AI, Games and Agents

Some observations
Game Characters are Dreadful

• Why are they dreadful?
• Why does it matter?
• How can we improve the situation?
Why do characters matter?

• Mainstream entertainment is based on interesting characters
Where Do Game Characters Fall Short?

• They’re often autistic
Where Do Game Characters Fall Short?

• They respond too similarly
Where Do Game Characters Fall Short?

• They’re wooden
Where Do Game Characters Fall Short?

- They repeat themselves
Where Do Game Characters Fall Short?

• They don’t interact believably
How Do We Make Game Characters More Interesting?

• Challenge 1: Characters shouldn’t act like idiots
  – They need to respond to events believably
  – Characters should vary their behavior
How Do We Make Game Characters More Interesting?

• Challenge 2: Characters should display a baseline level of human behavior
  – Their behavior takes relationships and past events into account
  – They have moods
  – They behave differently around people they know versus ones they don’t
  – They express themselves (at a minimum) via body language
How Do We Make Game Characters More Interesting?

- Challenge 3: Characters should have recognizable personalities
  - One-note personalities are acceptable for supporting characters (e.g. tough guy, weasily coward)
  - Ideally, main characters have at least two competing traits. This enables meta-games.
How Do We Make Game Characters More Interesting?

• Challenge 4: Characters should be able to engage emotionally with the player
Special Cases

- Soldiers
Special Cases

• Sports
Special Cases: Crowds

- Real crowds are non-uniform
Special Cases: Crowds

- Real People Respond Differently to Events
Facial Expression and Body Language as Indicators of Personality and Mood

• Animators figured out the rules long ago
“93% of human communication is through body language”

- A search for “body language” on Amazon generates 1373 hits
- Body language is straightforward to implement
Body Language

- Level 1: Brain-dead obvious
Body Language

- Level 2: Subtle
Body Language

• Level 3: Obscure
  – Don’t over-think it. Players won’t get it.
Body Language

- Static postures are the place to start
Body Language

• Posture plus movement can provide an unmistakable signal
Body Language

• Crowds can tell a story
Body Language

• Body language can express a changing relationship.
Body Language

• Another example of a changing relationship
Body Language

- Invading personal space creates tension
Body Language

• The message is clearest when postures reinforce each other
Body Language

• Mixed messages are interesting
Body Language

• You can always tell when someone cares
Body Language

• Group dynamics are a harder problem

Still matching group posture, Romily makes contact with Lee via gaze and smile. If she can get the attention of the social leader, he will draw others’ focus to her.

Romily is ‘in.’ Lee is ‘making way’ for her with eye contact and head tilt. The group is also allowing Romily to take the floor, moving nearer and turning to face her.
How Character Can Drive Gameplay

• Imagine that you cared about an NPC
• Would you change your play to avoid hurting their feelings or alienating them?
• Suppose an enemy NPC had human weaknesses that you could exploit?
Case Studies

- The guard
- The alien abductee
- The plucky heroine
Connecting Emotionally with Game Characters

• Can an NPC be your friend?
  – Shared interests
  – Shared experiences
  – Responsiveness
  – Friendly gestures

• How about if you choose your friends?
Summary: How Do We Make Game Characters More Interesting?

1. Characters should react to what’s happening around them
2. Characters should display a baseline level of human behavior
3. Characters should have recognizable personalities
4. Characters should engage emotionally with the player
Observation #1

Maximize the ratio of internal complexity to perceived intelligence.
Men are all alike.
>IN WHAT WAY?
-They're always bugging us about something or other.
>CAN YOU THINK OF A SPECIFIC EXAMPLE?
-Well, my boyfriend made me come here.
>YOUR BOYFRIEND MADE YOU COME HERE
-He says I'm depressed much of the time.
>I AM SORRY TO HEAR YOU ARE DEPRESSED
-It's true. I am unhappy
>DO YOU THINK COMING HERE WILL HELP YOU NOT TO BE UNHAPPY

Eliza
Men are all alike.

> IN WHAT WAY?

They're always bugging us about something or other.

> CAN YOU THINK OF A SPECIFIC EXAMPLE?

Well, my boyfriend made me come here.

> YOUR BOYFRIEND MADE YOU COME HERE

He says I'm depressed much of the time.

> I AM SORRY TO HEAR YOU ARE DEPRESSED

It's true. I am unhappy

> DO YOU THINK COMING HERE WILL HELP YOU NOT TO BE UNHAPPY

Perceived Complexity

Actual Complexity

SHRDLU

Eliza
\[ E_s/N_0 = E_b/N_0 + 10\log_{10}(2/3) = E_b/N_0 - 1.76 \text{ dB} \]

\[ E_s/N_0 = E_b/N_0 + 10\log_{10}(1/2) = E_b/N_0 - 3.01 \]
Observation #2

The player will build an internal model of your system. If you don’t help them build it, they’ll probably build the wrong one.
Observation #3

The flow of information about a system has a huge impact on the players perception of its intelligence.
Observation #4

From the players point of view there is a fine line between complex behavior and random behavior. Visibility of causal chains usually makes the difference.
State Machines

Environmental Situation

Fight
Flee
Eat
Forage
Nest

Behavioral Response

?
How to get toothpaste on a toothbrush...

The steps: The chimp (A) eats the two bananas (B) which tips the scale and makes the barrier (C) go down. Since the hammer (D) is not held back anymore, it slides down the tightly-tied rope (E). The hammer hits the jug of milk (F), which is standing at the very edge of the table and knocks it over. The milk jug is tied by a string (G) to the door of the fold back (H). When the milk jug falls, it pulls the door open (the door opens, see this: W). The bird (I) flies out of the cage and sits on the feed-feeder (J) because it has food. In (J), the added weight pulls the old ladder down and the barrier (E) opens. The unrestricted ball (L) slides down the ramp (M). The cat (N) sets the ball and jumps out of the basket. This shifts the balance, making the espiacet go up and the weight (O) go down. On the way down, the rubber band (P) expands (Q). When rubber band is full, you have to pass through the water (R) in the kettle without boiling. The steam goes through a tube (C) into the outdoor (S), which is like a steam engine. The steam expands and pushes the piston (T). The piston has a rod attached to it. Using a metal plate at this end (U), the metal plate pushes against the toothpaste which is attached to the wall (V). Because of the pressure the cork (W) flies...
Observation #5

Mimicking human intelligence and maximizing the intelligence of an artificial system are 2 very different tasks.
The graph illustrates the concept of anthropomorphism, showing the emotional response as a function of how machine-like or human-like an object is. The emotional response increases as the object becomes more machine-like, reaches a peak in the 'Uncanny Valley', and then decreases sharply as the object becomes more fully human-like.
Observation #6

There are many applications of AI in games that don’t involve Opponents, Avatars or even human-like intelligence.
Meta AI

Peer AI

Sub AI

Experience
- Information Flow
- Pacing
- Simple Player Model

Agents
- Behavior
- Opponents/Avatars
- Complex Player Model

Simulation
- Physics
- Tactile
- Intuitive Player Model
Failure

Meta AI

Peer AI

Sub AI

Game - Designer

Agents - Intelligence

World - Simulation
Observation #7

Building a system that collects and reflects natural intelligence is far easier than replicating that intelligence.
Observation #8

Building a robust, internal model of the player can have huge potential value.
From the player’s model of the computer...to...the computer’s model of the player
Player Story

Adaptive Mapping

Computer Understanding

- Comedy
- Romance
- Horror
- Mystery
- Action