



# Game Mechanic Alignment Theory (and discovery!)

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# Automatic Tutorial Generation

## A little context...

- [AtDelfi: Automatically Designing Legible, Full Instructions For Games](#)
- [Generating Levels That Teach Mechanics](#)
- [“Press Space To Fire”: Automatic Video Game Tutorial Generation](#)
- [Mech-Elites: Illuminating the Mechanic Space of GVG-AI](#)
- [Mario level generation from mechanics using scene stitching](#)
- [Automatic Critical Mechanic Discovery Using Playtraces in Video Games](#)
- [Intentional Computational Level Design](#)

Visit <https://mikecgreen.com>

What is a tutorial?

What is a tutorial?

How to win and lose

# A bit naive...

- A Theory of Fun for Game Design - Koster
- Characteristics of Games - Elias, Gutschera, and Garfield



# MINECRAFT



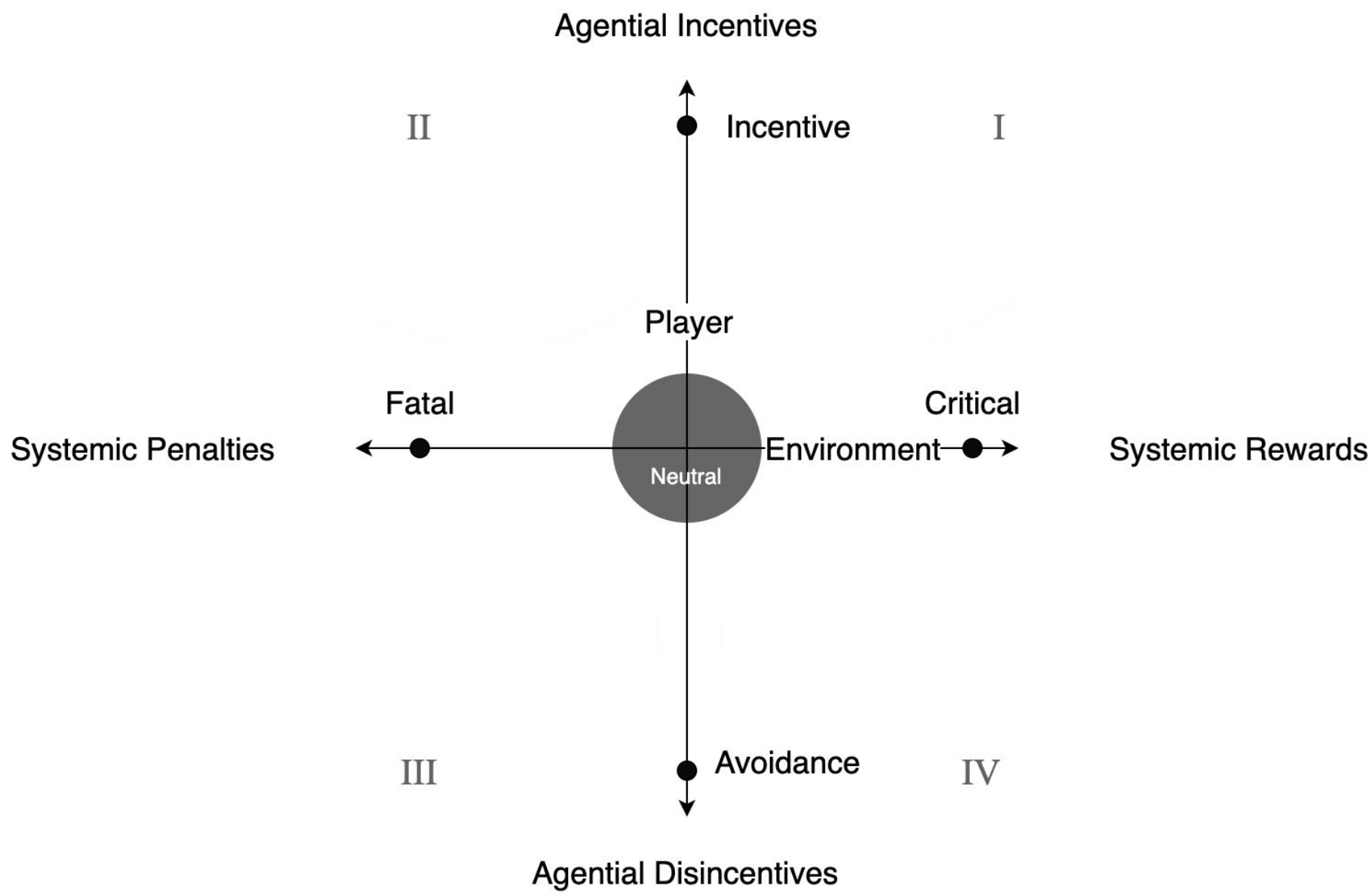


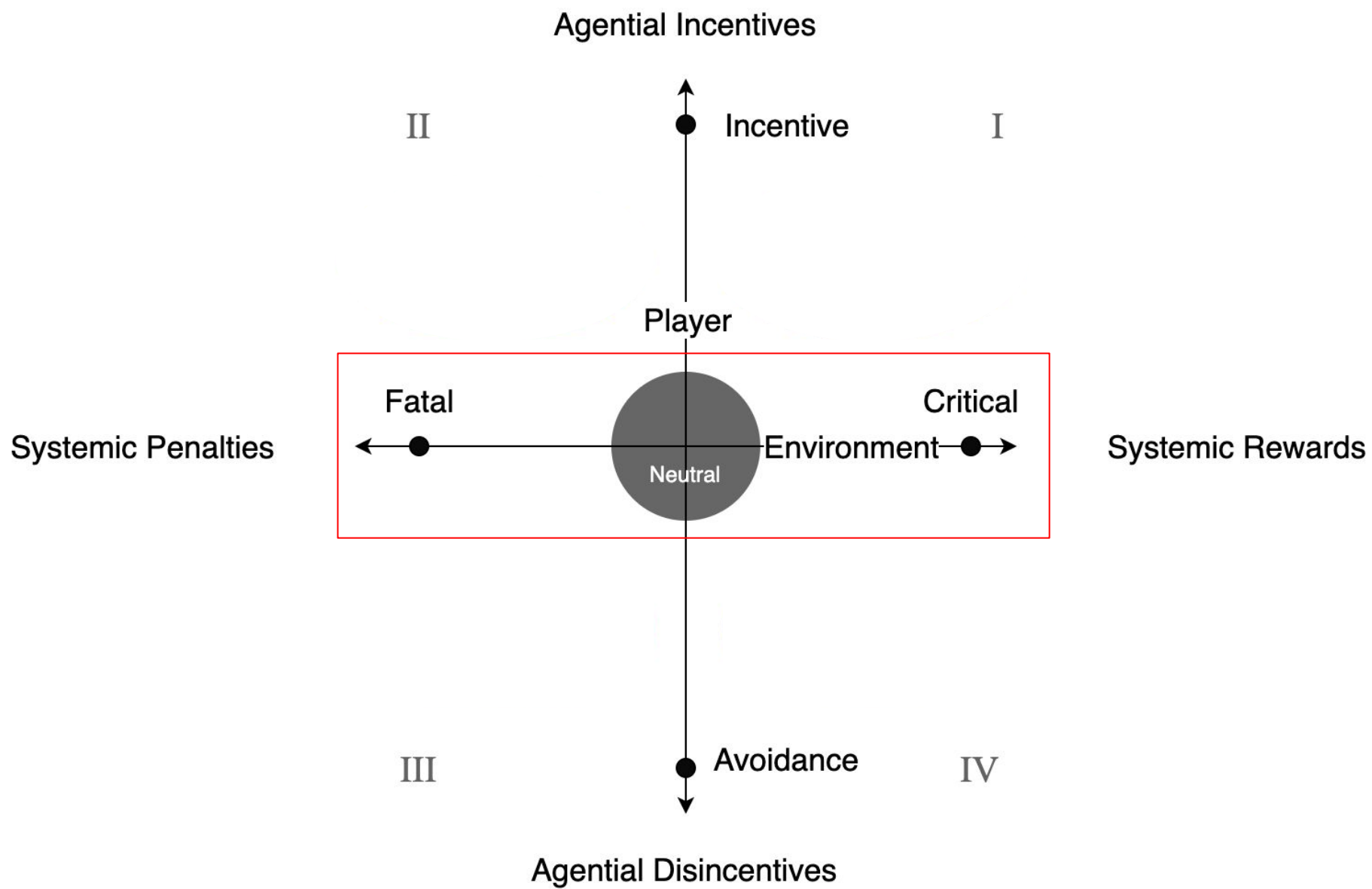


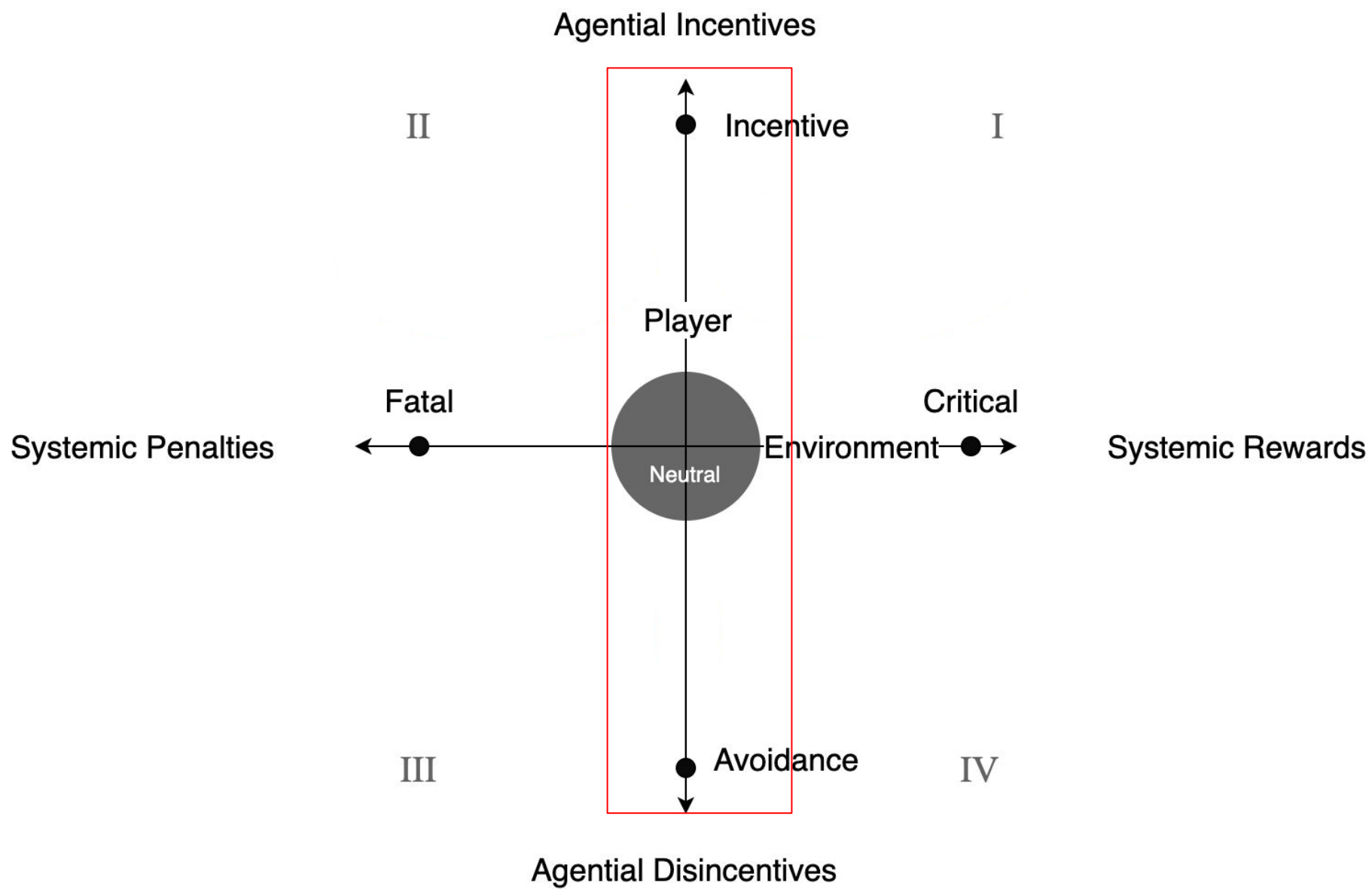


What is a tutorial?

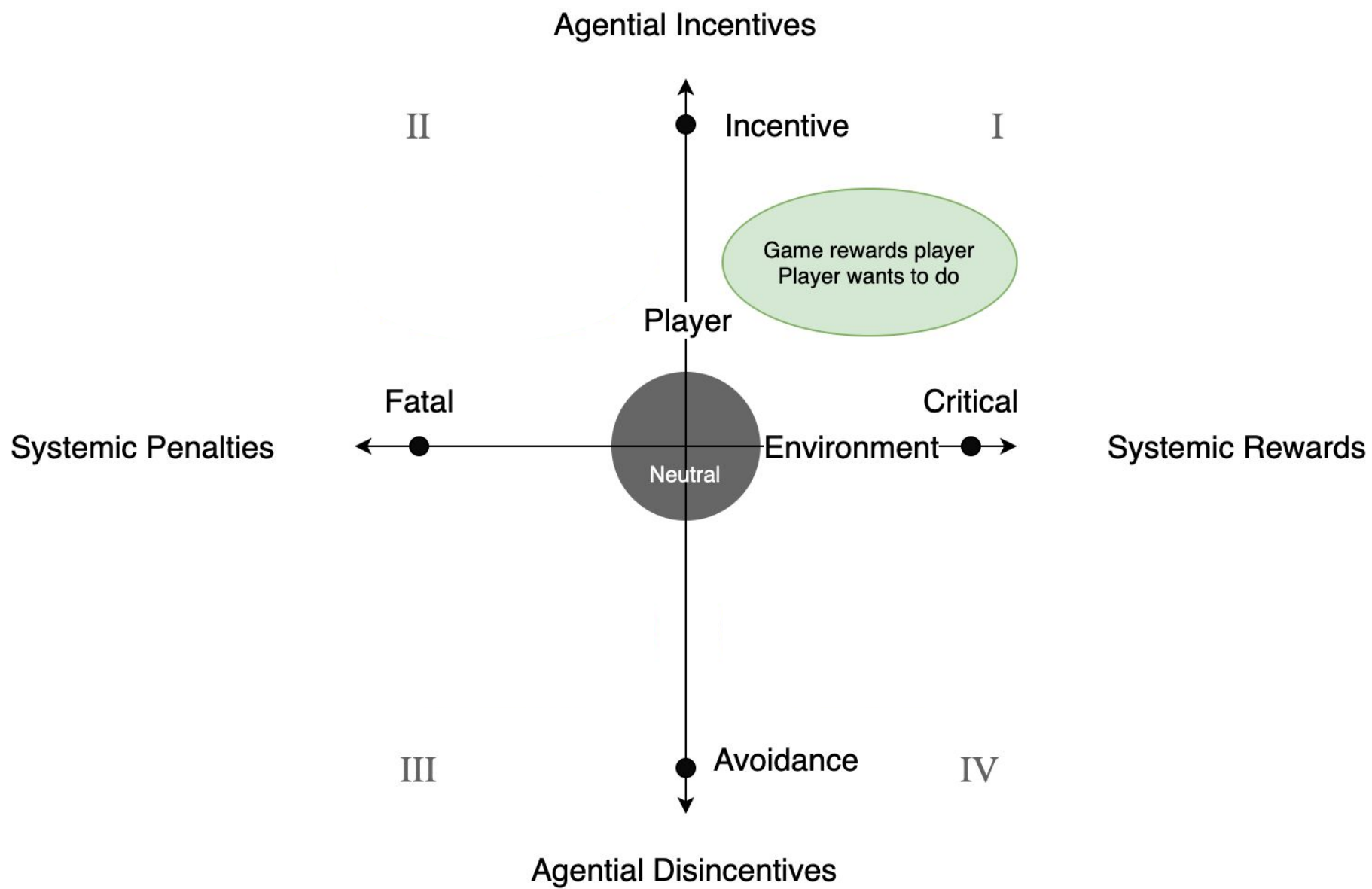
~~How to win and lose~~

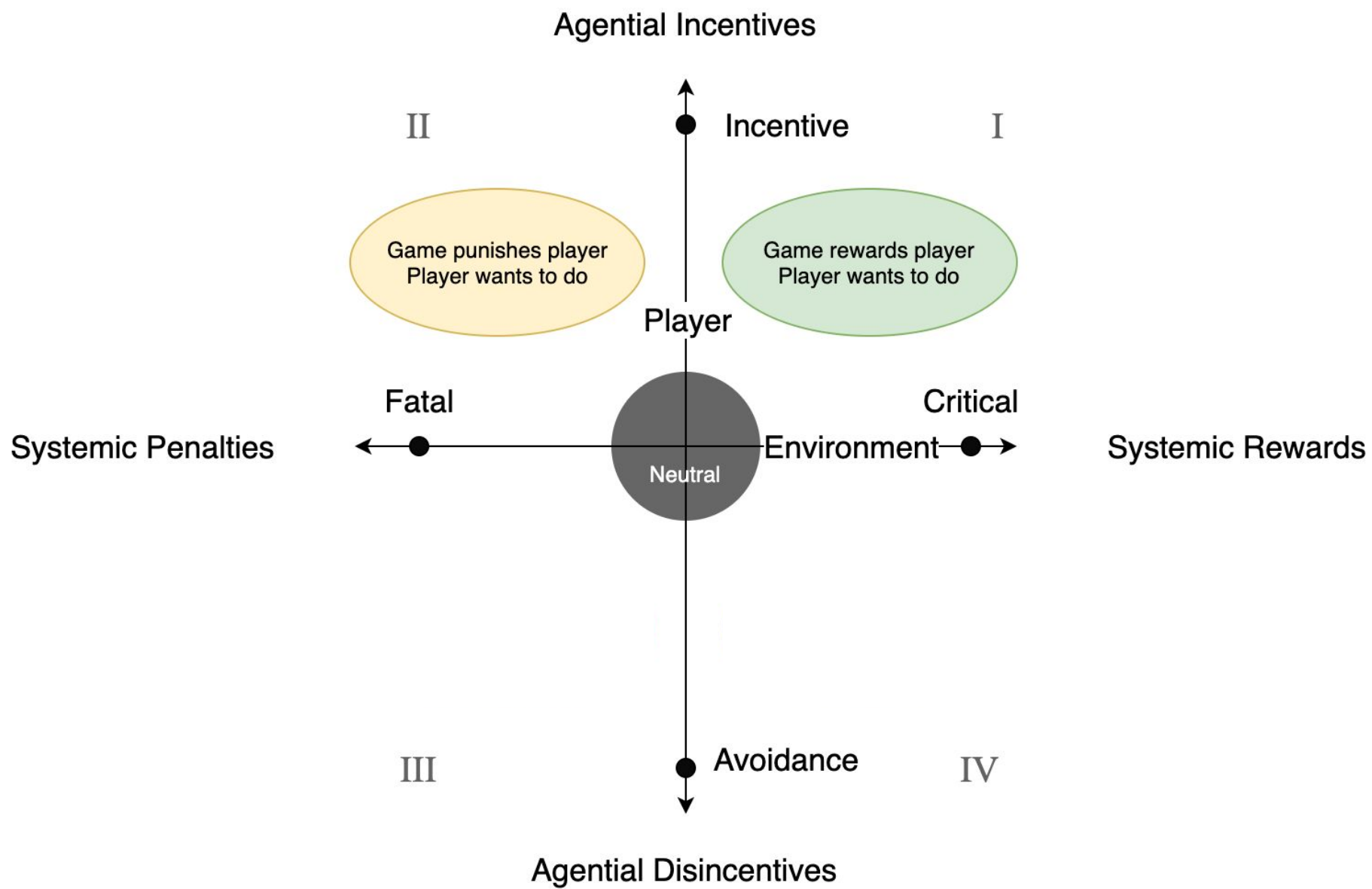


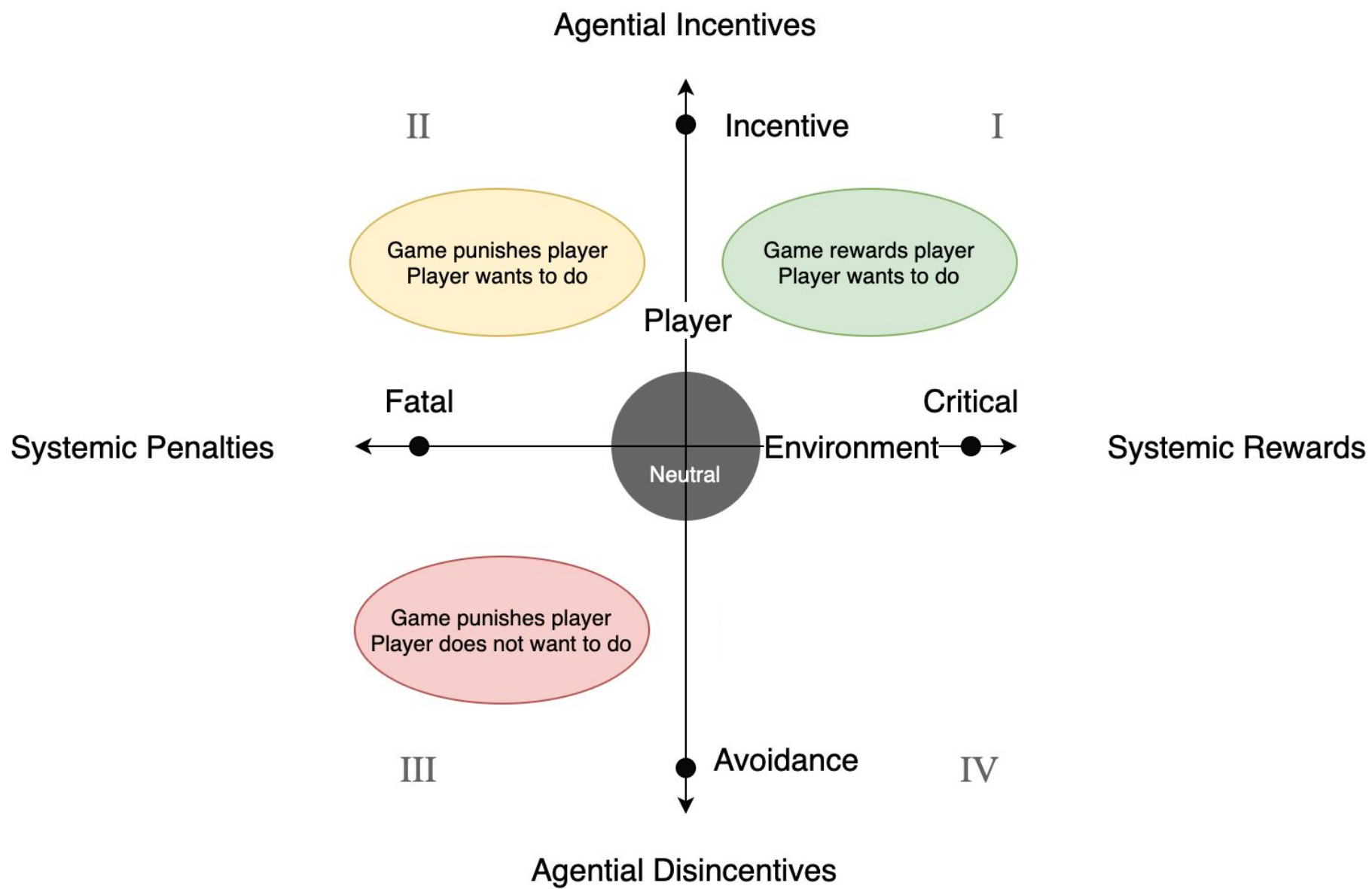


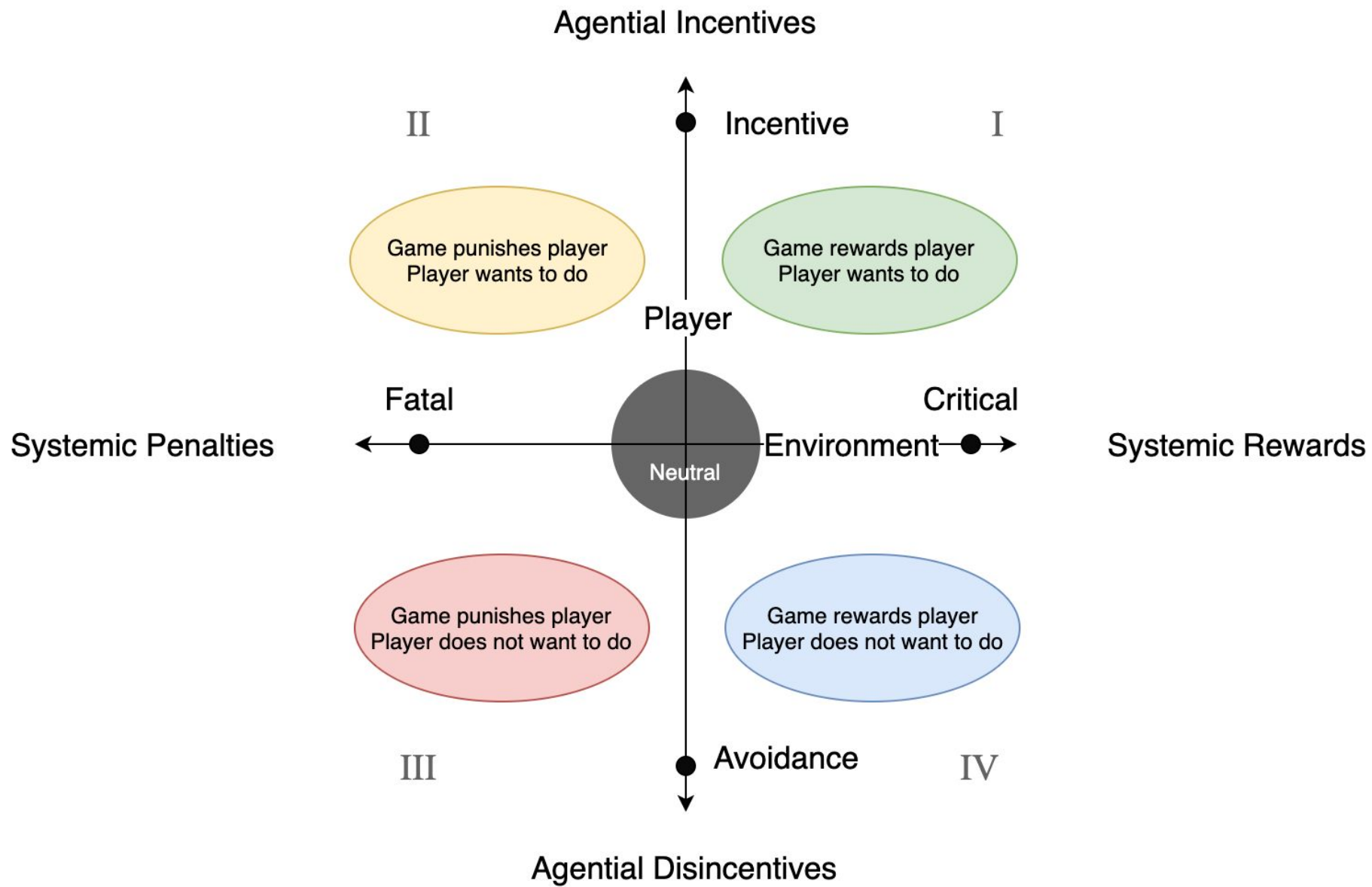




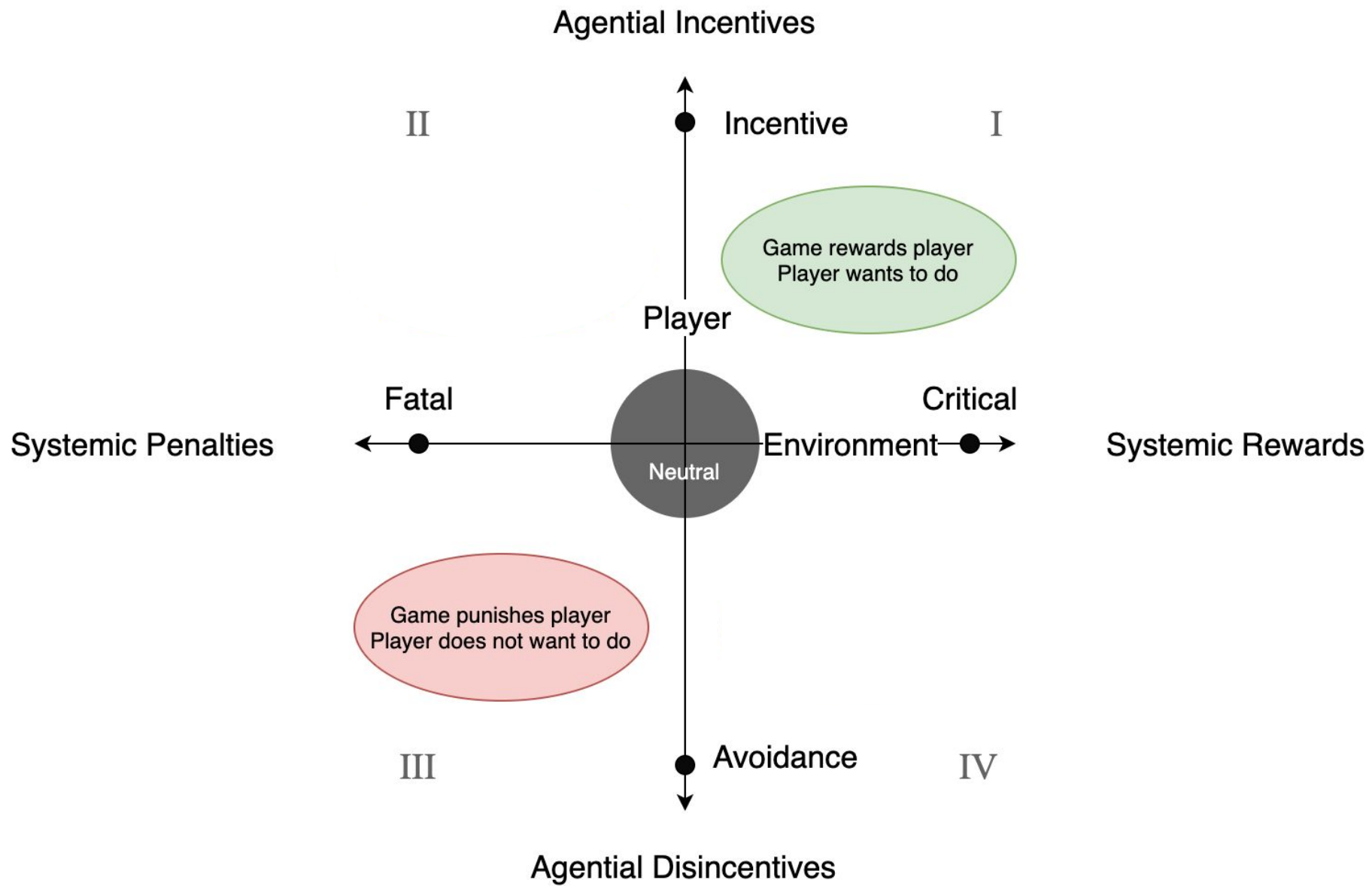












# What can it be used for?

- Differentiate players and how/why they behave
- Level Design
- Tutorial Generation

# Mario



Explorer Player

Agential

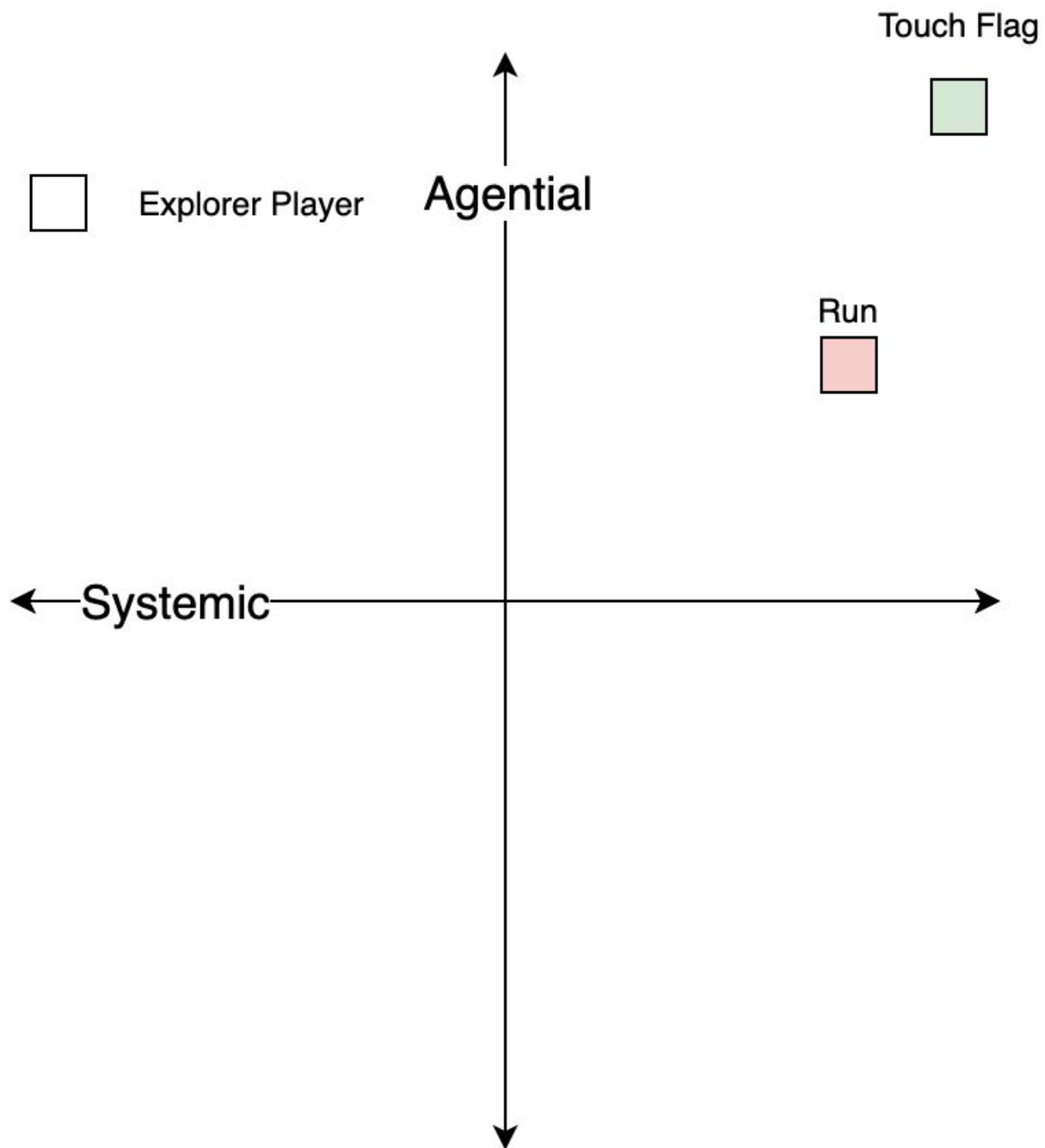
Touch Flag



Systemic

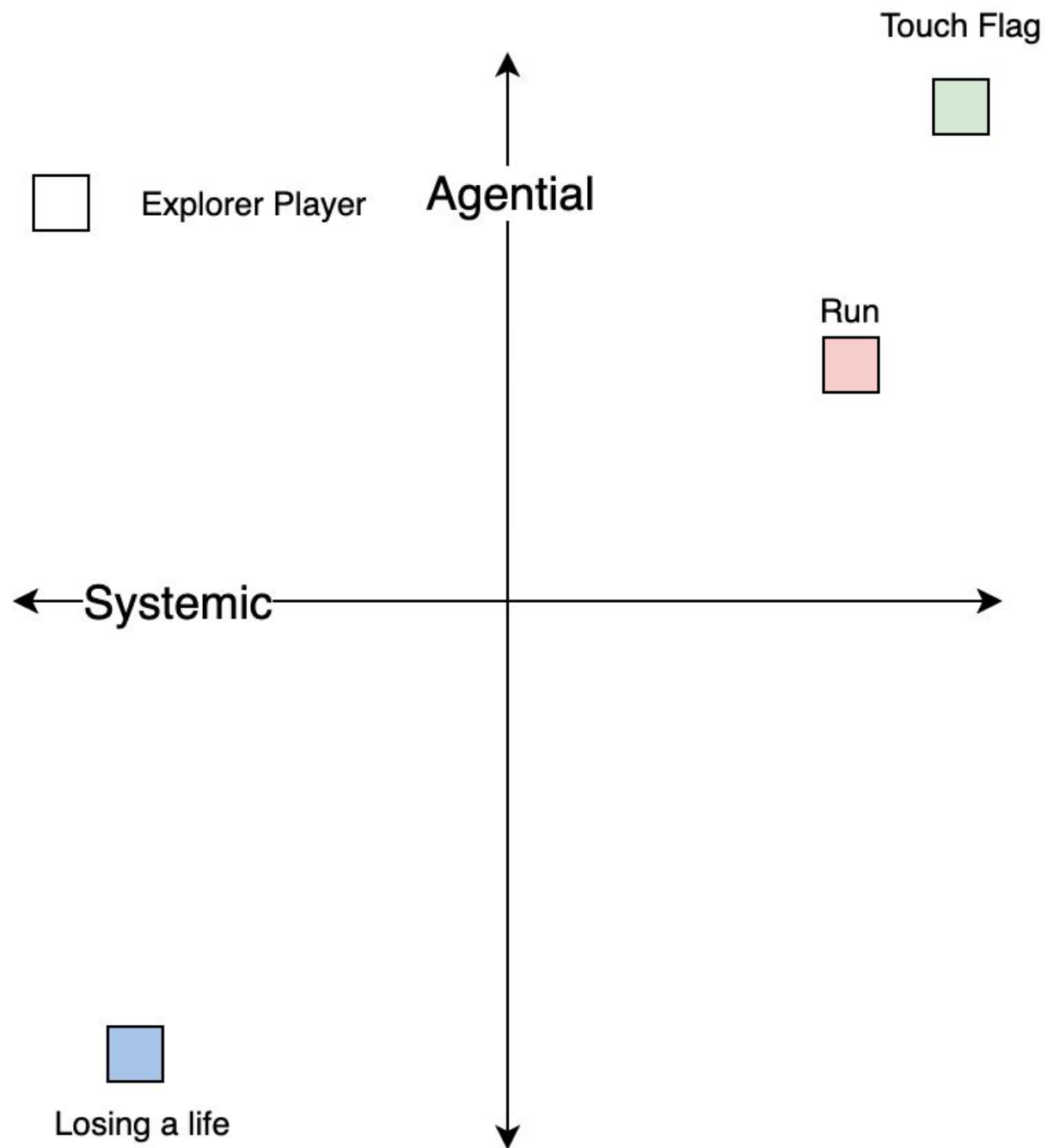


# Mario

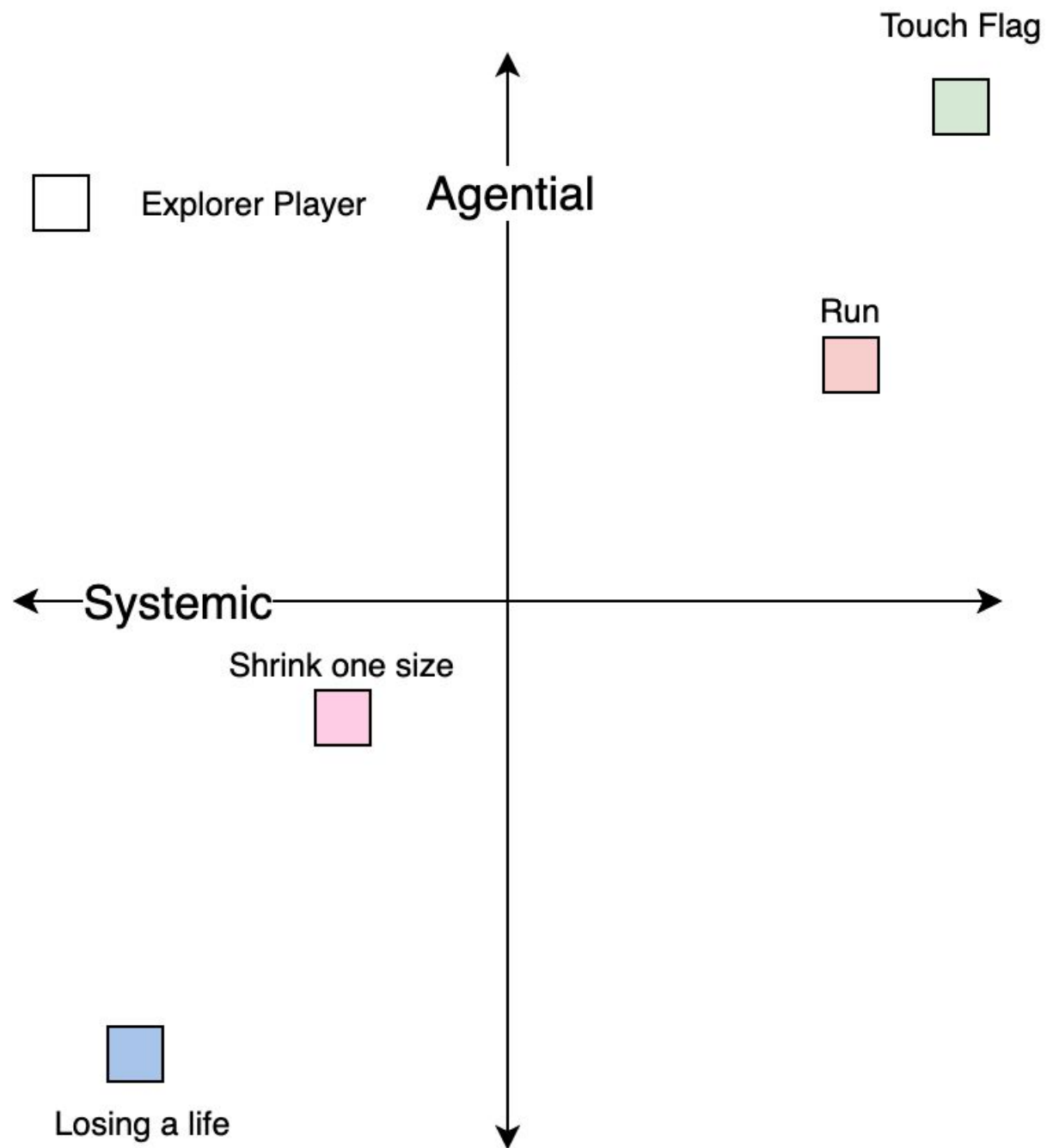




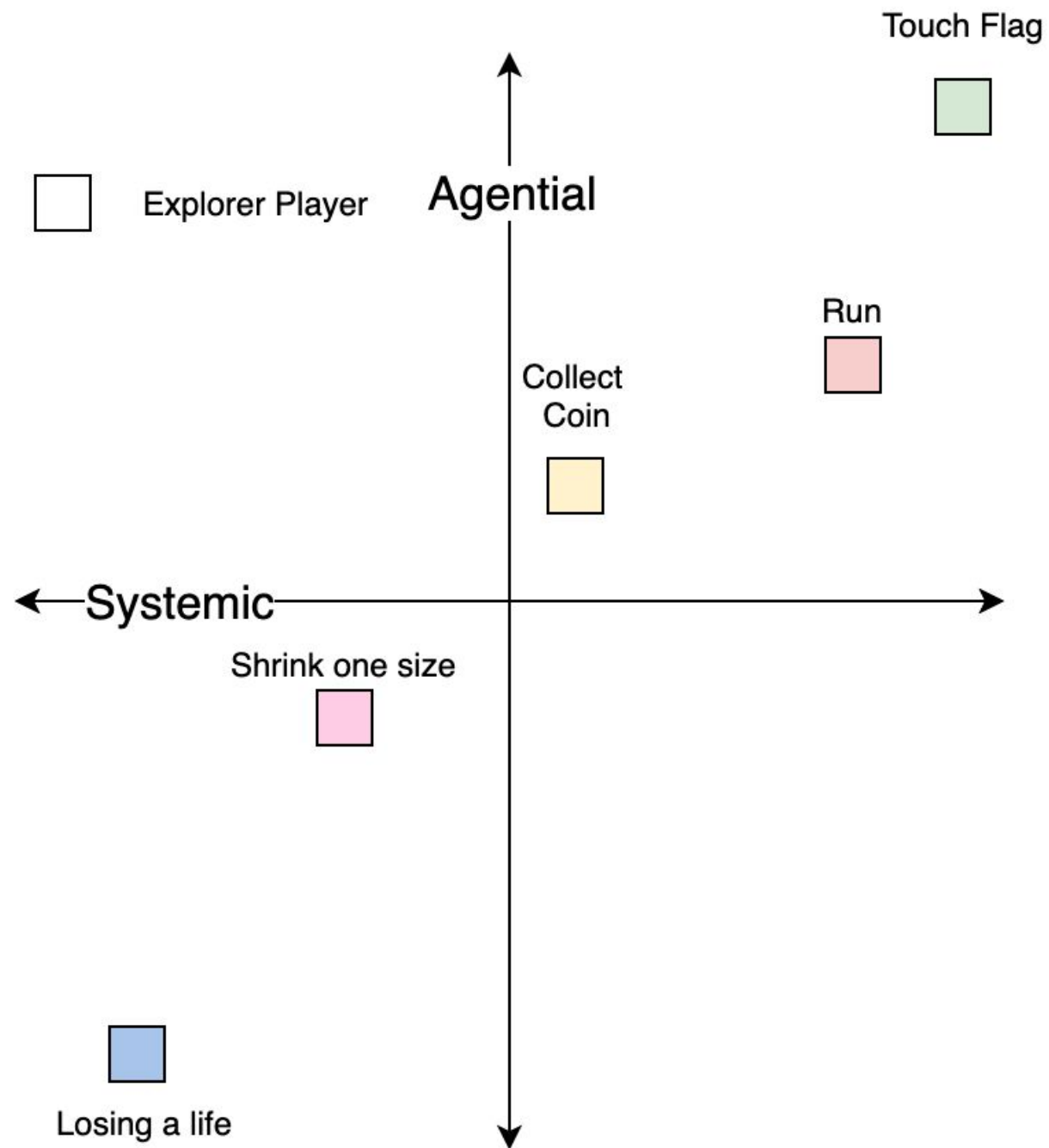
# Mario



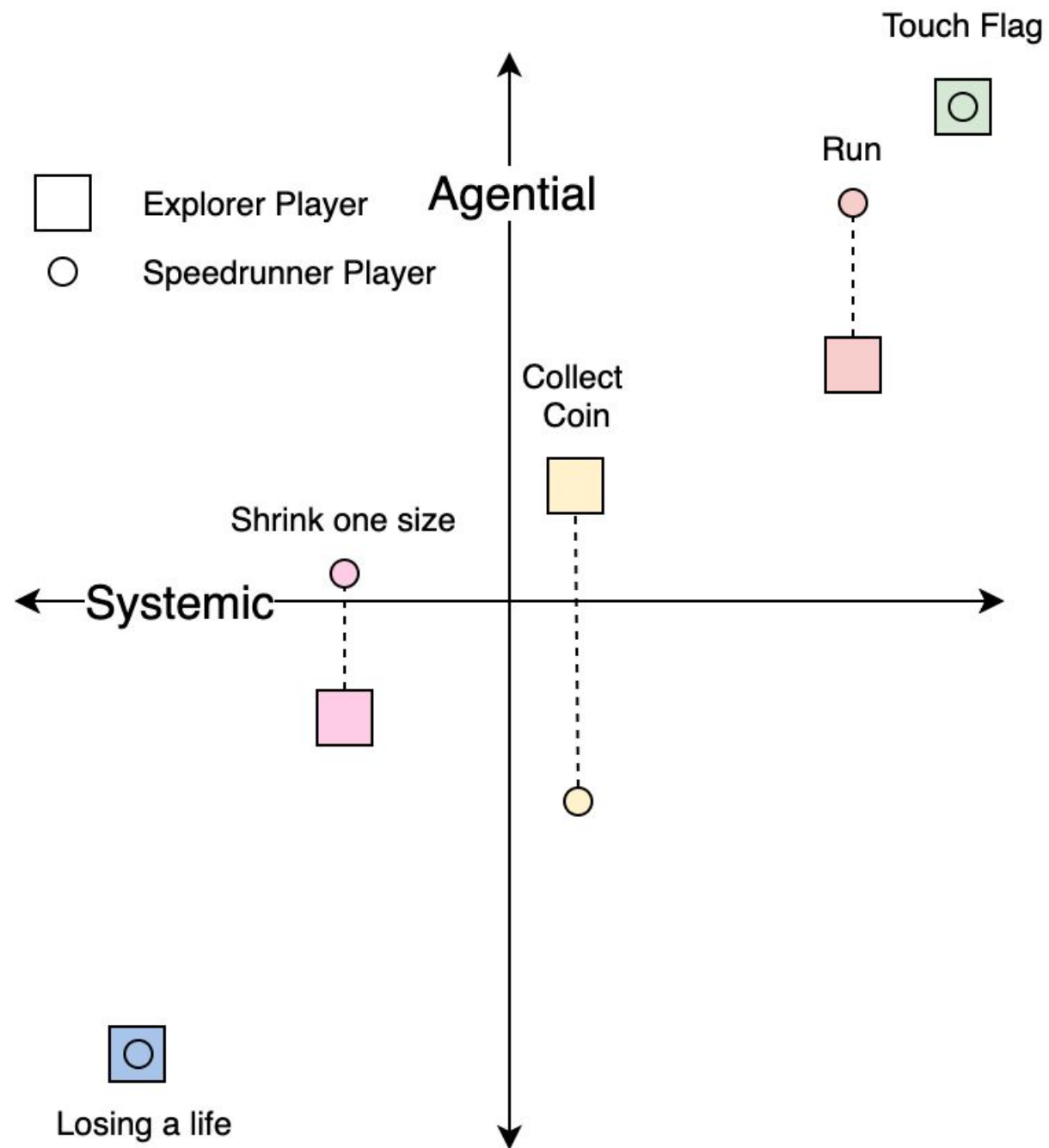
# Mario



# Mario



# Mario





How to put real mechs on the graph?

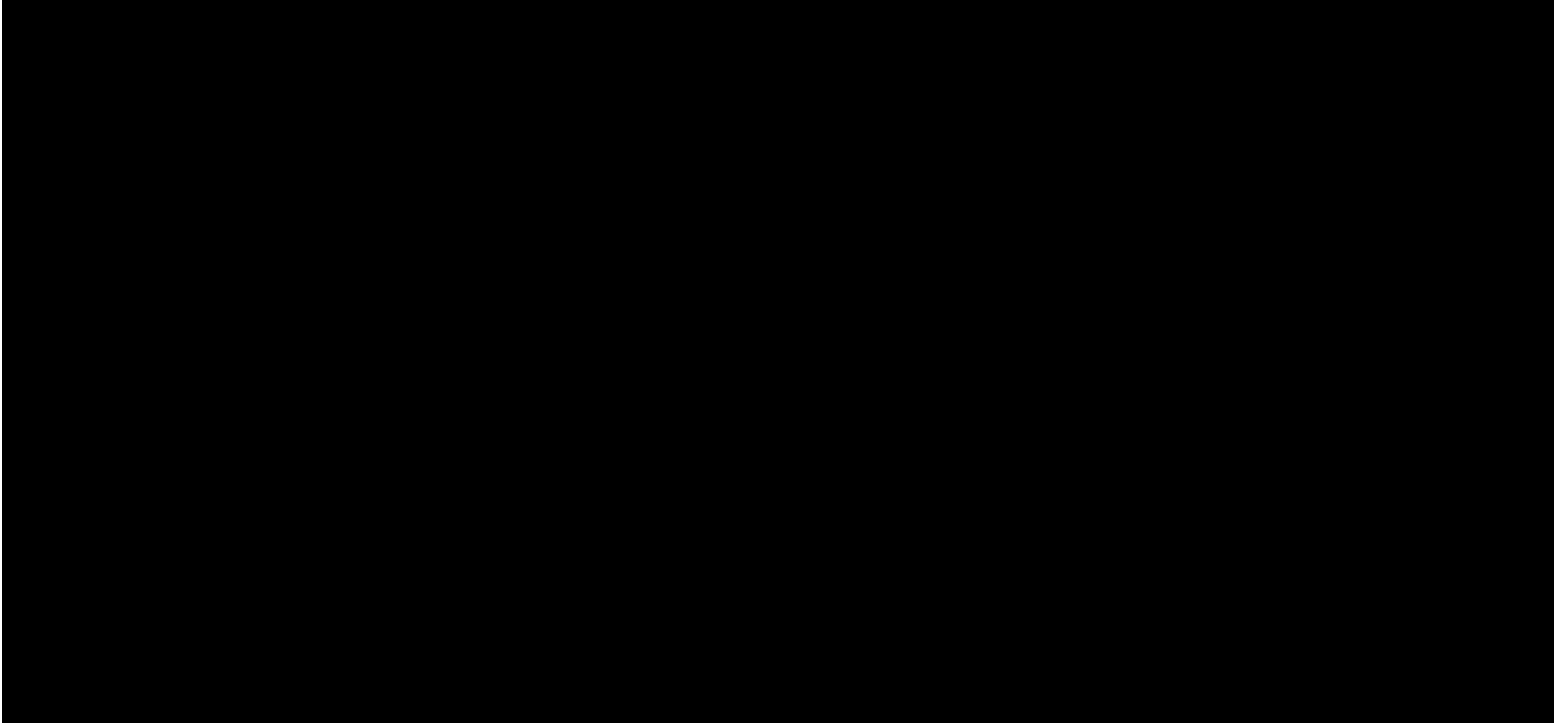
# How to put real mechanics on the graph?

- Systemic (x): Correlation between a mechanic and winning
- Agential (y): Correlation between a mechanic and a playstyle/person/agent
- Amass a distribution of playtraces w/ differing playstyles/people/agents
- Track all mechanics triggered that you care about

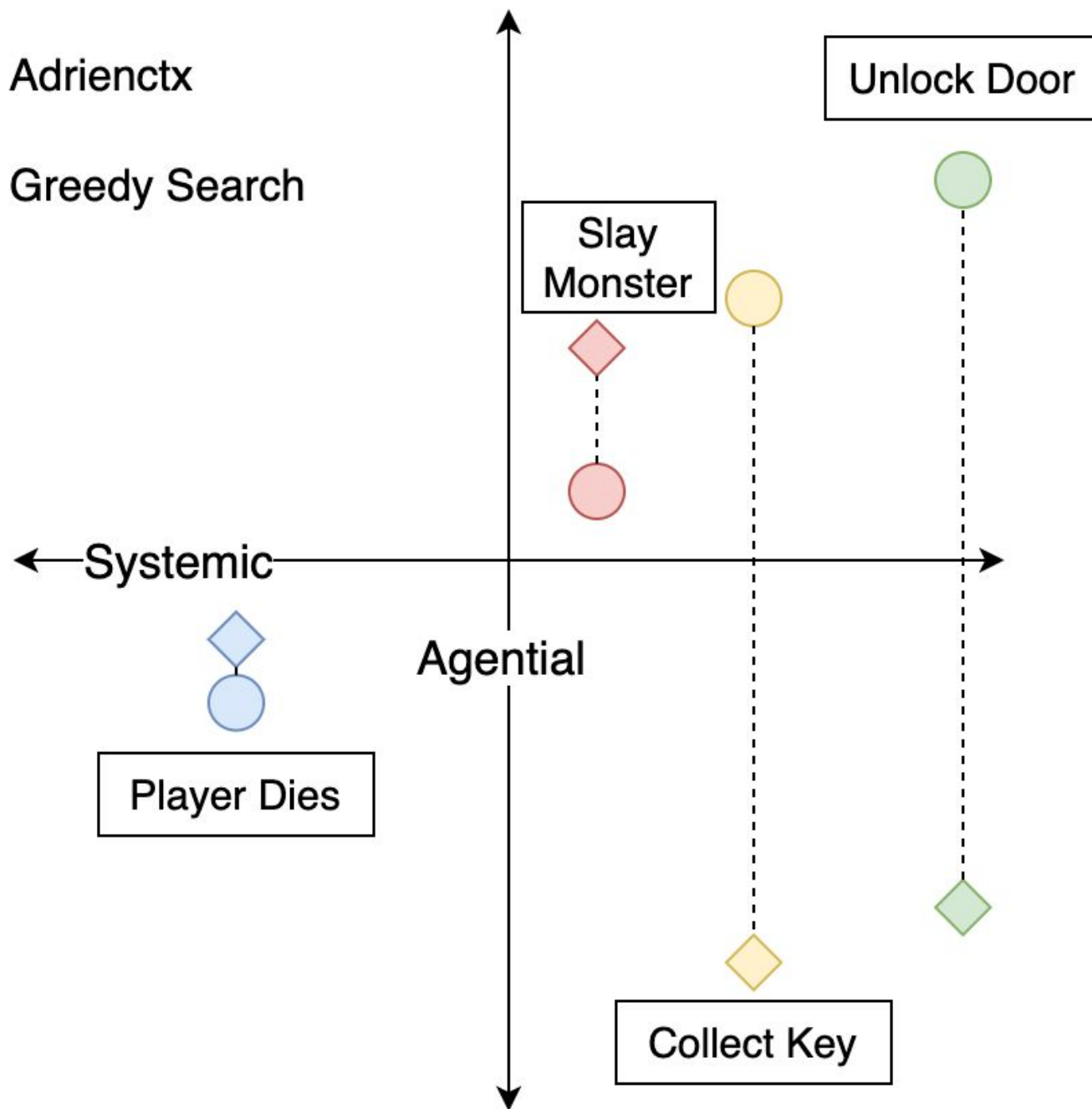
# Computational Estimates

- Wasserstein Distance
  - $D_{m,c} = W1(m|c, m)$
  - $S_{m,c} = \text{Sign}(u(m|c) - u(m))$
- 
- $y_m = S_{m,\text{agent}} * D_{m,\text{agent}}$
  - $x_m = S_{m,\text{win}} * D_{m,\text{win}}$

# Zelda



- Adrienctx
- ◇ Greedy Search



# Discussion

- Artificial agents with no explicit differing reward biases (only skill)
- Skill differences between players (was that a mistake?)
- Level layout
- Level difficulty
- Can account for some of this

# Future Work

- Real People!
  - Analyze player behavior
  - Cluster unknown players into known playstyles
- Build tutorials using x and y-axis scores
  - “You might want to do this, although it will cost points!”



Questions?