



Language Learning In Wubble World

Paul Cohen

Wesley Kerr

Daniel Hewlett

Yu-Han Chang

Shane Hoversten

Overview

- * Goals
- * Background
- * Word Learning
- * Future
- * Verb Learning

Research Goals

- * Natural Language Understanding (NLU)
- * Learn language the way a child does



- * Build sentence-scene corpus

Building the Sentence-Scene corpus

- * Option 1:
 - * Hire data entry personnel and train them to annotate.
 - * Annotation isn't language annotation, but scene annotation.
 - * Where things are, how they relate to each other, etc.

THE CAT SAT ON THE MAT



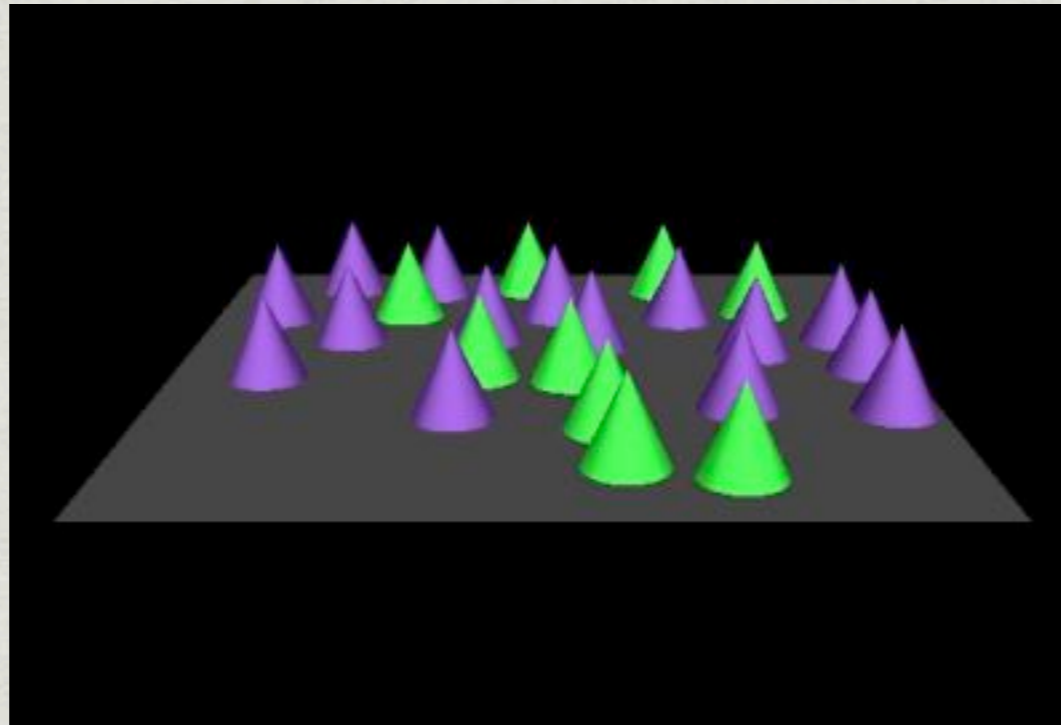
[HTTP://WWW.FLICKR.COM/PHOTOS/CLOUDSOUP/494542407/](http://www.flickr.com/photos/cloudsoup/494542407/)

ANNOTATION

```
((:AGENT 'CAT)
(:OBJECT 'MAT)
(:OBJECT 'FLOOR)
(:ACTION 'CAT 'SITTING)
(:RELATION :ON 'CAT 'MAT)
(:RELATION :ON 'MAT 'FLOOR))
```

Building the Sentence-Scene corpus

- * Option 2:
 - * Develop controlled environment that is automatically annotated
 - * Hire people to talk about the environment and record the language



[HTTP://WWW.MEDIA.MIT.EDU/COGMAC/PROJECTS/BISHOP.HTML](http://www.media.mit.edu/cogmac/projects/bishop.html)

Building the Sentence-Scene corpus

- * Option 3:
 - * Develop controlled environment that is automatically annotated
 - * Give the environment away for free



[HTTP://WWW.WUBBLE-WORLD.COM/IMAGES/SCREENSHOTS/SCREENSHOT2.PNG](http://www.wubble-world.com/images/screenshots/screenshot2.png)



[HTTP://WEB.MEDIA.MIT.EDU/~JORKIN/RESTAURANT/](http://web.media.mit.edu/~jorkin/restaurant/)

Why Games?

Precedent



[HTTP://WWW.WORLDOFWARcraft.COM/DOWNLOADS/SSOTD/#1386](http://www.worldofwarcraft.com/downloads/ssotd/#1386)

Precedent

**TIME TO REACH LEVEL 60
~10 DAYS 12 HOURS**



Precedent

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**TIME TO REACH LEVEL 70
BURNING CRUSADE**



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WRATH OF THE LICH KING**



Precedent

**TIME TO REACH LEVEL 60
~10 DAYS 12 HOURS**

**TIME TO REACH LEVEL 70
BURNING CRUSADE**

**TIME TO REACH LEVEL 80
WRATH OF THE LICH KING**

756 HOURS!



Precedent



[HTTP://WWW.GWAP.COM](http://www.gwap.com)

Why Children?

- * Cheap labor
- * Existing successful games
 - * Virtual pets games (Dogz™)
 - * Club Penguin™
- * Intrinsic desire to teach



Wubble World

The wheel in the sky keeps on turning...

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Welcome

February 8th, 2008

Wubble World is a fun place to meet new friends and play creative games. Wubbles are curious and intelligent creatures, as you'll find out when you teach your very own Wubble about the world it lives in. Wubble World consists of a series of different mini-games that you play. Sometimes you will be playing with your Wubble, while at other times you will be playing with other children through the internet. By cooperating with your teammates or your wubble you can succeed and ultimately win each different mini-game. If you enjoy Wubble World, we would love to hear about it.

Email us at wubbleworld@gmail.com.

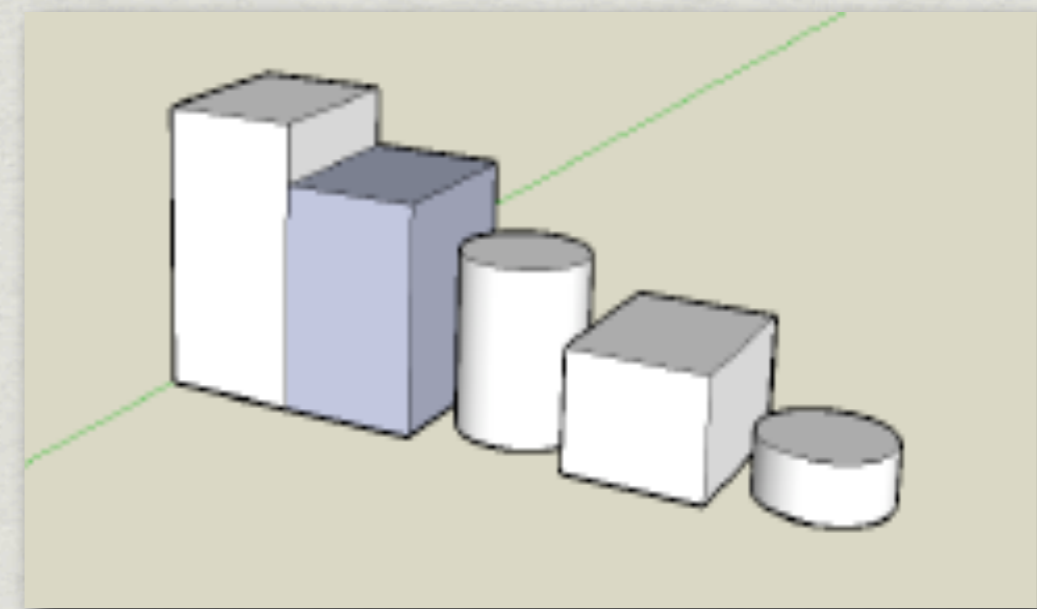
[HTTP://WWW.WUBBLE-WORLD.COM](http://www.wubble-world.com)

Learning Language in Wubble World

ENVIRONMENT



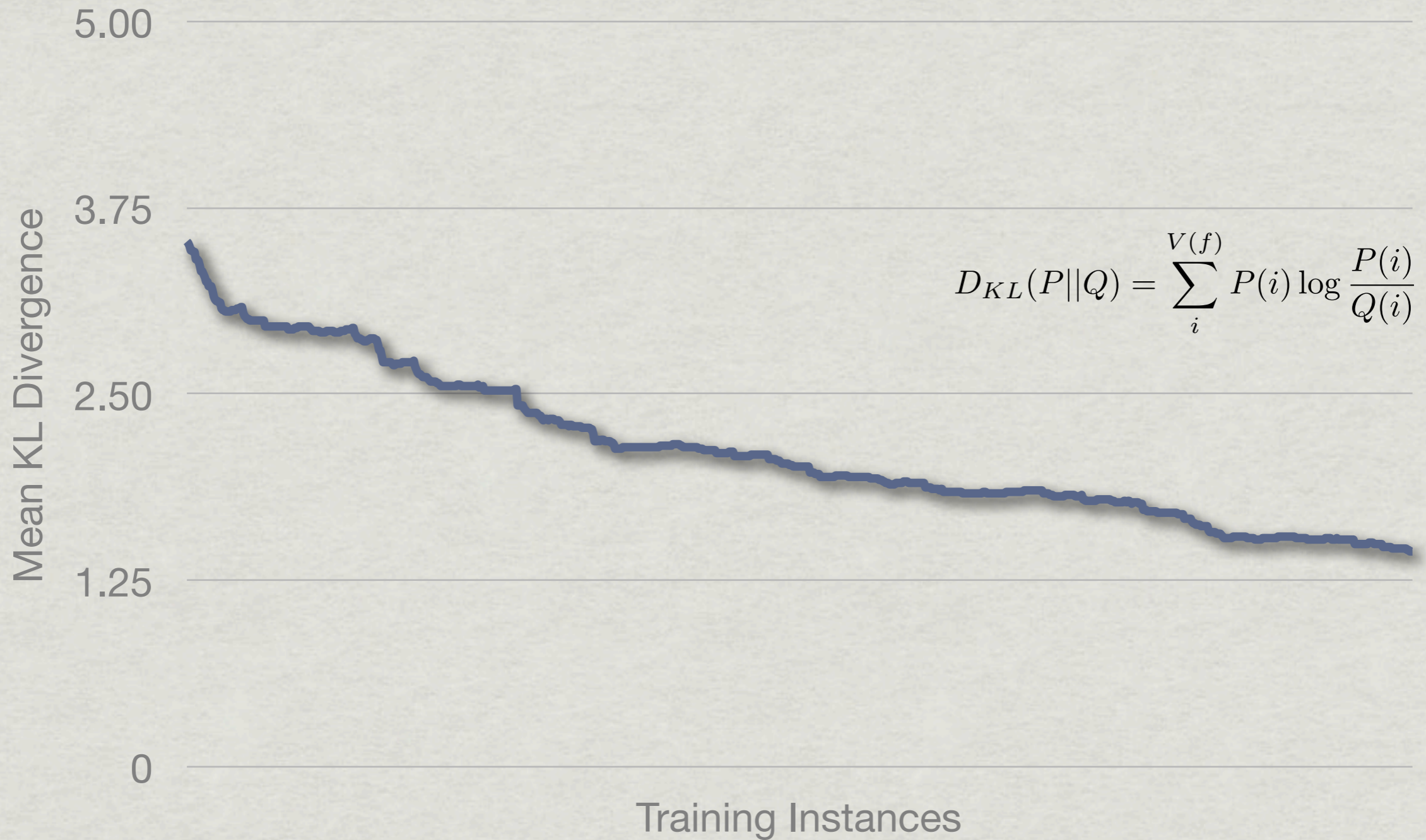
GOALS



INTERACTION

YOU: GO TO THE RED CUBE
WUBBLE: WHAT'S THE RED CUBE?
YOU: <POINTS TO THE RED CUBE>
YOU: GO TO THE BLUE CUBE
WUBBLE: WHAT'S THE BLUE CUBE?
YOU: <POINT TO THE BLUE CUBE>

Results



Summary

- * Successes

- * Fun environment for kids to play games and provide training data for NLP
 - * If you build it, they will come (probably).
- * Learned (shallow) meanings of nouns, adjectives, and prepositions.

- * Failures

- * Games are only fun for about 2 hours
- * Word learning is shallow
- * Unable to learn verb semantics
- * No cognitive architecture
 - * Control paradigm clunky
 - * Unable to reuse learned information in a coherent way

Future of Wubble World

- * Soar cognitive architecture
- * Verb learning
- * More games!!!

Current Project

- ✱ Wubble World 2D



SUBJECTS WERE SHOWN A 2 MINUTE SHORT MOVIE AND THEN ASKED TO WRITE A STORY THAT DESCRIBED THE MOVIE.



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HEIDER AND SIMMEL FOUND THAT MOST SUBJECTS USED RICH LANGUAGE IN THE STORIES.

(1) A MAN HAS PLANNED TO MEET A GIRL AND THE GIRL COMES ALONG WITH ANOTHER MAN. THE FIRST MAN TELLS THE SECOND TO GO; THE SECOND TELLS THE FIRST, AND HE SHAKES HIS HEAD. THEN THE TWO MEN HAVE A FIGHT, AND THE GIRL STARTS TO GO INTO THE ROOM TO GET OUT OF THE WAY AND HESITATES AND FINALLY GOES IN. SHE APPARENTLY DOES NOT WANT TO BE WITH THE FIRST MAN. THE FIRST MAN FOLLOWS HER INTO THE ROOM AFTER HAVING LEFT THE SECOND IN A RATHER WEAKENED CONDITION LEANING ON THE WALL OUTSIDE THE ROOM. THE GIRL GETS WORRIED AND RACES FROM ONE CORNER TO THE OTHER IN THE FAR PART OF THE ROOM. MAN NUMBER ONE, AFTER BEING RATHER SILENT FOR A WHILE, MAKES SEVERAL APPROACHES AT HER; BUT SHE GETS TO THE CORNER ACROSS FROM THE DOOR, JUST AS MAN NUMBER TWO IS TRYING TO OPEN IT. HE EVIDENTLY GOT BANGED AROUND AND IS STILL WEAK FROM HIS EFFORTS TO OPEN THE DOOR. THE GIRL GETS OUT OF THE ROOM IN A SUDDEN DASH JUST AS MAN NUMBER TWO GETS THE DOOR OPEN. THE TWO CHASE AROUND THE OUTSIDE OF THE ROOM TOGETHER, FOLLOWED BY MAN NUMBER ONE. BUT THEY FINALLY ELUDE HIM AND GET AWAY. THE FIRST MAN GOES BACK AND TRIES TO OPEN HIS DOOR, BUT HE IS SO BLINDED BY RAGE AND FRUSTRATION THAT HE CANNOT OPEN IT. SO HE BUTTS IT OPEN AND IN A REALLY MAD DASH AROUND THE ROOM HE BREAKS IN FIRST ONE WALL AND THEN ANOTHER

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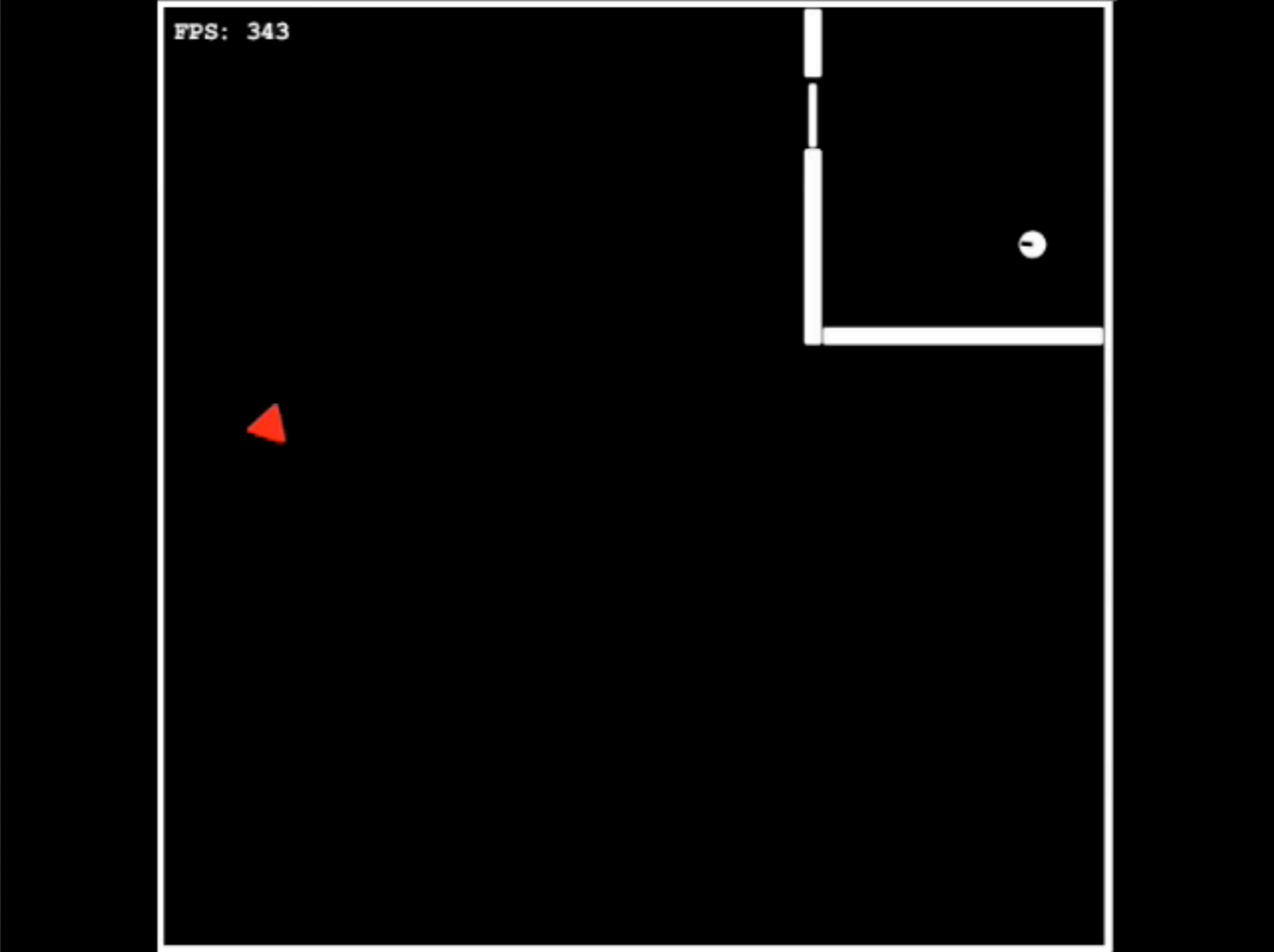
Questions?

Additional Slides

Wubble World 2D

Goals

- * Build a physics simulator in 2D
- * Connect simulator to a cognitive architecture (Soar)
- * Make scripts for movies like Heider & Simmel
- * Code agents in Soar that will perform the actions in the script
 - * Be mindful of intentional state explicitly encoded into the state of the agents
- * Record and present movies to experimental subjects
- * Collect and release the results
 - * Language paired with scenes



CLASSIC HORROR MOVIE PLOT SYNOPSIS

THE MOVIE OPENS WITH THE GIRL (REPRESENTED AS A CIRCLE) PACING IN A ROOM IN THE UPPER RIGHT CORNER OF THE MOVIE. THE MAN (REPRESENTED AS A TRIANGLE) ENTERS FROM BOTTOM LEFT AND BEGINS MOVING TO THE ROOM THAT CONTAINS THE GIRL.

THE MAN REACHES THE DOOR, OPENS IT AND MOVES INSIDE. AS THE DOOR IS OPENING THE GIRL TURNS AND FACES THE DIRECTION OF THE DOOR AS IF IT MADE A SOUND. CLEARLY SHE IS SURPRISED BY THE INTRUDER. HE CONTINUES TO APPROACH HER NOW THAT HE CAN SEE HER AND AS HE GETS CLOSER, THE GIRL CAN BE SEEN MOVING BACK AND FORTH. ONCE HE REACHES A CRITICAL POINT, THE GIRL TAKES OFF RUNNING AROUND HIM AND BOLTS FOR THE DOOR.

SHE RUNS OUT OF THE ROOM AND CONTINUES TO RUN AWAY. THE MAN GIVES CHASE BUT IS VISIBLY SLOWER THAN THE GIRL. AT ONE POINT, THE GIRL STOPS AND LOOKS BEHIND HER TO SEE IF HE CONTINUES TO GIVE CHASE. OF COURSE HE DOES AND THE GIRL TAKES OFF AGAIN.

Key Features

- * Learning Algorithms
 - * Don't need to be perfect
- * Movies
 - * Don't have to capture all aspects of certain words