

# GAME GRAMMAR

EVERYTHING ABOUT HOW GAMES WORK

RAPH KOSTER

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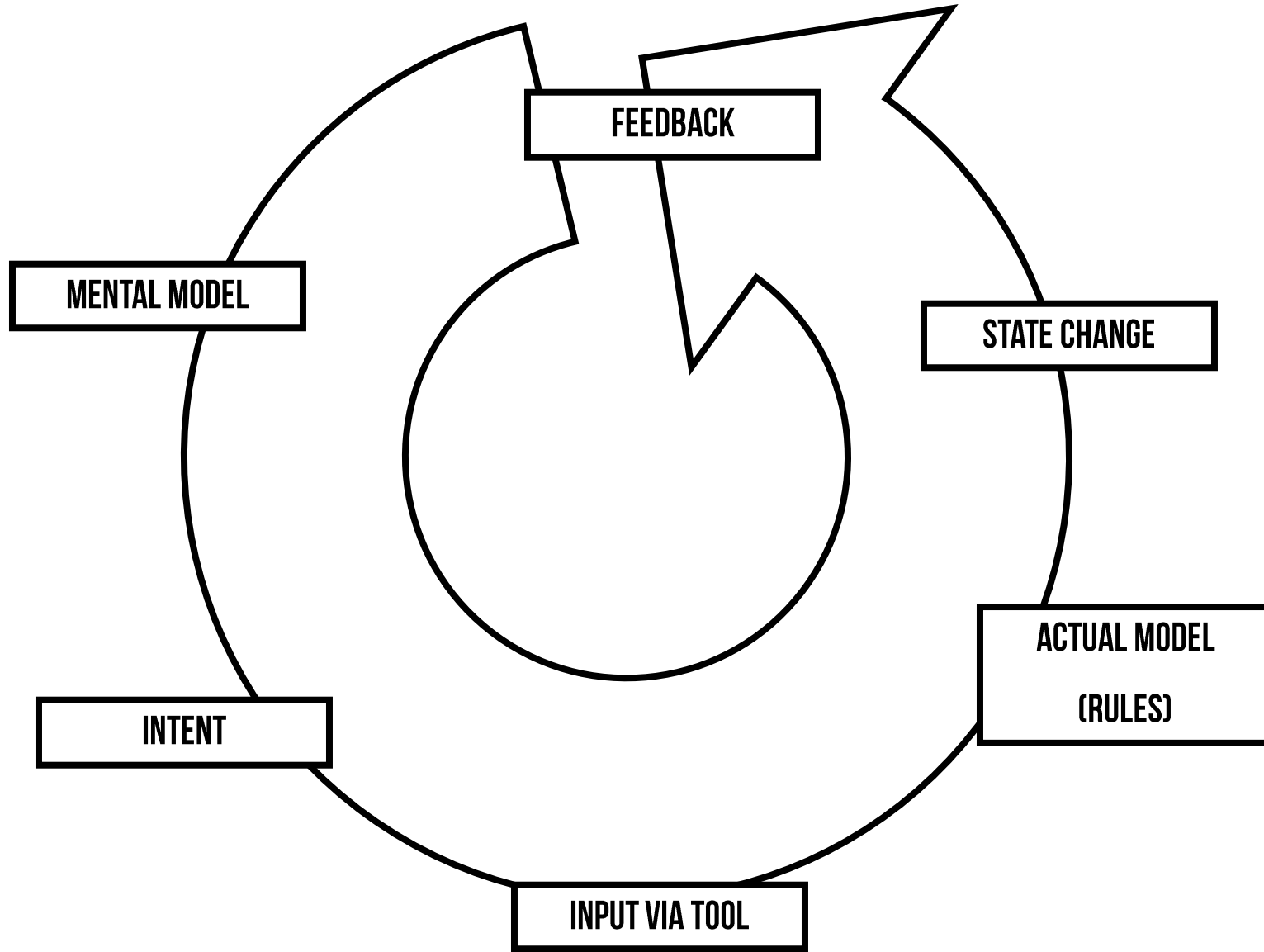
# WHAT IS GAME GRAMMAR?

## IT'S A WAY TO LOOK AT GAMES

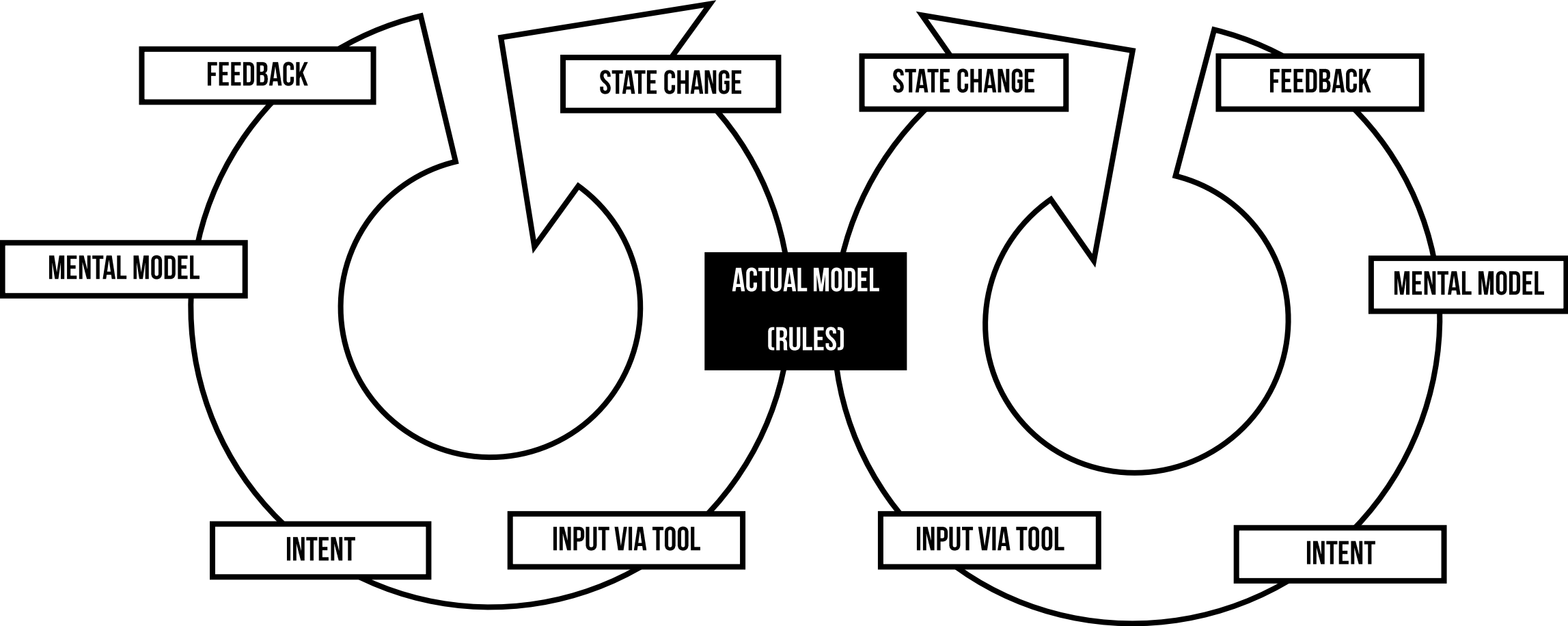
- NOT NECESSARILY A VERY ARTSY WAY
- RATHER DRY, SCIENCISH

## FELLOW TRAVELERS

- DAN COOK
- STEPHANE BURA
- JORIS DORMANS AND ERNEST ADAMS
- KEITH BURGUN



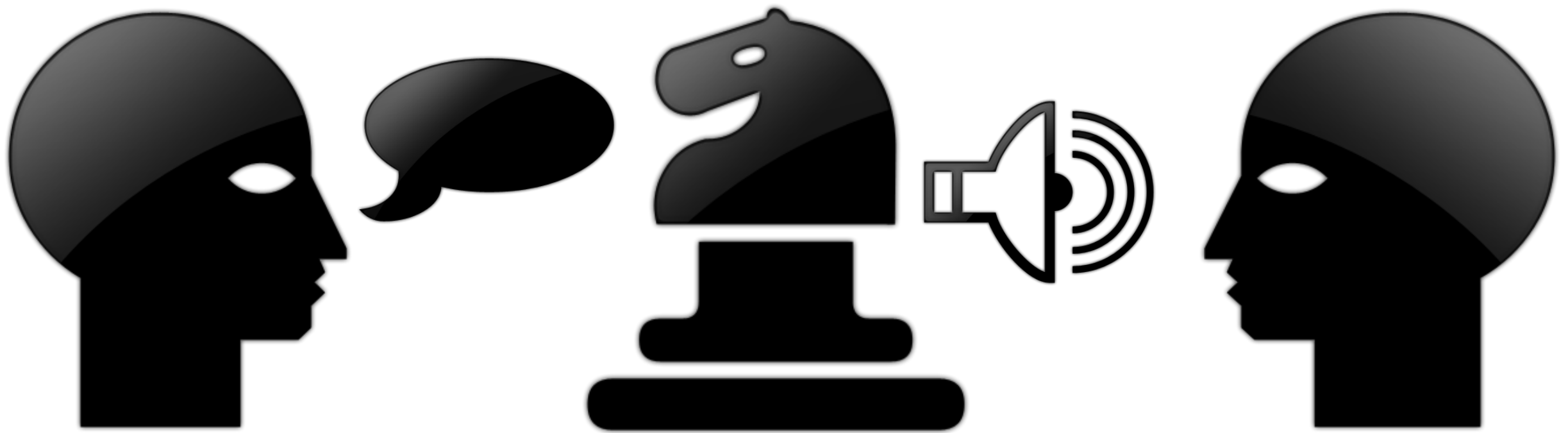
THE MEDIATION VERSION



LET'S IMAGINE A CHESS GAME.



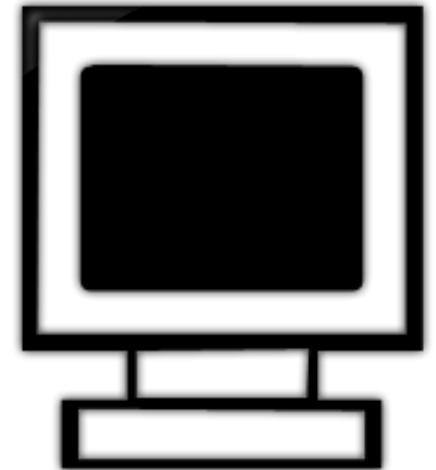
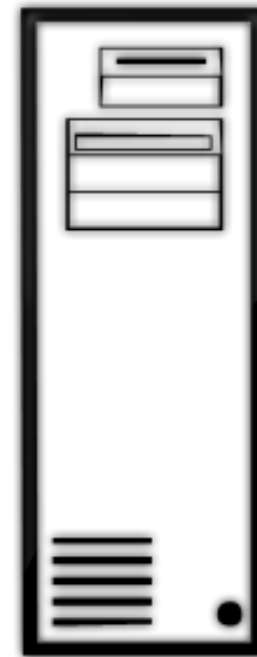
CHESS IS LIKE A MACHINE, A FILTER THAT COMMUNICATION FLOWS THROUGH.



CHESS ALSO TELLS US WHAT WE SHOULD BE DOING. BEATING THE OTHER PLAYER IS AN **OBJECTIVE**.  
WE CAN SET INTERIM GOALS ALONG THE WAY, BUT THERE'S A FRAMEWORK SET UP BY THE  
DESIGNER.



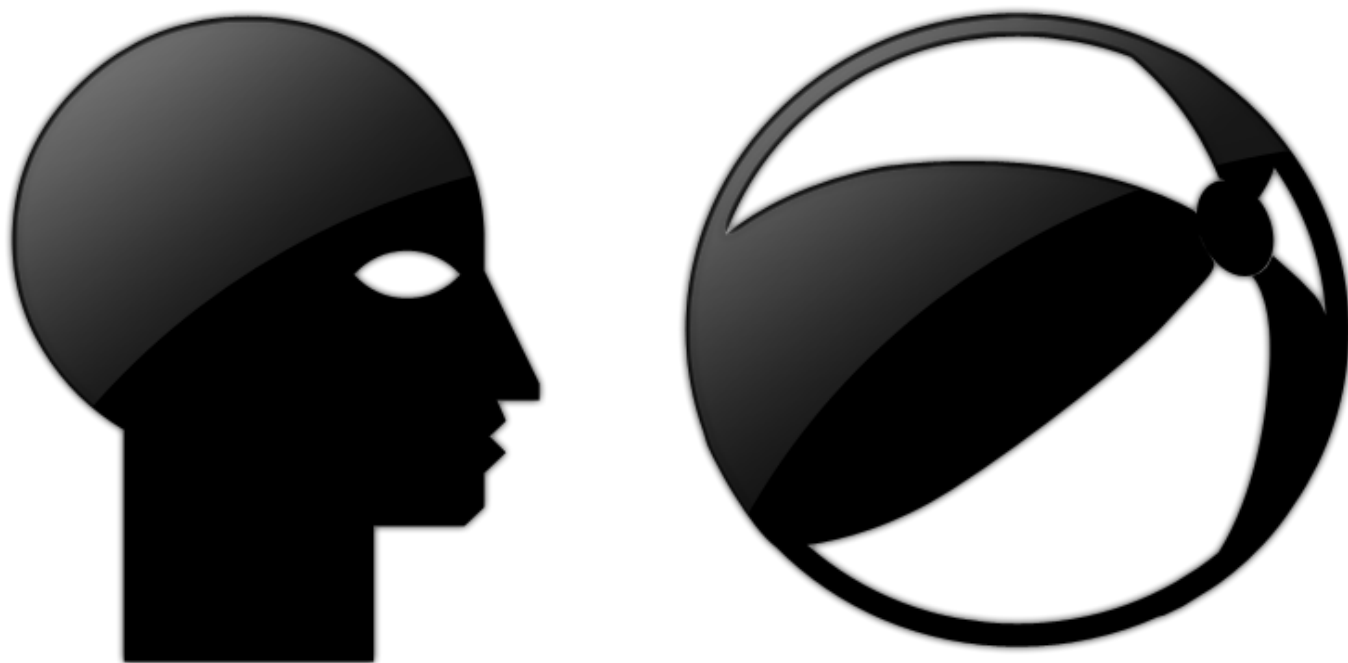
ALSO, OF COURSE, THERE MIGHT BE SOMETHING ARTIFICIAL MAKING THE DECISIONS BACK THERE TOO.



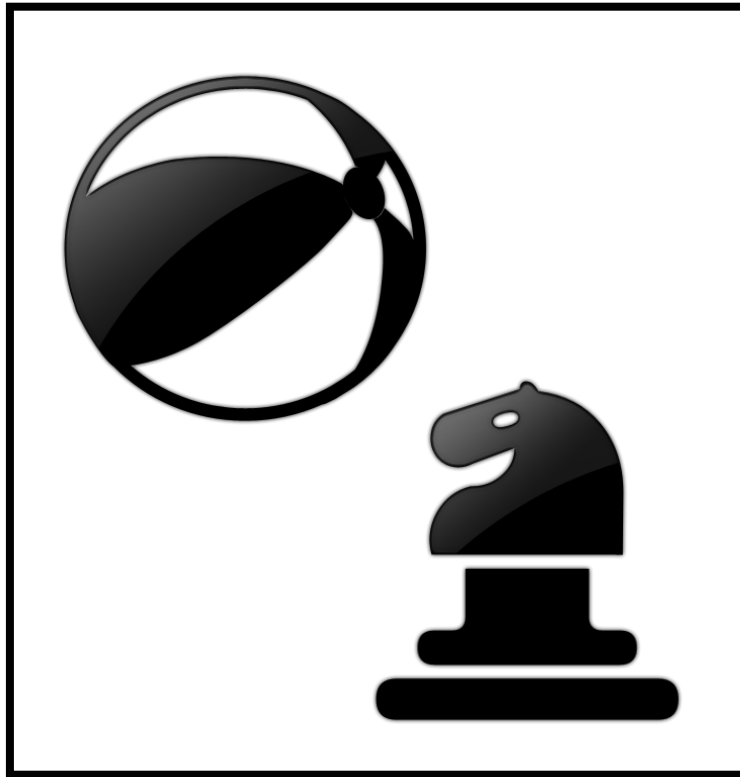
COMPARE TO A BALL.



A BALL DOES NOT NECESSARILY HAVE AN OBJECTIVE. JUST INTERIM GOALS.



BOTH THE BALL AND CHESS, HOWEVER, HAVE A SET OF COMMON CHARACTERISTICS THAT ENABLE PLAY.



# THE COMMON CLASSIFICATION

TOY



GAME

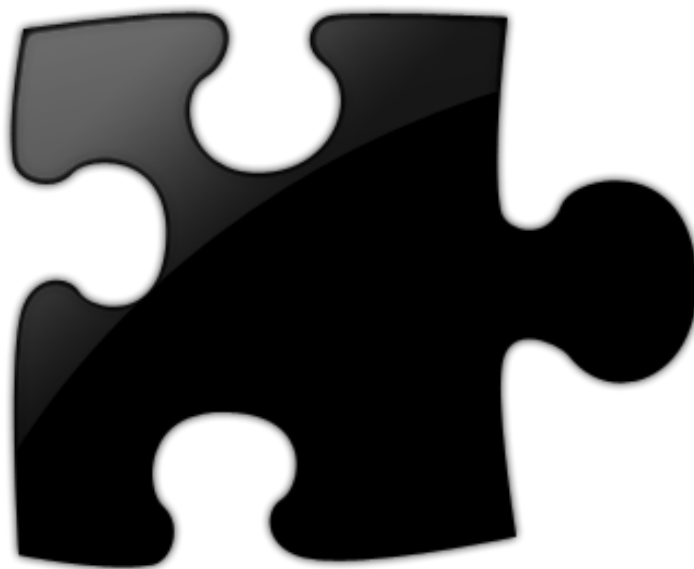


# THE COMMON CLASSIFICATION

TOY



PUZZLE



GAME



OK, BACK TO CHESS... REALLY, WE SHOULD BREAK IT INTO THREE PARTS.

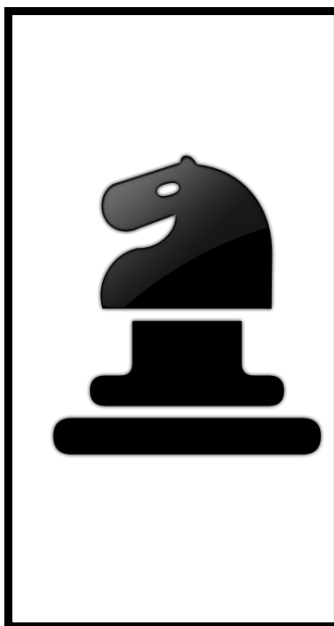




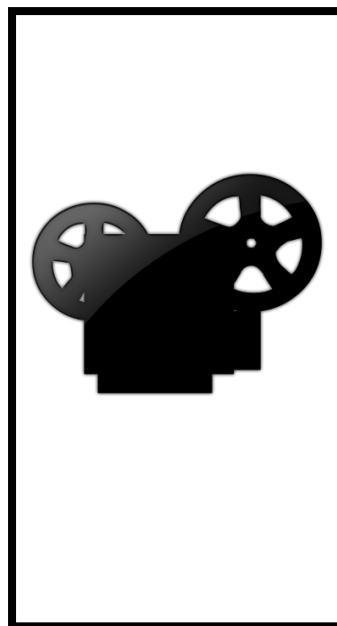
INPUT



BLACK BOX



PRESENTATION





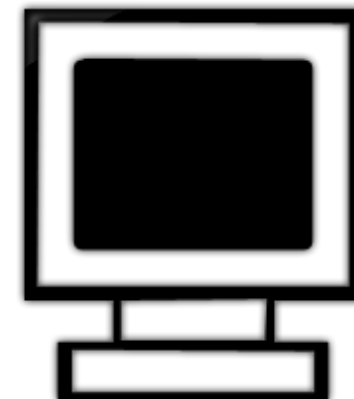
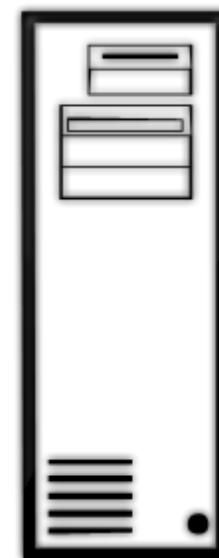
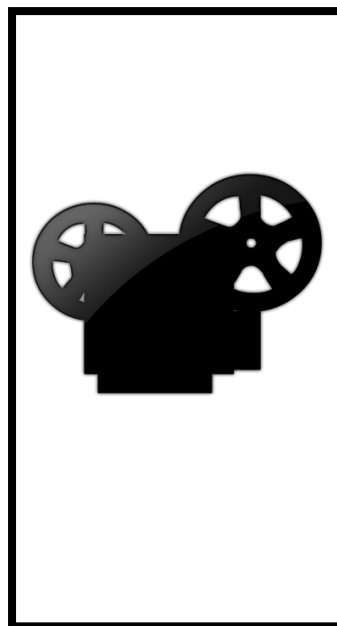
INPUT



BLACK BOX



PRESENTATION



# ASYMMETRIC GAMES

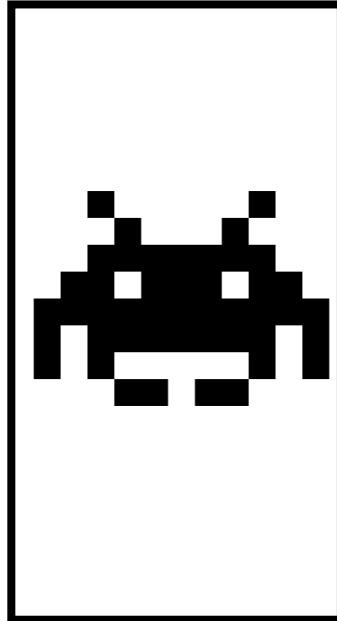
SPACE INVADERS HAS A BLACK BOX THAT IS SORT OF LIKE ONE WAY GLASS – IT OFFERS DIFFERENT INPUTS AND DIFFERENT “GAMES” TO THE TWO PLAYERS.



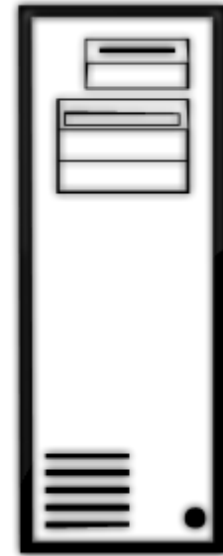
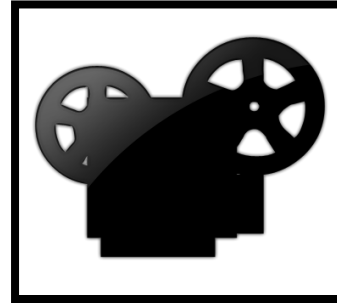
INPUT



BLACK BOX

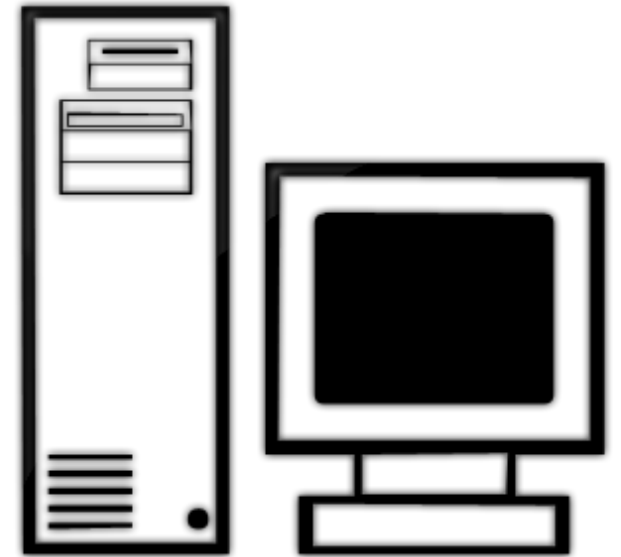
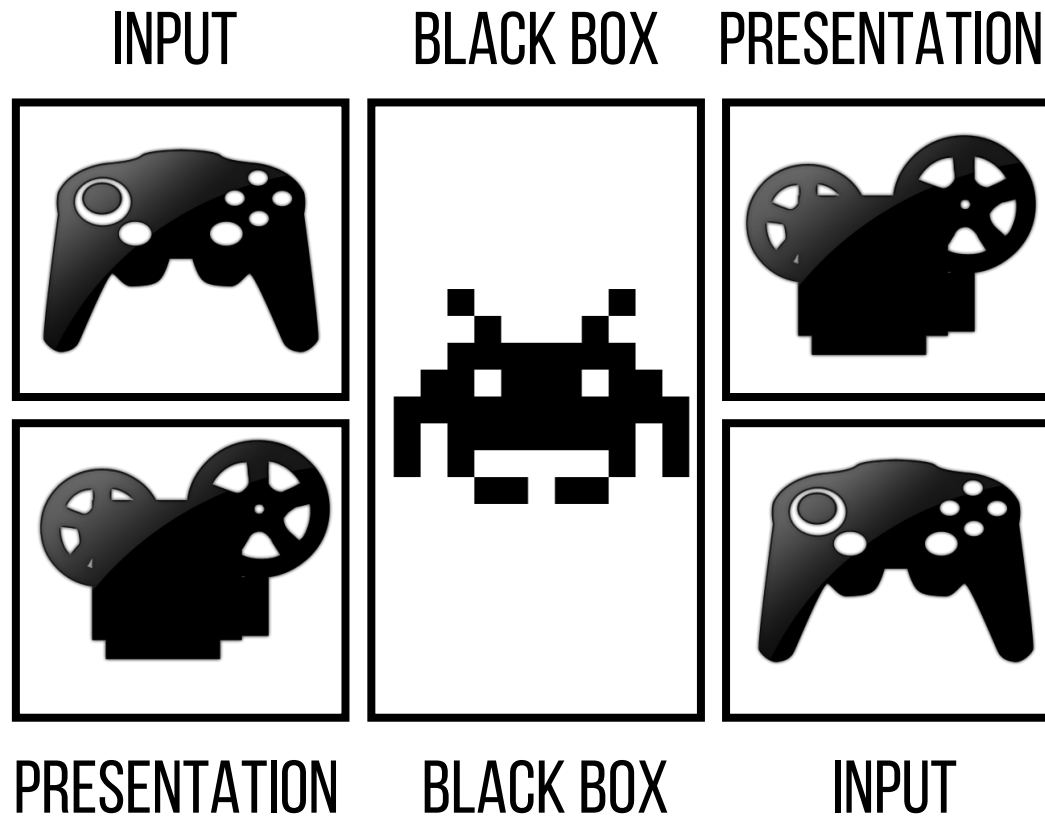


PRESENTATION



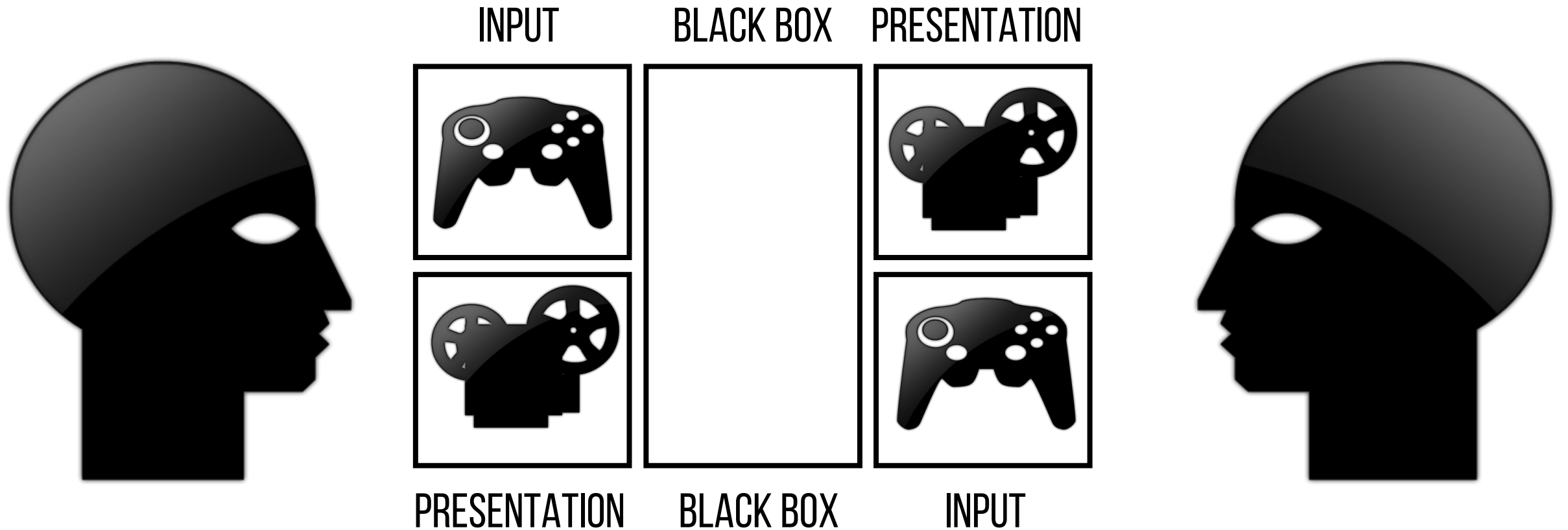
# ASYMMETRIC GAMES

SPACE INVADERS HAS A BLACK BOX THAT IS SORT OF LIKE ONE WAY GLASS – IT OFFERS DIFFERENT INPUTS AND DIFFERENT “GAMES” TO THE TWO PLAYERS.



# ASYMMETRIC GAMES

FOX AND GEESE, OR EVEN DUNGEONS AND DRAGONS, CAN BE THOUGHT OF THIS WAY. NOTE THAT THE GOALS FOR THE TWO PLAYERS CAN BE TOTALLY ORTHOGONAL DESPITE SHARING RULESET.



# **SOME QUESTIONS**

**IF YOU PLAY CHESS ON A COMPUTER IS IT STILL CHESS?**

**HOW ABOUT IF YOU PLAY IT ONLY IN YOUR HEAD?**

**WAS BATTLECHESS CHESS?**

**WHAT ABOUT CHESS PLAYED WITH HUMANS ON BIG SQUARES IN A PARK?**

# INTERIM GOALS AND THE OBJECTIVE

**MOVE ROOK**

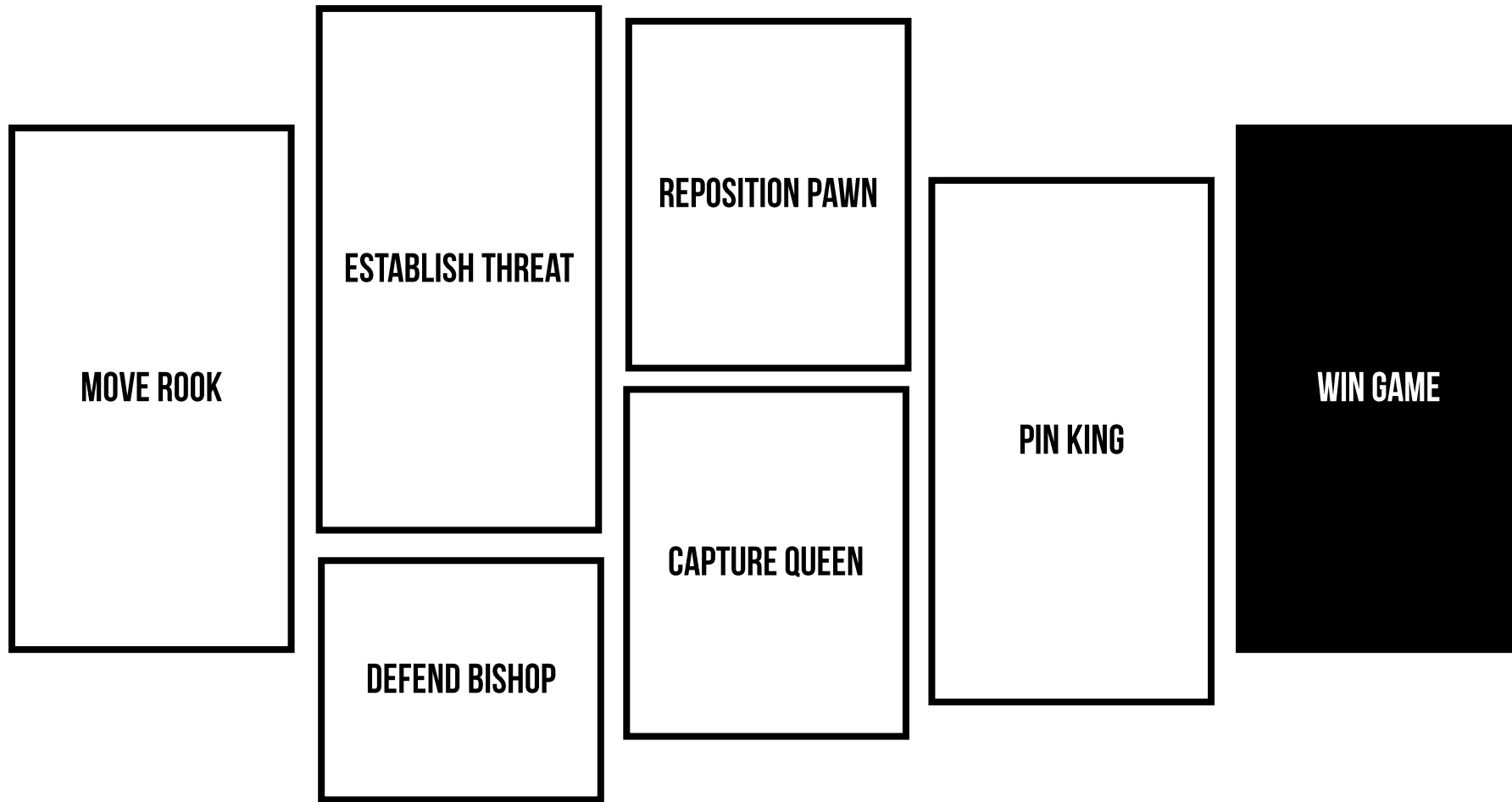
**ESTABLISH THREAT**

**CAPTURE QUEEN**

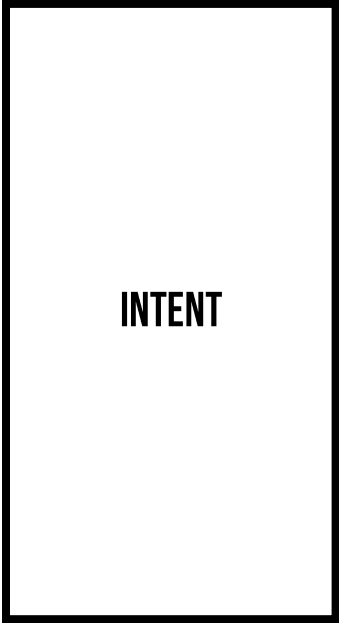
**PIN KING**

**WIN GAME**

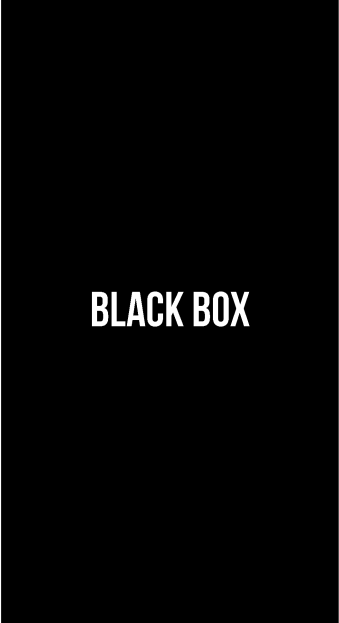
# INTERIM GOALS AND THE OBJECTIVE



# INTERACTION IS COMPLICATED



INTENT



BLACK BOX

# INTERACTION IS COMPLICATED



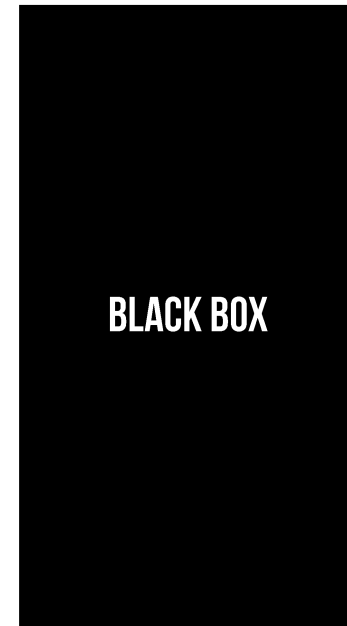
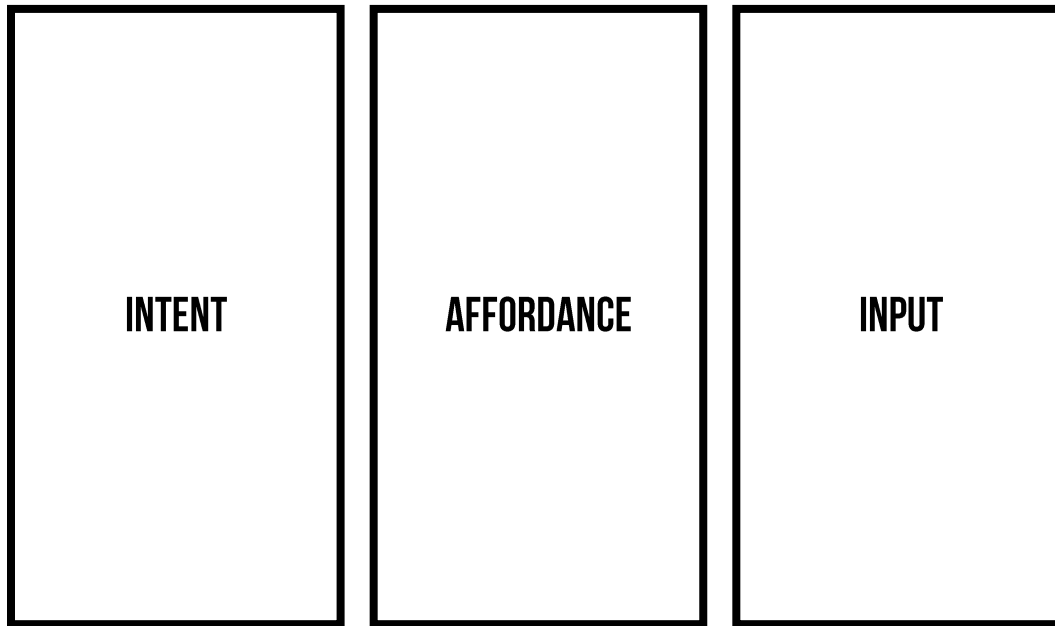
Diagram illustrating the components of interaction design. It consists of three rectangular boxes. On the left, two white boxes with black borders are positioned side-by-side. The first box contains the word 'INTENT' and the second box contains the word 'AFFORDANCE'. To the right of these two boxes is a single, solid black box containing the words 'BLACK BOX' in white. The boxes are arranged horizontally, suggesting a relationship or flow between the concepts of intent, affordance, and the black box model.

**INTENT**

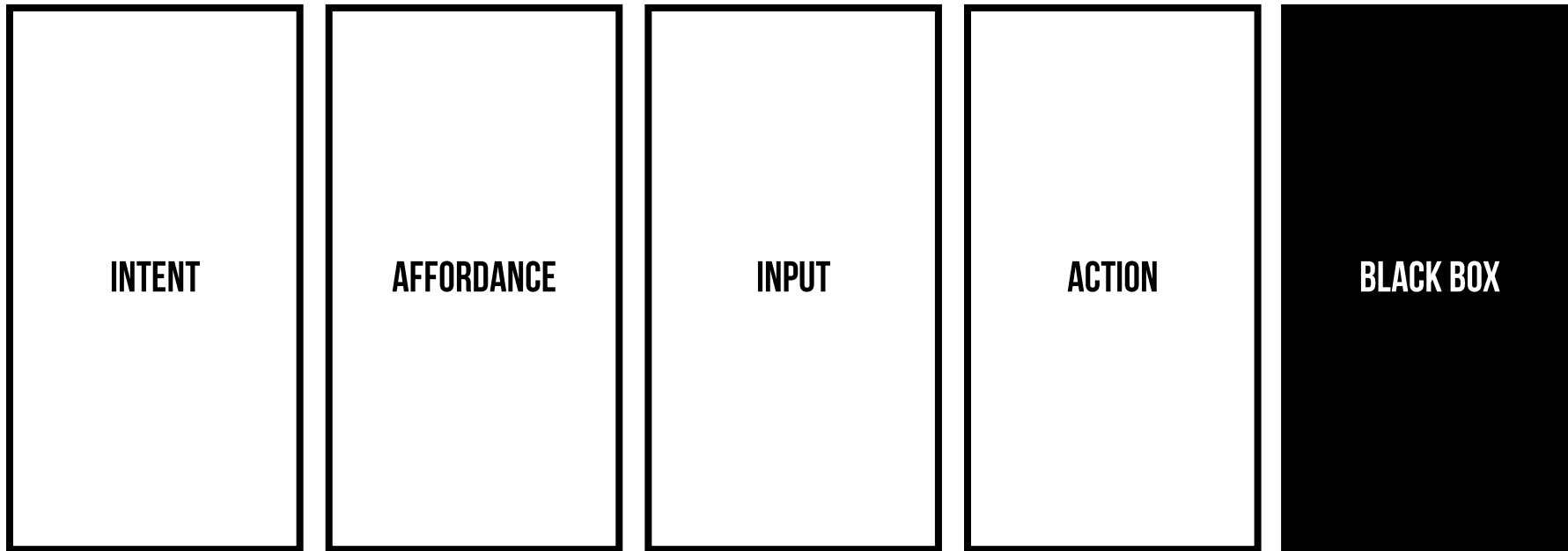
**AFFORDANCE**

**BLACK BOX**

# INTERACTION IS COMPLICATED

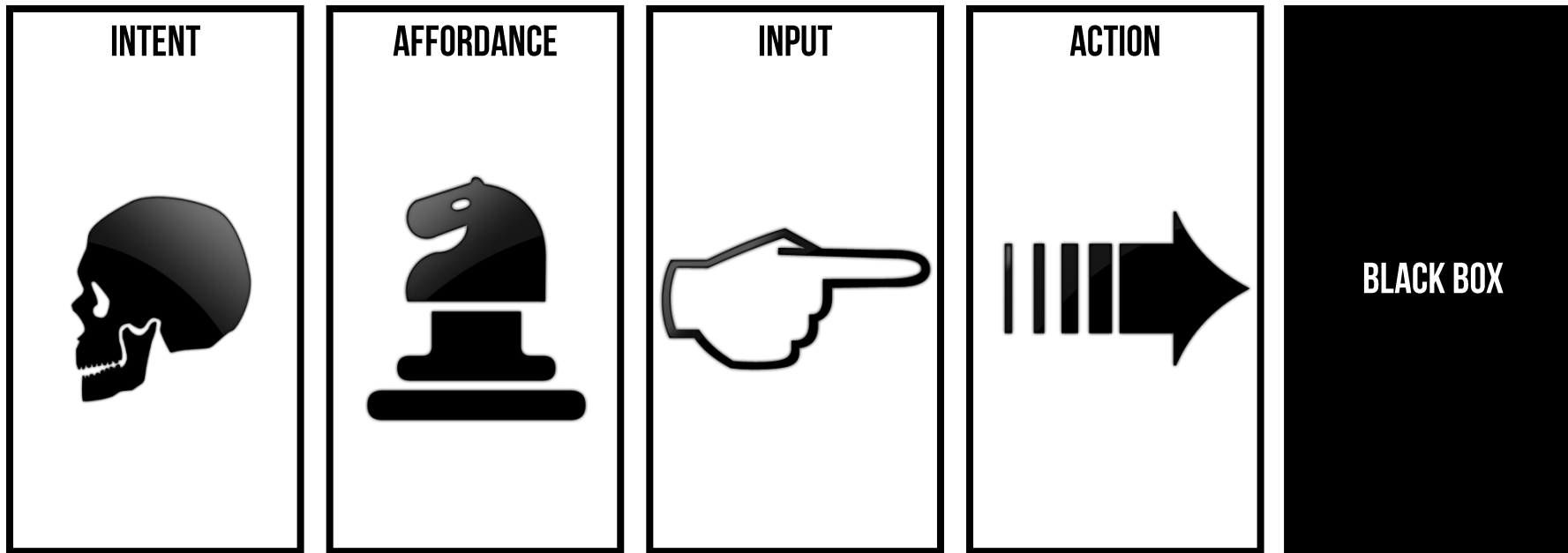


# INTERACTION IS COMPLICATED



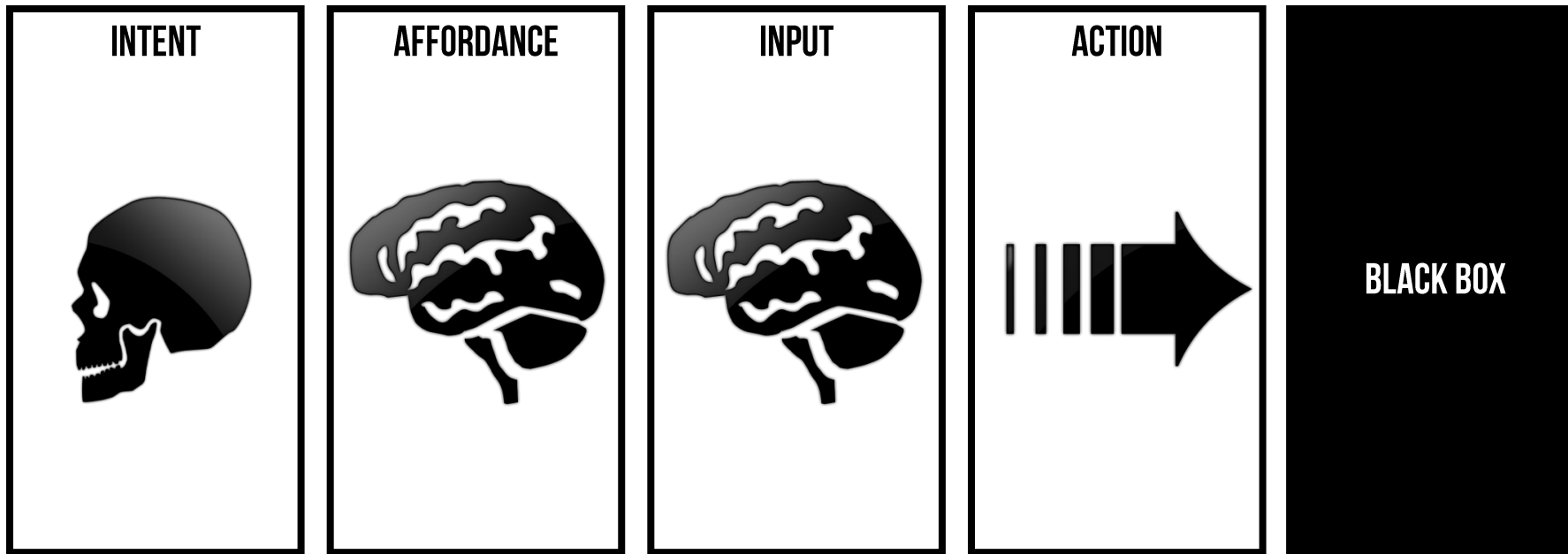
# INTERACTION IS COMPLICATED

TABLETOP CHESS.



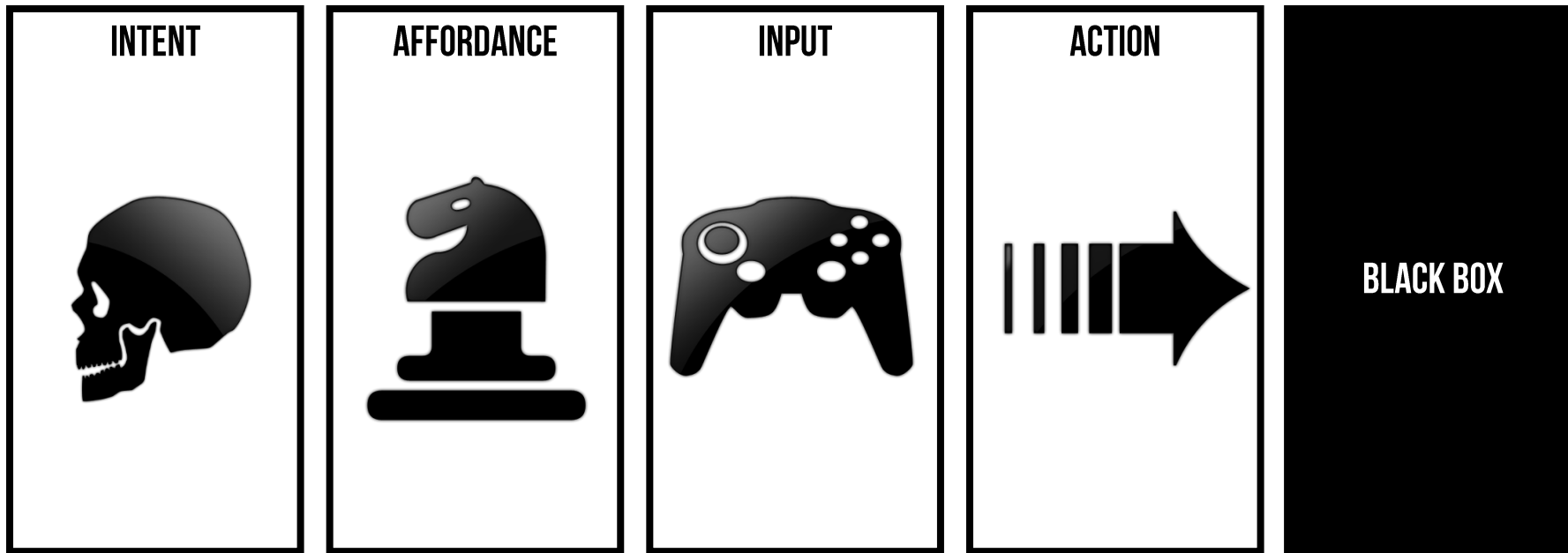
# INTERACTION IS COMPLICATED

CHESS IN YOUR HEAD.



# INTERACTION IS COMPLICATED

COMPUTER CHESS.



# GAMES NEST, ARE MADE OF GAMES.

WIN GAME

PIN KING

CAPTURE QUEEN

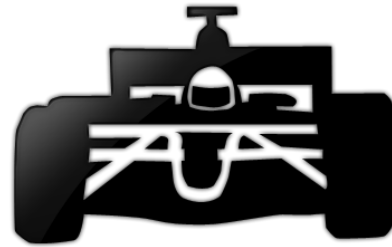
ESTABLISH THREAT

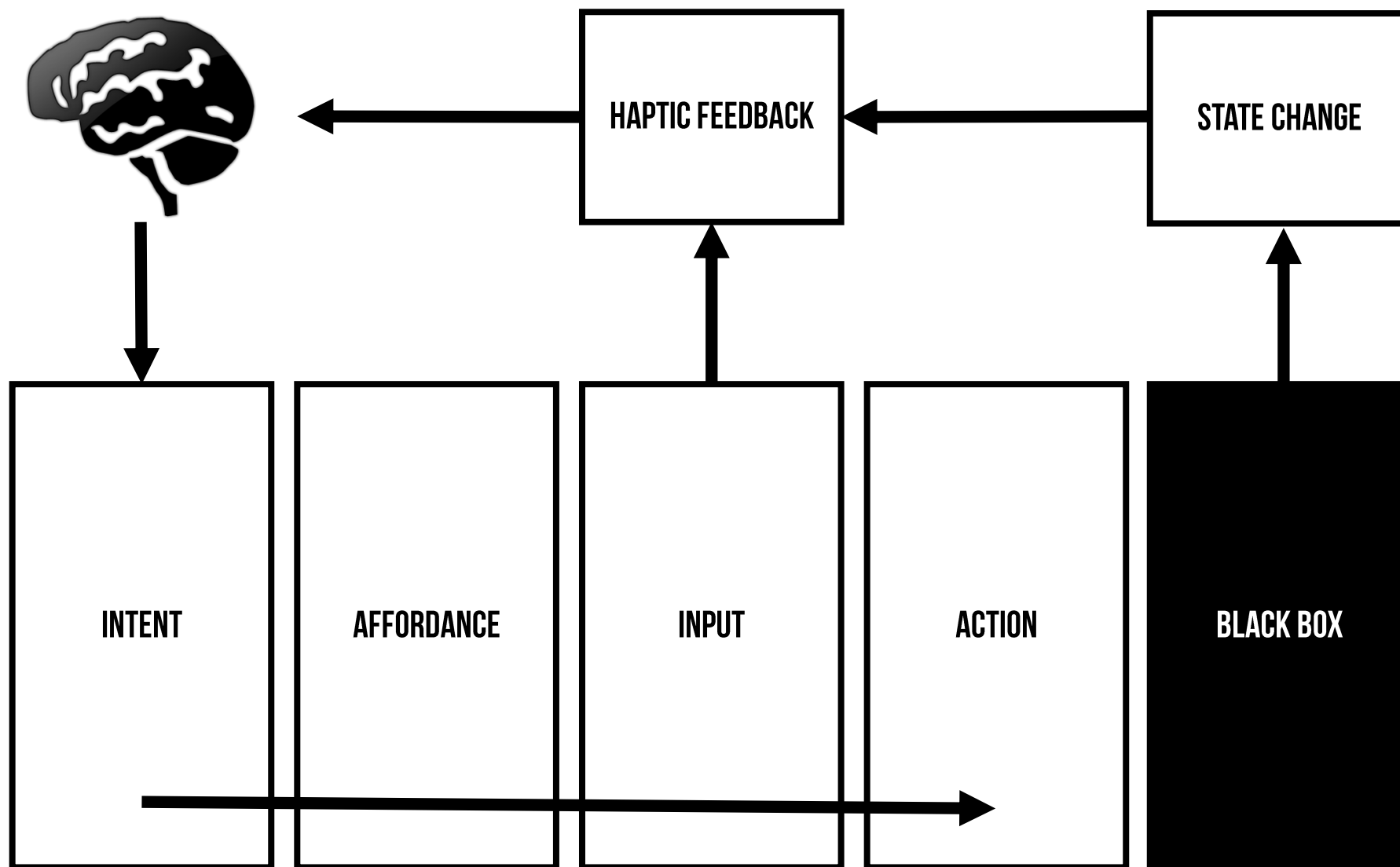
MOVE ROOK

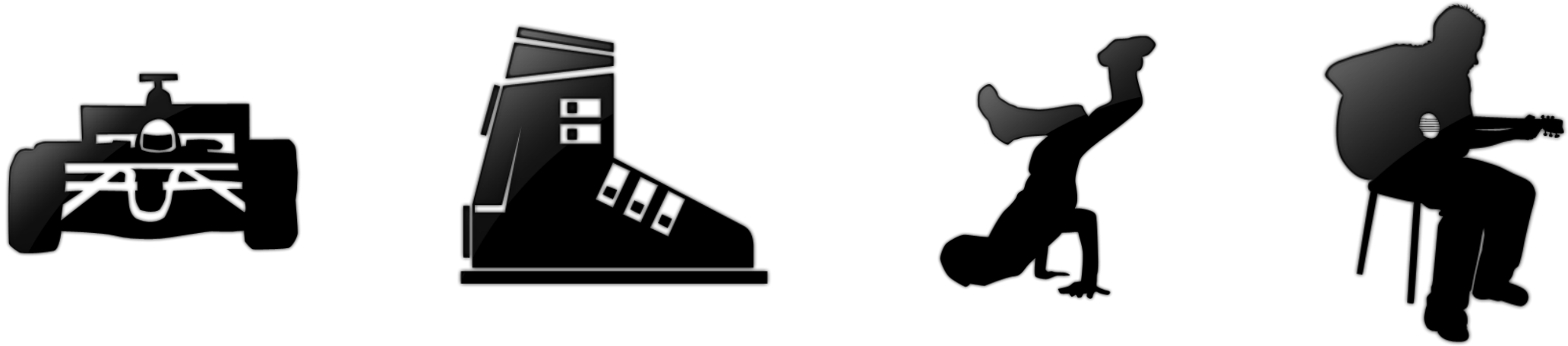
PICK UP ROOK.

MOVE HAND

# A RACING GAME: THE GAME IS THE INTERFACE



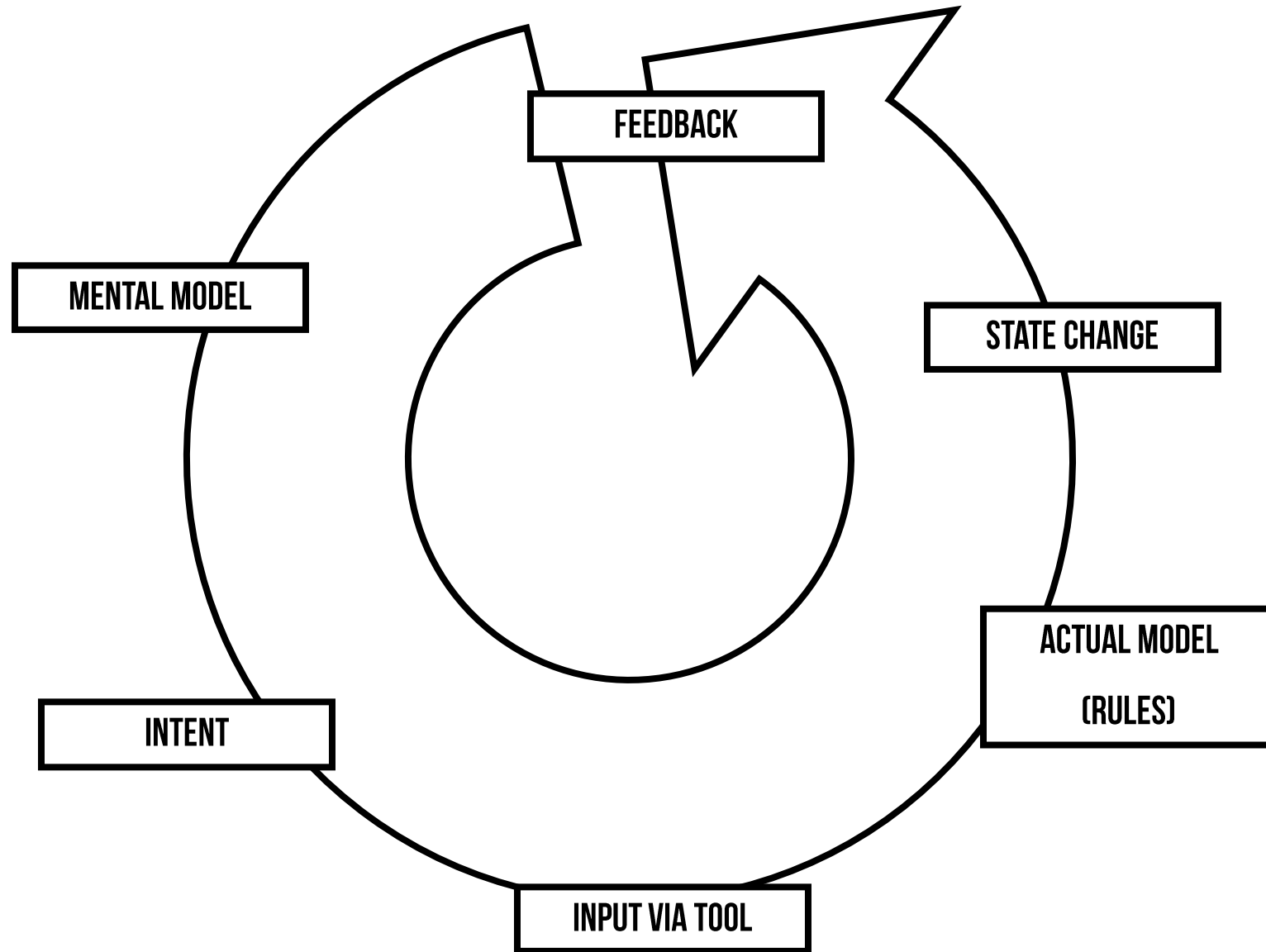




**VIRTUALLY ALL SPORTS RELY HEAVILY ON THIS, AS DO VARIOUS FORMS OF PLAY THAT ARE BASED ON MASTERING PHYSICAL REACTIONS.**

- ROLLERCOASTERS, ICE SKATING, DDR, GUITAR PLAYING, ARE ALL GREAT EXAMPLES OF GAMES OF “INTERFACE MASTERY” WHERE BEING ABLE TO MASTER INPUTS TO GET THE DESIRED ACTION IS ABSOLUTELY CRITICAL.
- THIS DOESN'T PRECLUDE THERE BEING A BLACK BOX OUTSIDE THIS LOOP; PLAYING GUITAR HAS MUSIC AS THAT BLACK BOX, AND ICE SKATING HAS PHYSICS.

# TURNS

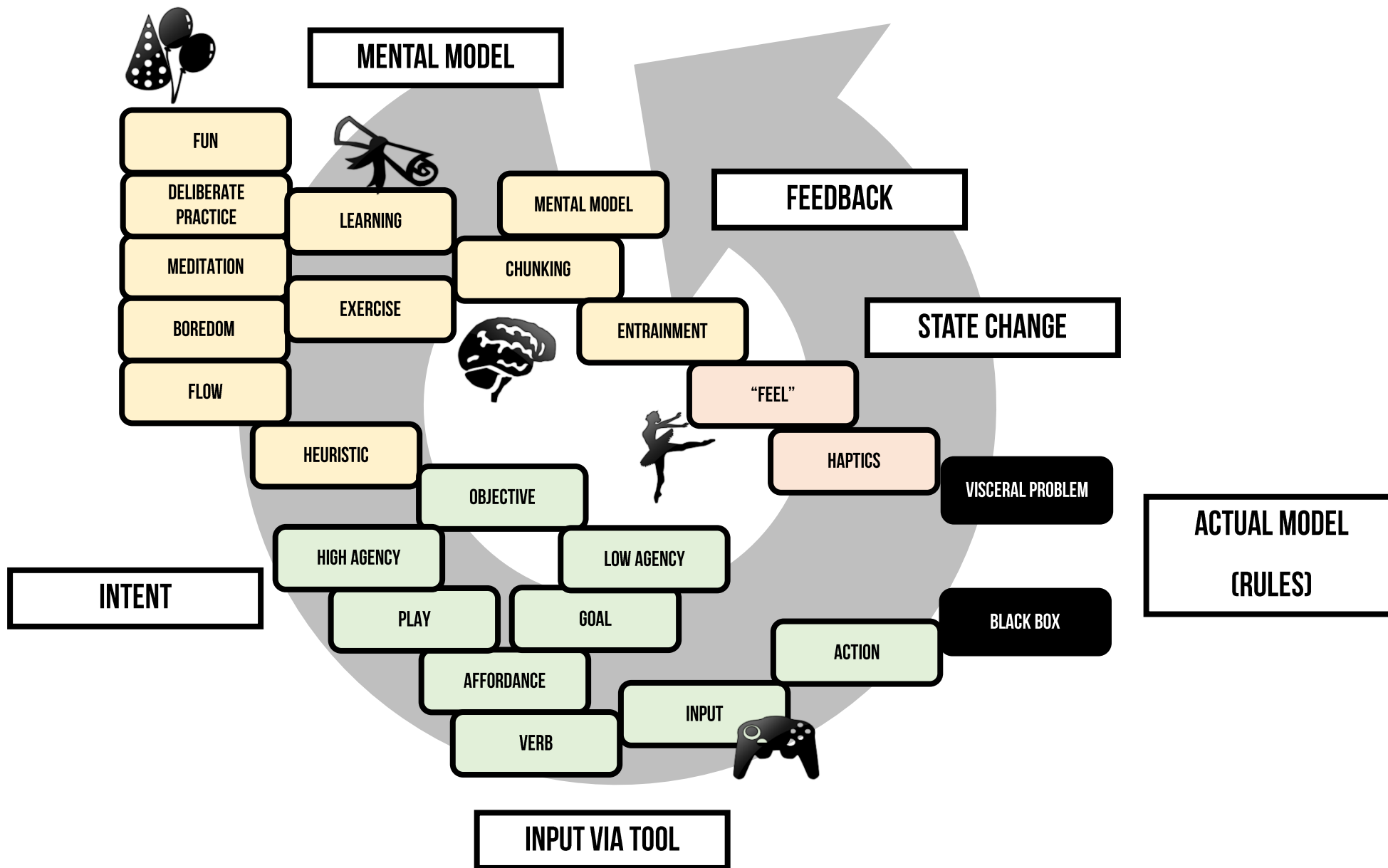


THE HUMAN FRAMERATE FOR CONSCIOUS REACTIONS VARIES BY INDIVIDUAL BUT IS AROUND 265MS, OR 16 FRAMES AT 60FPS, ASSUMING SIMPLE INPUT

# TRAINING

ON THE OTHER HAND, YOU CAN TRAIN SPEED BY ALLOWING THE BRAIN TO MASTER COMPLEX INPUTS TO REDUCE DOWN TO NEAR AUTONOMIC CHOICES

- GRADUALLY INCREASE SPEED, ROTE REPETITION
- THIS **ENTRAINMENT** IS ONE OF THE FOUR BIG CLASSES OF TEACHING THAT GAMES CAN DO



# SOME STRUCTURES AFFORD PLAY

## LUDIC ARTIFACTS

### SYSTEMS DESIGNED FOR PLAY



- GO
- MAGIC: THE GATHERING
- ASSOCIATION FOOTBALL
- WEREWOLF
- SPACE INVADERS
- LEAGUE OF LEGENDS

## LUDIC SYSTEMS

### SYSTEMS SUSCEPTIBLE TO PLAY

- THE STOCK MARKET
- MUSICAL INSTRUMENTS
- WARFARE
- POLITICS
- THE HUMAN INNER EAR
- PHYSICS



# THE WORLD IS COMPLICATED

WE ARRIVE AT HEURISTICS FOR COPING WITH THESE, WE CHUNK THEM INTO ICONS THAT WE CAN USE FOR DAY TO DAY LIFE.

FOR FULLY FUNCTIONAL ICONS, WE NEVER THINK OF THEM, LITERALLY.

FOR STUFF WE CAN'T ICONIFY, WE THINK OF IT AS NOISE.

FOR STUFF IN THE MIDDLE, WE USE GAMES AS A TOOL FOR ICONIFICATION, AND FUN IS THE REWARD.



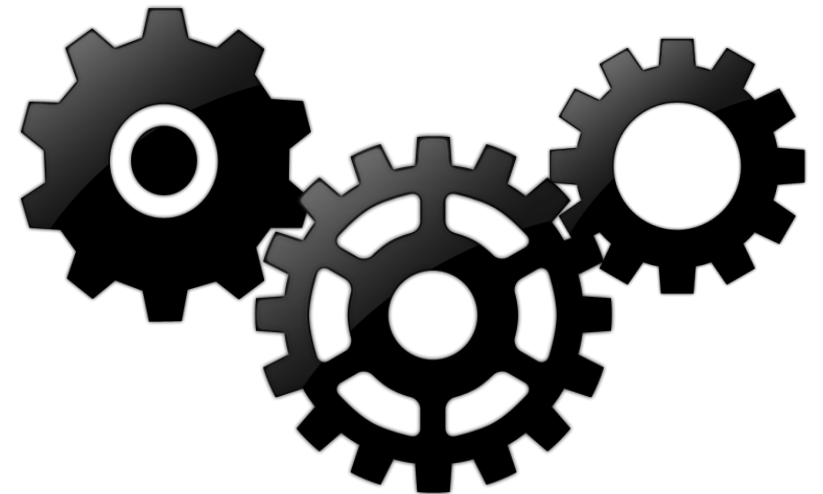
# COPING WITH DANGER

THE SYSTEMS AROUND US ARE FRICKIN' DANGEROUS, BIG GEAR MACHINES THAT MANGLE OUR LIMBS. SO GAMES OFFER TWO POSSIBLE WAYS TO COPE WITH LEARNING WITHOUT GETTING MANGLED:

- STICK OUR REAL HANDS INTO PRETEND GEARS (BY MAKING A TOY MODEL OF THE SYSTEM)
- STICK PRETEND HANDS INTO THE REAL GEARS (BY NOT EMOTIONALLY INVESTING IN OUR ACTIONS)

THERE IS ONE WORD WE USE FOR BOTH OF THESE:  
PLAY.

AND IT'S OBVIOUSLY SUBJECTIVE.



# SUITS AND LUSORY ATTITUDES



THE RIGIDITY AND WEIGHT OF THE STICK

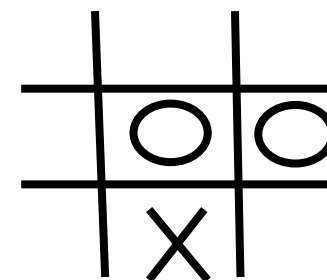
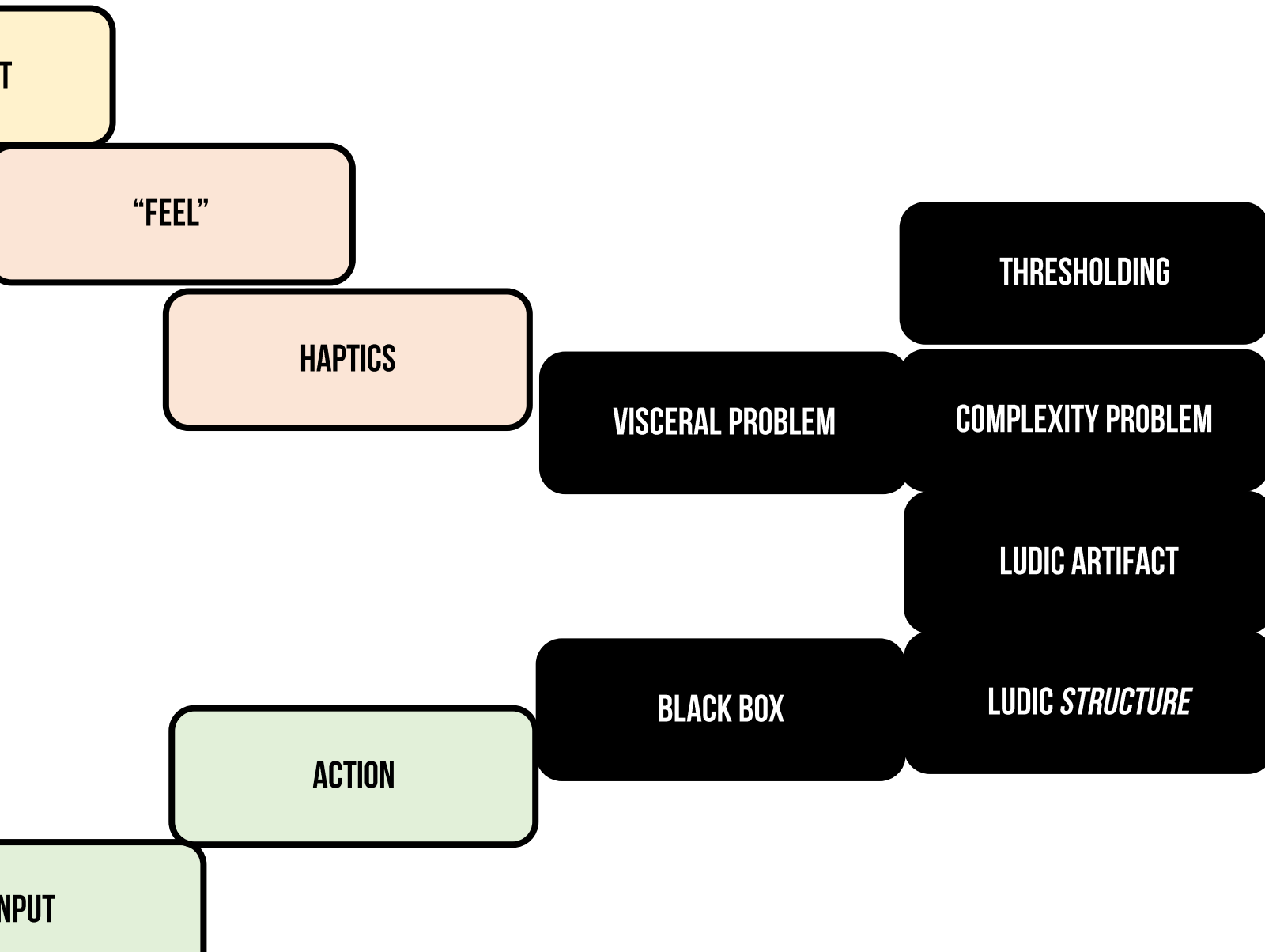
THE CHAOTIC INTERFERENCE OF THE SWIRLING WIND

THE MENTAL IMPACT OF THE OOHS AND AAHS OF THE SPECTATORS

THE WAY THE DEW FELL ACROSS THE GRASS AND REFLECTED SUN IN  
OUR EYES

THAT CRAMP IN OUR LEG FROM WALKING ALL THIS WAY

WE CARRY THOSE LESSONS ON IN TO OUR LIVES, WHERE KNOWING  
ABOUT GLARE, ABOUT TENSION, ABOUT TRAJECTORY AND ABOUT  
EMOTIONAL SUPPORT, MATTERS A LOT.



# ON DEFINITIONS

THIS IS WHY DEFINING GAME IS POINTLESS, IN ONE SENSE.

ANY LUDIC SYSTEM CAN BE A GAME IF APPROACHED AS ONE. DEFINE A GOAL, AND BOOM, YOU HAVE CREATED A GAME.

- A BALL, WHICH IS A TOY, BECOMES A GAME WHEN YOU DECIDE WHAT YOU ARE TRYING TO DO WITH IT.

IT CUTS THE OTHER WAY TOO; A USER MIGHT JUST NEVER SEE YOUR TWINE GAME AS A GAME, EITHER, AND YOU CAN'T REALLY TELL THEM OTHERWISE.

BUT IT'S NOT ALL SUBJECTIVE!

# **WAYS TO PLAY AND NOT HAVE FUN**

**MEDITATION**

**DELIBERATE PRACTICE**

**COMFORT**

# FOUR PROBLEM TYPES

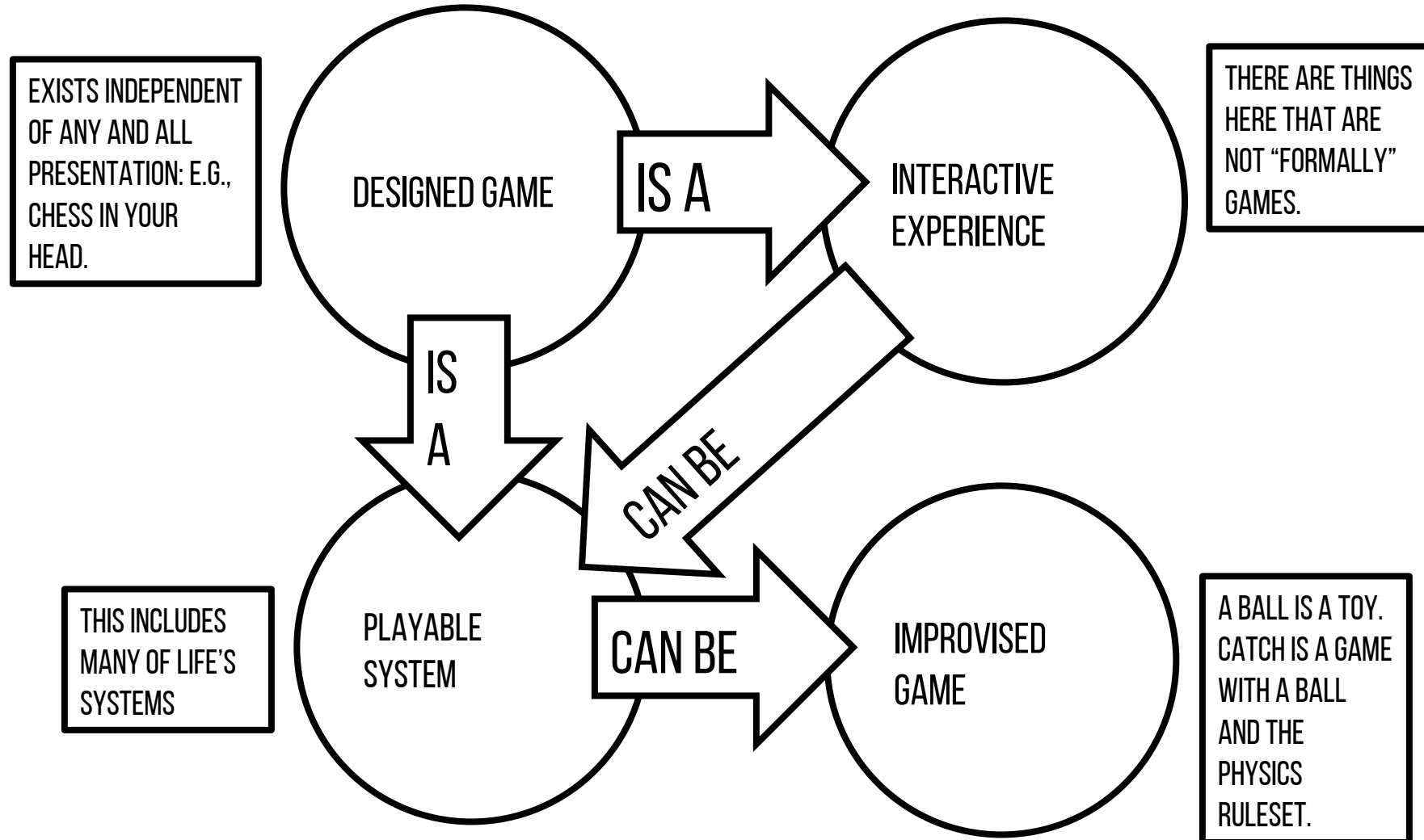
**MASTERING ONE'S OWN  
PHYSICAL REACTIONS**

**MASTERING SOCIAL SITUATIONS**

**MASTERING SYSTEMIC  
WEBS OF RELATIONSHIPS**

**FAILING TO UNDERSTAND  
PROBABILITY**

# THE LUDIC PROCESS



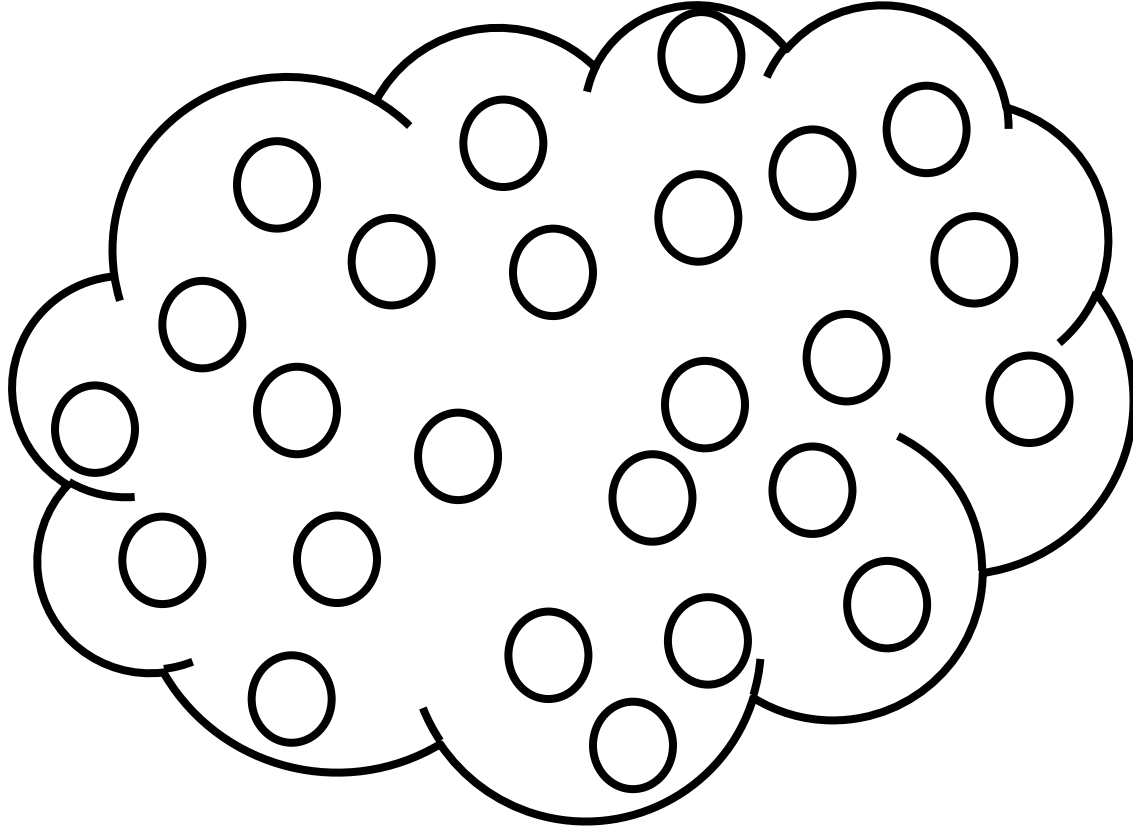


ANOTHER WAY TO THINK OF THIS SORT OF PLAY OR SPACE IS AS INTERPRETABILITY.

SOMETHING THAT STANDS STILL GETS ICONIFIED. SOMETHING IN MOTION HAS MORE TO TEACH. THE BIGGER THE RANGE OF MOTION, THE HARDER TO ICONIFY.

IN THE CASE OF RICH SIMULATION, WE MIGHT EVEN SPEAK OF THE SYSTEM HAVING AN INNER LIFE

- A RICH SIMULATION IS BASICALLY AN “OPPONENT” SPEAKING TO US THROUGH THE SIM
- OR MAYBE IT’S ACTUALLY A PERSON!



# FOUR PROBLEM TYPES LINE UP TO MECHANICS

**TRAINING, VERTIGO**

**COMPLEX MATH**

**MENTORING, HIERARCHY,  
OTHERING, IDENTITY**

**CHANCE**

# ALL KNOWN SOCIAL MECHANICS

## 1 V SELF/SYSTEM

- HELPING

## 1 V 1 PARALLEL

- STATUS
- RACES
- LEADERBOARDS
- TOURNAMENTS

## 1V1 OPPOSED

- FLOWER-PICKING
- DOT-EATING
- TUG OF WAR
- HANDICAPPING
- SECRETS

## 1 V 1 V 1 V ...

- LAST MAN STANDING
- BIDDING
- DECEPTION AND BLUFFING
- 3<sup>RD</sup> PARTY BETTING
- PRISONER'S DILEMMA
- GAMESMASTER

## N V N (GROUPS)

- ROLES
- HOT POTATO
- RITUALS
- GIFTS
- RECIPROCITY
- MENTORING & TWINKING
- IDENTITY
- OSTRACISM

## NETWORKS

- ITERATIVE INTERACTION & TRUST
- GUILDS
- EXCLUSIVITY
- GUILD VS GUILD
- TRADE AND CONTRACT
- ELECTIONS
- INFLUENCE AND FAME
- PUBLIC GOODS
- TRAGEDY OF THE COMMONS
- COMMUNITY
- STRATEGY GUIDES
- TEAMWORK (MLS)
- ARBITRAGE
- SUPPLY CHAINS
- USER GENERATED CONTENT

## DECONSTRUCTION

- GRIEFING

## “PASES”:

- POLITICS
- ART
- SCIENCE
- SOCIOLOGY
- ECONOMICS

# SOME KNOWN COMPLEXITY PROBLEMS

1. GRAPH ISOMORPHISM
2. EXACT COVER
3. SET PACKING
4. VERTEX COVER
5. GRAPH COLORING (THE FOUR COLOR MAP PROBLEM)
6. KNAPSACK PROBLEM
7. THREE-DIMENSIONAL MATCHING
8. STEINER TREE
9. MAXIMUM CUT
10. THE PARTITION PROBLEM

# LOOK TO THE UNDERLYING MATH

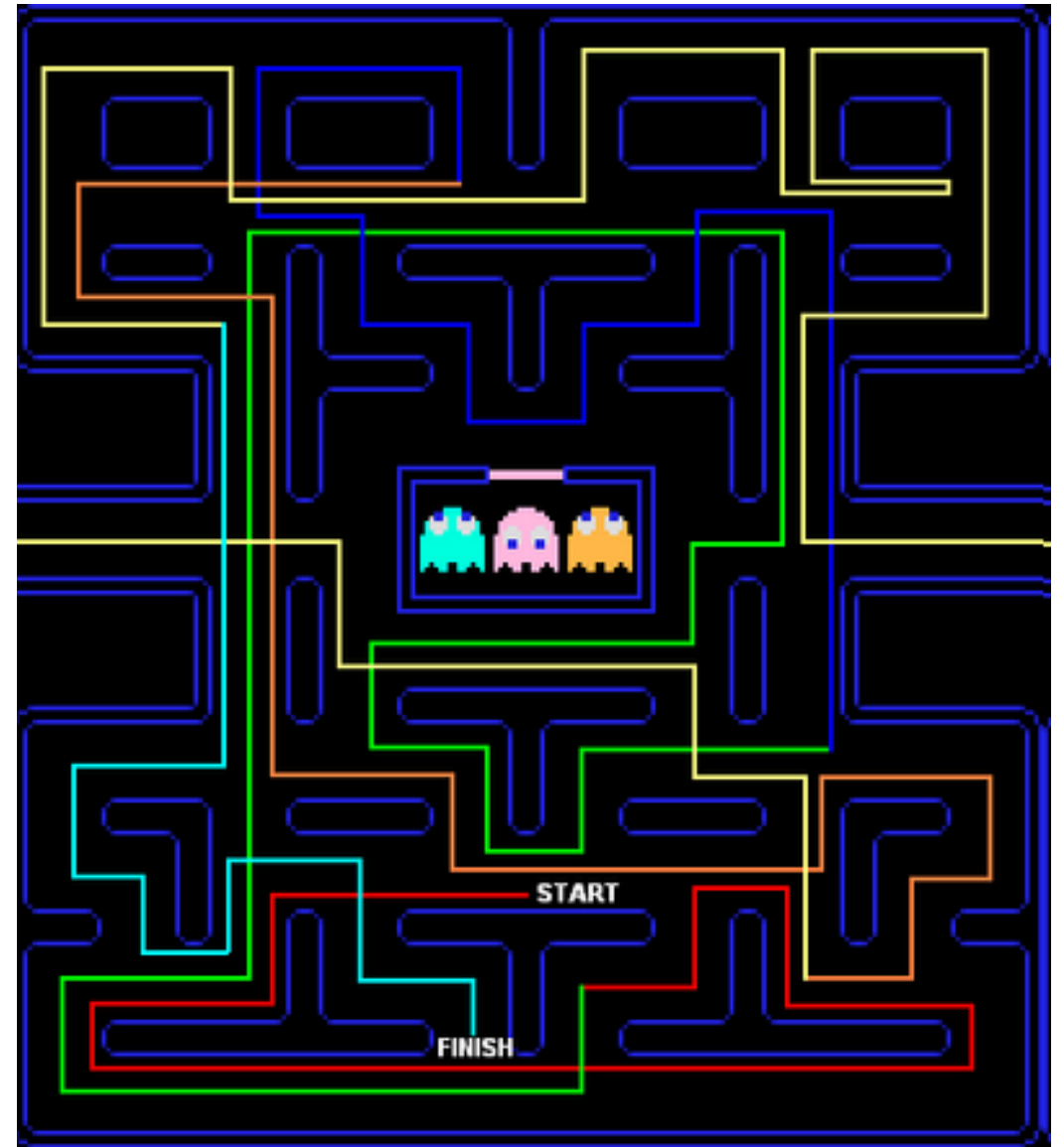
THESE ARE MORE OR LESS THE SAME PROBLEM.



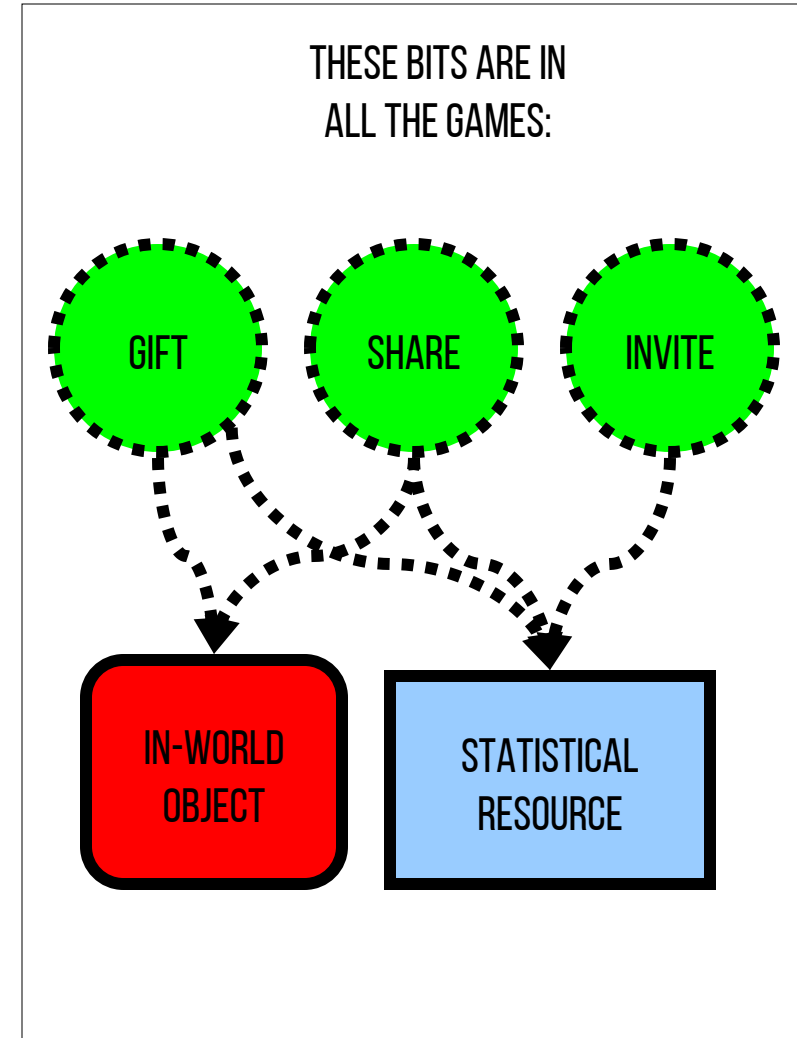
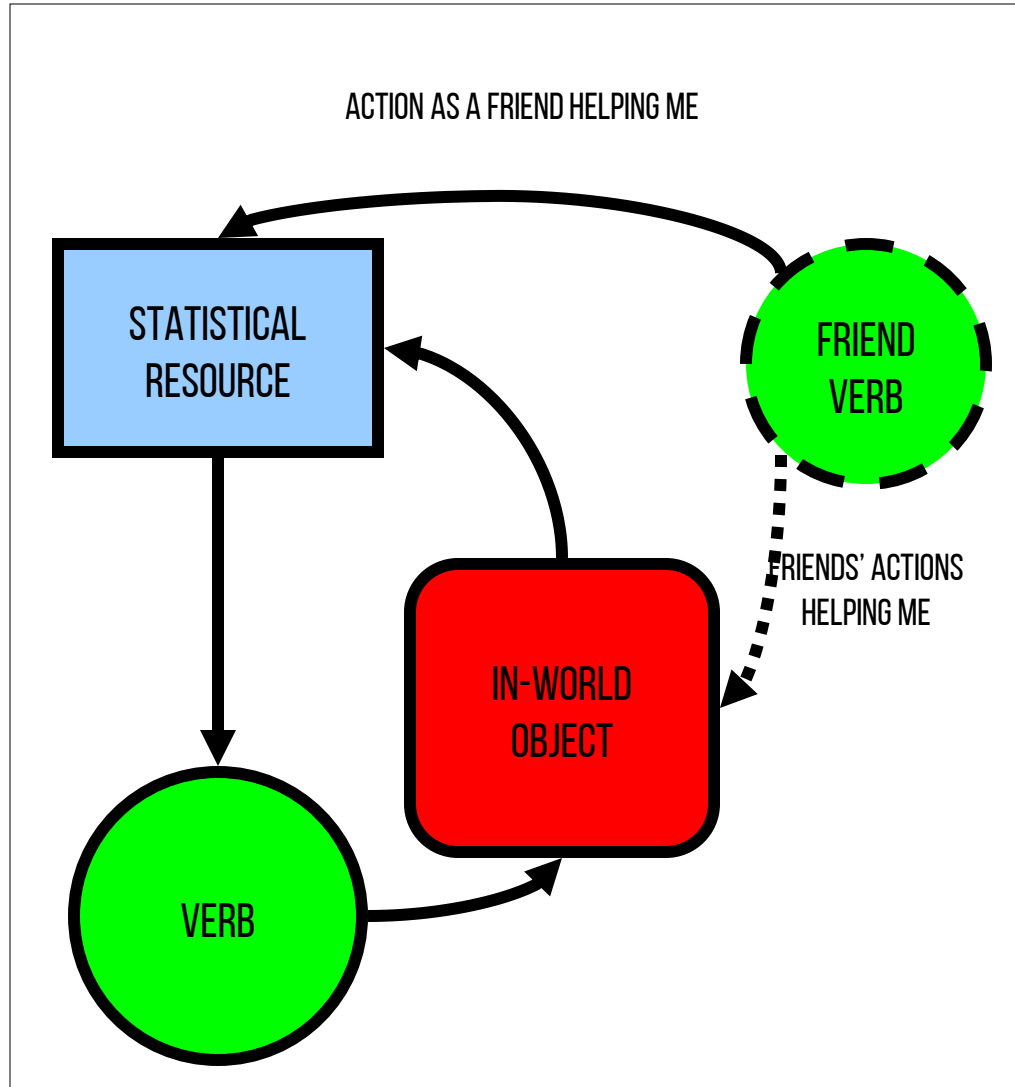
|   |  |   |   |   |   |   |   |
|---|--|---|---|---|---|---|---|
| 9 |  |   | 1 |   |   |   | 5 |
|   |  | 5 |   | 9 |   | 2 | 1 |
| 8 |  |   |   | 4 |   |   |   |
|   |  |   |   | 8 |   |   |   |
|   |  |   | 7 |   |   |   |   |
|   |  |   |   | 2 | 6 |   | 9 |
| 2 |  |   | 3 |   |   |   | 6 |
|   |  |   | 2 |   |   | 9 |   |
|   |  | 1 | 9 |   | 4 | 5 | 7 |



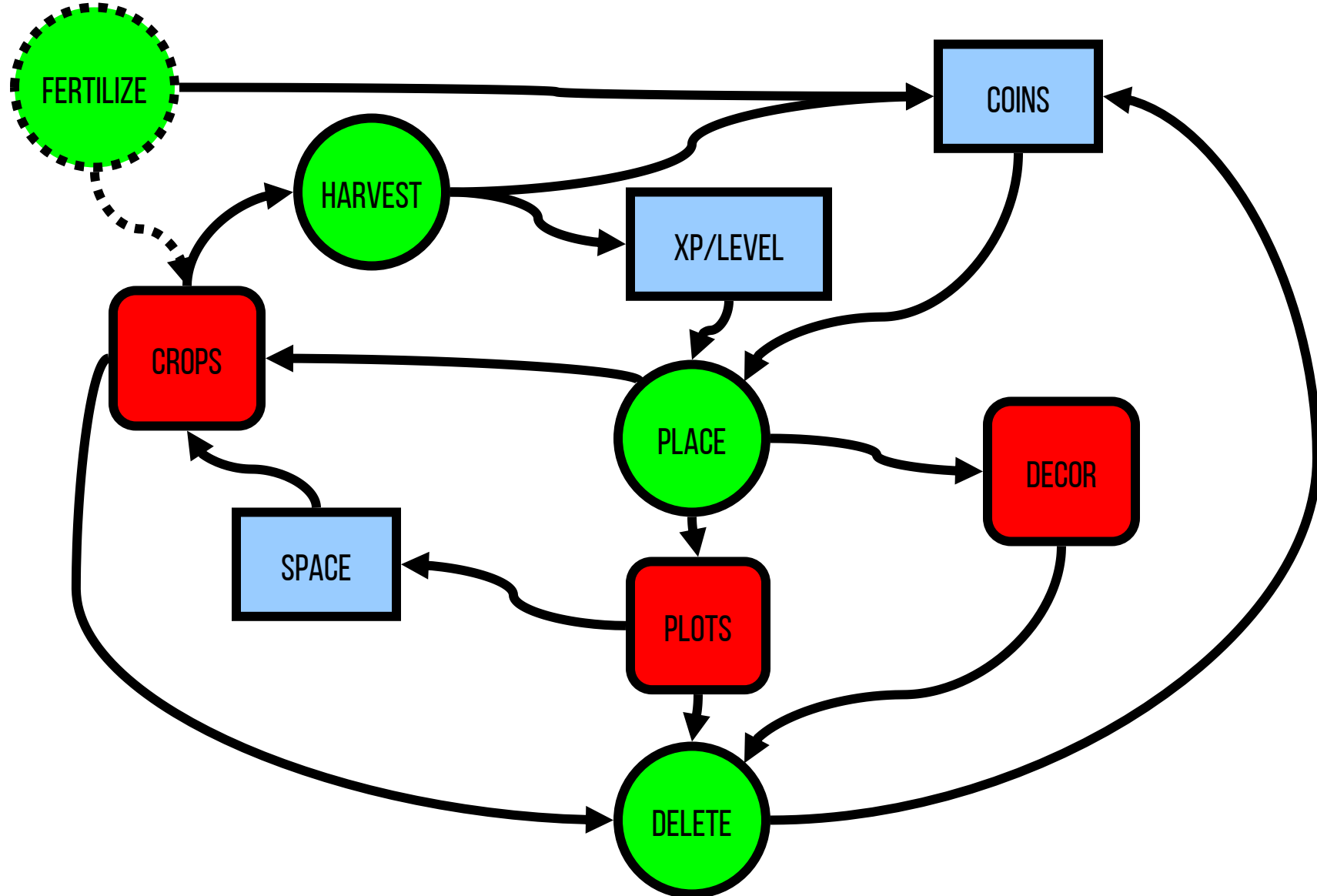
ON THE OTHER HAND, TOPOLOGY, WHICH IS OFTEN  
A MAJOR COMPONENT OF THESE PROBLEMS, IS  
BETTER EXPRESSED USING GRAPH THEORY.



# UNDERSTANDING THE DIAGRAMS



# FARMVILLE (ORIGINAL)

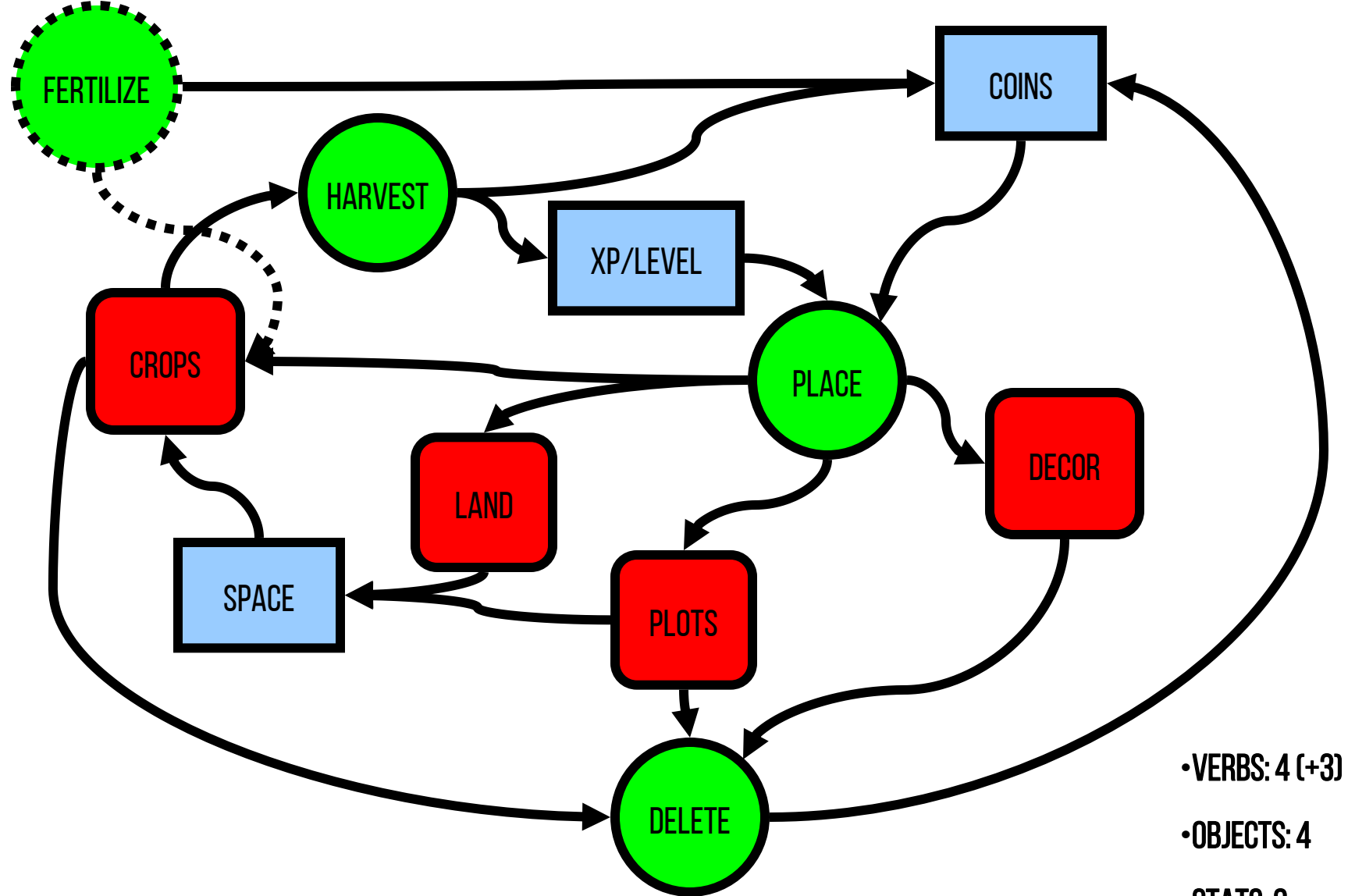


•VERBS: 3 (+3)

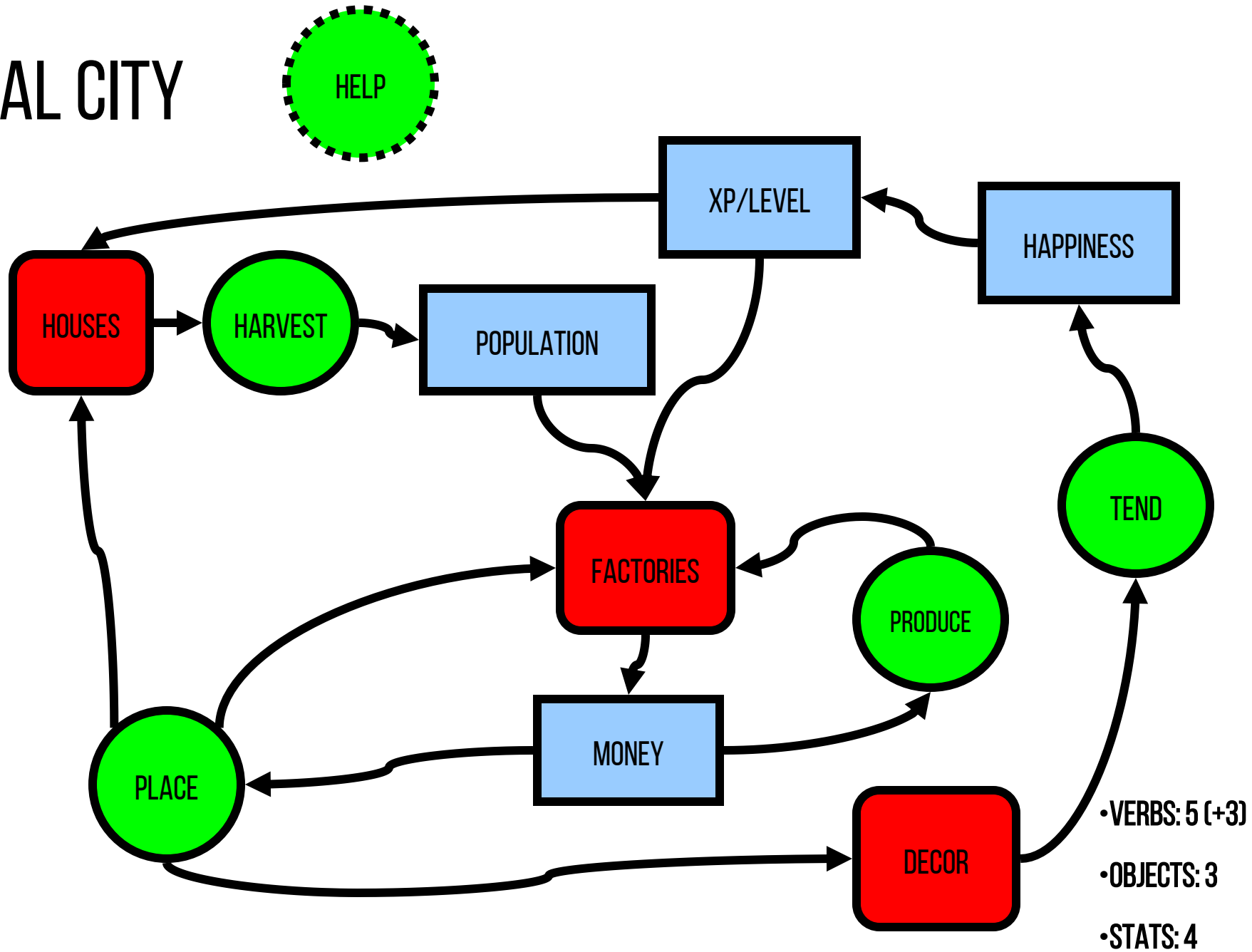
•OBJECTS: 3

•STATS: 3

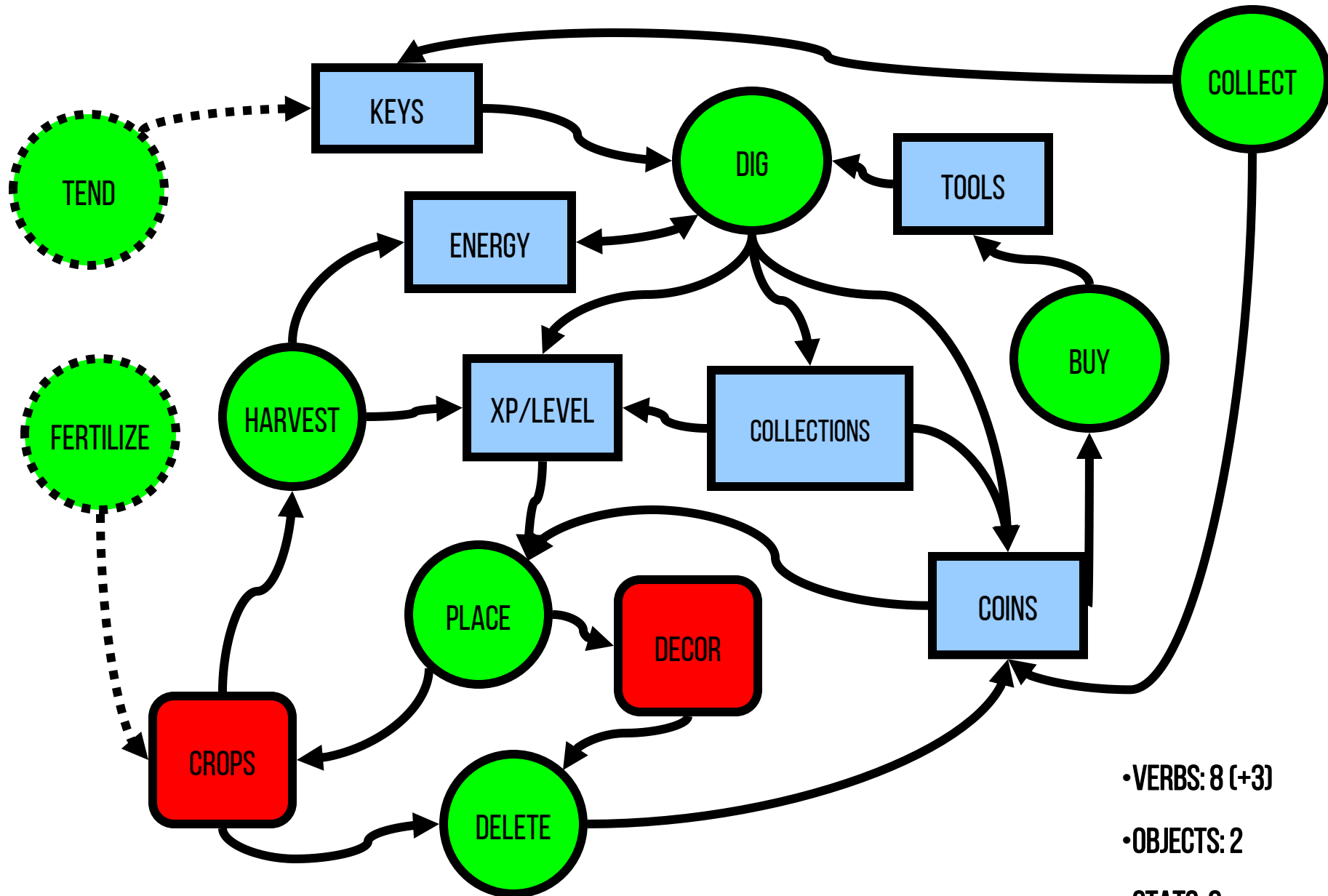
# ISLAND LIFE



# SOCIAL CITY



# TREASURE ISLE

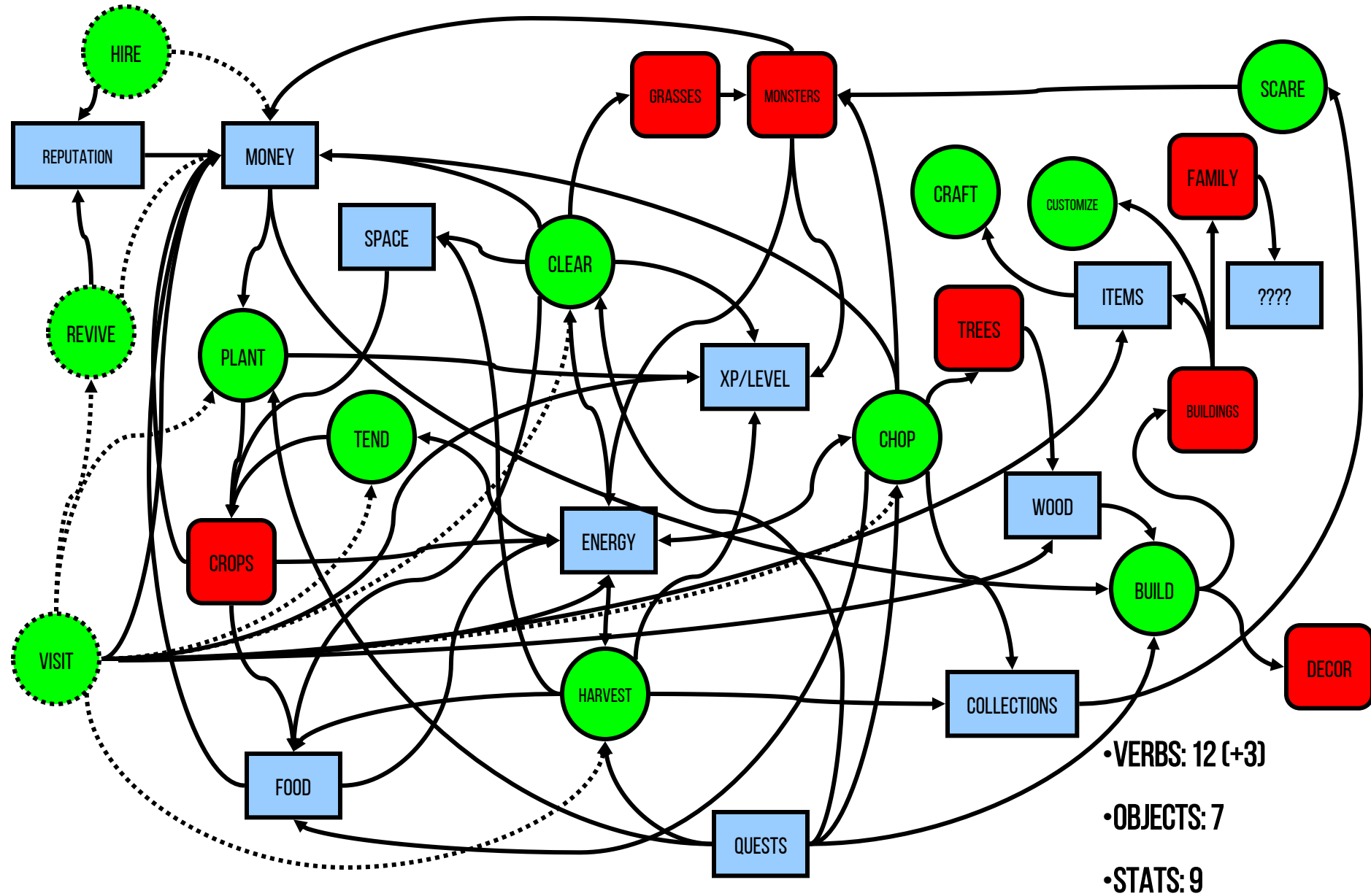


•VERBS: 8 (+3)

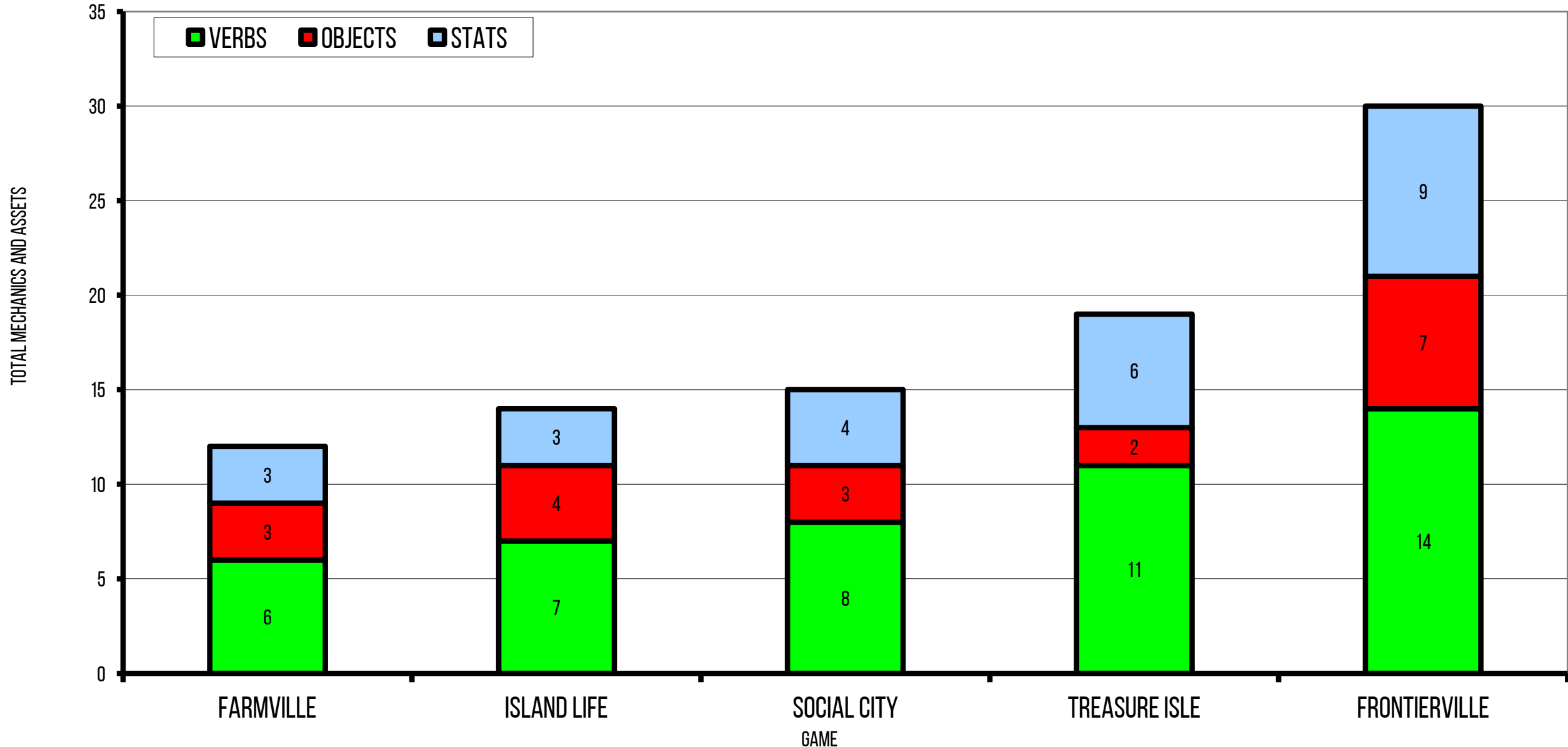
•OBJECTS: 2

•STATS: 6

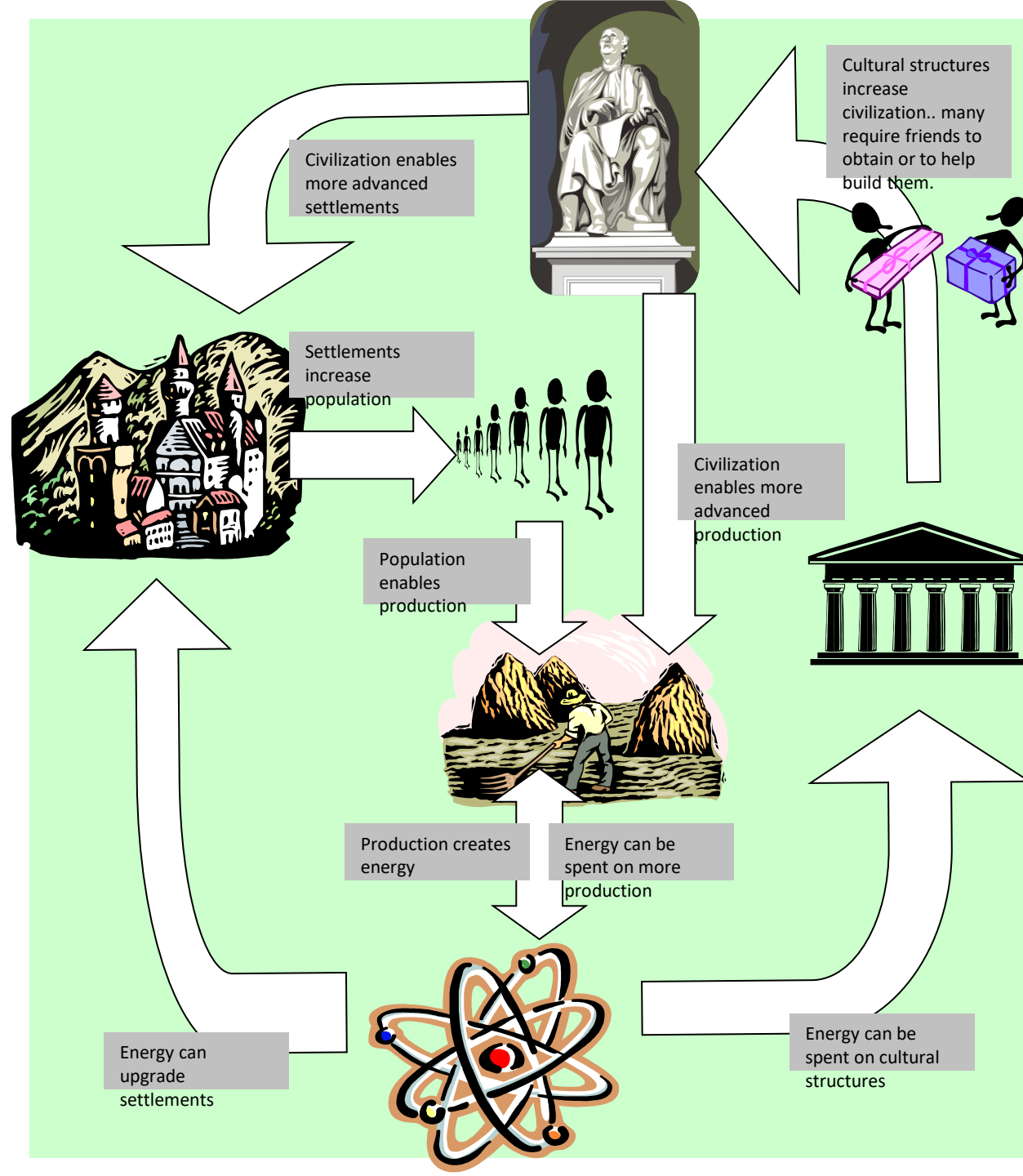
# FRONTIERVILLE



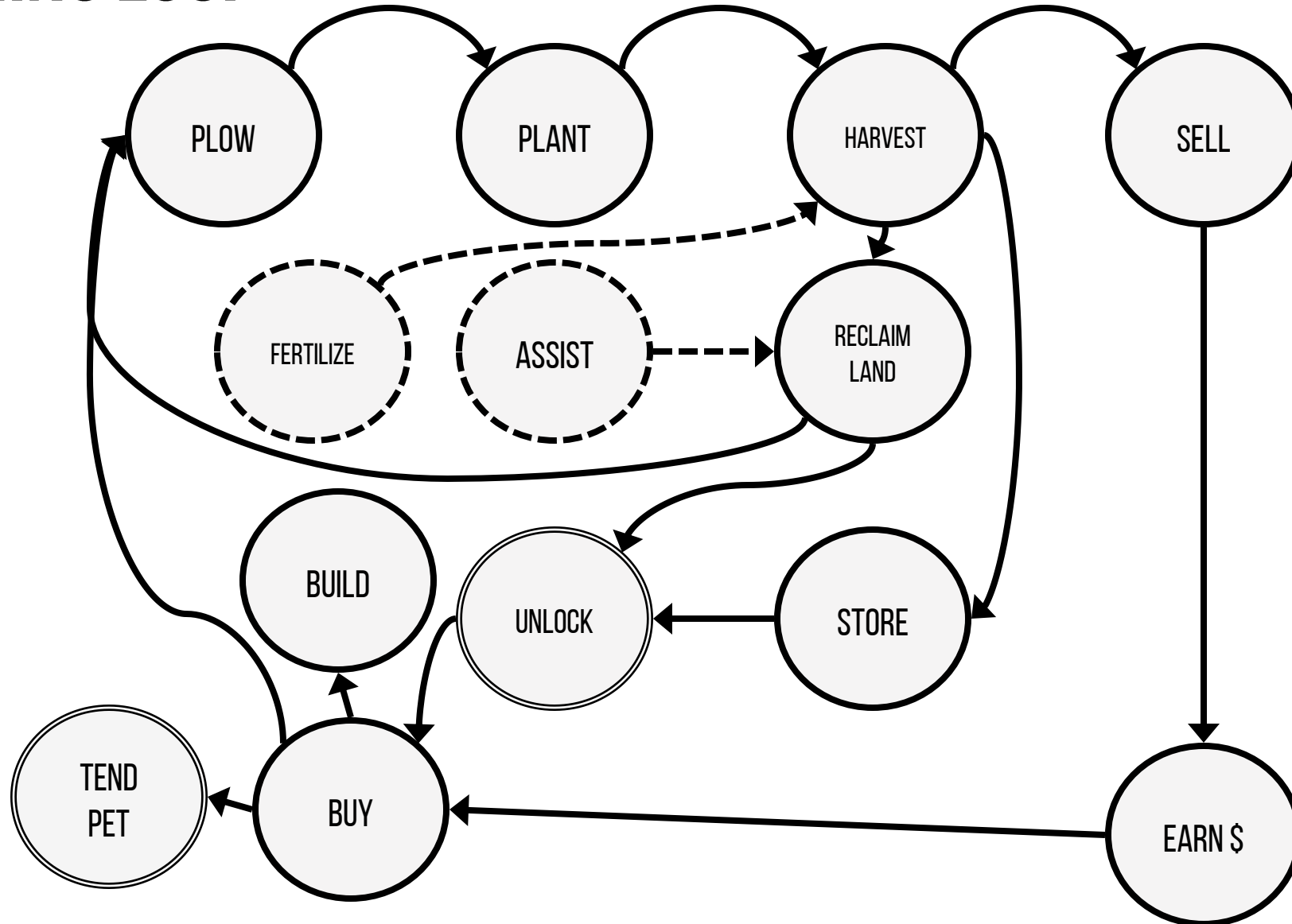
# SOCIAL GAME COMPLEXITY



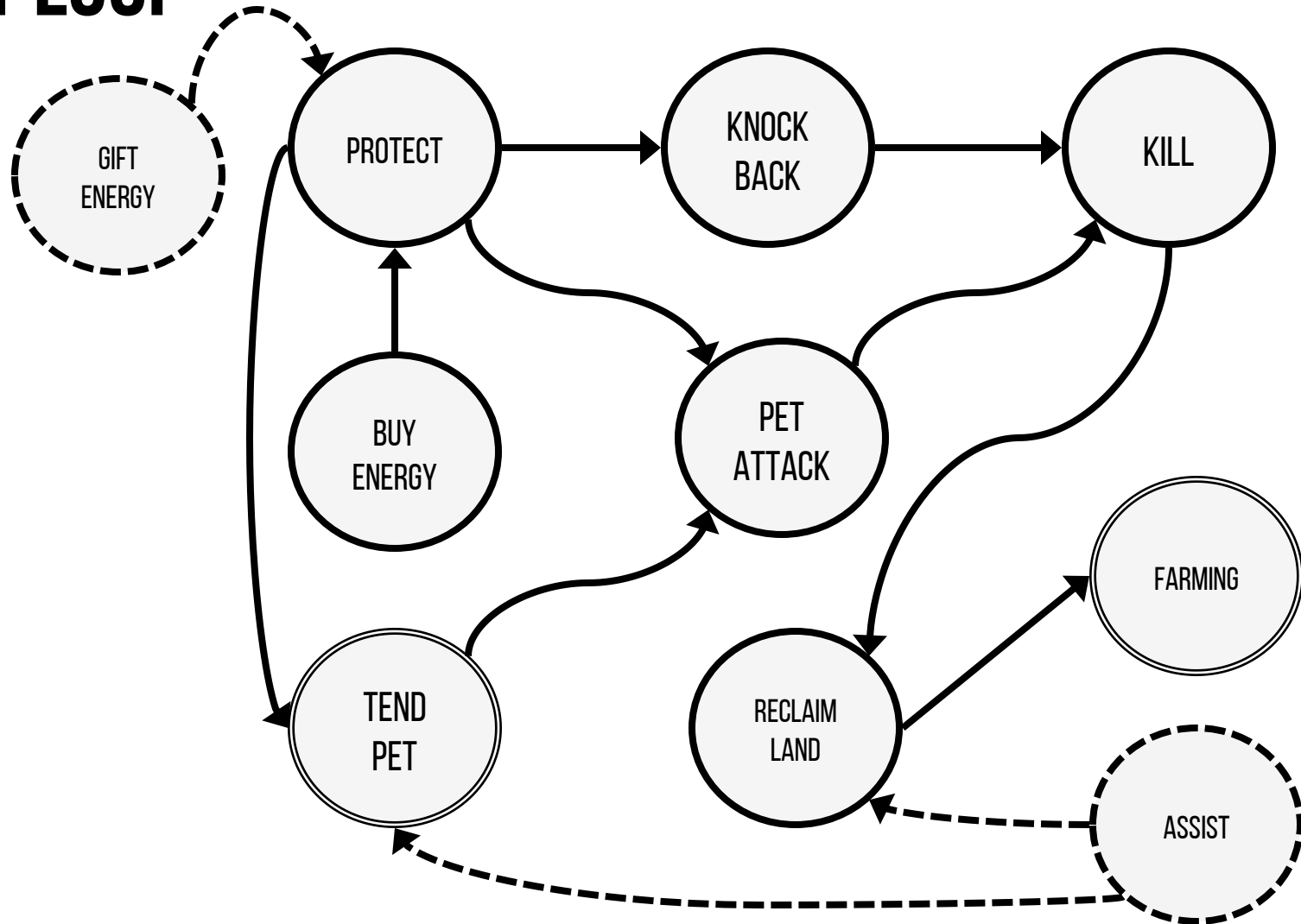
# SOCIAL CIV GAME LOOP



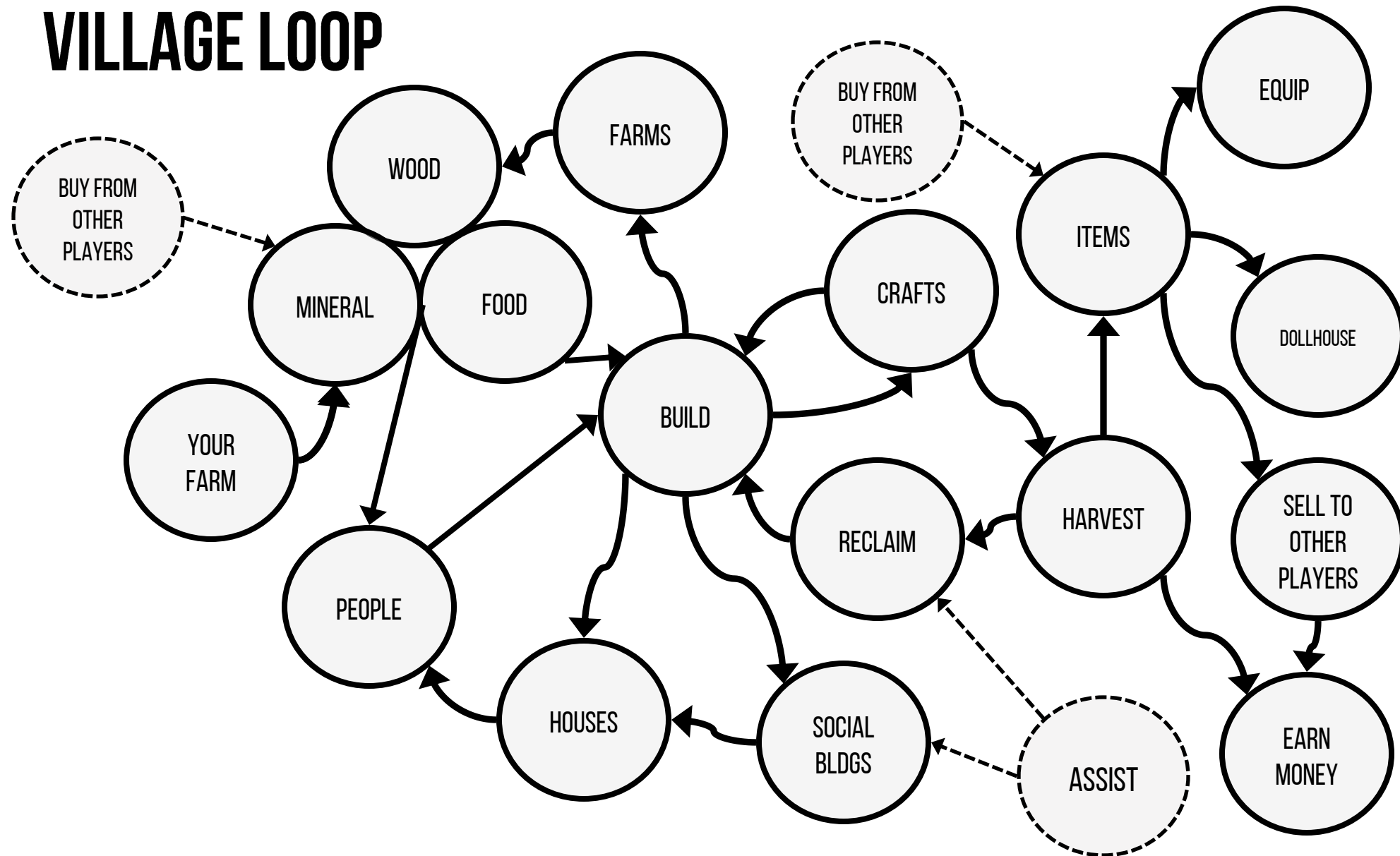
# FARMING LOOP



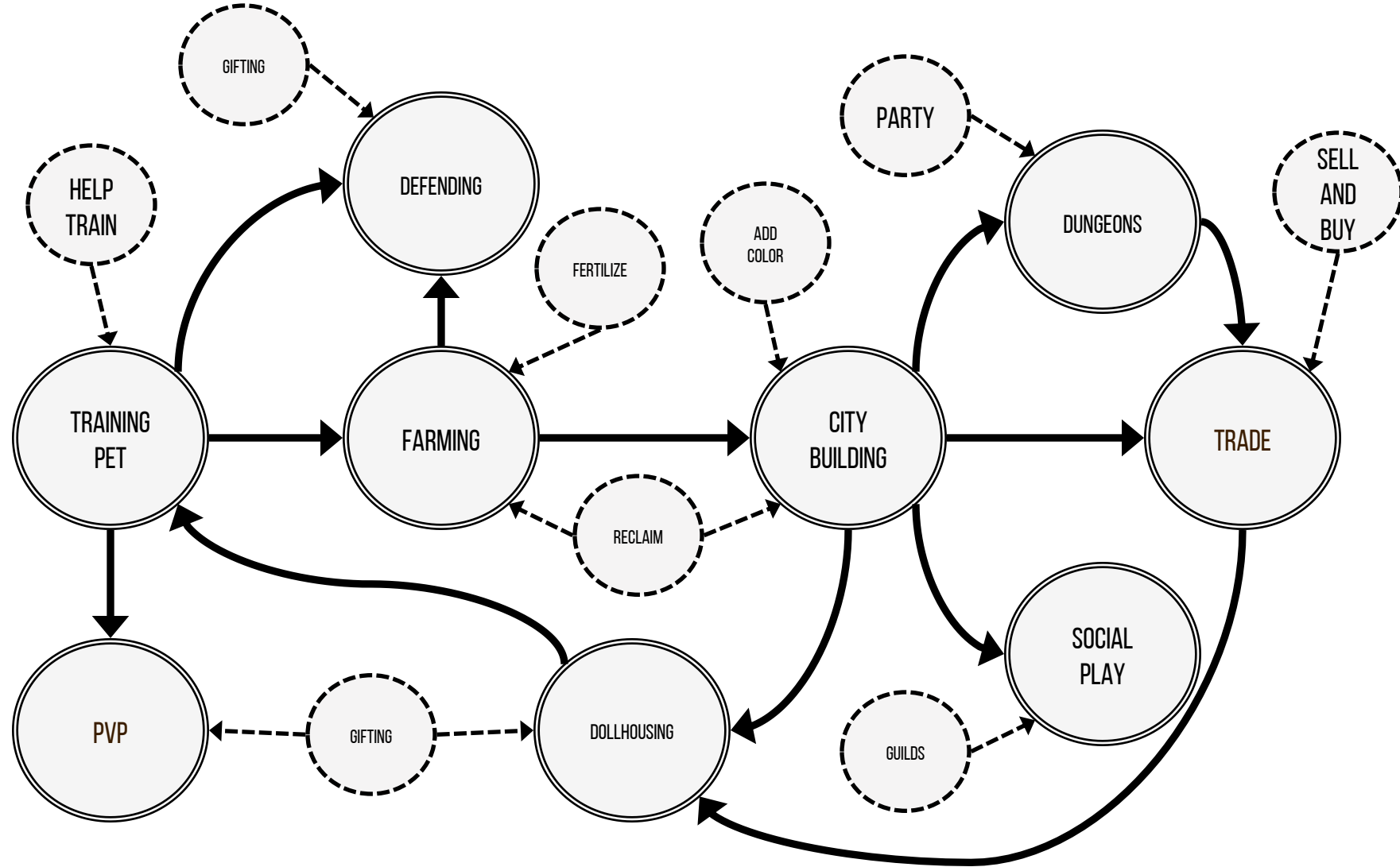
# COMBAT LOOP



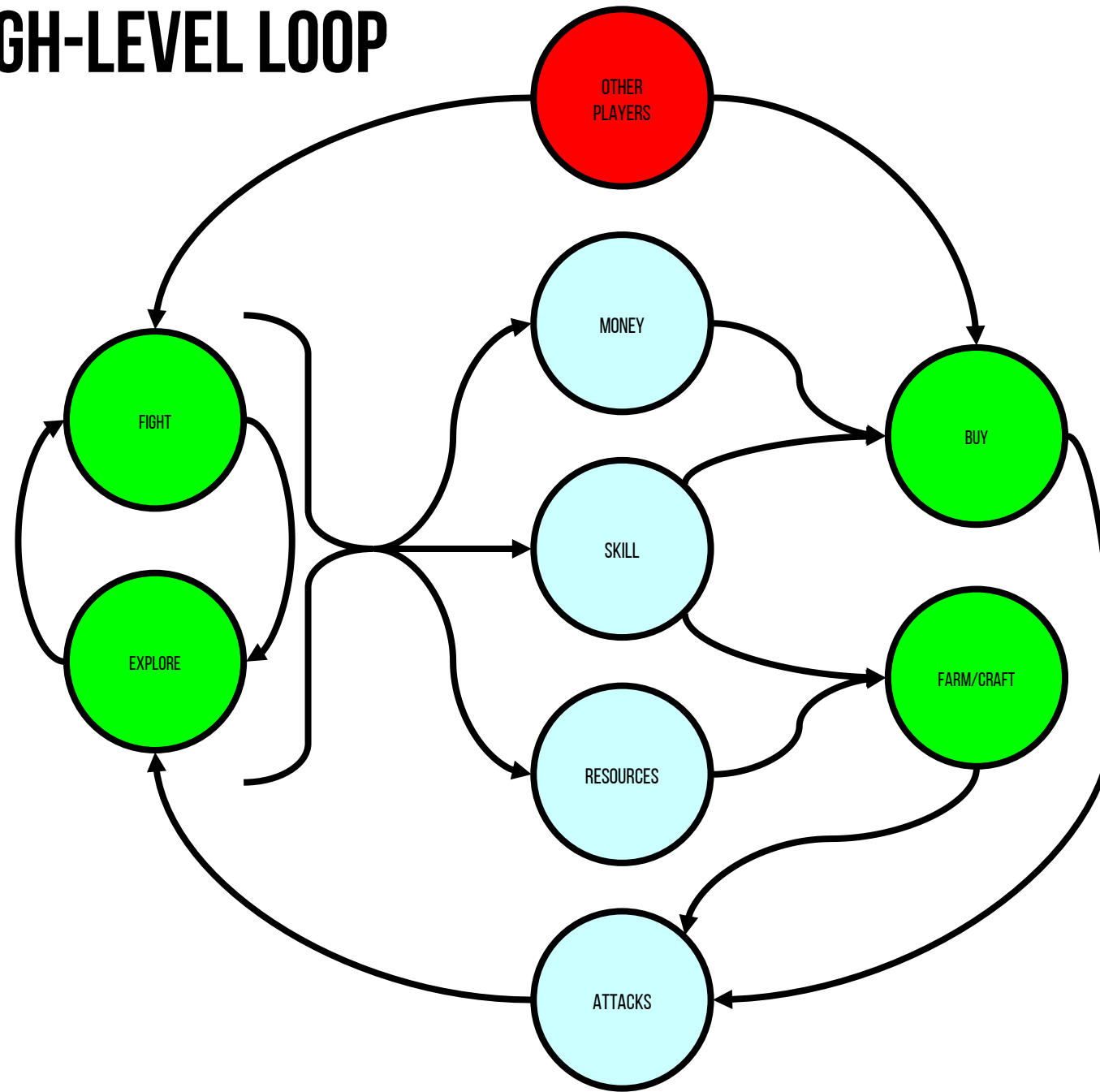
# VILLAGE LOOP

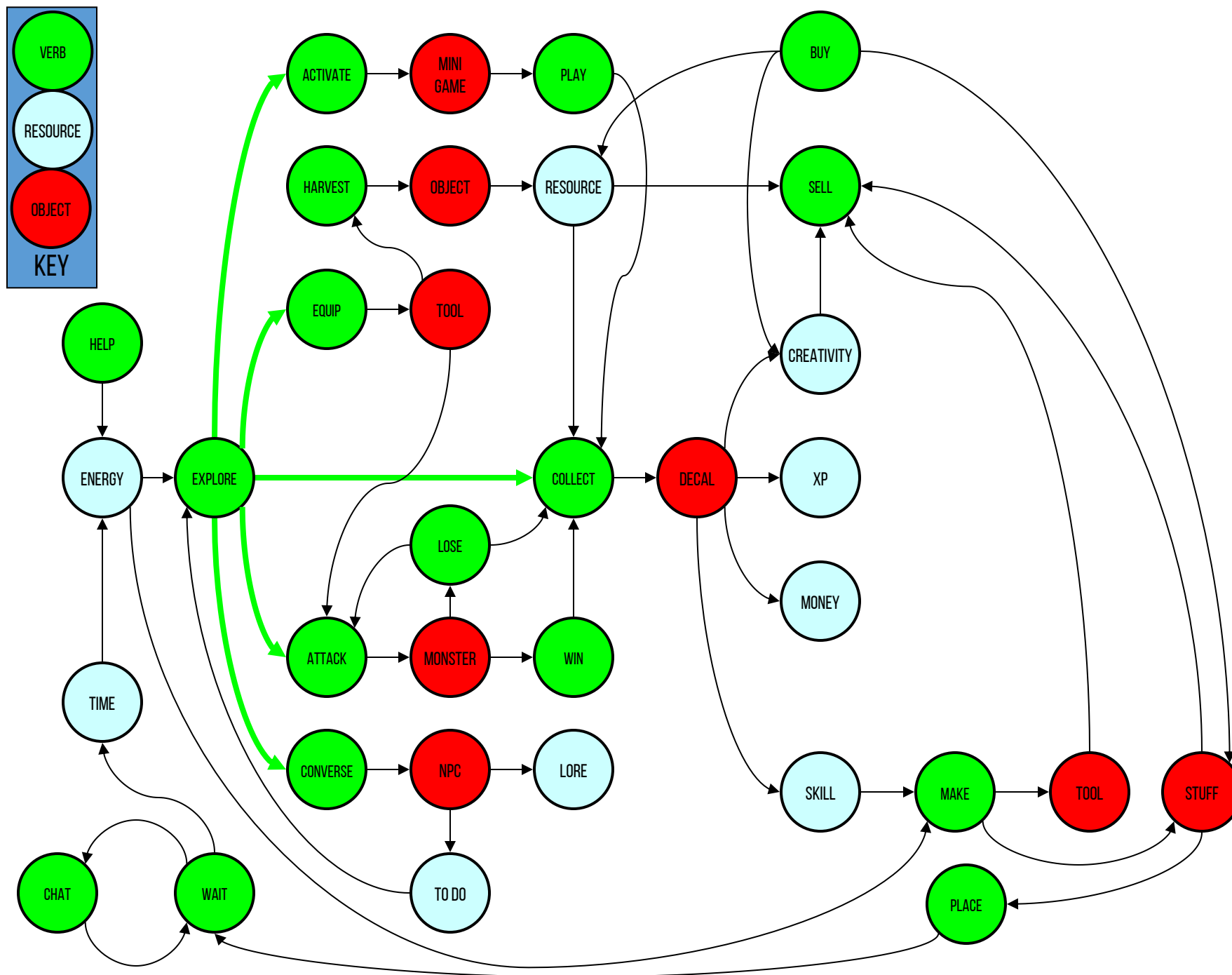


# FULL GAME DIAGRAM

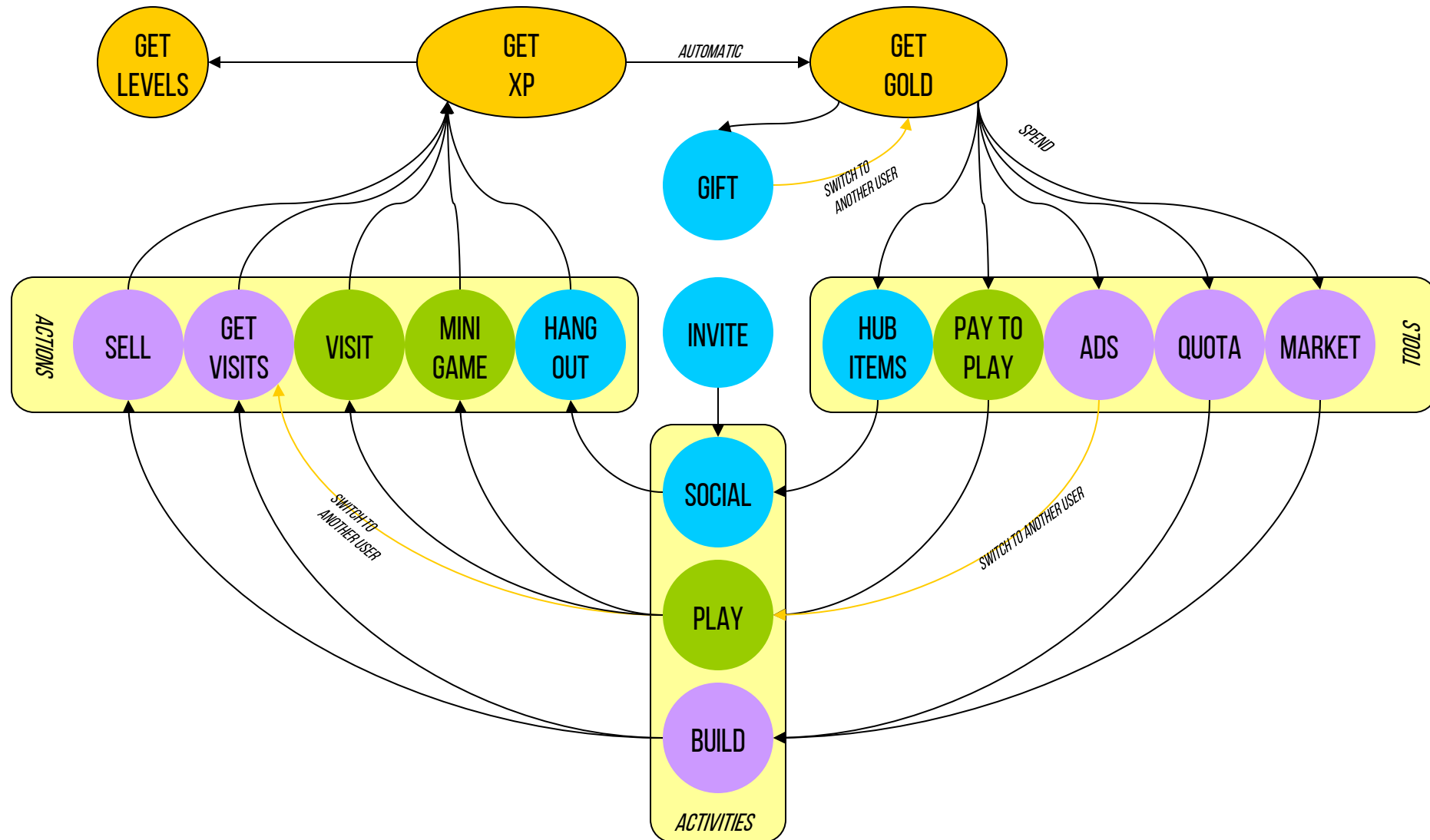


# HIGH-LEVEL LOOP





# UGC MP REWARD LOOP DIAGRAM



# ANALYSIS

ASK THINGS LIKE “WHAT IS THE PLAYER’S GOAL? WHAT IS THEIR FANTASY?” FOR EVERY VERB.

ASK WHAT THE MECHANIC IS AND THE METAPHOR. SEE IF THEY MATCH.

LOOK FOR THINGS LIKE SETS OF REPETITIVE ACTIONS.

DEPTH IS DEFINED AS NESTED ATOMS.

EXCESSIVE BRANCHING IS OBVIOUS.

INABILITY TO CLUMP SYSTEMS BECOMES APPARENT.

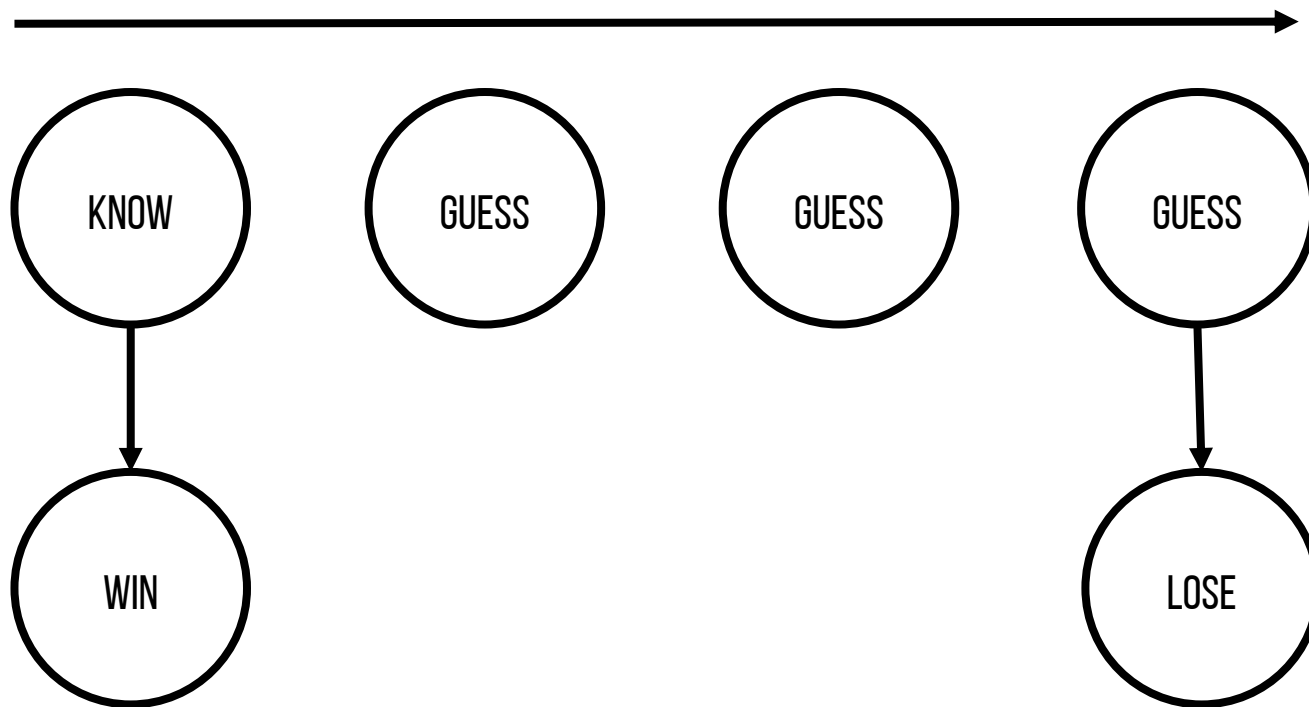
# BENEFITS

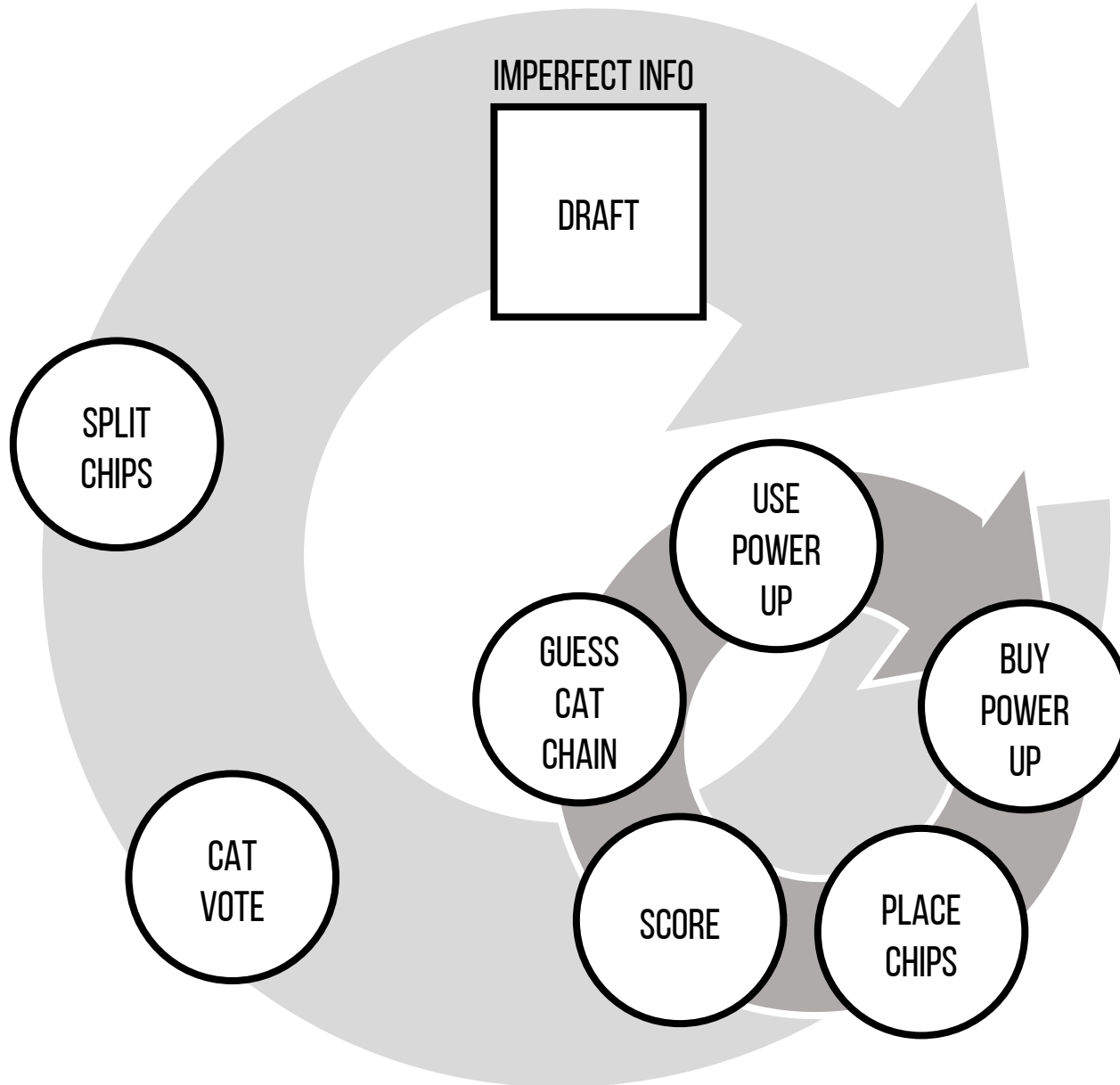
YOU CAN INSTANTLY SEE IF

- YOUR GAME IS TOO HARD
- TOO SIMPLE
- TOO REPETITIVE
- HAS A BORING PATCH
- HAS PARTS THAT CAN BE CUT

IT ALSO OUTPUTS YOUR OBJECT CLASSES (!)

IT IS SELF-DOCUMENTING, HANG IT ON THE WALL.





# CHANCE

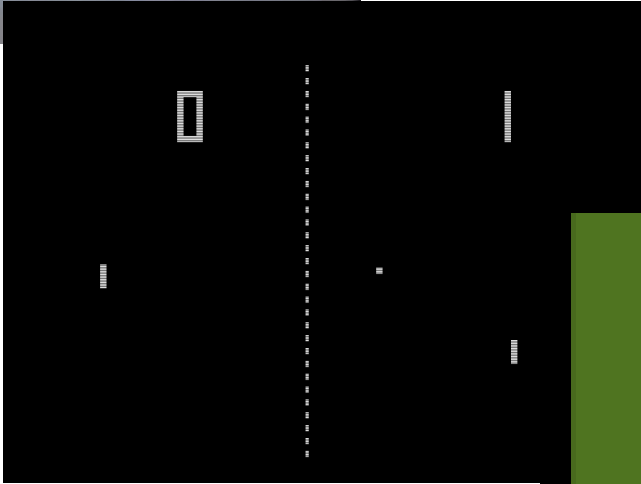
PROBABILITY ESTIMATION IS BASICALLY BROKEN IN THE HUMAN MIND.

CHANCE IS LIKE SUGAR. IT TASTES GOOD. USE WITH MODERATION, MOST OF THE TIME, BECAUSE IT IS PROVIDING FALSE LEARNING. BUT IT'S SURE FUN.

BIGGEST USE: AS A SKILL EQUALIZER.



# TENNIS HAS A SUPER SIMILAR GRAPH REGARDLESS OF VERSION



# **FAMILY TREES**

**CLONE: SAME GRAPH, NEW SKIN**

**CONTENT: SAME GRAPH, NEW SCALARS**

**VARIANT: SIMILAR GRAPH, SOME ATOMS CHANGE**

**FAMILY: A COLLECTION OF VARIANTS**

**GENRE: A COLLECTION OF CLONES AND VARIANTS**

# CREATIVITY RECIPE

INVENTING NEW GAMES IS ACTUALLY A REPLICABLE RECIPE.

EASY: TAKE A LUDIC ARTIFACT, CLONE, CHANGE ONE SIGNIFICANT RULE OR SCALAR.

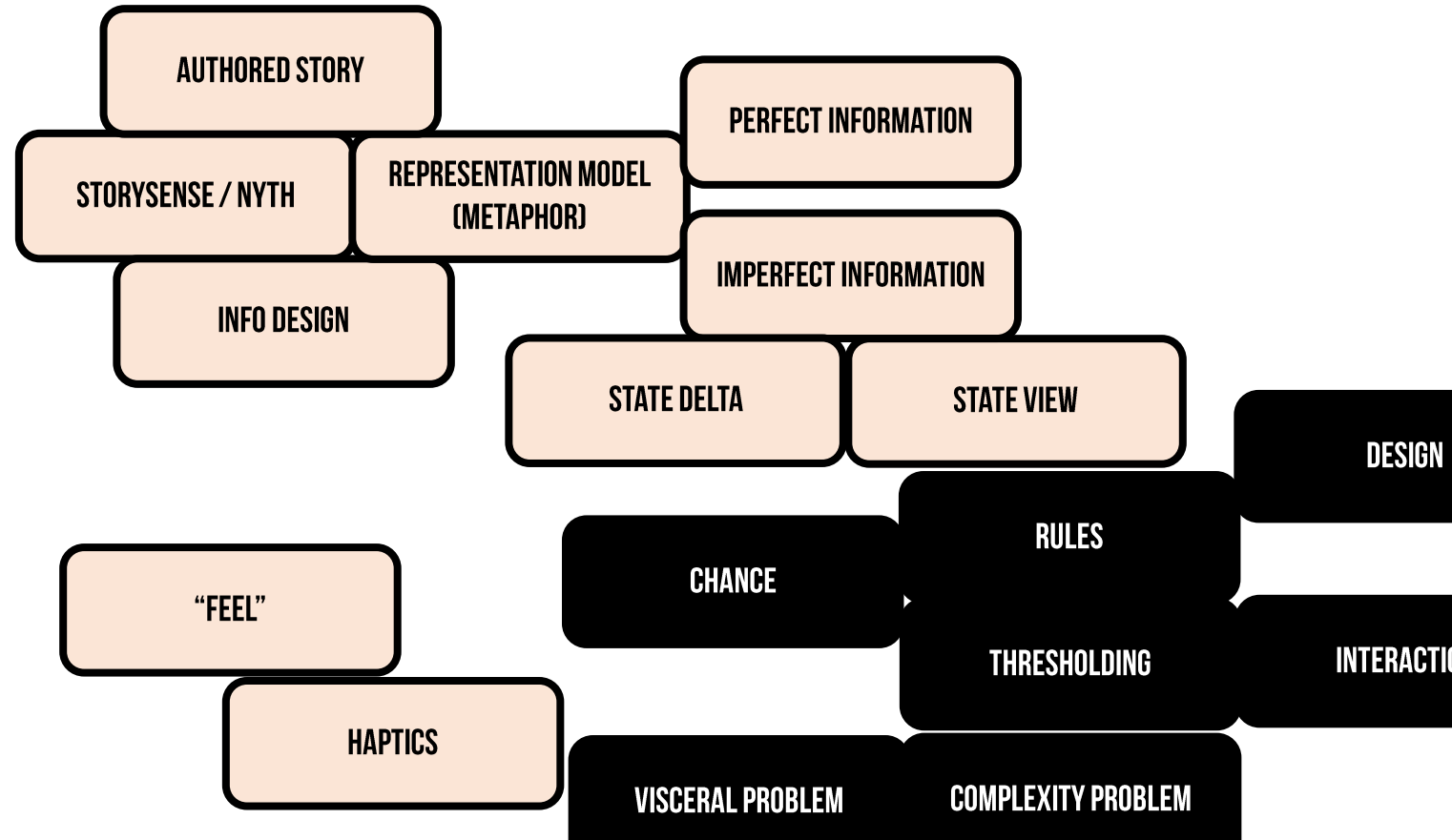
- MOVE TO REAL TIME. CHANGE TOPOLOGY. ETC.

HARDER: INVENT A NEW COMPLEX SYSTEM. NOT THAT HARD IF YOU CONSCIOUSLY ASSEMBLE KNOWN WORKING ATOMS.

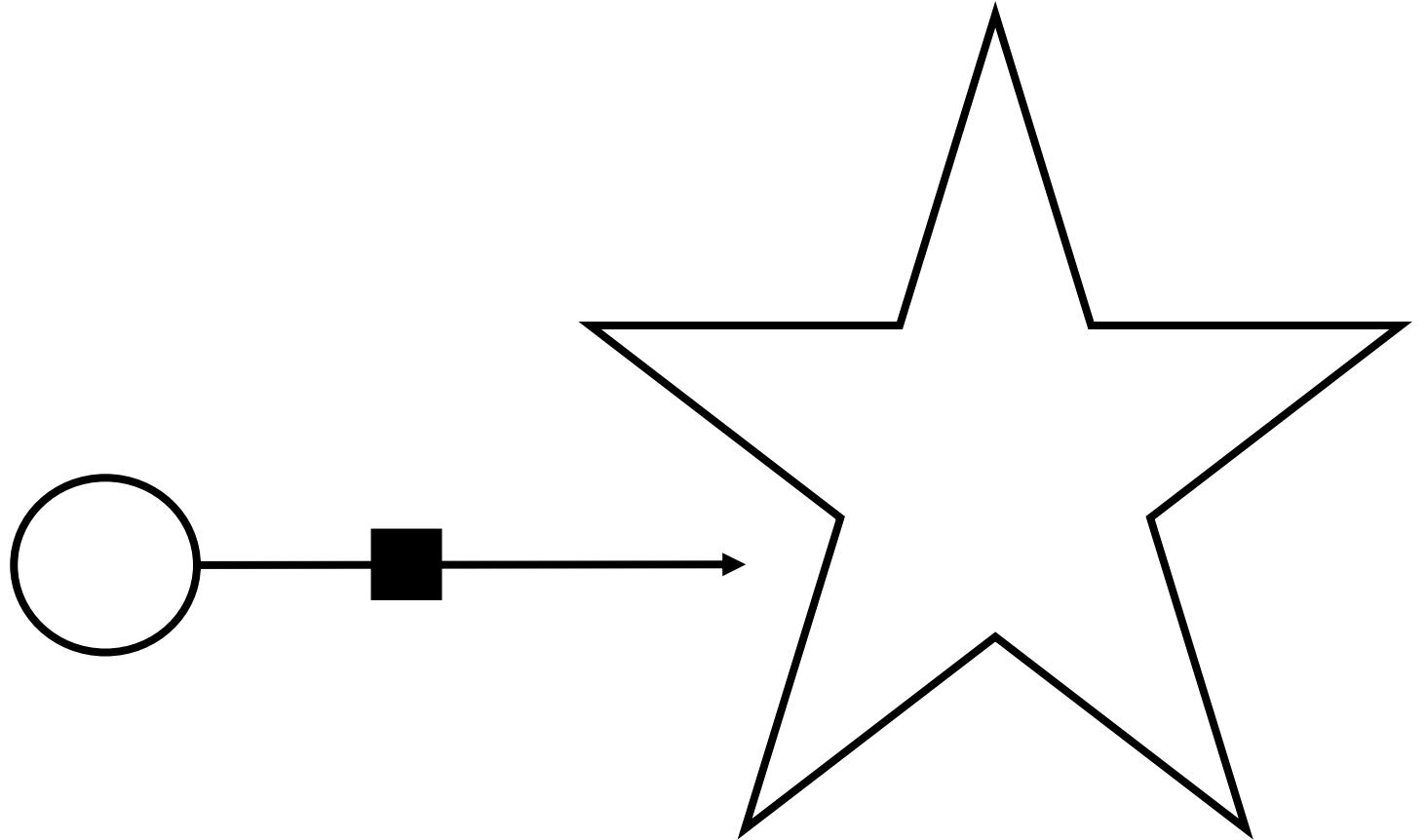
THE COMMONEST WAY, THOUGH, IS ALTERATION OF THE INFORMATION DESIGN, THE FEEDBACK. THIS IS THE RESKIN OR CLONE.

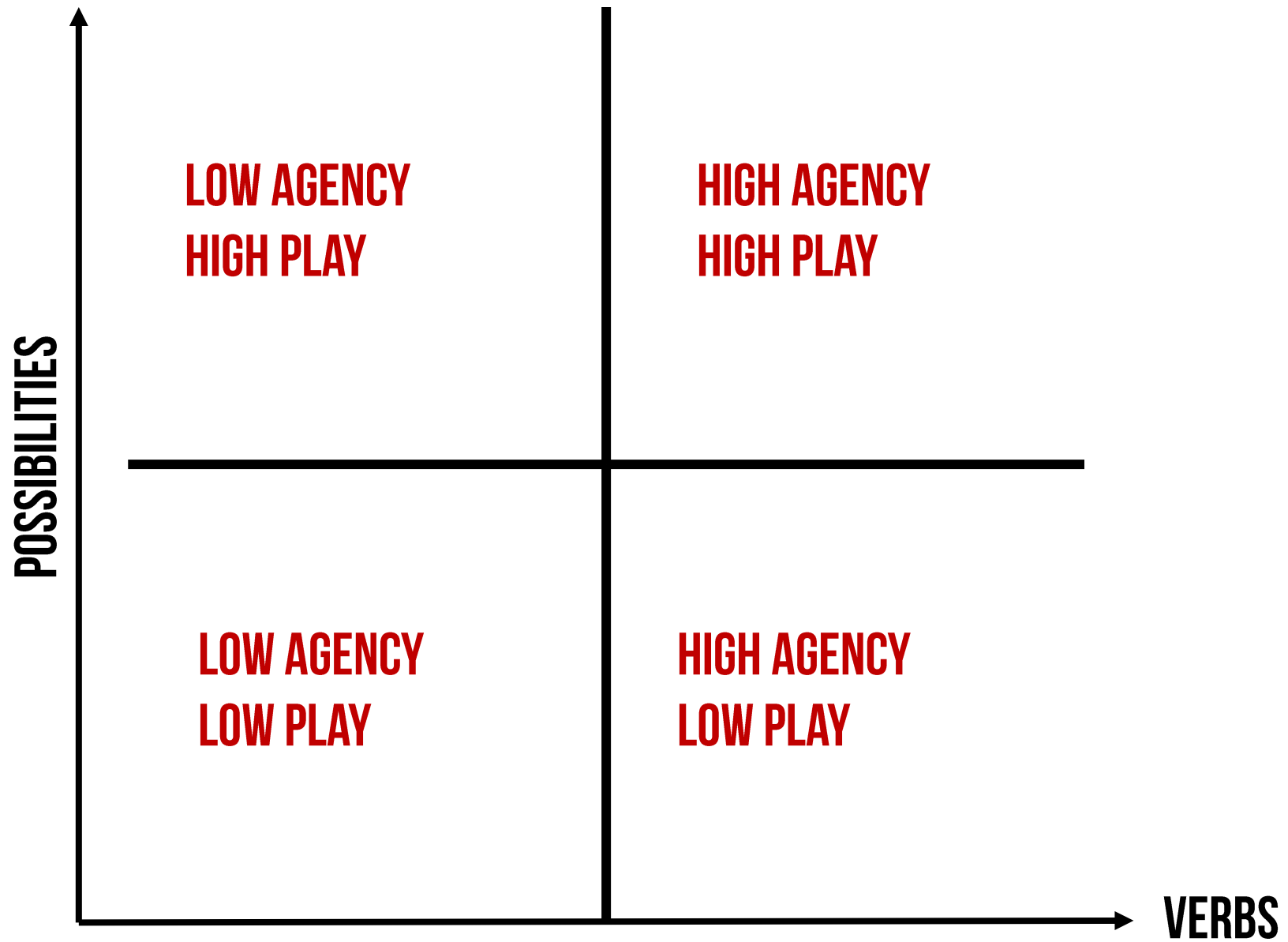
# FEEDBACK

ALMOST NO GAMES ARE UNSKINNED BY METAPHOR.

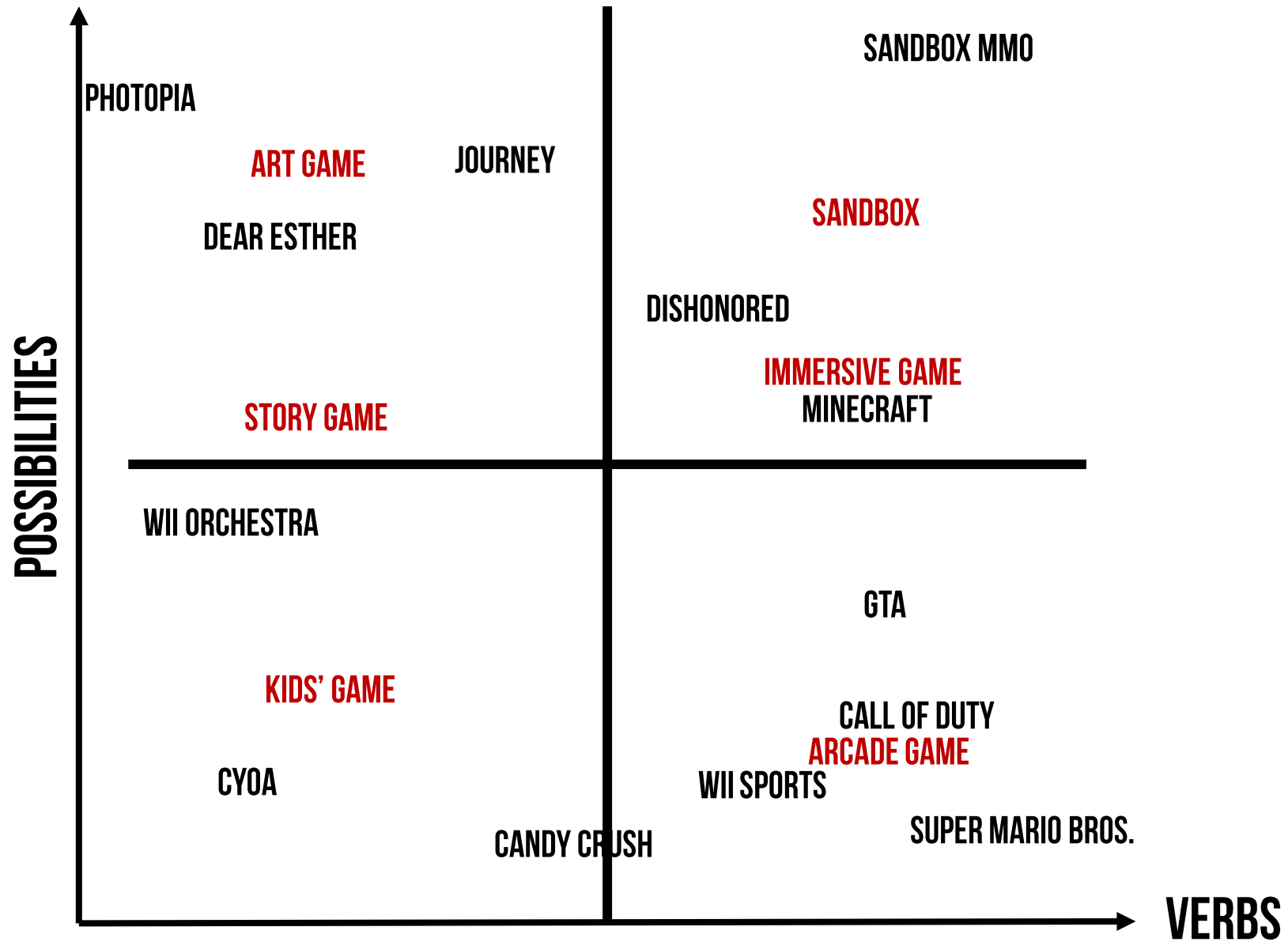


# HIGH FEEDBACK FOR LOW DELTA

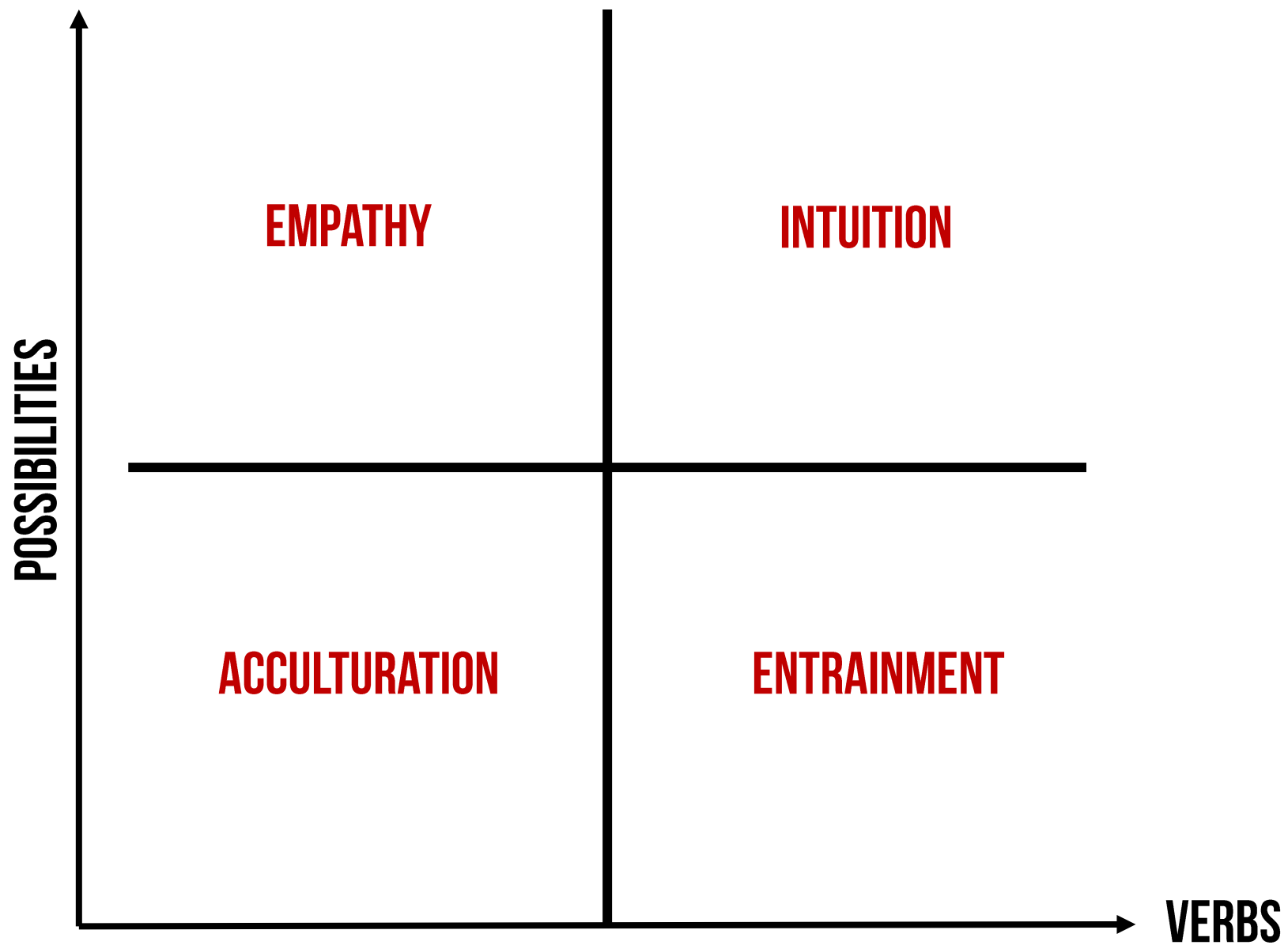




# THESE ARE MARKETING CATEGORIES TOO.



# WHAT WORKS FOR WHAT.

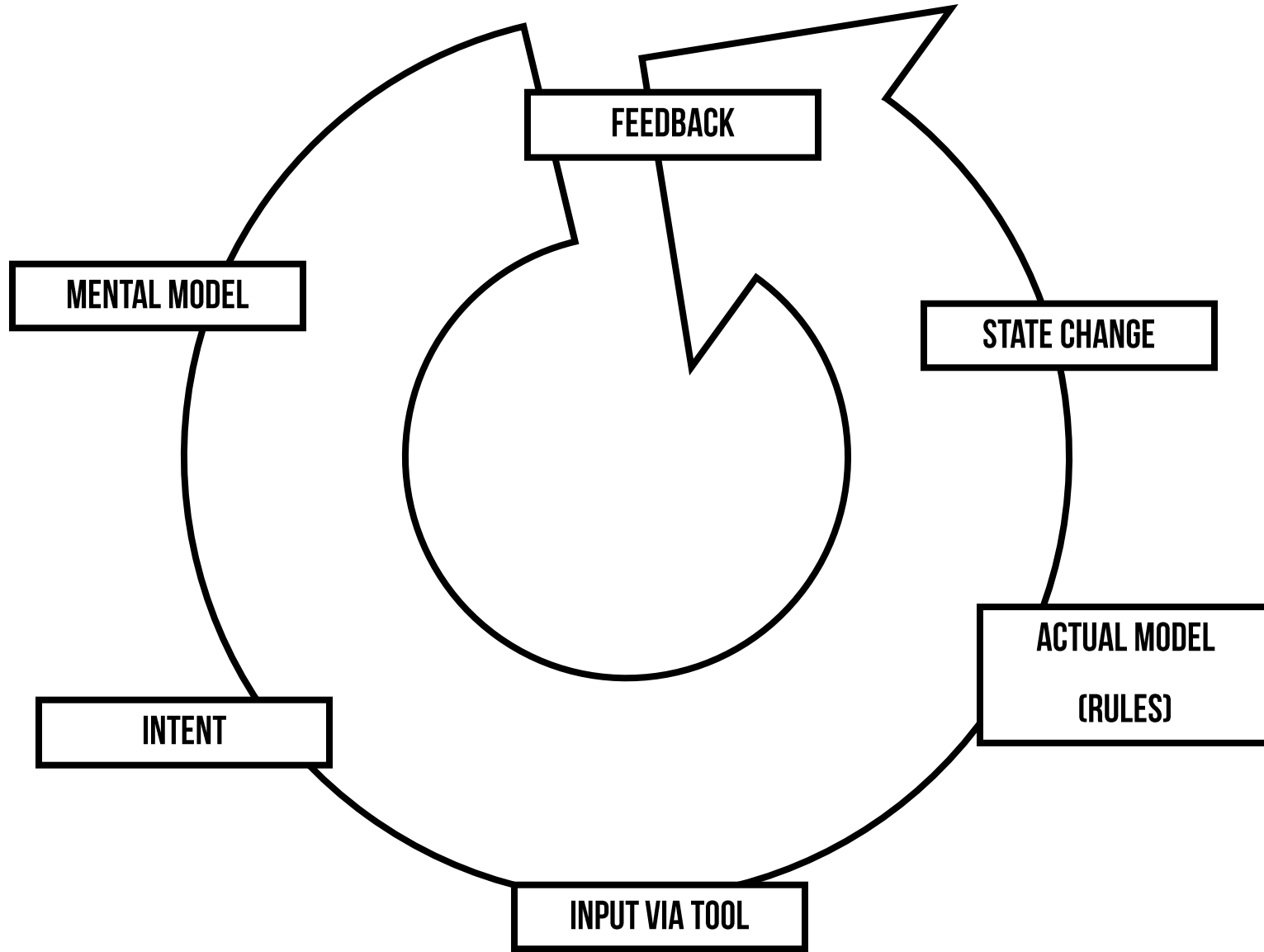


- LOOSE SYMBOLIC RELATIONSHIPS
  - LAYERED SYMBOLOGY
  - AMBIGUITY OF REFERENTS
- ANACOENOSIS: ASKING AUDIENCE FOR OPINION, PRESENTING MULTIPLE OPINIONS
  - SURREALISM, ACAUSALITY

- RHETORICAL REPETITION
- REPLAY FOR ACHIEVEMENTS
  - FRAMES, LABELS
- IMPOSE WORLDVIEW THRU VIEWPOINT CHARACTER
  - OTHERING
  - HIGH CAUSALITY

- NP PROBLEMS
- MULTIPLAYER
- ORTHOGONALITY (DISPARATE GAMES IN ONE)
  - SIMULATIONS
  - SIGNS AS TOKENS (RPGS, DIXIT)

- STAGECRAFT: CUTSCENES, TRIGGERS, CONTROL
  - STRING OF PEARLS
  - SCAFFOLDING
  - SPEED AND REFLEX TRAINING
  - SELECTIVE AGENCY (NO CHOICES)
    - TROPES



# THE MAP OF GAME

# MENTAL MODEL

