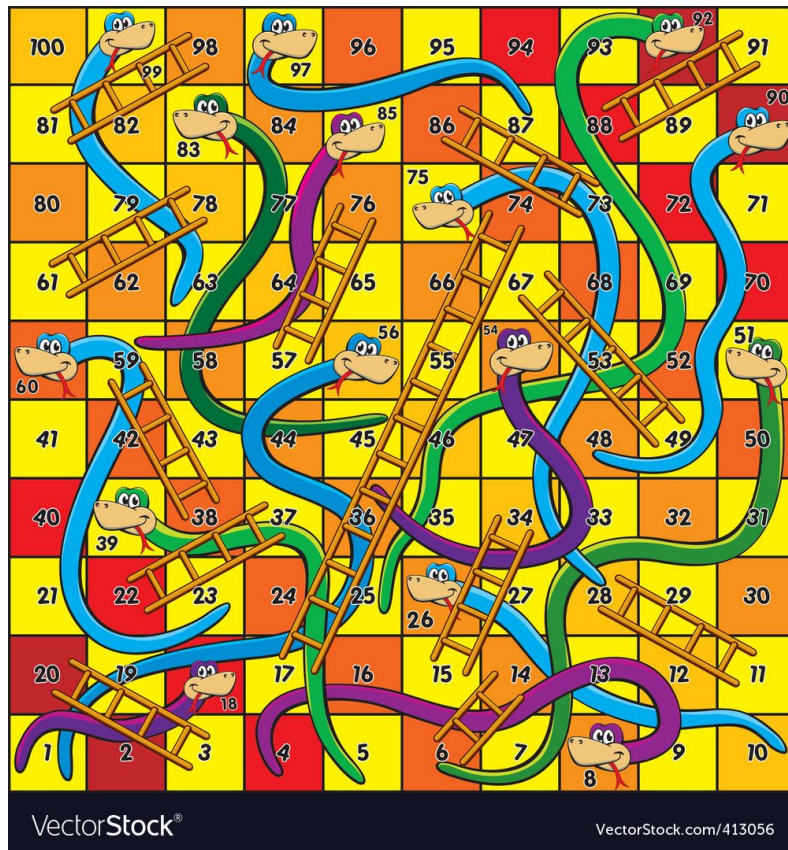# Game-Design
Report

20161170

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Snake and Ladders

Introduction

On a 1-100 label grid, starting from the 1st grid, 2 or more players roll dice to reach the 100th grid. The player who reaches 100th first wins the game. Snakes bite you and move you down the board whereas ladder helps you reach towards the top.

New Rules

Every ladder that you climb, you have to take the next snake to go down.

Foundational or Operational: Foundational Rule

Why this rule

For every good thing, there must be a consequence. Hence for going up the ladder, you must take the next snake.

Game Change

Duration: The most observable consequence was the increase in the game time.

Player Behaviour: In snake and ladders each person can only play the moves provided by the dice. He/she has no control over them.

Effect on the game: Ladder followed by the snake was effective in making the players reach 40-60s but as the number of snakes increased in the 80-90s grid range. Players would have a hard time completing the game.

Probablities: Game still remains symmetric but the chances of winning the game in the kth chance are affected.

Mathematics

The transition matrix of snakes and ladders will get affected. Ladders used to make player reach a higher region, now he might even be at a grid lower than before, get stuck in a loop, etc. Hence we see a right shift in the percentage of games that end on the Nth turn.

Similar to before it can be calculated that the game will eventually end. Take every ladder and snake combination and change it to its effective ladder or snake. After making these changes everything can be calculated again using the new transition matrix.

Brainvita
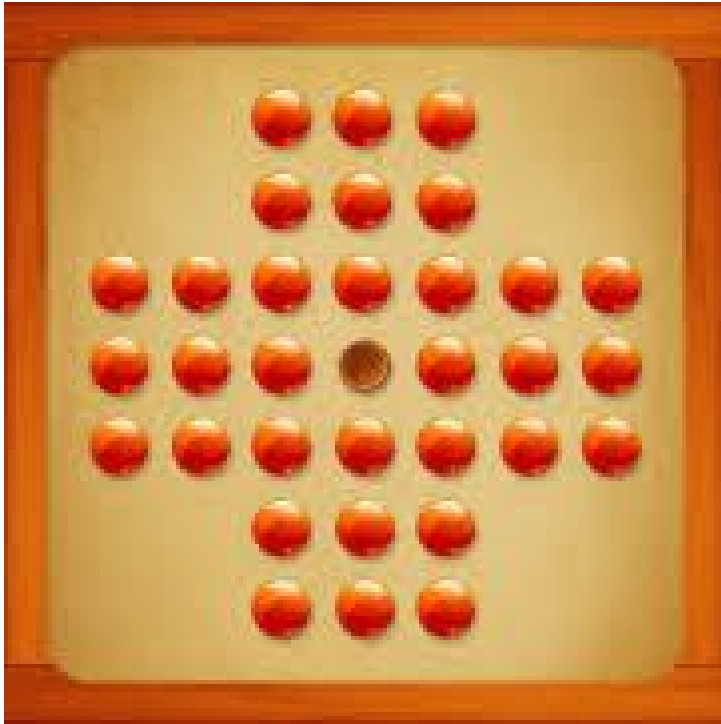
Introduction

It is a one player game. We move horizontally/vertically by skipping over an adjacent to remove a particular marble. Lesser the number of marble remaining in the end the better the score. Solution exists for only 1 marble remaining on the board.

New Rules

We made it a 2 player game, each player has the following moves:

- Skip over: Skip over a marble like the original move

- Block: Block pieces of the opponent player by moving an adjacent marble.

The person who removed a larger share of marbles wins.

Foundational or Operational: Operational Rules

Why this rule

We have made these new rules assuming the players know the solution of the game. (1 marble left on the board). Hence this creates a feeling of competition where the user has to optimize by reducing the marbles on the board or block other users move.

Game Change

Duration: Depends on the players. Varies from game to game.

Player Behaviour: Now players have to optimize by reducing marbles on the board or block other users marbles.

Effect on the game: We were able to create a 2 player game for a 1 player game.

Probablities: Most games players are able to block some of the opponents moves hence the chances of reaching the optimal solution(1 marble) are reduced. The player who starts the game tends to reduce the marbles on the board

Mathematics

Players know the optimal solution which required symmetry in operations to reach the goal. Hence blocking players try to break this symmetry leading to a large number of marbles which cannot be removed. Transition matrix gets much bigger(approx 4 times the old size because of the blocking move). The game generally ends with 5-6 marbles left.

Dominoes
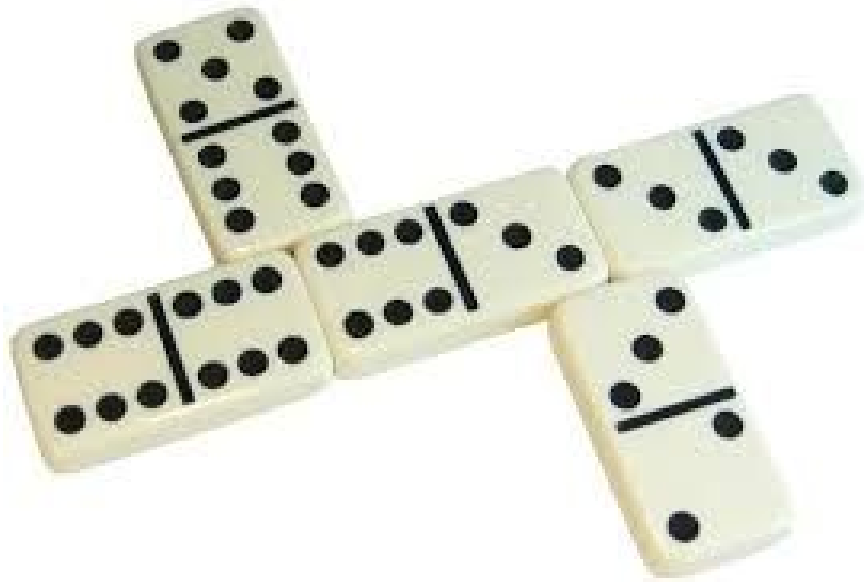
Introduction

Joining up dominoes pieces with matching pieces. A player who lays the last piece contributes to a sum divisible by 5. The total point tally of the players is added by that many pieces

New Rules

1. The changed game involves taking advantage of the colors and the numbers on the pieces to play a game similar to UNO.
2. If the blank appears, we role a dice with a prior bet placed. If the bet fails the player collects a certain amount of pieces, depending on the bet.
3. The player who's pieces end first wins.

Foundational or Operational

Foundational Rule, Operational Rule, Foundational Rule

Why this rule

We wanted to explore new ways of using dominoes pieces. UNO was favored by both of us. It increased the attention we had on the game. Also, it has lesser rules to remember. Dice was used for add randomness in the game.

Game Change

Duration: Dependable on the players. Varies from game to game.

Player Behaviour: Now players have to optimize by reducing dominoes in the hand.

Effect on the game: Game became more engaging and satisfying.

Probablities: Bets helps users take new cards frequently because the bets create specific constraints which gave the bets more chance to fail.

Mathematics

Players were playing moves as if they were actually playing UNO. Draw 4 and other action cards were replaced by the dice roll. The number of dominoes in players hand reduced much faster than UNO because each dominoes has to 2 numbers on it.

Checkers

Introduction

This game is played by the same foundational rules with a varying number of pieces. 12 vs 12 on 8*8 board , 20 vs 20 on 10*10 board , 30 vs 30 on 12*12 board. The basic rules involve strategically taking out opponent pieces off the board by jumping over them when they are diagonally in front of the piece. The game ends when any one of the players in unable to continue the game or all the pieces of one of the players has been completely eliminated.

New Rules:-

The 12 pieces from the original game are divided into two categories:-

- Crawlers:- These pieces (6 in front - 2 on each side in the second row) are placed in front of the jumpers. (also 6 in number and placed at the back)

They are unable to jump over enemy jumpers but can jump over enemy crawlers. At the same time they block enemy jumpers from jumping over them.

- Enemy jumpers when not placed against enemy crawlers can make a single or double jump depending on the situation. Double jump can only happen under the condition that there are 2 pieces in a direct diagonal line in front of it. The first piece of this line is killed in the process. The piece in the middle can not be a friendly.

Foundational or Operational:-

Both rules involve changing the property of the pieces themselves and hence is foundational.

Why this rule:-

All the pieces moved in similar fashion and gave the game a very dull experience. By changing up the properties and mutating the character of the pieces, the game became more strategic and engaging.

Game Change:-

Duration: The most observable consequence was the increase in the game time.

Player Behaviour: More careful actions had to be taken and pieces had to be placed in good strategic positions in a defend and counter fashion.

Effect on the game: The crawlers tend to be left behind until the variants are terminated.

Probablities: The games conceptual movements are completely different and the probability of win or loss has more factors to take into consideration hence there is also great change from the **mathematical** perspective since the game is fundamentally played in a different fashion, post-modifications.

Chinese Checkers

Marbles Only

Introduction

Be the first one to accumulate all of his beads on the opponent's side.

New Rules:-

- All colored pieces are initially placed in the middle. We start withdrawing from the center to the opposite corners The player to finish any or all his colors first wins the game.
- Movement along any direction is possible. Unlike before, where only forward movement was possible.

Foundational or Operational:-

Foundational, since the end goal, that is to clear his pieces from the center earlier than the opponent, is a fundamental change.

Operational, since it affects the way the pieces move.

Why this rule:-

The original game was too simple and short. So this is just an extension that creates a feel of having a larger scale, hence more satisfying.

Game Change:-

Duration: Extended, as is expected.

Player Behaviour: More relaxed. Became larger in scale.

Effect on the game: Game became more interesting and satisfying to play.

Probablities: Fundamentally different end goal and piece movement mean that the **mathematical** probability involved in reaching teh goal is drastically different from the original game.

Chess

Introduction

Chess is played with 16 pieces on each side. 8 are pawns and the rest are pieces with special roles. The specifically being Rook, Knight, Bishop, Queen and King. The game ends when the opponent king is held at a kill situation with no escape. This situation is called a checkmate.

New Rules:-

The player that makes the last kill has the ability to switch any piece on the board with any other piece on the board provided that both the pieces are of the same colour.

Foundational or Operational:-

Operational, since all the fundamental rules of the game remain same.

Why this change:-

It quickens the pace of the game by allowing people to make more sacrifices. Also it increases difficulty to perceive the opponent's move since valuable pieces can quickly change positions in large distances across the board.

Game change:-

Duration: Tends to speed up in some situations and slow down in others, depending on the play style of the players.

Player Behaviour: Players tend to make more bold moves knowing that the piece in use could be immediately replaced with a lower valued piece or sacrificial pawn.

Effect on the game: Game became more dangerous and bold. Also the pace increased and mistakes seemed to increase.

Probablities: More unpredicatable movements have created lesser disparity between players of different calibre, hence improving the win/loss probability and bringing it closer to 50-50.

Mathematical

As mentioned above, in the calculation for the best set of moves that a player should make in a given situation, it will be needed to include one more layer involving the positions switch of the pieces at every level. Therefore calculating an ideal path from a mathematical perspective becomes much harder.