Suspending Disbelief: Bringing Your Characters to Life With Better AI

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AI Summit GDC 2010

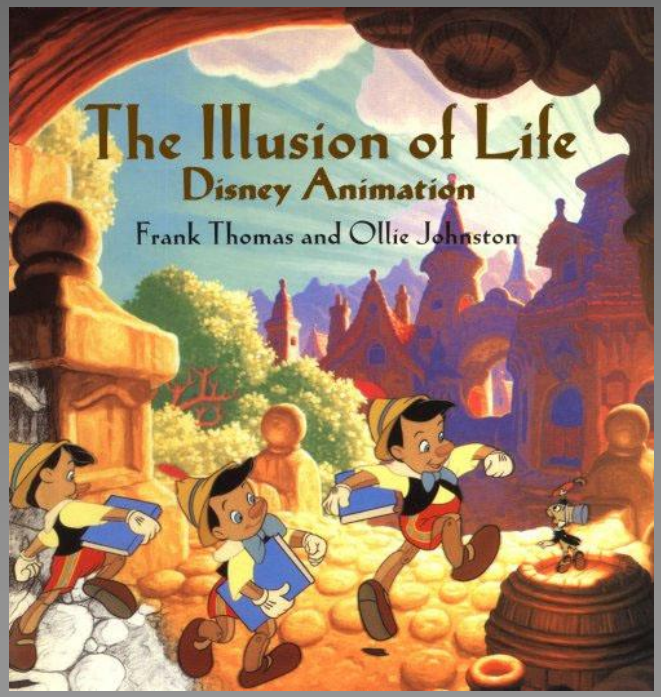
AI GAME PROGRAMMERS GUILD

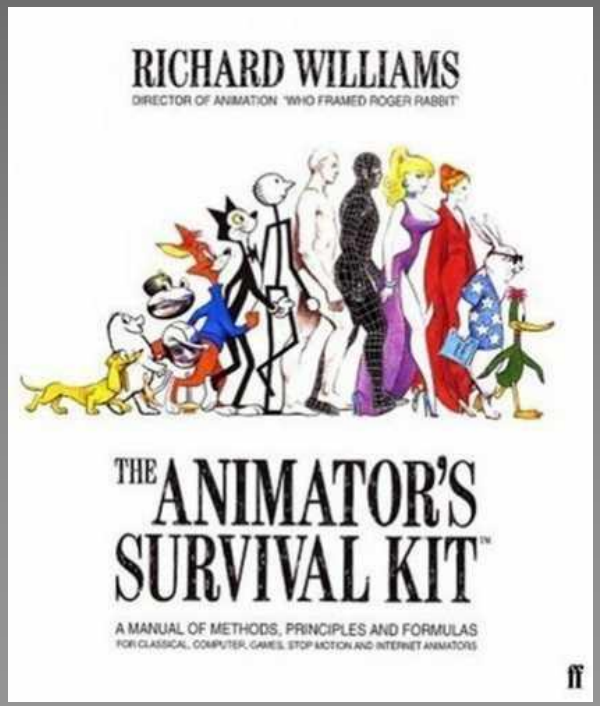
Two Sides of Character AI

- Representation
  - Traditional AI
  - Computer Science
- Communication
  - Film
  - Animation

Learn From Animation and Film

- How to tell stories through ‘living’ characters in visual media.

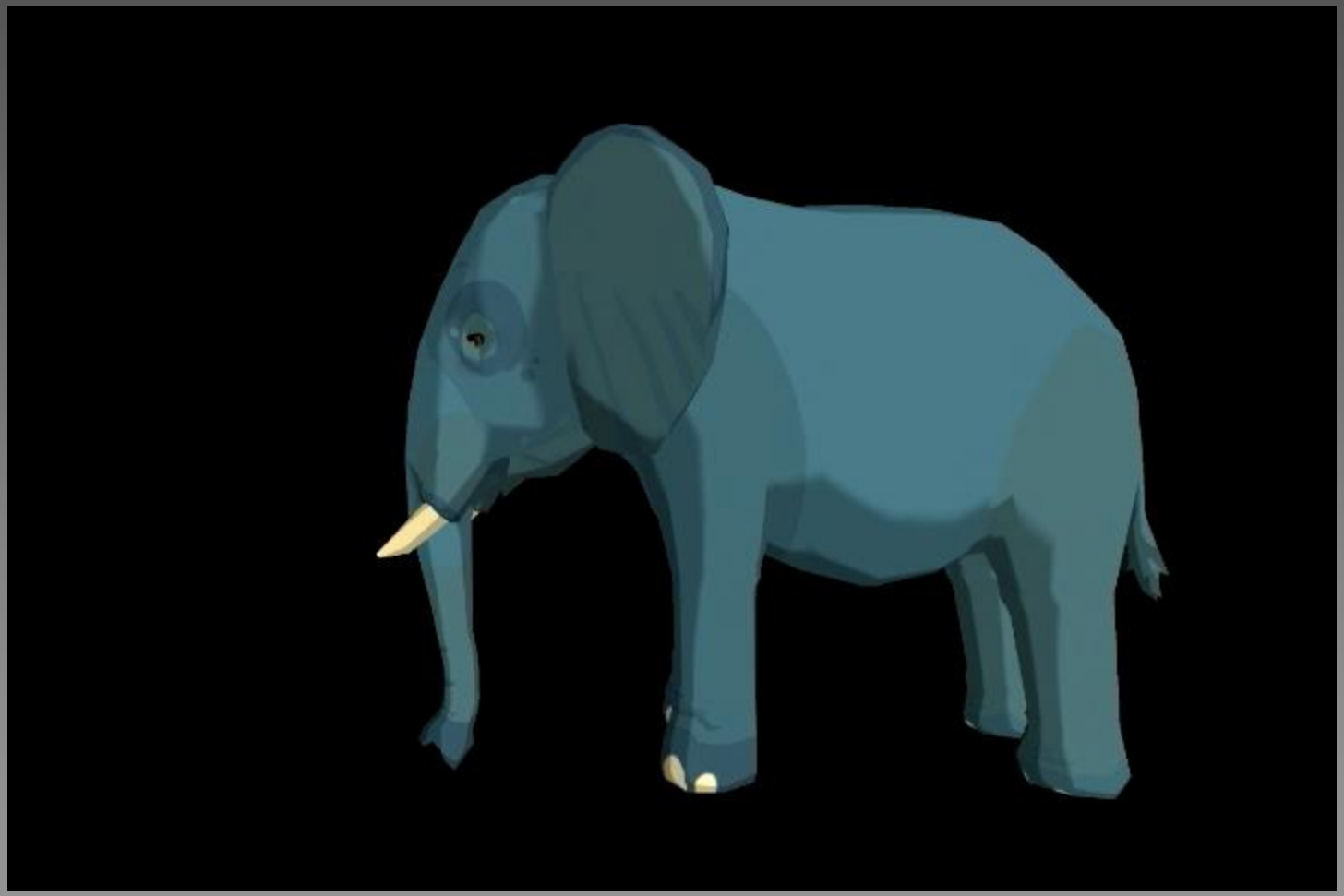




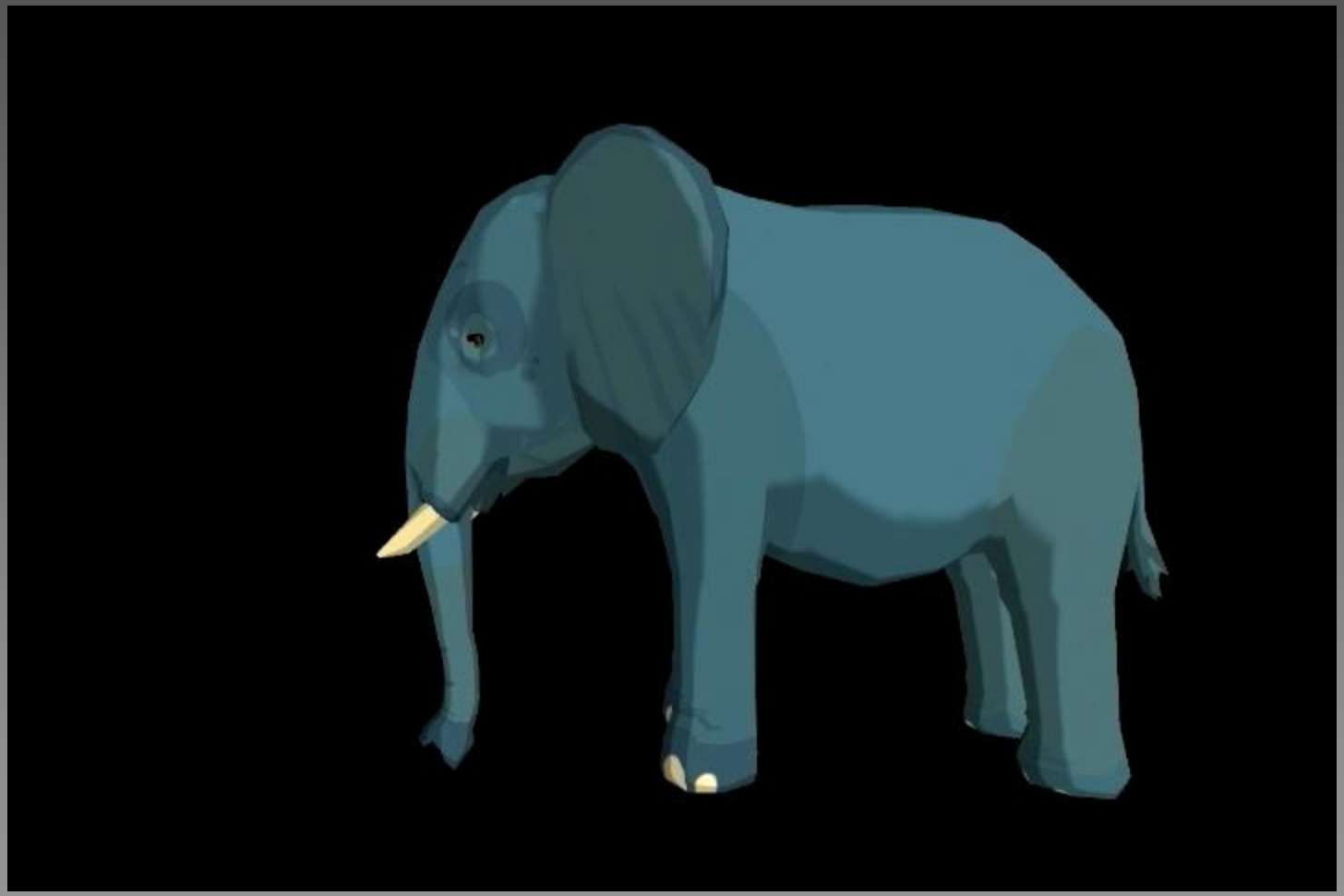
Anticipation

- The audience must be prepared for the next action and expect it before it actually occurs.
  - Wind-up before pitch, crouch before jump.
  - They come with us through the story.
  - Allows focus on the ‘how’ instead of the ‘what’.

Good Animation Anticipation Example



Bad Animation Anticipation Example



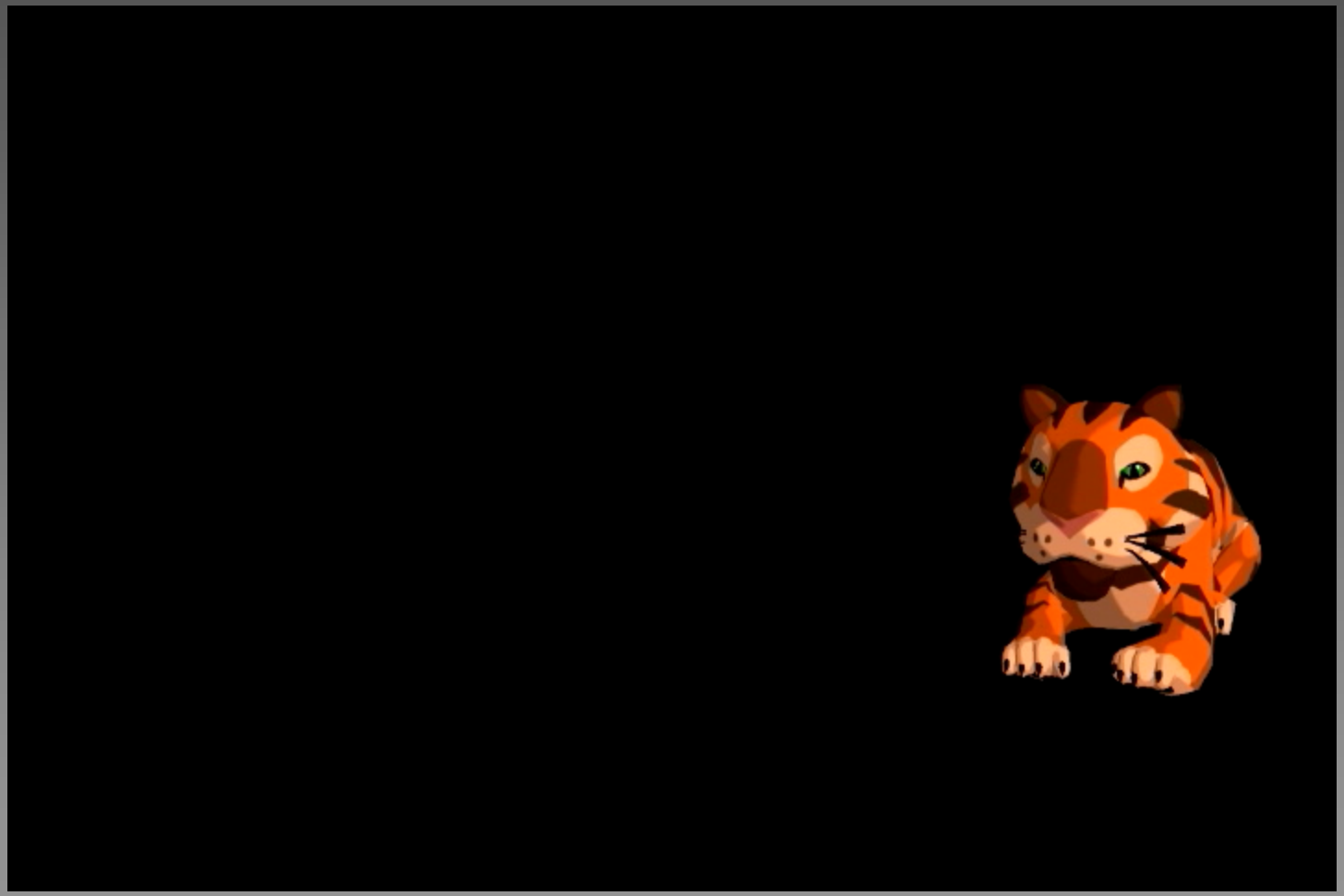
Why Anticipation Works

- Three basic components of animation:
  - Anticipation
  - Action
  - Reaction / Follow-through
- This is not just an animation trick.
  - For almost every action we take, there is an anticipation.
  - We think about something, then we do it.
  - Pay attention to your pets.

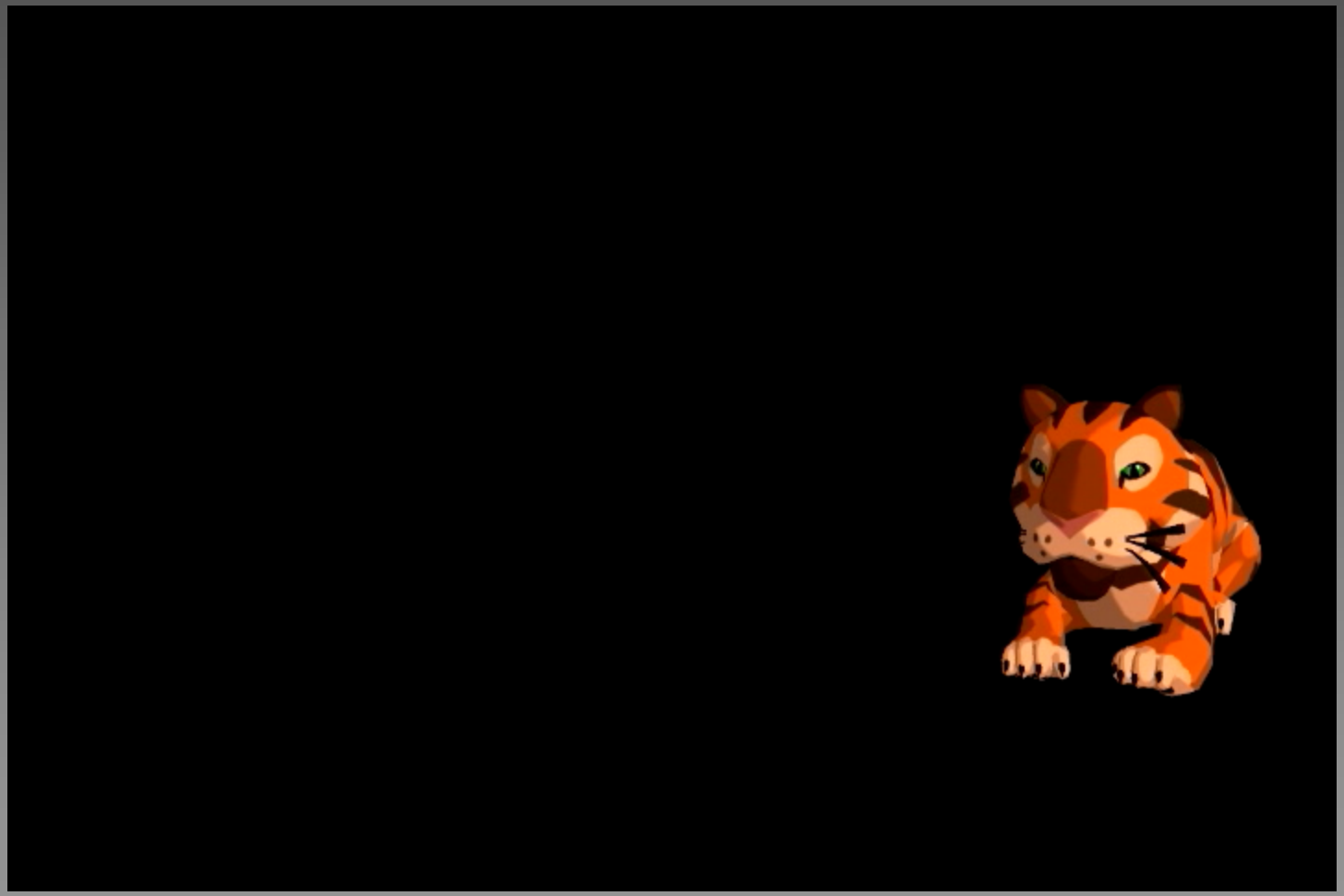
Behavioral Applications

- Behaviors anticipating behaviors.
- Create perceivable perception.
  - Motivates future behavior.
  - One reason why headlook is so important.
- Surprise!
- Allows characters to make decisions based on what is about to happen.

Lack of Behavioral Anticipation



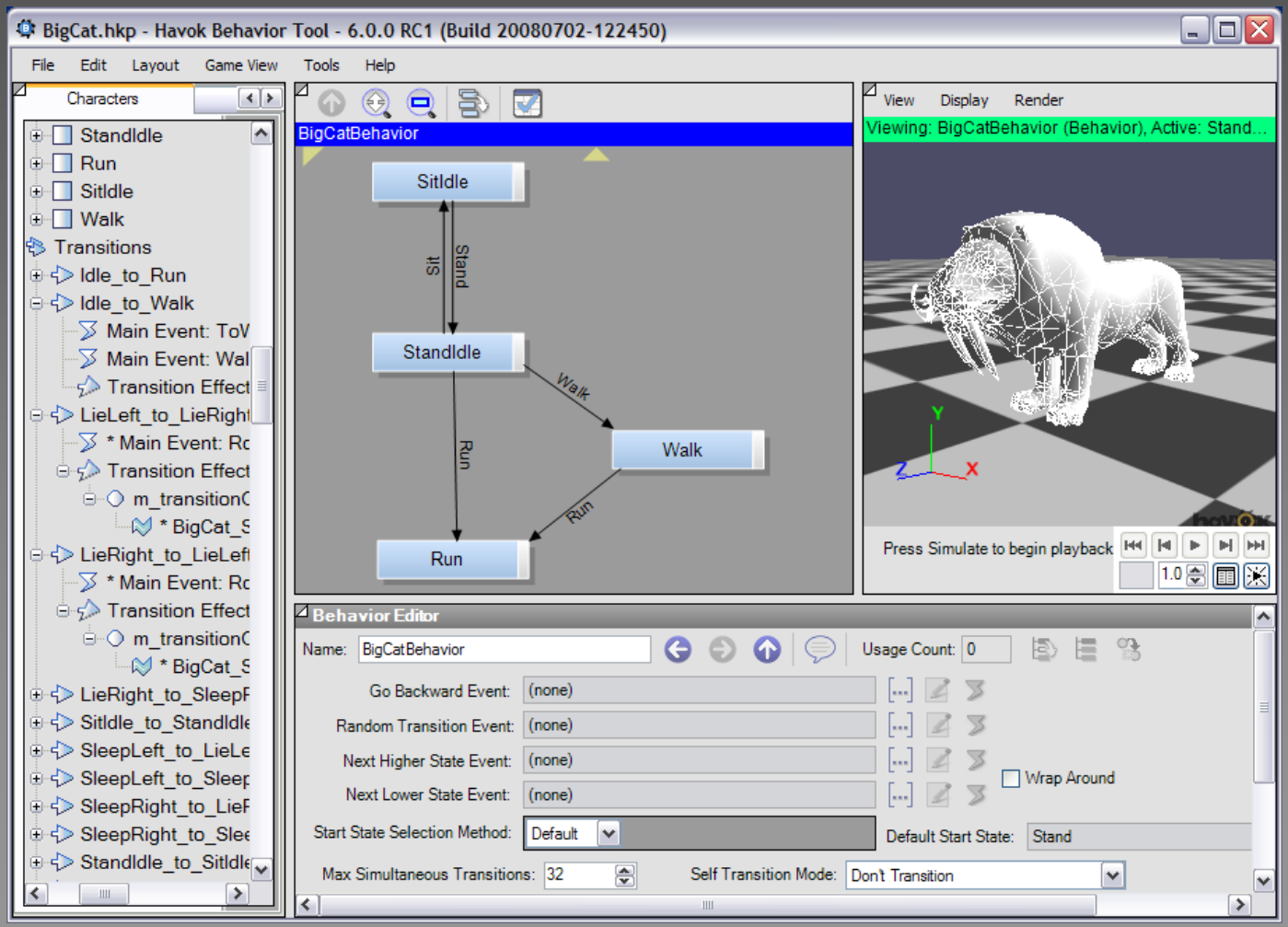
Behavioral Anticipation Example



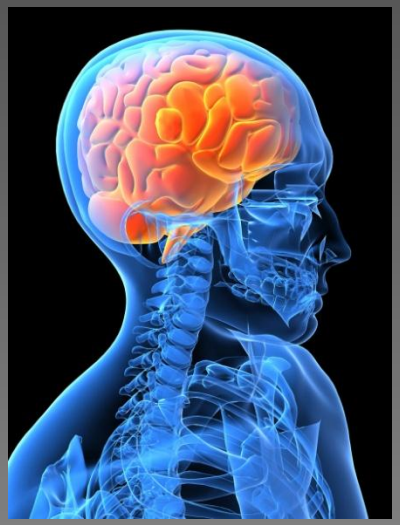
How to Make This Happen

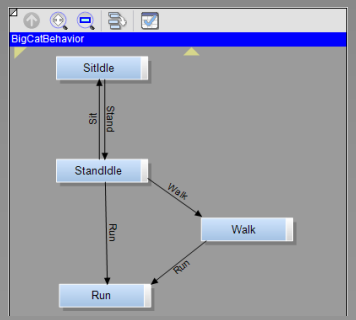
- Treat animators as first class AI authors.
- Animators should be able to work with anticipatory behaviors without a programmer's help.
  - Create a system with tools that allow animators to easily and intuitively author this type of content.

Havok Behavior Tool

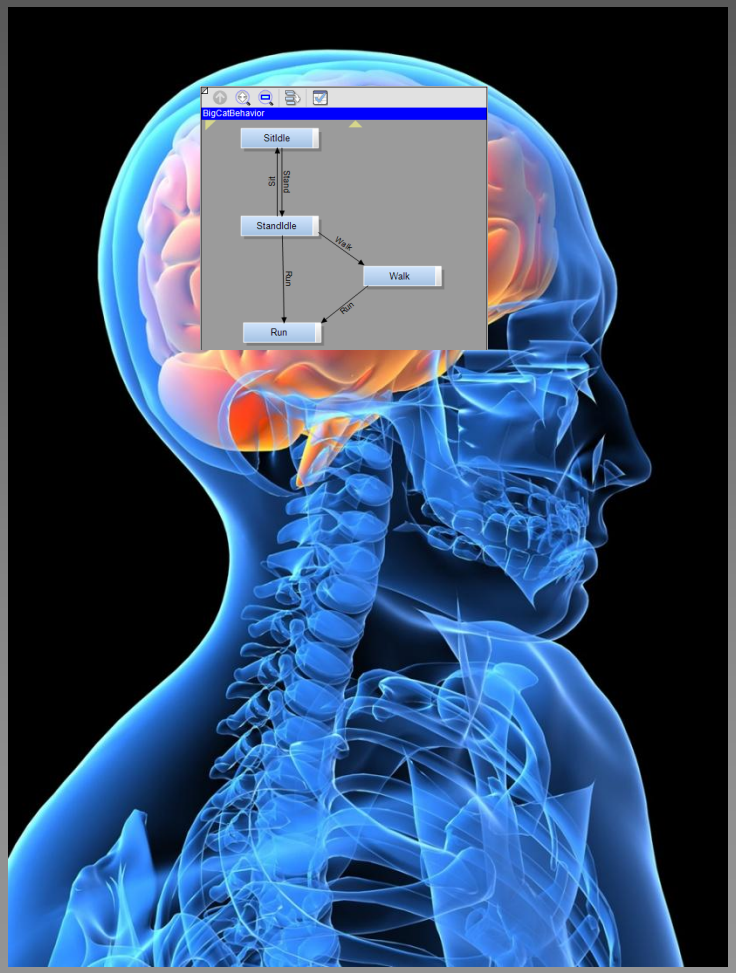


Animation Graph Utilization

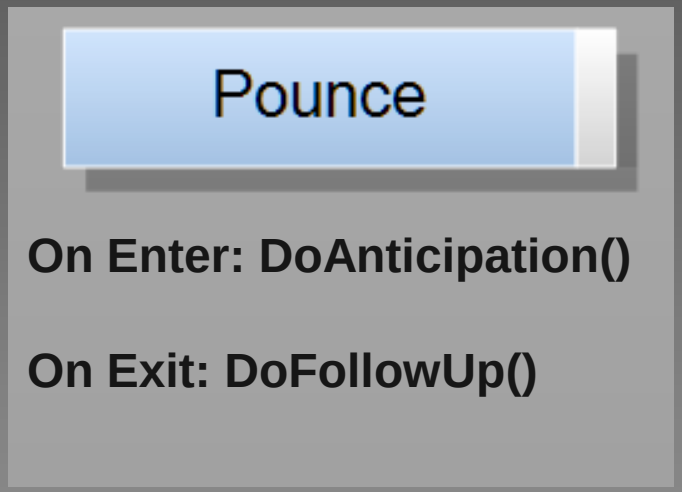




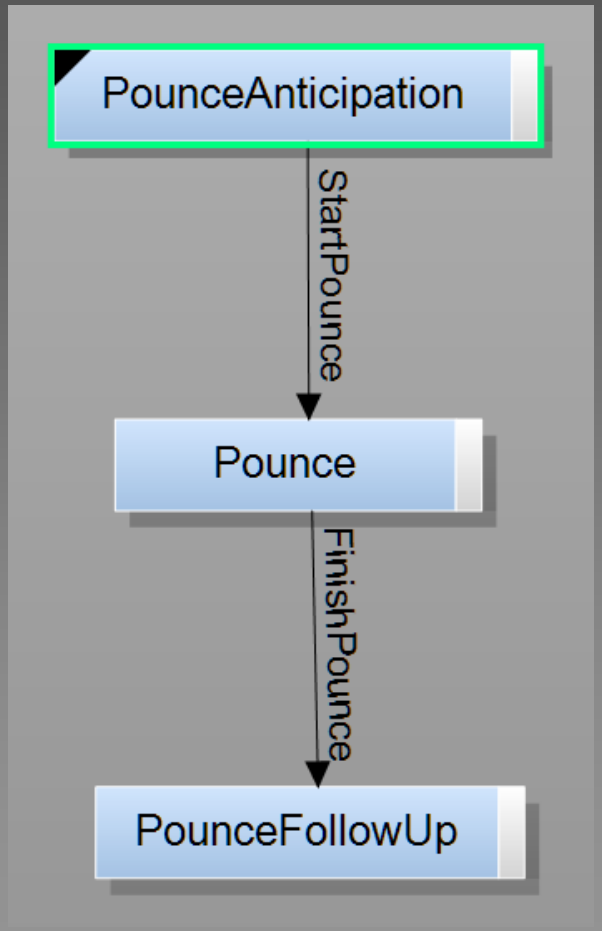
VS



Anticipatory Beats are First Class Behaviors



VS



Takeaways

- Communication is as important as representation.
- Anticipation is one of many concepts from the world of animation/film that can be directly applied to games.
- Create an AI environment that's friendly to animators - bring their ideas out!

Social Simulation

Phil Carlisle

Sponsored by UK Technology Strategy Board

What I'll cover

- Why bother with NVC?
- Practical NVC methods
  - Issues I've seen in games
  - Solutions!
- Example: Gaze controller
  - How they work
  - How they fit in with an engine

Why NVC?

- We are pre-programmed to read humans
- Characters that feel “human-like” should be more engaging
- Plenty of existing research (psychology, social psychology, anthropology etc)
- Good for the kinds of social distances in games
- Easier than speech!!!!! (less authoring)

Easy to get it horribly wrong!

Observation

- We as AI programmers should really pay more attention to animators methods
- Which means we need to be using observation!

Observation

VEHO
MUVI!

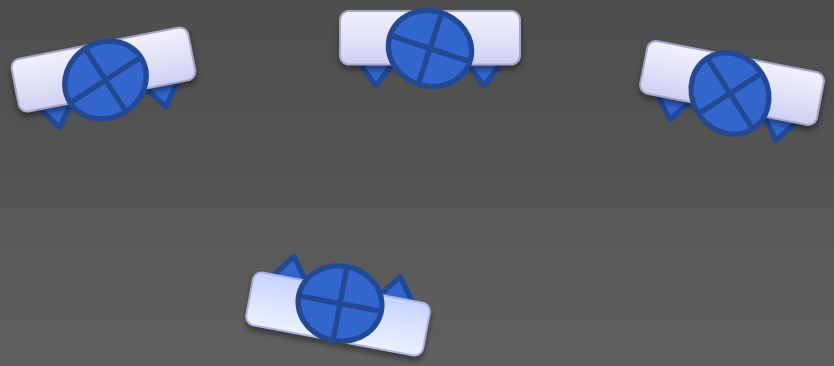
Observation

- When doing mocap, it is far more convincing if you do it with > 1 person!
  - Uncharted 2's mocap is so much better because of this (and great actors).
- This stems from the fact that the actors can touch each other!

NVC problems in games

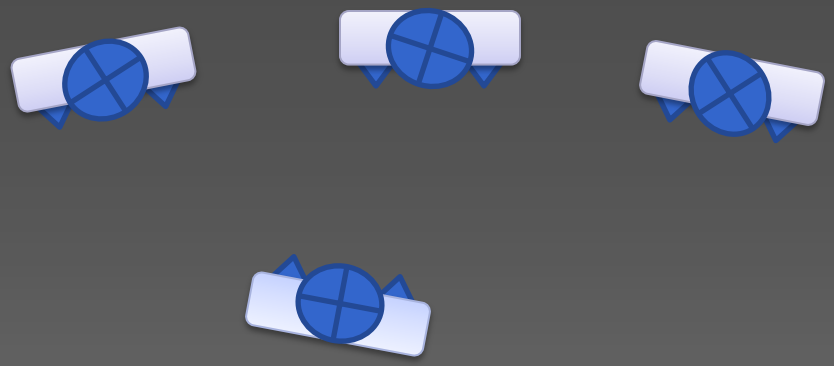
- Social greetings/threats
  - Gangs in GTA?
  - Traders in Dragon Age?
- “Alertness” reactions
- Character interactions

- Lets break it down.....



GANG

PLAYER



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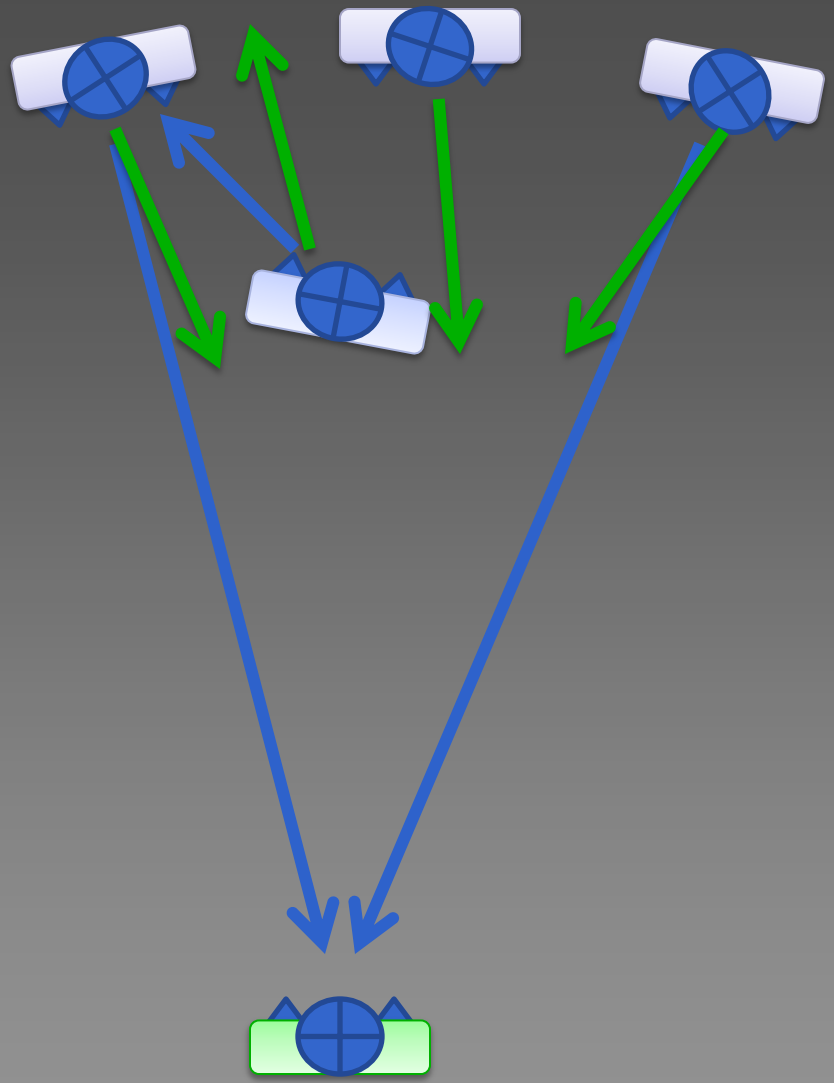


GANG

PLAYER

NVC problems in games

- How do we react to potential threats?
  - Gaze (for anticipation)
  - Posture shifts (to denote reaction)
  - Proximity shifts (to block threat)

NVC problems in games

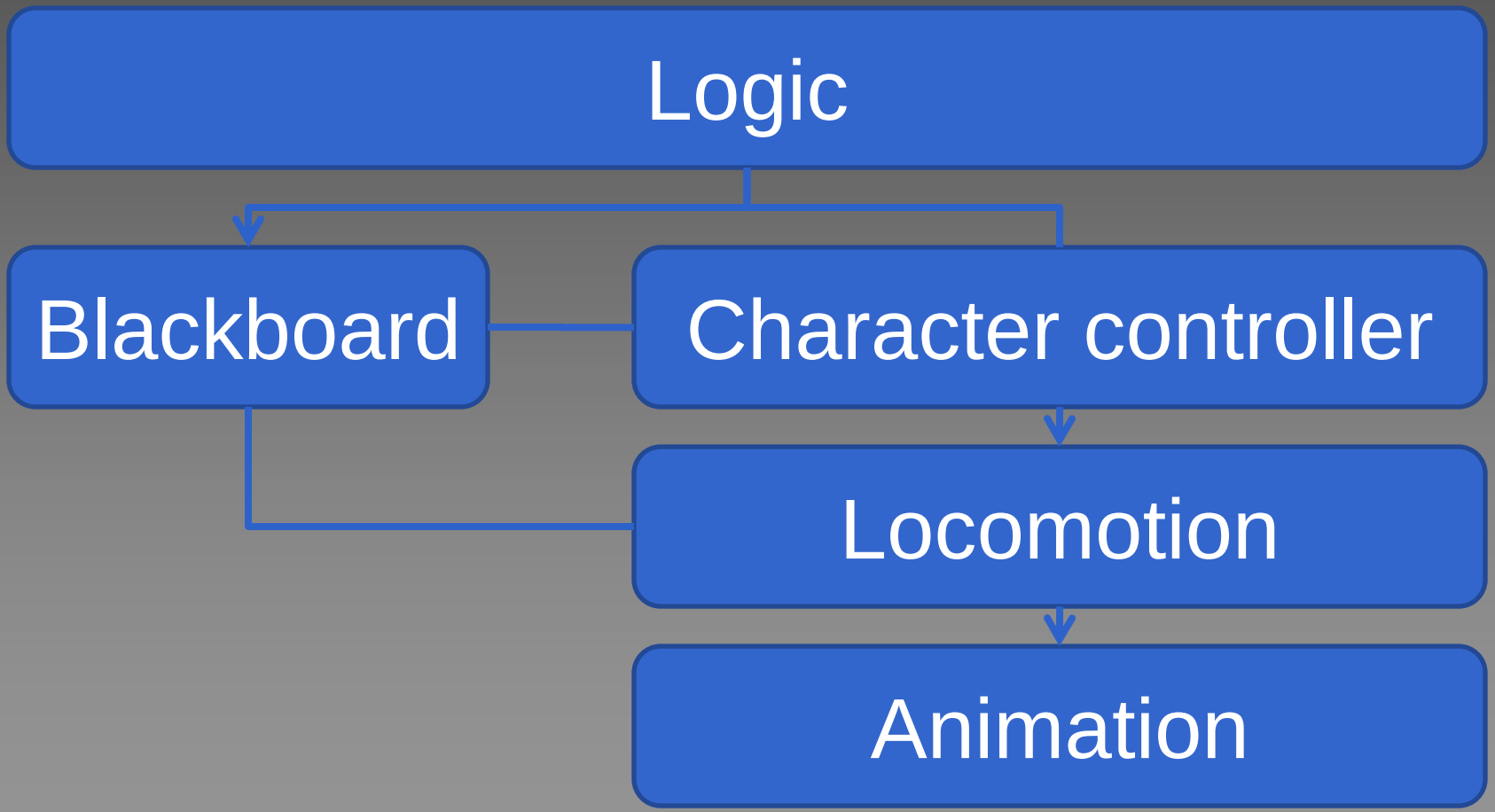
- Intentions of main NPC's
  - Dog barks good enough?
  - How are they feeling?
    - Example of Doom characters face!

- Most NVC happens "out of conscious"

NVC Solutions

- Dynamic system
- Don’t believe there is a “formula”
- But there ARE patterns
- Observe them!

Where does NVC control fit?



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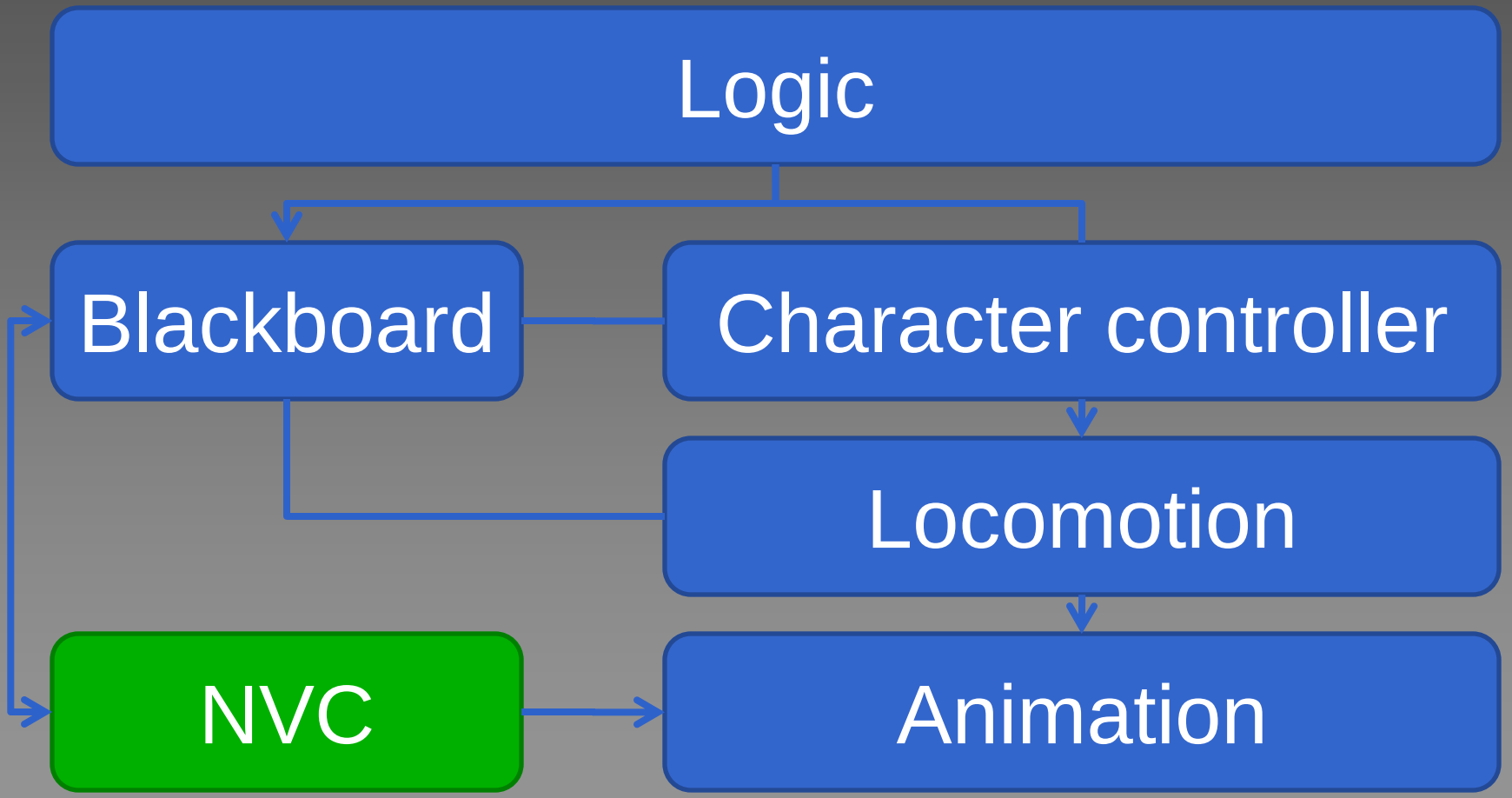

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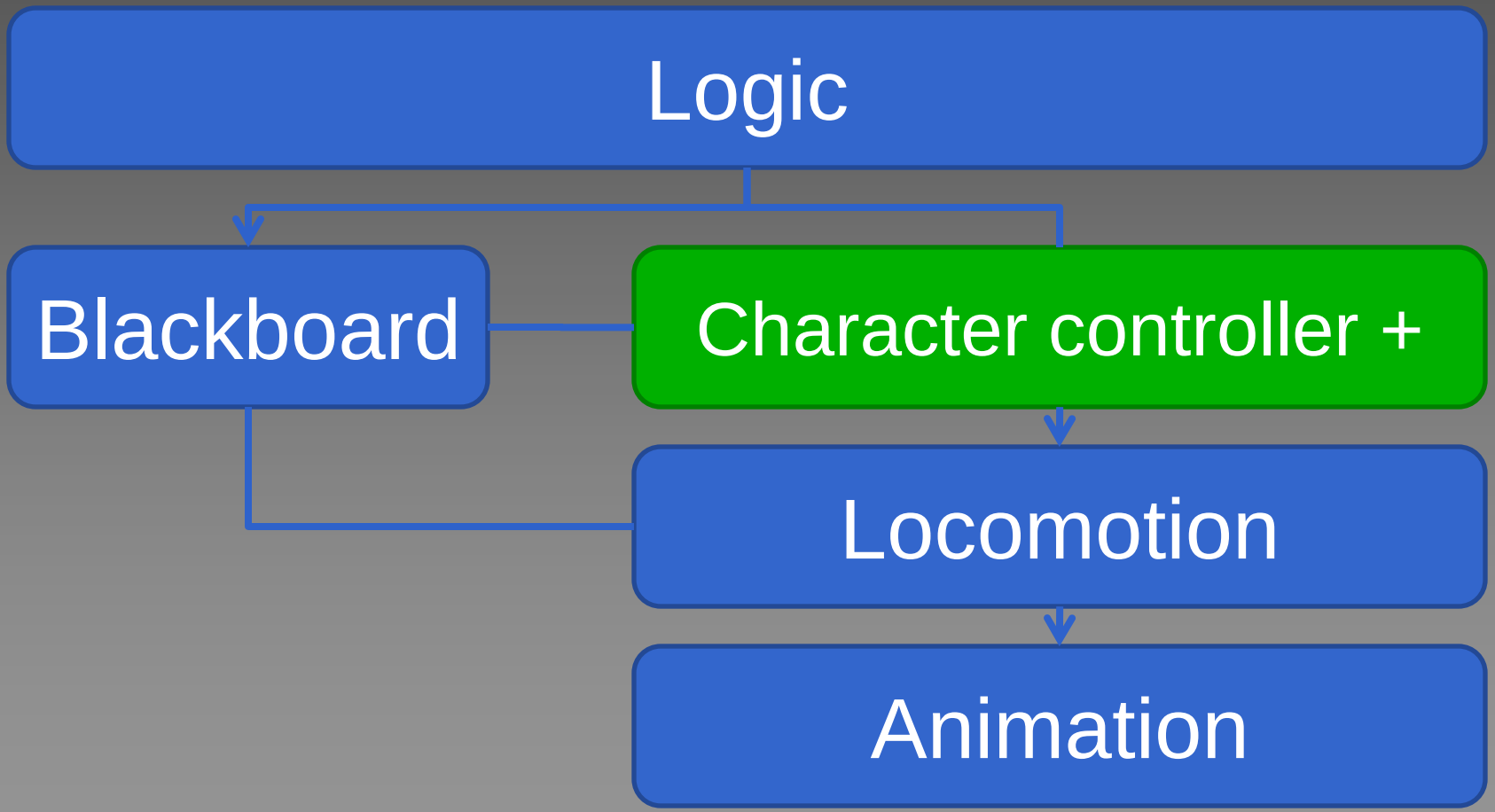


Gaze

- Why should we bother?
- What effects gaze?
- How do we handle gaze control?

Lieutenant General Bernard Freyberg VC, commanding officer of the British forces on Crete, gazes over the parapet of his dug-out in the direction of the German advance. - May 1941 Source: Wikimedia Commons

- We use gaze to actually see things!
- It lets others know what we see

- We use gaze to signal our thoughts/feelings
- Or to try and elicit reactions from others

- Gaze can show what we are attentive to
- And also, how we feel about others

- We use gaze to learn

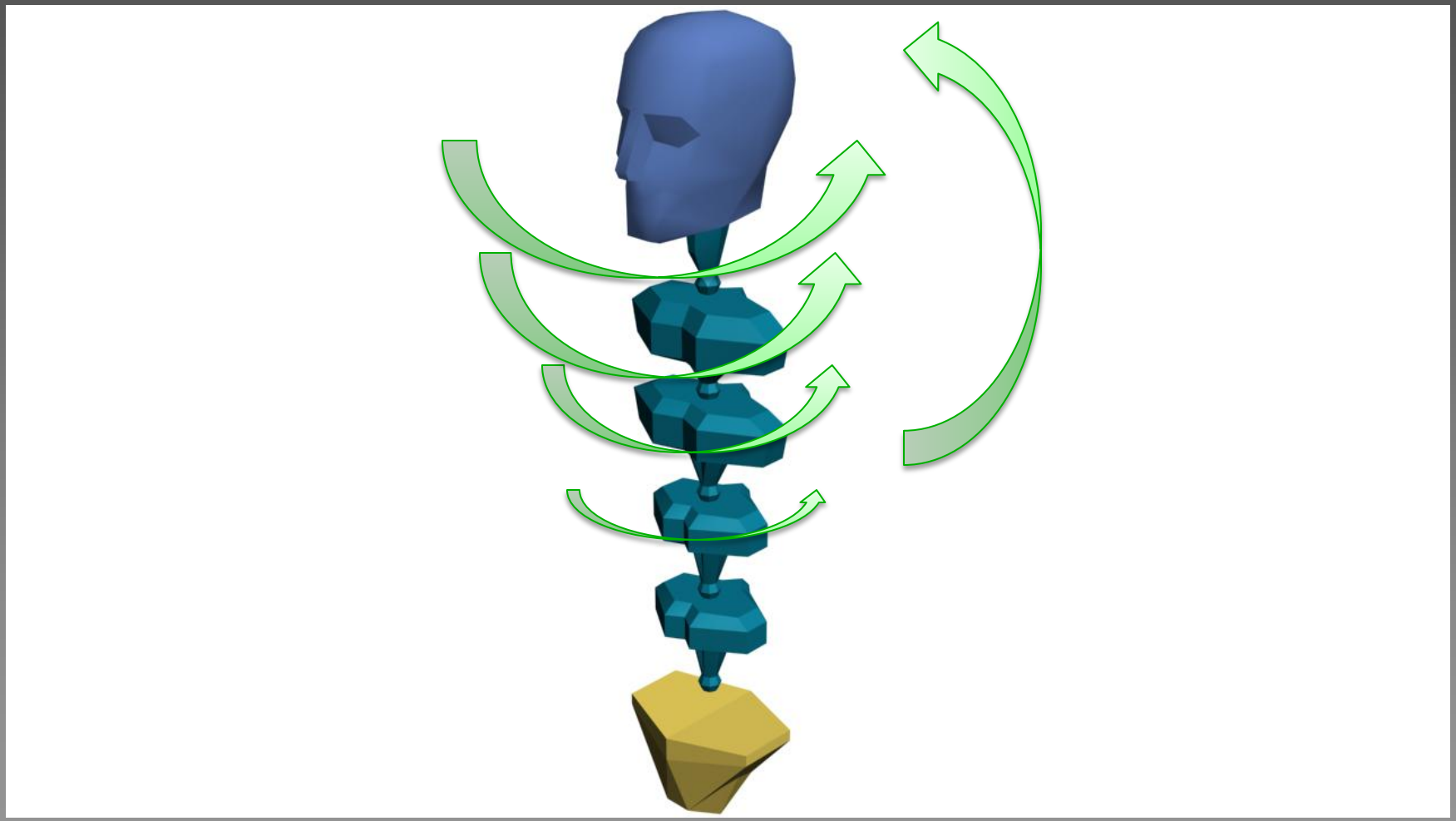
- And to teach

- And to comfort

What effects gaze?

- Internal state of mind
- Locus of attention
- Personality
- Proximity
- Orientation
- Affect
- Our eyesight!!!

Gaze Controller



Things to look at

Rune Johansen's
Head Look
Controller for
Unity3D
(with C# code)

http://unity3d.com/support/resources/unity-extensions/head-look-controller

Things to note:

- Mutual gaze is very intense
- We tend to avoid direct gaze unless intimate
- Glances and timing are important

Takeaways

- ✓Observation
- ✓Gaze is a good place to start
- ✓Social interactions

Characters and Social Games

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Characters & Social Games

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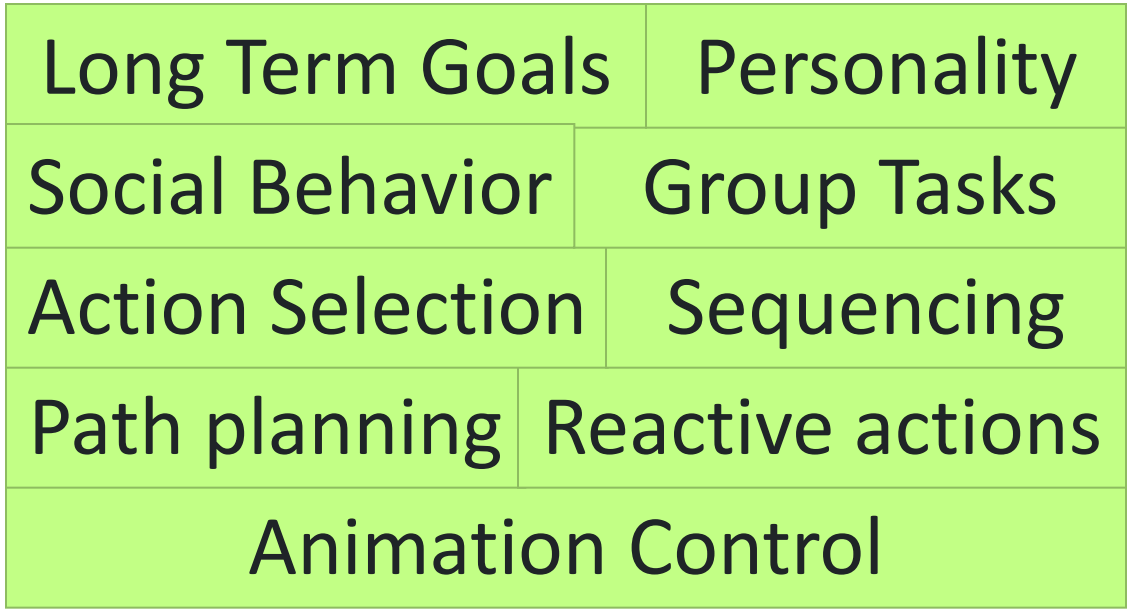
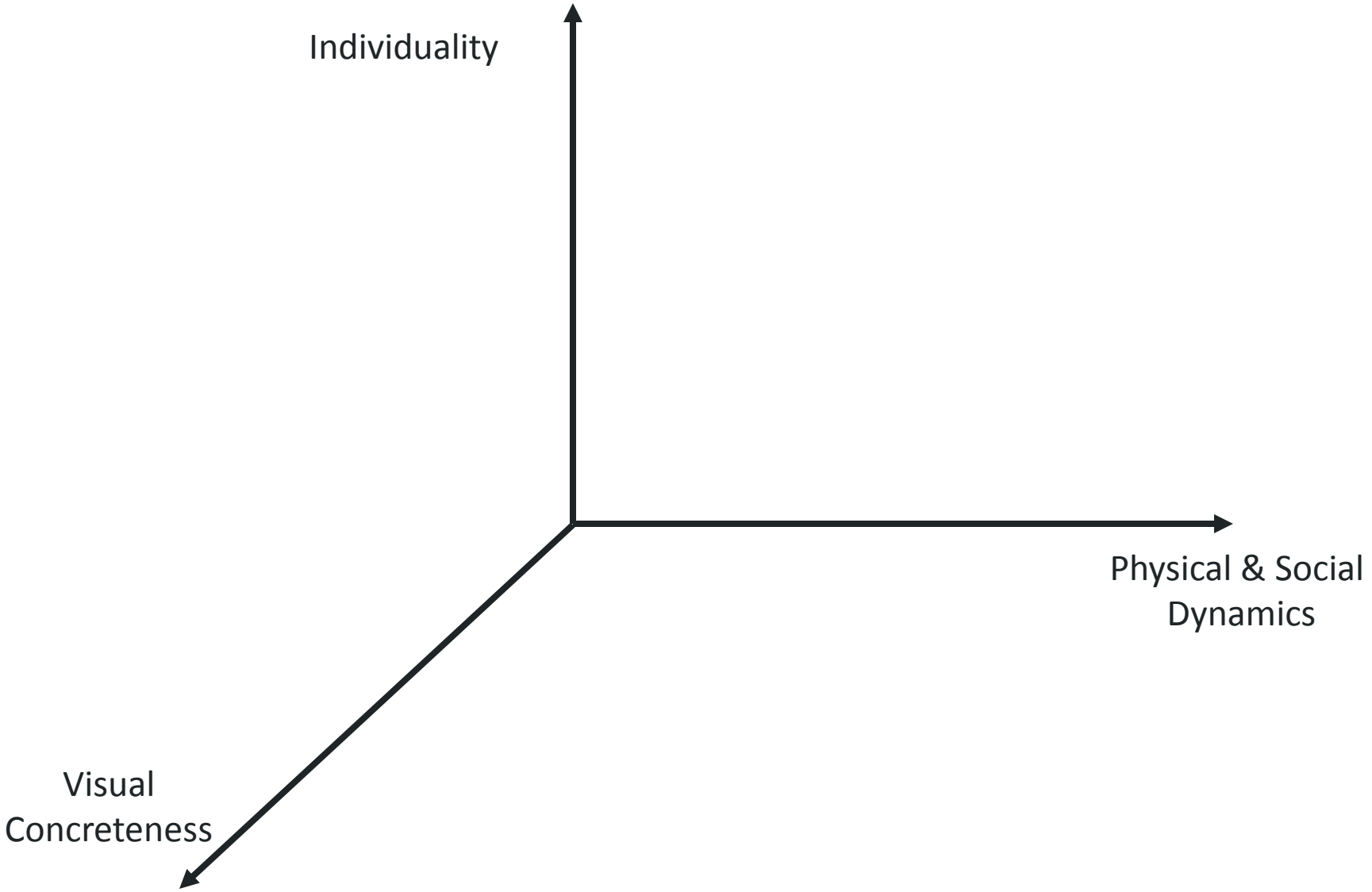
AI Summit: GDC 2010

The character performance hierarchy



Character design space



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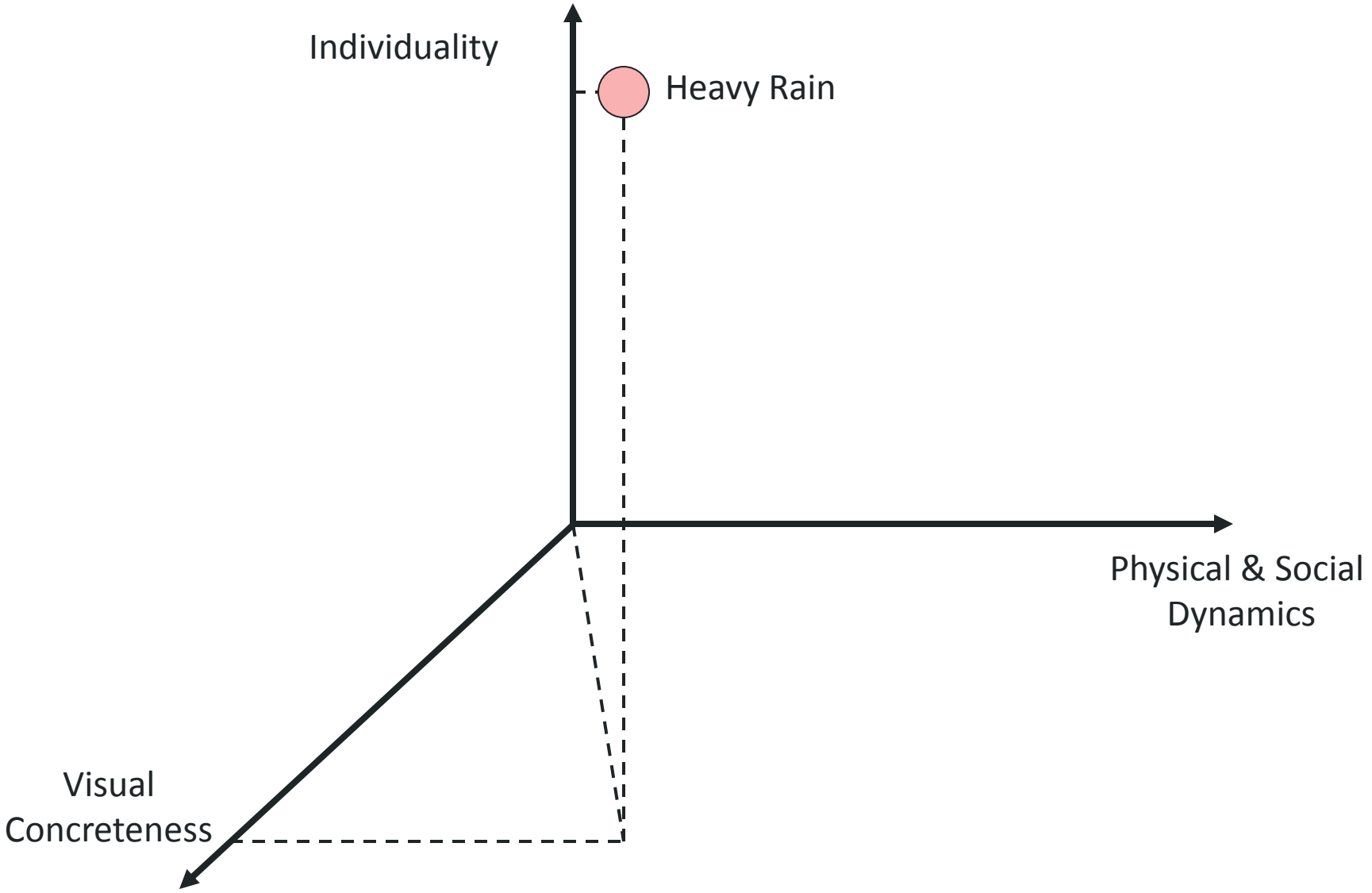

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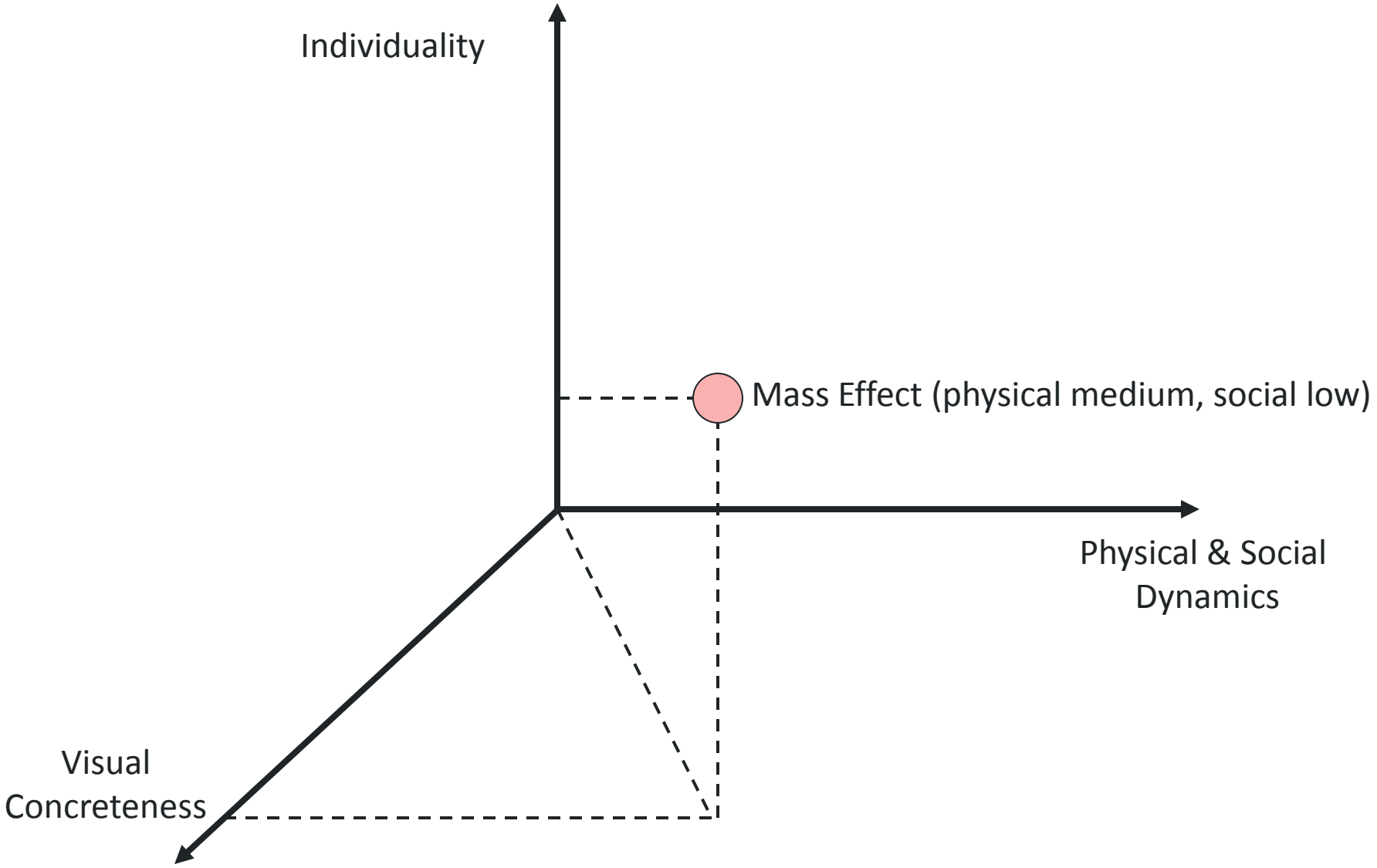

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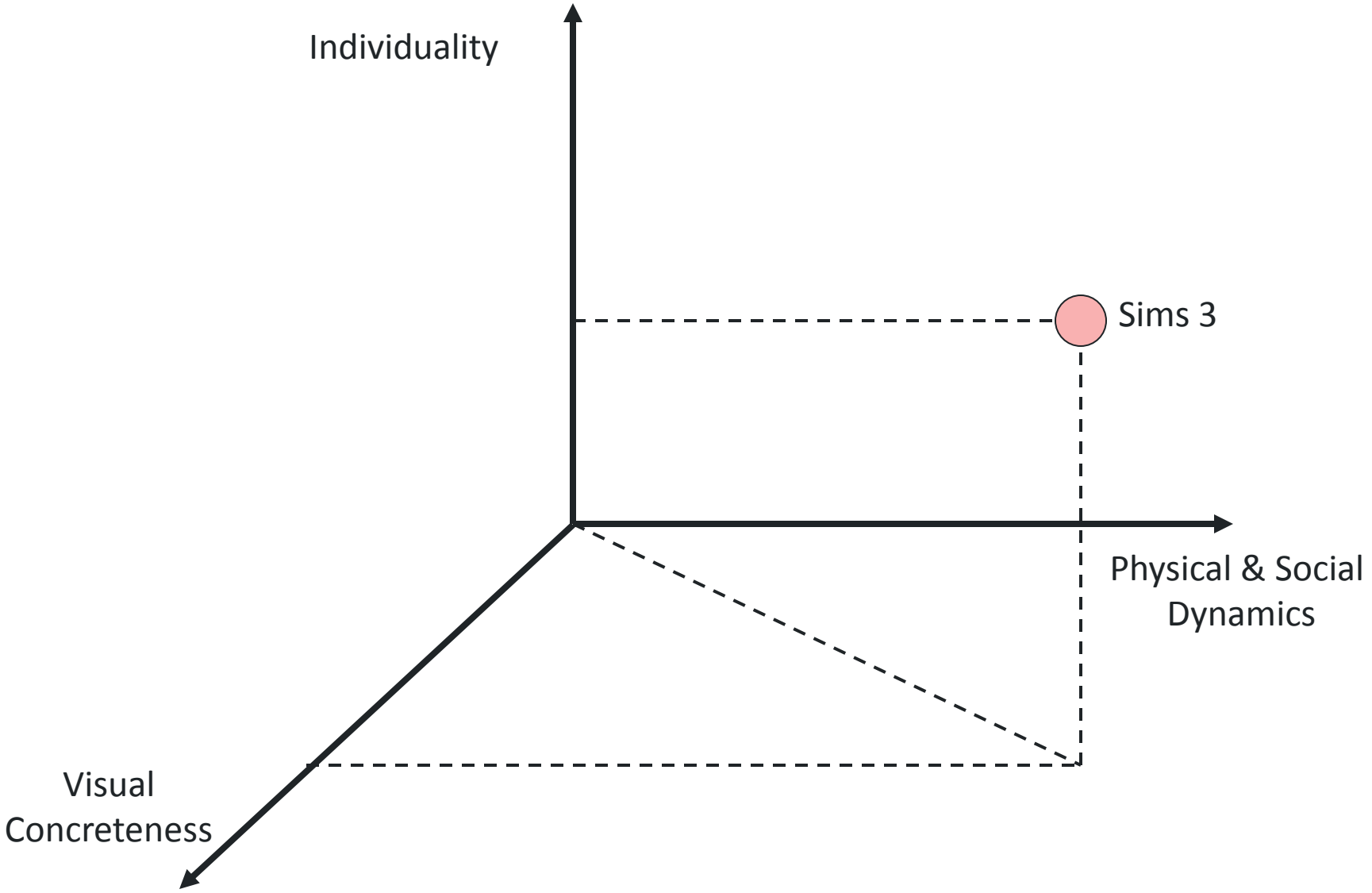

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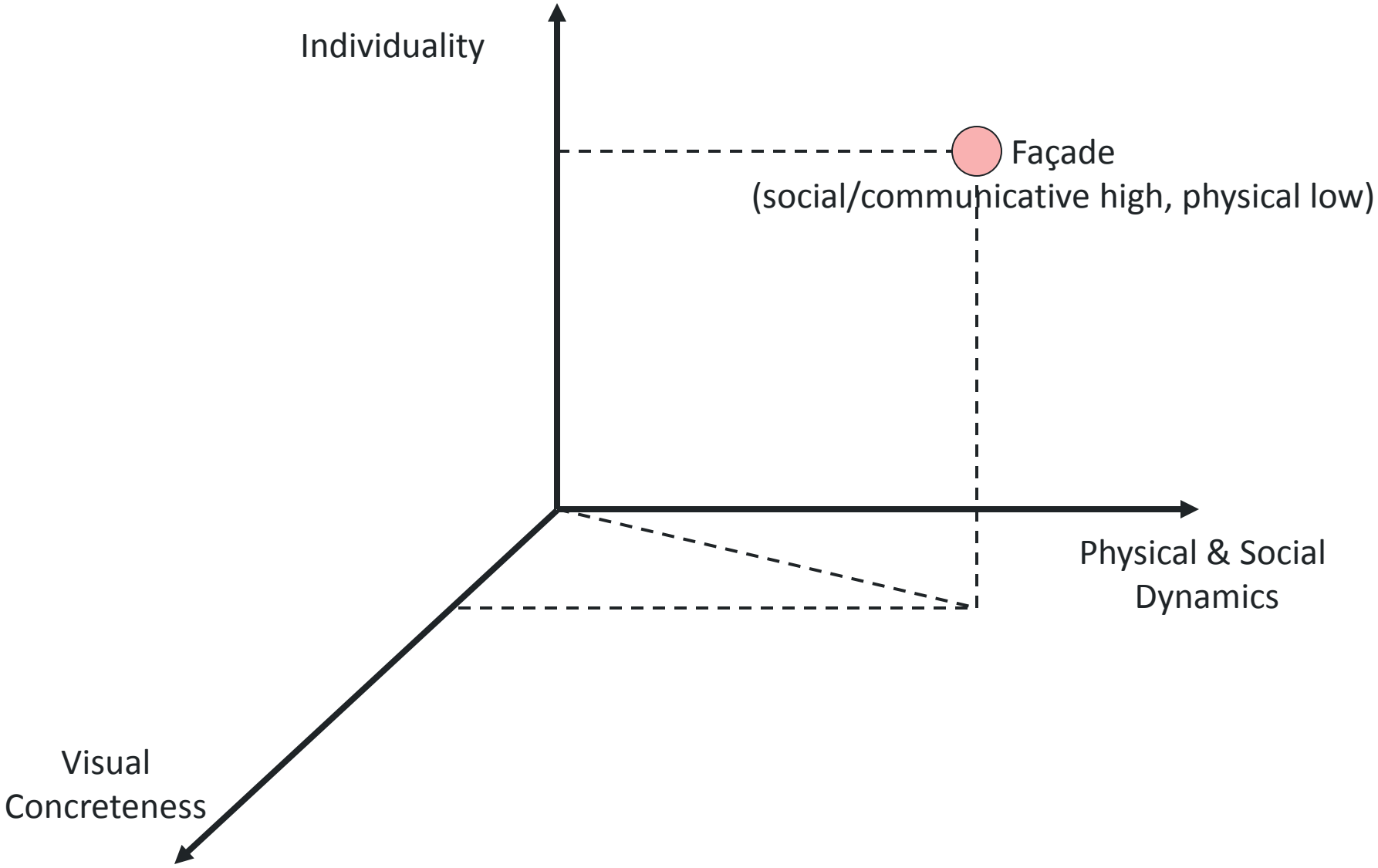
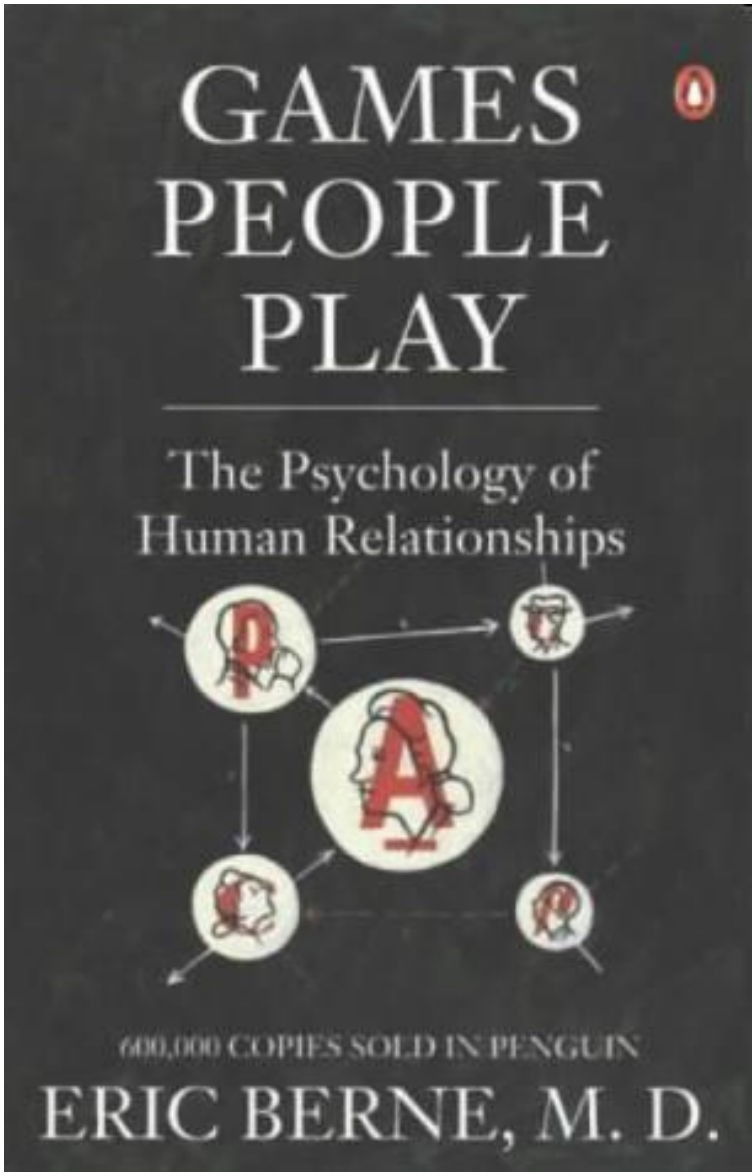


Zoomed in social behaviors

- Focus of this talk is zoomed-in social behavior

- This means
  - Interactions with dramatic potential
  - Detailed dialog
  - Detailed, playable social space

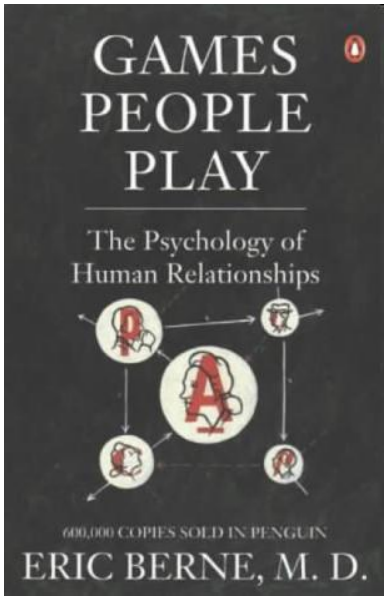
Façade


GAMES
PEOPLE
PLAY
The Psychology of
Human Relationships
600,000 COPIES SOLD IN PENGUIN
ERIC BERNE, M. D.

Façade's social games

- Affinity game
  - Player must take sides in character disagreements
- Hot-button game
  - Player can push character hot-buttons (e.g. sex, marriage) to provoke responses
- Therapy game
  - Player can increase characters' understanding of their problems
- Tension
  - Not a game, but dramatic tension increases over time and is influenced by player actions (e.g. pushing character hot-buttons can accelerate the tension)

Explicitly modeling social games



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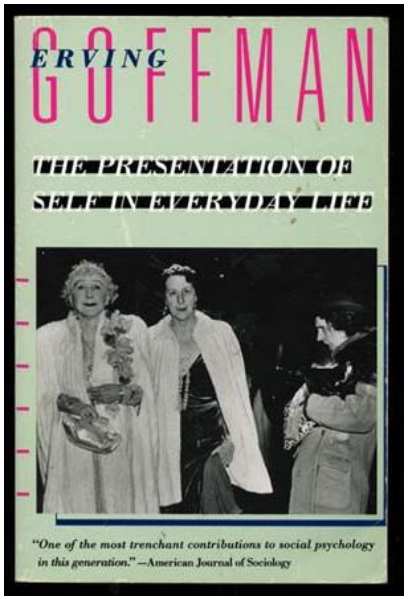

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= Models of social games

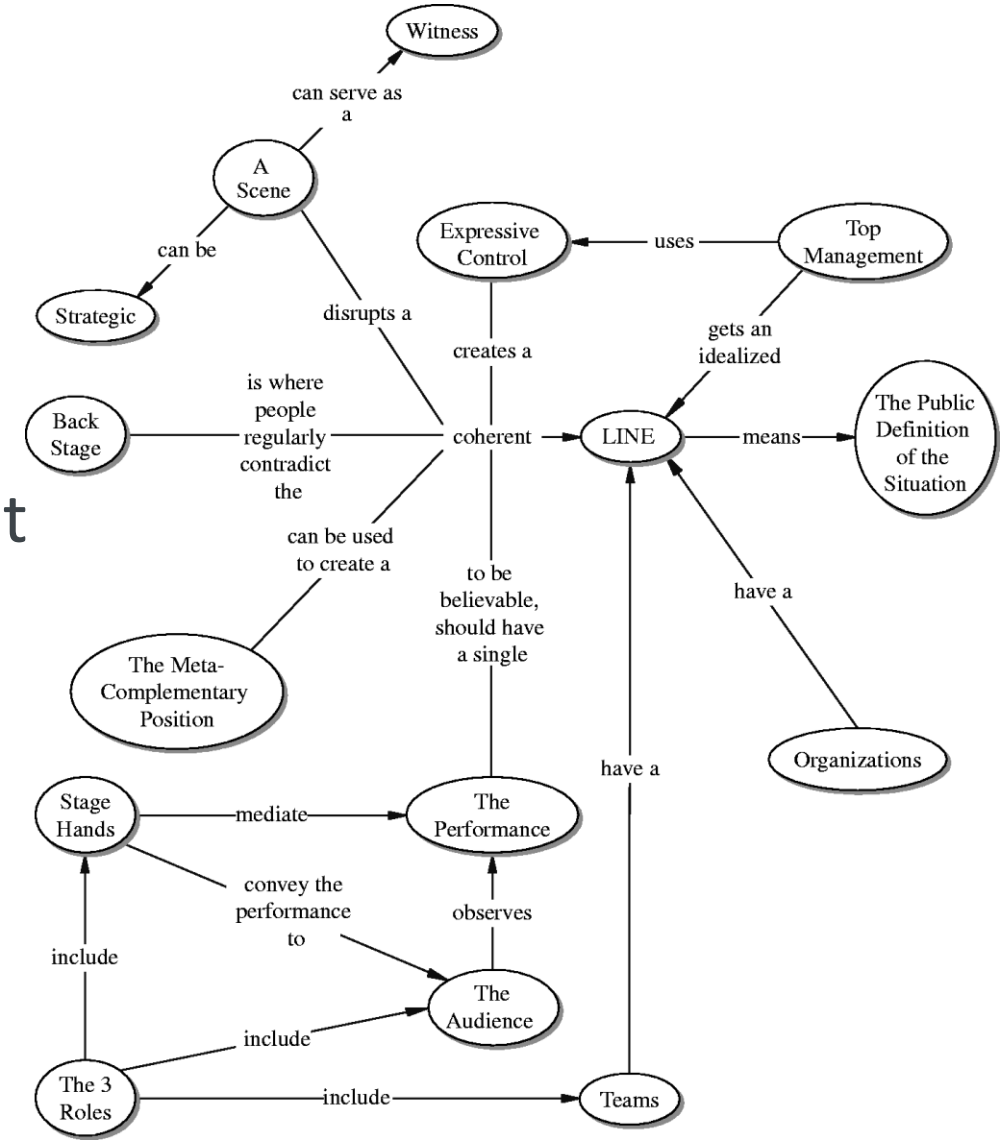
Definition of social game

A pattern of multi-agent interactions whose function is to modify the social state existing within and across the participants.

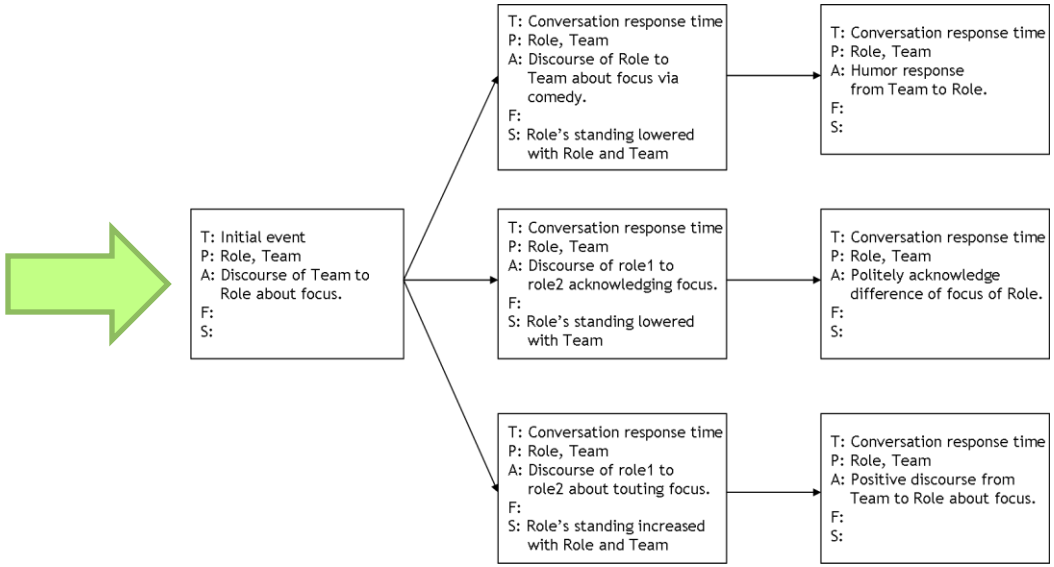
- Allows for agents to reason and perform in a social way to manipulate social state (includes social norm following)
- Interactivity – selection of game, current social state, and realization details influence oucome

Dramaturgical analysis

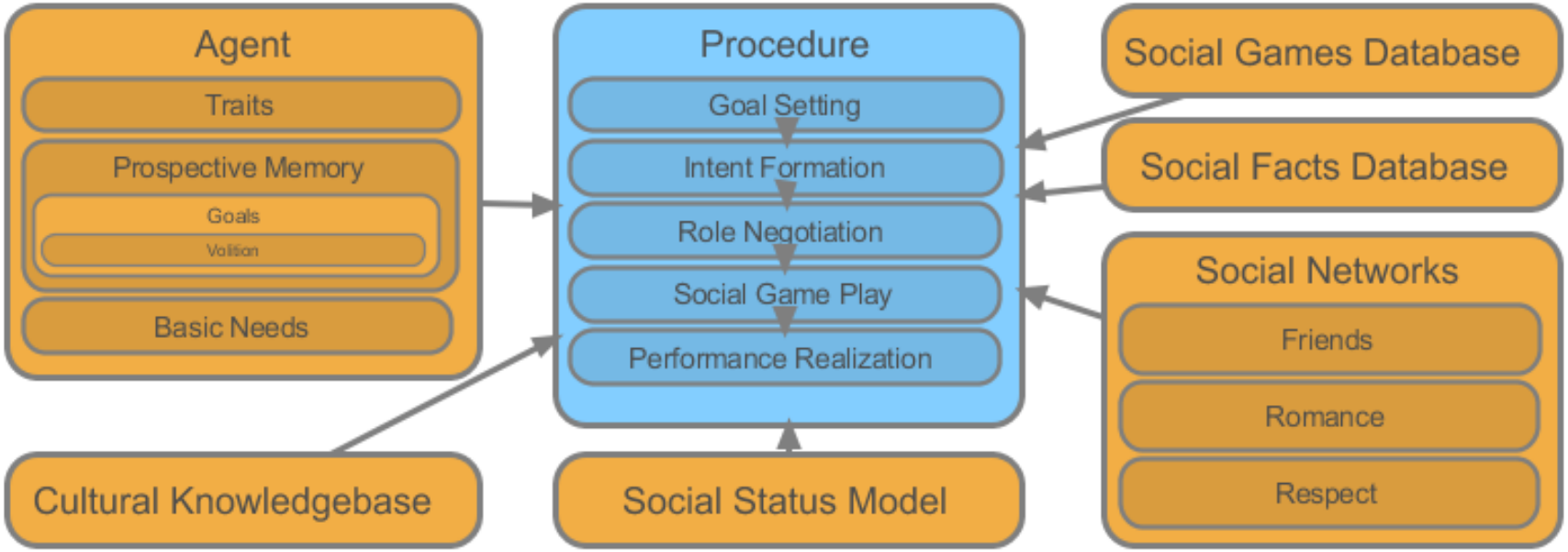
- Sociological tool for exploring reasons for behavior
- Impression management
  - Self-presentation
- Setting, stage, role, team, front/back stage, props, audience, etc.



Analyze media to find social games



Architecture



Social networks

- Our most primitive social state is captured by weighted edges in social network graphs
  - Each node is a character in the space
  - Each edge weight is the strength of the “affinity” that a character feels towards another

- We have three networks
  - **Relationship**: How much you like someone as a person (e.g. friends)
  - **Romance**: Interest in romantic endeavors (e.g. dating)
  - **Cool**: Respect for another.

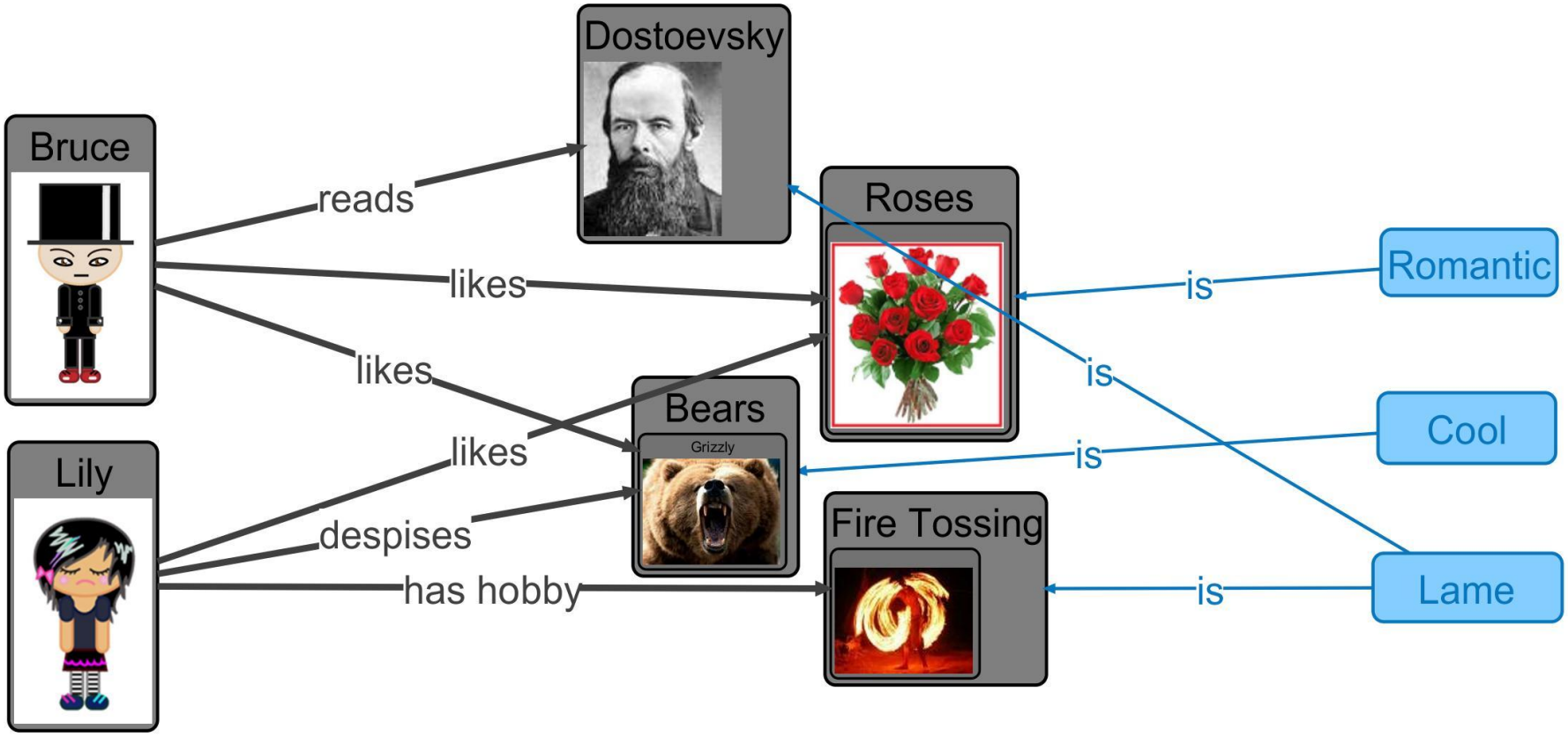
Social status

- Social status consists of higher-level social status that builds on the primitive social networks
- Inference rules chain from social networks to status

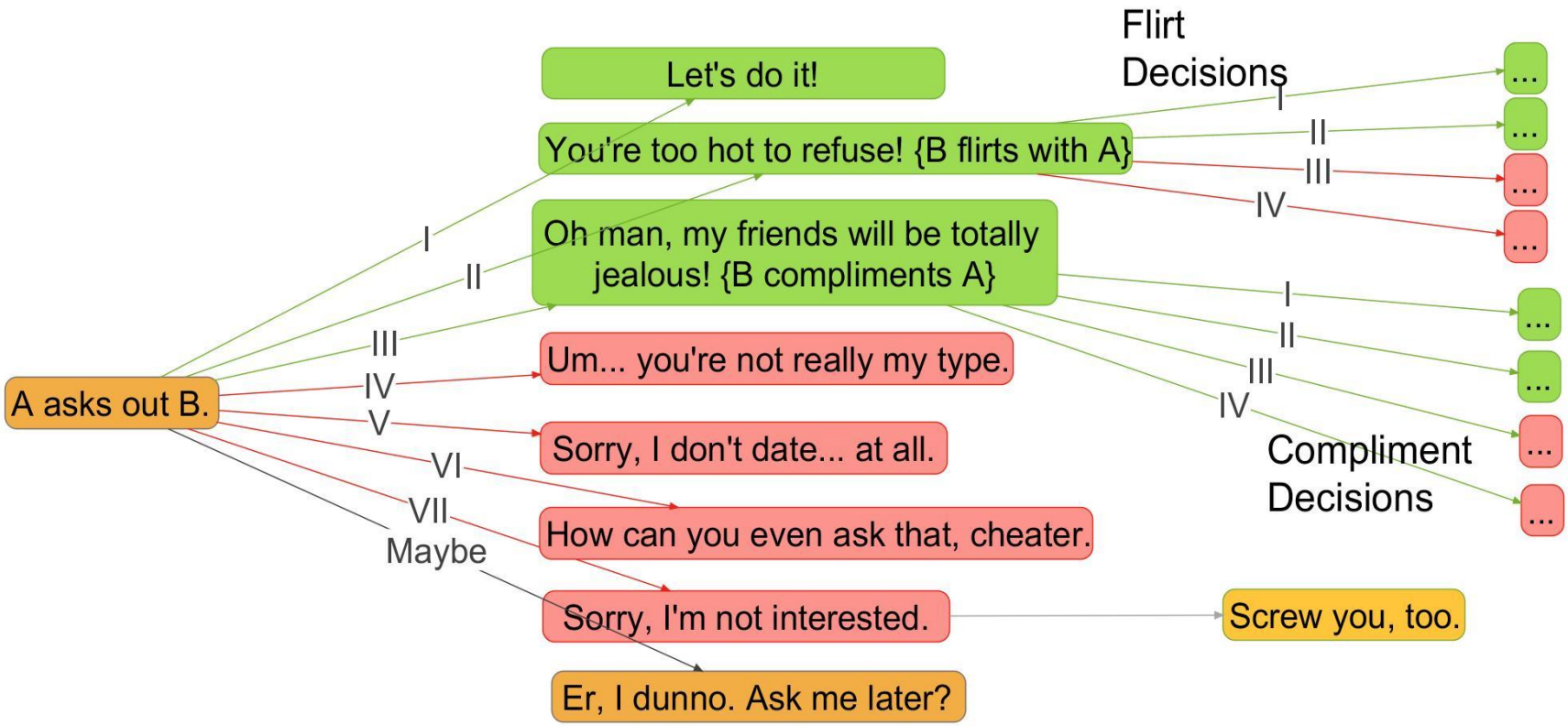
Dating(x,y) :- Rom(x,y) > 70 ^ Rom(y,x) > 70

Fighting(x, y) :- Enemy(x, y) ^ [NegativeAct(x,y)]
Fighting(x, y) :- Enemy(x, y) ^ [NegativeAct(x,z)] ^ Friends(y,z)
Fighting(x, y) :- Enemy(x, y) ^ [NegativeAct(x,z)] ^ Dating(y,z)

Cultural knowledge base



Social game example – “Ask Out”



For all friends f of B: avg(romantic(f,A)) > neutral → III
For all friends f of B: avg(cool(f,A)) > neutral → III
(rom(B,A) – threshold(Dating, rom)) < 0 → VII
trait(A, sex_magnet) → II (modifier high)
trait(B, desperate) → I (modifier medium)
…

Social facts database

Class	Word	A	B
1	dating	Kat	Rob
2	dating	Rob	Kat
4	friends	Kat	Miri
4	friends	Miri	Kat
6	broke up	Miri	Ed
6	broke up	Ed	Miri
2	took pass at	Rob	Ed
2	desires reconnect	Ed	Miri
7	dissed	Kat	Rob
7	insulted	Ed	Rob
8	fake story	Rob	Ed
11	spied on	Kat	Rob

Entry
Goal (chain back to status rule) Specific game and path Cultural knowledge used Social facts used Dialog templates with parameters

Take home

- Social games are a useful abstraction level for adding social dynamics to characters

- Holy grail of highly concrete, socially and physically dynamic, highly realized characters is still far way
  - For next several years, physical abstraction will be key for highly realized dynamic characters
  - I realize this doesn't help AAA, but can incrementally add social dynamics