

Director Agent

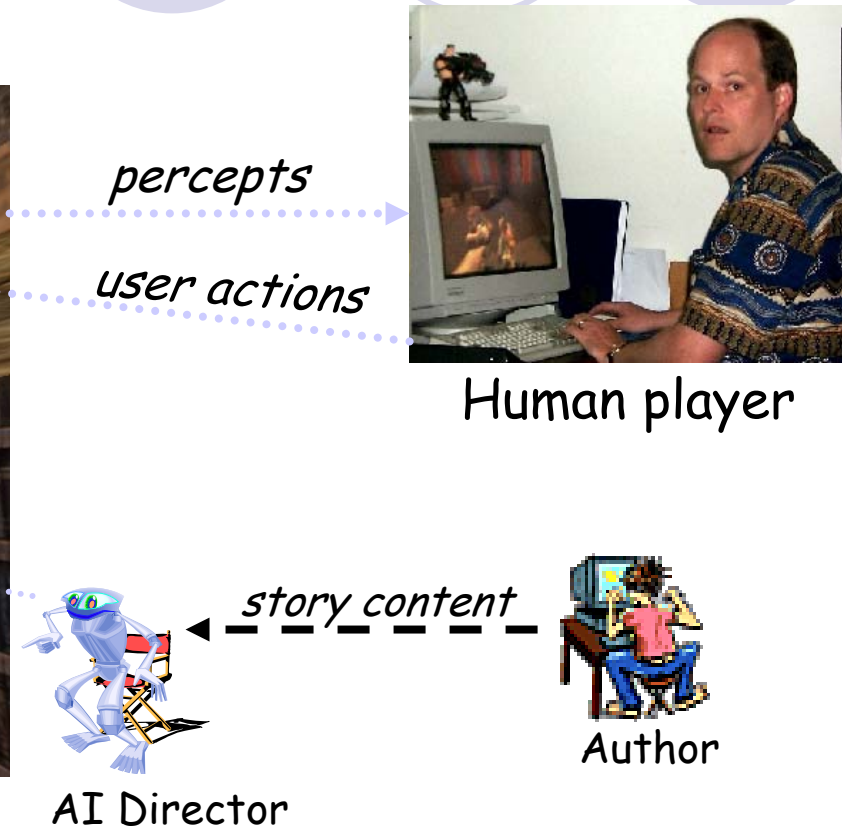
Brian Magerko
University of Michigan



IDA: An Interactive Drama Architecture

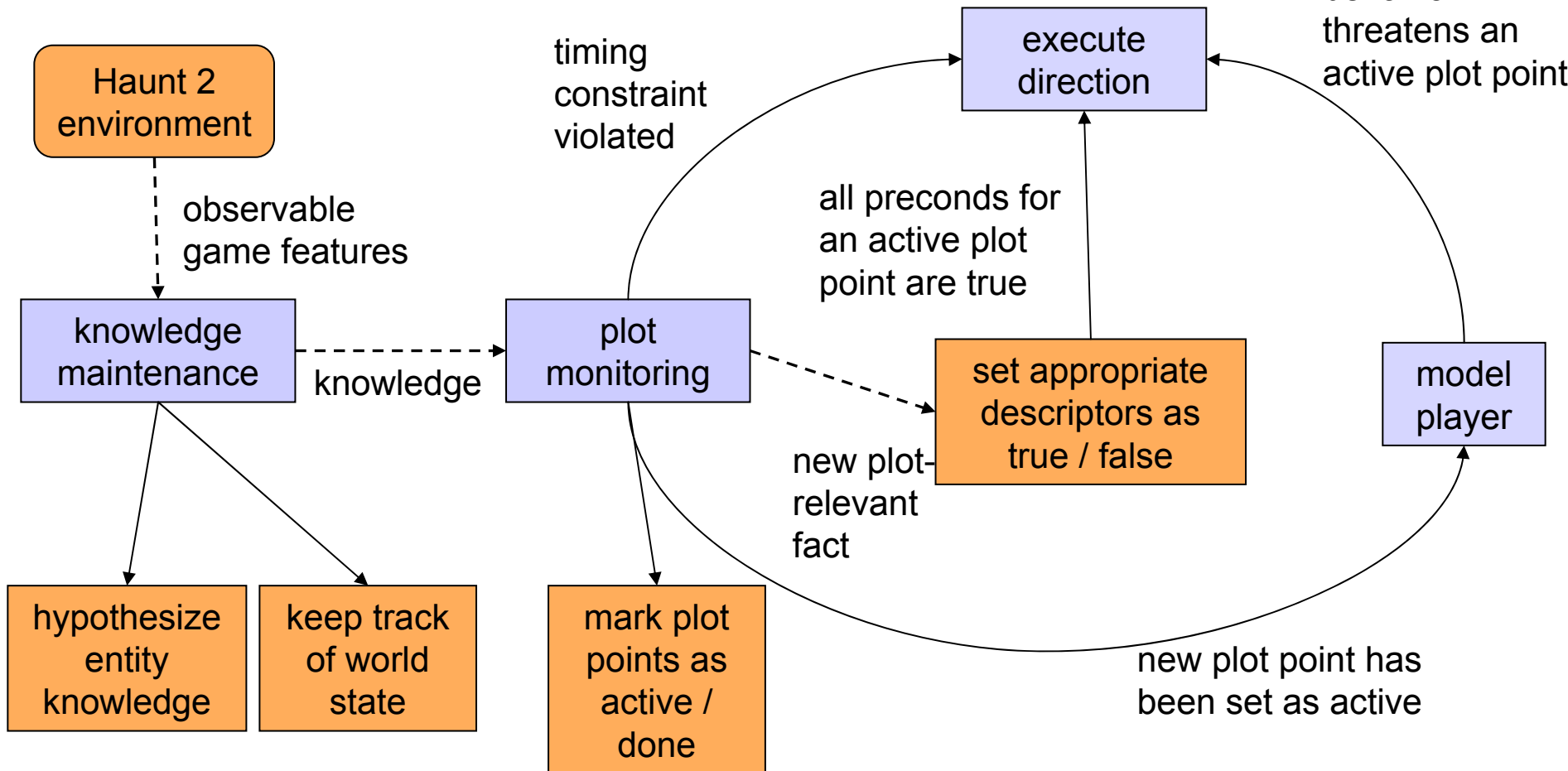


Haunt 2: Built in Unreal Tournament

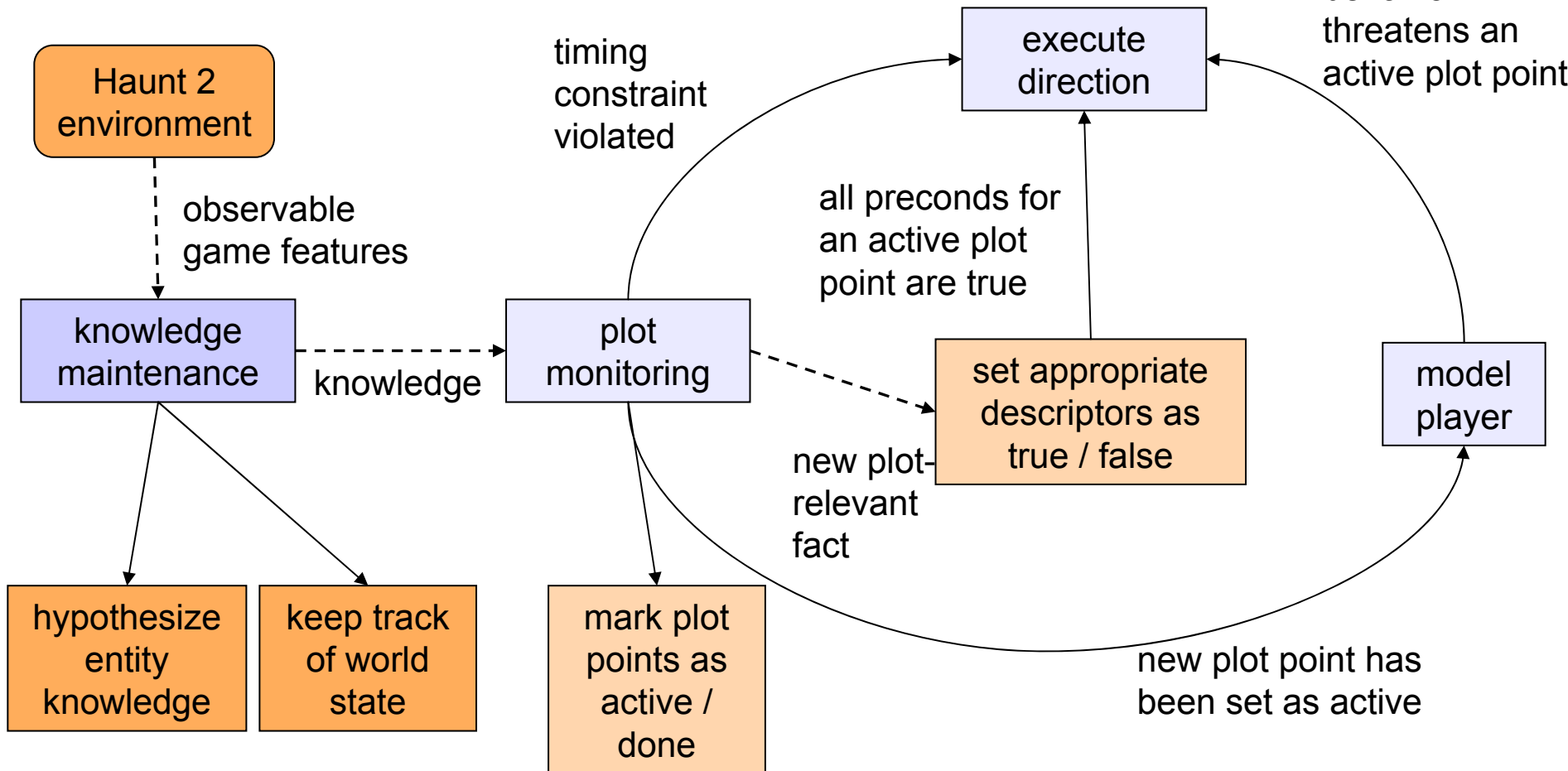


Interactive game, populated by human-like AI characters with an AI director that dynamically controls an unfolding story.

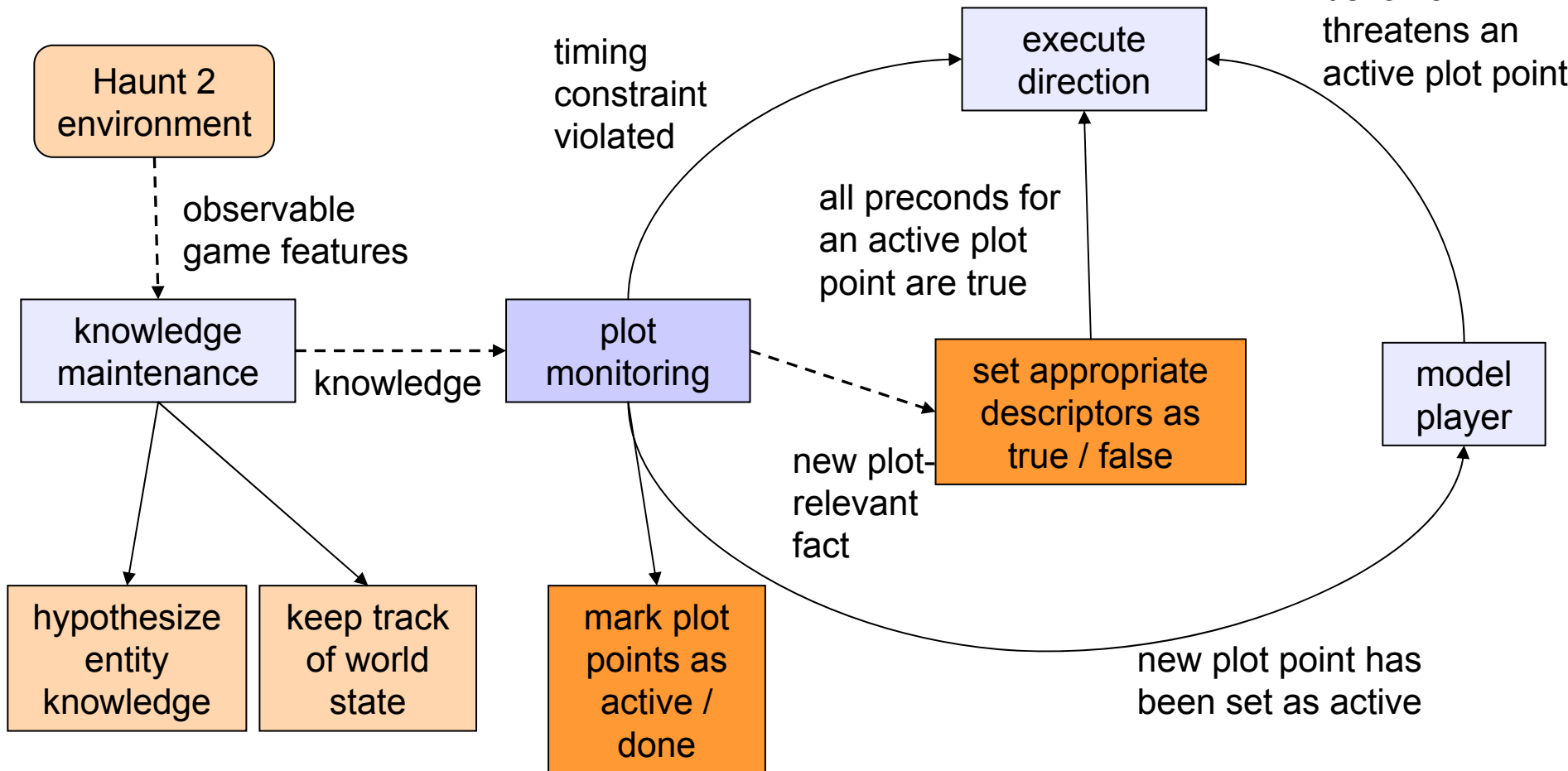
Director Execution Cycle



Knowledge Maintenance



Plot Monitoring

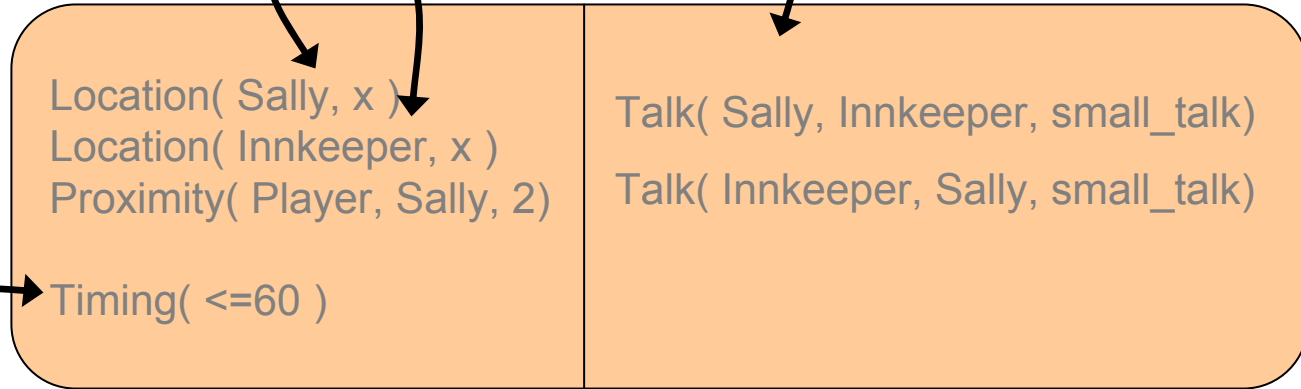


Plot Representation

some plot content is instantiated at run-time

postconditions are directions given to synthetic characters

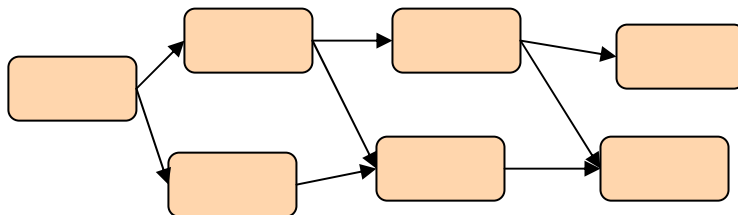
timing constraints represent pacing of story flow



preconditions

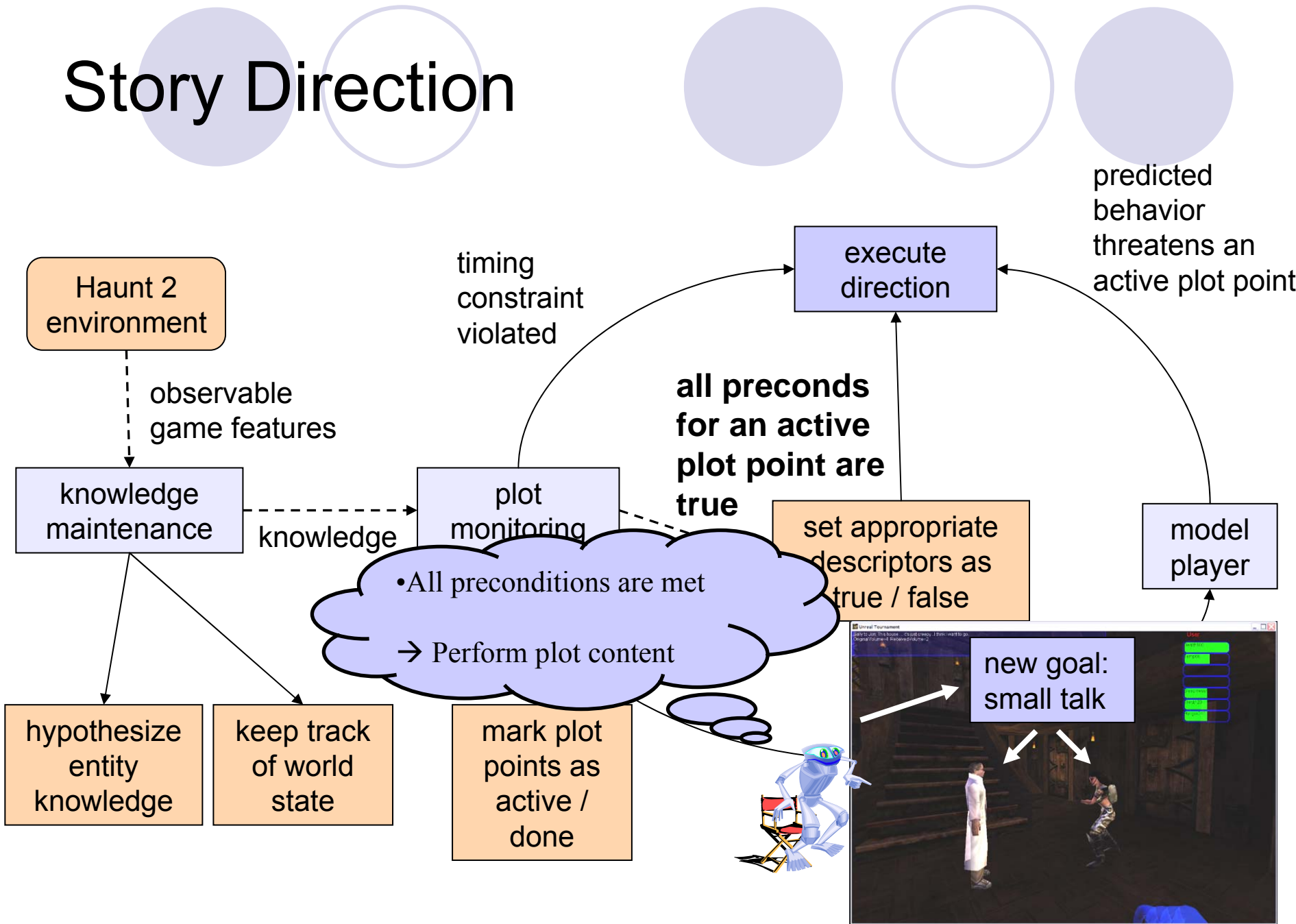
actions

Plots ordered for a scene:

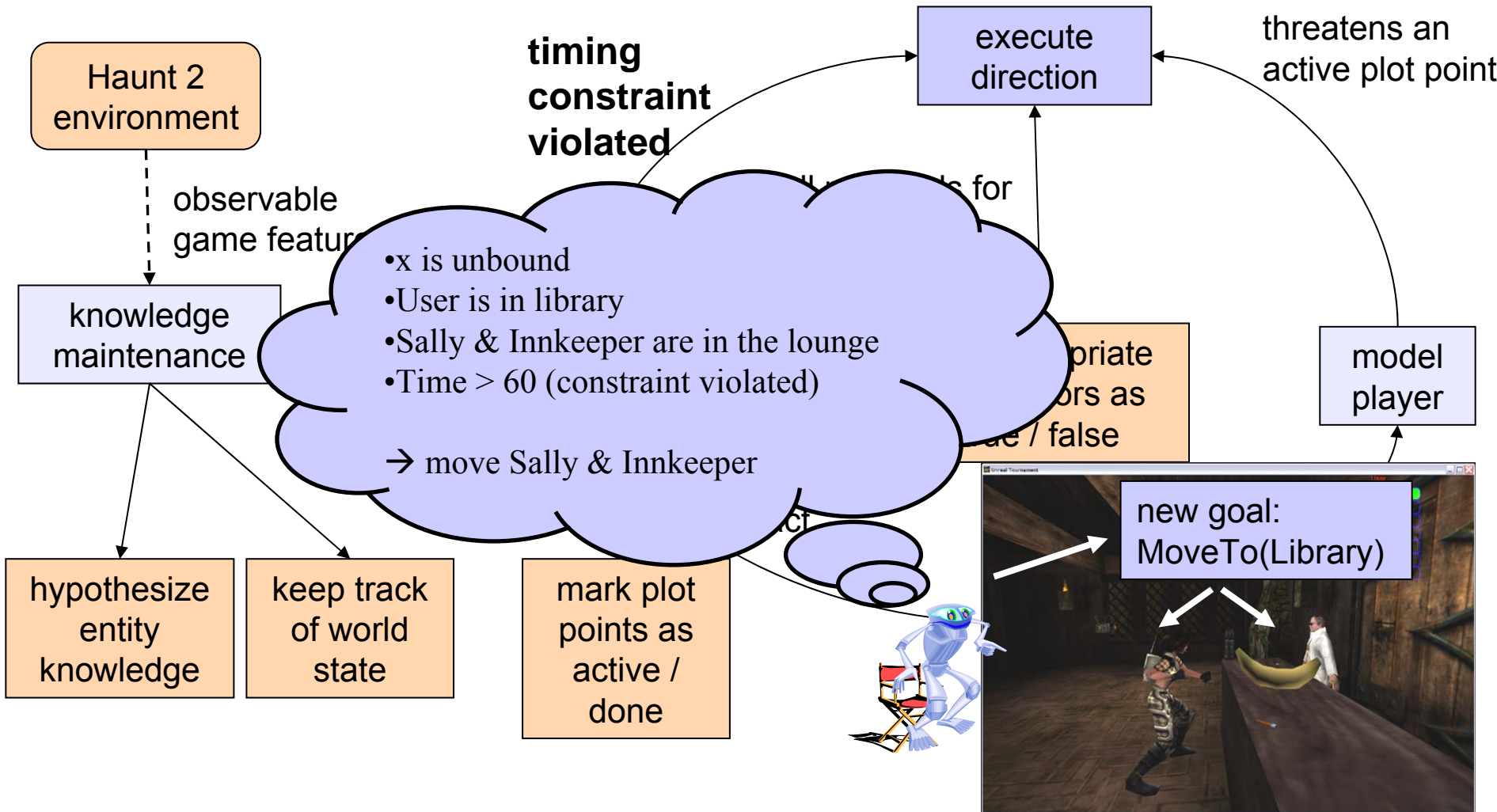


partially-ordered with other plot-points

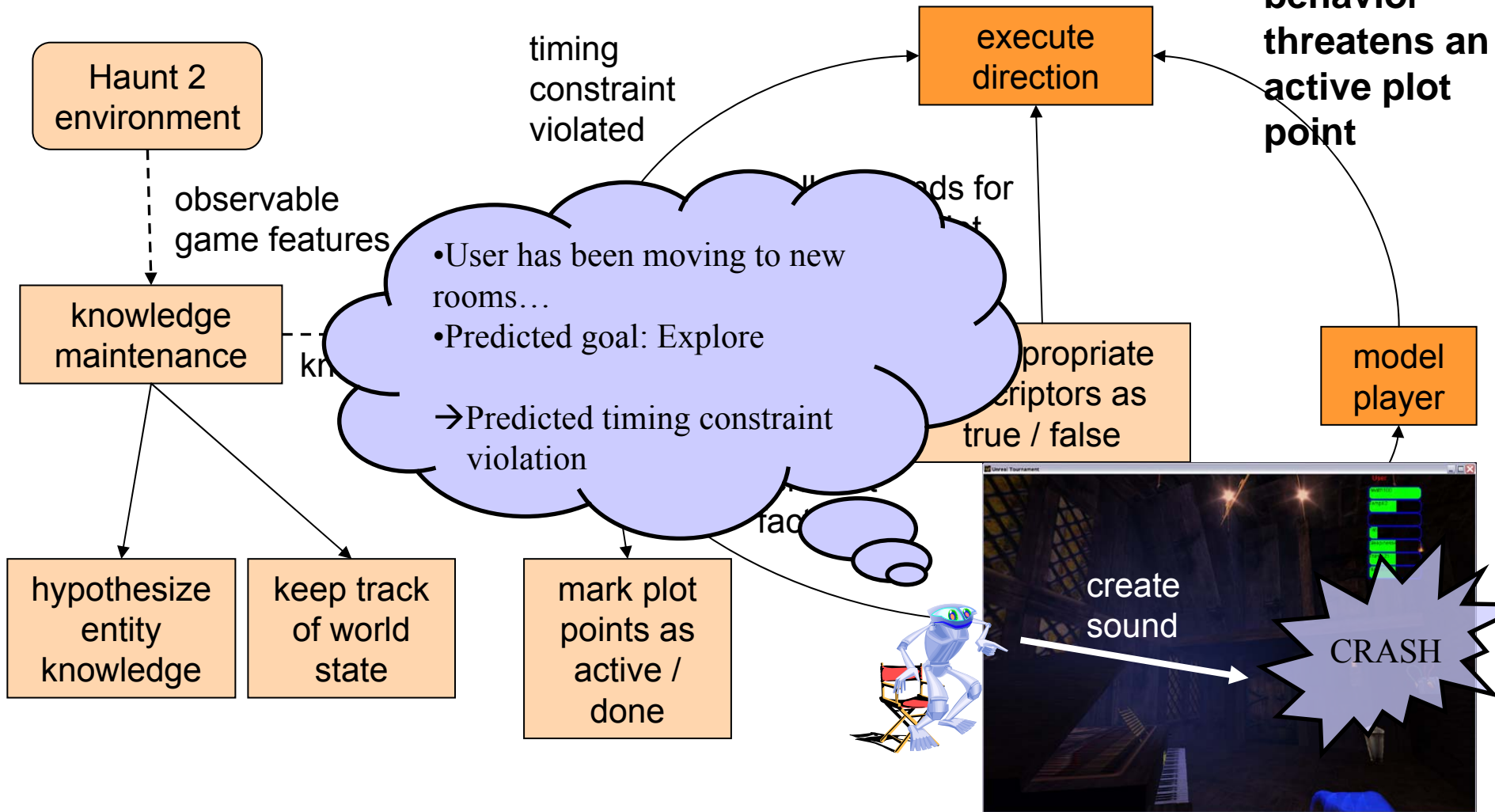
Story Direction



Reactive Direction



Preemptive Direction

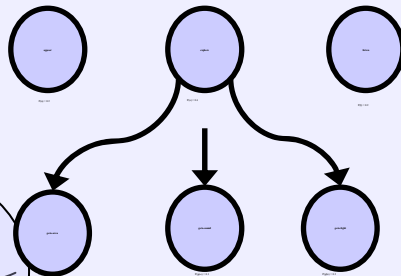


Single Modeling Run



world state

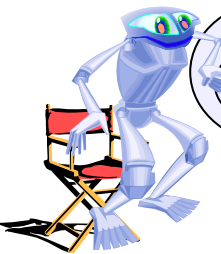
state copy



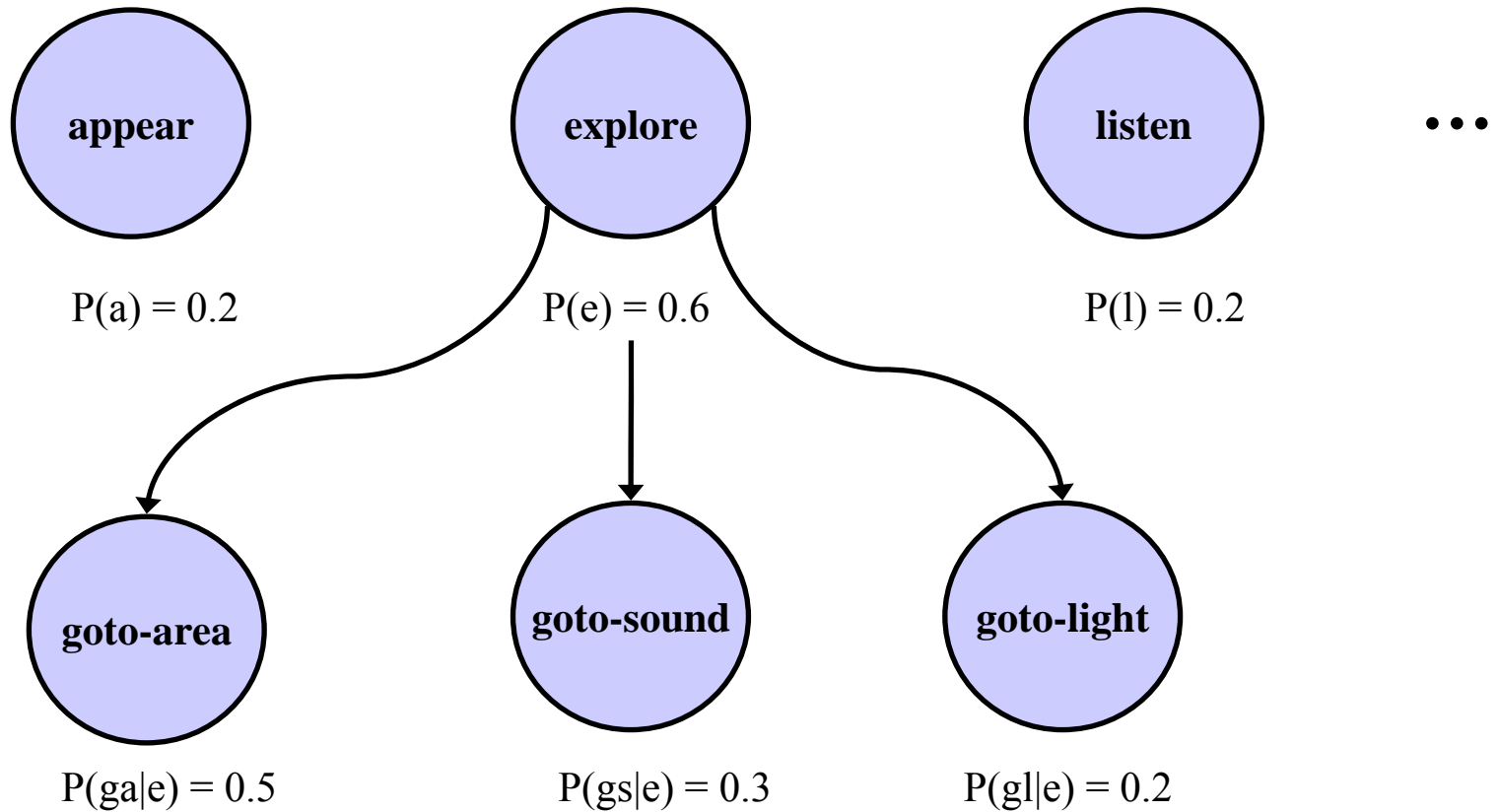
model

result

{Success, 0.42}



Probabilistic Player Model



Player Prediction



- Success
 - Precondition is fulfilled before a timing constraint is violated
- Failure
 - Timing constraint is violated
- Probabilistic sampling
- Result determines:
 - *if* the director preemptively directs
 - *how* it directs preemptively

Probabilistic Sampling



- Model returns a tuple, $M \rightarrow (R, P)$
 - R: success / failure
 - P: probability of particular sequence of actions chosen
- Model runs created iteratively until an author-defined limit ρ is reached

Probabilistic Sampling

- Once modeling is complete, director computes confidence in the user fulfilling plot content

$$C_m = \left(\sum_{s=0}^{ns} P_s \right) / ns - \left(\sum_{f=0}^{nf} P_f \right) / nf$$

- $-1 \leq C_m \leq 1$
- s / f : individual run which yielded a success / failure
- $P_{s/f}$: likelihood of run m occurring
- $C_m > \alpha \geq 0 \rightarrow$ success
- $C_m < \alpha < 0 \rightarrow$ insignificant success / failure & preemptive guidance is needed

Connecting Modeling to Director Actions

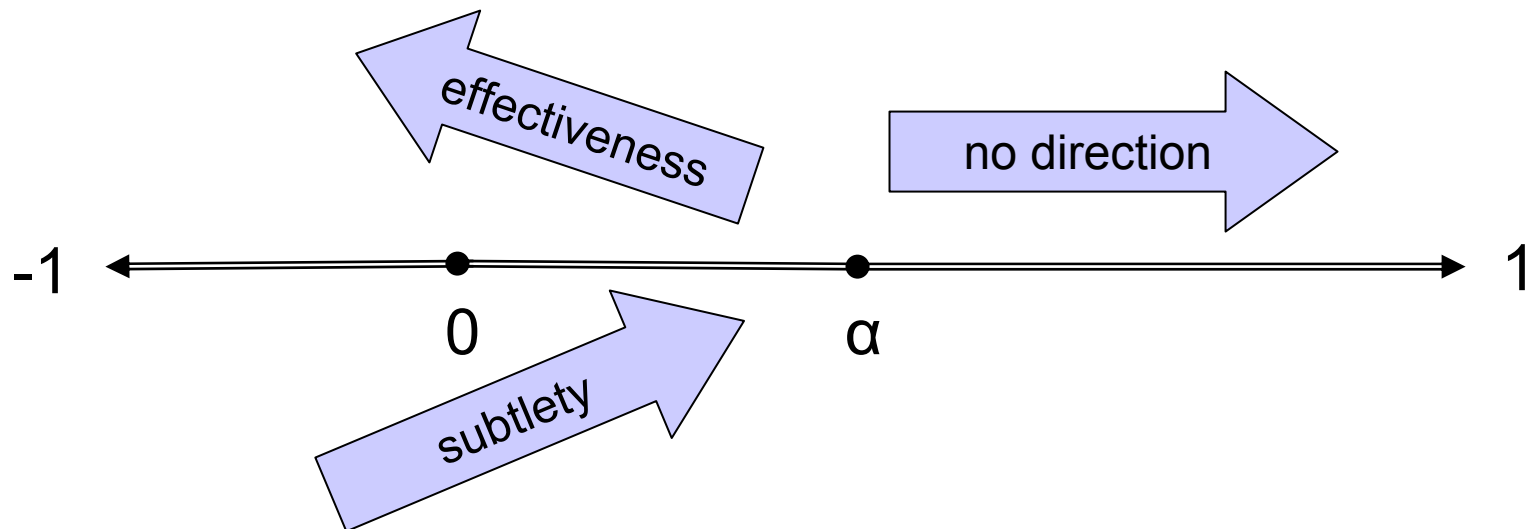
- Preemptive direction chosen by *score*
- Action scores are a f^n of modeling result, C_m
- Director actions rated by a scoring function

$$Score_{action} = (Sub * S_{action} + Eff * E_{action}) / 2$$

- S_{action} / E_{action} : authored rating for a particular director action
- Sub / Eff: weights assigned as a f^n of C_m

Assigning Score Weights

- Score for actions computed at run-time:
 - If $0 < \alpha < C_m$, then do not preemptively direct
 - If $0 < C_m < \alpha$, then assign $Sub > Eff$
 - If $-1 + \alpha < C_m < 0$, then assign $Sub == Eff$
 - If $-1 < C_m < -1 + \alpha$, then assign $Sub < Eff$



Nuggets and Coal



- Nuggets

- IDA is functionally finished
- New theory of story direction
- Tells a story (“It works!”)
- Has influenced interactive training approaches

- Coal

- Evaluation left to do
- Tells a story, just not a great one
- Low amount of interaction (“verbs”) in *Haunt 2*

A decorative header consisting of six circles in a row. The first circle is solid light purple and contains the text 'Questions?'. The second circle is an outline of a light purple circle. The third, fourth, and fifth circles are solid light purple. The sixth circle is an outline of a light purple circle.

Questions?

www.magerko.org/research

brian@magerko.org