



Everyone is an NLP expert now

Natural Language Processing

Fall 2023

Programming Languages

C, C++, Java, Python, ...

- unambiguous
- fixed (relatively)
- designed
- learnable?
- known simple semantics

Natural Languages

French, English, Korean, Chinese, Tagalog, ...

- ambiguous
- evolving
- transmitted
- learnable
- complex semantics

Why is NLP computationally hard?

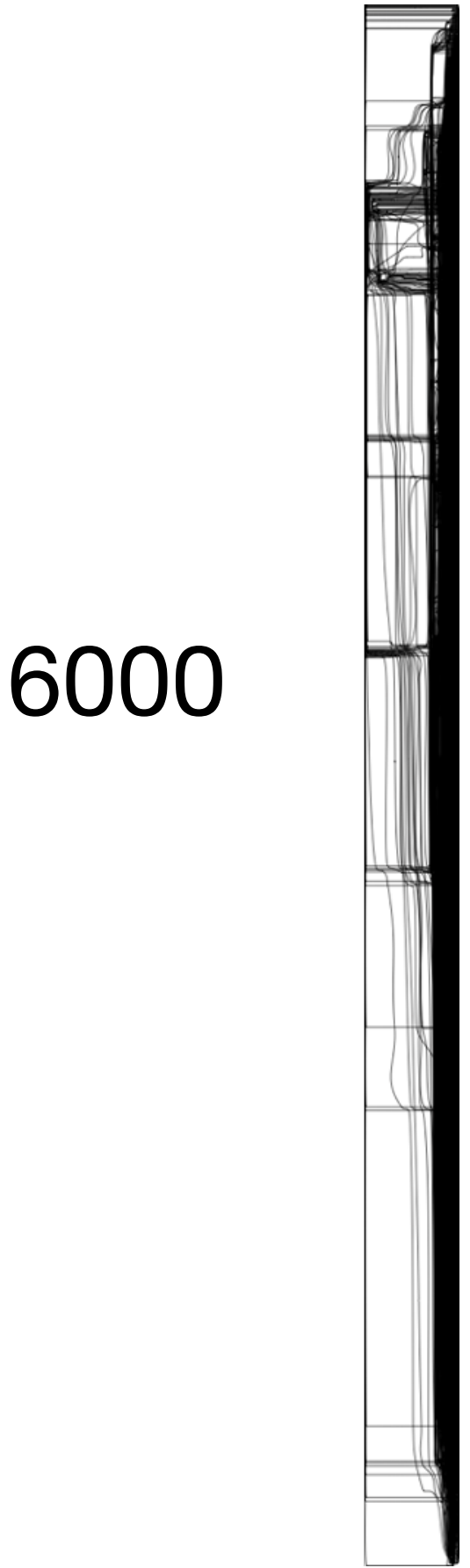
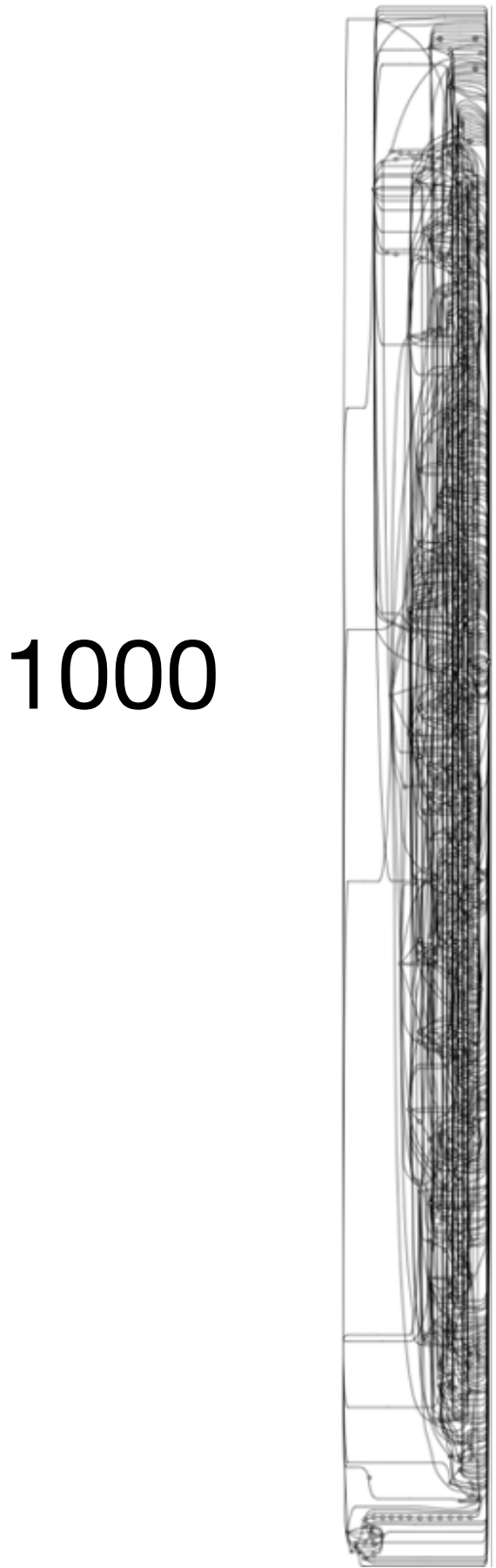
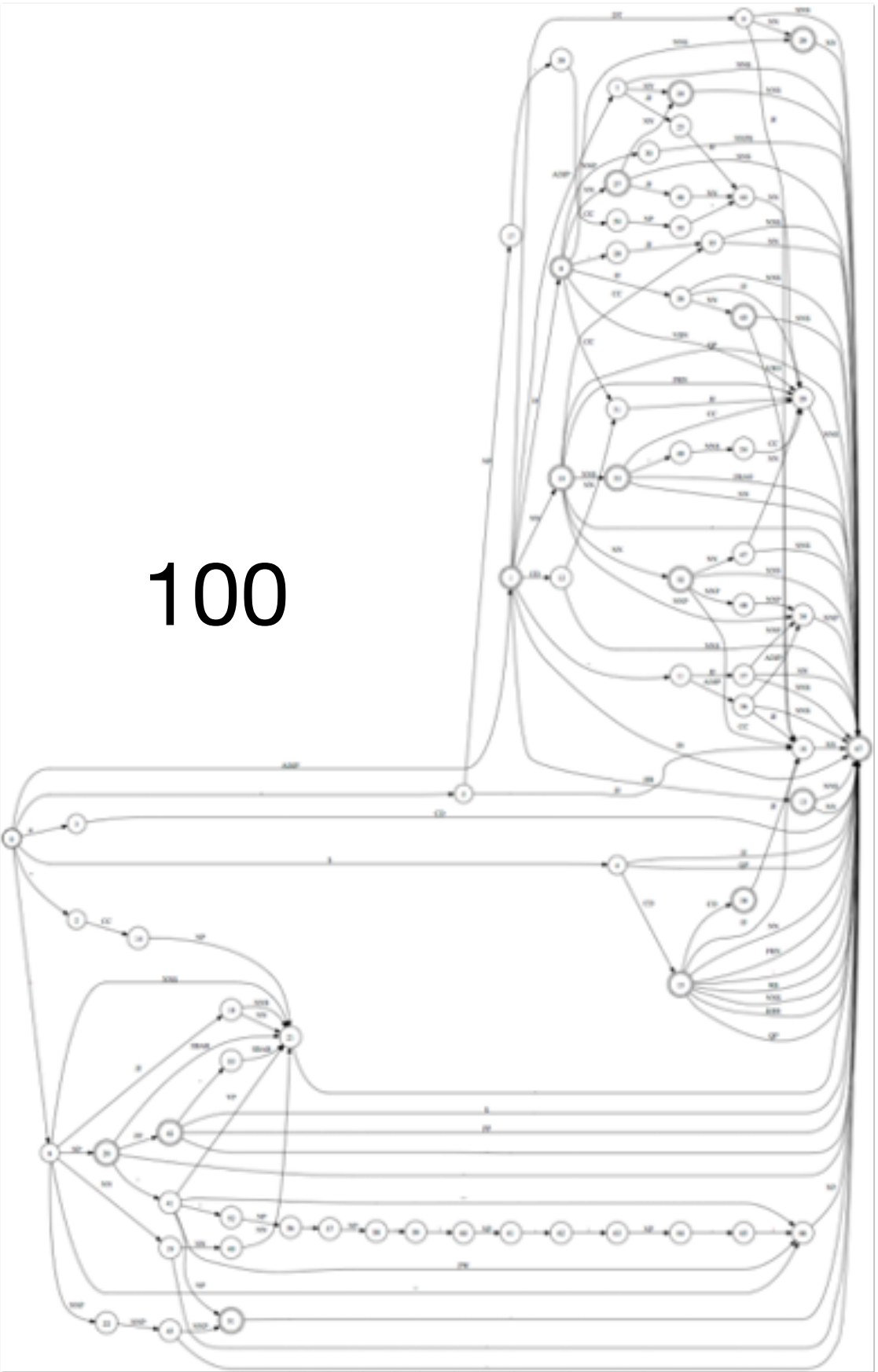
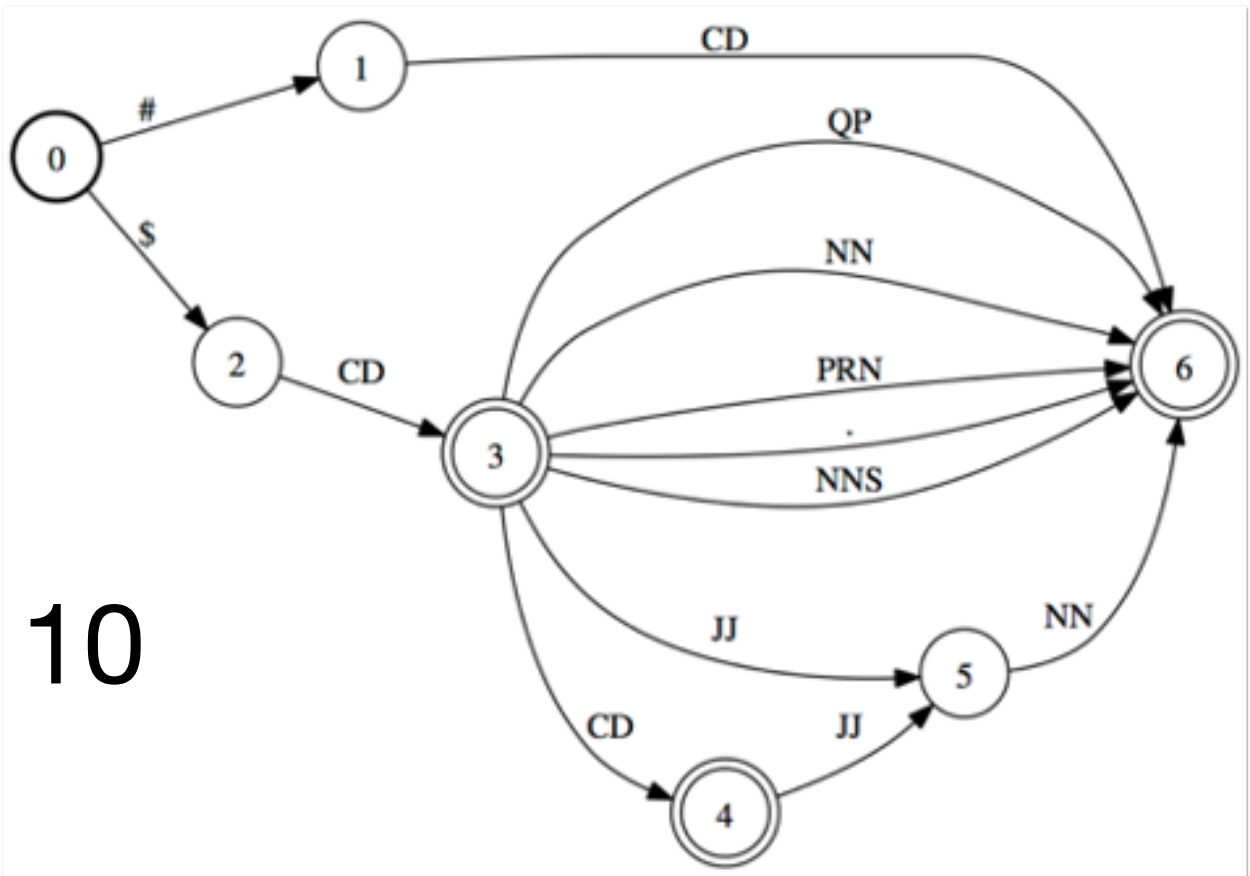
Language is Complex

\$ 3 monthly fee

\$ 1 per-share pricing

✓ \$ number adjective noun

✗ \$ noun number adjective



Language is ambiguous

- Lung cancer in women mushrooms
 - Mushrooms is noun or a verb?
- Ban on nude dancing on governor's desk
 - Similar to “if-then-else” ambiguity
- Island Monks Fly in Satellite to Watch Pope Funeral
 - “get delivery” vs. “fly into space”
- British Left Waffles on Falkland Islands
 - Is it talking about the "British Left" political parties or "Left" as a verb?

Language is ambiguous

The image illustrates the ambiguity of language using Google Translate. It shows two interface snippets. The top snippet shows an English sentence being translated into Korean. The bottom snippet shows the same Korean sentence being translated back into English, but with a different interpretation. A large blue arrow points from the Korean text in the top snippet to the English text in the bottom snippet, highlighting the difference in meaning.

Top Snippet (English to Korean):

English - Detected English Spanish French

The man saw the woman in the park with a telescope ×

[Look up details](#)

50 / 5,000

남자는 공원에서 망원경으로 여자를 보았다. ☆

namjaneun gong-won-eseo mang-wongyeong-eulo yeojaleul boassda.

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Bottom Snippet (Korean to English):

Korean - Detected English Spanish French

남자는 공원에서 망원경으로 여자를 보았다. ×

namjaneun gong-won-eseo mang-wongyeong-eulo yeojaleul boassda.

[Look up details](#)

23 / 5,000

Korean English Spanish

The man looked at the woman through a telescope in the park. ☆

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Language is ambiguous

English - Detected English Spanish French ▾

The man saw the woman in the park with a telescope ×

[Look up details](#)

50 / 5,000

Finnish Korean English ▾

Mies näki naisen puistossa kaukoputkella ☆

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Finnish - Detected English Spanish French ▾

Mies näki naisen puistossa kaukoputkella ×

✦ Did you mean: Mies **näkee** naisen puistossa kaukoputkella

[Look up details](#)

40 / 5,000

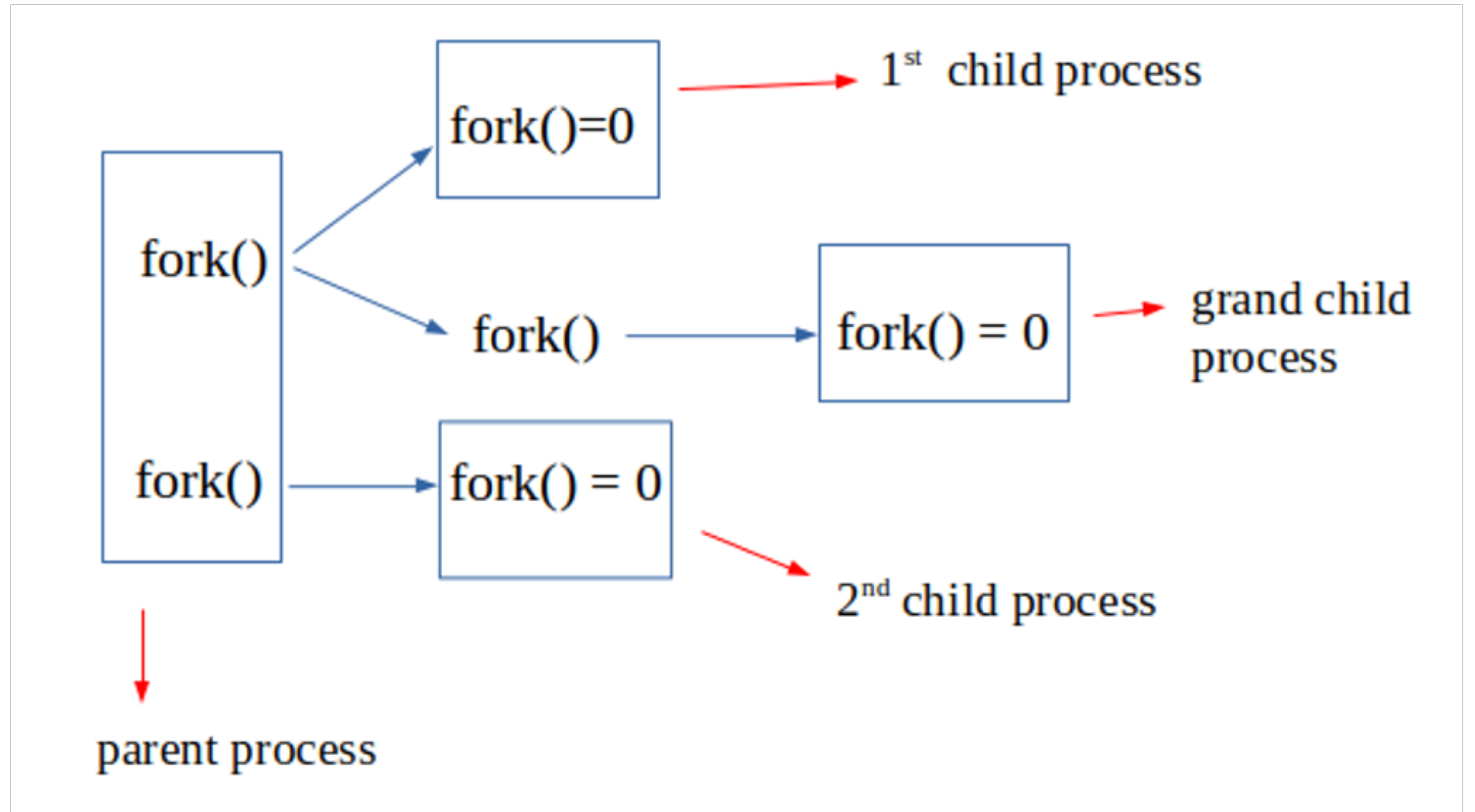
English Korean Spanish ▾

The man saw the woman in the park with binoculars ☆

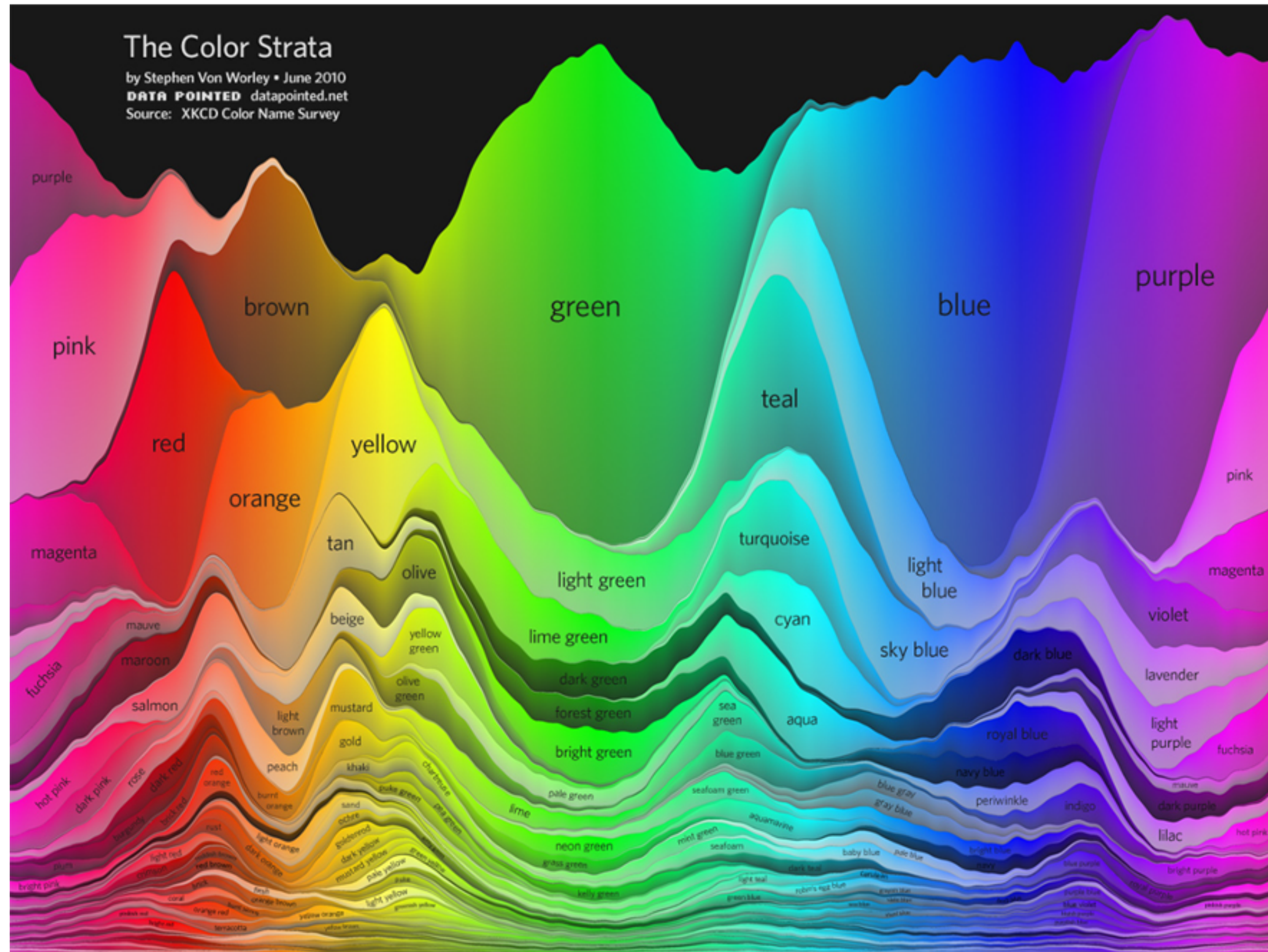
[Look up details](#)

Send feedback

Language is ambiguous



Language is ambiguous



Language is ambiguous





Language is ambiguous

Chinese (Simplified) - DetectedEnglishSpanishFrench


锅

Guō

Look up details







2 / 5,000



EnglishSpanishArabic

pot

Noun 锅 壶 罐 煲 盆 锅子 [Look up details](#)



More translationsExpand all

pan	Noun	锅 杆 平锅	▼
boiler	Noun	锅炉 锅 镬	▼
cauldron	Noun	釜 锅 镬 甑	▼
caldron	Noun	甑 釜 锅	▼
holloware	Noun	锅	▼

Language is ambiguous



Russian author Sasha Sokolov wrote *Between Dog and Wolf*, which had been deemed untranslatable from the original Russian since 1980. Alexander Boguslawski translated the work to English in December 2017.

<https://retrieverman.wordpress.com/2012/09/08/romeo-and-a-yellow-lab/>

<https://www.npr.org/2017/01/28/512199359/between-dog-and-wolf>

Language is ambiguous

- **Google's Computer Might Betters Translation Tool**
 - New York Times March 8, 2010
- **Number of Lothian patients made ill by drinking rockets**
 - Edinburgh Evening News, March 4, 2010
- **Violinist linked to JAL crash blossoms**
 - <https://languagelog.idc.upenn.edu/nll/?p=1693>

Language is contextual

The town councillors refused to give the angry demonstrators a permit because they feared violence.

Who feared violence?

A) the town councillors

B) the angry demonstrators

Language is contextual

The town councillors refused to give the angry demonstrators a permit because they advocated violence.

Who advocated violence?

A) the town councillors

B) the angry demonstrators

Language is contextual

English - Detected English Spanish French

she took the easy way out

[Look up details](#)

25 / 5,000

↔ Finnish English Korean

그녀는 쉬운 길을 택했다

geunyeoneun swiun gil-eul taeghaessda

[Look up details](#)

informal

Send feedback

Language is contextual

English - Detected English Spanish French

her majesty, she took the easy way out

[Look up details](#)

38 / 5,000

↔ Finnish English **Korean**

폐하, 그녀는 쉬운 길을 택했습니다

pyeha, geunyeoneun swiun gil-eul taeghaessseubnida

[Look up details](#)

formal

Send feedback

- Material for these slides comes from ideas borrowed from Angel Chang, Danqi Chen, Karthik Narasimhan and others on the Slack group for teaching NLP