Strategic Uses of Information I

Topics (across two lectures):

1. **Cheap Talk Equilibria**
   - credibly communicating information
2. **Screening/Sorting**
   - elicit another's information
3. **Signalling Unobservable Information**
   - convey one's own information
4. **Education as a Signal**
   - when a credible signal?
5. **The Market for "Lemons"**
   - when the bad drives out the good

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Has helped in understanding: (1) the nature of incentive contracts, (2) the organization of firms, (3) markets for labour and for durable goods, (4) government regulation, and (5) credit defaults, etc.

Includes means to use private information about oneself and to elicit others' private information, as well as manipulating what others think they know about you.

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So the *Tactics of manipulation of information* become part of the game.

Screening, Signalling. etc

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   Screen **or Sort.**
2. **Choose to remain ignorant ("credible deniability").**

Why not just ask? or tell?

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$\therefore$ Watch what he does, not what he says.

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An incentive scheme: **a strategy that, through rewards or penalties based on observable outcomes, influences another player's unobservable actions. (See Lectures 19, 20 on Contracts.)**

e.g. tie a bonus to sales figures to induce more effective selling, not easily monitored.

Bargaining and Information

(See McM Ch.6)

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- **Why do some tactics work?**
- **What are the limits of what negotiators can achieve?**
- **Uneven distribution of information may result in no agreement. How to mitigate an informational disadvantage. Screening.**
- **Credible strategies for communicating information. Signals.**

1. Cheap Talk: or Direct Communication

Works well when the players' interests are well aligned, such as in The Assurance Game. (Lecture 2, p. 24)

Both H & S want to meet and prefer the Local, so one saying "Let's meet at the Local" will work.

Stage 1: H: Saying where to meet;
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Doesn't work at all if players' interests are diametrically opposed, as in a Zero-Sum game, such as Tennis. (Lecture 2, p. 31)

> If Venus says "DL" and Serena belives this, Venus will CC; and vice versa. But Serena will not believe that Venus's lying either. ∴ Serena will disregard anything Venus says: only a ***babbling equilibrium.***

What if there is some commonality of interest?

Will a message lead to a clear N.E.: will there be a cheap-talk equilibrium at one of the two N.E.? Or will the message be ignored, with a babbling equilibrium at either N.E.?

In the Battle of the Sexes (L. 2, p. 27), Yes! get a *cheap-talk equilibrium:*

Hal says "Theatre", and then Shirl meets him there — a R.E. (Rollback Eqn.), and only one of the two N.E.s is chosen.

		Shirl Theatre	Concert
Hal	Theatre	2, 1	−1, −1
	Concert	−1, −1	1, 2

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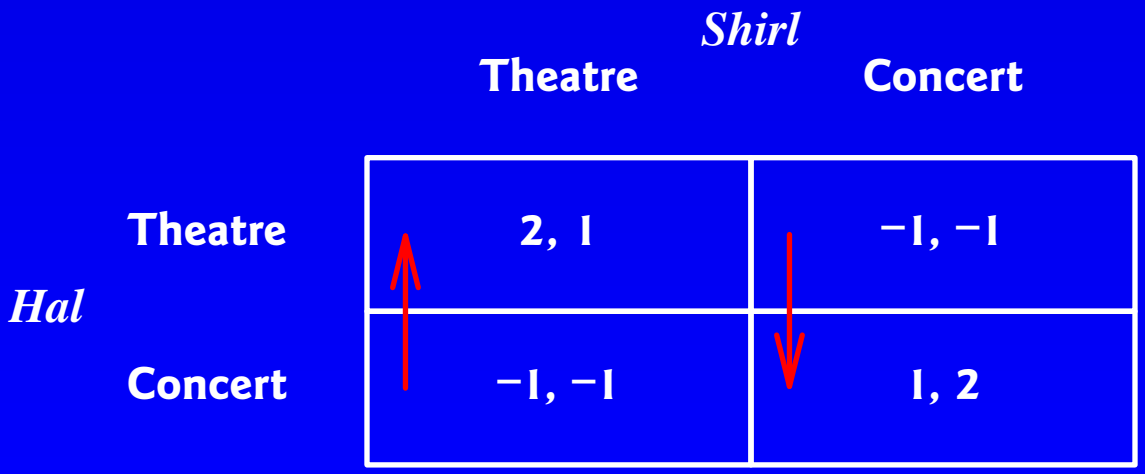

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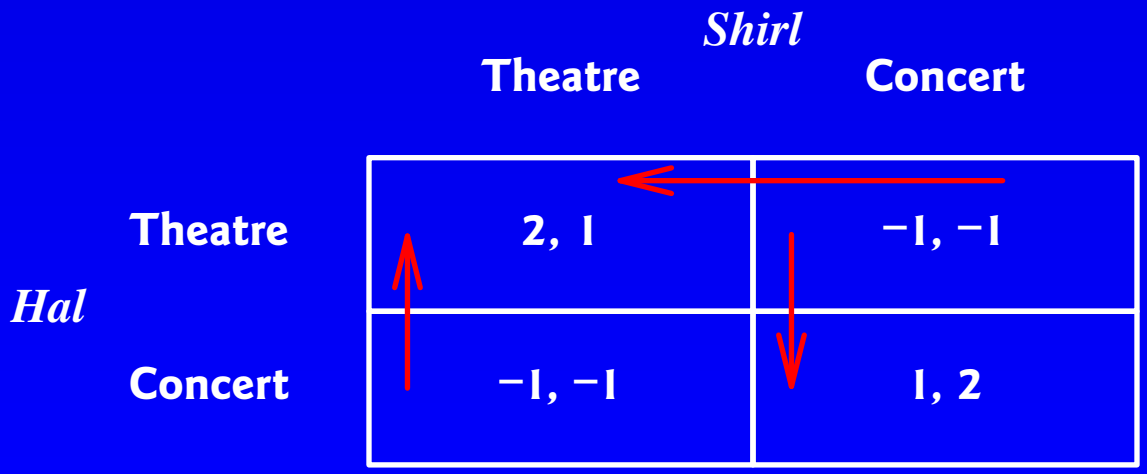

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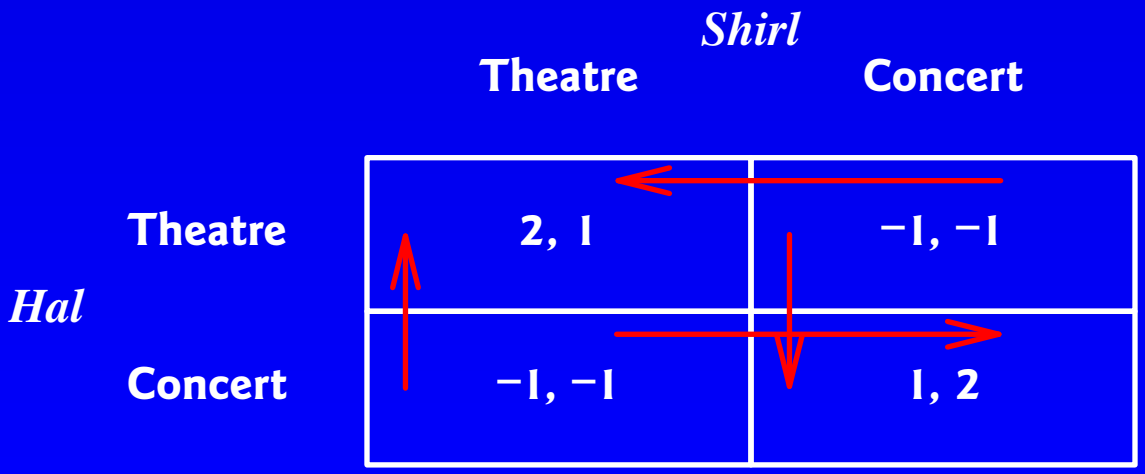

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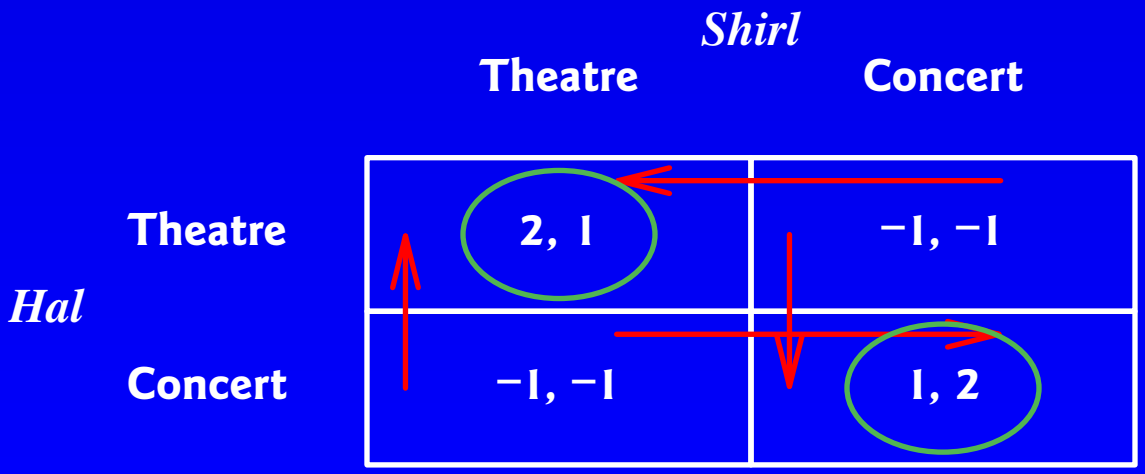
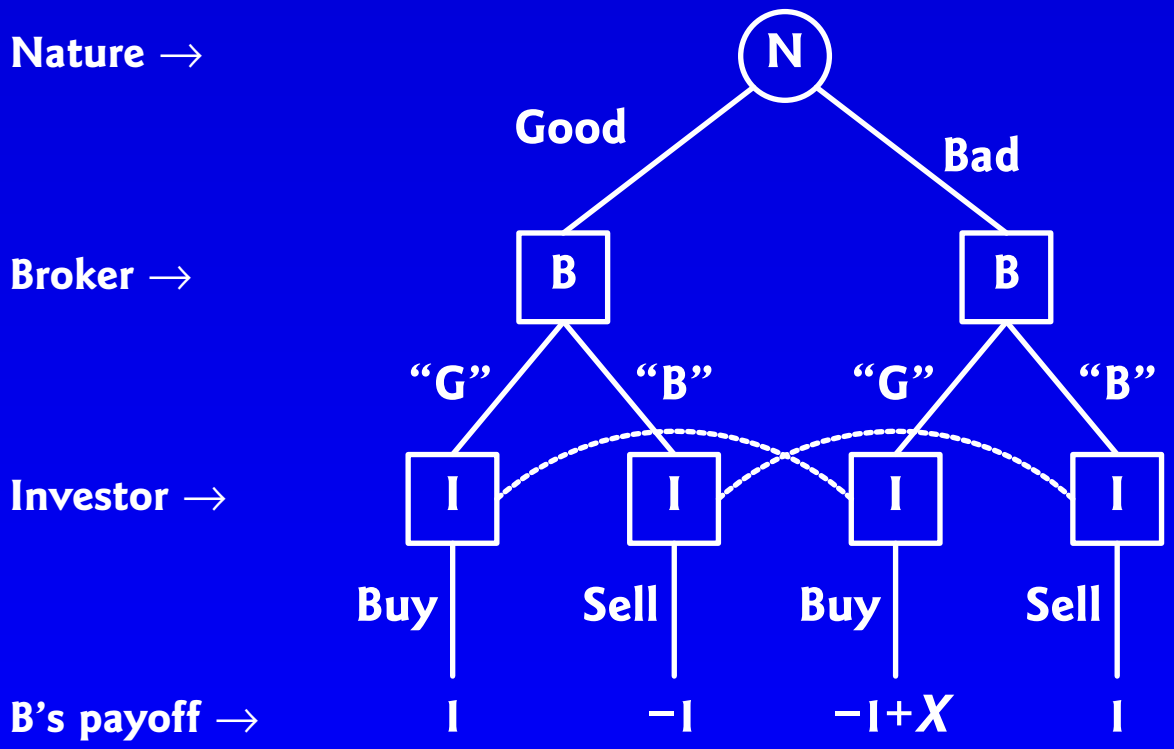


The Broker's Game

The Investor relies on the Broker to know whether a stock is Good or Bad: (a Harsanyi tree)



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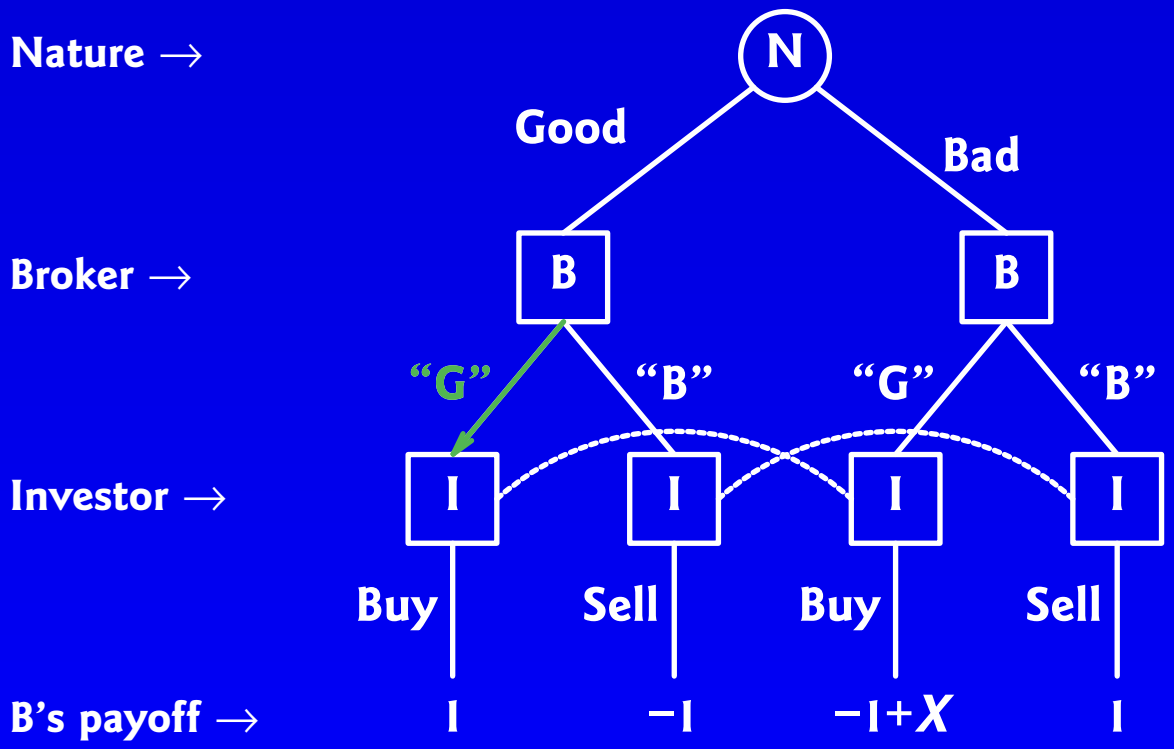

The Broker knows: ∴ no Information Set.
The Investor is ignorant: ∴ 2 Information Sets: "G" and "B".

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Investor believes the Broker, $\rightarrow$ Broker's payoffs:

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If the stock is Bad:

if $X < 2$, there will be a Cheap-Talk equilibrium, with no incentive to lie. Why?

if $X > 2$, the Broker has an incentive to lie "G" $\rightarrow$ Buy when the stock is Bad.

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Then over time the Investor will distrust the Broker's advice, and ignore it $\rightarrow$ *babbling equilibrium*. Ways to overcome?

Informational Handicap in Negotiation

Sally the seller and Burt the buyer are negotiating over a used car.

Suppose Sally doesn't know Burt's valuation of the car,

- Sally has many cars for sale, all of which cost her $1000.
- Sally knows that there are two kinds of buyer, say:
  - one (L) values this type of car at $1040,
  - the other (H) values it at $1100.
- Equal numbers of both types of buyer; no distinguishing marks.
- Private information.

Knowledge is a source of bargaining power.

Sally makes a take-it-or-leave-it offer.

- **If Sally knew how much Tom, Dick, or Harry would pay, then she could extract all the gains from trade.**
- **If Sally isn't sure of any buyer's willingness to pay, she can't.**
- **She risks:**
  - **asking too high a price and losing a sale (with L low valuers) or**
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  The best price balances these risks.

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  (and making \$1100 − 1000 = \$100 from every sale but losing half the customers, on average a return of \$50 per potential buyer).
- **Sally should ask \$1100 to maximise her expected profit, at the cost of forgone sales.**

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Each bargainer's attempt to grab a larger share of the gains from trade when he or she doesn't know the other's limit results in inefficiencies, and ignorance
$\rightarrow$ a significant probability of negotiation breakdown.

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Then there would always be a sale, at $1060:

- **since Sally'd make $1060 − 1000= $60 per potential buyer if she asked for $1060 in this case, and**
- **all would buy, some of the buyers (H) making a windfall profit of $1100 − 1060 = $40 per purchase, however.**

Two lessons

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Sally's in a powerful bargaining position by virtue of her ability (we have assumed) of being able to make commitments;

The buyers, however, have some countervailing power from Sally's lack of knowledge, which precludes her from extracting all the gains from trade.

2. Screening: Overcoming an Informational Disadvantage

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NB: *Lower costs of delay are a source of bargaining power.*

Who's less impatient?

- **Suppose buyers incur costs if agreement is delayed:**

  suppose that settlement can be reached when buyers enter Sally's yard or a week later,

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- Sally, however, faces no costs of delay. (She's relatively less impatient.)
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- What's her best schedule or menu? Remember, both parties know it beforehand.

A game tree

Consider an extensive-form Harsanyi tree:

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(H): Burt values the car at $1100 (H), or

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This game tree represents the Harsanyi transformation. The late John Harsanyi, who studied at Sydney University and taught at A.N.U., shared (with Nash and Selten) the 1994 Nobel.

Bargaining Tree with Pooling of Types:

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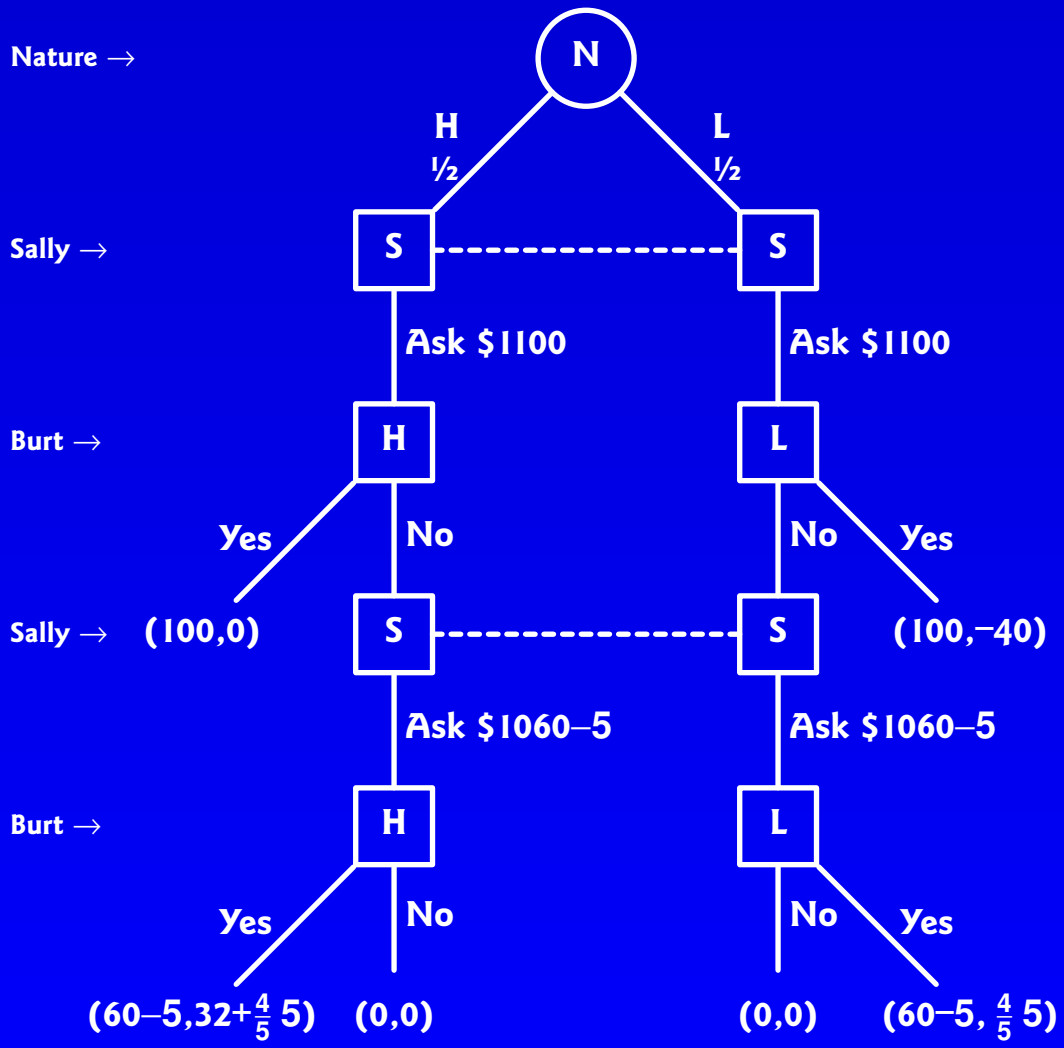

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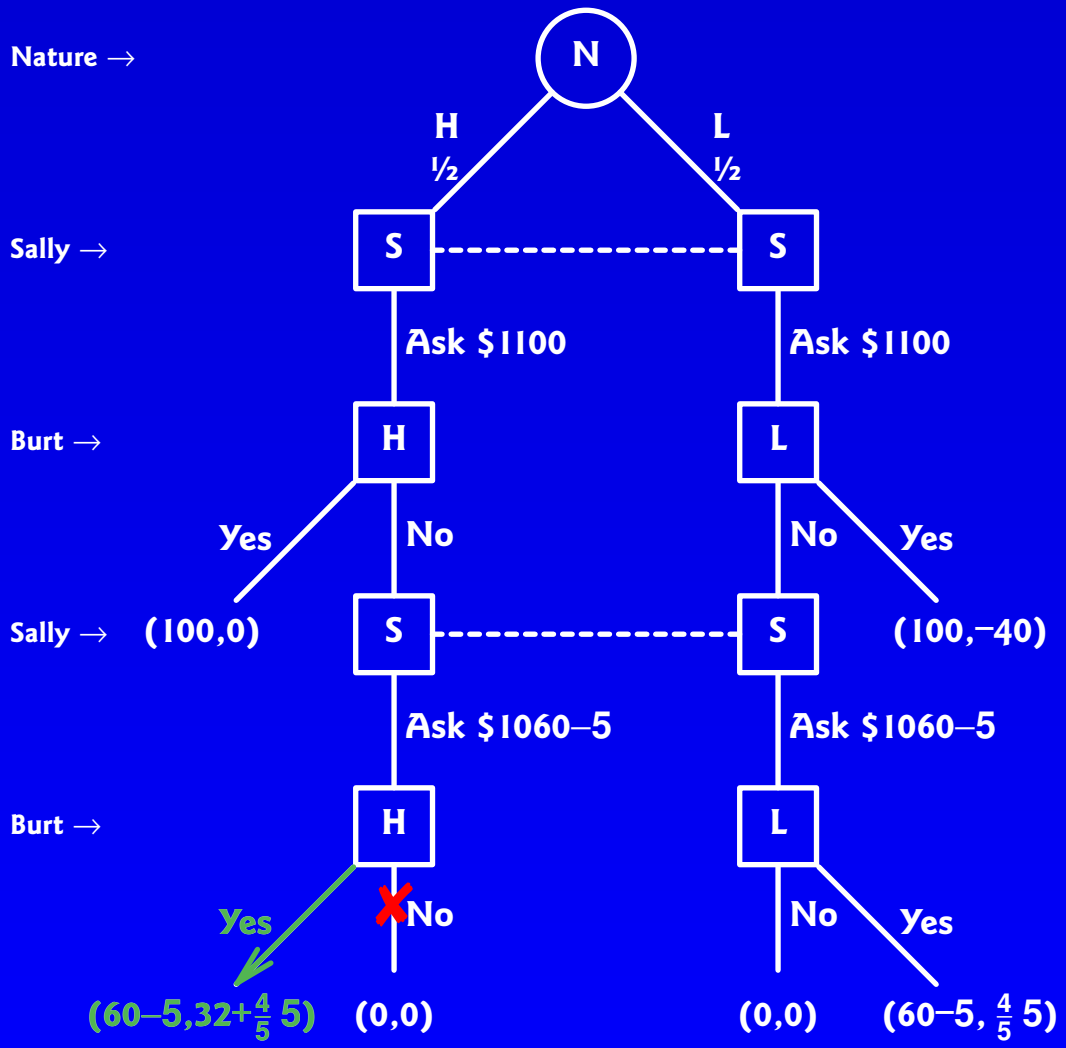

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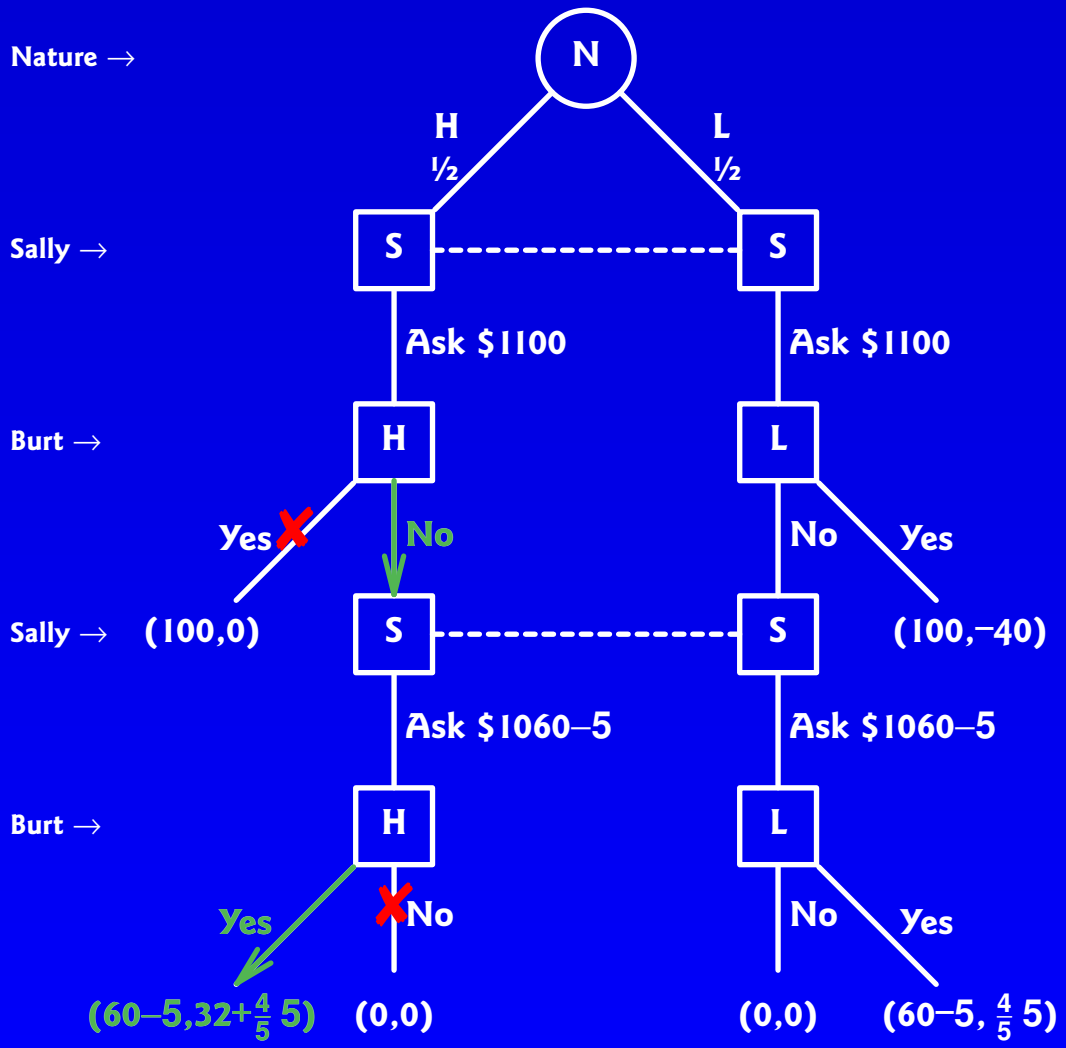

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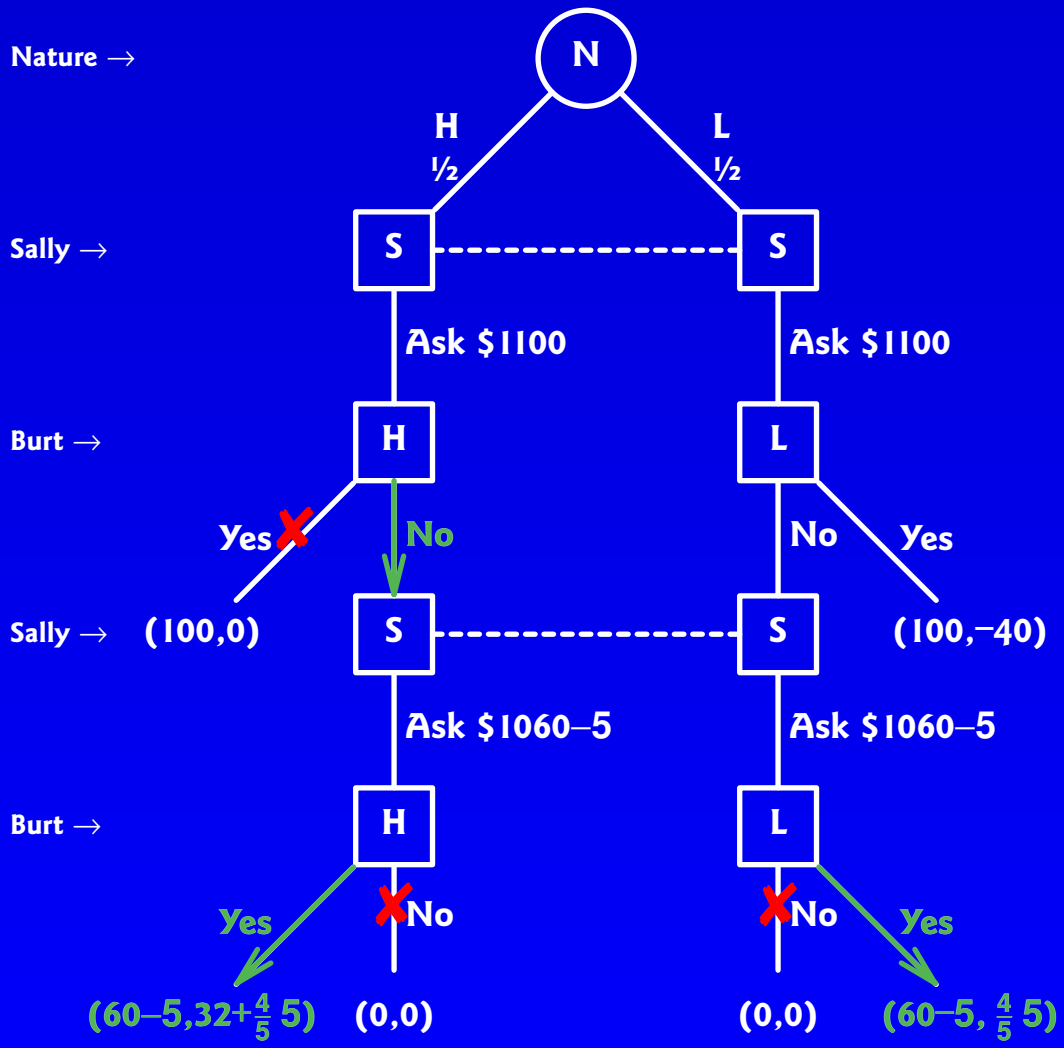

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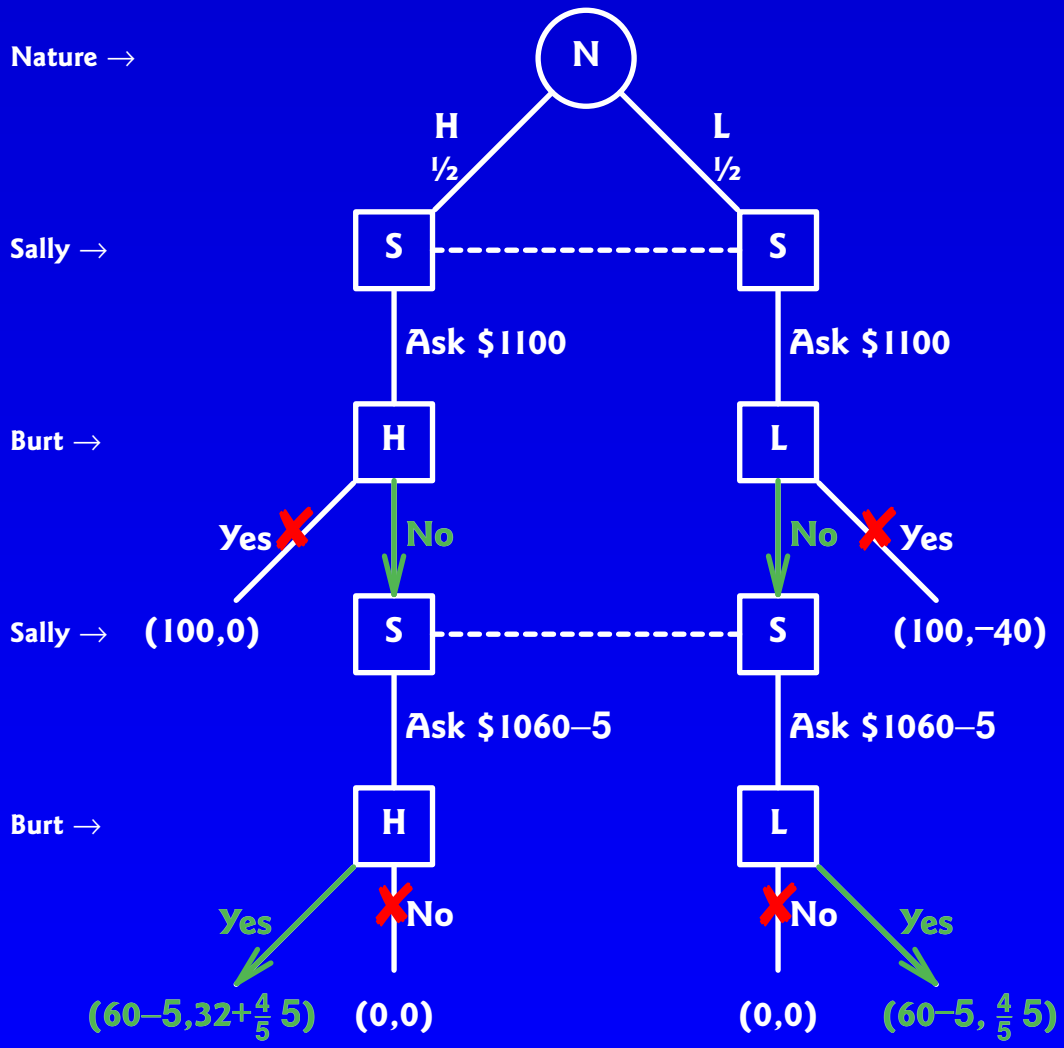

5 is a small amount, chosen so that \$1060−5 < Low B valuation.

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- **No: since Burt is an H type, that's his valuation of the car, meaning he gains none of the gains to trade at the high price, and he knows that Sally will offer it a lower price later.**

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- ***Second,*** **if Burt is an L type and finds himself in the second period with an offer of \$1060–5 for the car, then he will buy and make himself a (small) windfall profit of**

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There is *pooling of types* of buyers.

So Sally's schedule of (\$1100, \$1060–5) doesn't screen or sort the buyers.

Can Sally screen the buyers into the two groups?

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even if Burt is a low valuer L (as he must be for the car not to have sold in the first period), he will buy at this price.

Call the first-period price *P*.

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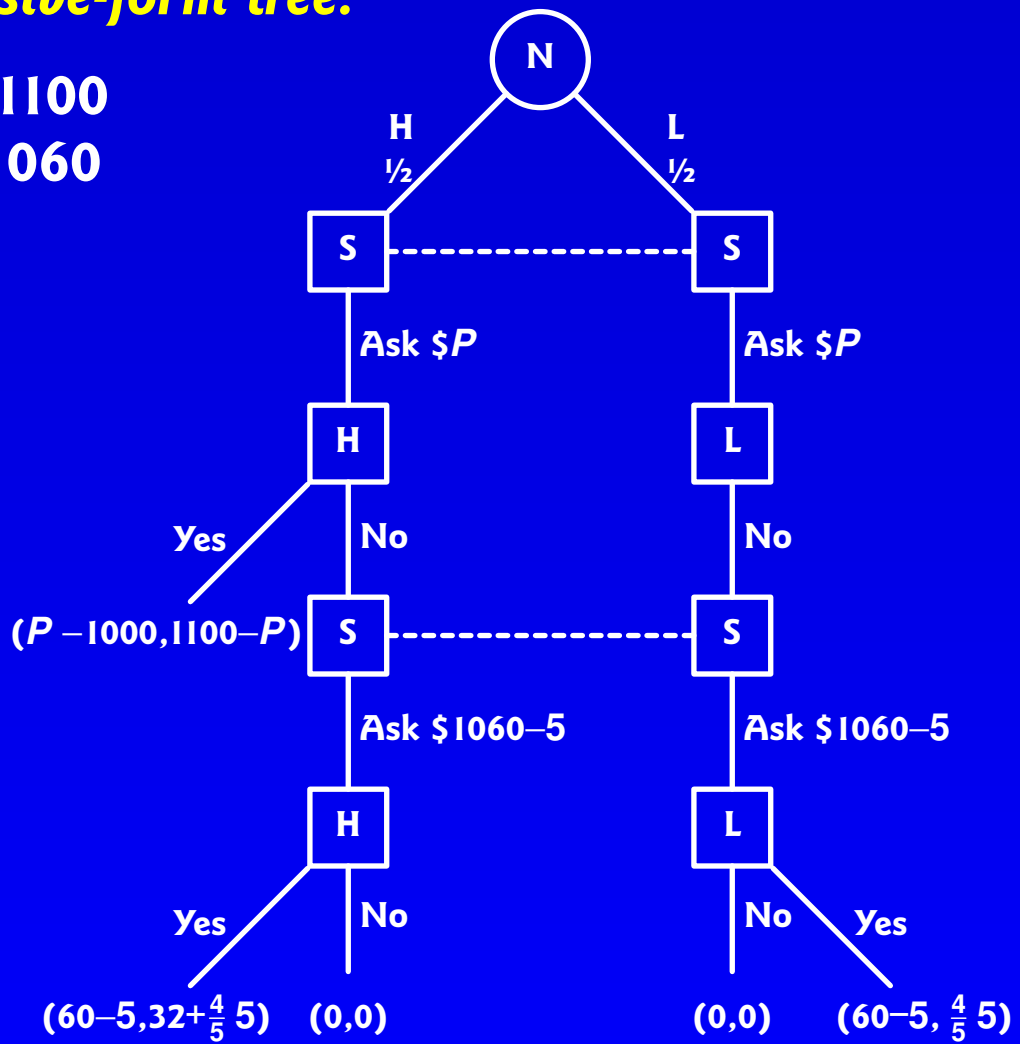

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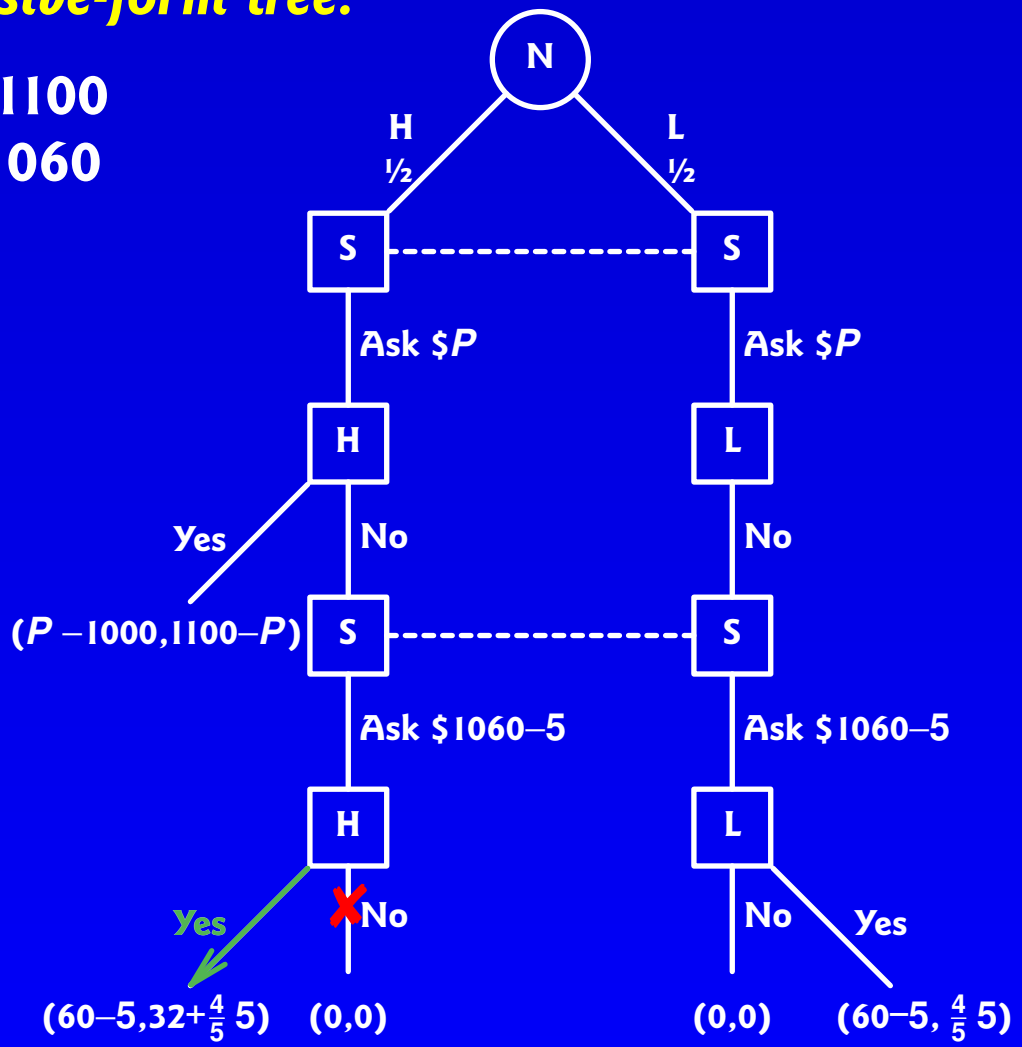

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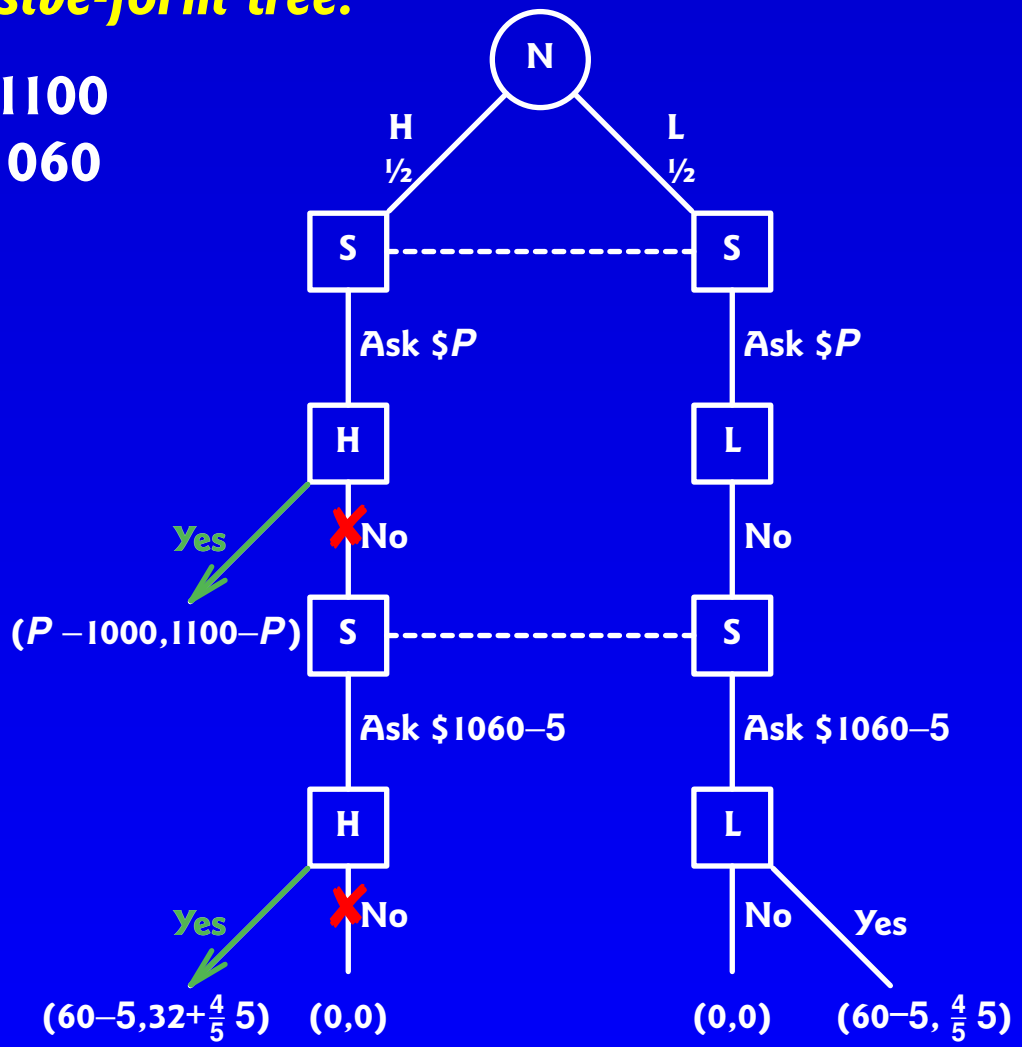

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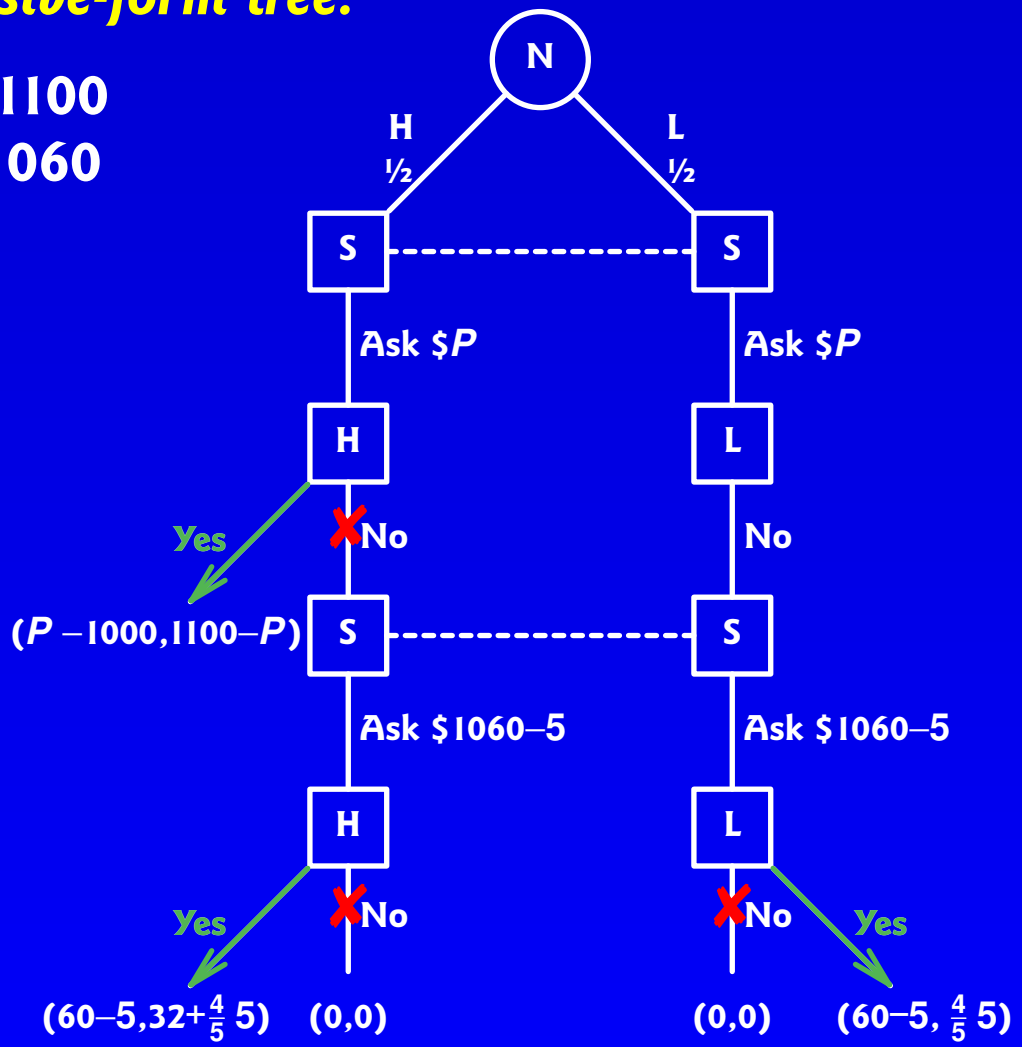

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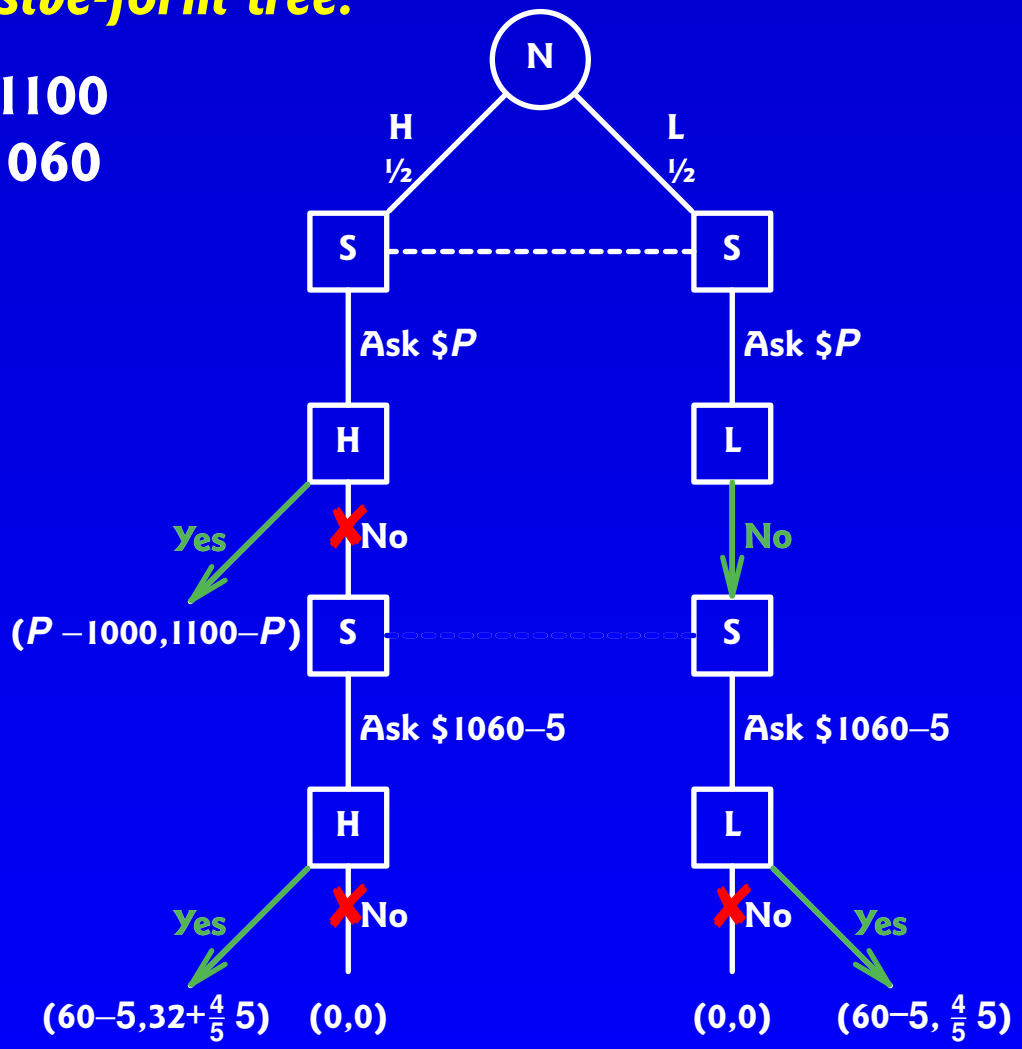

Bargaining Tree with Separating of Types:
Payoffs (Sally, Burt)

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- In the limit (as $5 \to 0$), $P = \$1068$, and Burt (H) will be indifferent between buying sooner or later.

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Sally's average return with screening is ½ × $68 + ½ × $60 = $64, which is $4 per customer higher than the $60 average with the non-screening strategy above.

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Haggling can be seen in this light as revealing information about the other's limit.

But haggling doesn't always work.

A lower valuation

If Burt's low valuation L were \$1040, instead of \$1060 as above, then Sally could still screen with a schedule of

(W1: \$1046, W2: \$1040),

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This is inefficient: some gains from trade are left unappropriated, and no sales are made to low-valuation customers, even though they will pay more than Sally's valuation of the cars.

Other screening devices.

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All reveal private information, and enable a more efficient trade to take place — both buyers and sellers are happier than if no trade took place.

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Even when screening works, there are some dead-weight losses, caused by *asymmetric information*: with screening (and high-valuation buyers paying more), low-valuation buyers must wait, at some loss, so not all gains to trade realised, with some inefficiency.

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But what are the cost to haggling for the seller?

Delay is only one device for screening to reduce an informational handicap: other methods too may result in opponents' revealing their valuations:

- Sales methods.
- Employment contracts.

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- **the bargaining process depends on the bargainers' Information Sets: *what they know* (and know they know) and vice versa**
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- **if *delay* — a temporary breakdown — is costly for any bargainer, then there are dead-weight losses (inefficiencies).**

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Similarly for Burt and other buyers.

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Private estimates of values of the leases. In unitization, each firm assigned a revenue share based on its lease's value, so has an incentive to exaggerate the value. Sufficient to cause breakdown.

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Lessons:

- **bargainers should try to learn their rivals' valuations of the item under negotiation**
- **bargainers will conceal their own valuations, to try to bluff their rivals into overestimating the minimum (or underestimating the maximum) they'd settle for, even if breakdown**
- **long-term consequences to reputation of deception?**

Ethics

Strategic uses of information.

Bluffing involves deception ("strategic misrepresentation").

Nice distinction between deception and lying.

Is honesty the best policy?

Is playing one's card close to one's chest innocuous?

How valuable is a reputation for honesty?

"Would you buy a used car from this man?"