Applications of AI Planning: Story Telling

Preface

- Application areas: strucutural similarity
- Story: sequence of character actions
- Benefit?

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- Application areas: strucutural similarity
- Story: sequence of character actions
- Benefit?
  - When creating something new

Outline

- Story world modeling
- Differences to classical planning
- Concrete Approaches
  - Fabula
  - Discourse
- Conclusion

Story world modeling

- On a basic level

Attributes of main characters	$\rightarrow$	Predicates
Actions of main characters	$\rightarrow$	Operators

Story world modeling

- On a basic level

"In a fictional world with a continent named Westeros, the highborn refugee Viserys sold his younger sister Daenerys to a warlord in exchange for the warlord's army. He used the army to conquer Westeros and become its king."

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Story world modeling

- A = { V-army , V-king , D-sold }
- O = { V-sell-D , V-conquer-W }
  - V-sell-D = ⟨ ¬V-army ∧ ¬D-sold , V-army ∧ D-sold ⟩
  - V-conquer-W = ⟨ V-army ∧ ¬V-king , V-king ⟩
- I = ¬V-army ∧ ¬V-king ∧ ¬D-sold
- γ = V-king

Story world modeling

- On a basic level

Story world modeling

- More sophisticated

Story world modeling

- More sophisticated
  - Story variations
  - Interactivity
  - Planning of story structures based on world rules

Differences to classical planning

- Similar on basic level
- Different in nature
  - Purpose
  - Key Properties
  - More sophistication $\rightarrow$ challenges
- Specialized planners (IPOCL)
- Interactivity

Concrete approaches

- Fabula
  - Haslum
    Narrative planning: Compilations to classical planning
- Discourse
  - Porteous, Cavazza, Charles
    Applying planning to interactive storytelling: Narrative control using state constraints

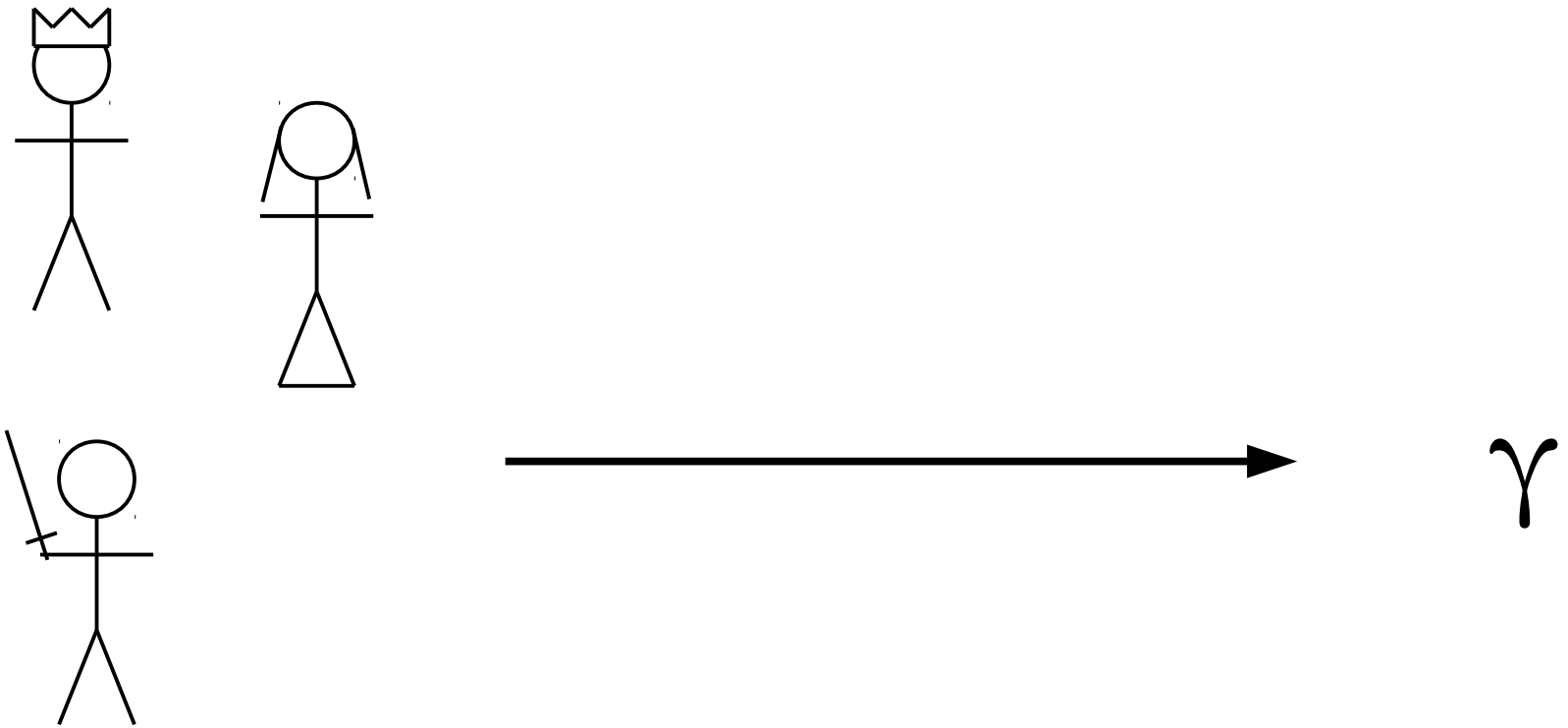
Concrete approaches

"In simple terms, the [fabula] is the *what* in a narrative that is depicted, discourse is the *how*." — Chatman

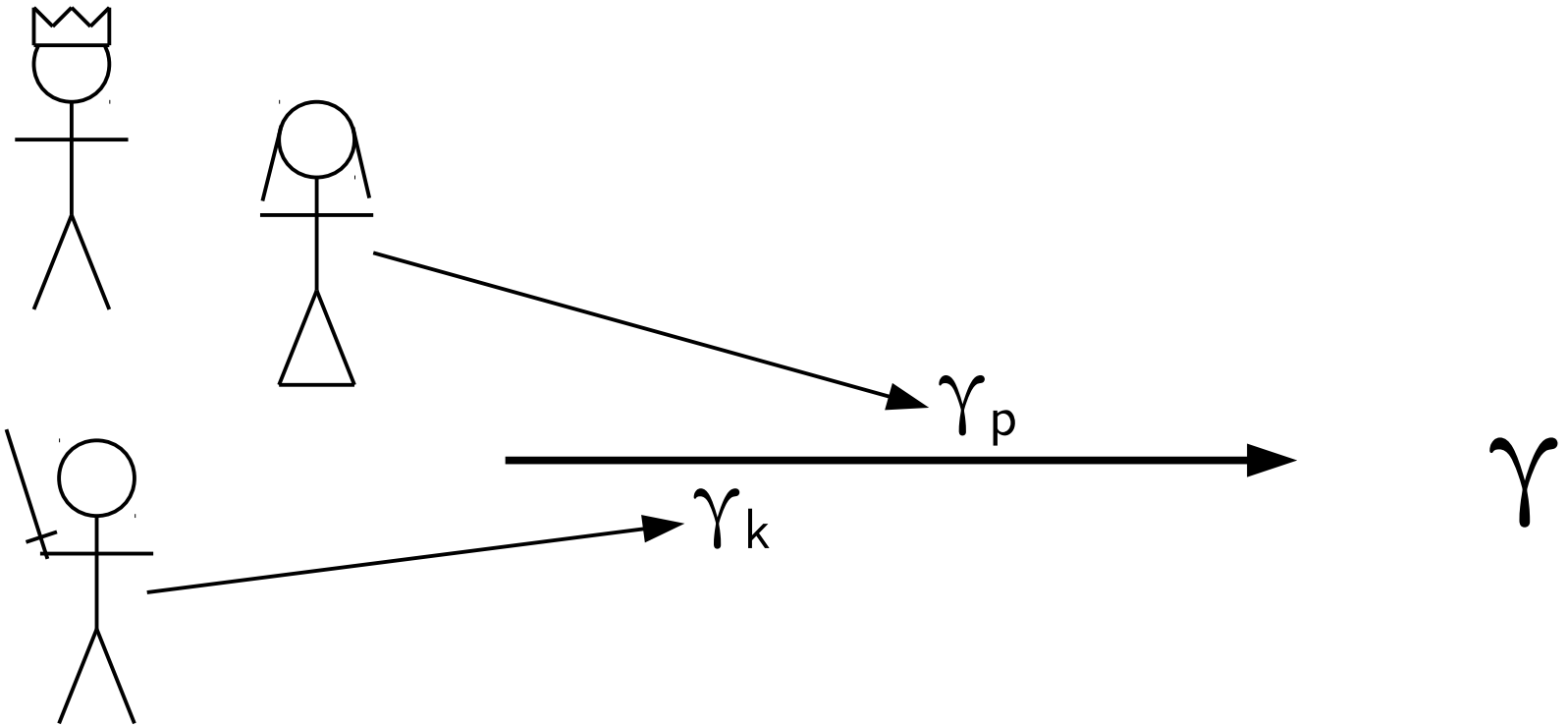
Concrete approaches: fabula

- Based in IPOCL approach
  - Compiled into classic planning problem
- Focus on intentionality
  - Character goals
  - Delegation
  - Intentional plans, frames of commitment

Concrete approaches: fabula



Concrete approaches: fabula



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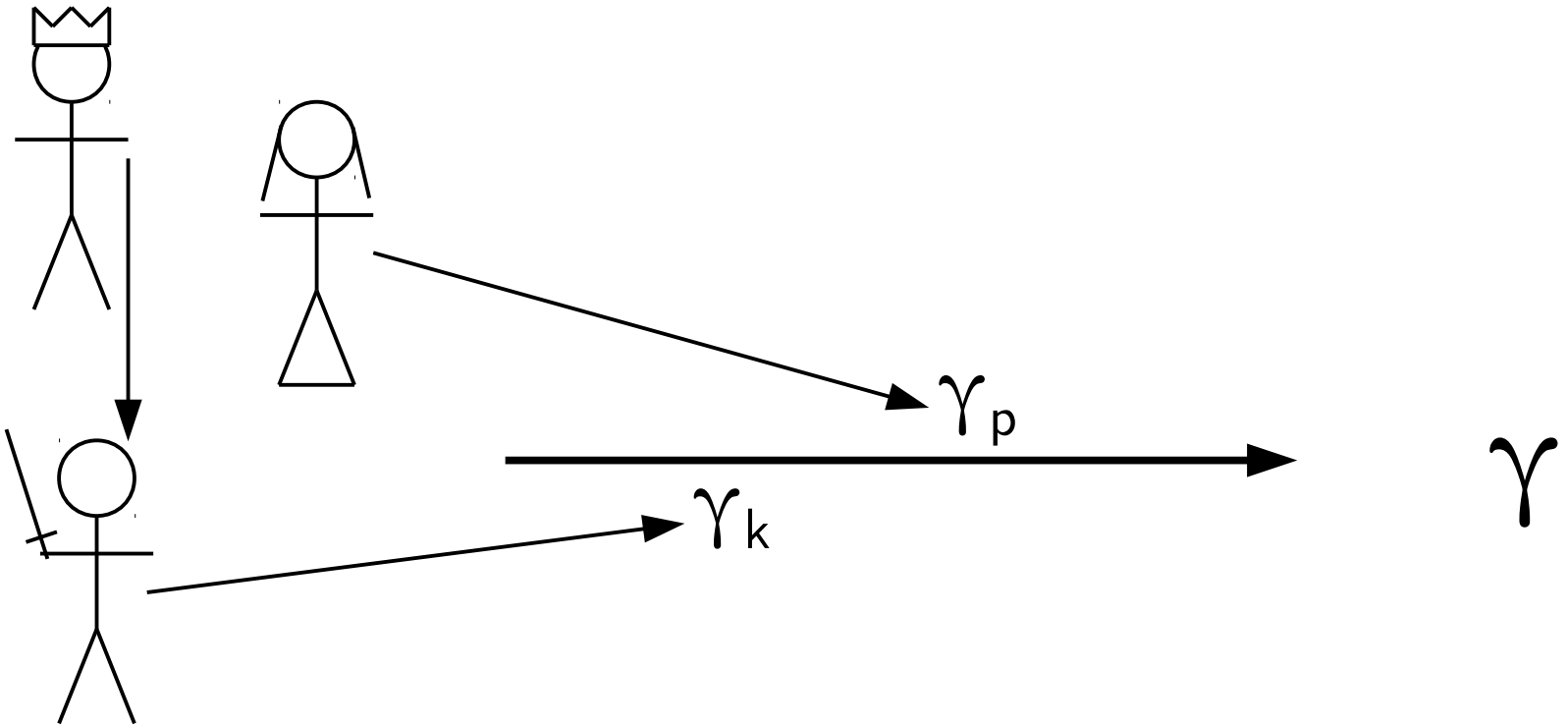

Concrete approaches: fabula

- Def. Intentional plan:
  - Intentional actions: associated with (intends A g)
  - Final step $s_{fin} \in S'$ makes g true
  - Motivating step $s_m \notin S'$
  - Causal or motivational links to s_{fin}

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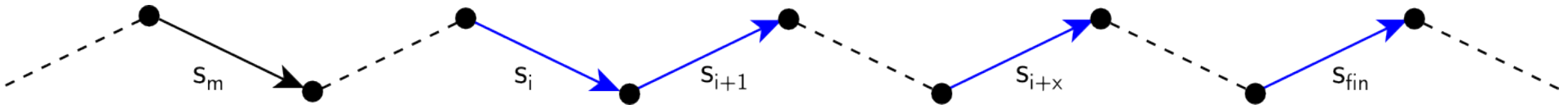

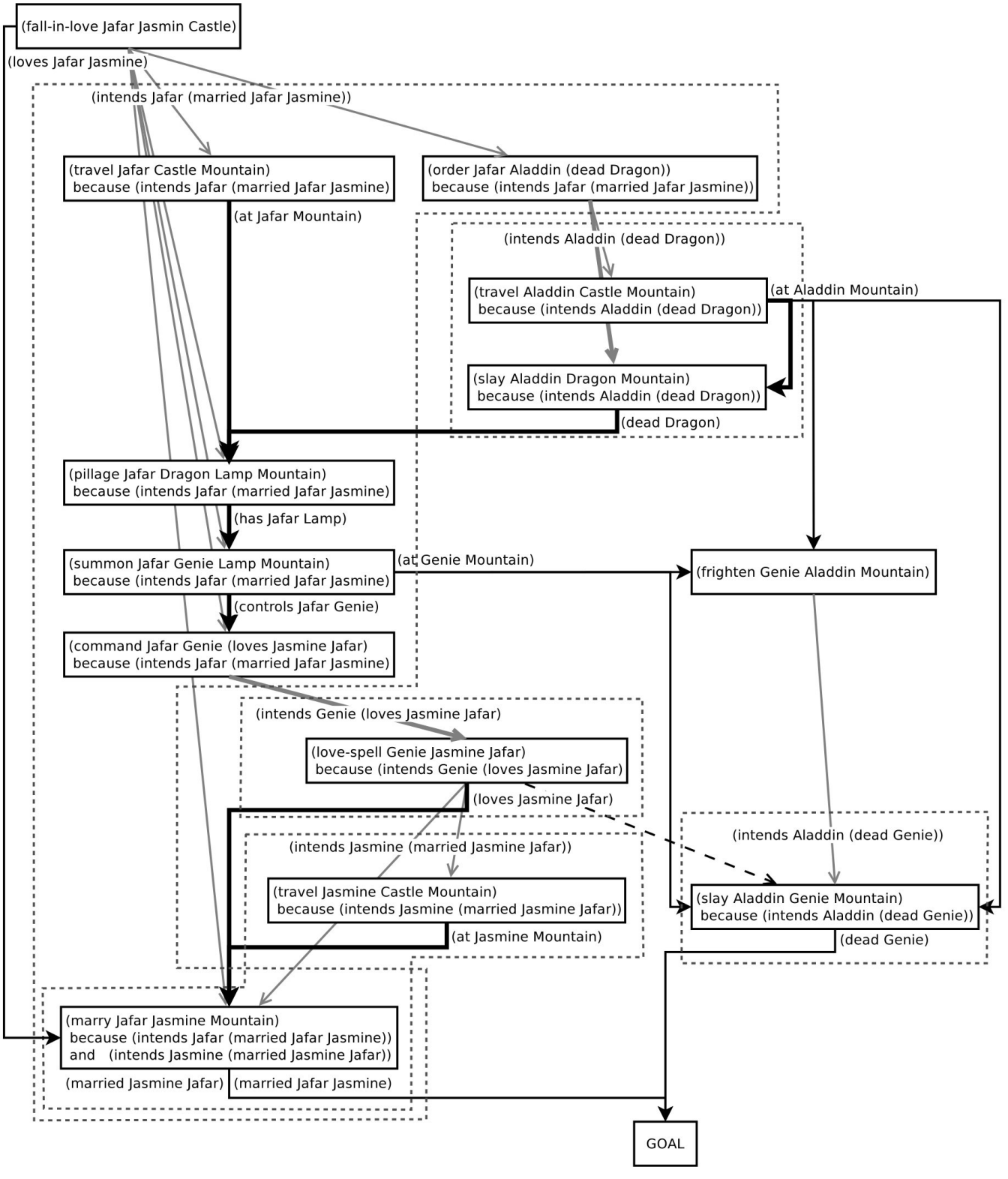
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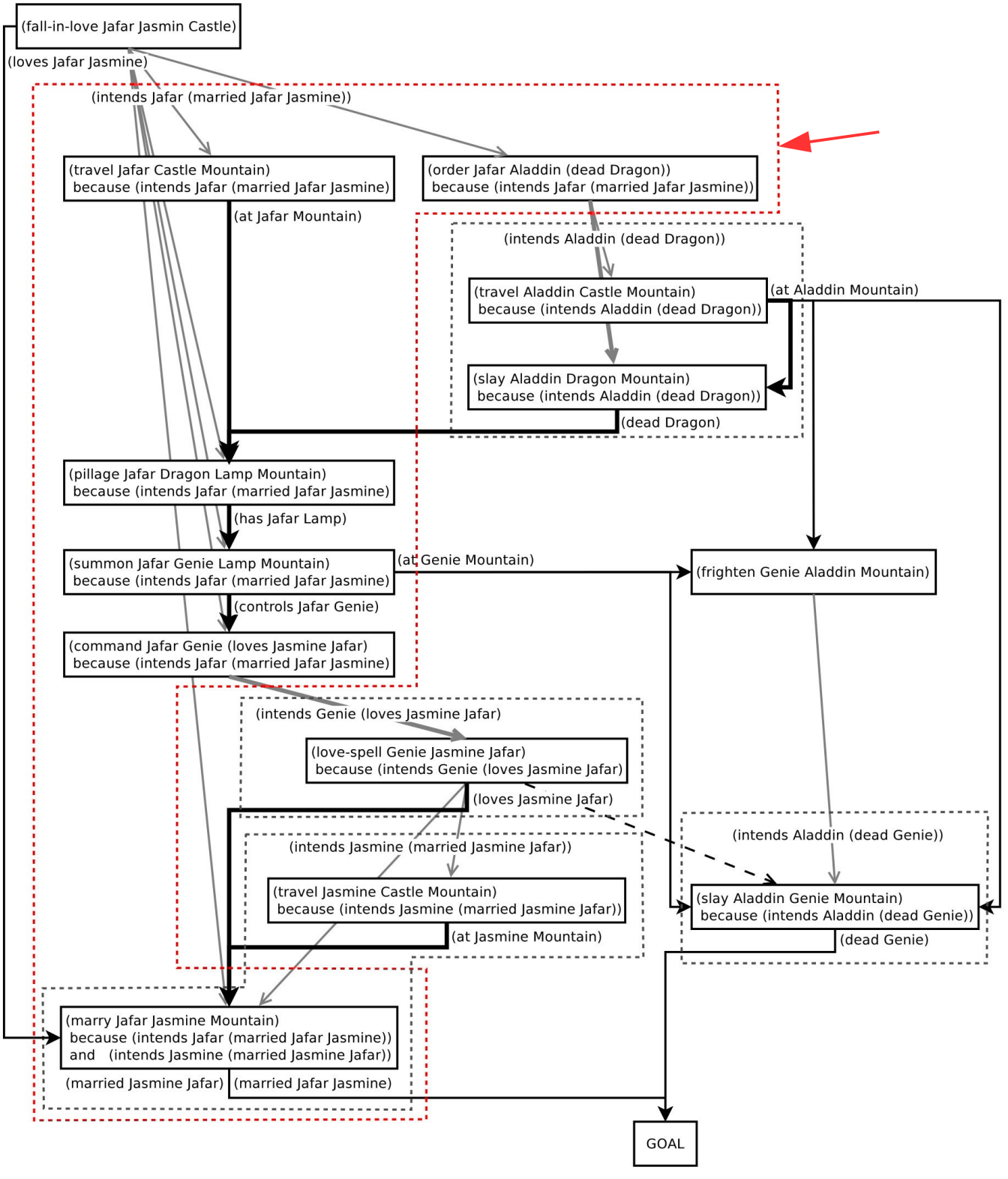
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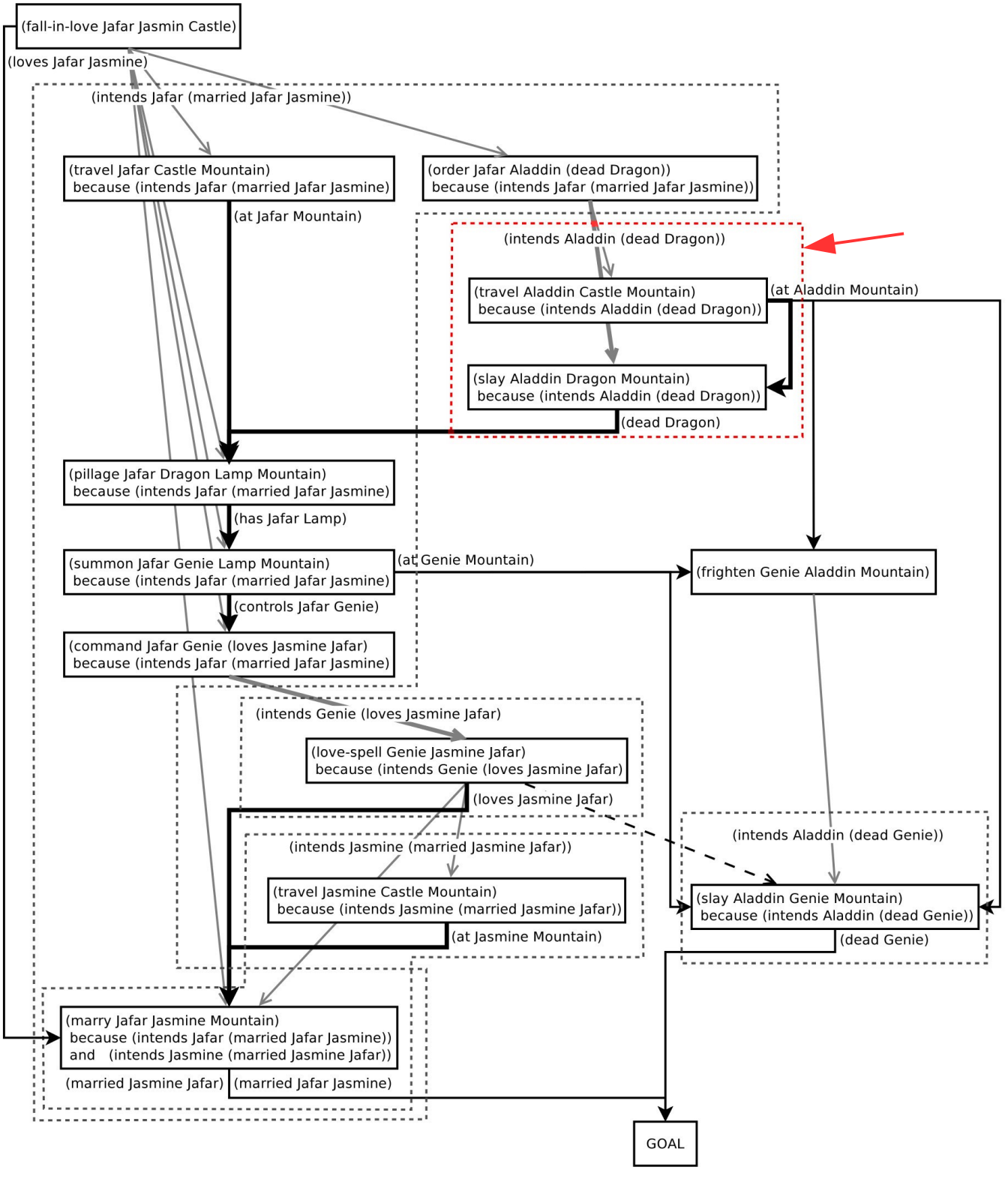
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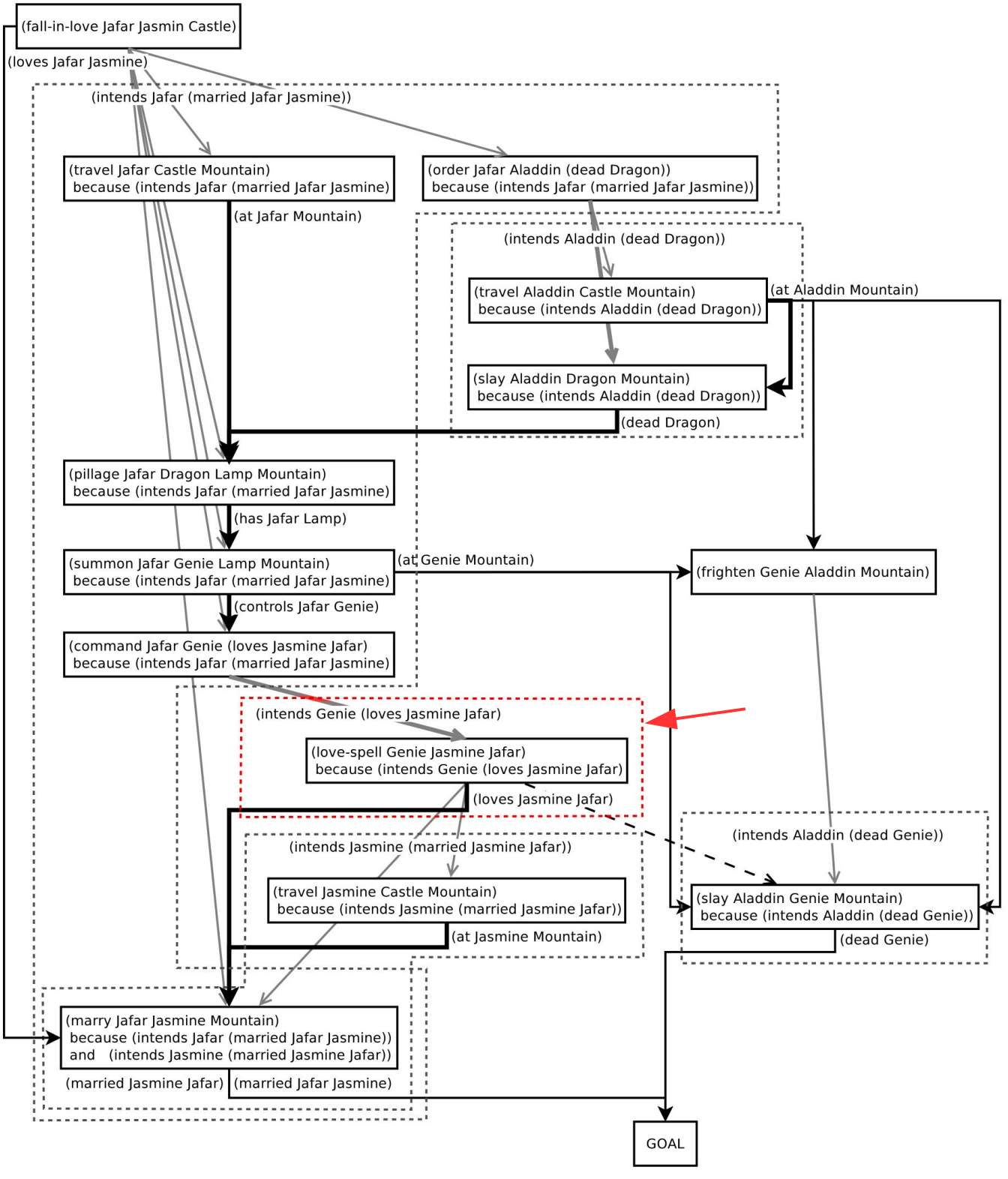
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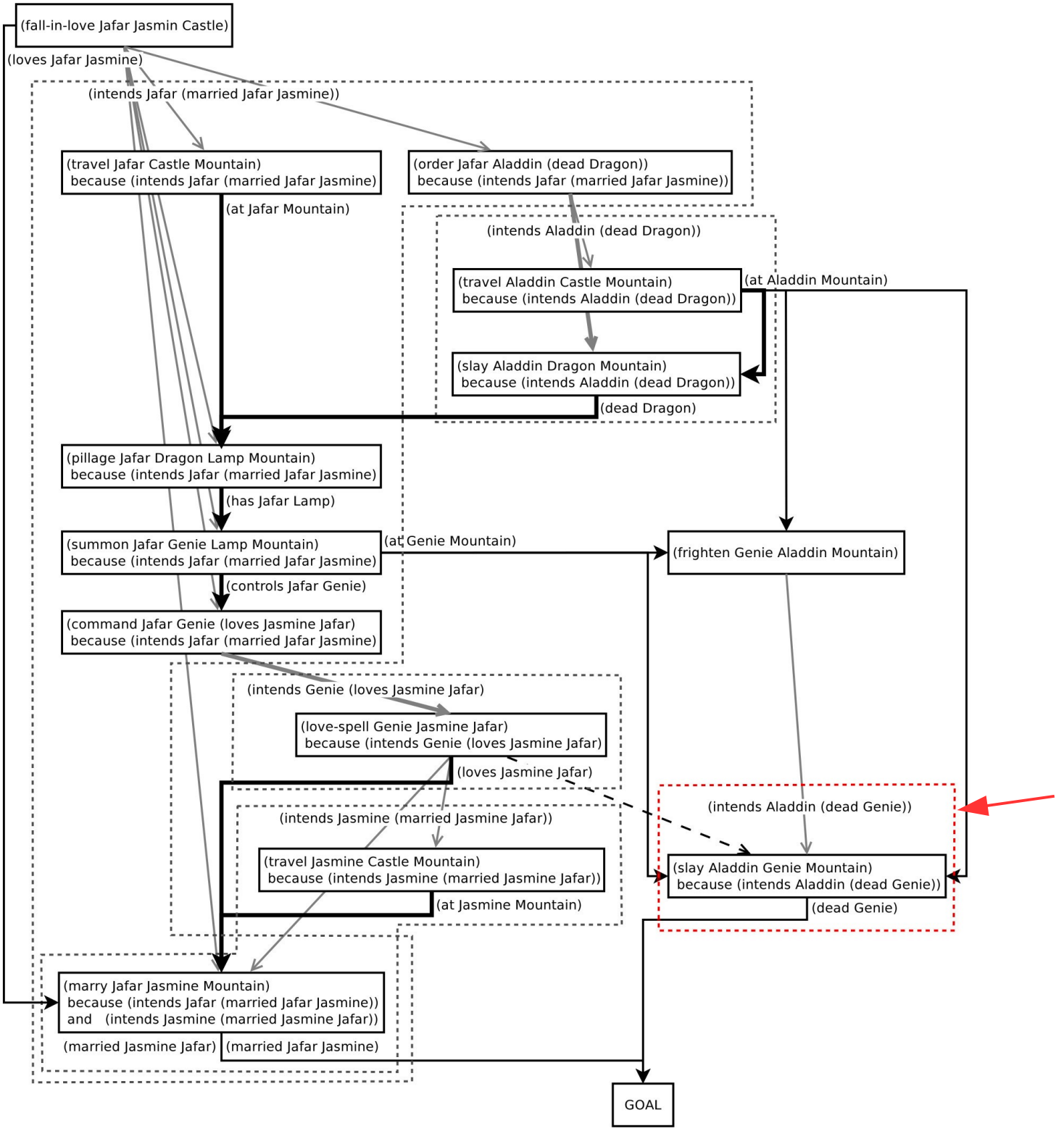
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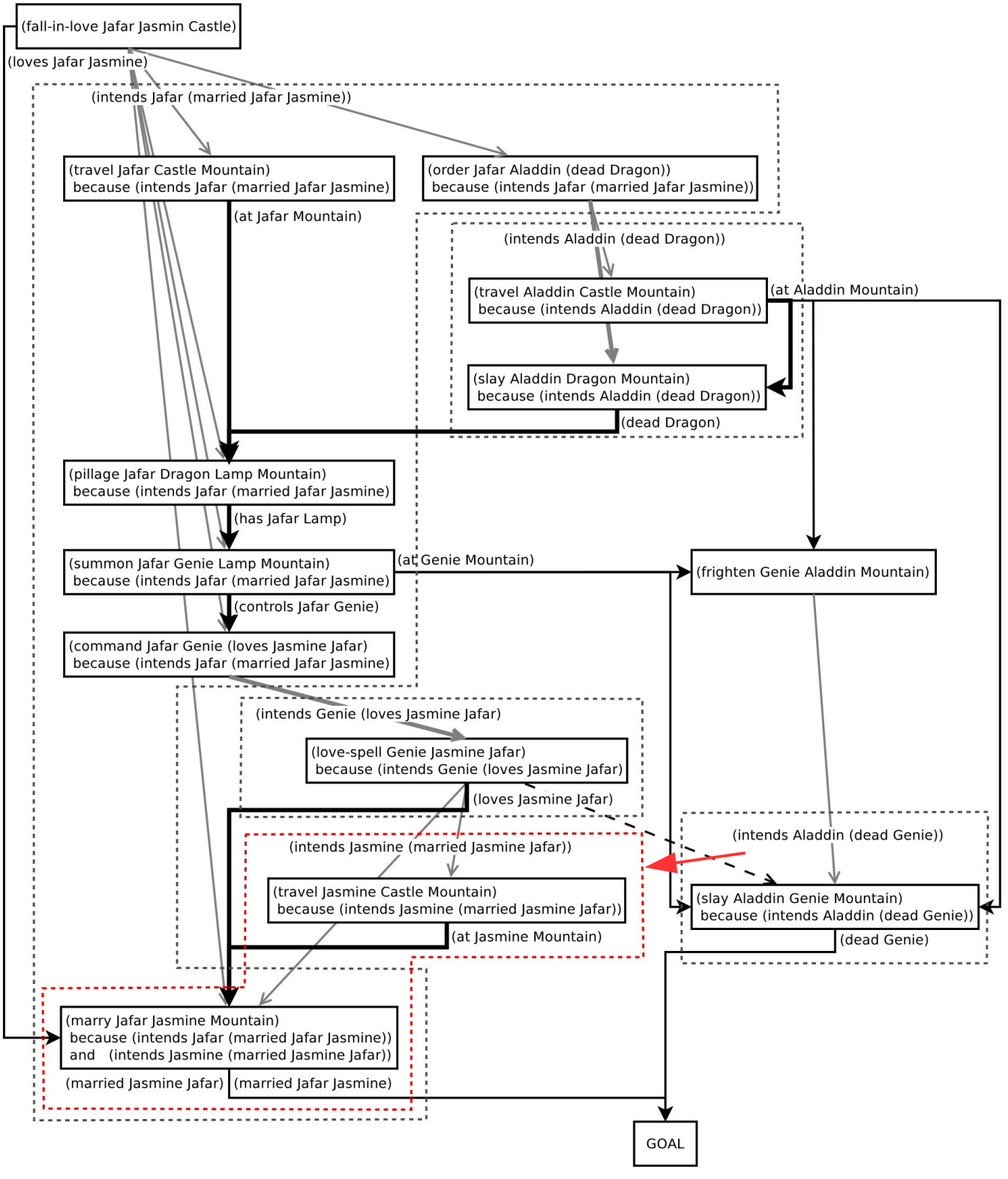
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Concrete approaches: discourse

- Goals
  - Variation
  - Interactivity
- Methods
  - PoV
  - Decomposition

Concrete approaches: discourse

- PoV
  - Perspective
  - Disposition

- Example
  - V-sell-D = $\langle\ \neg$V-army $\wedge\ \neg$D-sold , V-army $\wedge$ D-sold $\rangle$

Concrete approaches: discourse

$$\text{V-sell-D} = \langle\ \neg\text{V-army} \wedge \neg\text{D-sold}\ ,\ \text{V-army} \wedge \text{D-sold}\ \rangle$$

- Perspective: Viserys / Daenerys
- Disposition:
  - V: indifferent / regretful
  - D: submissive / revengeful

Concrete approaches: discourse

$$\text{V-sell-D} = \langle\ \neg\text{V-army} \wedge \neg\text{D-sold}\ ,\ \text{V-army} \wedge \text{D-sold}\ \rangle$$

- PoVs:
  - Viserys-indifferent $\rightarrow$ V-sell-D $= \langle$ ...
  - Viserys-regretful $\rightarrow$ V-sell-D $= \langle$ ...
  - Daenerys-submissive $\rightarrow$ V-sell-D $= \langle$ ...
  - Daenerys-revengeful $\rightarrow$ V-sell-D $= \langle$ ...

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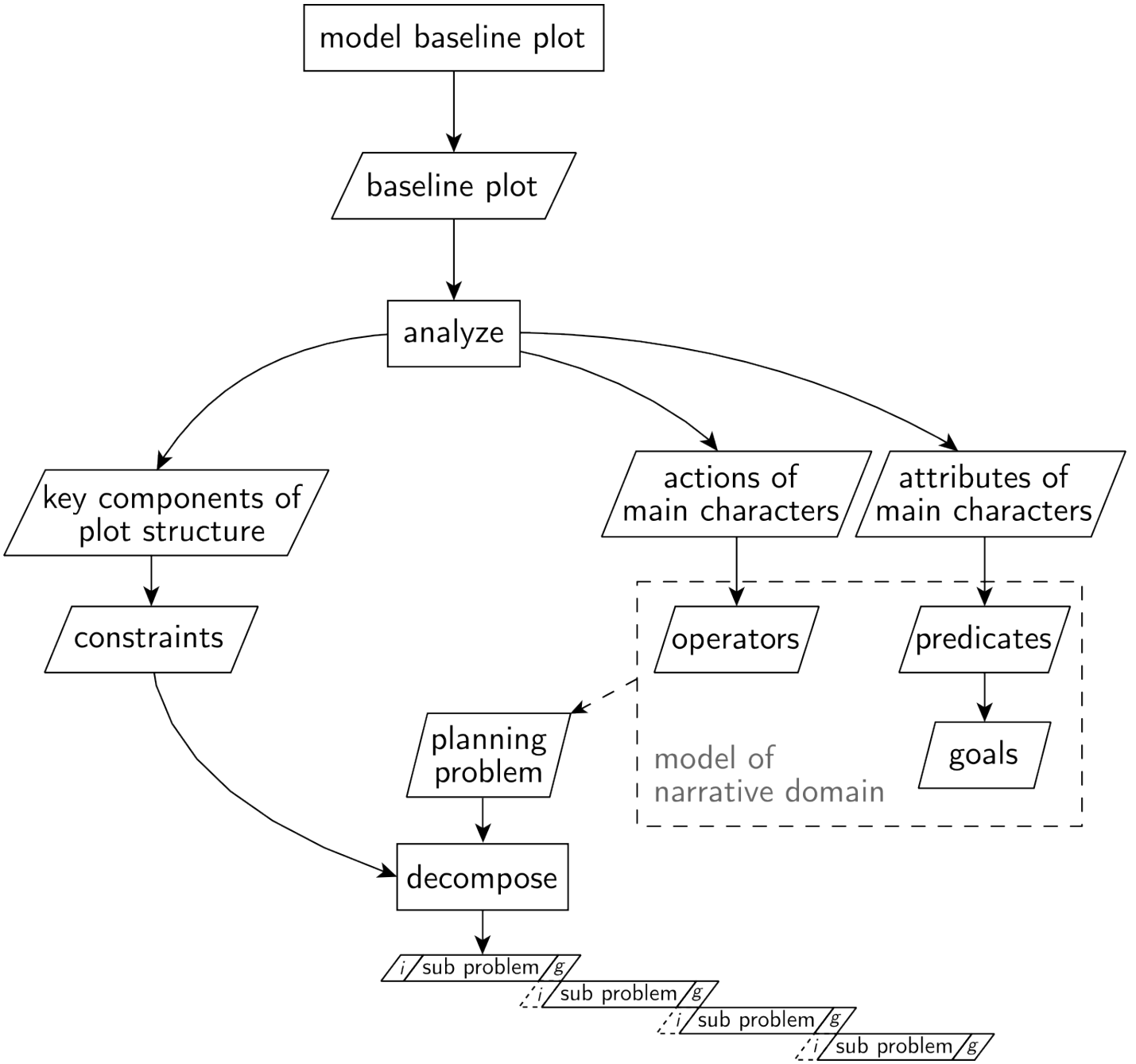
model baseline plot
baseline plot
analyze
key components of plot structure
constraints
actions of main characters
attributes of main characters
operators
predicates
goals
model of narrative domain
planning problem
decompose
i
sub problem
g

2 (**SHOW-CONTENTMENT** *A B AR*)
3 (**RECEIVE-LOAN-REQUEST** *A B AR*)
4 (**RESPOND-TO-LOAN-REQUEST** *A B AR*)
5 (**RECEIVE-THANKS** *A B AR*)
6 (**GOSSIP-ABOUT-FRIEND** *A B AR*)
7 (**TALK-OF-CARNIVAL** *A B AR*)

A1 (**offered-guarantee-loan** *A B*)

10 (**GREETINGS-AND-INTRODUCTIONS** *A B S VR*)
11 (**ASK-TO-BORROW-MONEY** *A B S VR*)
12 (**REVEAL-FEELINGS-ABOUT-LOAN** *A B S VR*)
13 (**SHOW-DISLIKE-OF-USURY** *A B S VR*)
14 (**RECEIVE-OFFER-OF-LOAN-ART** *A B S VR*)
15 (**BORROW-MONEY-CONFIDENT-REPAY** *A B S VR*)

C1 (**sealed-bond-over-loan** *S A*)

16 (**DISMISS-RISK-OF-FORFEIT** *A B VR*)

A2 (**responded-to-bond** A)

19 (**REVEAL-FEELINGS-FOR-FRIEND-ART** *A B VS*)
20 (**SAY-GOODBYE-TO-FRIEND-ART** *A B VS*)

A3 (**despatched-friend** *A B*)

25 (**CONSIDER-LOST-SHIPS** *A AR*)
26 (**WRITE-TO-FRIEND** *A AR*)

A4 (**asked-to-return** *A*)

29 (**REQUEST-AN-AUDIENCE** *A S VS*)

C2 (**discussed-bond-and-forfeit** *A S*)

32 (**OFFER-TO-REPAY-LOAN** *A D C*)
33 (**SHOW-CONTEMPT-FOR** *A S D C*)
34 (**CALL-FOR-JUDGEMENT** *A S D C*)
35 (**RELEASE-FROM-FORFEIT** *A S D C*)

C3 (**received-verdict-of-court** *A S*)

36 (**SHOW-HAPPINESS** *A C*)

A5 (**responded-to-verdict-of-court** *A*)

39 (**INTRODUCE-AND-WELCOME** *A B P BM*)
40 (**RECEIVE-GOOD-NEWS-SHIPS** *A B P BM*)

C4 (**end-of-play**)

39 (**NARRATIVE-ACTION** *LIST-OF-ARGS*)
A1 (**PoV-specific-constraint** *LIST-OF-ARGS*)
C2 (**common-constraint** *LIST-OF-ARGS*)

A: Antonio
B: Bassanio
D: Duke
S: Shylock

BM: Belmont
C: Courtroom
AR: Antonio-Residence
SR: Shylock-Residence
VR: Venice-Rialto
VS: Venice-Street

Conclusion

- Approachable on different levels
  - Fabula
  - Discourse
- Specialized planners vs. modeling
- Interactive story telling

Sources

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