

Probability in “Deal or No Deal”



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MTH 111

DEAL OR NO DEAL

**Using
Mathematics**

HOWIE MANDEL



DEAL OR NO DEAL

Banker's
Offer???

THE BANKER



DEAL OR NO DEAL

Don't Let Your
Emotions Take Over!



MEGHAN MARKLE

Brief History

- Originated in Holland
- First aired in the United States in 2005
- Is now played in more than 60 countries
 - Do not all have the same name
 - Same, or very similar rules

Object of the Game

- Decide which is the better option, 'Deal' or 'No Deal'
- Not much skill required to play
- Make decisions
- Requires
 - A contestant
 - A Host
 - A Banker
 - 26 Cases representing dollar amounts ranging from \$0.01 to \$1,000,000

Mathematics in the Game

- Probability- The probability of picking one certain case is $1/26^{\text{th}}$.
- Mean-
 - (Sum of remaining amounts)/(number of cases)
 - Compare this number to the offer given by the banker
 - Offer higher than the mean- Deal!
 - Offer lower than the mean- No Deal!

How to Play

- Choose 1 of the 26 cases
- Remaining 25
 - Choose 6 cases, then receive an offer from the banker
 - The \$ amount from each case is eliminated from board
 - Amount offered is usually close to the mean
 - Try to persuade you to take the deal
 - Do the same but for sets of 5, 4, 3, and 2.
 - Receive an offer from the banker after each
- [http://www.nbc.com/Deal or No Deal/game/flash.shtml](http://www.nbc.com/Deal_or_No_Deal/game/flash.shtml)

LET'S MAKE A DEAL

The Monty Hall
Problem



Switching Doors or Not?

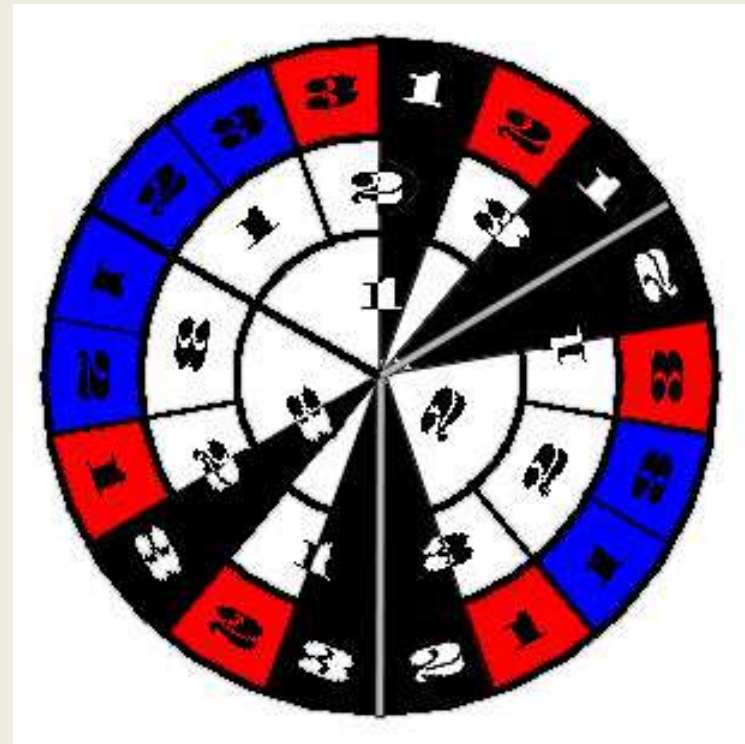
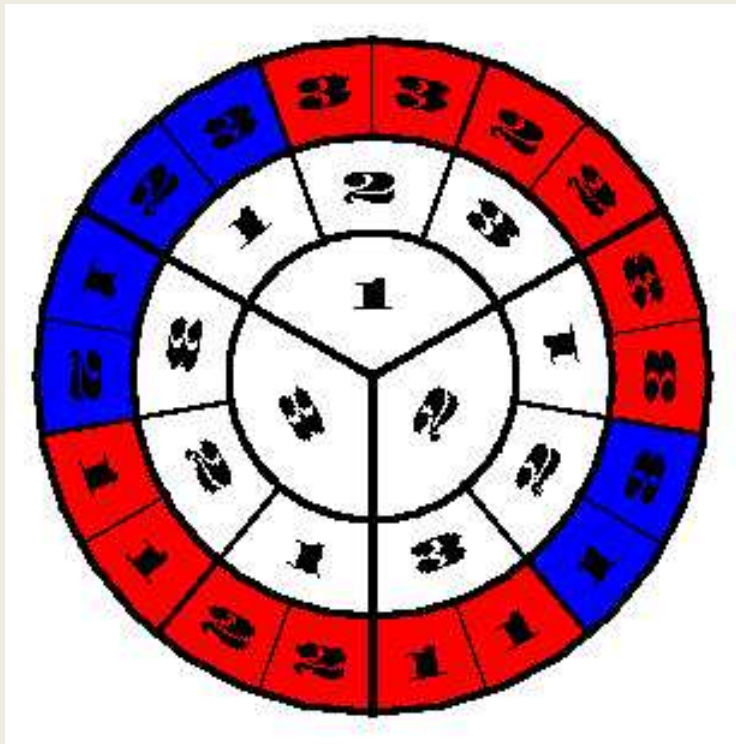


Analyzing the Monty Hall Problem

Chances by switching doors (Red areas) = $12/18 = 2/3$

Chances by NOT switching doors (Blue areas) = $6/18 = 1/3$

Odds change when Monty does not know the location of the car or always chooses the same door (i.e. Door #3)



Monty Hall Tree

	Car location	Host opens:	Total probability	Stay	Switch:
1/3	Door 1	1/2 Door 2	1/6	Car	Goat
		1/2 Door 3	1/6	Car	Goat
1/3	Door 2	1 Door 3	1/3	Goat	Car
1/3	Door 3	1 Door 2	1/3	Goat	Car

Not Switching Doors = $1/6 + 1/6 = 2/6 = 1/3$

Switching Doors = $1/3 + 1/3 = 2/3$

**LET'S
MAKE
A
DEAL**



www.decisionhelper.com/montyhall.htm

Does this apply?

“Deal or No Deal”



The Monty Hall Problem



Show Me The Money!

So do you think YOUR understanding of mathematical probability is all there is to winning those millions?

Psychological/Emotional factors

- Needs
- Preferences
- Individual values
- Benefit vs. harm



Cognition – 4 main ways

- Sensing
- Intuition
- Feeling
- Thinking

Cognitive Biases

- listing the advantages and disadvantages of each option flipping a coin, cutting a deck of playing cards, and other random or coincidence methods
- accepting the first option that seems like it might achieve the desired result
- prayer, tarot cards, astrology, other forms of divination
- acquiesce to a person in authority or an "expert"
- calculating the expected value or utility for each option.
- believing we have more control over events than we really do.
- peer pressure to conform to the opinions held by others (a "Deal or No Deal" contestant even blamed her husband's "egging her on" as the reason she made a somewhat irrational choice. (Forelle 2006))

Logical vs. Illogical Decision making

- Logical
 - Applying your knowledge in a given area to making informed decisions
 - Ex: utilizing mathematical probability & determining odds
- Illogical
 - Contradicting or disregarding the principles of logic
 - Ex: not crossing a road because a black cat has just crossed your path

OTHER INFLUENCING FACTORS

- Needs, preferences and individual values
- Emotions
 - Rational
 - Irrational
- **Cognitive Style** (Isabel Briggs Myers)
 - Thinking & feeling; extroversion and introversion; judgment and perception; and sensing and intuition

Some decision making techniques used in every day life:

- listing the advantages and disadvantages of each option, popularized by [Plato](#) and [Benjamin Franklin](#)
- flipping a coin, cutting a deck of playing cards, and other random or coincidence methods
- accepting the first option that seems like it might achieve the desired result
- [prayer](#), [tarot](#) cards, [astrology](#), [augurs](#), [revelation](#), or other forms of [divination](#)
- acquiesce to a person in authority or an "expert"
- calculating the expected value or [utility](#) for each option.
- Peer pressure

DEAL OR NO DEAL

So, Don't Let Your
Emotions Take Over!

• <http://www.youtube.com/watch?v=OI2DedEhOGI&feature=email>



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