Actors and Interaction

"Stories are about the most fascinating thing in the universe: people.”
– Chris Crawford

Vogler’s Narrative Archetypes

- Hero
- Herald
- Mentor
- Threshold Guardian
- Shadow
- Trickster
- Shapeshifter
Lead Roles in Games

Heroes
Speaking of Enemies...

Threshold Guardians

Heroes and their Enemies
But Not Just Games
Online Avatars

Making Them Act

Autonomoy of Actors

Follow a Script | Make Decisions
Perception Action Loop

Decision

Perception → A1
P2 → A2
P3 → A3
...

Perception Action Loop

Lookup
P1 → A1
P2 → A2
P3 → A3
...

Perception Action Loop

State Machine
S0 + P1 → A1 + S1
S1 + P2 → A2 + S2
S2 + P3 → A3 + S2
...

Perception
Action

Perception
Action
Perception Action Loop

Competition
\[ A_1 \rightarrow f_1(P, \text{State}) \]
\[ A_2 \rightarrow f_2(P, \text{State}) \]
\[ A_3 \rightarrow f_3(P, \text{State}) \]
\[ \cdots \]
\[ \max\{A_1, \ldots, A_n\} \rightarrow A \]

Planning / Reasoning

update(KB, k1)
update(KB, k2)
update(KB, k3)
bestaction(KB) \rightarrow A

Perception Action Loop

Decision

Perception
Action

Perception Action Loop

Planning / Reasoning

update(KB, k1)
update(KB, k2)
update(KB, k3)
bestaction(KB) \rightarrow A

Perception Action Loop

Planning / Reasoning

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Perception
Decision
Action
Visible Action

- The chosen action of an actor manifests itself typically as visible behavior at some point.
- The behavior will be performed by an articulated body, typically human-like in appearance.
- The movements communicate the inner world of the actor.
- Any movement or lack of movement that is not consistent with that inner world, destroys the credibility of that actor.

But it's very hard to control a visible body

- Over 230 joints
- Over 50 muscles in face
- And we never stop moving!

Humans control it with little effort

© Josh Lerner
But hard for computers and “players”

How do we make it easier?

The answer is a layered approach

Layered Control: Many Perception Action Loops
Body (physics)

- Knows its location and configuration
- Knows its limits
- Knows if it’s touching something
- Knows what’s perceivable
- Can balance itself

**Example: I bumped into another person!**

Motion (Dynamics)

- Knows what joints are needed
- Knows how joints can move
- Can maintain itself
- Can blend with other motions
- Can synchronize with environment

**Example: Eyes track an object**
Behavior [Performance]

- Knows what motions are needed
- Knows which motions are most important
- Knows if the behavior succeeded
- Can change if needed

- Example: Point at instruments
- Example: Nod the head

Intent [Cognition Level 1]

- Knows what behaviors help intent
- Knows what behaviors are permissible
- Knows the social context
- Can try something different if behavior fails

- Example: Start conversation
- Example: Reach the tower

Goal [Cognition Level 2]

- Knows what intent is most useful
- Knows intent of others
- Knows needs, desires, emotions, personality...
- Can evaluate progress towards goals

- Example: Tell john about the lottery!
- Example: Defeat the enemy

John must know this
Summary of layered approach

- **Intelligence** is spread across layers, with higher concentration at the top and lower concentration in the graphics hardware at the bottom.
- **Interfaces** between layers: As well as being the glue holding a character together, they provide
  - scripting opportunities
  - sharing of standard components (e.g. "engines")
  - different levels of control (e.g. Player vs. NPC)