Game AI as Storytelling

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Conclusion

Post questions to the discussion board!

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Wait.... what?

Experience Manager and Trajectories

- "Story on Rails" vs player agency
- *Experience Manager*: Generalization of the Drama Manager. Looks forward into the narrative and determines what should happen to bring about an enjoyable experience.
- Trajectories: The Experience Management problem is to compute trajectories through state space.

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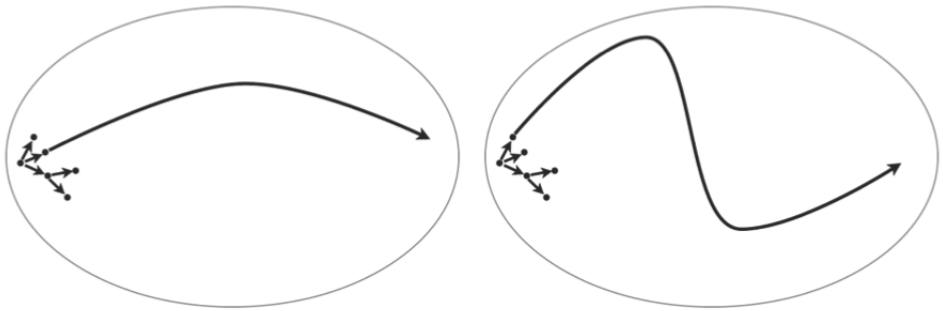
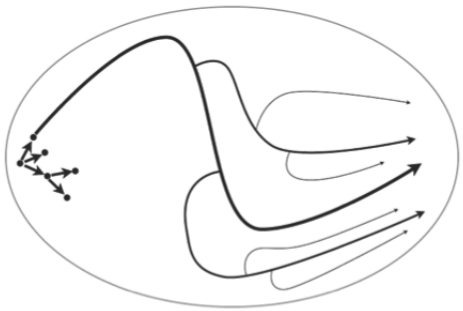


(a) A possible trajectory through state space.

(b) A trajectory that visits areas of state space, yielding one with certain properties.



(c) Accounting for player interaction.

Qualities of Narratives

Two nearly universal qualities of narratives:

1. Logical causal progression. A certain degree of causal coherence is required for the audience to follow the succession of events.
2. Character believability. Goal-oriented behavior is a primary requirement for believability.

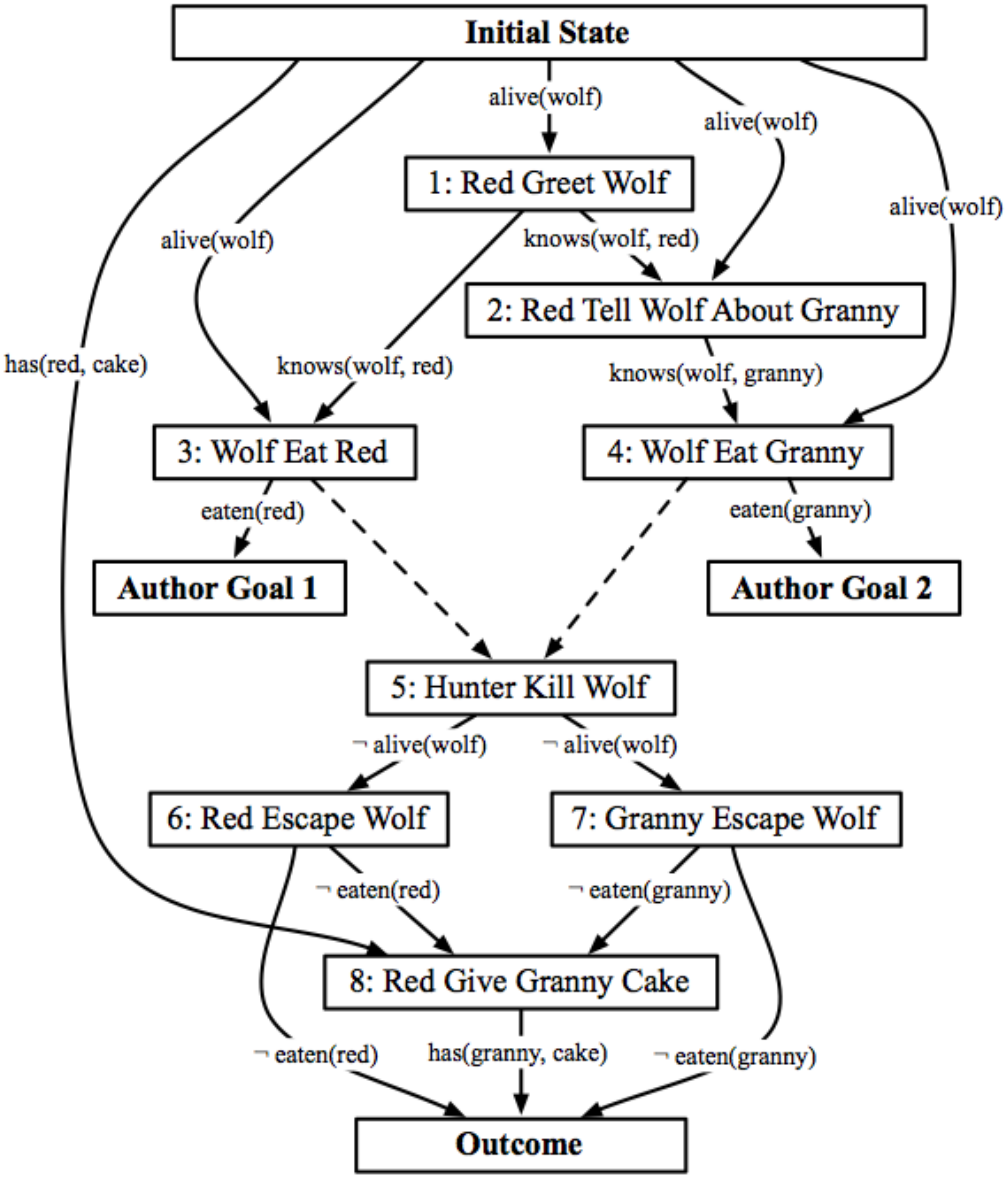
Narrative as Plans

A model of a *Partial-Order Casual Link* (POCL) is the basis for the plan. It is a DAG where the nodes are actions which, when executed change the world state. Edges are *casual* and *temporal* relations between actions.

- Casual: $a_i \rightarrow^c a_j$. The execution of a_i will cause condition c to be true in the world which is needed for subsequent action a_j.
- Temporal: Ordering constraints between actions.

Additionally, there are preconditions and effects.

Red Riding Hood



Partial Order Planning

Authors chose Partial Order Planning (POP) to solve the planning problem.

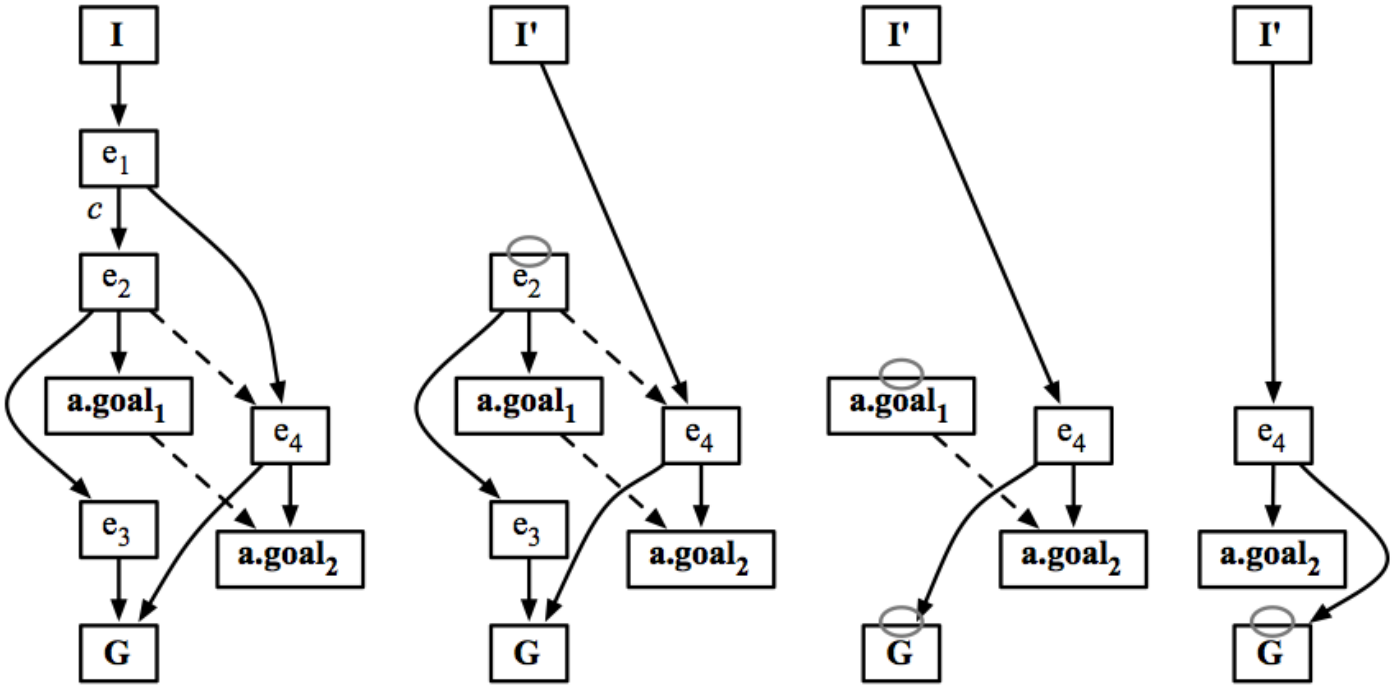
PARTIAL ORDER PLAN(P)

1 // Start with an Empty Plan P
2 **while** flaw exists
3 // Repair the flaw by producing 0 or more plans
4 **if** flaw = *open condition*
5 // Find or Instantiate an event that satisfies precondition
6 **else** flaw = casual threat: $\exists a_k \exists \neg c \exists \langle a_i, a_j \rangle [a_i \rightarrow^c a_j \neq \text{TRUE}]$
7 Repair: Add temporal constraint to force a_k before a_i
8 or after a_j

POCL Extension

Author Events: Partially specified intermediate states that the story must pass through before the goal.

Offline Replanning

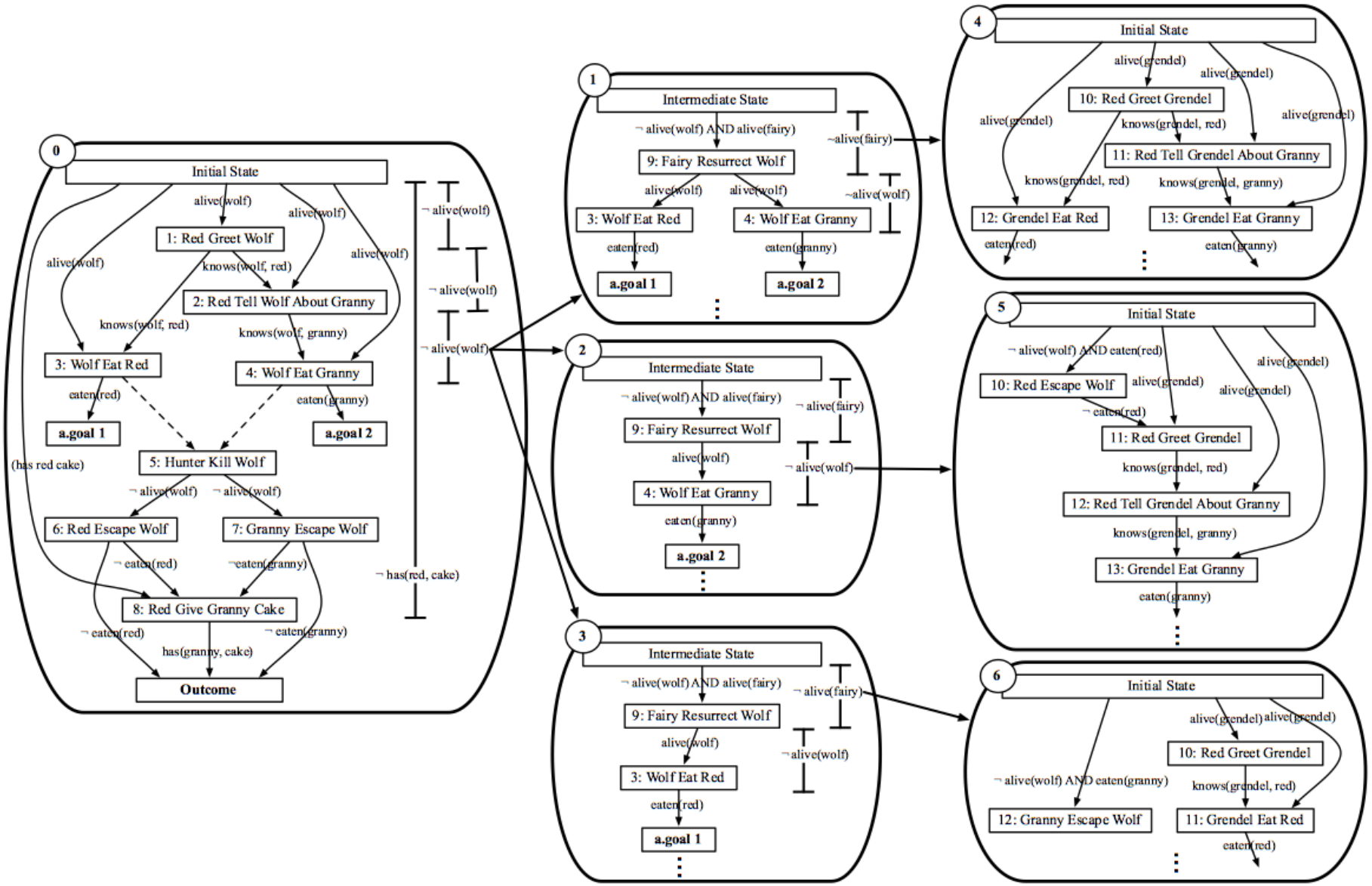


(a) Exemplar (b) Tier i (c) Tier ii (d) Tier iii

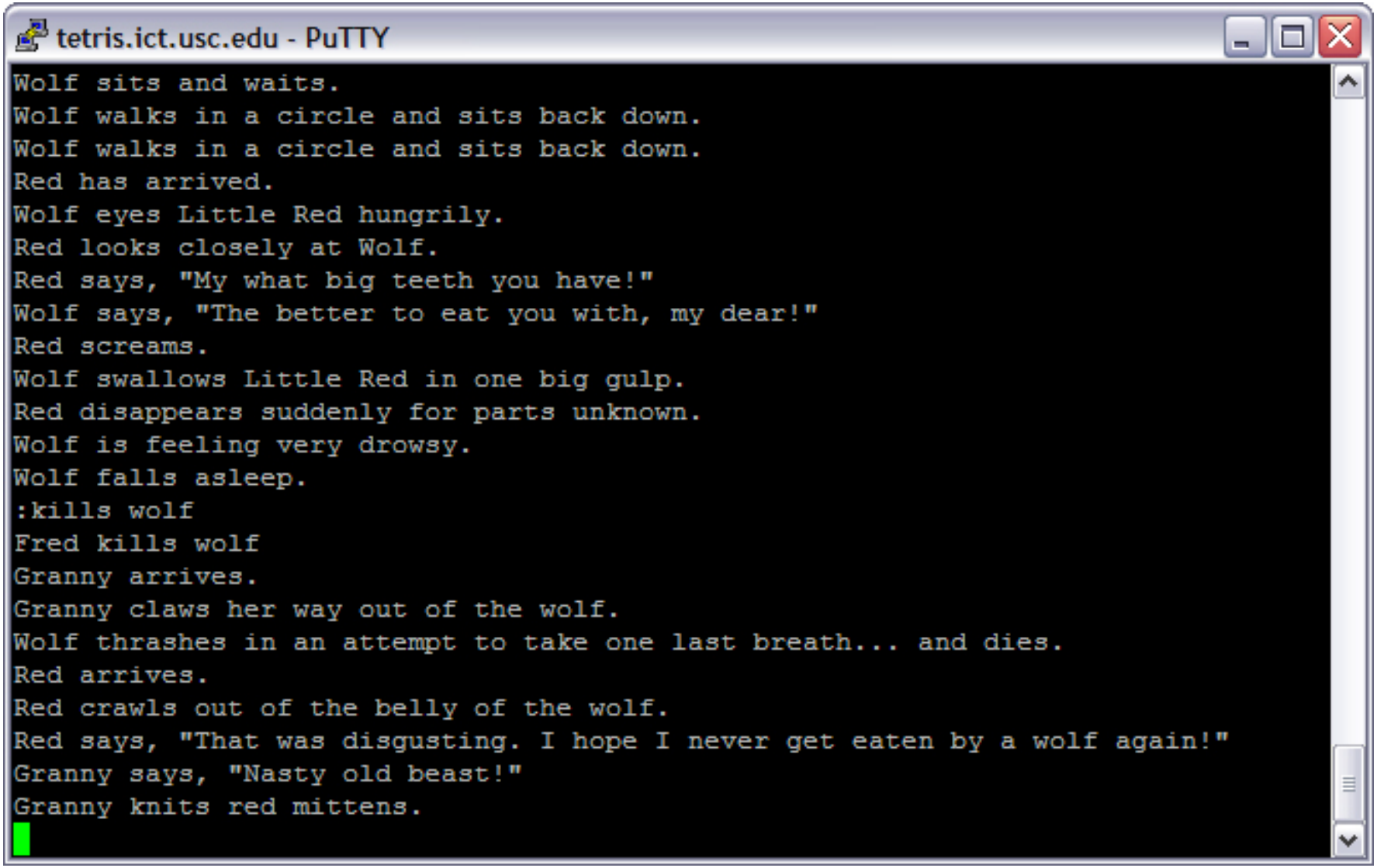
Exemplar Trajectory

The human game designer's preferred story; the best possible experience according to the designer.

Contingencies



MOO in Automated Story Framework



Metrics

- Based on exemplar narrative, **1319** branches generated with a contingency depth of 5!
- With a depth of 5, the contingency tree can handle five exceptional player actions in one play session before reverting into *an emergent, unmanaged world*.
- Offline planning takes **43 minutes** (11 minutes of garbage collection) on:
  - Intel Core2 Duo 3GHz
  - 3GB of RAM
  - 100GB of virtual memory
  - running ALLEGRO CL® 8.0

Modeling

Based on PASSAGE system, use a theory of playing modeling based on a vector of scalars.

Player Model

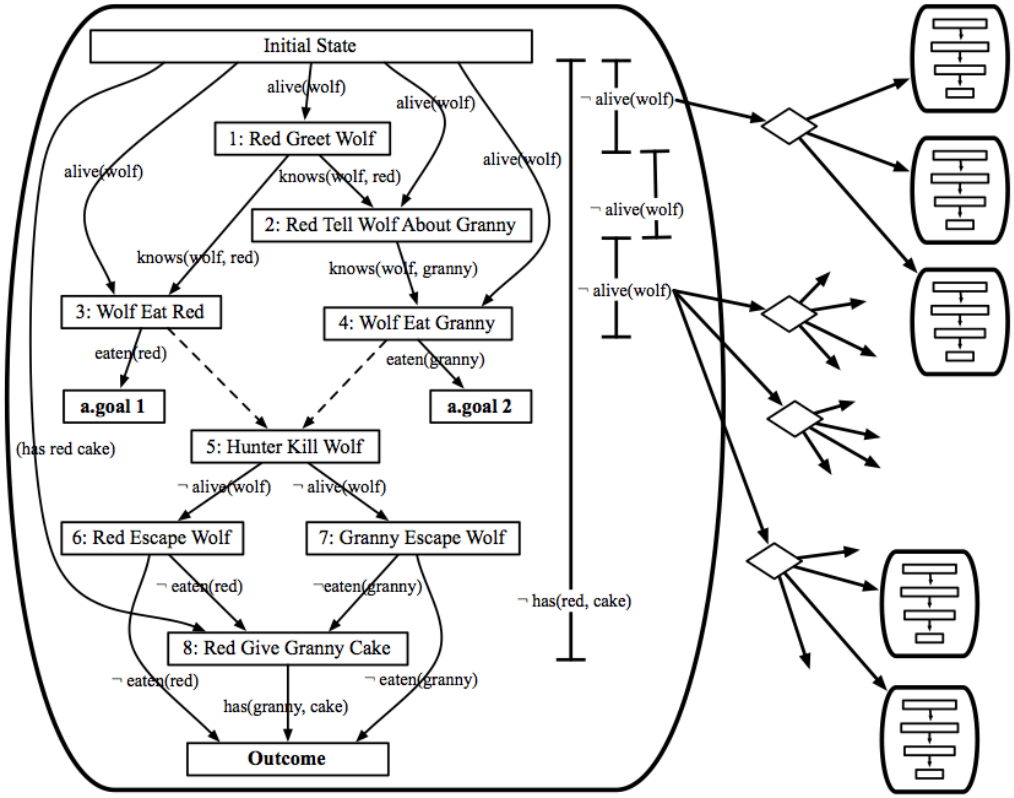
Let a model PM be a vector of scalars, $\langle f, m, s, t, p \rangle$ where:

- Fighter (f) - for players who enjoy engaging in combat
- Method Actor (m) - for players who enjoy having their personality tested
- Storyteller (s) - for players who enjoy considering complex plots
- Tactician (t) - for players who enjoy thinking creatively
- Power Gamer (p) - for players who enjoy gaining special items and abilities

Incorporating the Player Model

Extend POP model with the Player Model:

- Calculate all four strategies at once, vice a tiered approach
- Use the Player Model Vector to decide which branch to take
- Still requires *a priori* calculation with a $O(n)$ increase in branches
- Increased burden on human designer: more author goals. (Deemed negligible since AIs will have less reliance on humans . . .)



Conclusions . . . For real . . .

Author's Conclusions:

- Created a system where player can exert agency that are inconsistent with the original narrative
- However, the AI is able recover *and* bring the narrative trajectory in line with the player's inferred desires.
- Games that value experience over state (Anchorhead vs. chess), modeling the AI is a beneficial approach.