Factors for Measuring Dramatic Believability

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Outline

- Introduction
- Deconstruction
- Evaluation from Player Perspective
Process

• How do you measure a character’s believability?
• Good question
Mechanisms

- Procedural animation
- Emotion modeling
- Social behavior
- Intelligent agents
- Discourse modeling
- Speech generation
- Story management
- ...

[Image: Machinery with a prohibition symbol]
Believable Behavior

- The Turing Test
Dramatically Believable Behavior
## Oz Project

<table>
<thead>
<tr>
<th>Believable Agents</th>
<th>AI</th>
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<tbody>
<tr>
<td><img src="Image" alt="Character Icon" /></td>
<td><img src="Image" alt="Microscope Icon" /></td>
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<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Personality</td>
<td>Competence</td>
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<tr>
<td>Audience perception</td>
<td>Objective measurement</td>
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<tr>
<td>Specificity</td>
<td>Generality</td>
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<tr>
<td>Characters</td>
<td>Realism</td>
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Characters are not reality, but rather an artistic abstraction of reality.
Expectation

• Behavior deemed as believable is a function of what is expected
High Fidelity

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THAT'S WHY I DECIDED TO DRAW MYSELF IN SUCH A SIMPLE STYLE.

WOULD YOU HAVE LISTENED TO ME IF I LOOKED LIKE THIS??

Thus, when you look at a photo or realistic drawing of a face--

YOU SEE IT AS THE FACE OF ANOTHER.

But when you enter the world of the cartoon--

YOU SEE YOURSELF.
Kline & Blumberg

• 4 subsystems for driving character behavior
  – Motivational drives
  – Emotions
  – Perceptions
    • Two parts
      – Inputs
      – Evaluation of input
  – Action selection
    • Planning
    • Competing behaviors (e.g. subsumption)

• Player’s *perception* of these subsystems is key
Bottom Line

A character’s believability can be measured as a sum across modalities of a character’s adherence to the set of relevant constraints.
Outline

• Introduction
• Deconstruction
Expectation

External Expectation
- Defined by everyday world knowledge
- E.g. “people can talk” or “matches can start fires”

• Internal Expectation
- Defined by promises / conventions made in-game
- Fidelity of different aspects of the player experience
- E.g. “barrels and crates blow up” or “You can’t shoot and talk”
Connection to Believability

• Believability can be viewed as two terms
  – the gap between what is expected and what is offered
  – the ceiling for believability
• Character believability → what is expected + what is promised
• E.g. if you use humans but don’t fake discourse, the ceiling will be lower but the gap will be smaller
Top-level Factors

- events
- environment
- story
- character
- performance
- modalities
- believability
Expectation

- events
- environment
- story
- character

performance

believability

modalities
Example: Tron

• Environment
  – Inside a computer

• Story
  – Game programmer finding his way in the game world

• Character
  – Bit
  – Blue → benign
  – Sidekick

• Modalities
  – 3D motion
  – “Yes / No” discourse

• Performance
Expectation

- **Performance**
  - Very simple

- **Expectation determined by**
  - Fiction (inside of a computer)
  - Character (‘bit’ analogy)

- **Modalities**
  - Animation: low expectation, fulfilled
  - Motion: low expectation, fulfilled
  - Discourse: medium expectation, partially-fulfilled
Example: Half Life 2

• Environment
  – Orwellian military state

• Story
  – Rogue scientist on the run

• Character
  – Alyx Vance
    – Scientist, resistor, daughter

• Modalities
  – 3D motion
  – Limited physical interaction
  – Facial animation
  – Canned speech

• Performance
Expectation

• Performance
  – Complex
  – Varying fidelity depending on game state

• Expectation from realistic human character modalities presented

• Modalities
  – Animation: high expectation, good fulfillment
  – Physical interaction: medium expectation, low fulfillment
  – Discourse: high expectation, low fulfillment
A Closer Look

• Modalities
  – Determined by character
  – Dimensions of performance

• Performance
  – Determines believability
  – Perceived constrained decision-making
    • Internal constraints
    • External constraints
Modalities

- Speech
- Appearance
- Body language
- Gaze
- Facial expressions
- Physical manipulation
- Motion
Example: Alyx Vance

- **Speech**
  - Non-interactive NL
- **Appearance**
  - Realistic model
  - Scripted gestures & staging with some interactivity
- **Facial expressions**
  - Very realistic
  - Scripted
- **Physical manipulation**
  - Normal & scripted
  - Responsive to game situations
- **Motion**
  - Normal scripted AI
  - Responsive to game situations
Performance

• The perceived process of constrained decision-making

• Constraints
  – Internal
  – External
External Constraints

• World-level
  – Social status
  – Action history
  – Relationships
  – Role
  – Physical state
  – Fiction

• Meta-level
  – Interface
  – Application
  – Player beliefs
Internal Constraints

- Memory
  - Common sense reasoning
  - World knowledge
- Beliefs, desires & intentions (BDI)
- Emotional / Physiological state and biases
- Personality
- Interpreting inputs
- Mapping BDI + knowledge to actions
- Story goals
- Directability
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A character’s believability can be measured as a sum across modalities of a character’s adherence to the set of relevant constraints.

E.g. discourse via perceived BDI, player commonsense knowledge, & perceived character personality.
Measurement

- Experimentally gauge believability through user study
  - Compare performances in similar games that vary within a single modality (e.g. F.E.A.R. vs. Half Life 2)
  - What questions can be asked of a player to gauge believability of a character?
- Results could inform technology and design decisions
Questions from Modality Factors

• “Did the character’s face (modality) ever react (performance) to something you just did (constraint)? What happened if so?”

• “What was the character’s personality (constraint)? How was that reflected (performance) in the character’s body language (modality)?”
Queries

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