



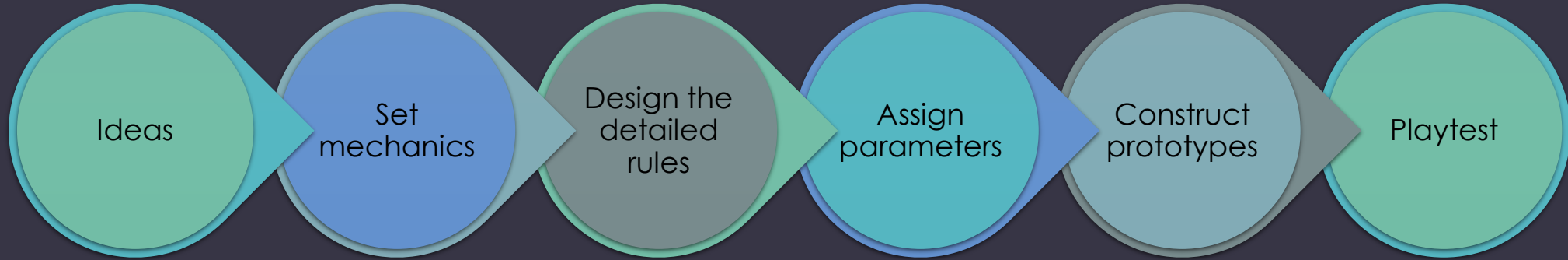
# RANDOM TALKS ON GAME BALANCING

By Jiayi Wu



Why this topic?

- Share experience and possible insights from a designer's view
- How to achieve game balance
- What to do with unbalanced games
- Discuss the possibility to quantifying mechanisms used in games
- What can we do to unbalanced games



Popular mechanics:

- Dice rolling
- Grid movements
- Action points
- Victory points
- <https://boardgamegeek.com>

Board Game Mechanics	
Acting	Action Drafting
Action Points	Action Queue
Action Retrieval	Action Timer
Action/Event	Advantage Token
Alliances	Area Majority / Influence
Area Movement	Area-Impulse
Auction/Bidding	Auction: Dexterity
Auction: Dutch	Auction: Dutch Priority
Auction: English	Auction: Fixed Placement
Auction: Once Around	Auction: Sealed Bid
Auction: Turn Order Until Pass	Automatic Resource Growth
Betting and Bluffing	Bias
Bingo	Bribery
Campaign / Battle Card Driven	Card Play Conflict Resolution
Catch the Leader	Chaining
Chit-Pull System	Closed Drafting
Closed Economy Auction	Command Cards
Commodity Speculation	Communication Limits
Connections	Constrained Bidding
Contracts	Cooperative Game
Crayon Rail System	Critical Hits and Failures
Cube Tower	Deck Construction
Deck, Bag, and Pool Building	Deduction
Delayed Purchase	Dice Rolling
Die Icon Resolution	Different Dice Movement
Elapsed Real Time Ending	Enclosure
End Game Bonuses	Events
Finale Ending	Flicking
Follow	Force Commitment

Steady-State Probabilities for Monopoly		
<i>n</i>	Position	Steady-State Probability
0	Go	.0346
1	Mediterranean Ave.	.0237
2	Community Chest 1	.0218
3	Baltic Ave.	.0241
4	Income tax	.0261
5	Reading RR	.0332
6	Oriental Ave.	.0253
7	Chance 1	.0096
8	Vermont Ave.	.0258
9	Connecticut Ave.	.0237
10	Visiting jail	.0254
11	St. Charles Place	.0304
12	Electric Co.	.0311
13	State Ave.	.0258
14	Virginia Ave.	.0288
15	Pennsylvania RR	.0313
16	St. James Place	.0318
17	Community Chest 2	.0272
18	Tennessee Ave.	.0335
19	New York Ave.	.0334
20	Free parking	.0336
21	Kentucky Ave.	.0310
22	Chance 2	.0125
23	Indiana Ave.	.0305
24	Illinois Ave.	.0355
25	B and O RR	.0344
26	Atlantic Ave.	.0301
27	Ventnor Ave.	.0299
28	Water works	.0315
29	Marvin Gardens	.0289
30	Jail	.1123
31	Pacific Ave.	.0300
32	North Carolina Ave.	.0294
33	Community Chest 3	.0263
34	Pennsylvania Ave.	.0279
35	Short Line RR	.0272
36	Chance 3	.0096
37	Park Place	.0245
38	Luxury tax	.0295
39	Boardwalk	.0295

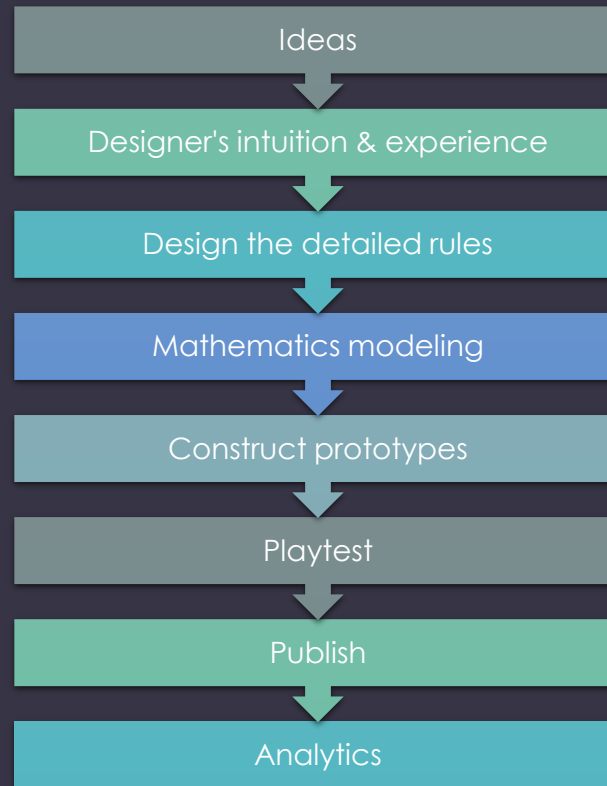
How to efficiently create a “fair” game?

- Avoiding wild guesses
- $E(x)$
- “The more you think, the less you have to do”
- Mathematics modeling
- ...
- Mathematically Balanced

THE STEADY-STATE PROBABILITIES FOR MONOPOLY  
BY ROBERT B. ASH AND RICHARD L. BISHOP

DOES THE STORY ENDS THERE?





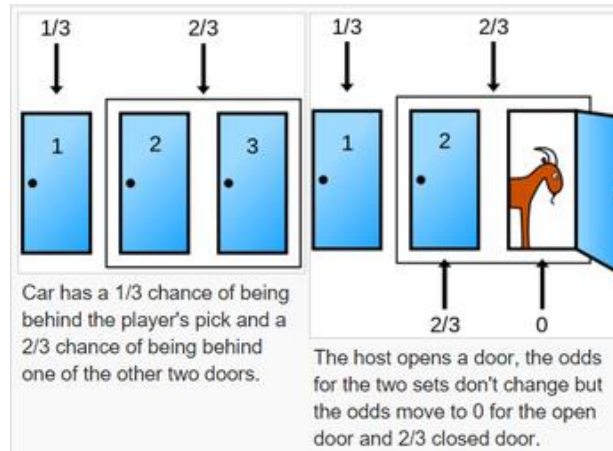
Definition of game balancing: creating the appearance of fairness in a game

## WHY PLAYTESTING?

### Two Envelope Problem

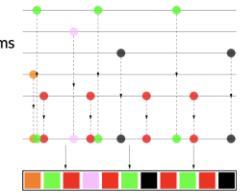


You are given two indistinguishable envelopes and you are told one contains twice as much money as the other. You may open one envelope, examine its contents, and then, without opening the other, choose which envelope to take.



### Less Random Approach to Randomizing

- Spotify developed new algorithm that places songs in specific order rather than completely randomizing
- Anti-clustering algorithm similar to dithering
  - Try to stretch artists out as evenly as possible
- Uses Fisher-Yates shuffle within artists/albums



\*Citing from Giovi

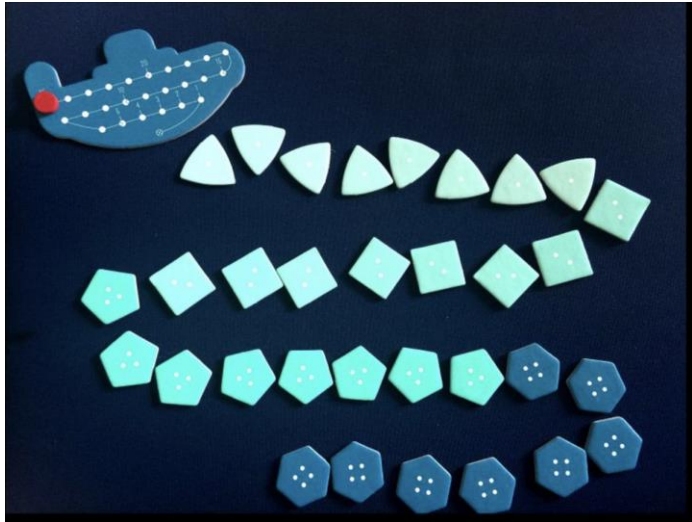
“IT IS THE EXPERIENCE OF FAIRNESS THAT MATTERS.”

YET, another problem unsolved by playtesting:

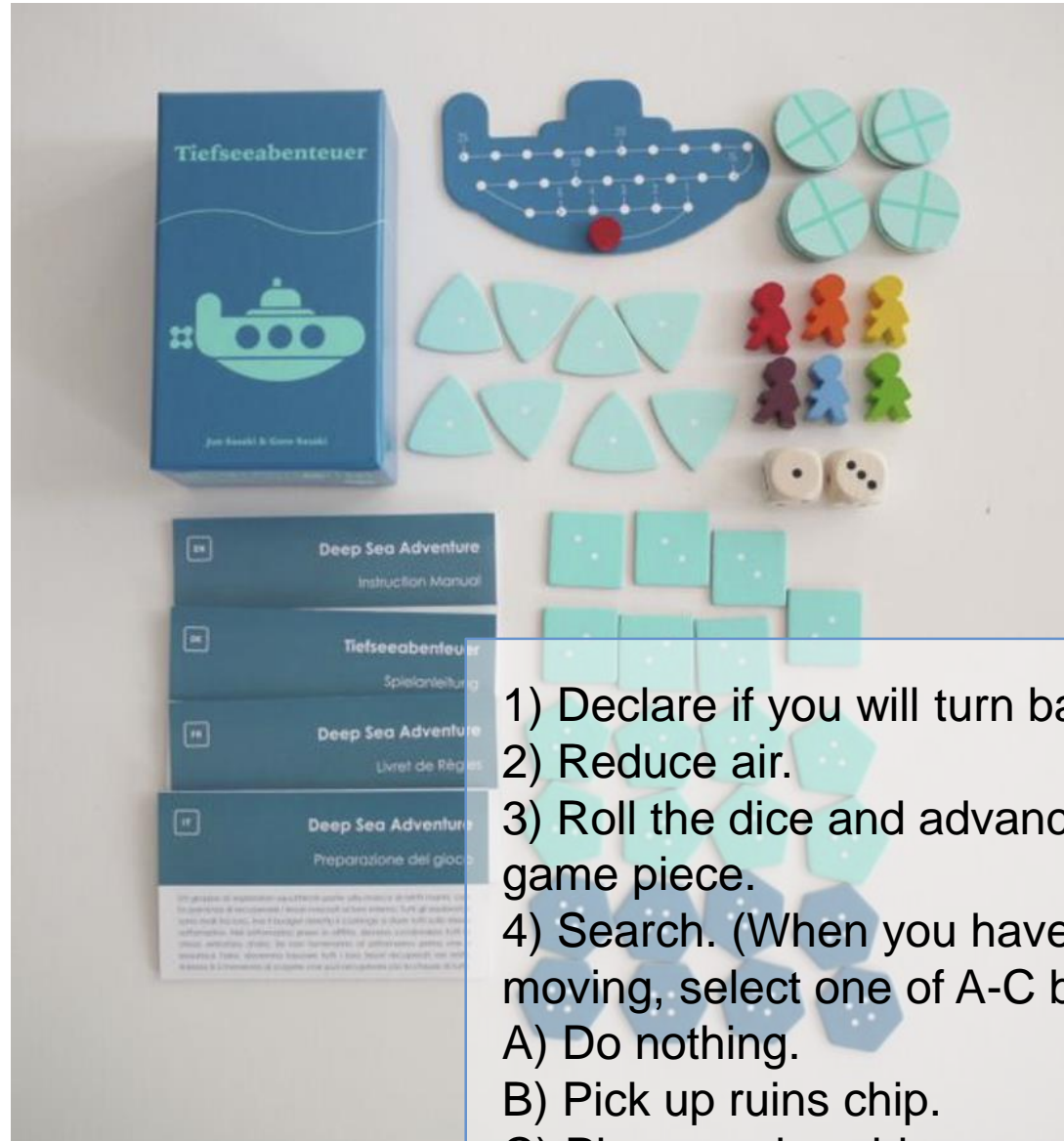
- Players!
- Decision making (game theory related)
- Influences on each other
- Ability to make the best choice

...

We need a large data set to drive a conclusion!



Deep Sea Adventure (2014)



- 1) Declare if you will turn back or not.
- 2) Reduce air.
- 3) Roll the dice and advance your game piece.
- 4) Search. (When you have stopped moving, select one of A-C below)
  - A) Do nothing.
  - B) Pick up ruins chip.
  - C) Place a ruins chip.

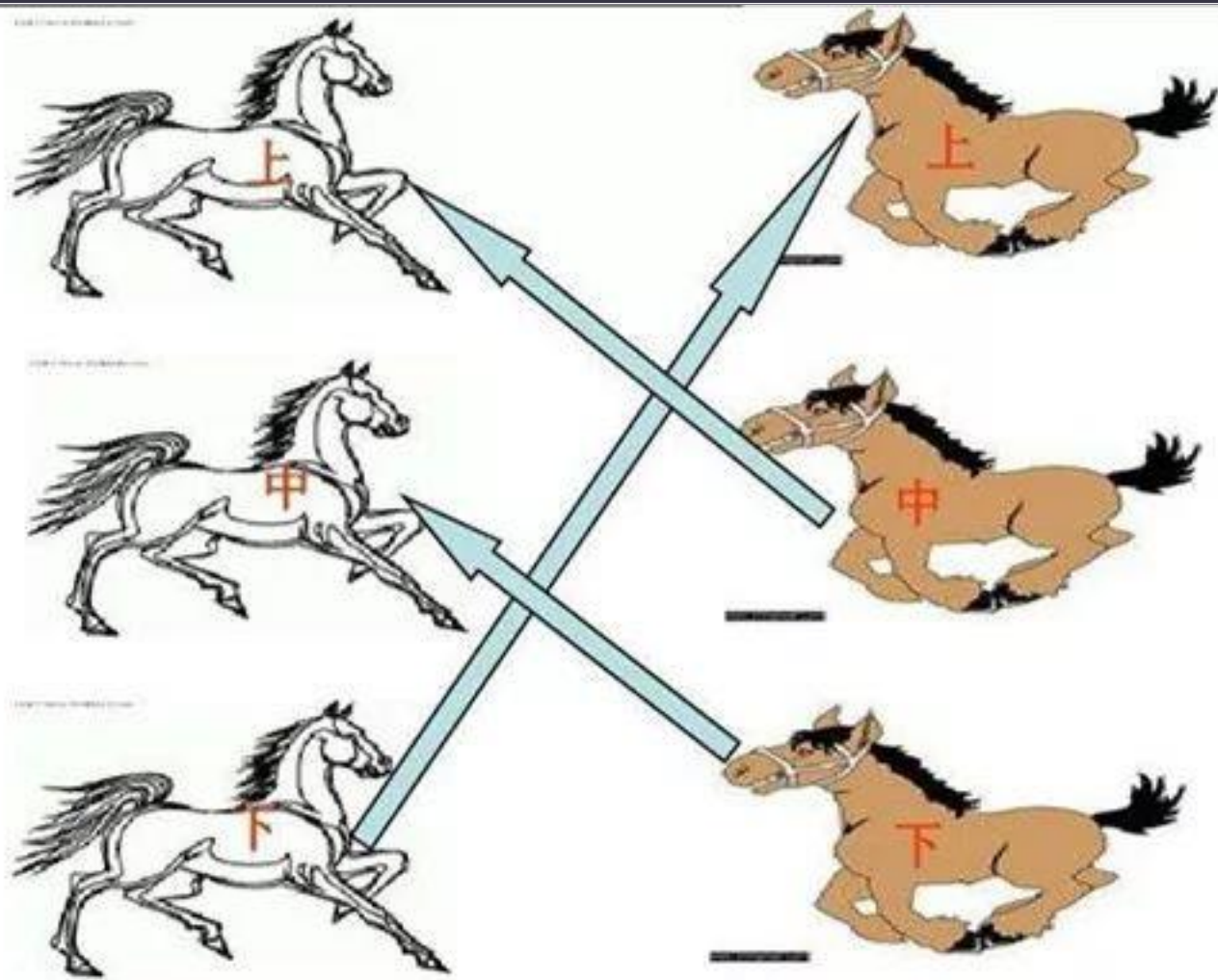
Pros/cons of analytics:

- Data collection obstacles
- Sample size
- Timely issues
- Ability to change
- “Do we really need analytics for boardgames?”

# ON-LINE PVP EXAMPLE:

- <https://www.loldatascience.com/counters-mid>
- <https://www.metasrc.com/5v5/stats>
- <https://www.leagueoflegends.com/en-us/news/game-updates/patch-12-5-notes/>







FNATIC

:17

0 - 0

PATCH 8.19

:17

INVICTUS GAMING



COACH: DYLAN FALCO

COACH: KIM

7  
FNC Bwipo

10  
FNC Broxah

11  
FNC Caps

18  
FNC Rekkles

19  
FNC Hylissang



8  
IG TheShy

9  
IG Ning

12  
IG Rookie

17  
IG JackeyLove

20  
IG Baolan

BANS

PHASE 1  
1 3 5

PHASE 2  
14 16



BANS

PHASE 1  
2 4 6

PHASE 2  
13 15



WHAT TO DO WITH UNBALANCED GAMES?