



IMPROVISATIONAL COMPUTATIONAL STORYTELLING IN OPEN WORLDS



entertainment intelligence lab

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IMPROVISATIONAL





abc family

WHAT THE HECK DID WE JUST SEE?

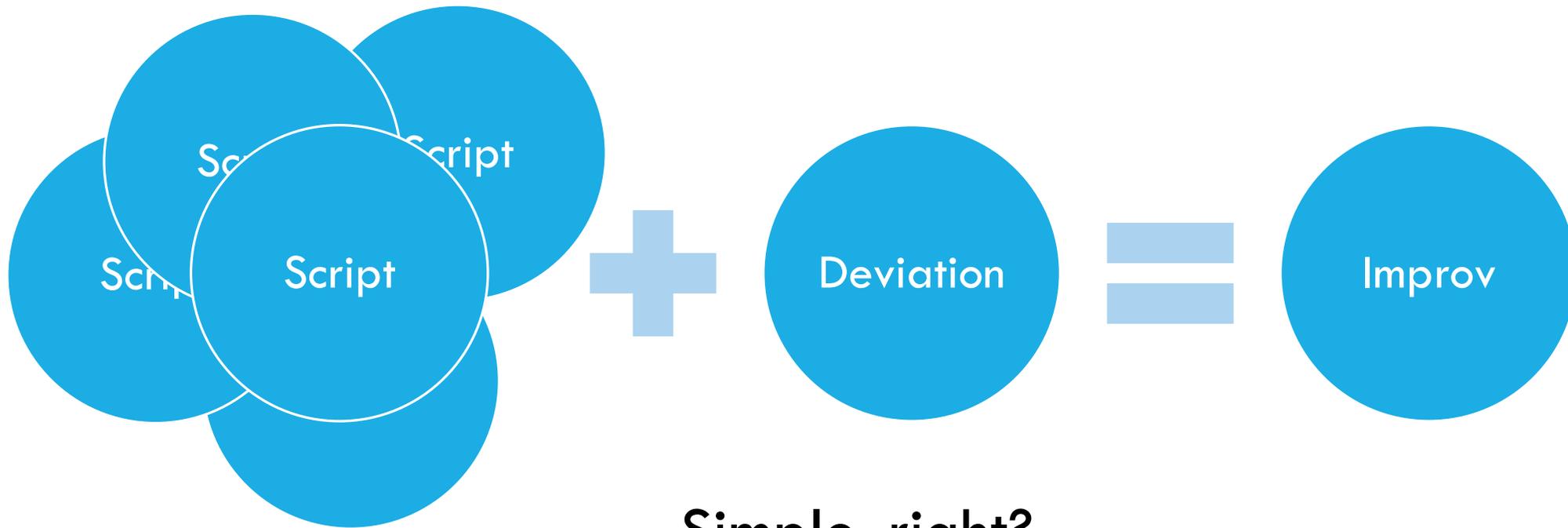
- The American version of the show *Whose Line Is it Anyway?* Season 3, Episode 8

Sure, but...

- They're building a story.
- They're reinterpreting the surgery theme by adding a spy and a Film Noir feel.
- They're building up and playing off of our and each others' expectations.
- But also, they're making (occasionally humorous) responses that break our expectations.



I GIVE UP. HOW DO THEY DO IT?



Simple, right?

HUMANS CAN DO IT. SO WHY CAN'T COMPUTERS?

- It takes a lot of expertise.
- Computational systems tend to be experts in a single area.
- The response needs to be quick (real-time).



OPEN WORLDS



OUR DEFINITION OF AN “OPEN WORLD”

All possible
thoughts a
human can think
of and express
through
language



OKAY, SO IT'S HARD.

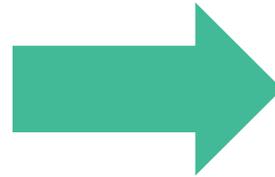
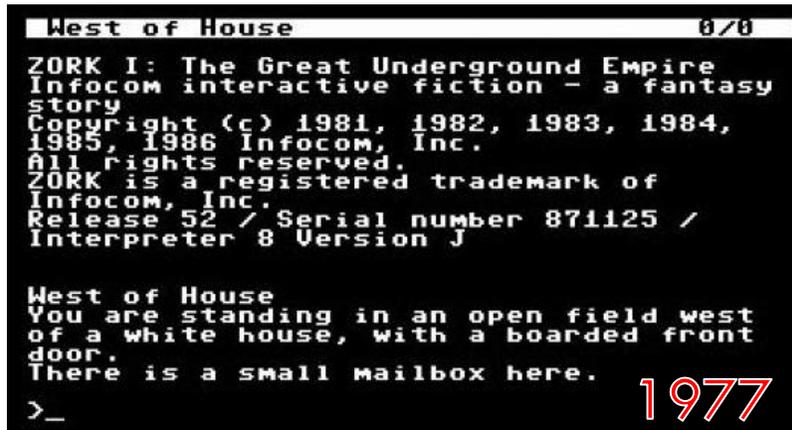
BUT AT LEAST WE'RE NOT STARTING FROM SCRATCH...?



COMPUTATIONAL STORYTELLING



INTERACTIVE NARRATIVE



- + Computational
- + Storytelling
- Improvisational
- Open World

- + Computational
- + Storytelling
- + Improvisational
- Open World

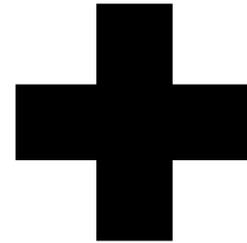
NOW LET'S MAKE IT AN OPEN WORLD!



IMPROVISATIONAL STORYTELLING



Interactive Narrative



Improv Theater

```
West of House 0/0
ZORK I: The Great Underground Empire
Infocom interactive fiction - a fantasy
story
Copyright (c) 1981, 1982, 1983, 1984,
1985, 1986 Infocom, Inc.
All rights reserved.
ZORK is a registered trademark of
Infocom, Inc.
Release 52 / Serial number 871125 /
Interpreter 8 Version J

West of House
You are standing in an open field west
of a white house, with a boarded front
door.
There is a small mailbox here.

>_
```

User Follows Script

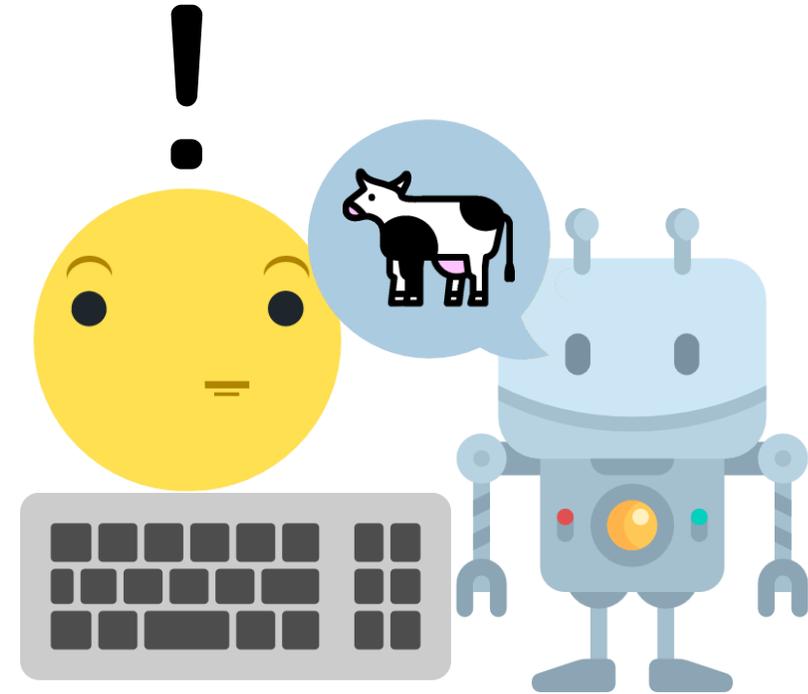
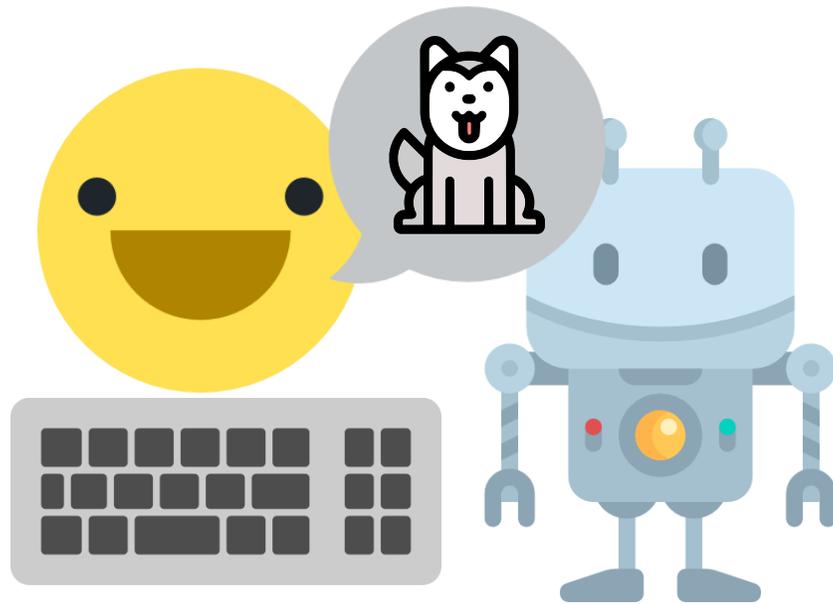


User Goes Rogue



“Interactive Script”

WHAT DID WE GET OURSELVES INTO?



WE HAVE A PLAN.

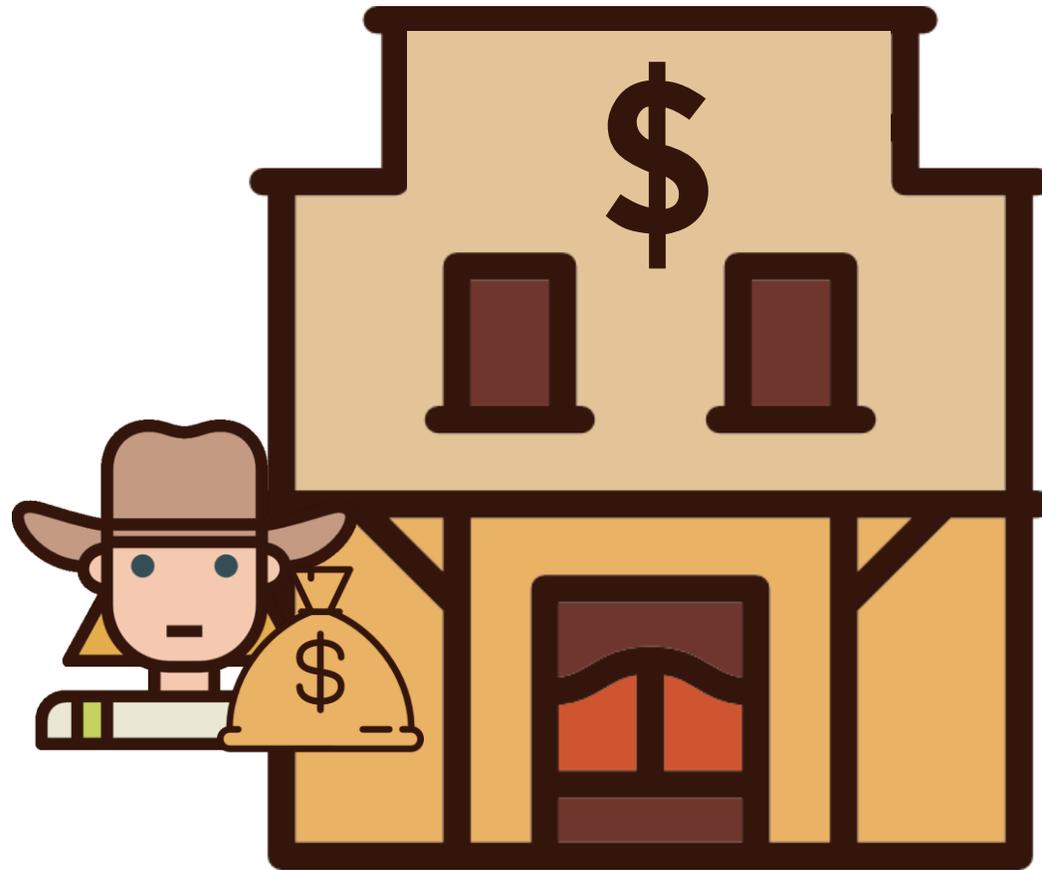
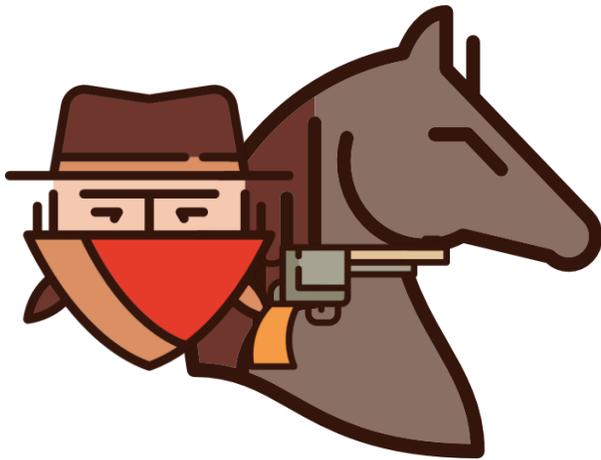


HOW DO WE HANDLE HUMANS?

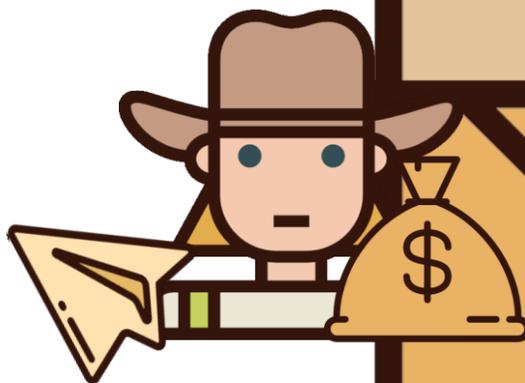
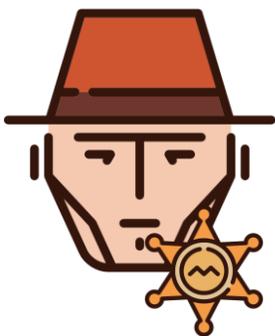
1. We have to assume that the user has a set of scripts, like improv actors.
2. Depending on what the human does, the agent chooses the appropriate actions based off of 3 strategies:
 - Constituent
 - Consistent
 - Exceptional



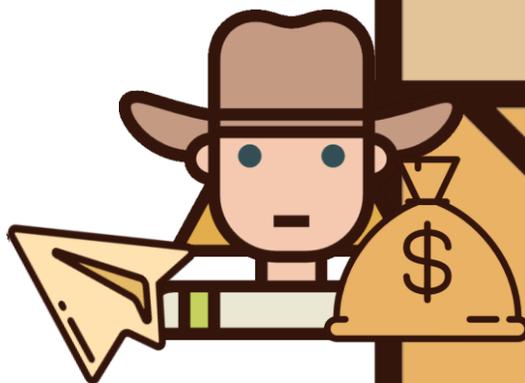
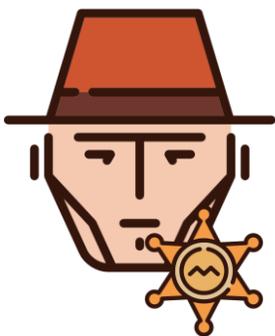
THE SETUP



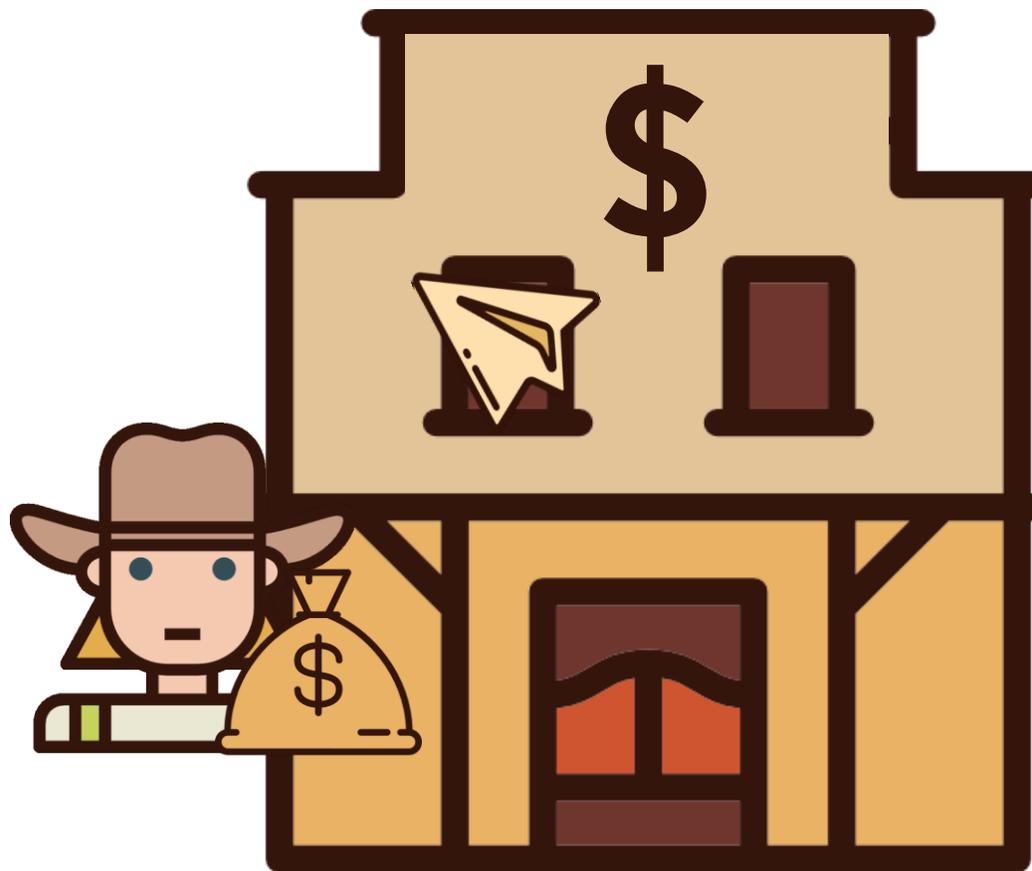
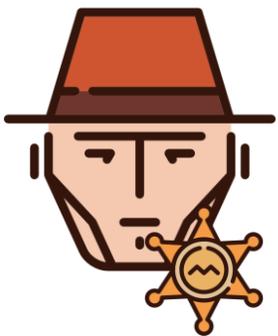
HOW IT SHOULD END



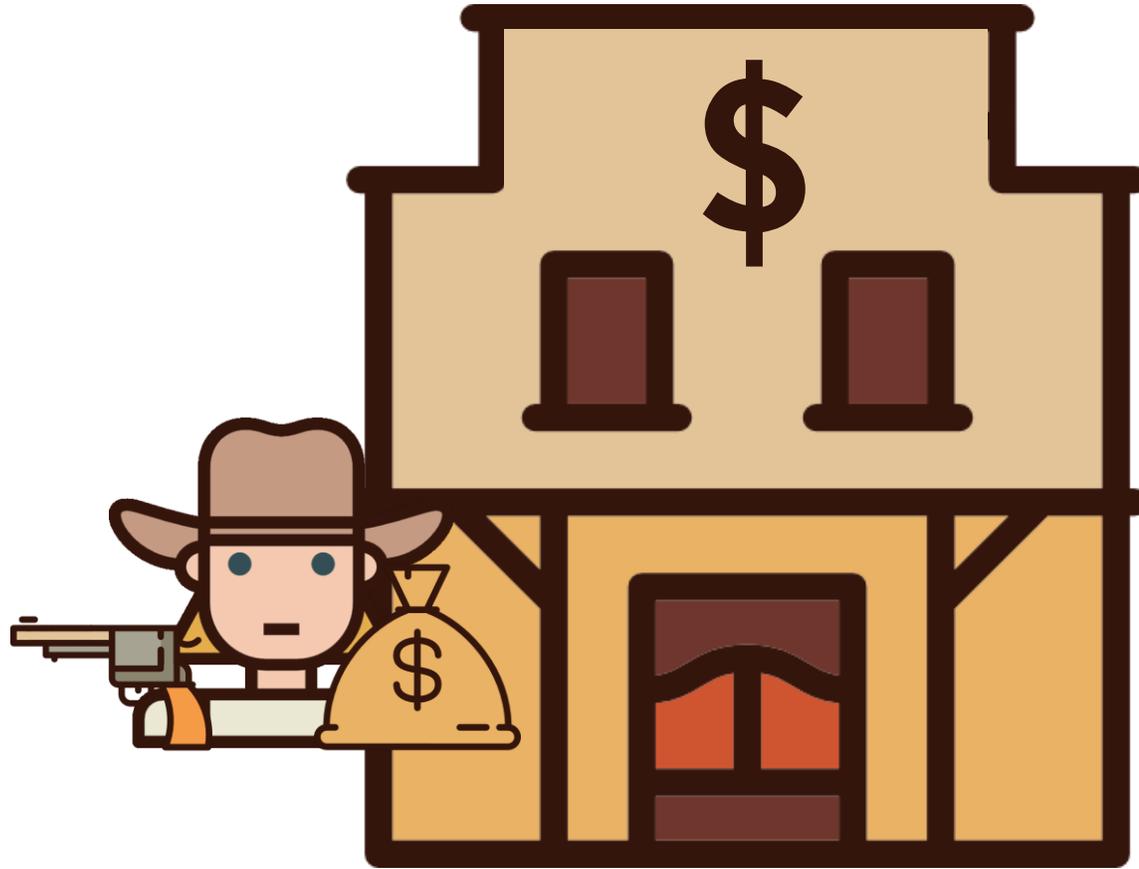
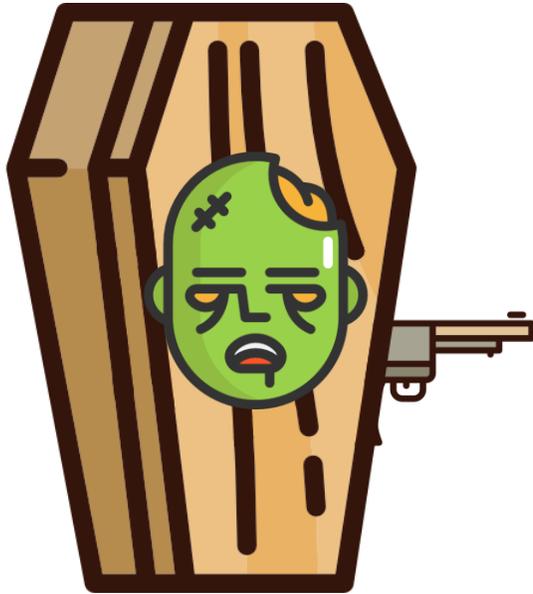
CONSTITUENT (SAME)

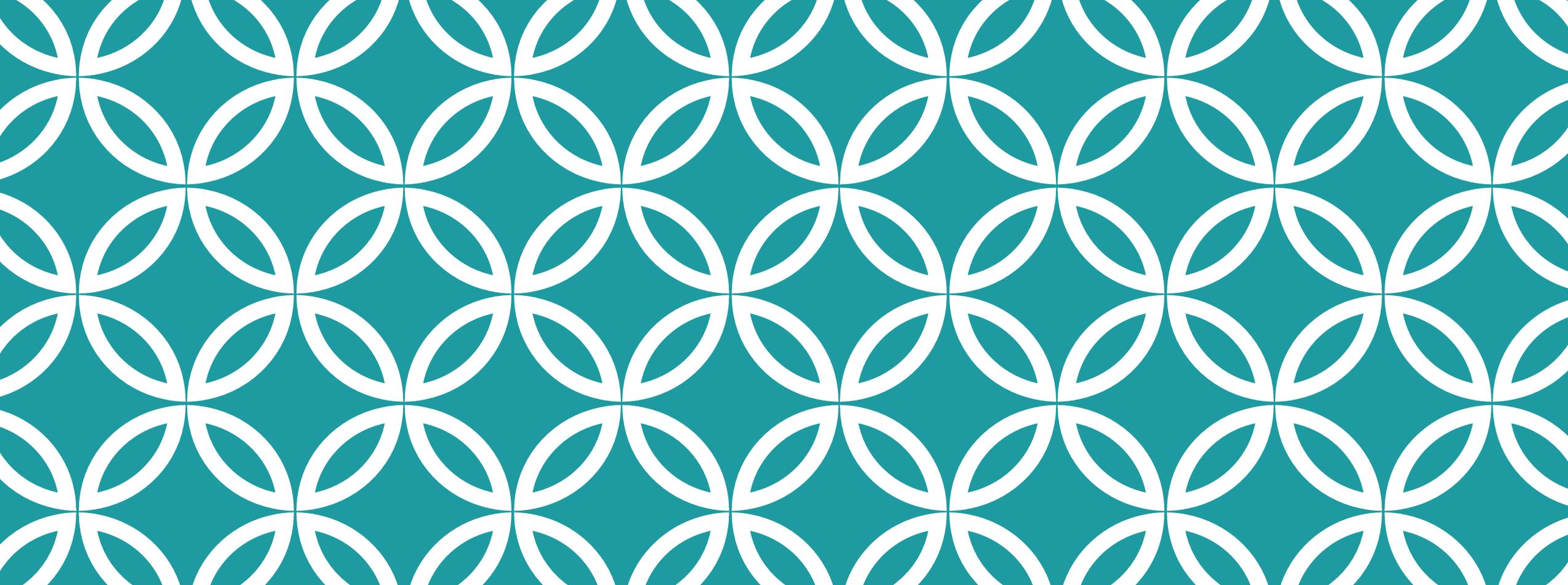


CONSISTENT



EXCEPTIONAL

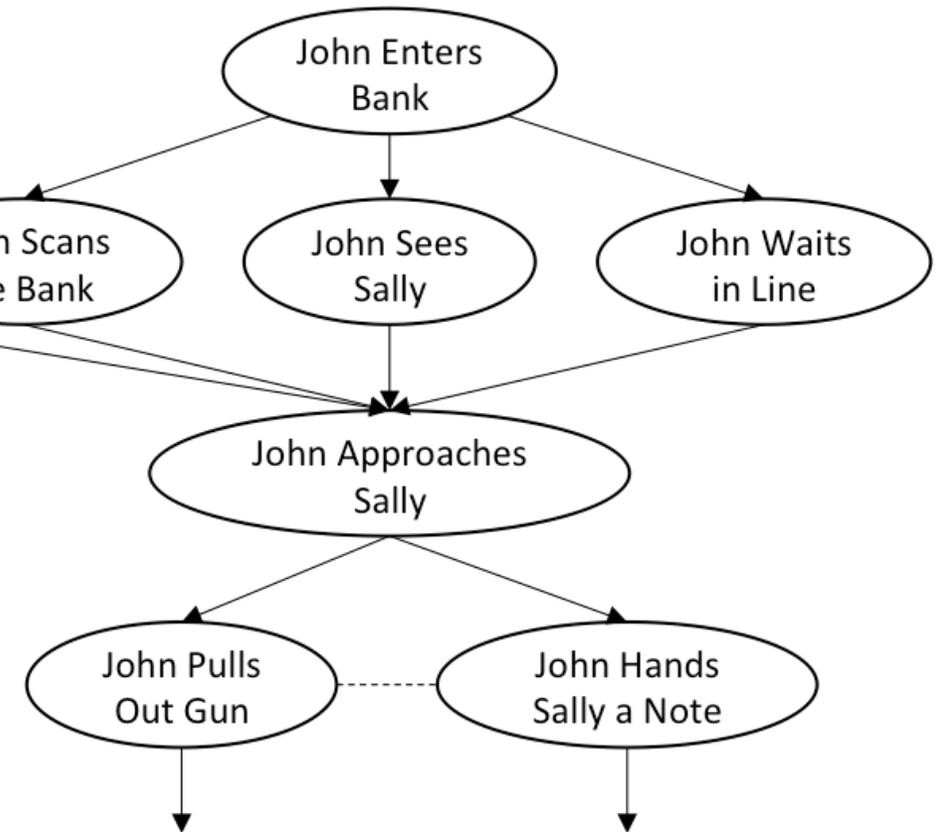
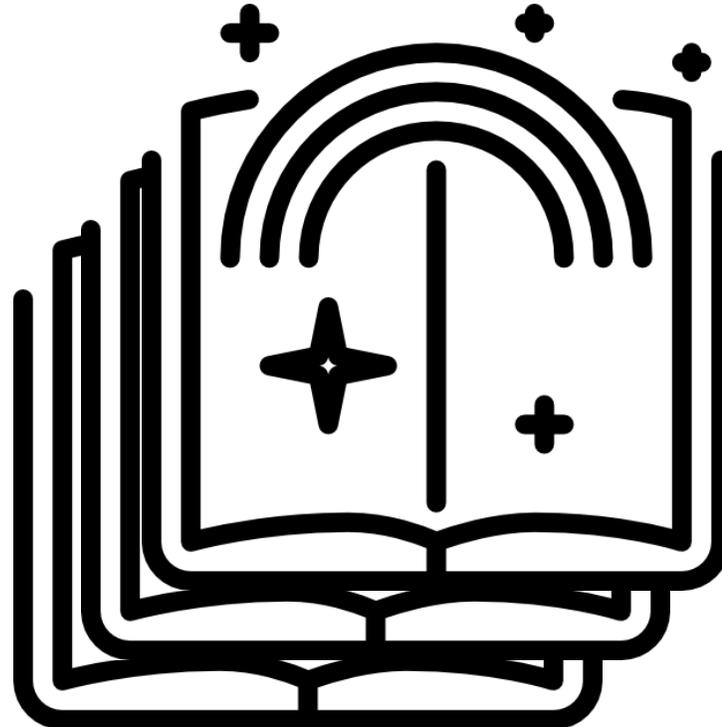
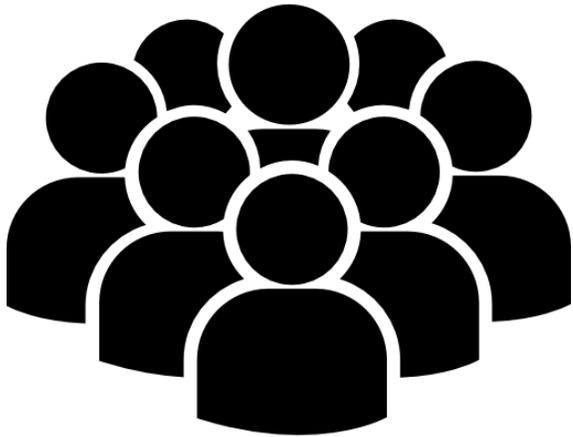




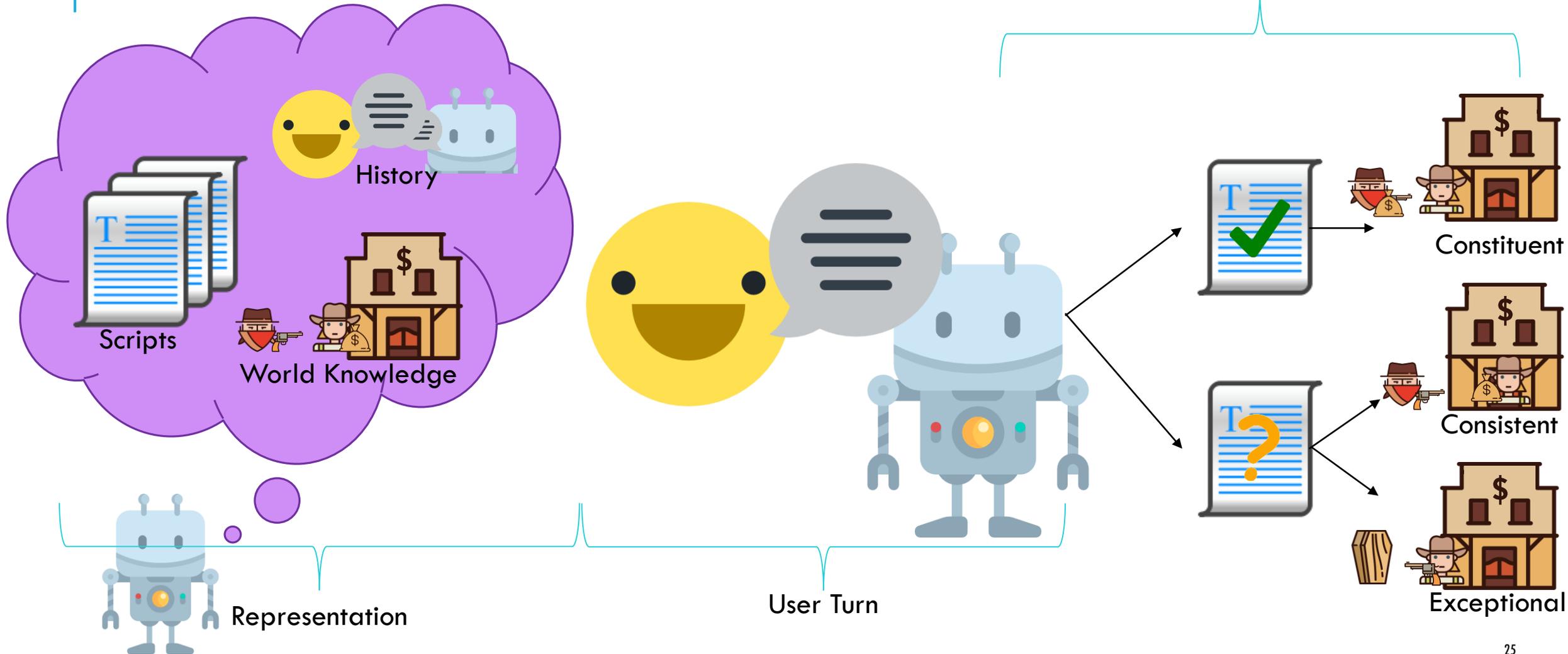
GRAPH-BASED REPRESENTATION



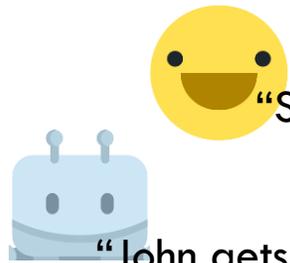
PLOT GRAPH (SCRIPT) LEARNING



OUR GENERAL FRAMEWORK

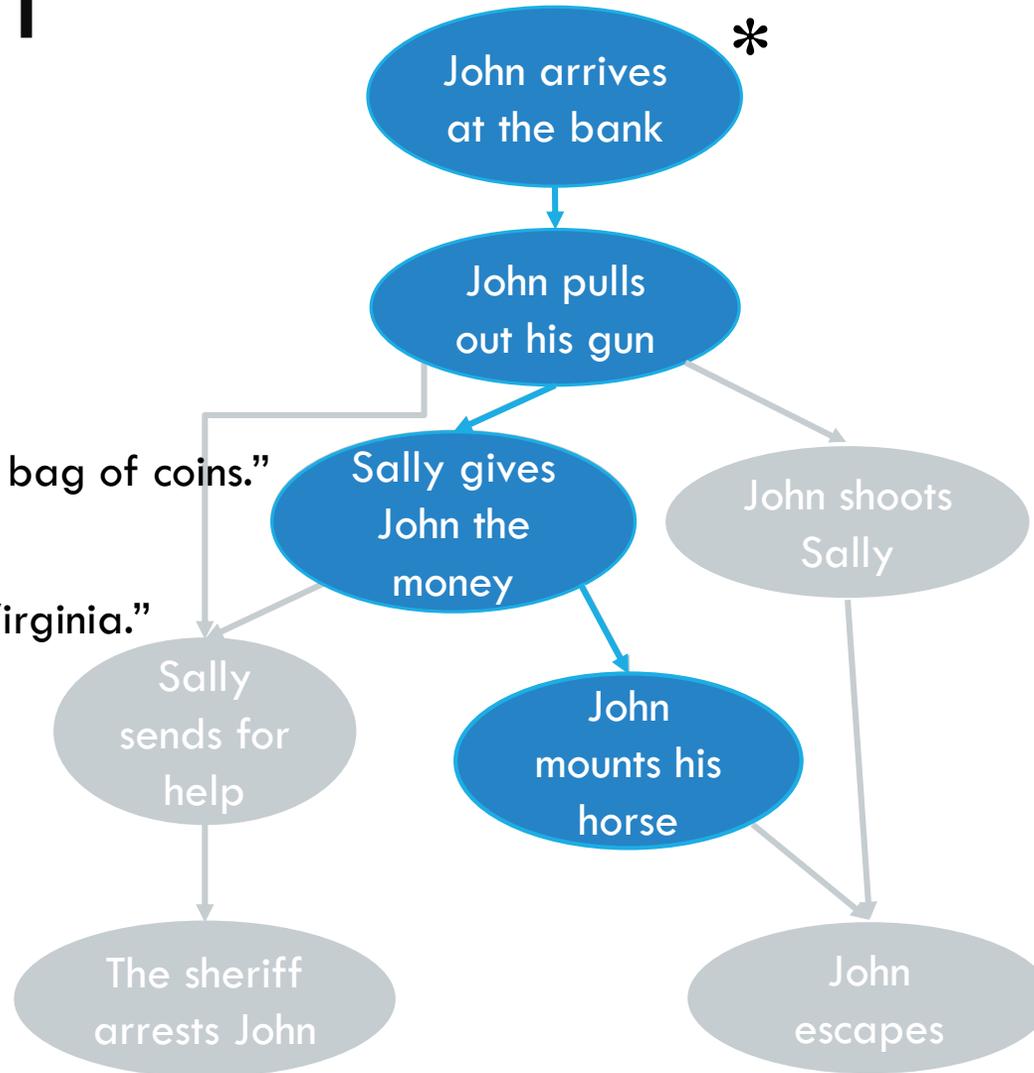


CONSTITUENT



“Sally throws John the bag of coins.”

“John gets back on his horse, Virginia.”



*Not a real plot graph.

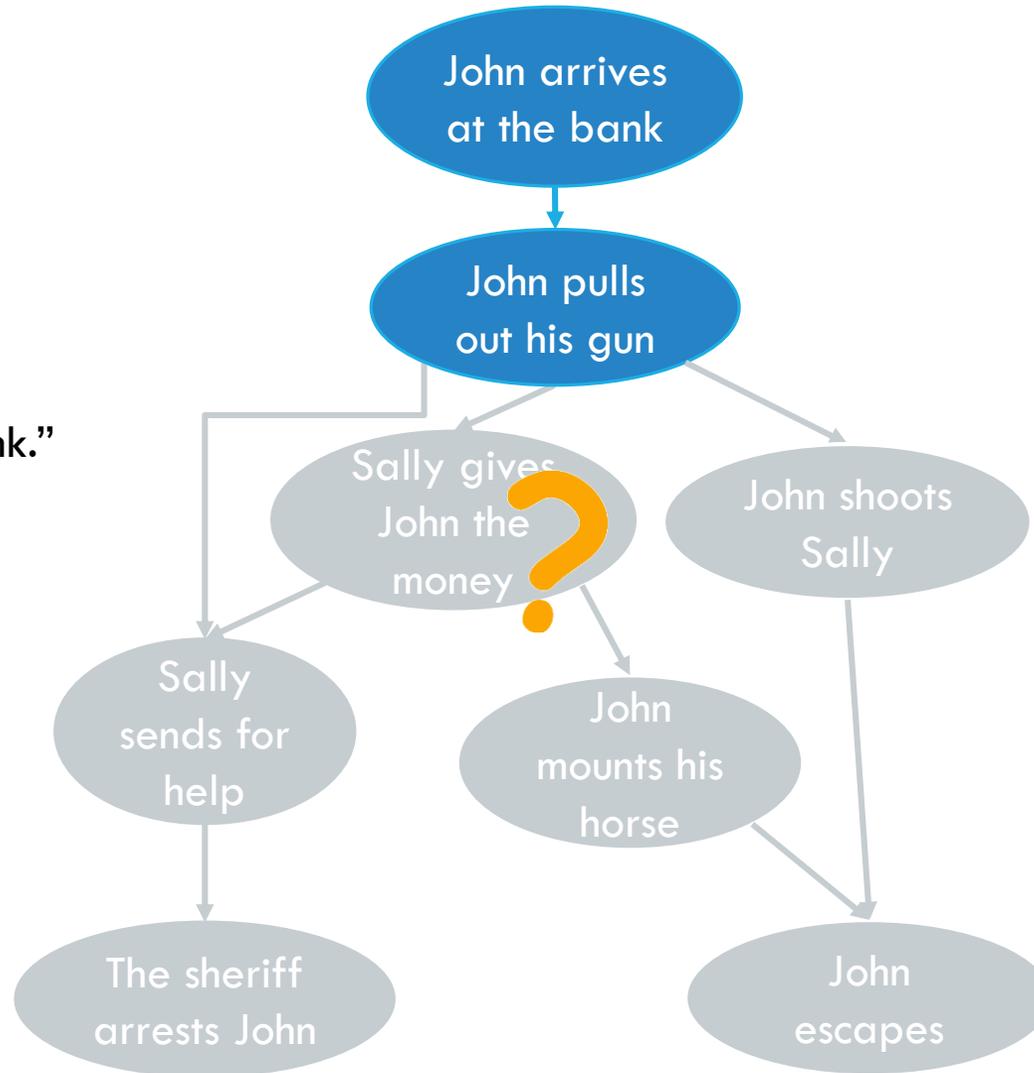
CONSISTENT



“Sally runs into the bank.”



“John locks the bank.”



EXCEPTIONAL

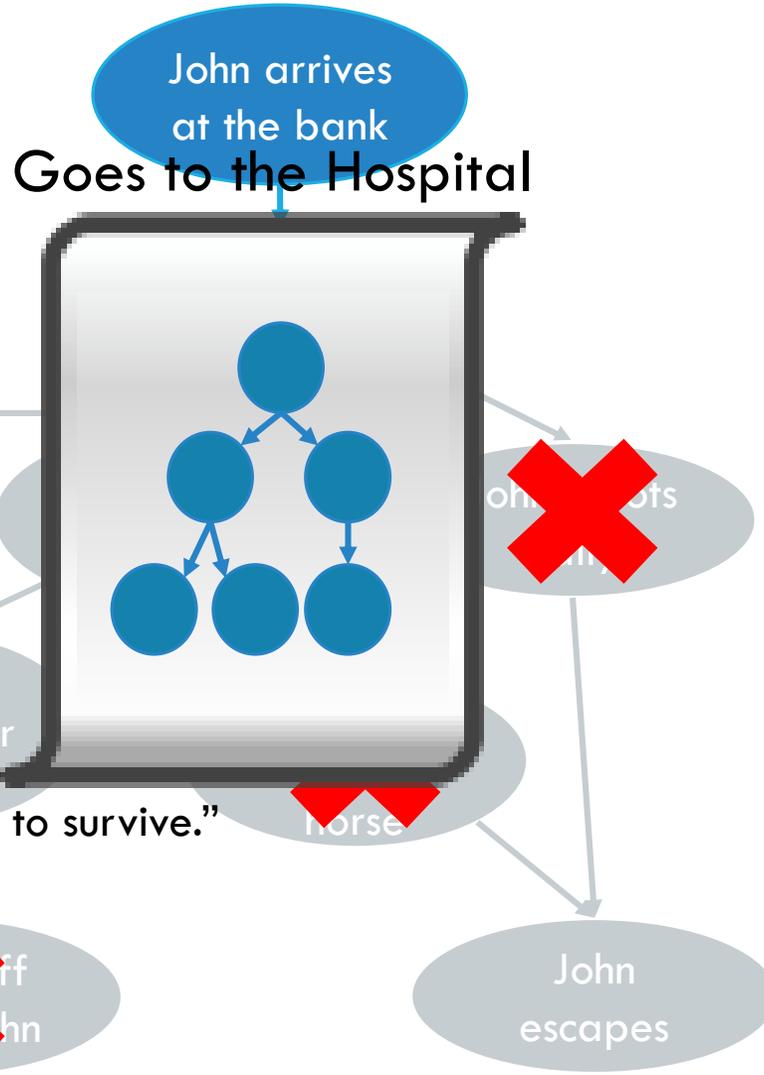


"Sally shoots John before he can escape."



"John calls for an ambulance."

"The ambulance arrives just in time for John to survive."



GRAPH-BASED REPRESENTATION

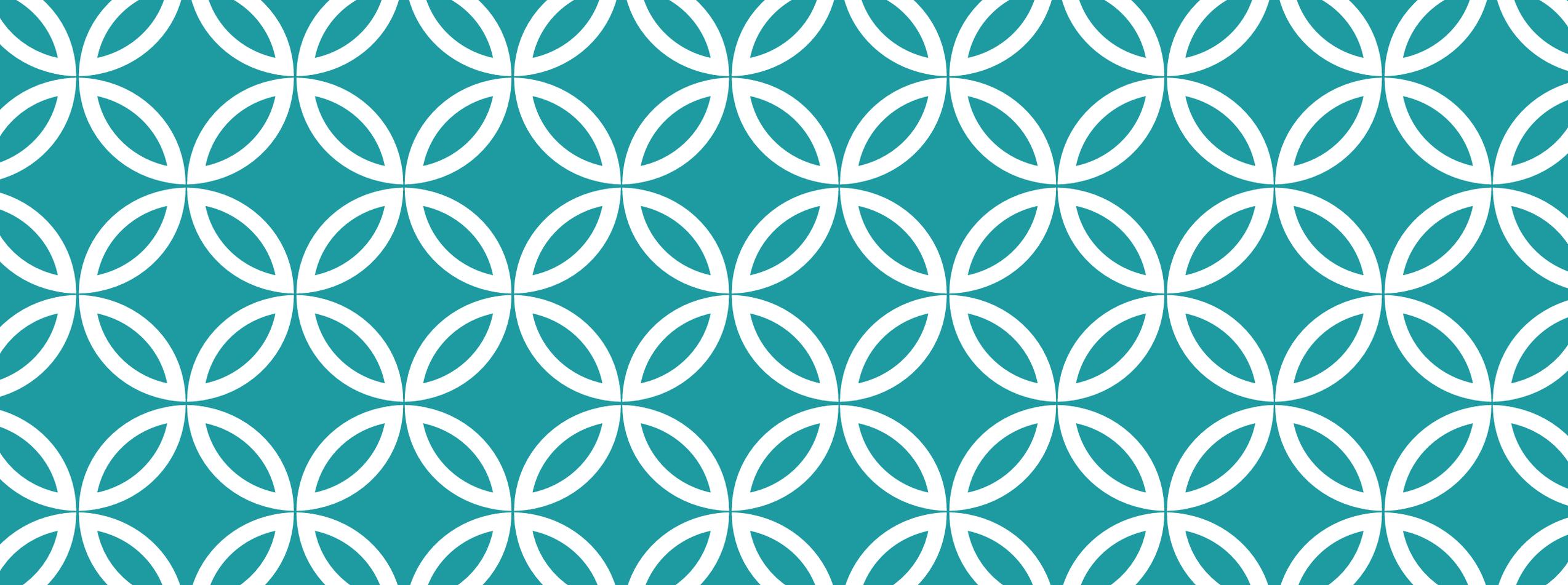
Pros

- Clear story flow
- Can have multiple scripts
- Can be acquired from just a few special stories

Cons

- Crowdsourced separately for each genre
- Script might not be ideal (matching user, boring, etc.)
- Awkward transitioning between scripts
- Reliant on sentential NLP

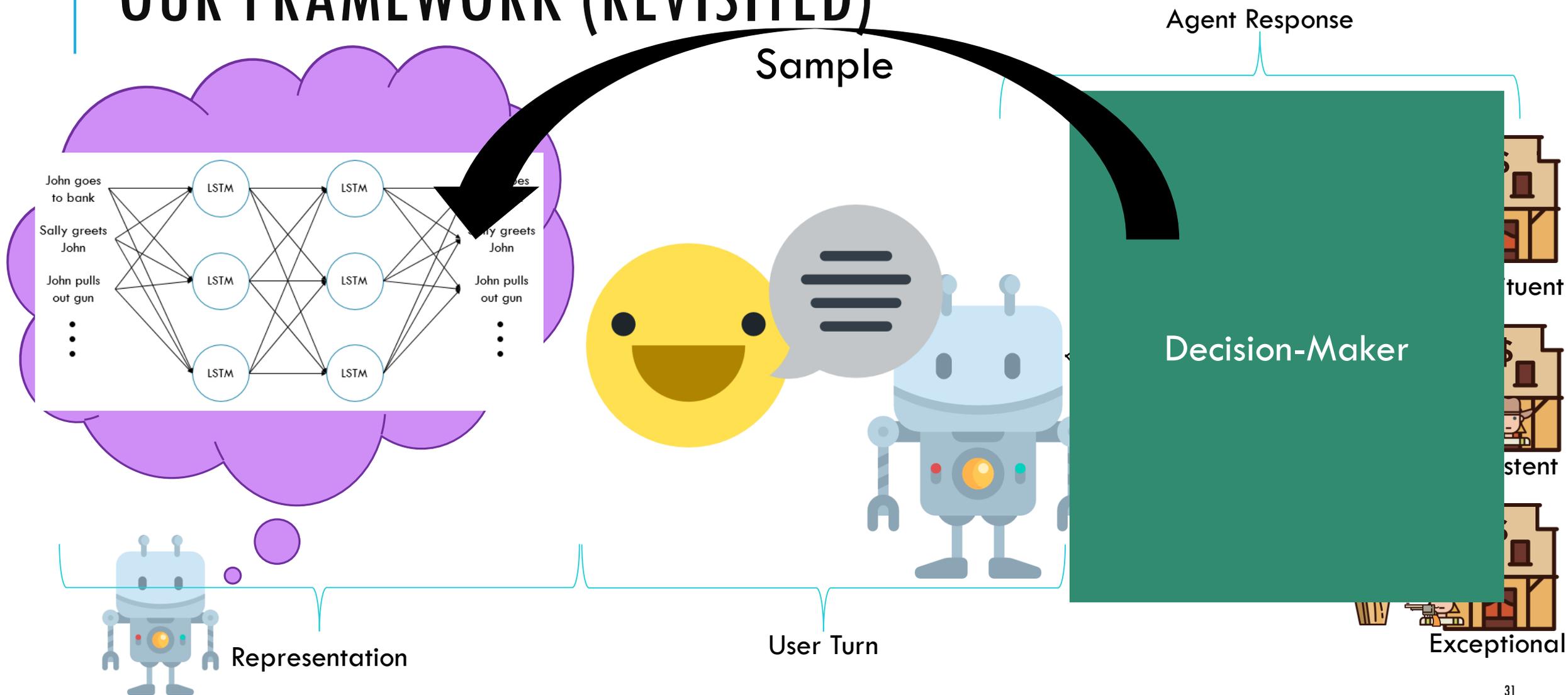




NEURAL NET REPRESENTATION



OUR FRAMEWORK (REVISITED)



NEURAL NET REPRESENTATION

Pros

- Self-learning internal “memory”
- Transitions easily between genres
- Can use any stories

Cons

- Need a lot of stories
- Don't know what goal/objective function to optimize for (surprisal, consistency, etc.)
- Hard to see why an agent makes certain decisions



WHY ARE WE DOING THIS?

- It's fun!
- Serious games for training (forensics, strategists)
- Problem-based inquiry educational games (open-ended problem-solving)
- Integration into conversational agents to appear more human
- A glimpse into cognitive processes of human improv



DISCUSSION

- This is not a solved problem. Are we covering all possible scenarios for how a story can unfold?
- What kind of data should we be training on? Can it scale?
- What does it mean for a story to be considered “good” or “entertaining”?
- How “creative” can we be before things get weird?



Thank you!

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entertainment intelligence lab

–Icons taken from flaticon.com and adapted for this presentation.
“Whose Line” video cut from <https://youtu.be/XmnZ9HZTHjw>