Evil Games

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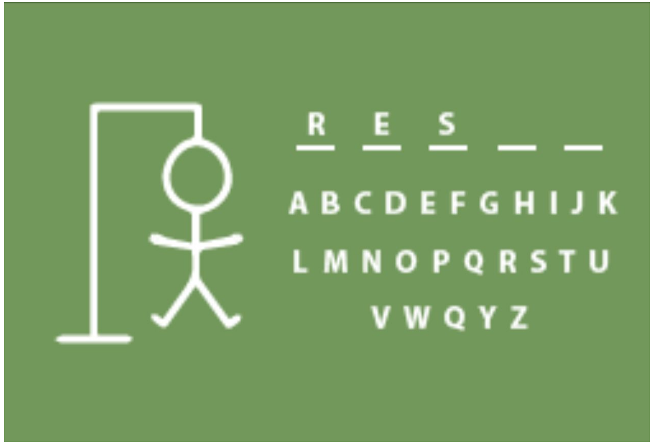
What kind of games can become “evil”?

- Each instance of a game is a randomly selected answer from a finite set of possible solutions
- On each turn, the player guesses a solution to the game
- Game provides feedback on correctness of proposed solution
- Game continues until player has correctly guessed solution

Examples of games:

Hangman

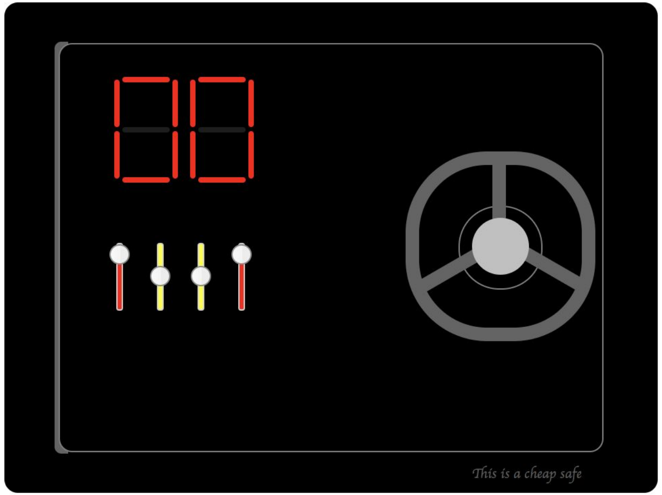


Examples of games:

Wheel of Fortune

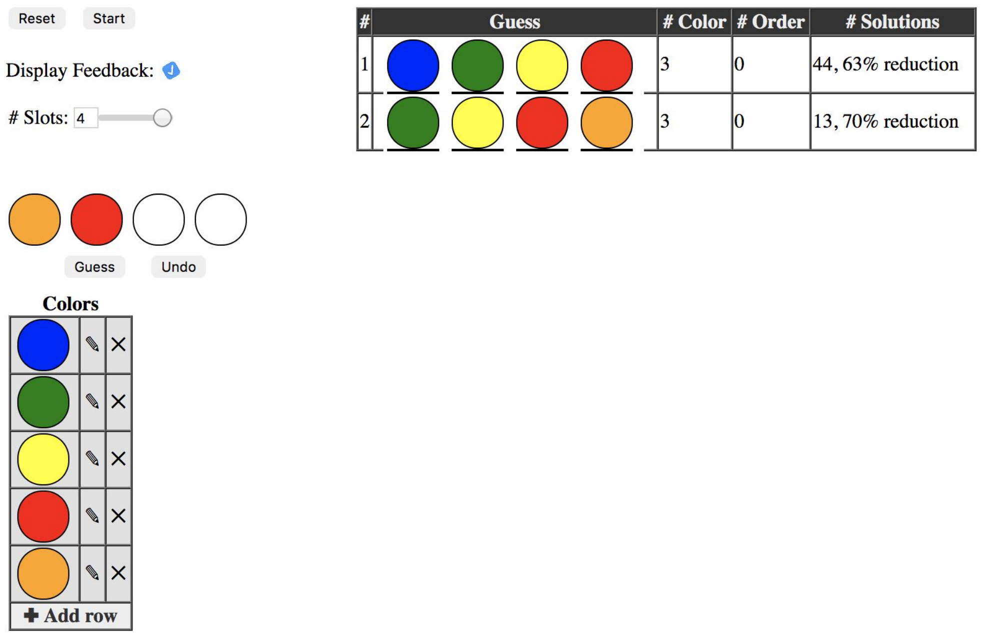
Examples of games:

Safecracking Puzzle



Examples of games:

Mastermind

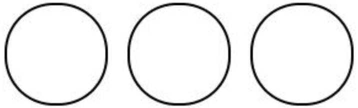


How to play an evil version of a game

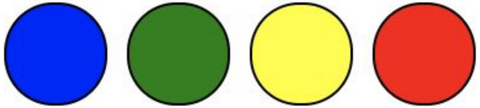
- The game never generates a random solution at the beginning of the game
- Instead, maintain a set of valid candidate solutions
- After each guess by the player, give feedback that removes the fewest number of candidates from the set of viable solutions
- The player wins once there is only 1 valid solution remaining!

Mastermind

- **K** slots



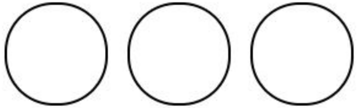
- **C** colored balls



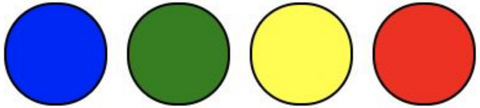
- Each slot can hold one of the colored balls
- Single player game where the goal is to correctly guess the assignment of balls to each slot.
- After each guess, the game returns a hint containing the following information:
  - The number of balls which are the correct color
  - The number of balls which are the correct color and in the correct slot

Mastermind

- **K** slots

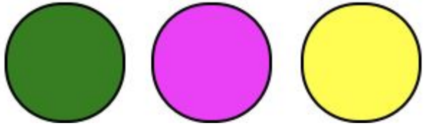


- **C** colored balls



- Each slot can hold one of the colored balls

Guess:



Solution:

Hint says: **2** Correct Colors, **1** Correct Order

Evil Mastermind

- K slots
- C colored balls
- Each slot can hold one of the colored balls

- Maintain a set of all possible solutions that are **consistent** with given hints.
  - Always provide the hint that maximizes the number of remaining candidates
  - Player wins when their guess is the only remaining candidate

- Number of initial arrangements:

$$\prod_{i=0}^{K-1}(C-i)$$