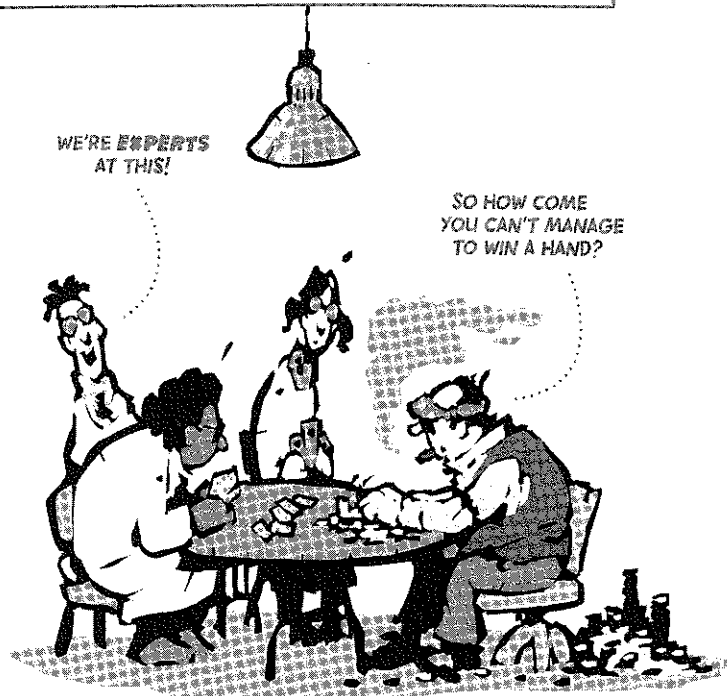


Klein and Bauman
"Game Theory" (chap. 6)
from: "The Cartoon Introduction
to Economics"
FSGBooks, 2010

CHAPTER 6 CAKE CUTTING



GAME THEORY GOT ITS NAME BECAUSE SOME OF ITS EARLIEST TOPICS WERE GAMES LIKE POKER...

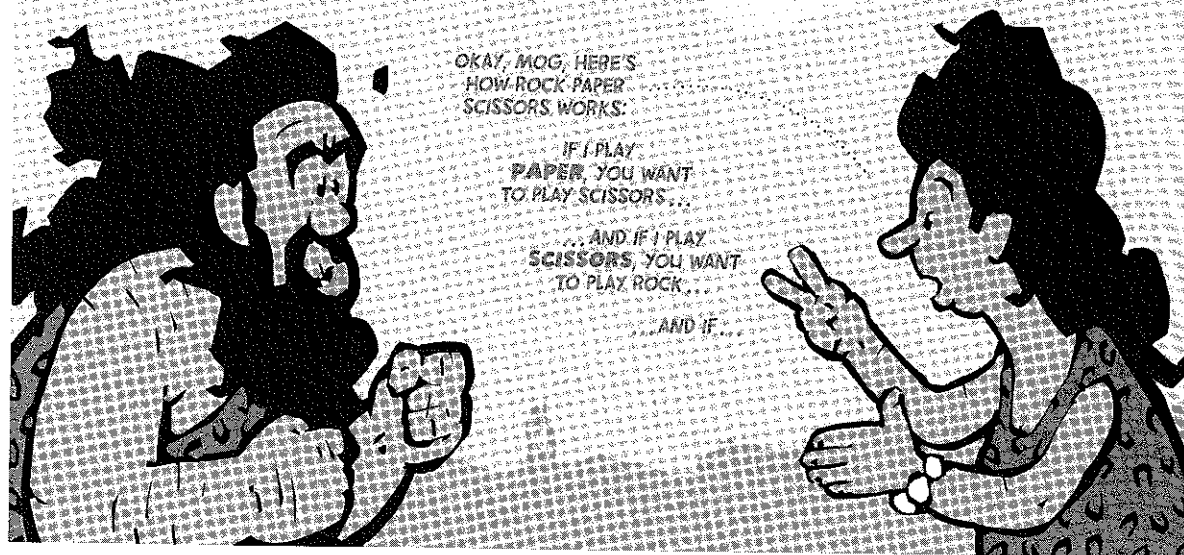


WE'RE EXPERTS AT THIS!

SO HOW COME YOU CAN'T MANAGE TO WIN A HAND?

... BUT TO ECONOMISTS, A GAME IS ANY SITUATION WITH INTERDEPENDENCE BETWEEN MULTIPLE PLAYERS.

INTERDEPENDENCE MEANS THAT WHAT HAPPENS TO ONE PLAYER DEPENDS ON WHAT THE OTHER PLAYERS DO.



OKAY, MCG, HERE'S HOW ROCK-PAPER-SCISSORS WORKS:

IF I PLAY PAPER, YOU WANT TO PLAY SCISSORS.

AND IF I PLAY SCISSORS, YOU WANT TO PLAY ROCK.

AND IF

EACH PLAYER IN A GAME HAS TO THINK ABOUT WHAT ALL THE OTHER PLAYERS ARE THINKING.

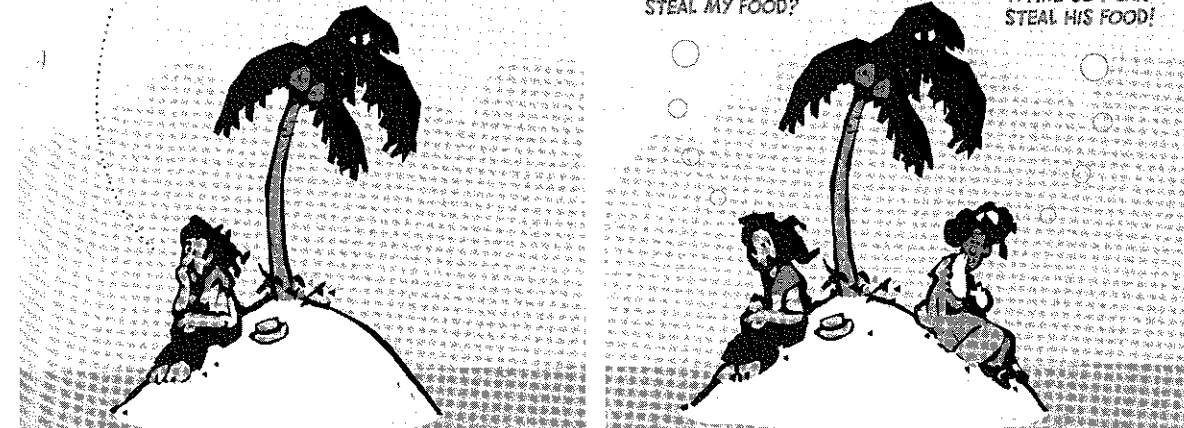
THAT'S WHAT DISTINGUISHES THE INDIVIDUAL OPTIMIZATION WE STUDIED IN PART ONE...

... FROM GAME THEORY.

SHOULD I MAKE A FIRE OR LOOK FOR FOOD?

IF I MAKE A FIRE, IS SHE GOING TO HELP ME OR STEAL MY FOOD?

I HOPE HE MAKES A FIRE SO I CAN STEAL HIS FOOD!



WHEN ECONOMISTS STUDY GAMES, THEY ANALYZE ALL THE STRATEGIES OF ALL THE PLAYERS.

YOUR STRATEGY IS A COMPLETE DESCRIPTION OF YOUR ACTIONS IN A GAME.

IF SHE MOVES HER PAWN, WHAT ARE YOU GOING TO DO?

AND IF SHE MOVES HER BISHOP, WHAT ARE YOU GOING TO DO?

AND IF SHE MOVES... MOVES...

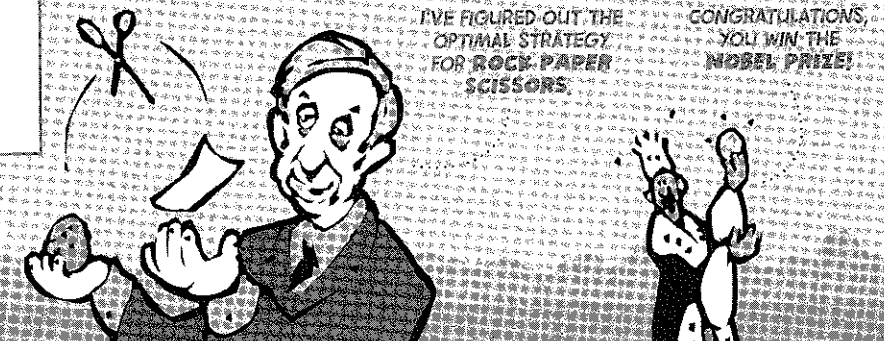
SHUT UP! I'M TRYING TO THINK!



JOHN NASH SHARED THE NOBEL PRIZE IN 1994 FOR HIS ANALYSIS OF GAME THEORY STRATEGIES.

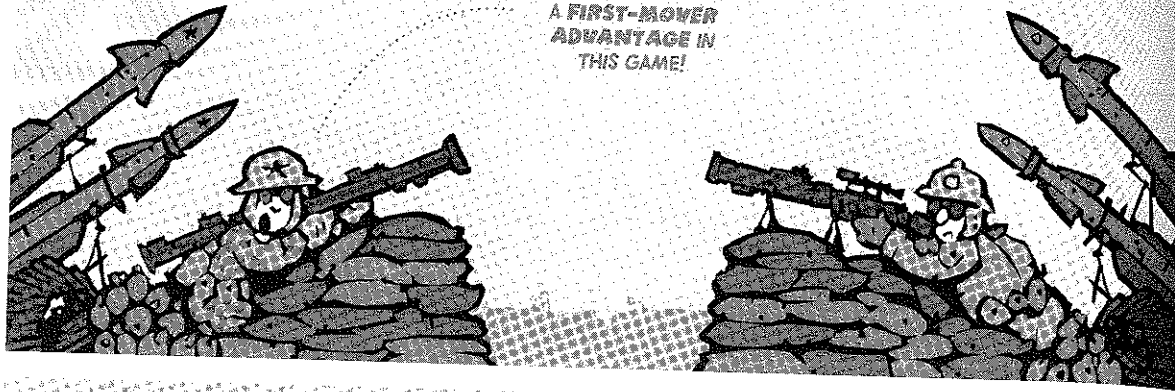
I'VE FIGURED OUT THE OPTIMAL STRATEGY FOR ROCK-PAPER-SCISSORS.

CONGRATULATIONS, YOU WIN THE NOBEL PRIZE!



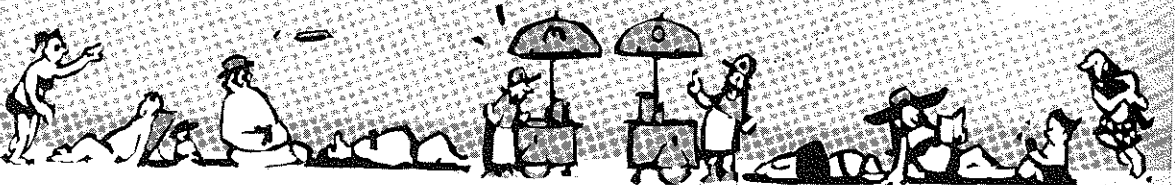
OF COURSE, GAME THEORY IS NOT JUST ABOUT ROCK PAPER SCISSORS, IT ALSO COVERS DEADLY SERIOUS TOPICS...

LIKE WARFARE...



LOOKS LIKE THERE'S A FIRST-MOVER ADVANTAGE IN THIS GAME!

AND BUSINESS...



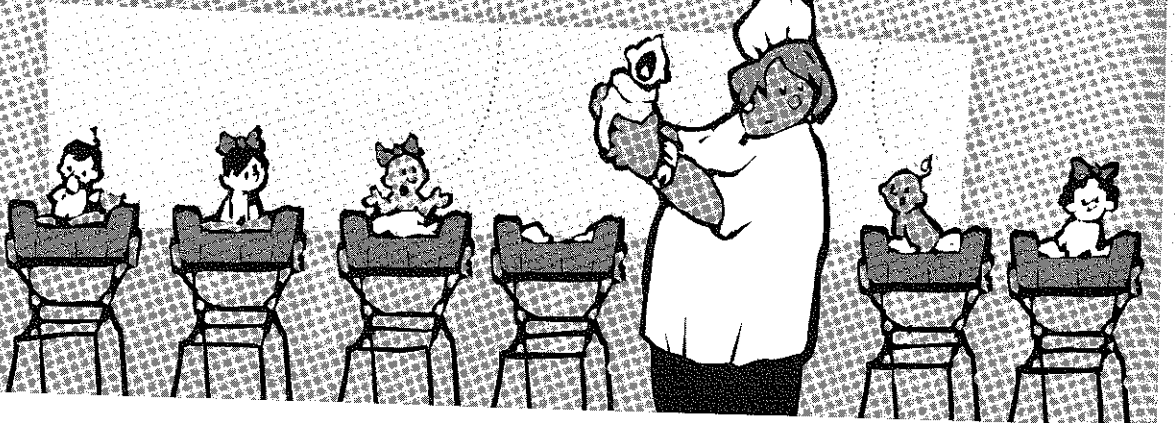
THIS BEACH IS ENTIRELY COVERED WITH PEOPLE.

... WHY DID YOU PUT YOUR HOT DOG CART RIGHT NEXT TO MY HOT DOG CART?

BECAUSE WE'RE BOTH TRYING TO CAPTURE THE MIDDLE GROUND.

... IT'S CALLED HOTELLING'S LAW!

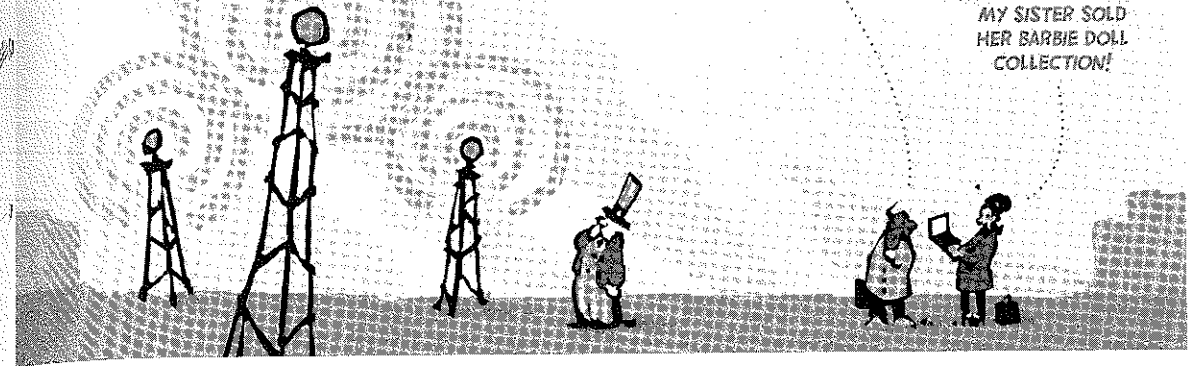
AND BIOLOGY...



WHY ARE THERE ROUGHLY EQUAL NUMBERS OF BOY BABIES AND GIRL BABIES?

... IT'S CALLED HANDEL'S SEX RATIO THEORY!

AND AUCTIONS...

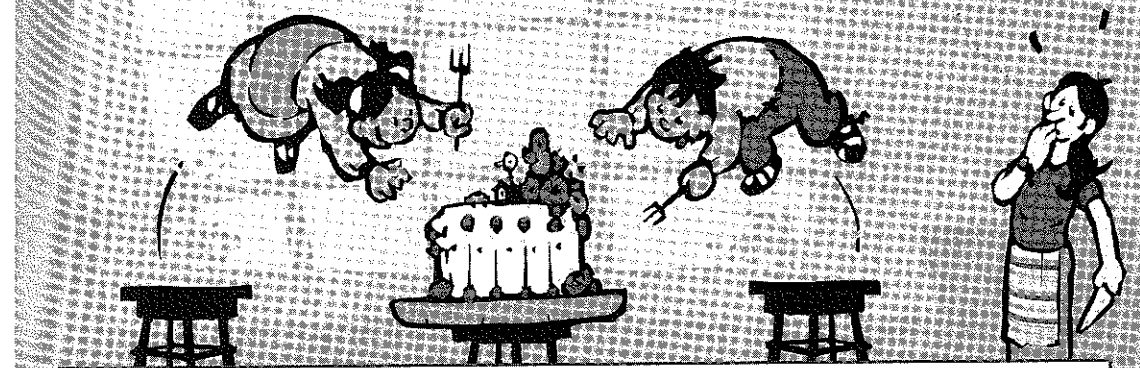


HOW SHOULD THE GOVERNMENT SELL BILLIONS OF DOLLARS WORTH OF WIRELESS SPECTRUM?

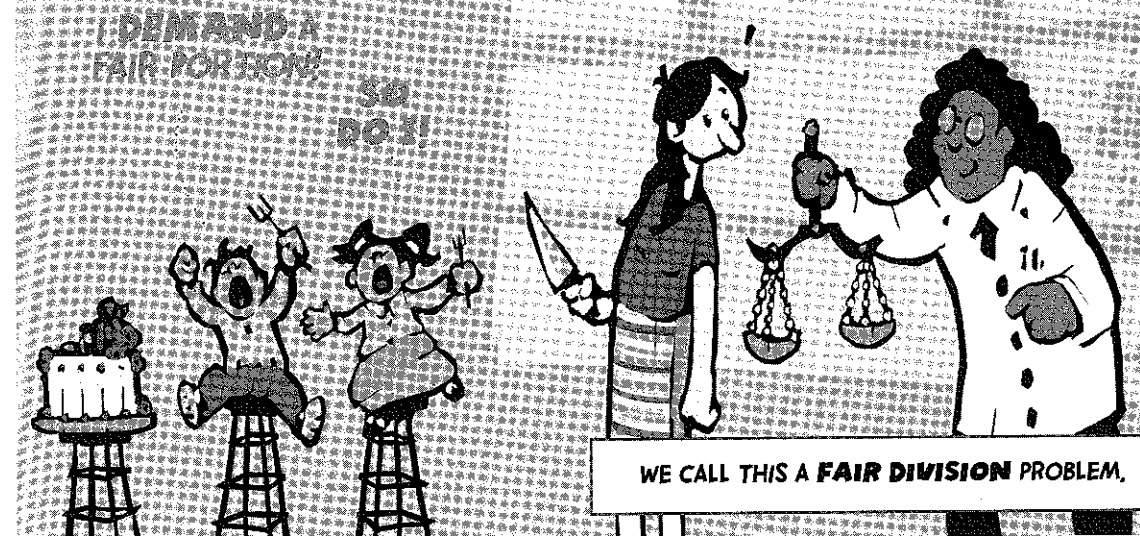
THEY SHOULD TRY EBAY...

... IT WORKED WHEN MY SISTER SOLD HER BARBIE DOLL COLLECTION!

AND DIVIDING CAKE BETWEEN SIBLINGS.



CAKE CUTTING MAY SOUND SILLY, BUT IT APPLIES ANY TIME YOU NEED TO DIVIDE THINGS FAIRLY!



DEMAND A FAIR PORTION!

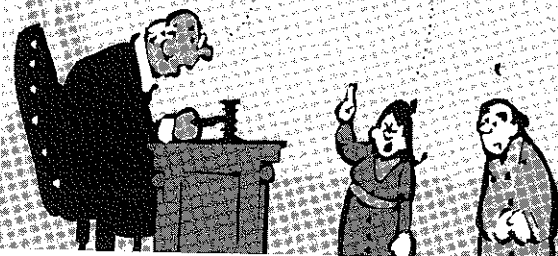
WE CALL THIS A FAIR DIVISION PROBLEM.

FAIR DIVISION PROBLEMS APPEAR ALL OVER THE PLACE:

IN DIVORCE SETTLEMENTS...

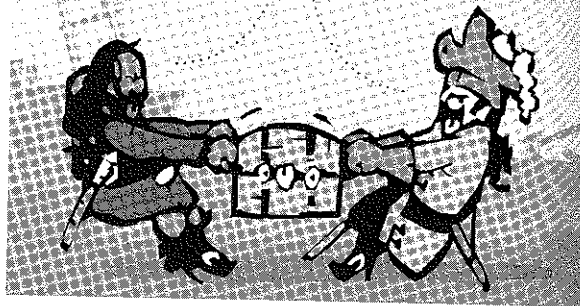
MRS. SMITH, I'VE DECIDED TO SPLIT EVERYTHING SO THAT YOUR EX-HUSBAND GETS TEN TIMES MORE THAN YOU.

IN THAT CASE, I'D LIKE TO HAVE A MILD HEART ATTACK!



... AND CORPORATE PROFIT-SHARING ...

AARGH, HOW DO WE DIVVY UP THE LOOT?



... AND GOVERNMENT POLICY ...

OKAY, SO WE'RE GOING TO LIMIT OVERFISHING BY USING A SYSTEM OF TRADABLE FISHING PERMITS.

HOW DO WE ALLOCATE THE PERMITS?



... AND POLITICAL NEGOTIATIONS.

I HAVE A GOOD IDEA, LET'S PRETEND THE ENTIRE MIDDLE EAST IS LIKE A BIRTHDAY CAKE!



THAT'S WHY THERE ARE SO MANY BOOKS ABOUT THE CAKE-CUTTING PROBLEM!

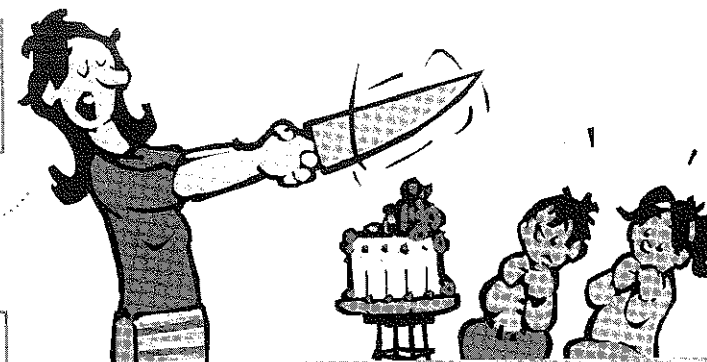


WHO KNEW ECONOMISTS HAD SUCH GOOD PARENTING ADVICE?



IN ADDITION TO MODERN SOLUTIONS LIKE THE MOVING KNIFE PROCEDURE...

DON'T WORRY, I READ ABOUT THIS IN AN ECONOMICS BOOK!



... THERE'S AN ANCIENT SOLUTION TO THE CAKE-CUTTING PROBLEM:

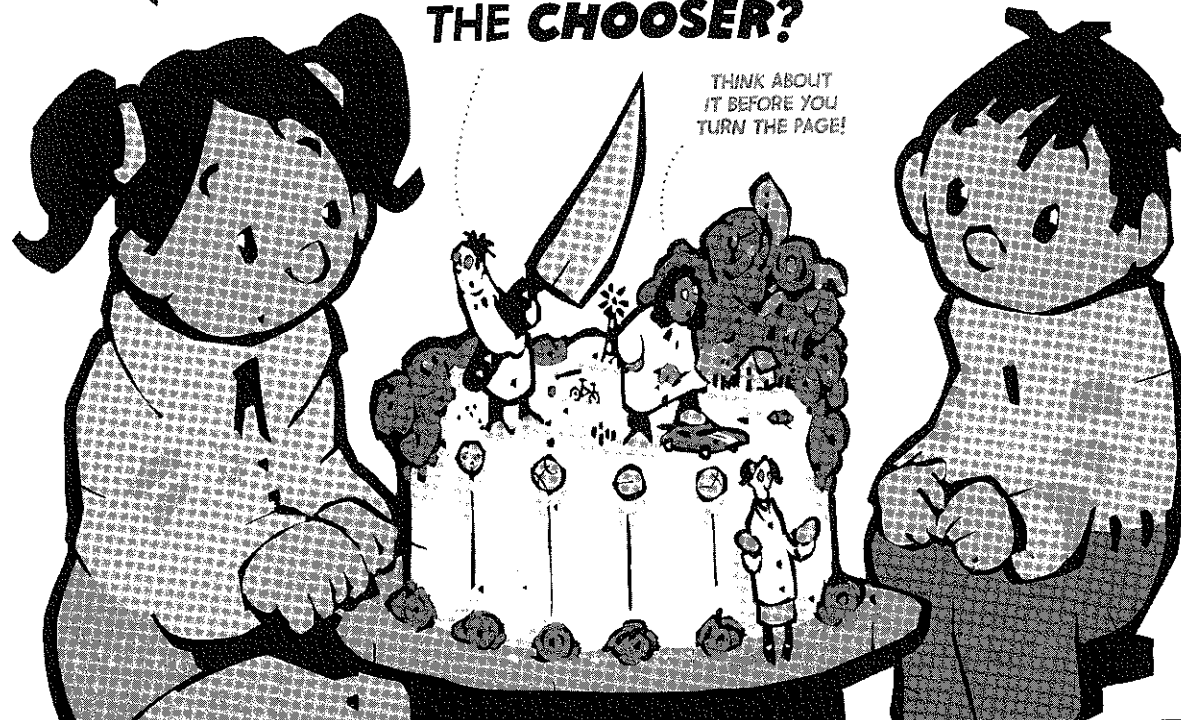
I CUT, YOU CHOOSE!



THIS LEADS US TO OUR FIRST INTERESTING GAME THEORY QUESTION:

IS IT BETTER TO BE THE CUTTER OR THE CHOOSE?

THINK ABOUT IT BEFORE YOU TURN THE PAGE!



ACTUALLY, THE ANSWER IS IN YOUR HEAD... AND IN THE OTHER PLAYER'S HEAD!

IT DEPENDS ON WHAT YOU KNOW ABOUT THE OTHER PERSON...

...AND WHAT THEY KNOW ABOUT YOU...

...AND WHAT YOU KNOW THEY KNOW ABOUT YOU!



IF YOU KNOW A LOT ABOUT THE OTHER PERSON, YOU SHOULD TRY TO BE THE CUTTER.

I KNOW THAT JIMMY LOVES RACE CARS

...SO IF I CARVE OFF A TINY PORTION WITH THAT RACE CAR ON IT, HE'LL CHOOSE IT AND LEAVE THE REST TO ME!



BUT IF YOU DON'T KNOW MUCH ABOUT THE OTHER PERSON, YOU'RE PROBABLY BETTER OFF BEING THE CHOOSE, ESPECIALLY IF THEY DON'T KNOW MUCH ABOUT YOU!

I CAN'T REMEMBER. DOES SALLY LIKE CHOCOLATE OR FLOWERS BETTER?

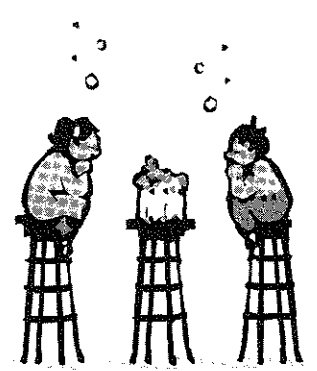
I'D BETTER LET HER CUT, BECAUSE THEN I CAN CHOOSE BASED ON HER PREFERENCES!

THAT WILL WORK GREAT, AS LONG AS SHE DOESN'T REMEMBER HOW MUCH I LOVE RACE CARS!



THE BOTTOM LINE—AND THIS IS TRUE EVERYWHERE IN GAME THEORY—IS:

INFORMATION MATTERS!

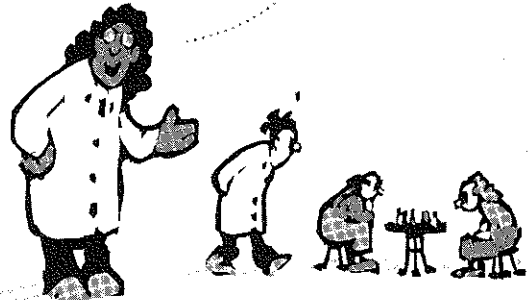


ECONOMISTS WHO STUDY GAMES FOCUS ON TWO QUESTIONS. THE FIRST GAME THEORY QUESTION IS:

CAN WE PREDICT THE OUTCOME OF A GAME?



THIS IS WHAT WE CALL A POSITIVE QUESTION, BECAUSE IT DEALS WITH WHAT'S ACTUALLY GOING TO HAPPEN IN A GAME.

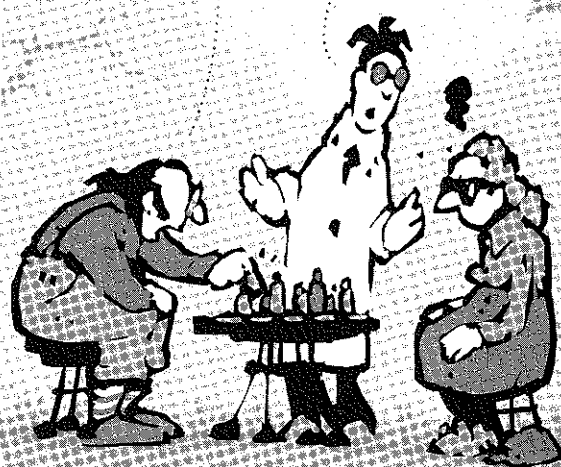
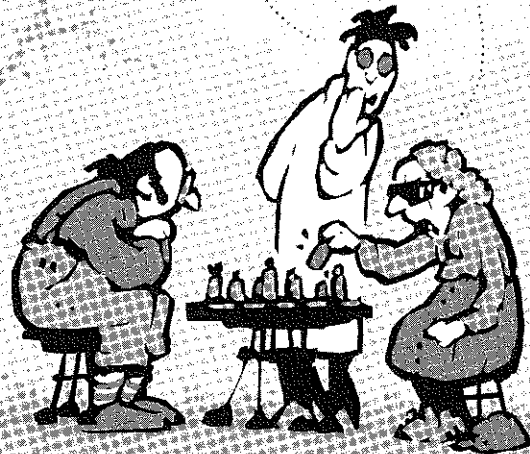


IF YOU GO THERE, HE'S GOING TO TAKE YOUR QUEEN AND CHECKMATE YOU!

HA! WE'LL SEE ABOUT THAT.

CHECKMATE!

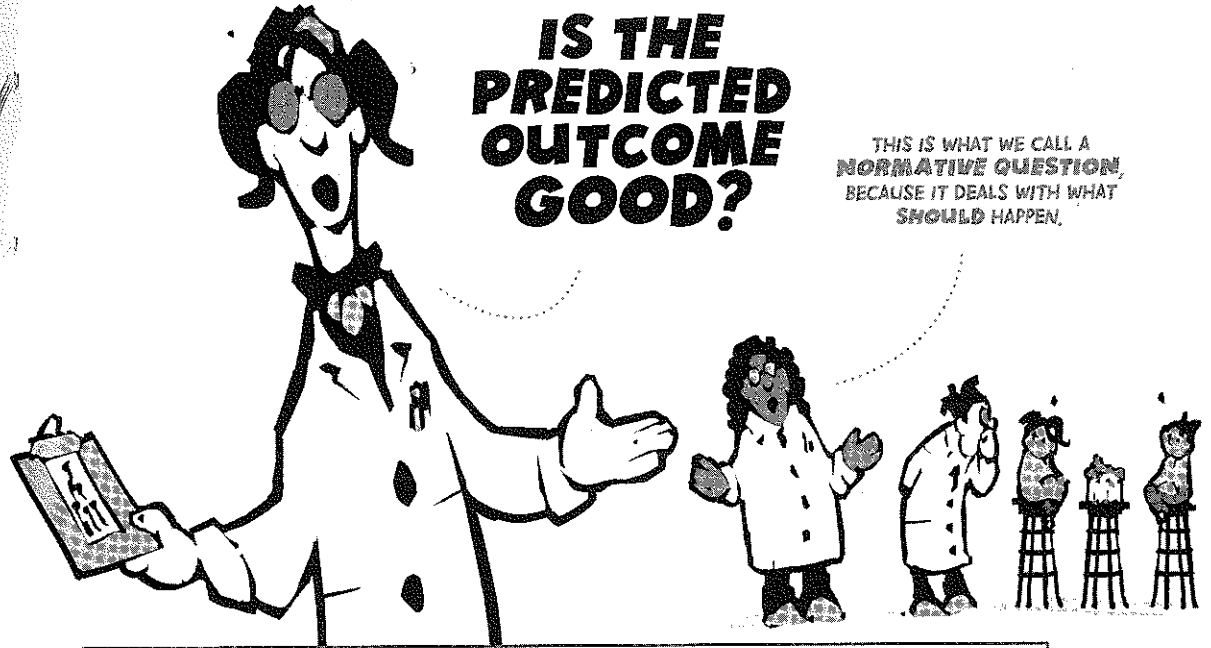
I TOLD YOU SO!



ONCE WE FIGURE OUT HOW TO PREDICT THE OUTCOME OF A GAME, WE CAN MOVE TO THE SECOND GAME THEORY QUESTION:

IS THE PREDICTED OUTCOME GOOD?

THIS IS WHAT WE CALL A NORMATIVE QUESTION, BECAUSE IT DEALS WITH WHAT SHOULD HAPPEN.



THIS QUESTION IS CENTRAL TO ALL FAIR DIVISION PROBLEMS:

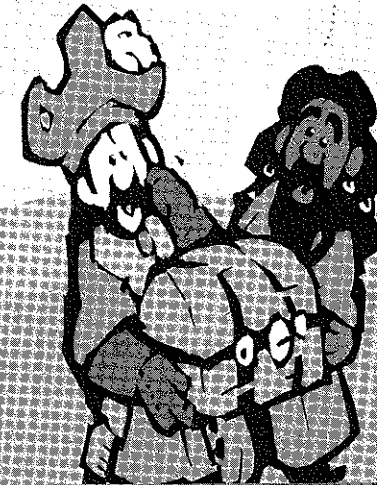
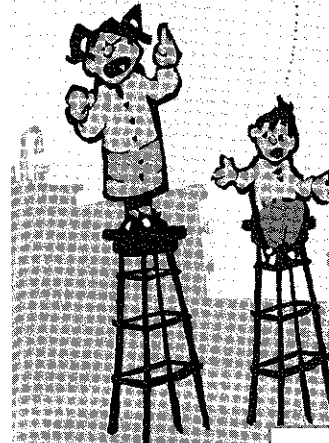
YOU SHOULD GIVE ME A BIGGER PIECE OF CAKE BECAUSE I'M BIGGER!

WE NEED TO DIVVY UP THE LOOT!

I SHOULD GET MORE LAND BECAUSE MY PEOPLE HAVE LIVED HERE FOR MILLENNIA!

BUT SHE DIDN'T DO ALL HER CHORES!

TIME TO USE AARRRITHMETIC!



UNFORTUNATELY, IT'S NOT ALWAYS CLEAR WHAT MAKES AN OUTCOME FAIR, AND THAT BRINGS US BACK TO THE BIG QUESTION...

UNDER WHAT
CIRCUMSTANCES DOES
INDIVIDUAL OPTIMIZATION
LEAD TO OUTCOMES
THAT ARE **GOOD** FOR
THE GROUP AS
A WHOLE?

UM, WHAT EXACTLY
DOES "GOOD" MEAN,
ANYWAY?



CHAPTER 7 PARETO EFFICIENCY

JUST BECAUSE
IT SOUNDS GOOD
TO YOU ...

... DOESN'T MEAN
IT SOUNDS GOOD
TO ME!

