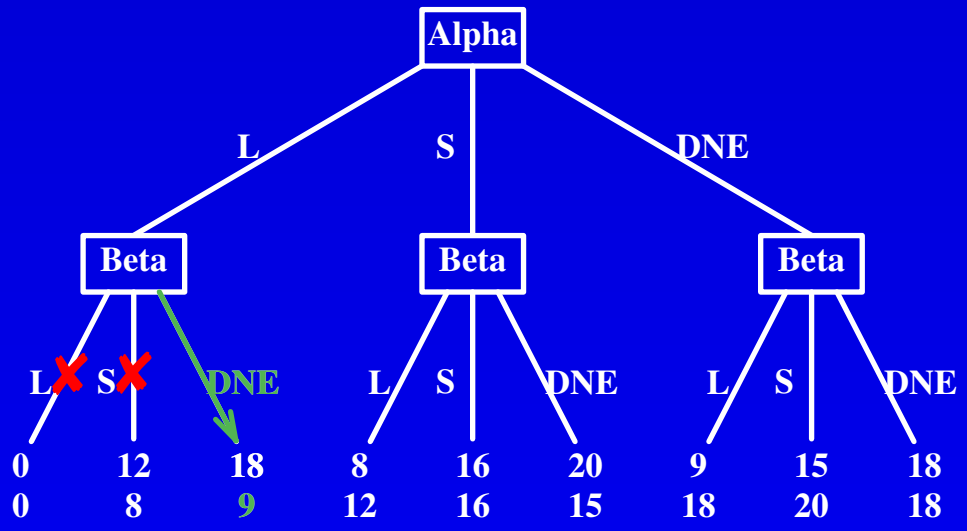

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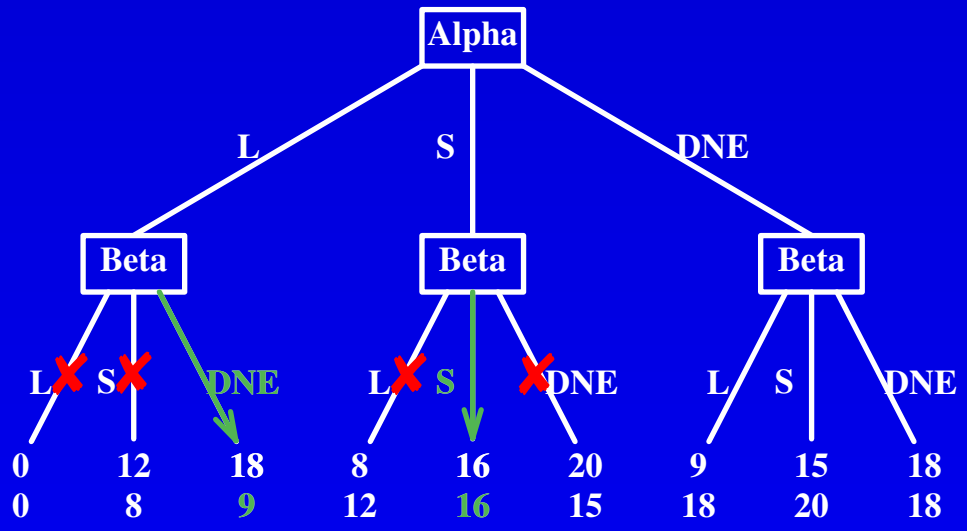

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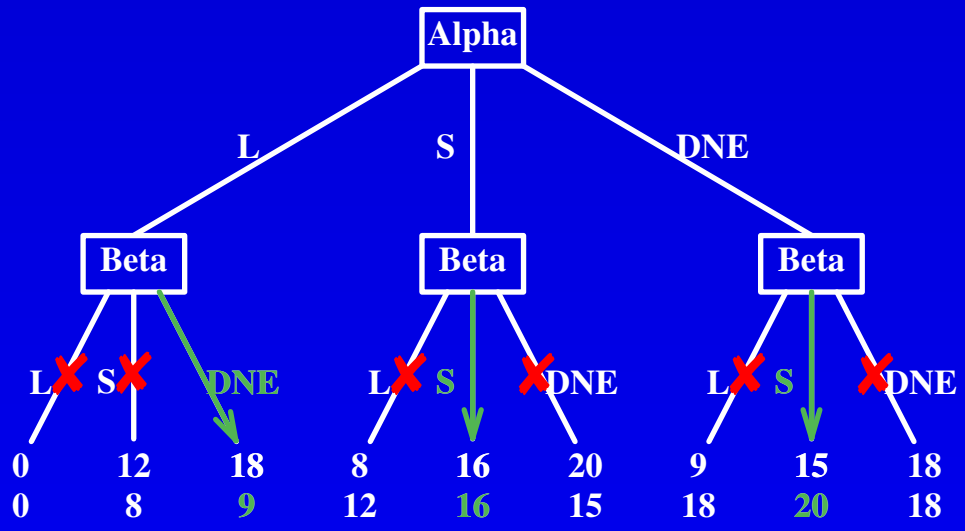

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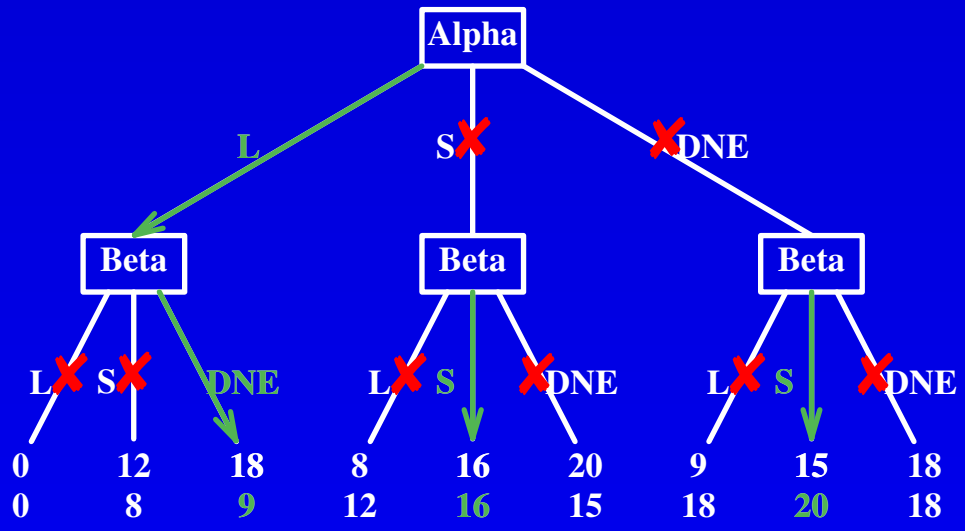

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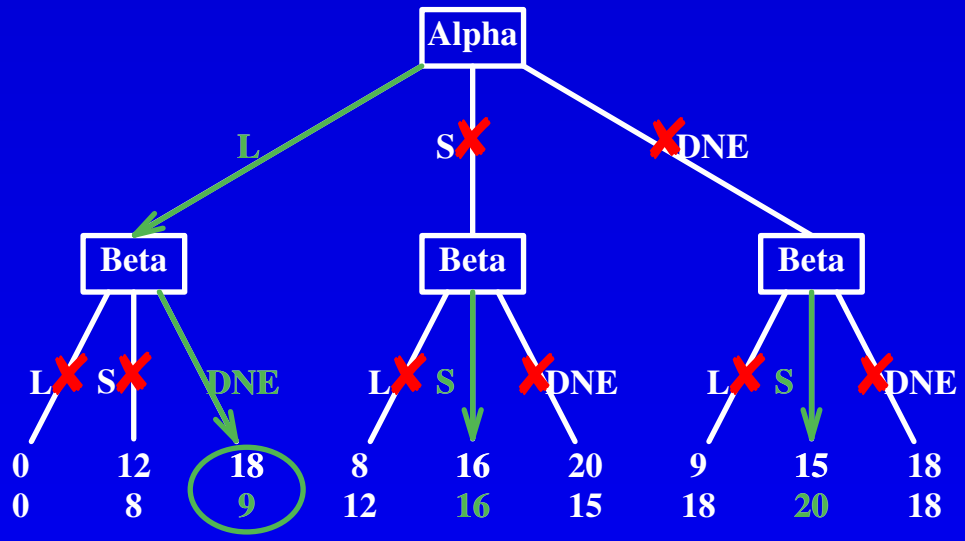

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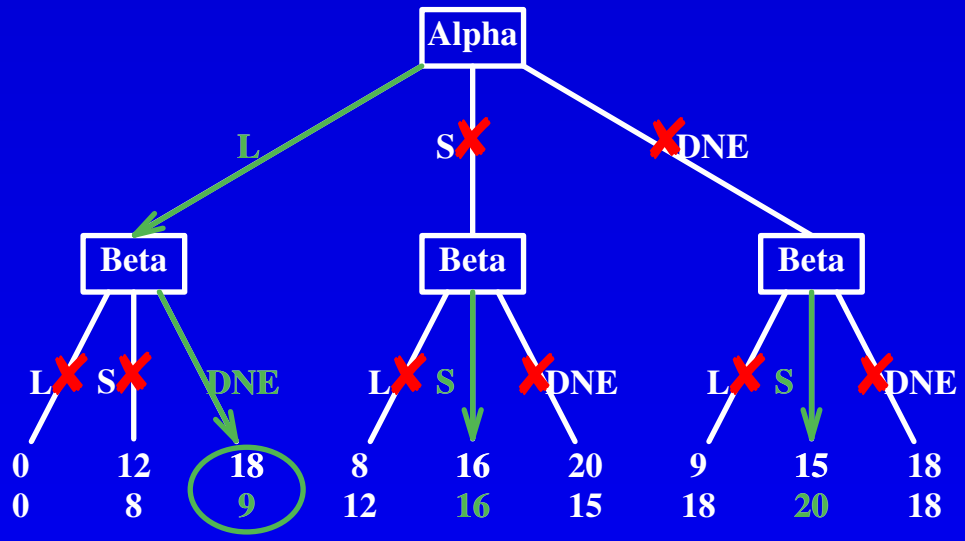

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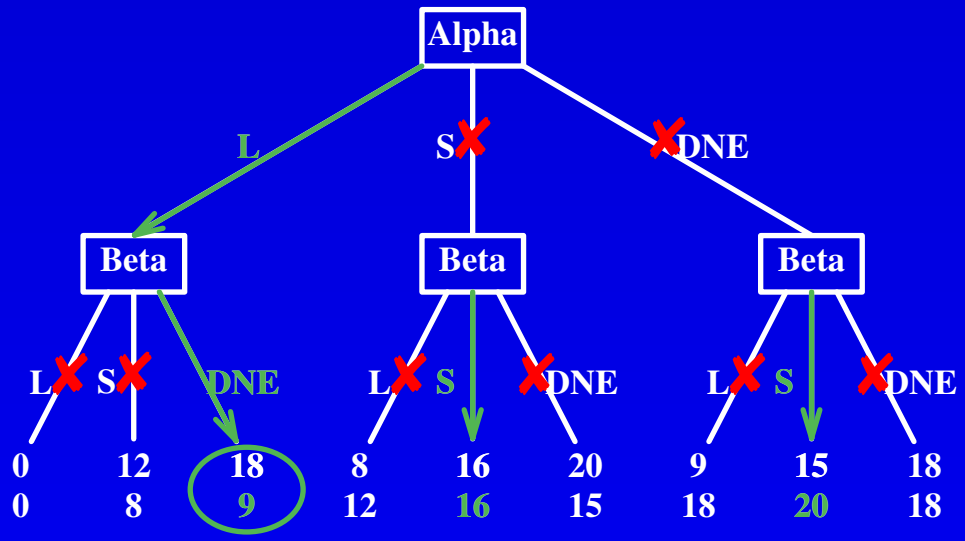

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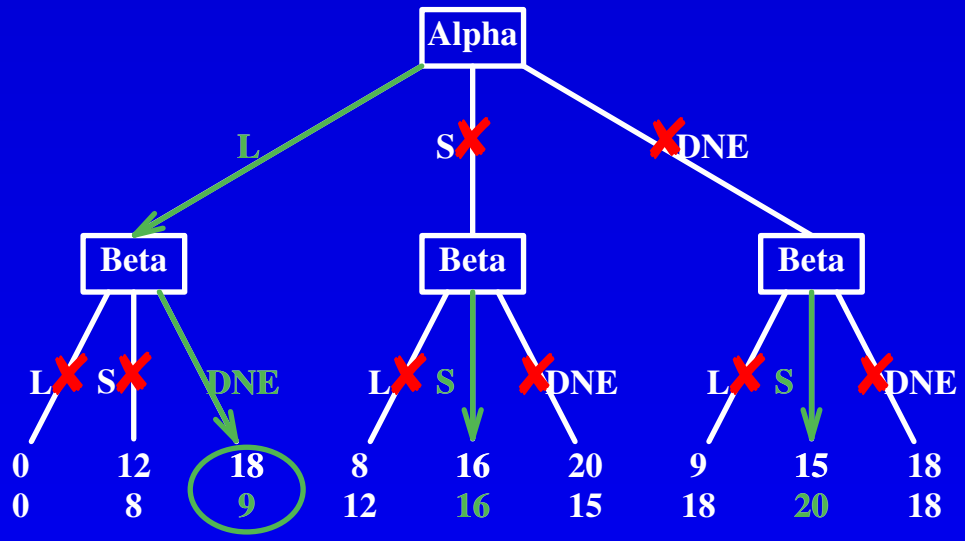

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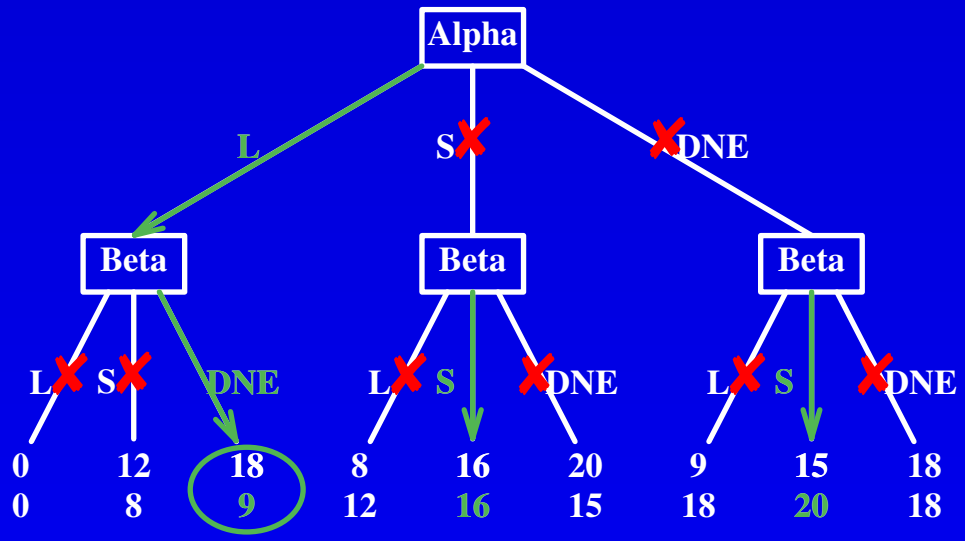

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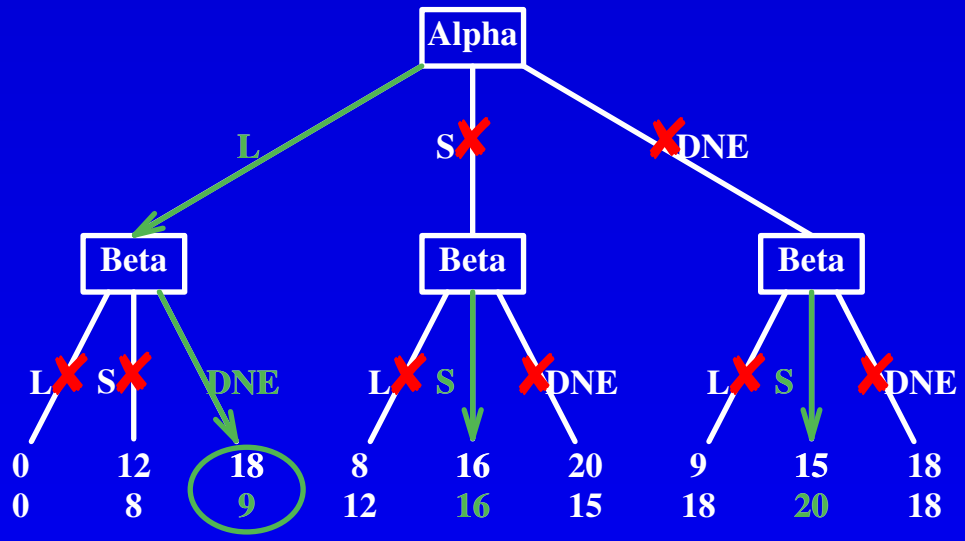

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Commitment v. flexibility?

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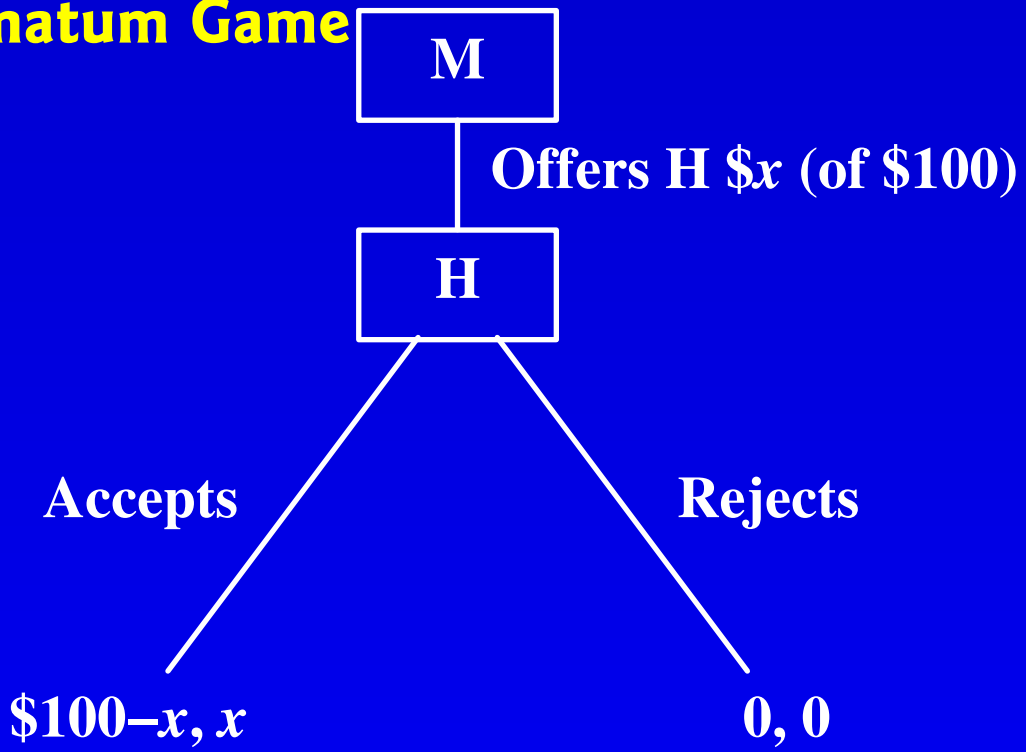
What will Mortimer offer $*x*?
What would you offer? (Write it down.)

The Ultimatum Game



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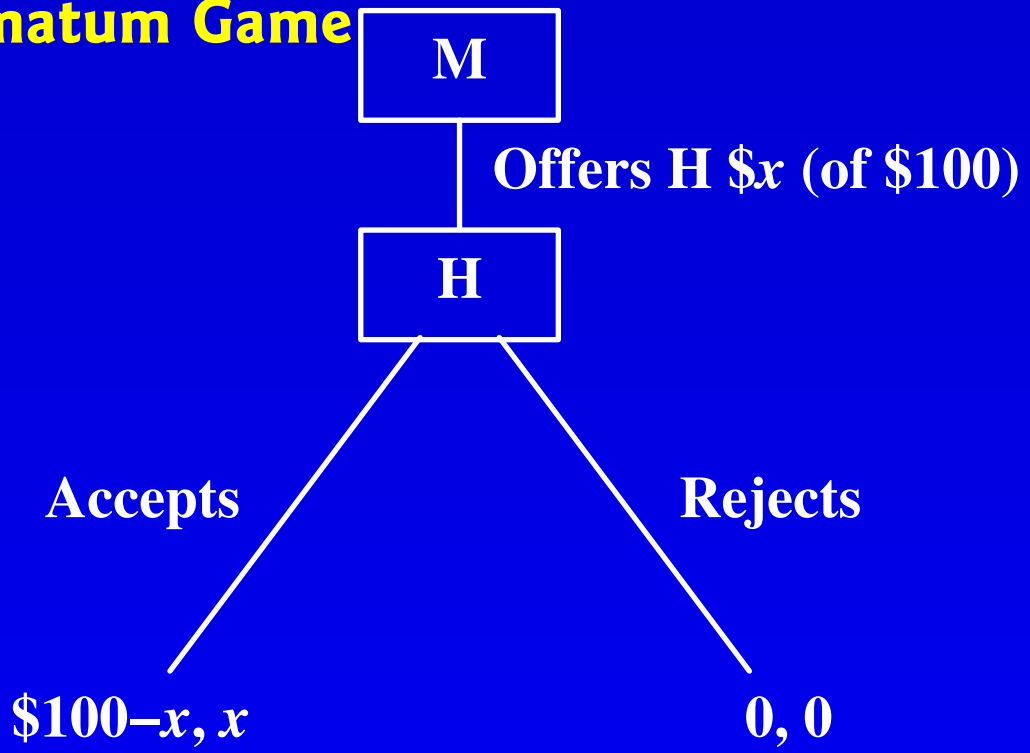

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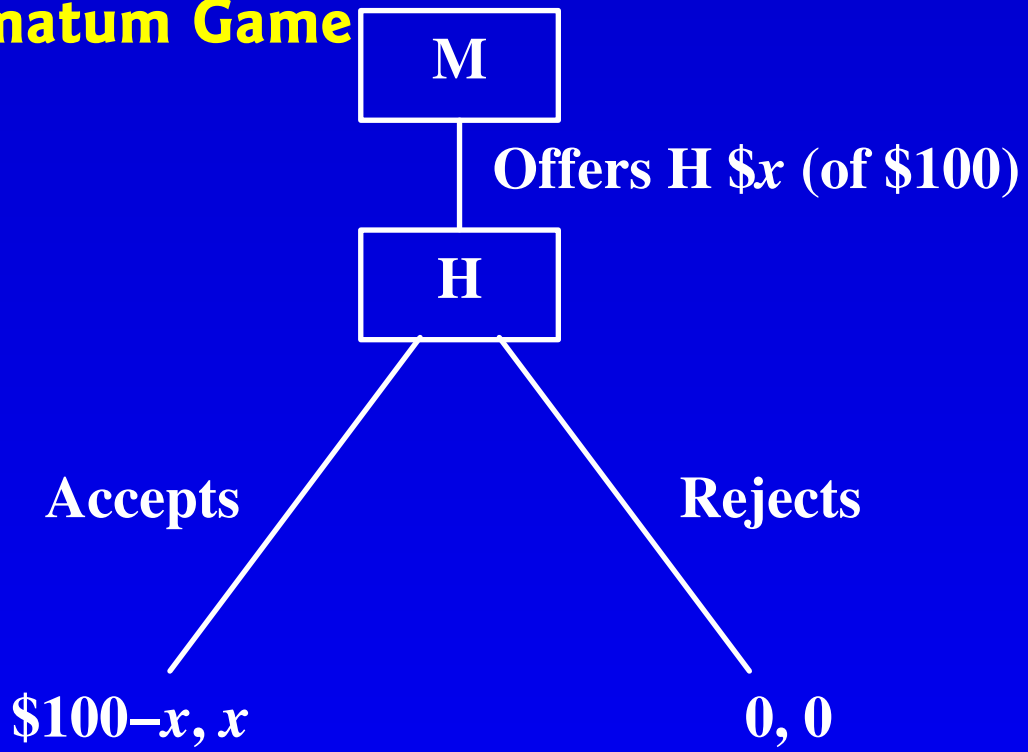
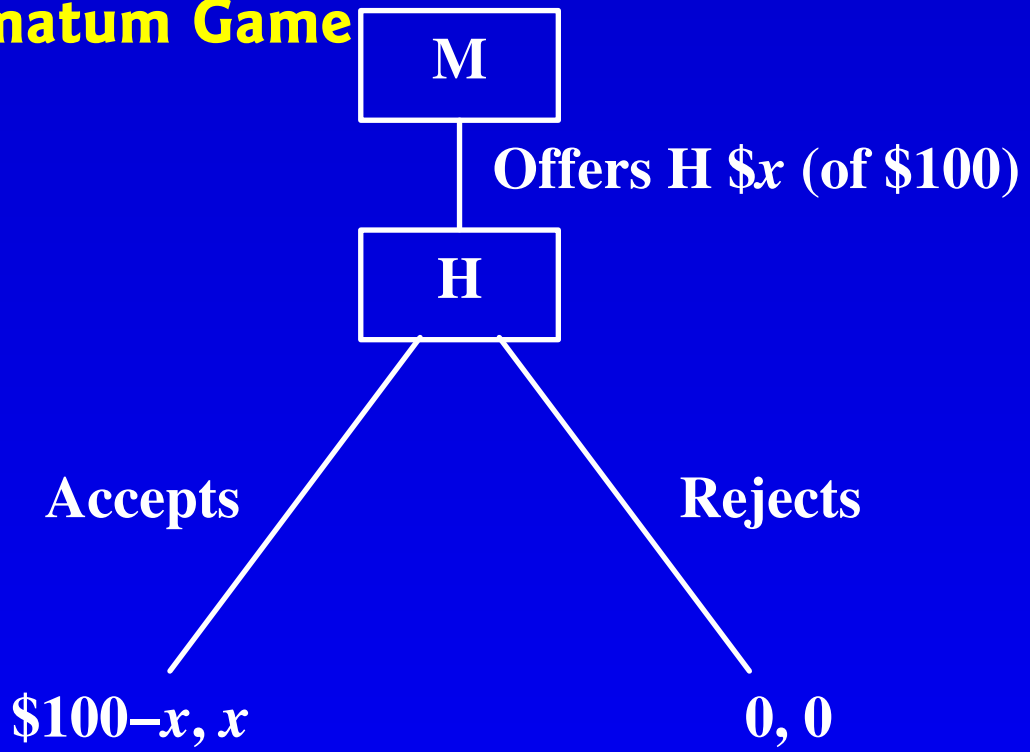


Most offer a 50:50 split, and almost all accept.
Most reject less than $25 offered, and some even $40.

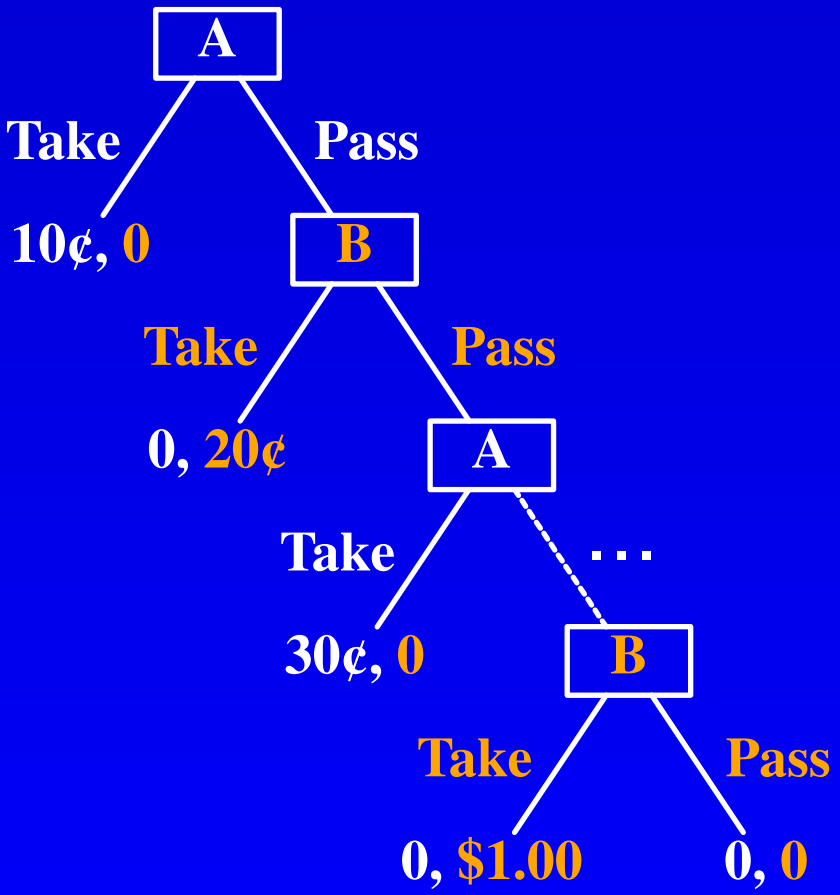
The Ultimatum Game



Most offer a 50:50 split, and almost all accept.
Most reject less than $25 offered, and some even $40.

A fairness (equal) focal point.

The Centipede Game



What would you do: as A? as B?

The Centipede Game

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Perhaps players care not only about $ and ¢, but also about fairness or reputation.

∴ Don't assume that the other player (whether an acquaintance or anonymous or new) has your values.

THREE CLASSROOM INTERACTIONS

I. Auctioning a Ten-Dollar Note

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I. Auctioning a Ten-Dollar Note

Rules:

- First bid: 20¢
- Lowest step in bidding: 20¢
  (or multiples of 20¢)
- The auction lasts until the clock starts ringing.
- The highest bidder pays bid to auctioneer and gets $10 in return.
- The second-highest bidder also pays her bid to auctioneer, but gets nothing.

The Ten-Dollar Auction

Write down the situation as seen by

1. the high bidder, and
2. the second highest bidder.

The Ten-Dollar Auction

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What happened?

Escalation and entrapment

Examples?

(See O'Neal's article in the Readings.)

II. Schelling's Game

Rules:

- **Single play, $4 to play: by writing your name on the slip**
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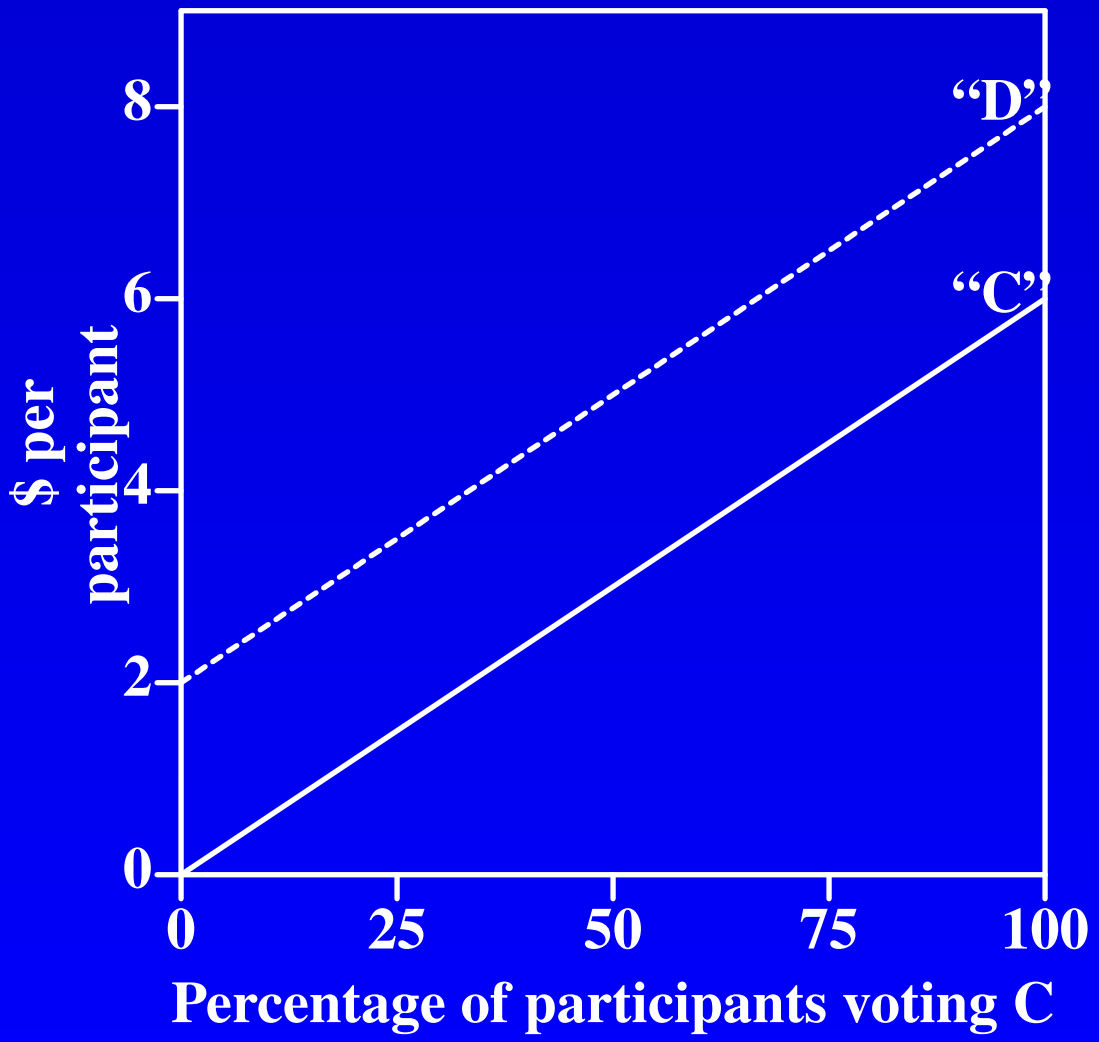
- Or: You needn't play at all.

Schelling's Game



Note: the game costs $4 to join.

Schelling's Game

What happened?

➢

Schelling's Game

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- **numbers & payoffs.**
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Schelling's Game

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Schelling's Game

What happened?

- **numbers & payoffs.**
- **previous years?**

Dilemma: { **coöperate for the common good *or* defect for oneself**

Public/private information

Schelling's n-person Game

Examples?

- **price**
- **tax avoidance**
- **individual negotiation**
- **coal exports**
- **market development**
- **others?**

(See Schelling in the Package.)

III. The Ice-Cream Sellers

(See Marks in the Web page.)

- **Demonstration**
- **Payoff matrix**
- **Incentives for movement?**
- **Examples?**

Modelling the ice-cream sellers.

We can model this interaction with a simplification: each seller can either:

- move to the centre of the beach (M), or
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Since each has two choices for its location, there are $2 \times 2 = 4$ possibilities.

The Sellers' Payoff Matrix

		The Other Seller M	*The Other Seller* NM
You	M	40, 40	50, 30
	NM	30, 50	40, 40

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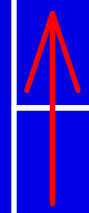

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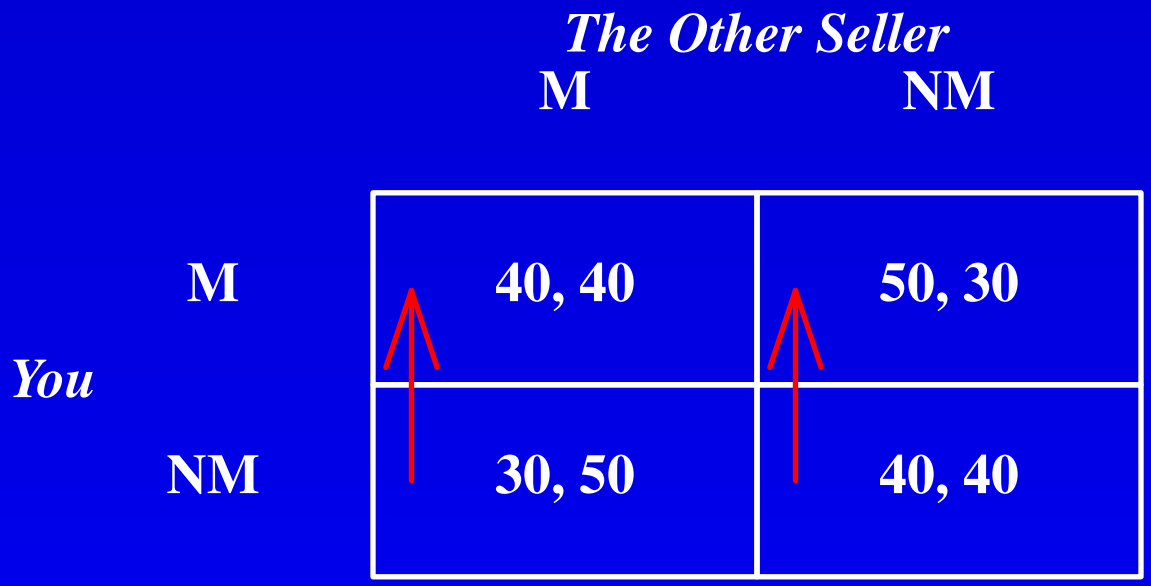

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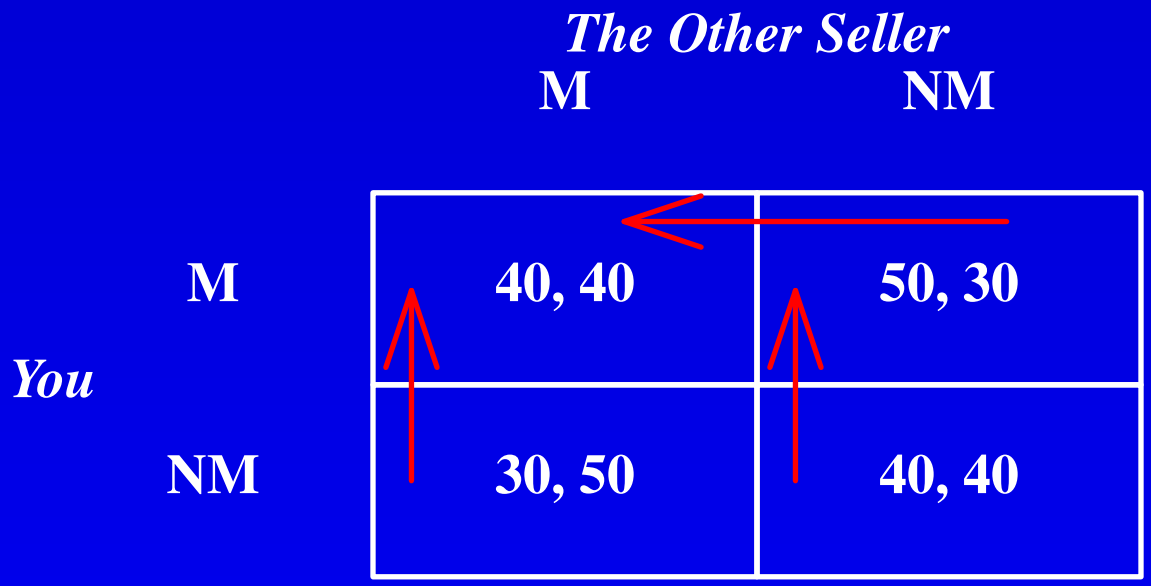

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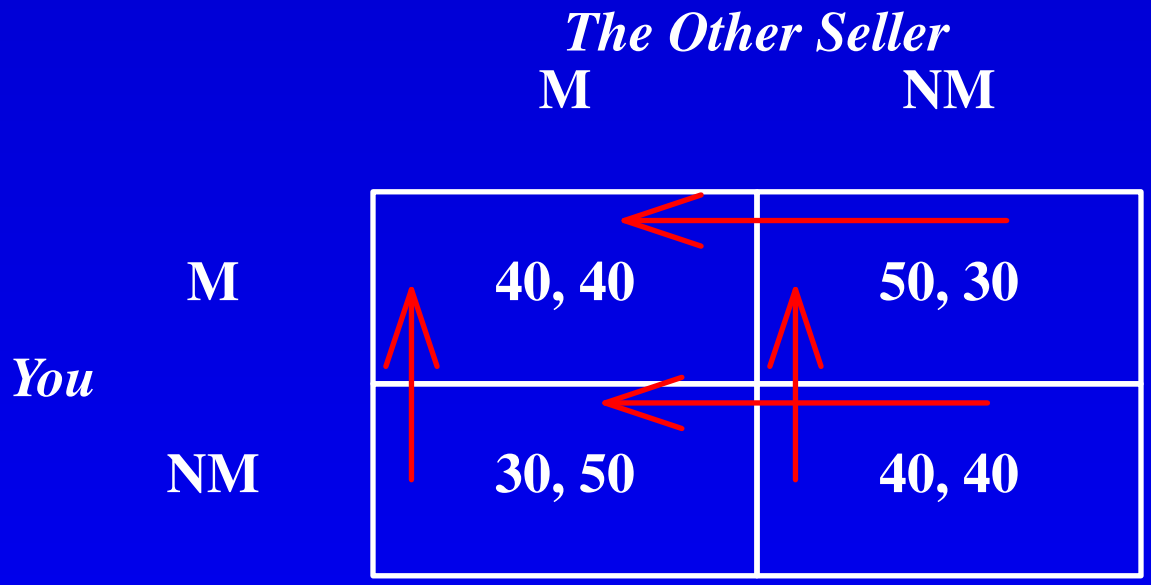

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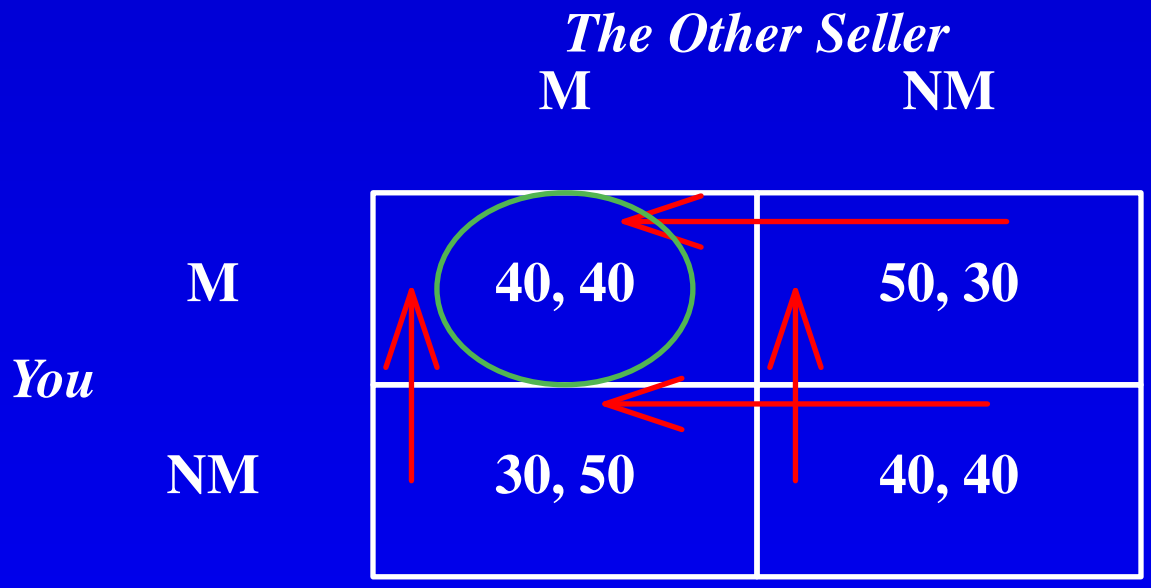

The payoff matrix (You, Other).

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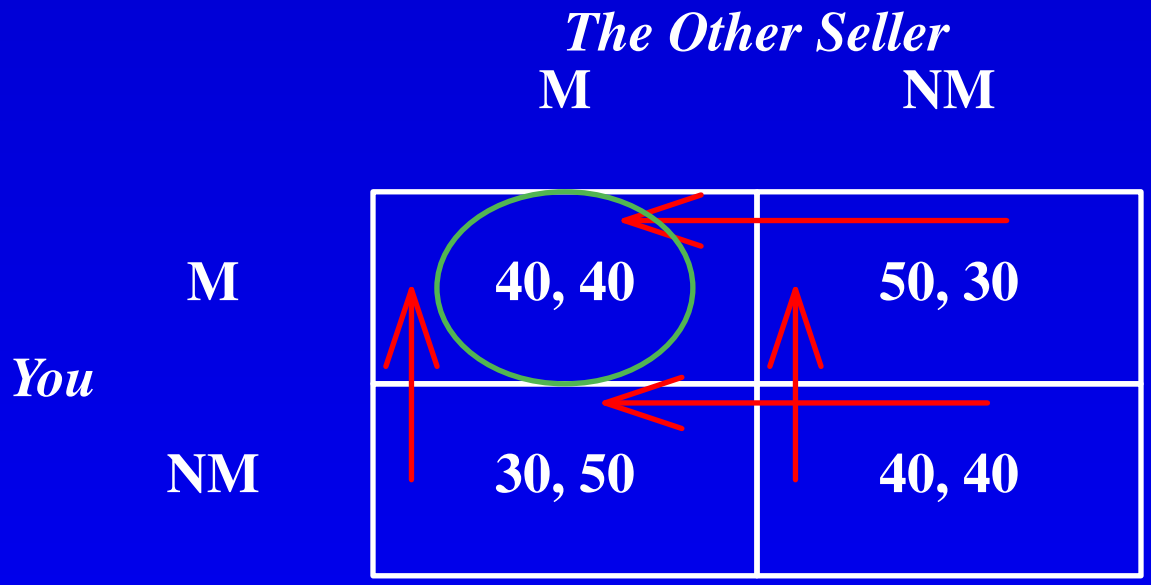

The payoff matrix (You, Other).

A non-cooperative, zero-sum game, with a *dominant strategy*, or dominant move.

Real-World Ice-Cream Sellers

Think of the beach as a product spectrum, each end representing a particular niche, and the centre representating the most popular product.

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Demand is largest for the most popular product, but so is competition.

This simple model: a tendency to avoid extremes, especially with barriers to entry for new players.

Examples:

–

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- **the convergence of fashions?**
-

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- the convergence of fashions?
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A twist: What if the centre is too far for some bathers (at the ends of the beach) to walk?

Then the tendency for the sellers to offer the same product (at the centre) is reduced, and they might differentiate their products.

Seven issues addressed in Game Theory:

1. What does it mean to choose strategies "rationally" when outcomes depend on the strategies chosen by others and when information is incomplete?
2. In "games" that allow mutual gain (or mutual loss) is it "rational" to cooperate to realise the mutual gain (or to avoid the mutual loss) or is it "rational" to act aggressively in seeking individual gain regardless of mutual gain or loss?
3. If the answers to 2. are "sometimes," then in what circumstances is aggression rational and in what circumstances is cooperation rational?

4. In particular, do continuing relationships differ from one-off encounters (one-night stands?) in this issue?
5. Can moral rules of cooperation emerge spontaneously from the interactions of rational egoists?
6. How well does actual human behaviour correspond to "rational" behaviour in these cases?
7. If it differs, then how? Are people more cooperative than would be "rational?" More aggressive? Both?

Cooperative and Non-cooperative Games

Question 1:

A wholesaler wants to merge with any one of four retailers who jointly occupy a city block. If the merger goes through, the wholesaler and the retailer will make a combined profit of $10 million.

The retailers have an alternative: they can band together and sell to a real estate company, making a joint profit of $10 million that way.

Can the outcome be predicted?

If the wholesaler joins a retailer, how should they divide the $10 million?

Question 2:

An inventor and either of two competing manufacturers can make $10 million using the inventor's patent and the manufacturer's factory.

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- **— agreements binding on all players, and**
- **— means of transferring payoffs between players.**

(See Dixit & Skeath, Chapter 17.)
But for SGTM: Non-Cooperative Game Theory only

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what kinds of *coalitions* a group of players will form:

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***Non-cooperative game theory*:**

no binding agreements,
and which *strategies* will players choose?

Where Are We?

1.

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1. Strategic interactions.
2.

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1. Strategic interactions.
2. Look forward and reason backwards.
3.

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8. Extensive-form game tree for sequential games; rollback, (information sets — later).