

Interactive Storytelling and Emotions

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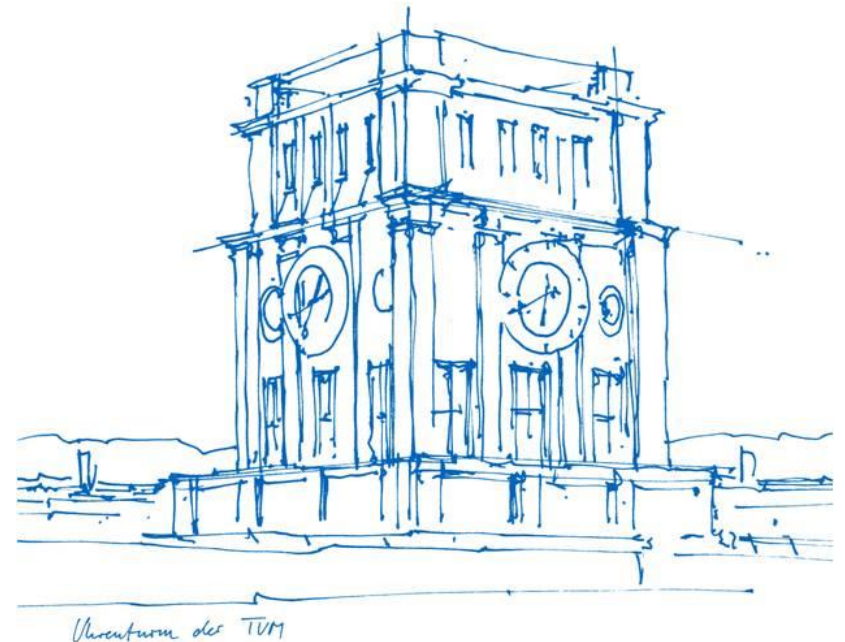
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Motivation

- Games can often be incoherent in their emotional representation
- The range of emotions portrayed by video game narratives appears to be narrow

Related Work

- Emotion Theories (e.g. Russel [1], Smith and Lazarus [2])
- Computational Models of Emotion (e.g. EMa [3], MAMID [4])
- Simulation of Non-Player Characters (e.g. GAMYGDALA [5])
- Narrative Meaning Creation [6]

Emotion in Interactive Storytelling

- Traditional narratives can potentially convey any emotion to us
- Only a portion of that can generally be found in video game narratives
- Emotions portrayed were often simple
- Characters tended to be involved in extra-personal conflicts

Games and Stories

World

- Ludic space: part of gameplay and the mechanics
- Extra-ludic space: representational storytelling device

Objects

- Game component the player can interact with
- Conflict between player agency and authorial control over narrative

Games and Stories

Characters

- Bots
- Shallow
- Deep

Events

- Stories and games are sequences of events

Environmental Storytelling

- Spaces can act as a storytelling device
- Lighting, color, music, even architecture can evoke emotions in us

Storytelling through Mechanics

- Game Mechanics have narrative value
- Mechanics determine what the player can and cannot do
- Mechanics can allow the player to directly influence the course of the story
- Some stories can emerge from the interaction between player and game

Emergent Storytelling

- Narrative that emerges during play
- Requires non-player characters with their own goals, needs and urges
- When characters come into conflict with each other, the player, or the environment interesting stories can emerge
- The depth an emergent story can achieve depends on richness of characters and world
- Even when requirements are met it is not guaranteed a narrative will emerge

Emotion Theories – Discrete Emotion Theory

- Assume emotions are biologically innate and universal across all humans
- Emotions can be grouped into a few basic categories; all other emotions derive from these
- Emotions allow us to quickly respond to fundamental life-tasks

Emotion Theories – Dimensional Theory

- Assumes emotions can be described in several continuous dimensions
- Emotions not entirely rooted in biology, but influenced by culture and upbringing as well
- Popular model uses pleasure and arousal as dimensions
- Most emotions can be mapped onto a circle in those dimensions
- Two dimensions not enough to form all emotional responses, but might be at core of many emotional experiences

Emotion Theories – Appraisal Theory

- Currently rather popular theory
- Emotions as the result of a cognitive process
- Individual's current situation is evaluated and in response an emotion is elicited
- In part rooted in biology, in part based on individual and cultural factors

An Emotion Model for Games

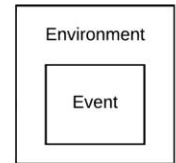
- Based on appraisal theory and several computational models of emotion
- Model the complex emotions of characters
- Believable characters on an emotional level
- Reinforce emotional content of the story

An Emotion Model for Games – Representation

- Dimensional representation with valence and intensity to represent and calculate Mood
- Categorical representation determined by Appraisal
- Allows mapping of specific categorical emotions to less specific dimensional emotions if required

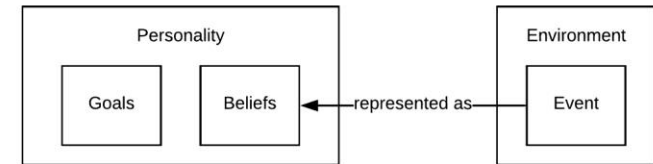
An Emotion Model for Games – Environment

- Emotions as reactions to events
- Events occur in environment
- Events as input for Appraisal Mechanism



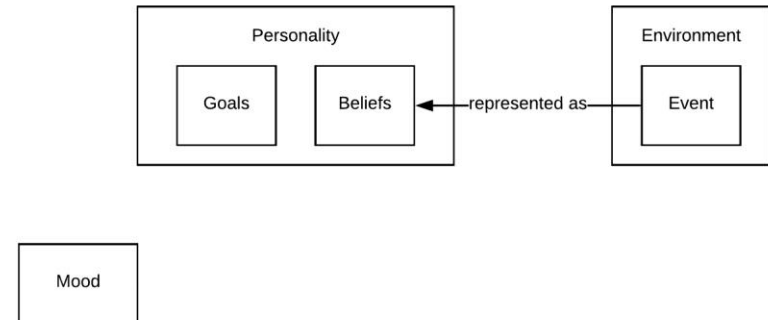
An Emotion Model for Games – Personality

- Agents have goals they pursue to differing degree; annotated with an utility
- Beliefs as internal representation of events for agents
- Beliefs model environment through several variables (e.g. likelihood, attribution)
- Belief system based on GAMYGDALA [5]



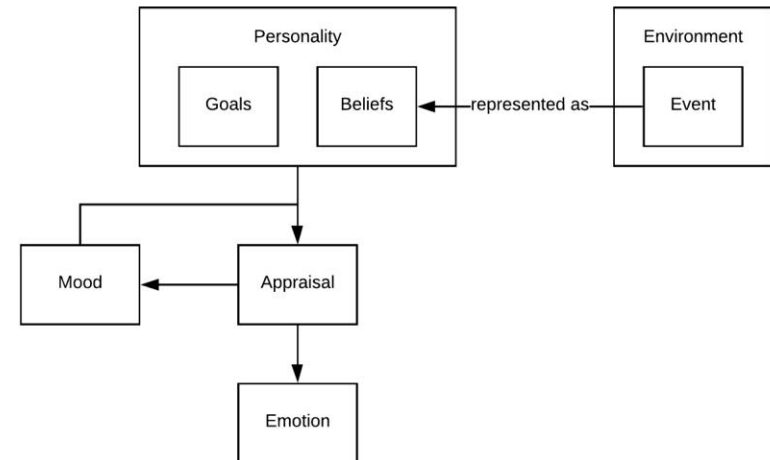
An Emotion Model for Games – Mood

- Represented in two dimensions (valence, arousal) based on Russel [1]
- Determined by average of all emotions resulting from appraisal
- Prevents sudden changes in emotion unless intensity is high and recurring expression of same emotion



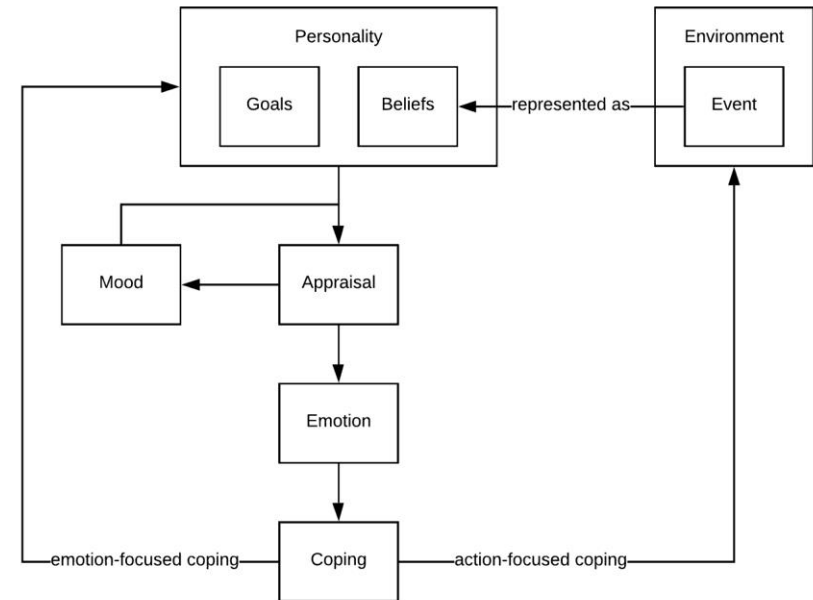
An Emotion Model for Games – Appraisal

- Calculates actual emotional state and determines whether state is expressed
- Evaluates beliefs with regards to each of agent's goals
- Ultimately selects an emotion to express



An Emotion Model for Games – Coping

- Agent should engage in coping action
- Action-focused coping: agent takes action to mitigate or further occurrence of event
- Emotion-focused coping: agent changes utility or drops goal to deal with emotional impact



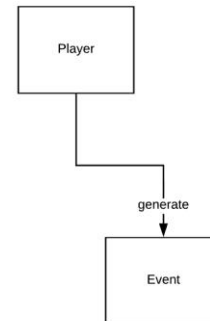
The Emotion Engine

- Allows us to respond to game events with emotional coherence
- Events are annotated with beliefs for each actor that should respond to an event



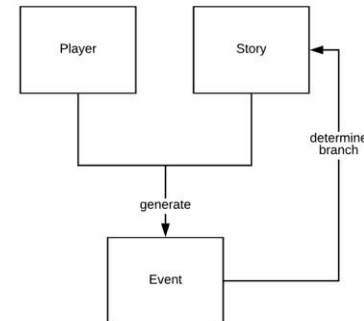
The Emotion Engine – Input

- Player interacts with game through mechanics
- Interaction leads to events
- Mechanics allow to influence course of story through events



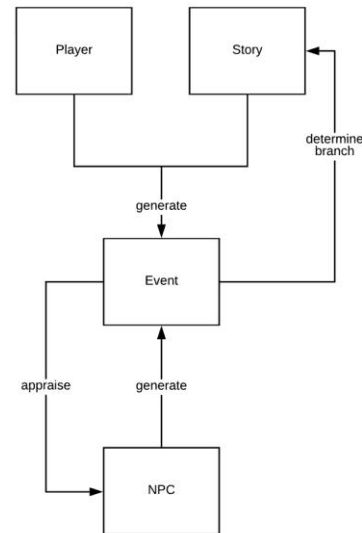
The Emotion Engine – Input

- Story component generates pre-authored events
- Triggered by player when certain conditions are met
- Allows for authorial control over story
- Adds or drops goals to representational actors to convey emotional meaning



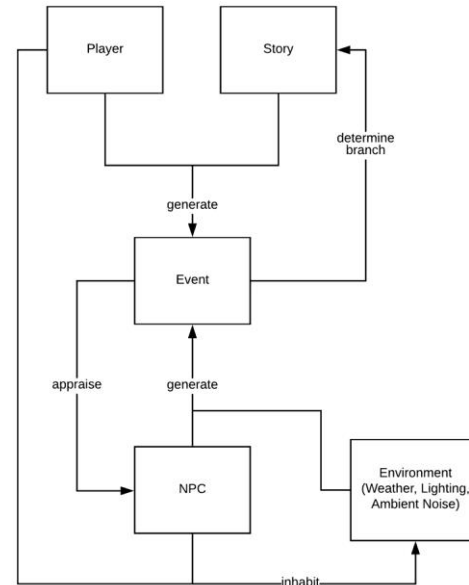
The Emotion Engine – NPC

- Appraise and generate events
- Convey emotion to player by reacting to events
- Generation of and reaction to events by NPCs can lead to emergent stories



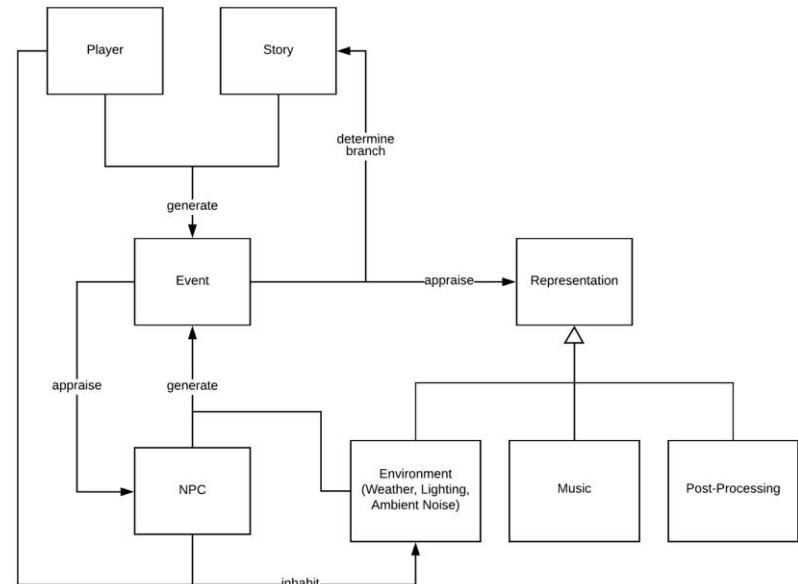
The Emotion Engine – Environment

- World space inhabited by all agents
- Part of representation



The Emotion Engine – Representation

- Conveys emotional state of game and narrative
- Require goals to react to events
- Music can evoke wide range of emotions
- Adaptive soundtrack can convey emotion fitting current event
- Saturation and brightness of image influence us emotionally
- Tweak these in post-processing to fit emotional meaning of story



Future Work

- Prototype
- Integration of social emotions into the model
- Integration of personality traits to allow for a greater variety in agent's emotional responses
- Inclusion of user modeling to predict the user's current emotional state

Conclusion

Theoretical foundation for:

- An emotion model based on the appraisal theory of emotion that supports an emotional response for different types of actors and features 10 emotions
- An emotion engine that allows for emotionally coherent and believable characters and can further emphasize the emotional content of the narrative

References

- [1] J. A. Russell, “A circumplex model of affect.,” *Journal of personality and social psychology*, vol. 39, no. 6, p. 1161, 1980.
- [2] C. Smith and R. Lazarus, “Emotion and Adaptation,” in. Jan. 1990, vol. 21, pp. 609–637.
- [3] S. C. Marsella and J. Gratch, “EMa: A process model of appraisal dynamics,” *Cognitive Systems Research*, vol. 10, no. 1, pp. 70–90, 2009.
- [4] E. Hudlicka, “This time with feeling: Integrated model of trait and state effects on cognition and behavior.,” *Applied Artificial Intelligence*, vol. 16, no. 7/8, pp. 611–641, 2002, issn: 08839514.
- [5] A. Popescu, J. Broekens, and M. Van Someren, “Gamygdala: An emotion engine for games,” *IEEE Transactions on Affective Computing*, vol. 5, no. 1, pp. 32–44, 2013.
- [6] J. Tanenbaum and A. Tomizu, “Narrative meaning creation in interactive storytelling,” *International Journal of Computational Science*, vol. 2, no. 1, pp. 3–20, 2008.