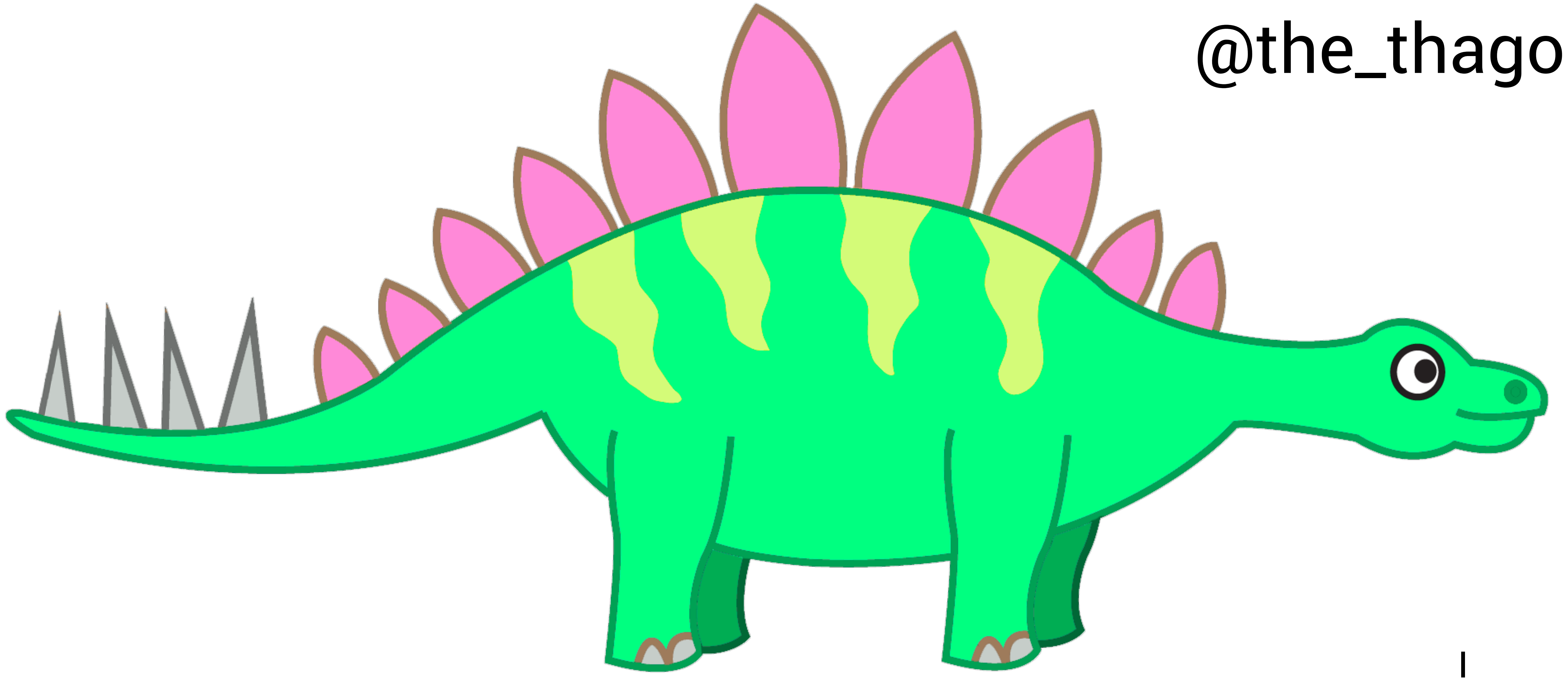
NLP For Rubyists

Aja Hammerly
@the_thagomizer

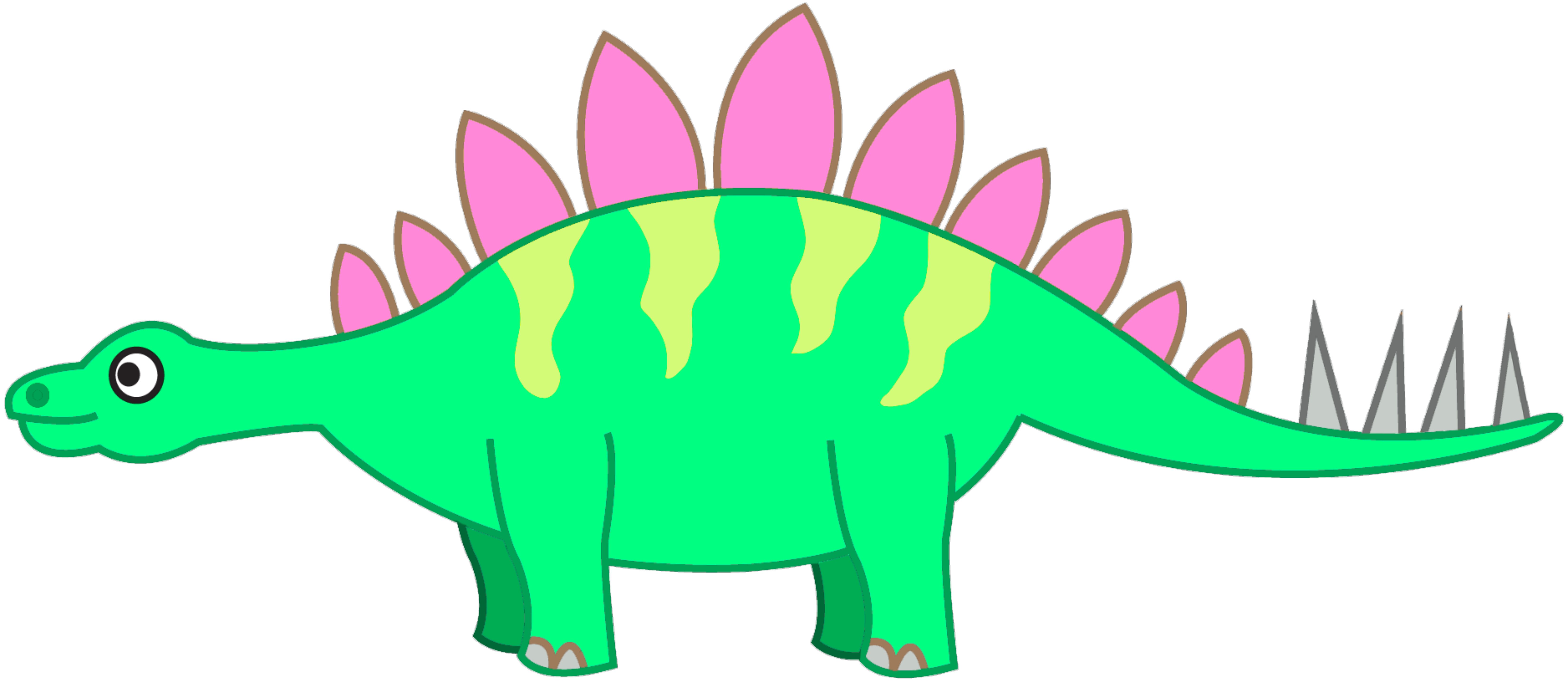


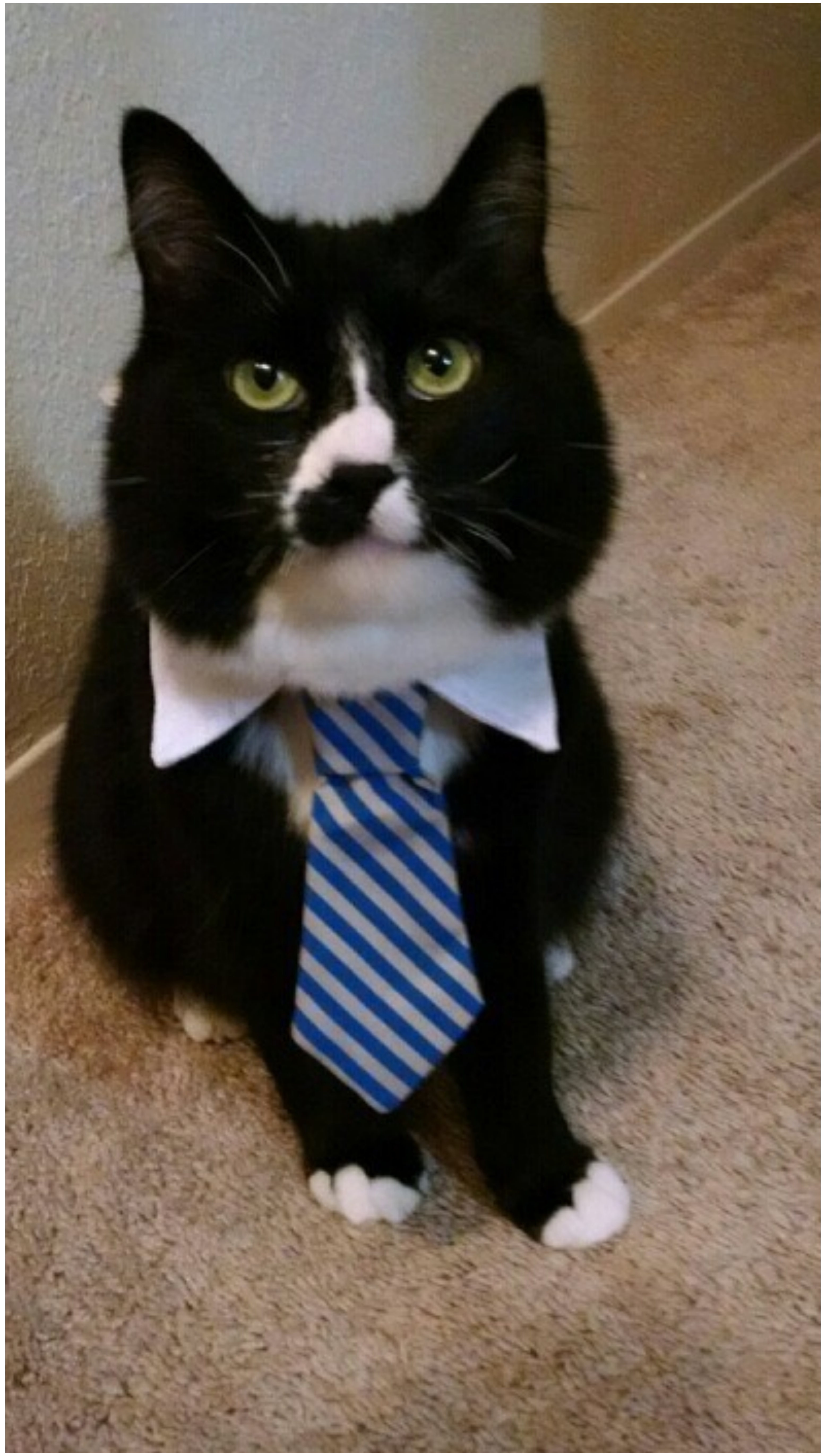
Aja Hammerly

http://github.com/thagomizer

@the_thagomizer

http://www.thagomizer.com





Lawyer Cat Says:

Any code is copyright Google and licensed Apache V2

Google Cloud Platform

NLP?!?!

Natural **L**anguage **P**rocessing

Natural language processing (NLP) is a field of computer science, artificial intelligence, and computational linguistics concerned with the interactions between computers and human (natural) languages and, in particular, concerned with programming computers to fruitfully process large natural language corpora.

- Wikipedia

Teaching computers to understand (and ideally respond to) human languages.
- Aja

Why Should I Care?

It Is Already Here

Better User Experience

@the_thagomizer

Accessibility

Improved Understanding

Assist Us

Hard

Why Is This Hard?

English Is Horrible

Seal

North Carolina

Their

There

They’re

Love

English is **Horrible**

All Human Languages Are Horrible

No Computational Grammar

EASTON

I’m Starving

You look freezing.

Unique

Computers Suck at Sarcasm

Sure, I'd ***love*** to.

Why Is This Hard?

History

Leibniz & Descartes

The Turing Test

ELIZA

Chat Bots

Show Me The Codes

Impractical

Twitter

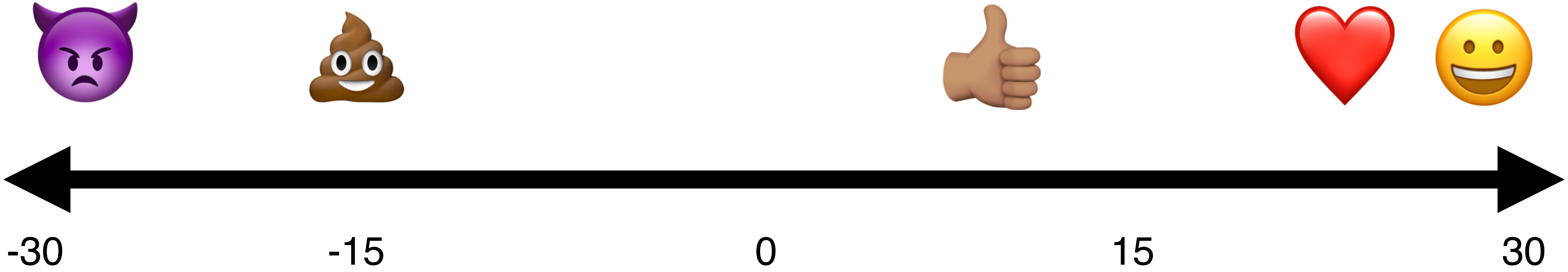
110% More Bad Ideas

Worst. Ideas. Evar.

AT SCALE

sen·ti·ment a·nal·y·sis (noun)

the process of computationally identifying and categorizing opinions expressed in a piece of text, especially in order to determine whether the writer's attitude towards a particular topic, product, etc., is positive, negative, or neutral.



@the_thagomizer

Google Cloud Natural Language API

```
gem install google-cloud language
```

```
require "google/cloud/language"
language = Google::Cloud::Language.new

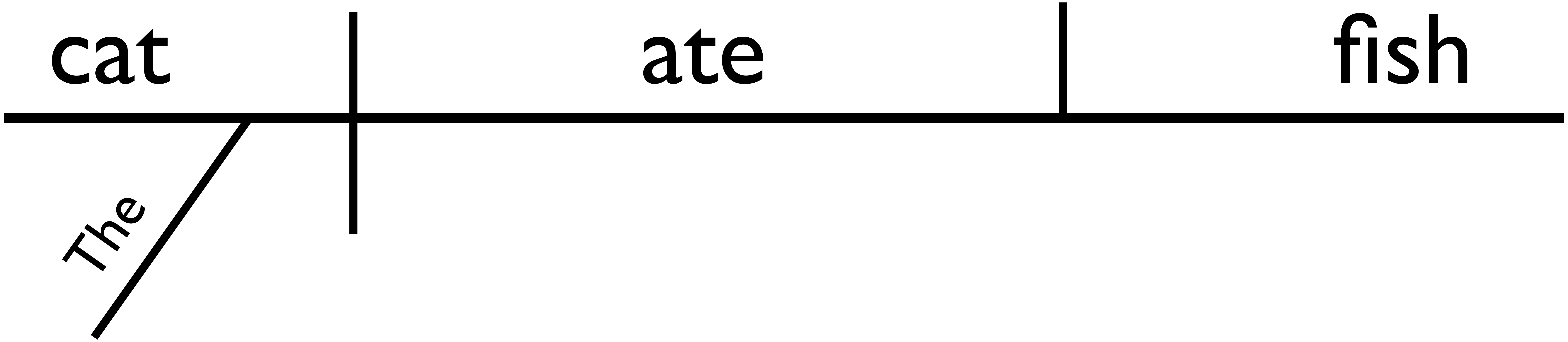
def analyze tweet
  document  = language.document tweet
  sentiment = document.sentiment
  sentiment.score
end
```

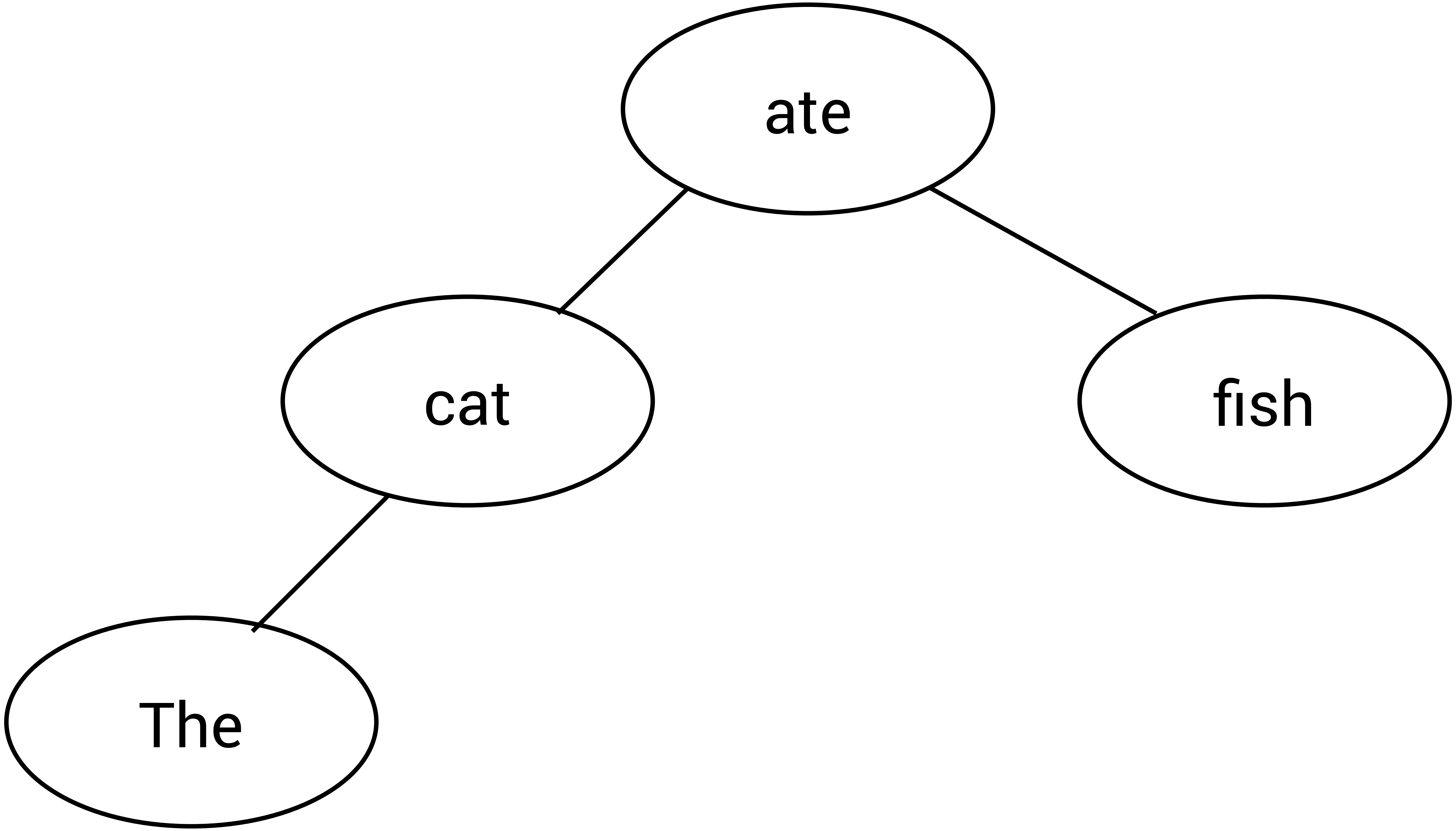
Hand Wave

Demo

#railsconf

Sentence Diagramming


cat
ate
fish
The


ate
cat
fish
The

Eww! Grammar.

Side Quest!!!!

Grammar 101

Parts of Speech

Verb

Action

State of Being

Noun

Person

Place

@the_thagomizer

Thing

@the_thagomizer

Idea

Adjective

Attributes

Compare

Article

Determiner

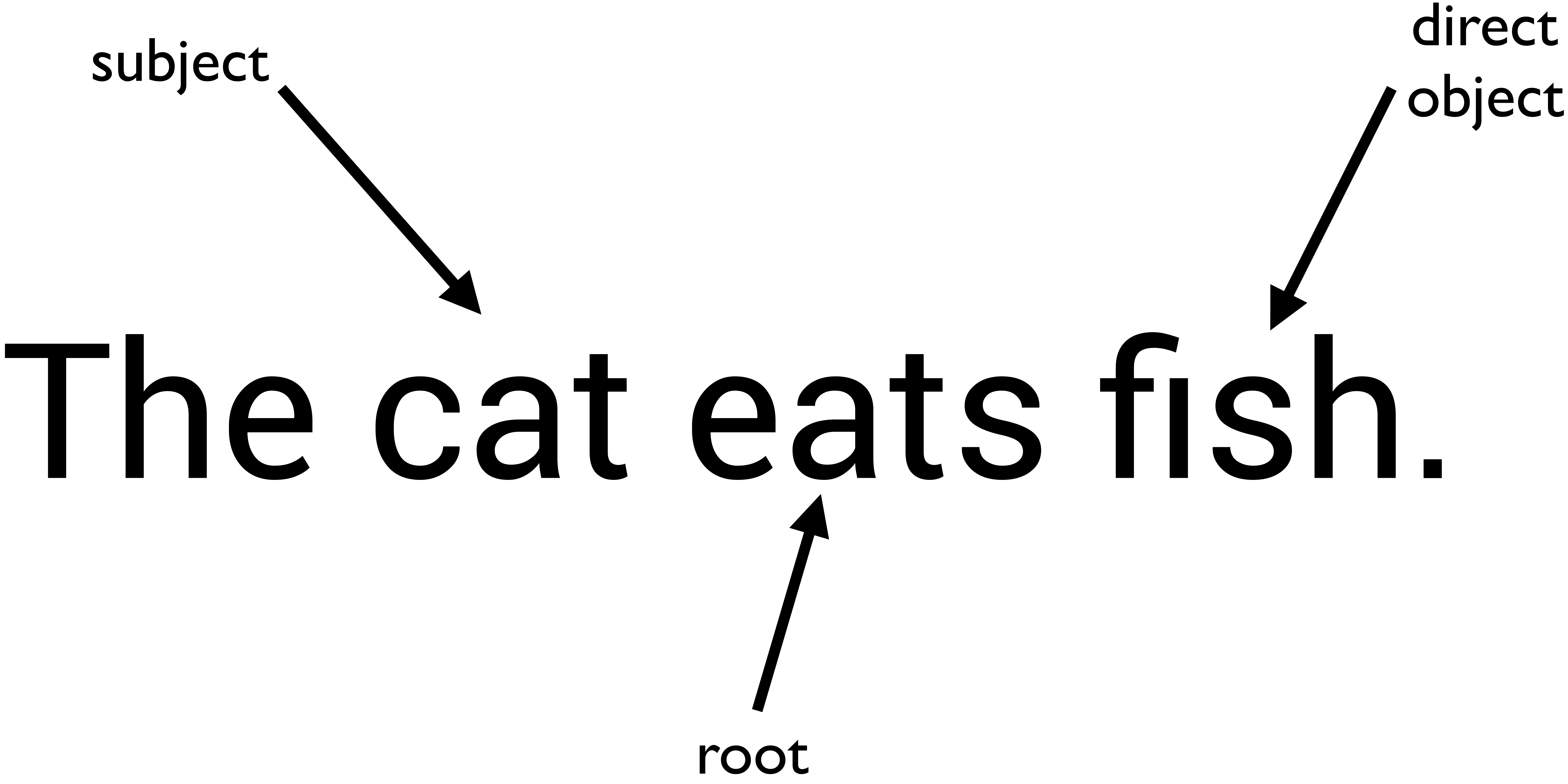
Parts of a Sentence

Root

Subject

Direct Object

The cat eats fish.



subject

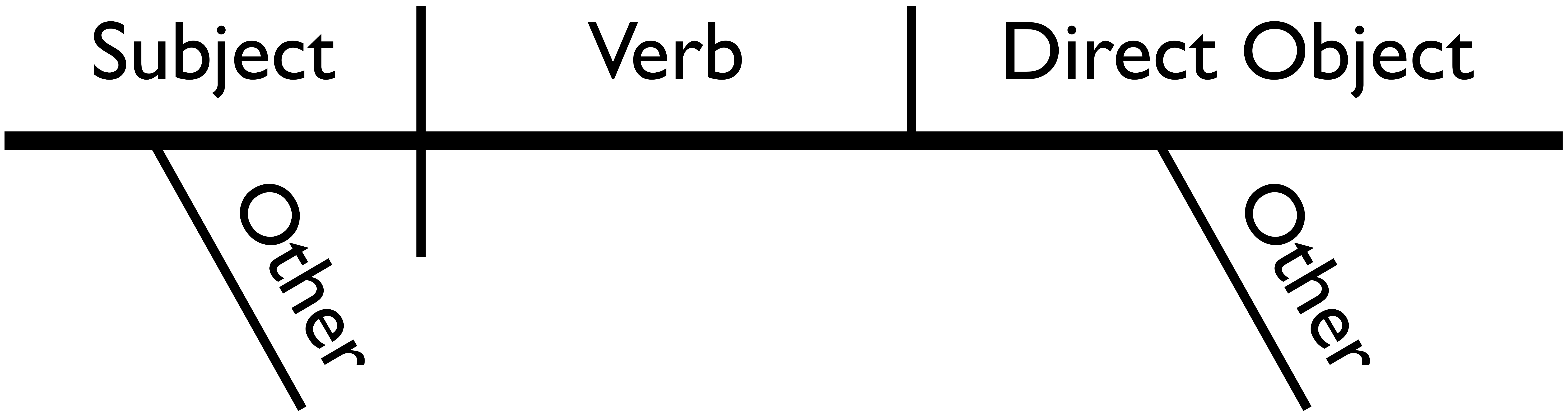
direct object

The cat eats fish.

root

Side Quest Complete

Sentence Diagramming


Subject
Verb
Direct Object
Other
Other

Syntax

```
require "google/cloud/language"
l = Google::Cloud::Language.new

d = l.document("The cat ate fish.")

s = d.syntax
puts s.tokens
```

```
<Google::Cloud::Language::Annotation::Token:0x007fb86d0909c0
 @head_token_index=2,
 @label=:NSUBJ,
 @lemma="cat",
 @part_of_speech=
  #<Google::Cloud::Language::Annotation::PartOfSpeech:0x007fb86d090a10
   @aspect=:ASPECT_UNKNOWN,
   @case=:CASE_UNKNOWN,
   @form=:FORM_UNKNOWN,
   @gender=:GENDER_UNKNOWN,
   @mood=:MOOD_UNKNOWN,
   @number=:SINGULAR,
   @person=:PERSON_UNKNOWN,
   @proper=:PROPER_UNKNOWN,
   @reciprocity=:RECIPROCITY_UNKNOWN,
   @tag=:NOUN,
   @tense=:TENSE_UNKNOWN,
   @voice=:VOICE_UNKNOWN>,
 @text_span=
  #<Google::Cloud::Language::Annotation::TextSpan:0x007fb86d090a60
   @offset=4,
   @text="cat">>
```

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 @label=:NSUBJ,
 @lemma="cat",
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   @aspect=:ASPECT_UNKNOWN,
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   @gender=:GENDER_UNKNOWN,
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   @tense=:TENSE_UNKNOWN,
   @voice=:VOICE_UNKNOWN>,
 @text_span=
  #<Google::Cloud::Language::Annotation::TextSpan:0x007fb86d090a60
   @offset=4,
   @text="cat">>
```

```ruby
require "google/cloud/language"

language = Google::Cloud::Language.new

syn = language.document("The cat ate fish.").syntax

subj = syn.tokens.find { |t| t.label == :NSUBJ }.text_span.text
verb = syn.tokens.find { |t| t.label == :ROOT }.text_span.text


puts "#{subj} | #{verb}"
puts "----------------"
puts "#{" " * subj.size} |"
```

```ruby
require "google/cloud/language"

l = Google::Cloud::Language.new

syn = l.document("The cat ate fish.").syntax

subj = syn.tokens.find { |t| t.label == :NSUBJ }.text_span.text
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verb = syn.tokens.find { |t| t.label == :ROOT }.text_span.text


puts "#{subj} | #{verb}"
puts "----------------"
puts "#{" " * subj.size} |"
```

```
cat | ate
-----------
    |
subj = syn.tokens.find { |t| t.label == :NSUBJ }.text_span.text
verb = syn.tokens.find { |t| t.label == :ROOT }.text_span.text
dobj = syn.tokens.find { |t| t.label == :DOBJ }.text_span.text

puts "#{subj} | #{verb} | #{dobj}"
puts "#{"-" * (subj.size + verb.size + dobj.size + 7)}"
puts "#{" " * subj.size} |"
```

```
cat | ate | fish
----------------
    |
```

The cat eats fish.

```
#<Google::Cloud::Language::Annotation::Token:0x007fc8bb9a25a0
 @head_token_index=1,
 @label=:DET,
 @lemma="The",
 @part_of_speech=
  #<Google::Cloud::Language::Annotation::PartOfSpeech:0x007fc8bb9a2640
   @aspect=:ASPECT_UNKNOWN,
   @case=:CASE_UNKNOWN,
   @form=:FORM_UNKNOWN,
   @gender=:GENDER_UNKNOWN,
   @mood=:MOOD_UNKNOWN,
   @number=:NUMBER_UNKNOWN,
   @person=:PERSON_UNKNOWN,
   @proper=:PROPER_UNKNOWN,
   @reciprocity=:RECIPROCITY_UNKNOWN,
   @tag=:DET,
   @tense=:TENSE_UNKNOWN,
   @voice=:VOICE_UNKNOWN>,
 @text_span=
  #<Google::Cloud::Language::Annotation::TextSpan:0x007fc8bb9a2690
   @offset=0,
   @text="The">>
```

[The,
cat,
eats,
fish,
.]

```
tokens.each do |t|
  if tokens[t.head_token_index] == subj
   print t.text_span.text
  end
end
```

```
cat | ate  | fish
-----------------
The |
```

The cat at the fish with a side of milk.

```
graph
```

```
node(id, label)
```

```
edge(to, from)
```

```ruby
require "google/cloud/language"
require "graph"

l = Google::Cloud::Language.new
tokens = l.document("The cat ate fish.").syntax.tokens

digraph do
  tokens.each_with_index do |t, i|
    node(i, t.text_span.text)
    unless t.head_token_index == i
      edge(i, t.head_token_index)
    end
  end

  save "sentence4", "png"
end
```

```ruby
require "google/cloud/language"
require "graph"

l = Google::Cloud::Language.new
tokens = l.document("The cat ate fish.").syntax.tokens

digraph do
  tokens.each_with_index do |t, i|
    node(i, t.text_span.text)
    unless t.head_token_index == i
      edge(i, t.head_token_index)
    end
  end

  save "sentence4", "png"
end
```

```ruby
require "google/cloud/language"
require "graph"

l = Google::Cloud::Language.new
tokens = l.document("The cat ate fish.").syntax.tokens

digraph do
  tokens.each_with_index do |t, i|
    node(i, t.text_span.text)
    unless t.head_token_index == i
      edge(i, t.head_token_index)
    end
  end

  save "sentence4", "png"
end
```

```
require "google/cloud/language"
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  tokens.each_with_index do |t, i|
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    end
  end

  save "sentence4", "png"
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```

```
require "google/cloud/language"
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    end
  end

  save "sentence4", "png"
end
```
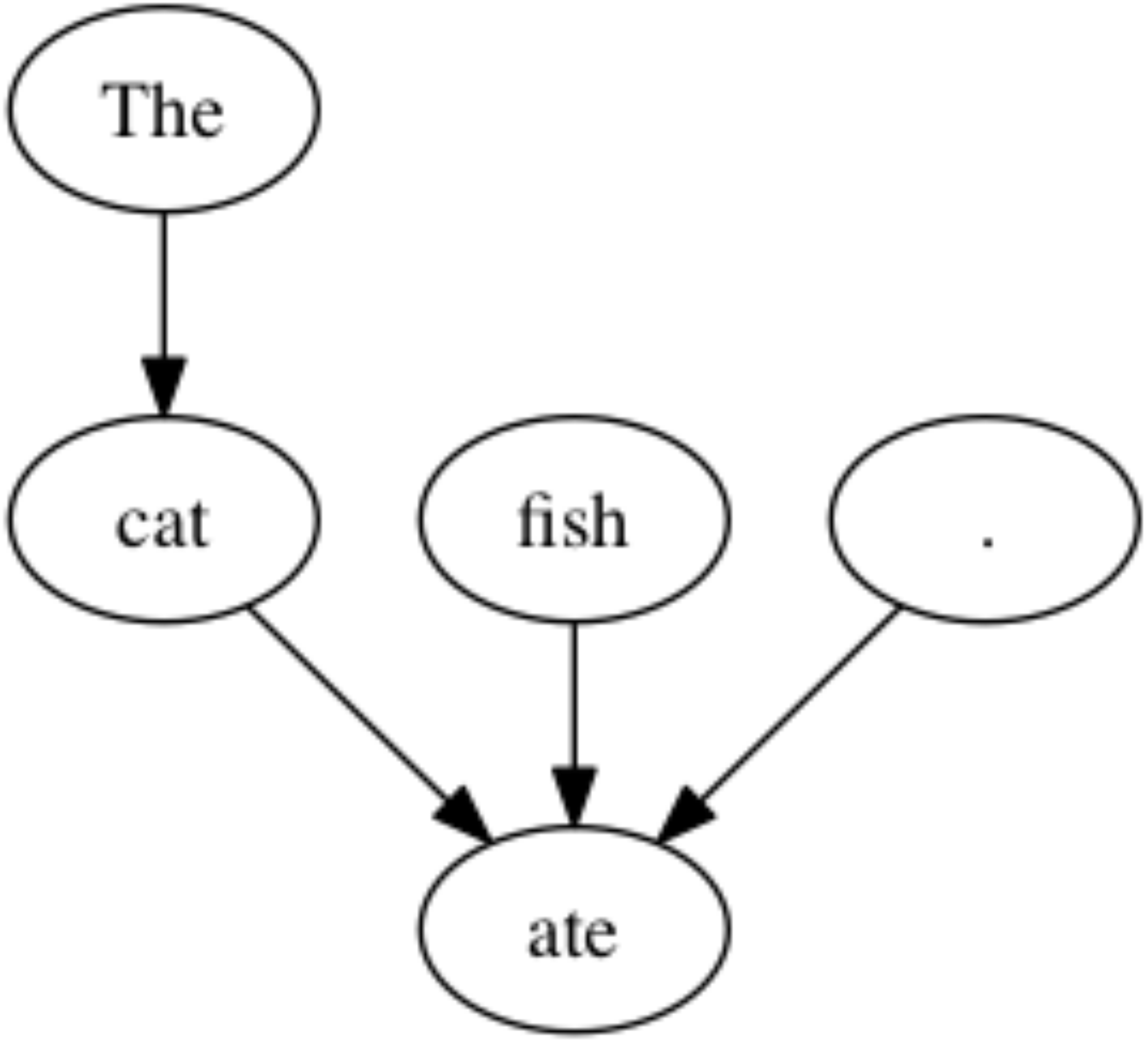
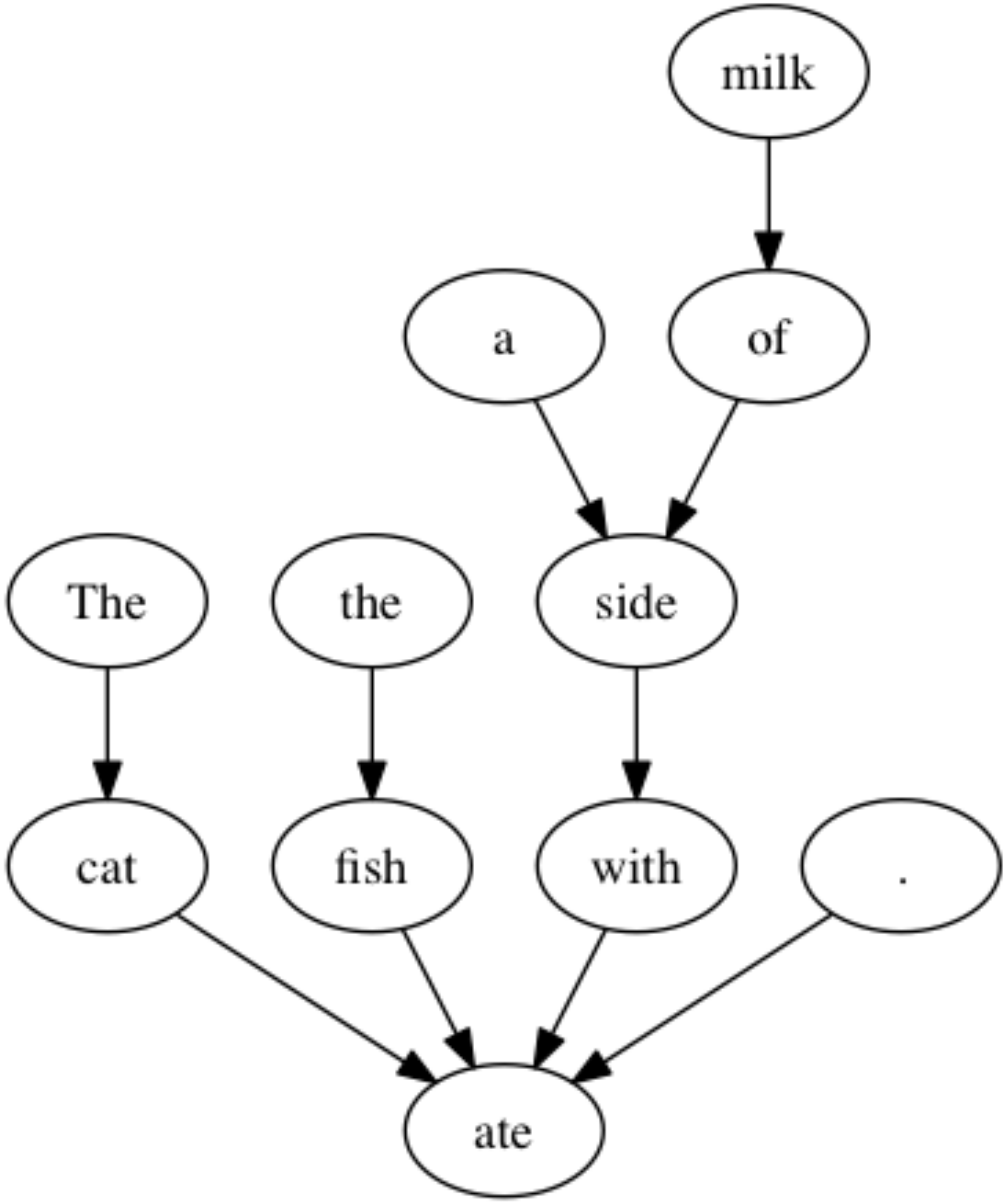


The
cat
fish
.
ate


milk
a
of
The
the
side
cat
fish
with
.
ate

Silly Examples

Practical

Free

Google at RailsConf

- Booth: Codelabs. Stickers. Answers.
- Talks:
  - Google Cloud <3 Ruby (watch on ConFreaks)
  - What’s My App *Really* Doing in Production
    - Thursday @ 3:30 in Rm 156
- Raffle for a Google Home:

Thank You

Questions?