Multilinguality

COMP3361 — Week 11

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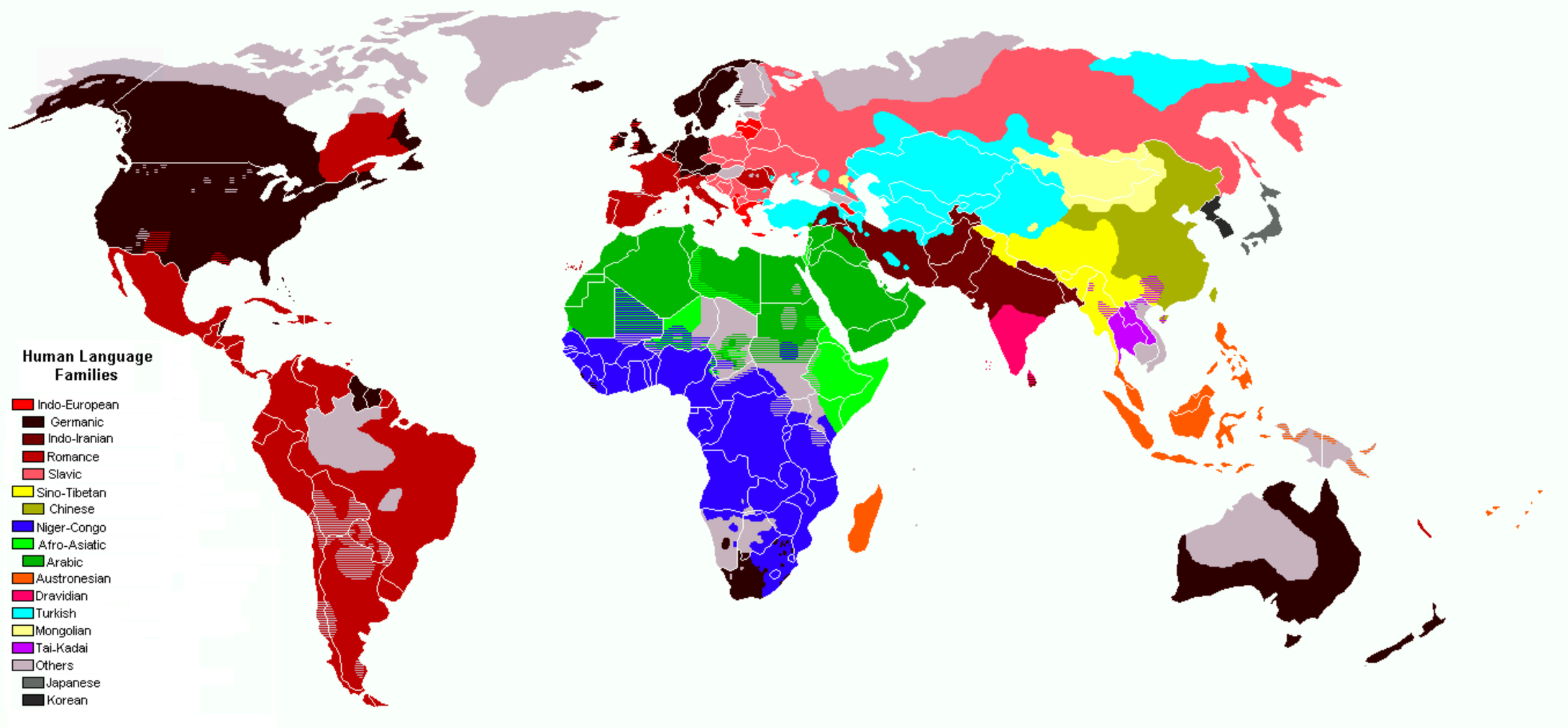
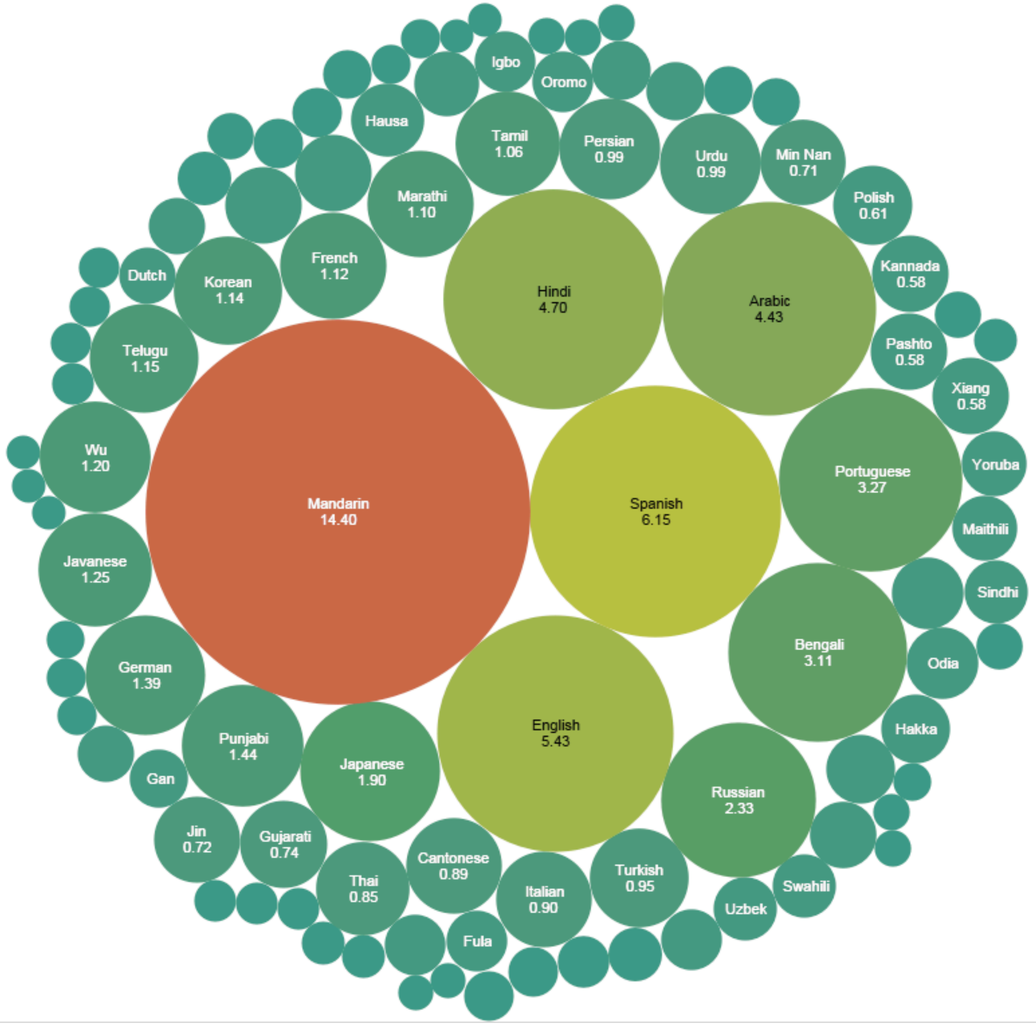
Languages in the World

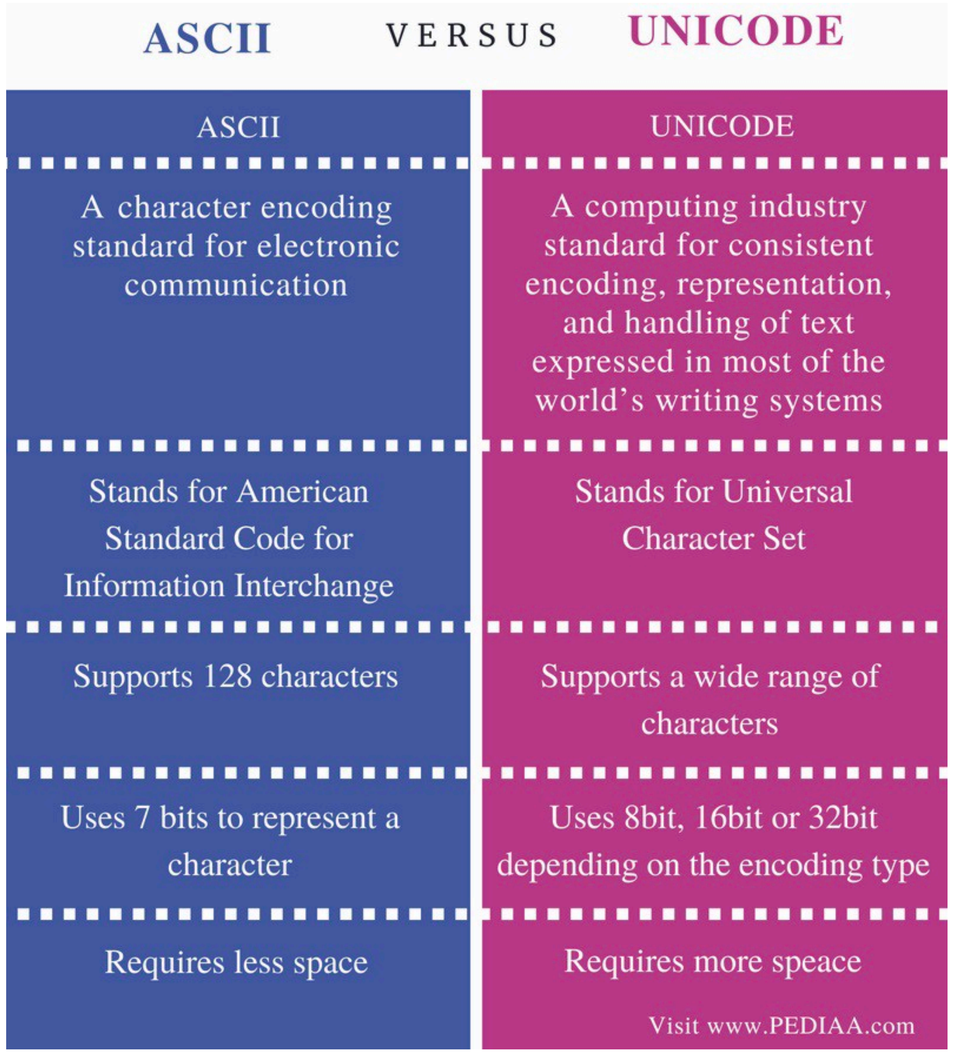


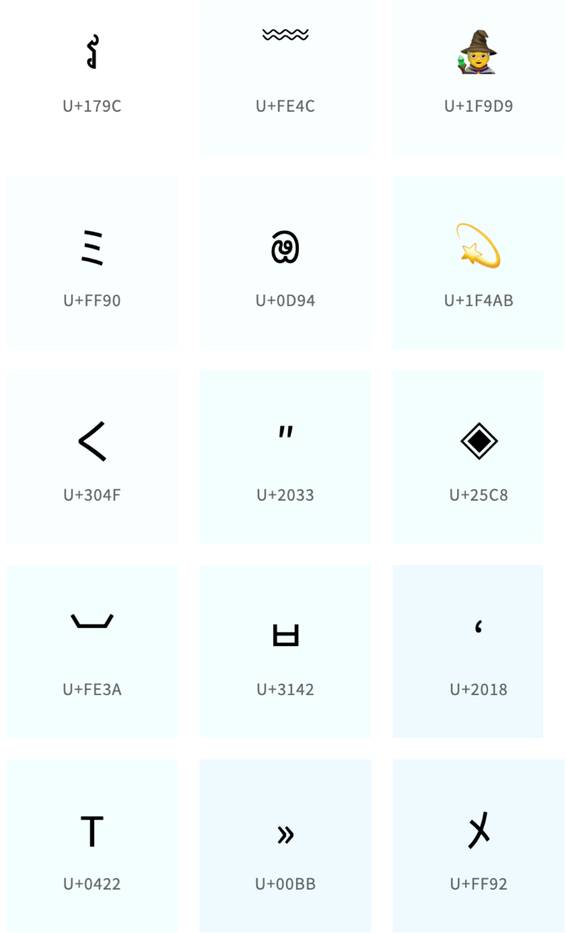
Languages in the World

Rank	Language	Speakers (millions)	Percentage of world pop. (March 2019)[8]	Language family	Branch
1	Mandarin Chinese	918	11.922%	Sino-Tibetan	Sinitic
2	Spanish	480	5.994%	Indo-European	Romance
3	English	379	4.922%	Indo-European	Germanic
4	Hindi (sanskritised Hindustani)[9]	341	4.429%	Indo-European	Indo-Aryan
5	Bengali	300	4.000%	Indo-European	Indo-Aryan
6	Portuguese	221	2.870%	Indo-European	Romance
7	Russian	154	2.000%	Indo-European	Balto-Slavic
8	Japanese	128	1.662%	Japonic	Japanese
9	Western Punjabi[10]	92.7	1.204%	Indo-European	Indo-Aryan
10	Marathi	83.1	1.079%	Indo-European	Indo-Aryan
11	Telugu	82.0	1.065%	Dravidian	South-Central
12	Wu Chinese	81.4	1.057%	Sino-Tibetan	Sinitic
13	Turkish	79.4	1.031%	Turkic	Oghuz
14	Korean	77.3	1.004%	Koreanic	language isolate
15	French	77.2	1.003%	Indo-European	Romance
16	German (only Standard German)	76.1	0.988%	Indo-European	Germanic
17	Vietnamese	76.0	0.987%	Austroasiatic	Vietic
18	Tamil	75.0	0.974%	Dravidian	South
19	Yue Chinese	73.1	0.949%	Sino-Tibetan	Sinitic
20	Urdu (Persianised Hindustani)[9]	68.6	0.891%	Indo-European	Indo-Aryan
21	Javanese	68.3	0.887%	Austronesian	Malayo-Polynesian
22	Italian	64.8	0.842%	Indo-European	Romance
23	Egyptian Arabic	64.6	0.839%	Afroasiatic	Semitic
24	Gujarati	56.4	0.732%	Indo-European	Indo-Aryan
25	Iranian Persian	52.8	0.686%	Indo-European	Iranian



Languages in Computers





Language Identification

That is life	English
C’est la vie	Portuguese
Yahee jeevan hai	Hindi
Bubomi obo	isiXhosa
それが人生です	Japanese

Source: O’Sullivan, towards data science

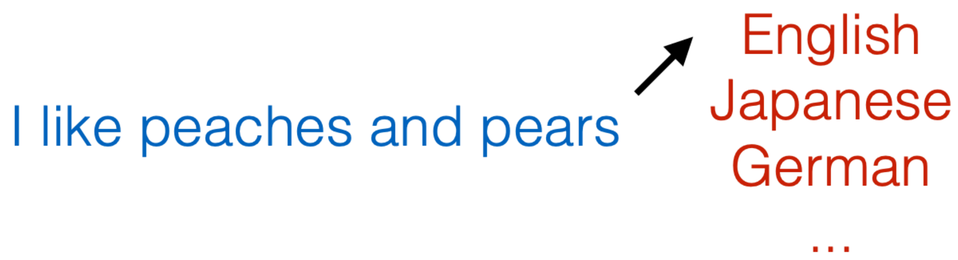
Language Identification

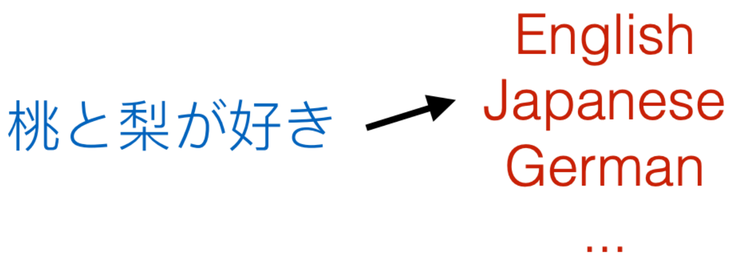
Lexically inspired methods

Language model based methods

勉强　　勉強

Text classification (Machine Learning)





Code-Switching

我真的很appreciate上次你的跟我讲的ideas啊！

to amplify & emphasize

quote

to show identity

habitual expressions

.....

Code-Switching

Newpapers and Wikipedia will not be code-switched

Why care about NLP of non-standard language?

Code-switching is how people actually communicate

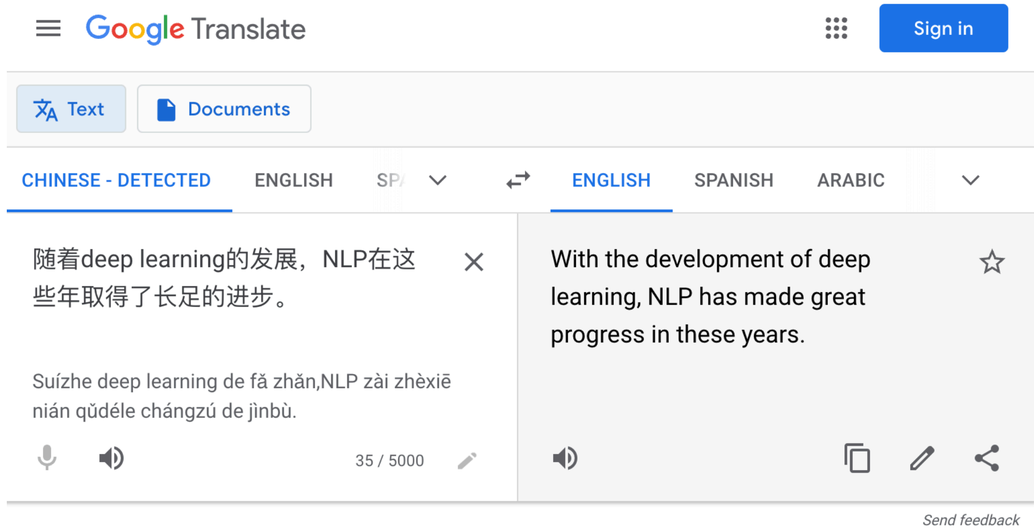
People type in questions to Google/Bing

They talk to call centers

They write their opinions

Use of code-switching can define group membership

People trust code-switched communication better



(Not that it is fake, but its their language and someone developed communication in their language)

Facebook, Amazon, Microsoft, Apple all want to understand Code-switch more

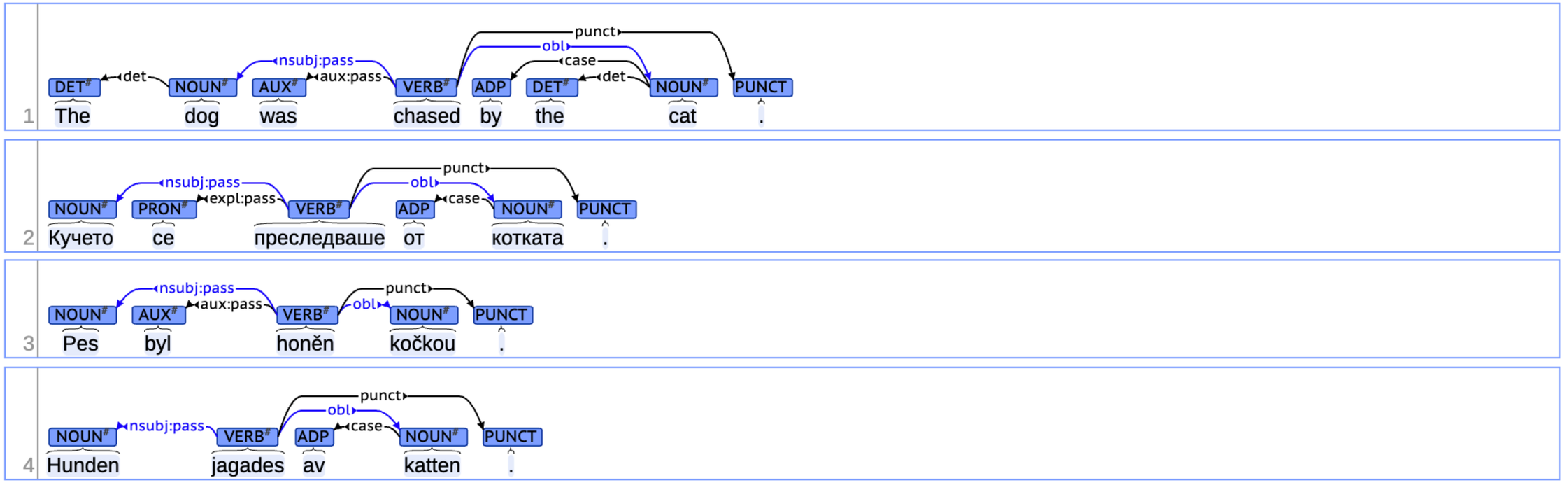
Code-Switching

Techniques:

Very similar to general low-resource language issues:

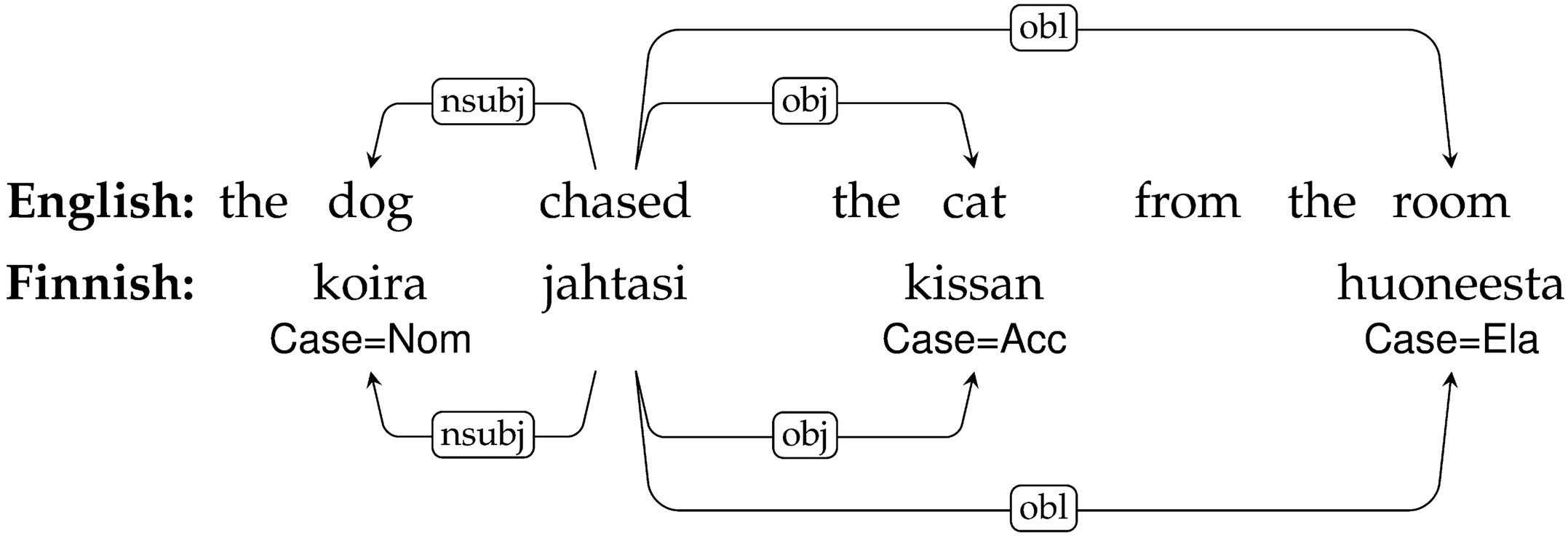
Find appropriate data
Bootstrap labeling
Data argumentation / generation techniques
Find new (reliable) evaluation techniques

Universal Dependencies



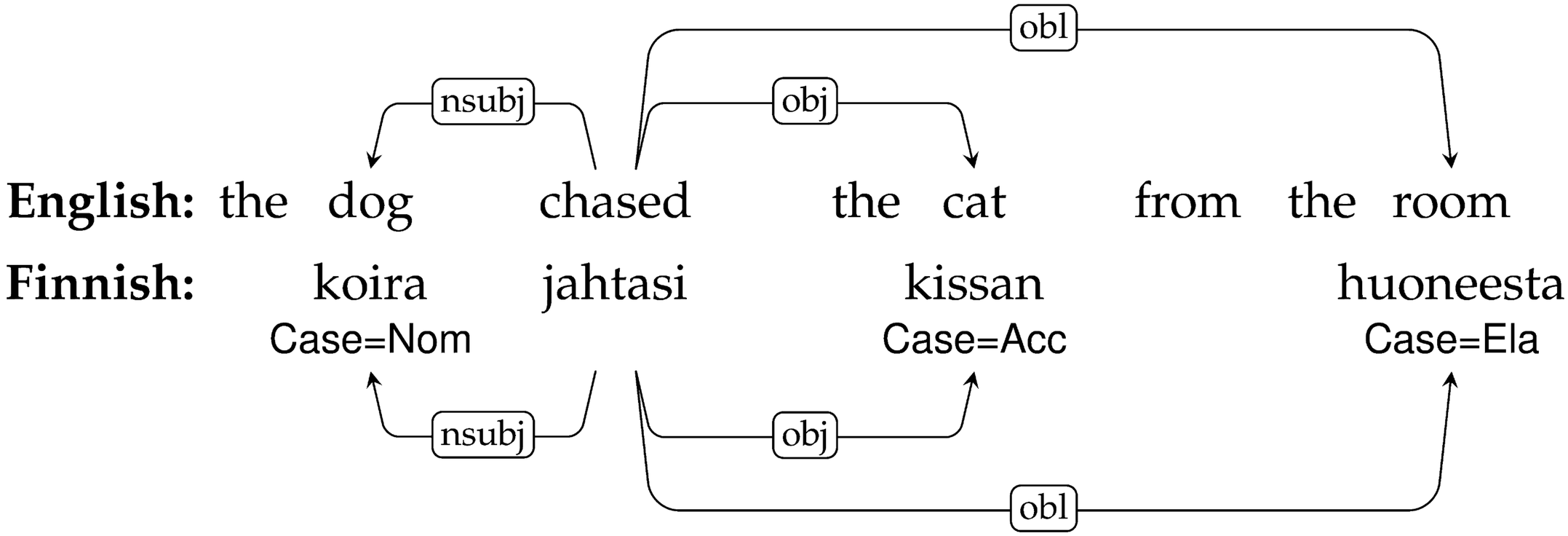
(Marie-Catherine de Marneffe et al., 2021)

Universal Dependencies



(Marie-Catherine de Marneffe et al., 2021)

Universal Dependencies



(Marie-Catherine de Marneffe et al., 2021)

Universal Dependencies

LAS	target language							average
	de	en	es	fr	it	pt	sv	
monolingual	**79.3**	**85.9**	83.7	81.7	88.7	85.7	83.5	84.0
MALOPA	70.4	69.3	72.4	71.1	78.0	74.1	65.4	71.5
+lexical	76.7	82.0	82.7	81.2	87.6	82.1	81.2	81.9
+language ID	78.6	84.2	83.4	**82.4**	**89.1**	84.2	82.6	83.5
+fine-grained POS	78.9	85.4	**84.3**	**82.4**	89.0	**86.2**	**84.5**	**84.3**

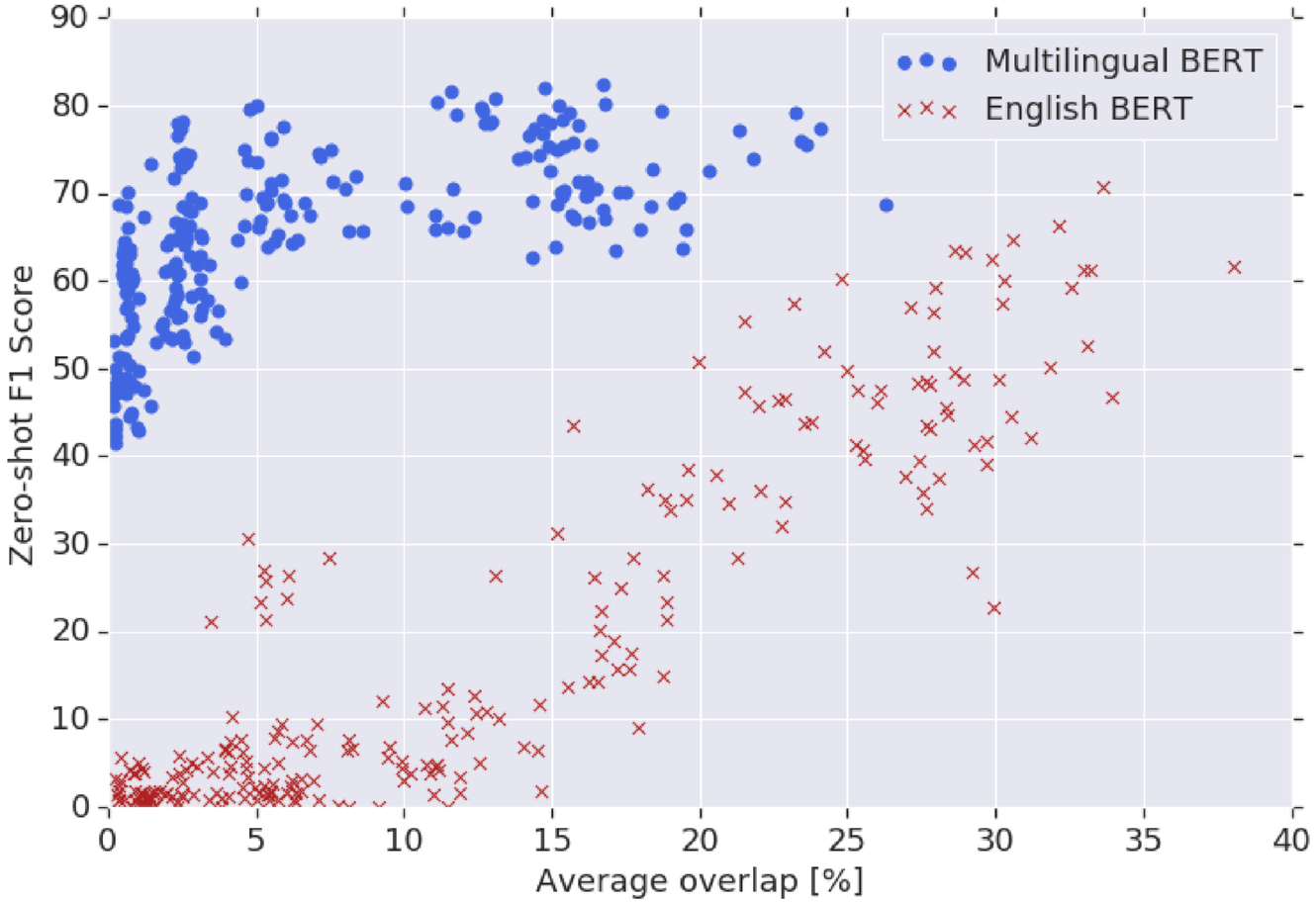
(Many Languages One Parser, Ammar et al., 2016)

Multilingual BERT

Pre-trained from monolingual corpora in 104 languages

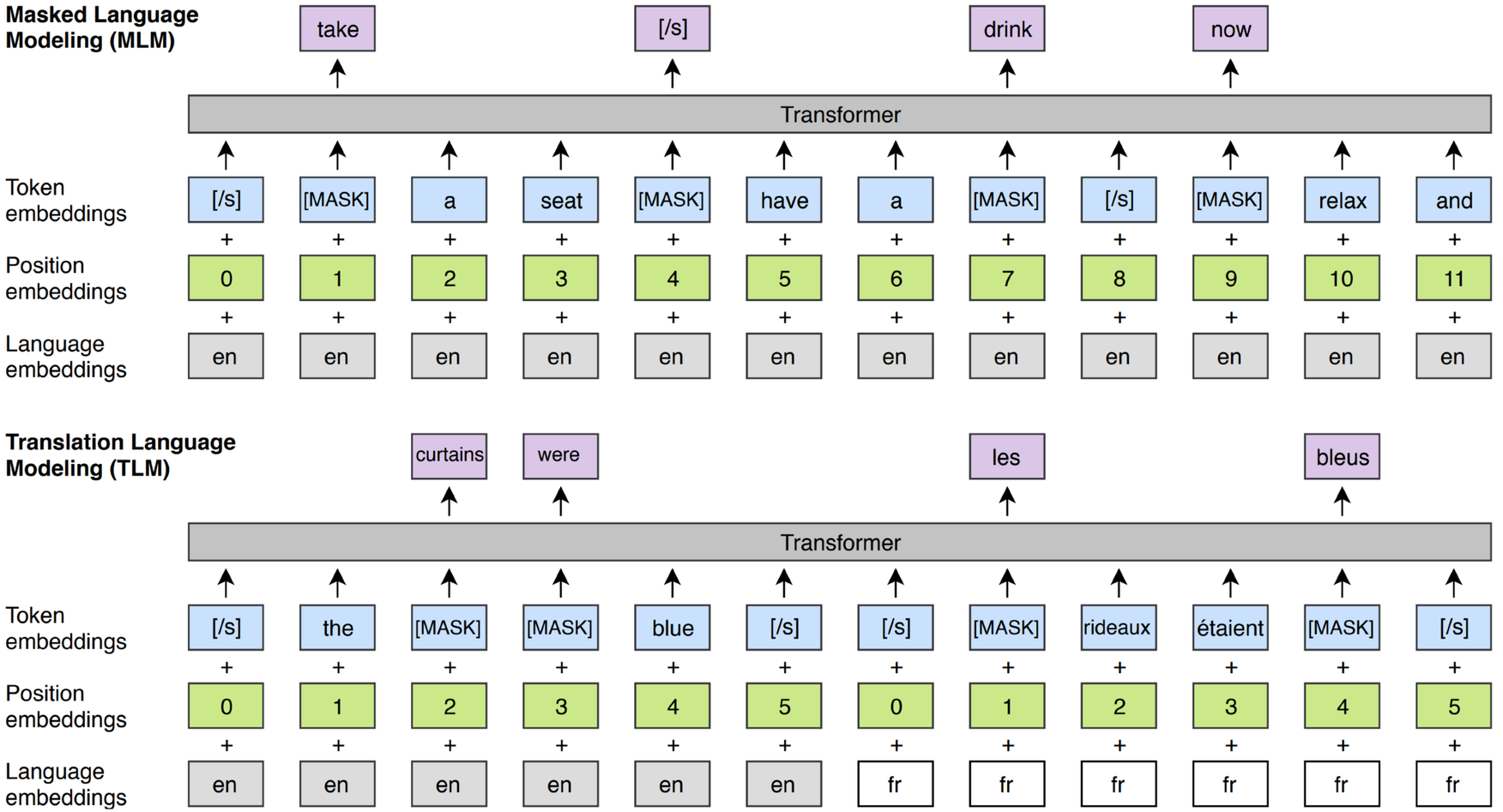
Good at zero shot cross-lingual model transfer:

Fine-tune the model using task-specific supervised training data from one language, and evaluate that task in a different language!



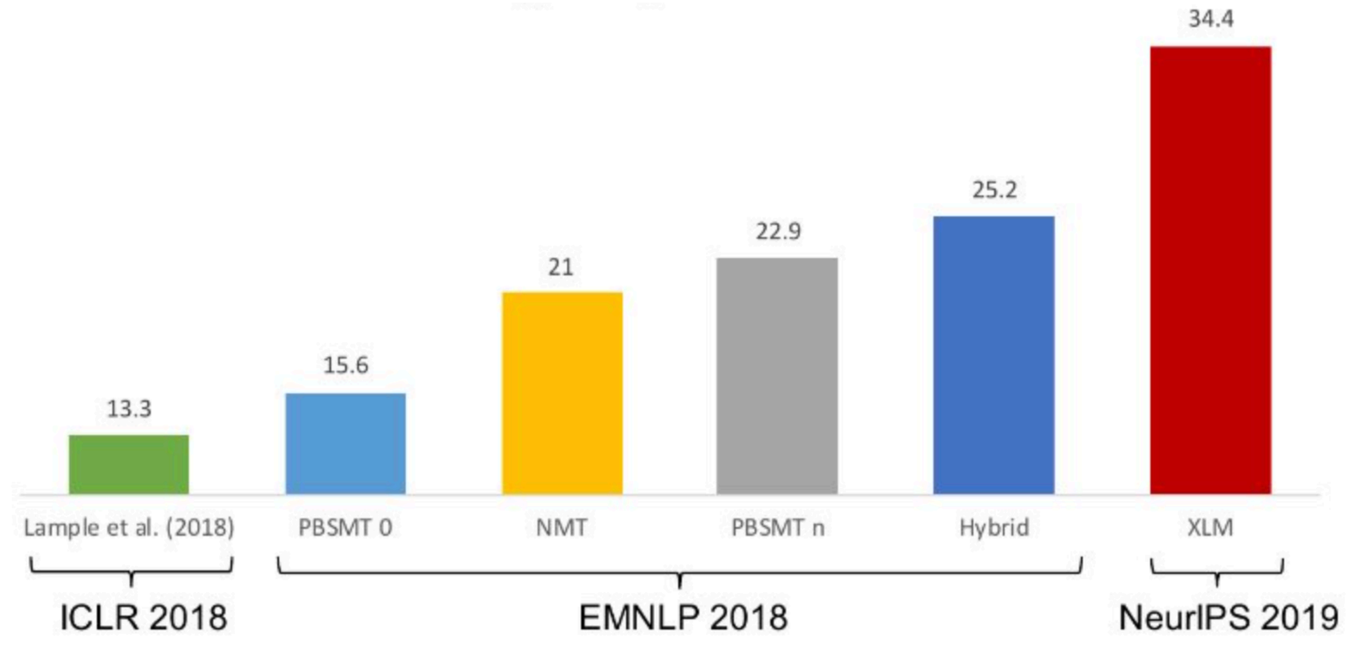
(Devlin et al., 2019; Pires et al., 2019)

Cross-lingual Language Model Pretraining



(Lample and Conneau, 2019)

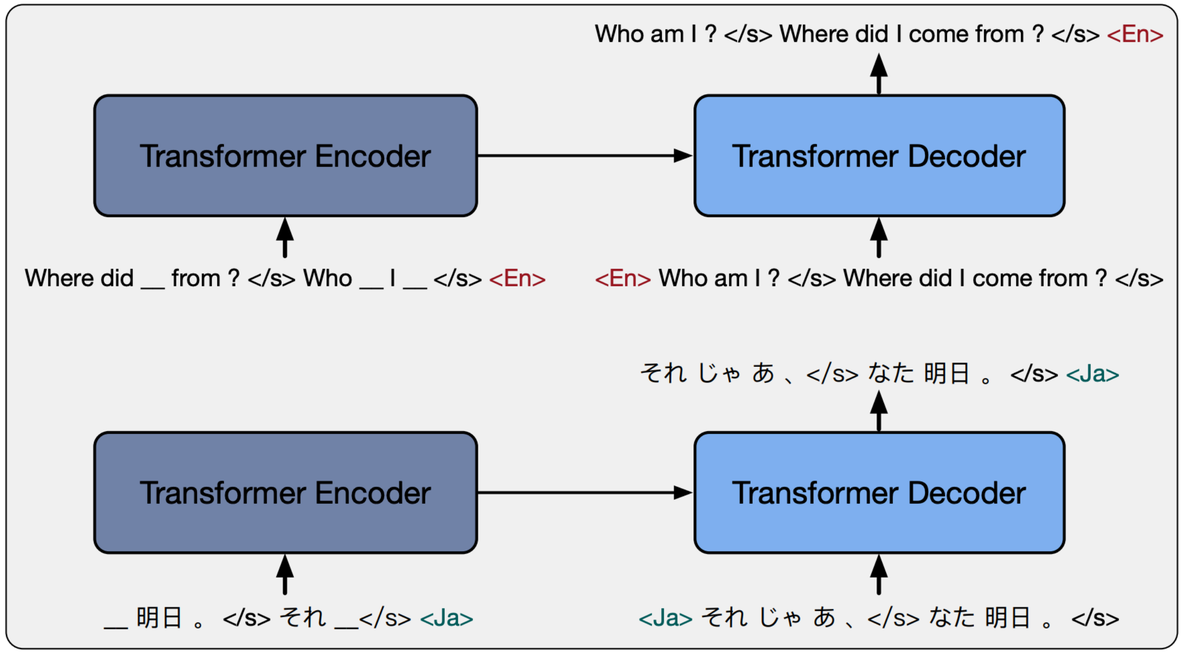
Cross-lingual Language Model Pretraining



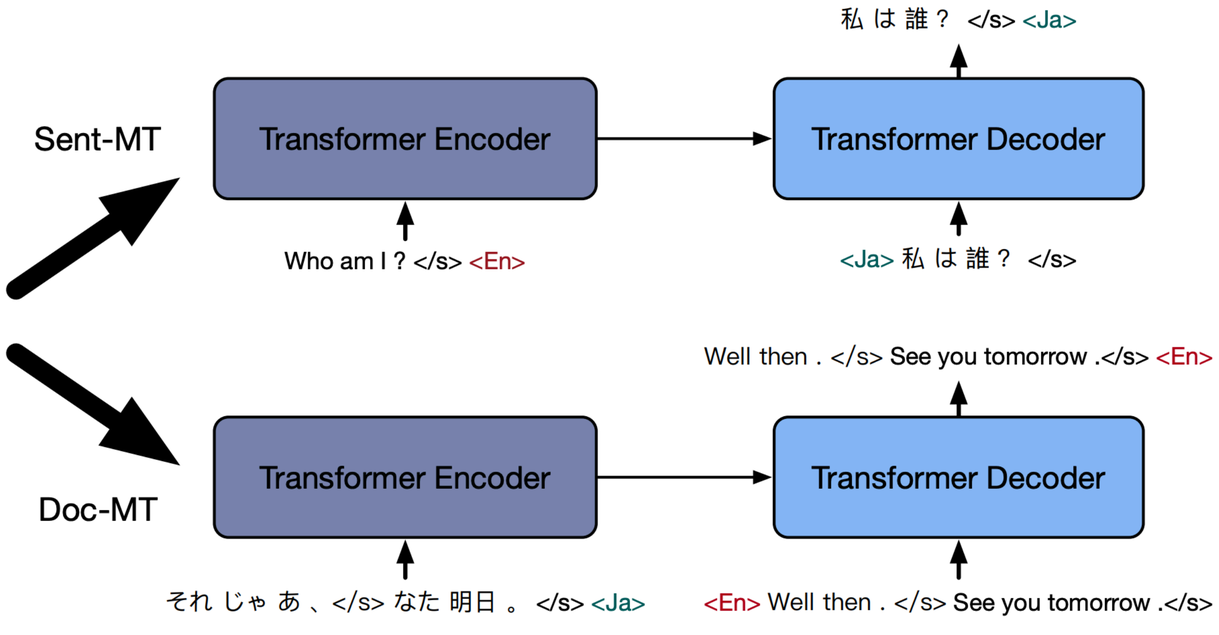
Evolution of Unsupervised MT BLEU score on German-English - newstest 2016

(Lample and Conneau, 2019)

mBART: Multilingual Denoising Pretraining



Multilingual Denoising Pre-Training (mBART)



Fine-tuning on Machine Translation

(Liu et al, 2020)