



# MADLY AMBIGUOUS: A GAME FOR LEARNING ABOUT STRUCTURAL AMBIGUITY AND WHY IT'S HARD FOR COMPUTERS

Ajda Gokcen, Ethan Hill, Michael White

## INTRODUCTION & MOTIVATION

Accessible at: <http://madlyambiguous.osu.edu>

- **Madly Ambiguous** is an open source, in-browser **online game** aimed at teaching audiences of all ages about **structural ambiguity** and some of the difficulties it poses for natural language processing
- Developed as an **outreach** component of a project whose aim is to develop methods for avoiding ambiguity in natural language generation and for using **disambiguating paraphrases** to crowd source interpretations of structurally ambiguous sentences
- Made for the **Language Pod** at **COSI**, which had no general audience demos that dealt with **syntax-related linguistic phenomena**

## INTERFACE

Complete the following sentence  
with a **Noun Phrase**  
like "**meatballs**" or "**a silver fork**" or "**my friend Joe**",  
making sure to picture what it means to you.  
Then I'll take my best guess at your intended meaning!

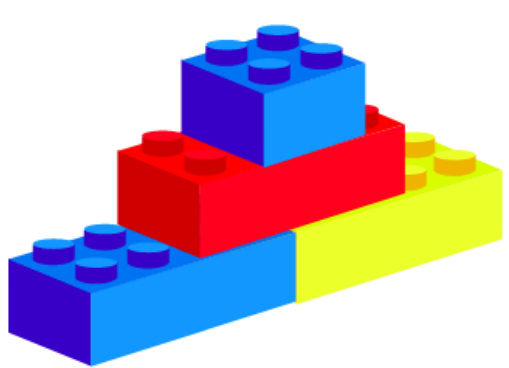
Jane ate spaghetti with

- Users first read an **introduction** to structural ambiguity and to the rules of the game, in which they will try to trick the computer
- Users are then challenged to **fill in the blank** in the sentence, "Jane ate spaghetti with \_\_\_."
- The system guesses whether the filled-in content is intended as a **utensil, part, manner, or company**; the user confirms or denies
- Finally, users read an **explanation** of the NLP behind the system

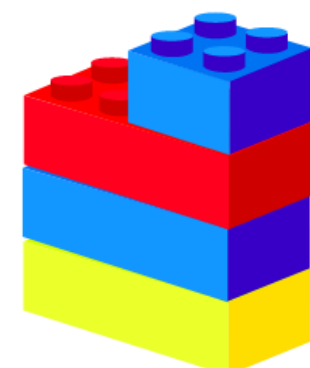
## EDUCATIONAL & ILLUSTRATIVE COMPONENTS

Illustrations are a central component of making the game accessible to all ages. Some are more generally explanatory (*left*), while others humorously show the ridiculous interpretations of the sentences (*center*). All explanations are narrated by **Mr. Computer Head** (*right*), who challenges users to trick him by completing the sentence in a way that he will misinterpret.

Another kind of ambiguity is called **structural ambiguity**.  
The confusion doesn't come from words with multiple meanings,  
but instead from different ways the parts of the sentence can be put together.



Same pieces . . .



. . . different shapes!



Ouch – that's a little TOO al dente!



In advanced mode, I take advantage of **word embeddings** trained on about 100 billion words of Google News text using a tool called **word2vec**.

## NLP

The system uses **two methods** of guessing the interpretation:

- **Basic mode**, a traditional rule-based approach, uses part-of-speech tagging, lemmatization, and **WordNet**
- **Advanced mode**, closer to the state-of-the-art, uses clusters of **word embeddings**

## FEEDBACK

- Demo went live online in Summer 2017, with widespread **community** feedback as well as **classroom** usage
- Users go to great lengths to win, coming up with **creative** examples like "*a cucumber dressed as a person*"

## ACKNOWLEDGMENTS