Natural Language Processing

Lecture 15

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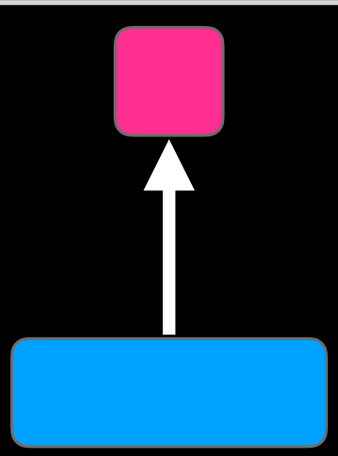
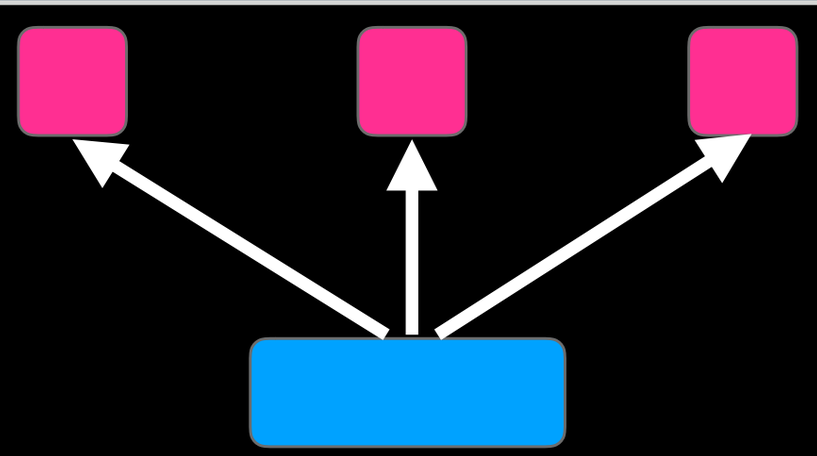
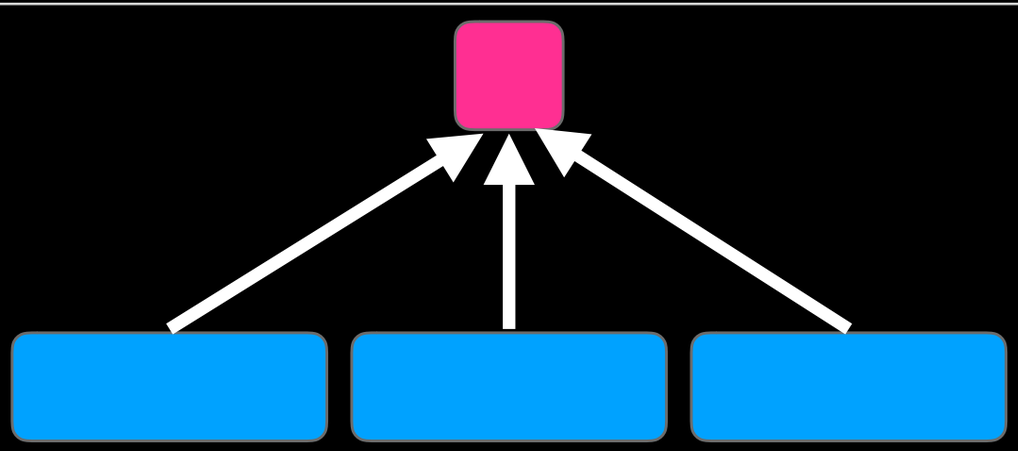
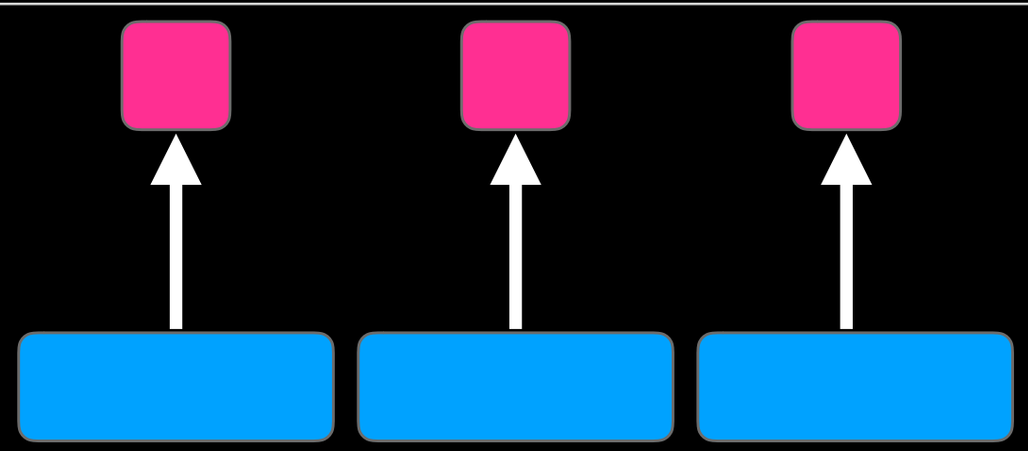
Text Classification

Examples

Types of Text Classification

	Fixed length	Variable length
Fixed length	 Logistic Regression, Perceptron, Feed-Forward Network, Random Forest, Naive Bayes, SVM, …	 Multitask Learning, Decoder
Variable length	 Convolutional Neural Networks (CNN)	 Recurrent Neural Networks (RNN), Hidden Markov Models (HMM), Conditional Random Fields

Goals for Today

- Learn about **ethical issues**
- Understand potential **sources of bias**
- Learn about **counter measures**

Ethical Considerations

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Biased Language Systems

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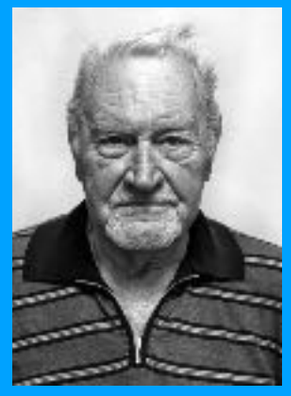
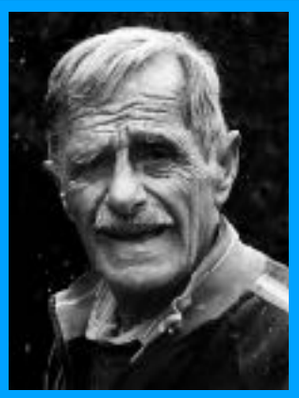
Language Biases



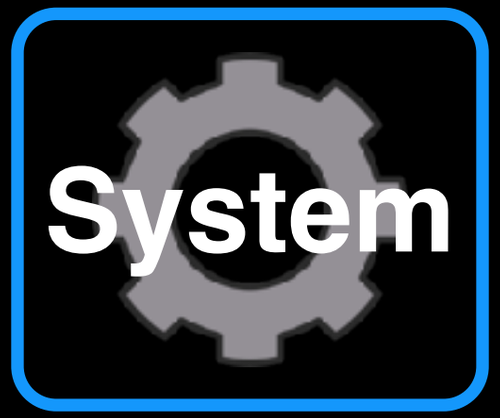
Example 1

Example 2



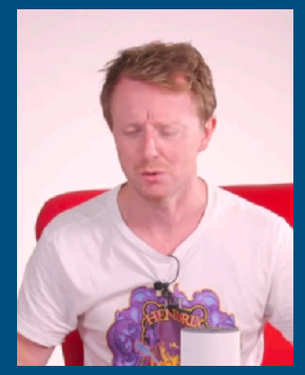
Example N

I don't understand you…



Hello, computer

Shite…



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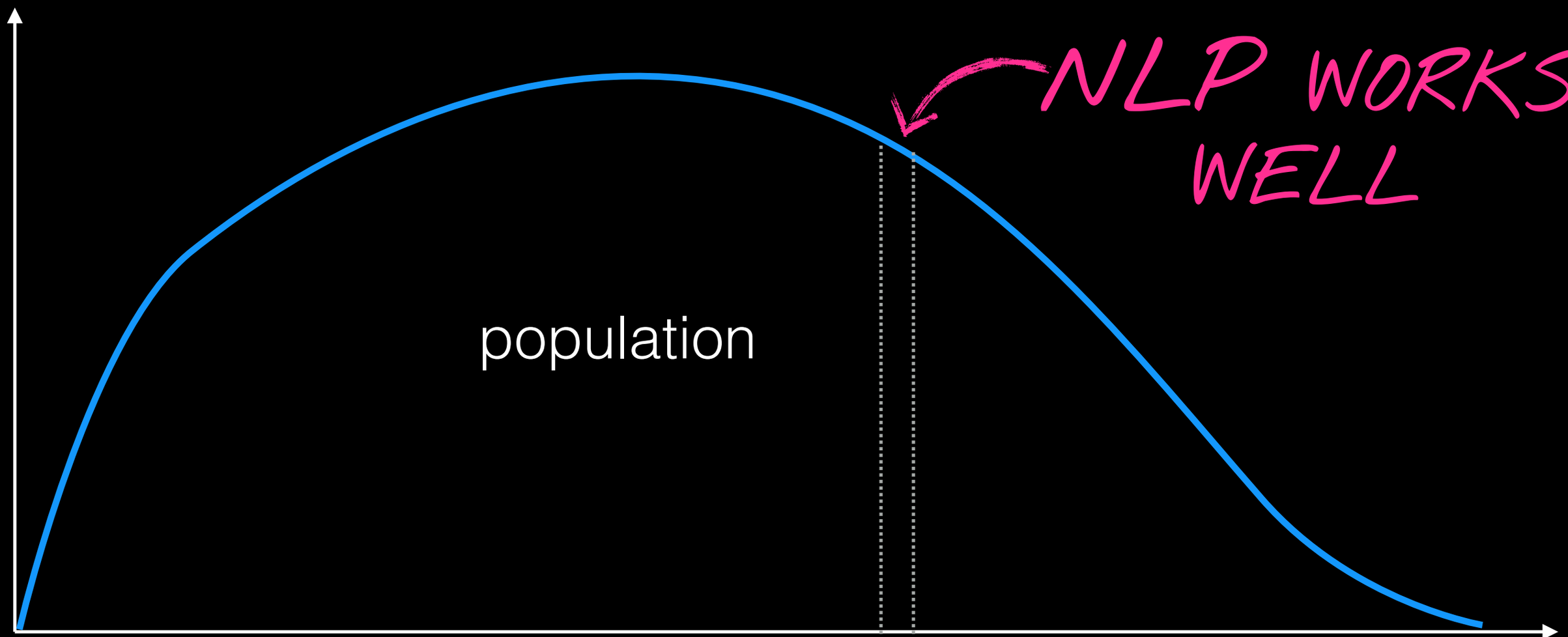
The Consequences



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Solutions?

Symptoms

Example 1

Example 2

Example N

System

Cause

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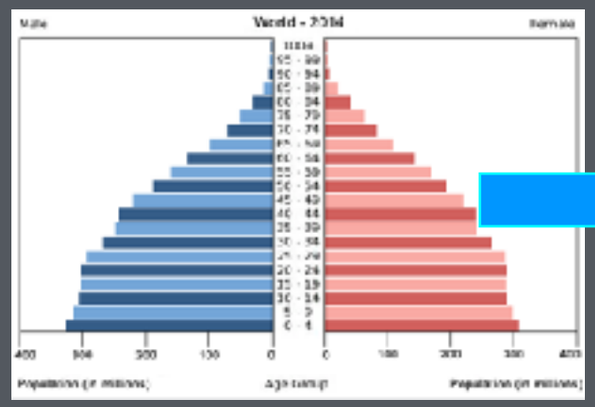
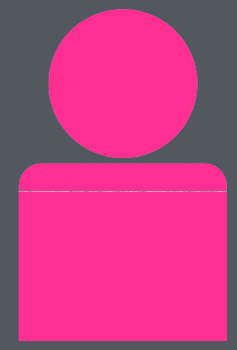
Who cares about bias?

Philosophers

Legal

Sources of Bias



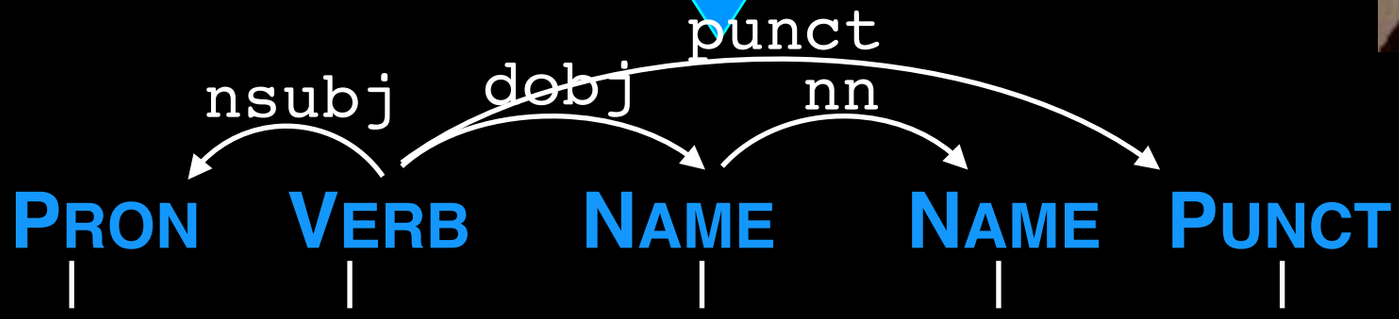


SELECTION

ANNOTATION

MODELS

DESIGN



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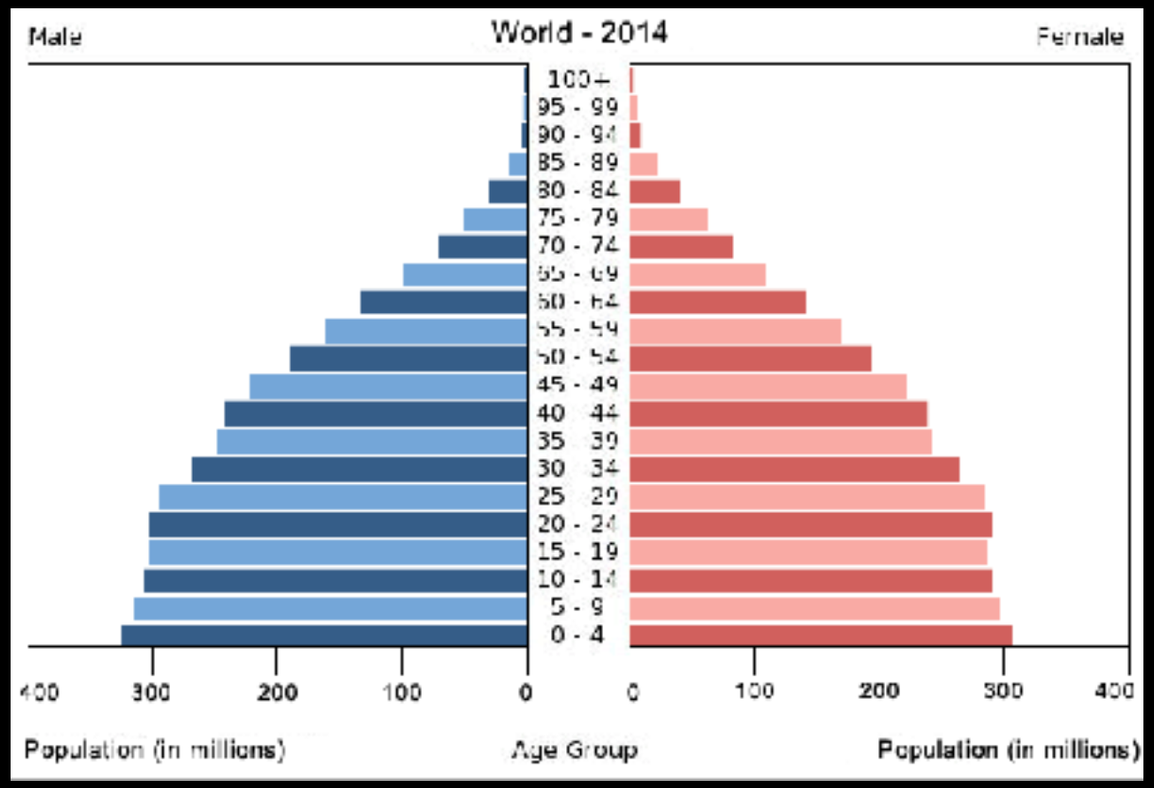
Data Bias



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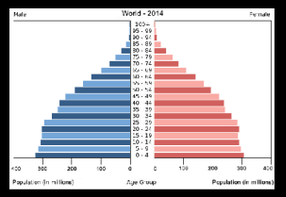
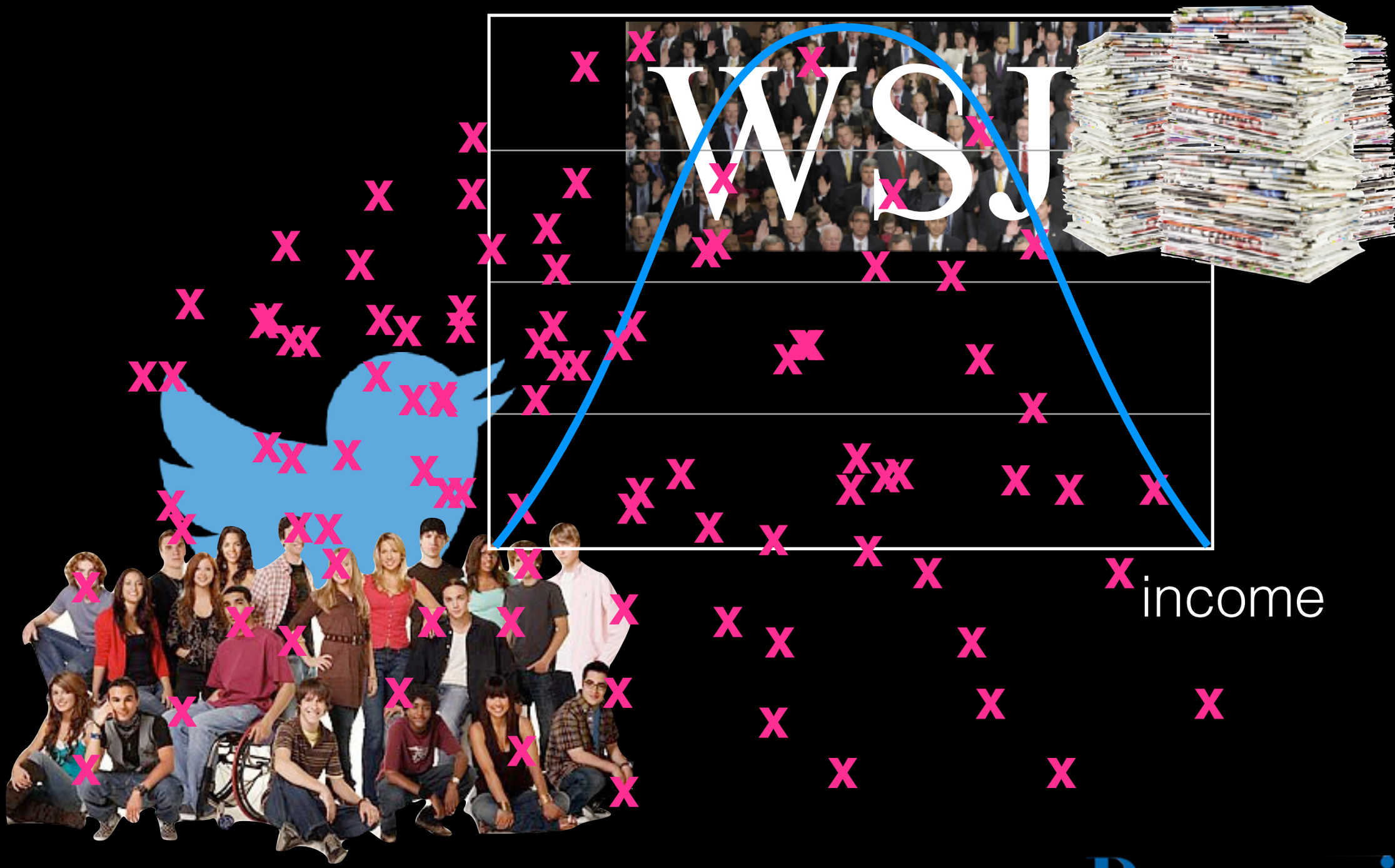


Distributions

age



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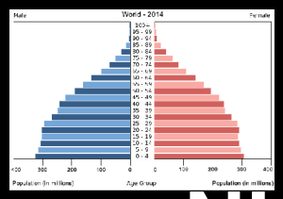
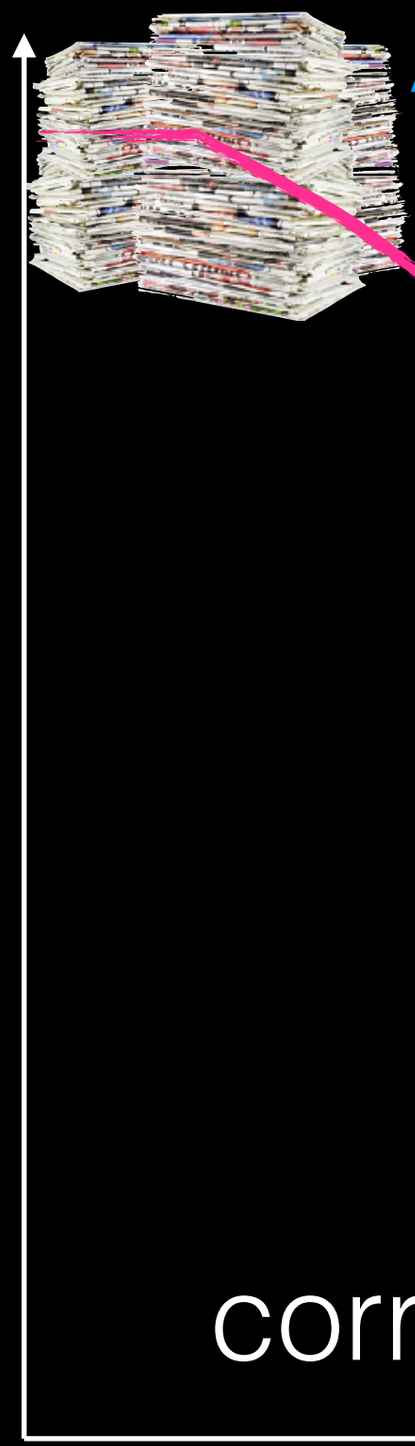
Jørgensen et al. (WNUT 2015)
Hovy & Søgaard (ACL 2015)

The WSJ Effect



NLP performance



ADV ADV ADJ ADV

Not definitely sure yet

ADV NOUN X ADV

Not deffo sho yet

correlates w/ demographics

distance from “standard”

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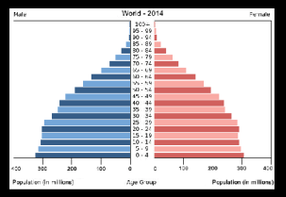
Exclusion

Jørgensen et al. (WNUT 2015)
Hovy & Spruit (ACL 2016)



F1

80

50

16

avg

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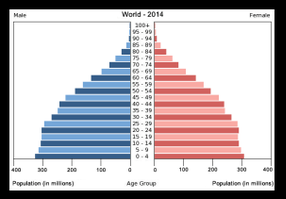

Exclusion

Hovy & Søgaard (ACL 2015)
Hovy & Spruit (ACL 2016)

accuracy

100

95

90

85

80

ing

views

ned

2

O45 U35 O45 U35

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Annotator Bias

It's a particle!

No! It's an adposition!

PRON VERB **PRT** NOUN NUM

PRON VERB **ADP** NOUN NUM

it comes out apr 30

Model Bias

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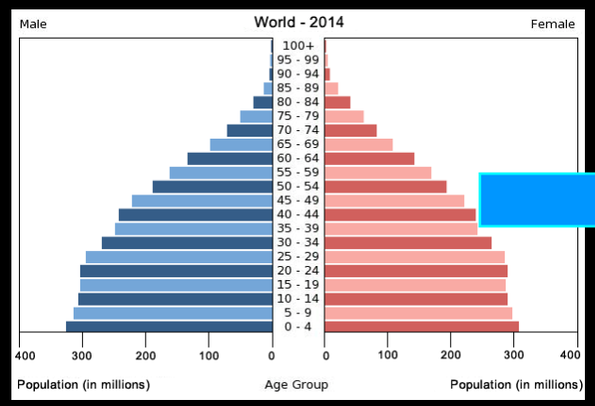
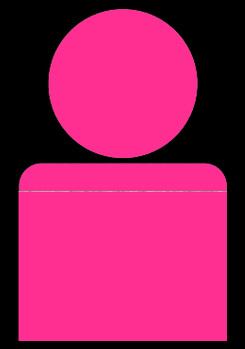
Biased Models





SELECTION

ANNOTATION

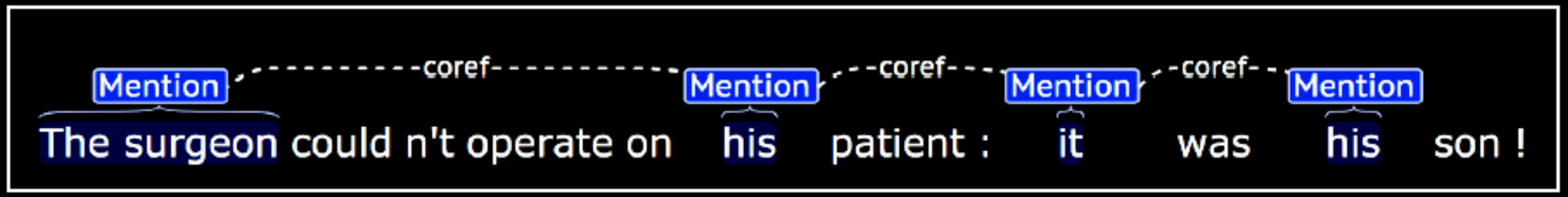
NLP

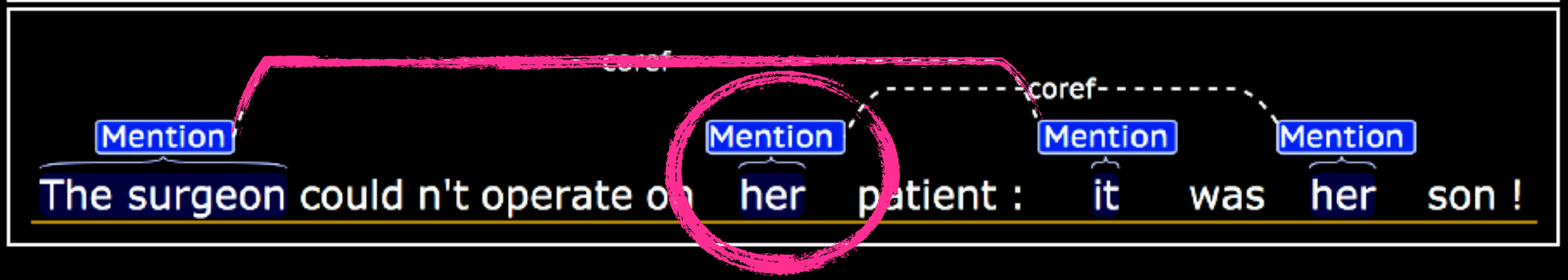
THIS IS REPRESENTATIVE

THIS IS RELIABLE

Rudinger et al. (2018)

Wrong Coreference





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Kiritchenko & Mohammad (2018)

Biased Sentiment Analysis

0.64

He made me feel ***afraid***

0.48

She made me feel ***afraid***

0.52

I made ***Latisha*** feel ***angry***

0.43

I made ***Heather*** feel ***angry***

Zhao et al. (EMNLP 2017)

Models Amplifying Bias

BIAS = 0.66

Agent: WOMAN

Agent: MAN

Agent: WOMAN

NLP

BIAS = 0.84

WOMAN

WOMAN

WOMAN

MAN

WOMAN

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Design Bias

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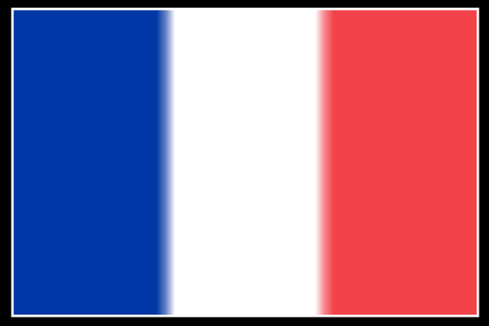
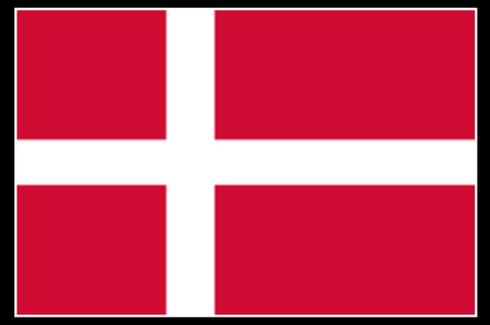
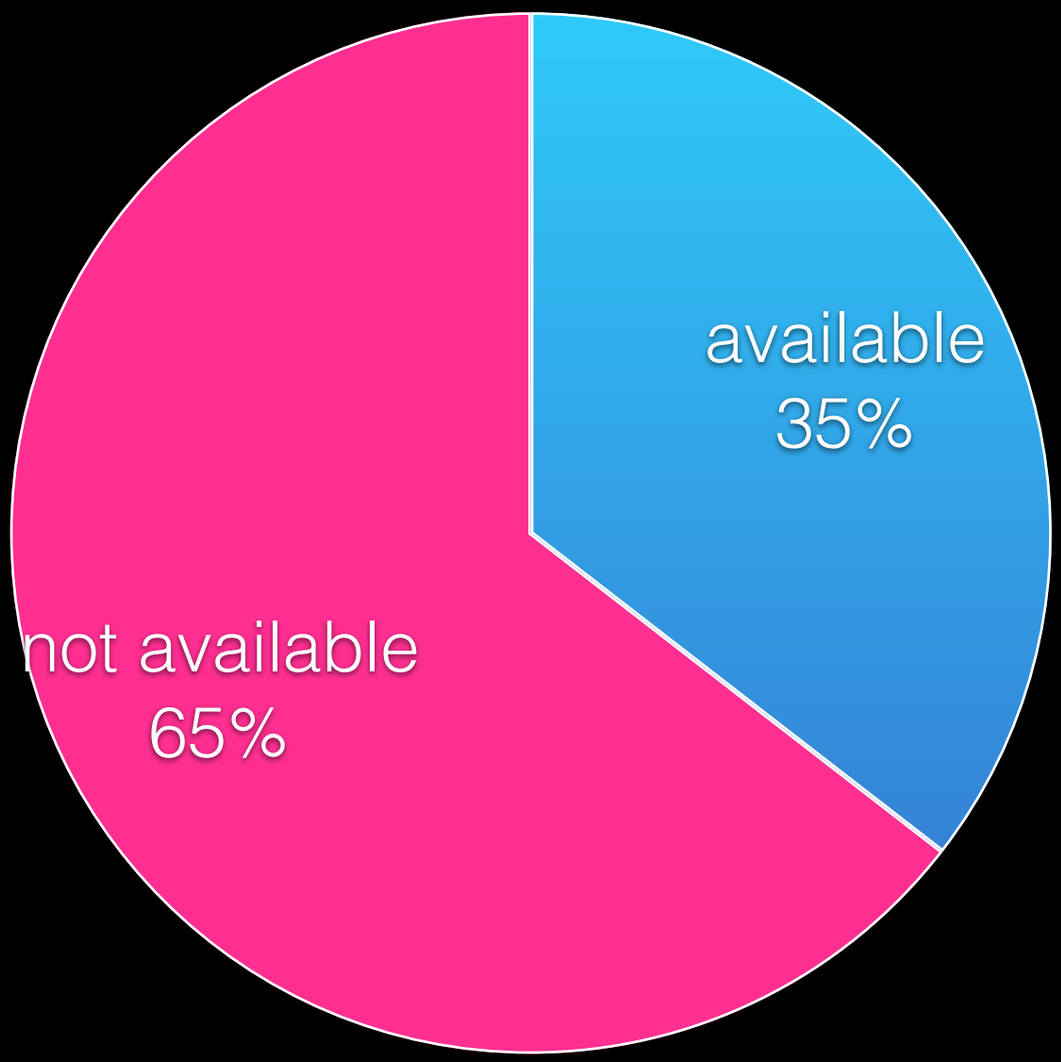
Exposure



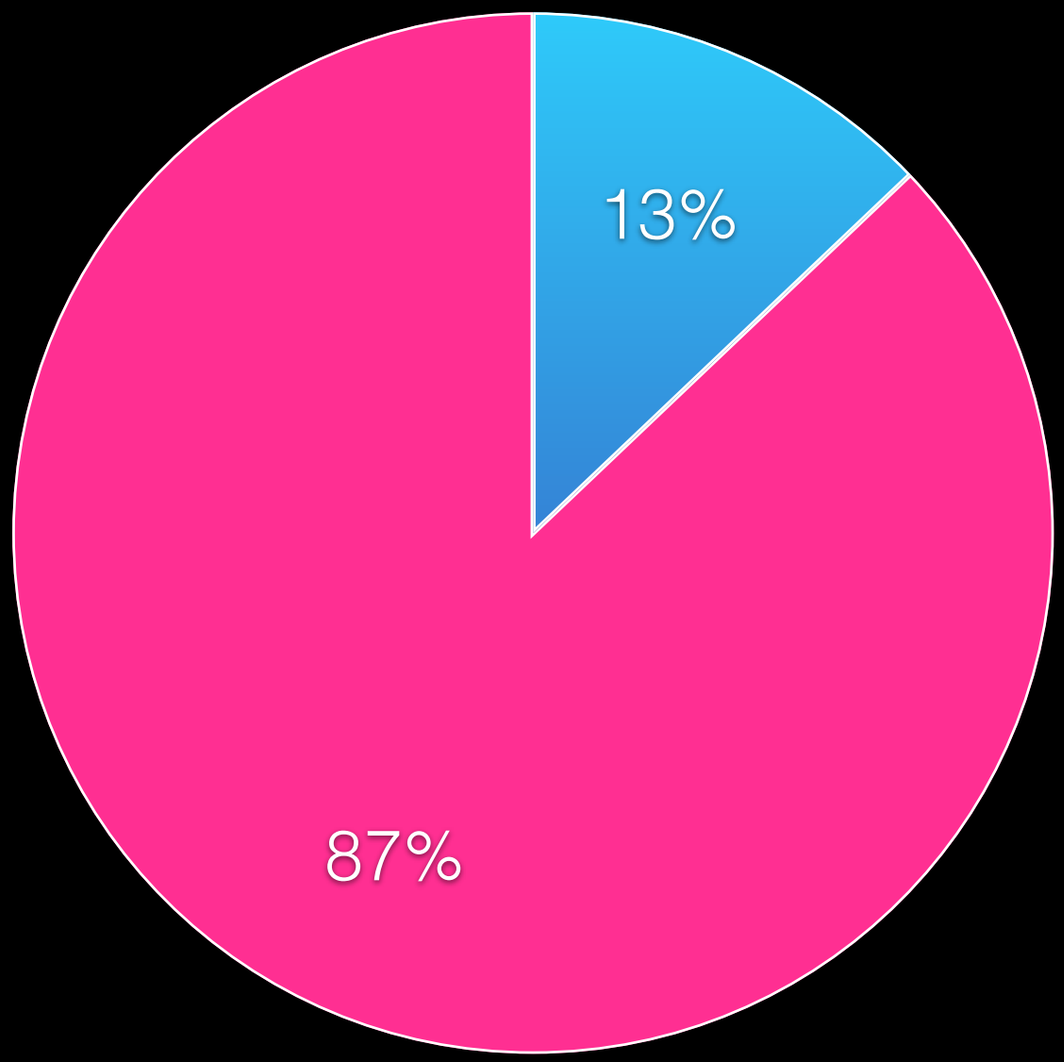


Under-Exposure

treebanks



semantic resources



evaluation

Over-Exposure

POS tagging

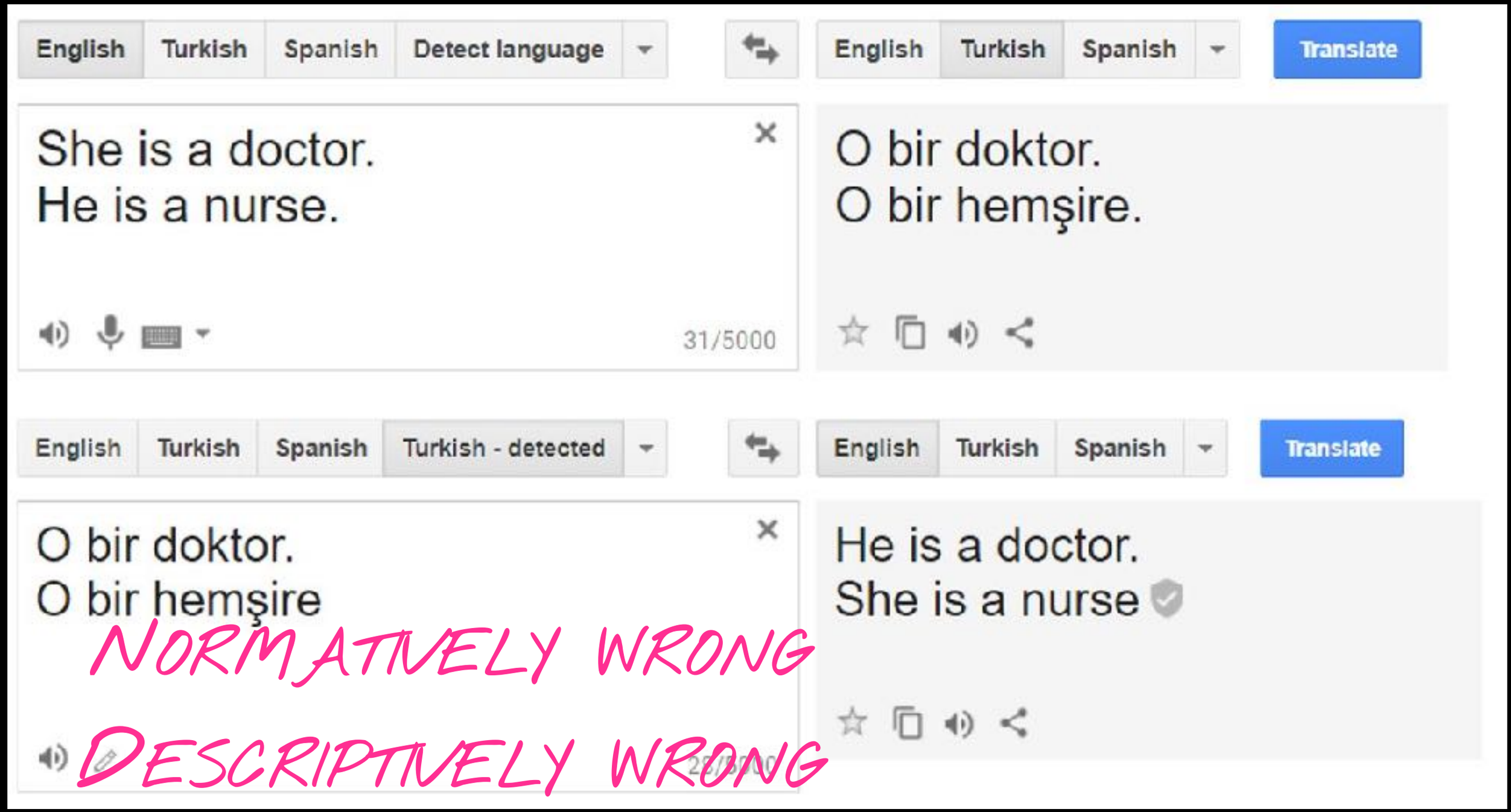
Discourse

Dual Use

Hovy & Spruit (ACL 2016)

Task	Pro	Con
authorship attribution	historical documents	dissenter anonymity
text classification	sentiment analysis	censorship
personalization	better user experience	tailored ads

Normative vs Descriptive Ethics



Normative vs Descriptive Ethics

why are american

why are american **so fat**
why are american **[illegible]ons so long**
why are american **so proud**
why are american **houses made of wood**
why are american **trucks different to european**
why are american **universities the best**
why are american **houses made of cardboard**
why are american **cars so big**

Google-Suche | Auf gut Glück!

Weitere Informationen

Unangemessene Vervollständigungen melden

NORMATIVELY WRONG

DESCRIPTIVELY TRUE?

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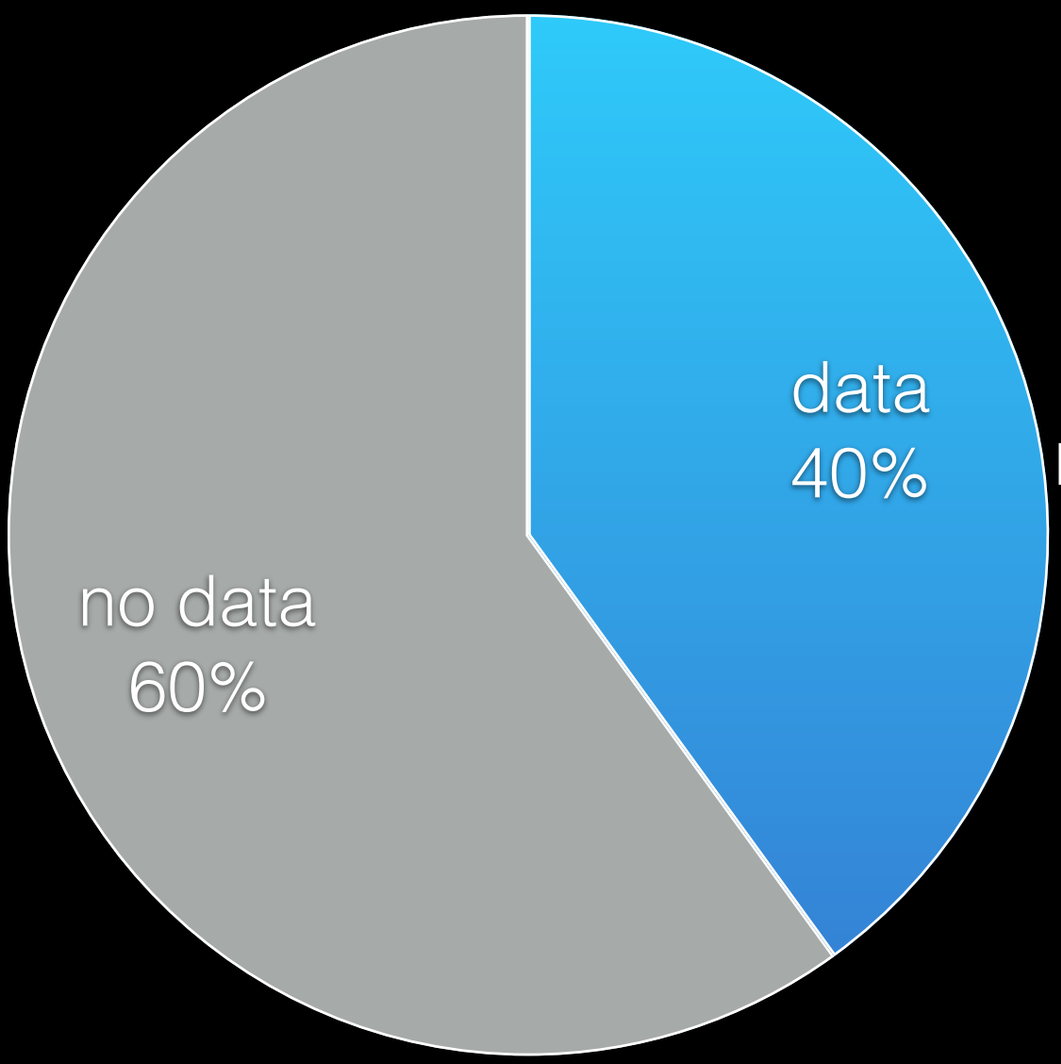
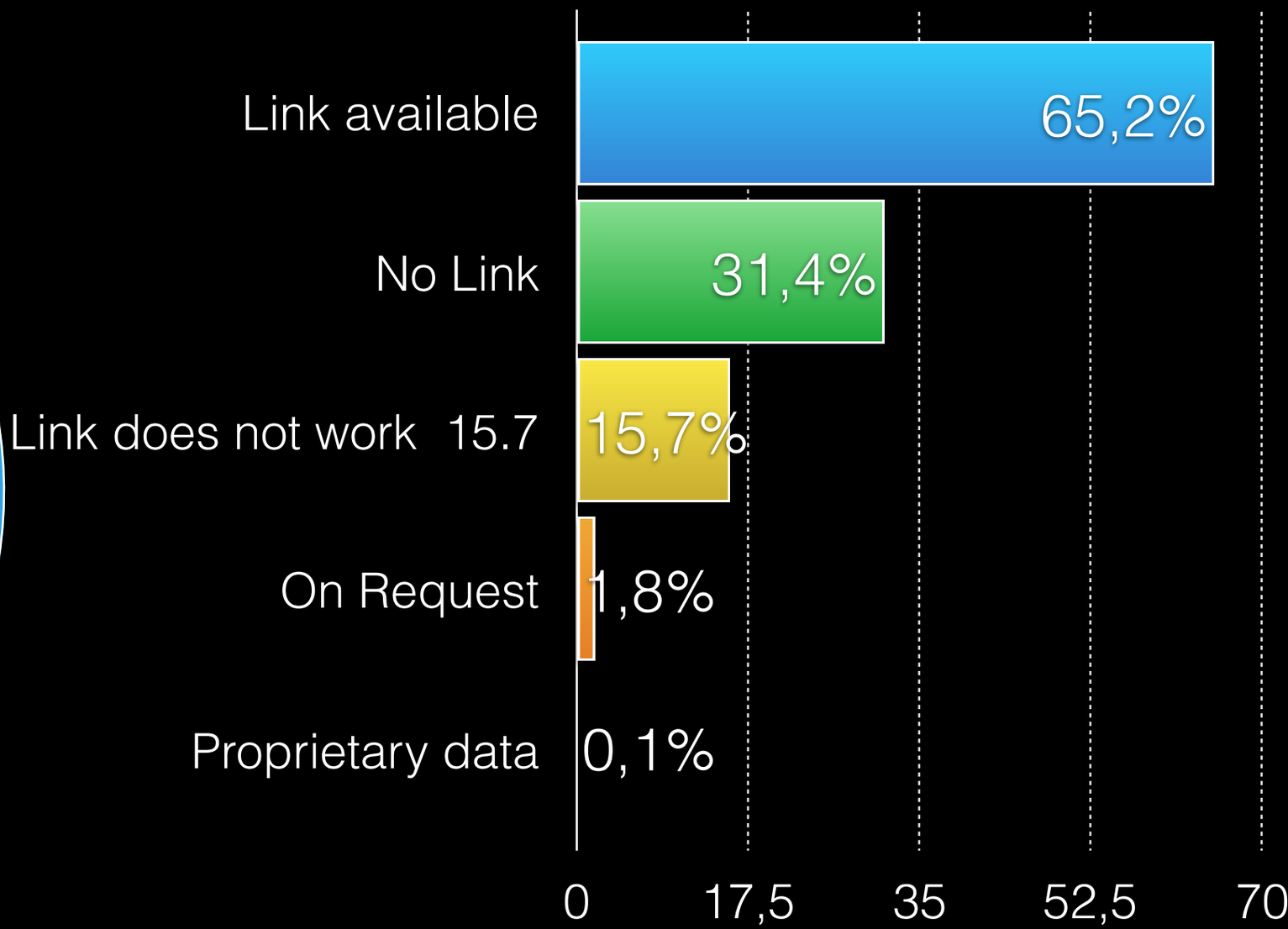
Replicability





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Counter Measures

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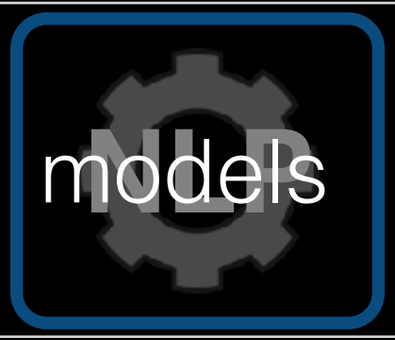
What can we do?

Source	Problem	Countermeasures
data selection 	**Exclusion**	stratification, priors
annotation 	**Label Bias**	annotation models, disagreement weighting
models 	**Overgeneralization**	dummy labels, error weighting, adversarial learning
research design 	**Exposure**	always consider possible impact

Zhao et al. (EMNLP 2017)

Reducing Bias

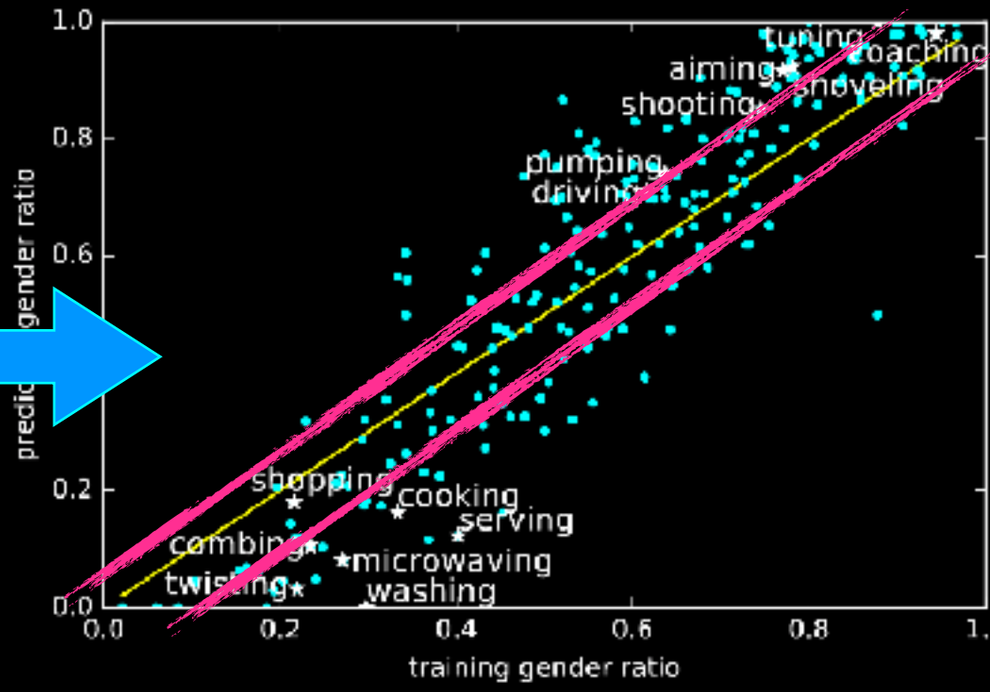
BIAS = 0.66

Agent: WOMAN

Agent: MAN

Agent: WOMAN

ILP



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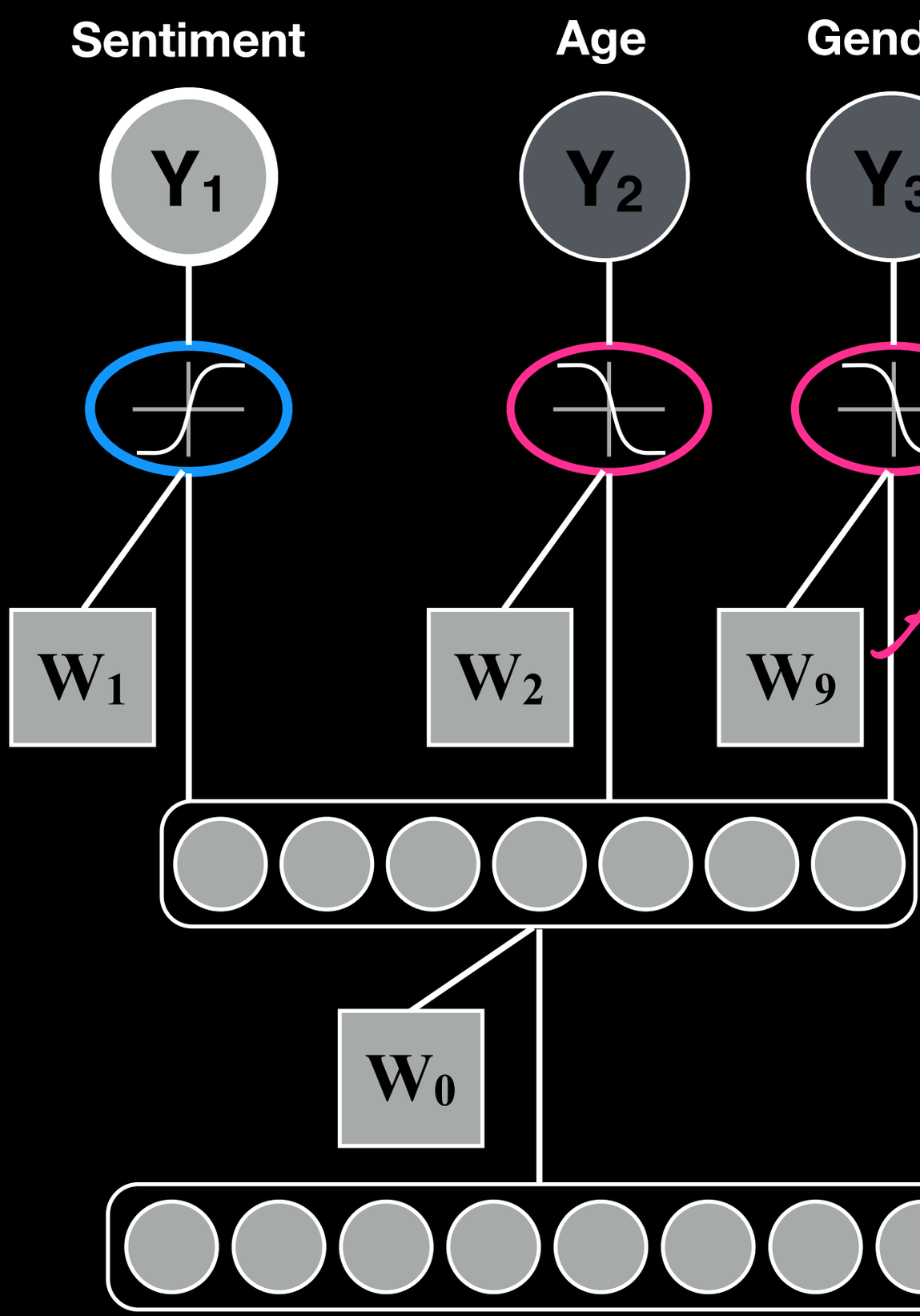
Li et al. (ACL 2018)

Adversarial Model



ADVERSARIAL LEARNING

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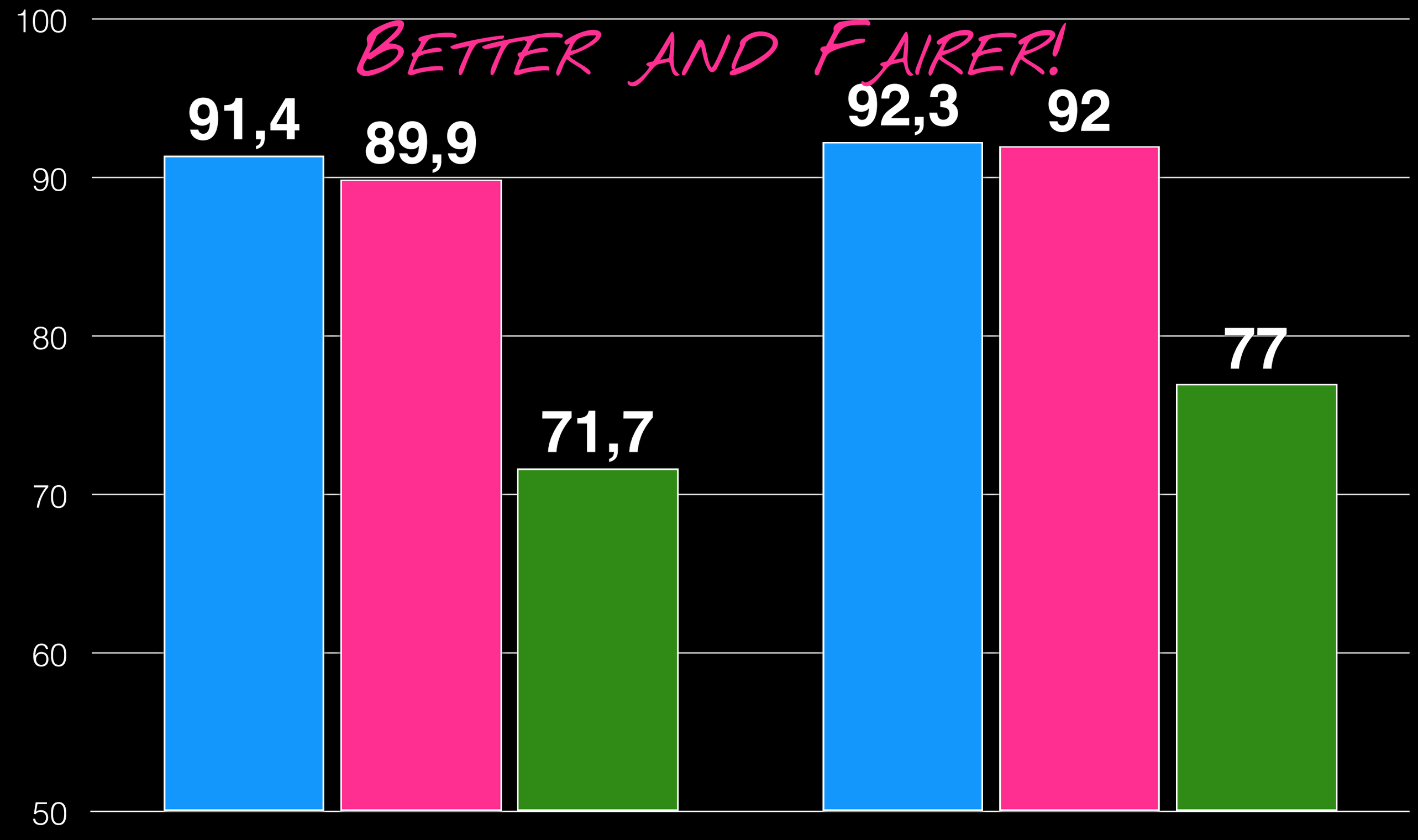
Li et al. (ACL 2018)

Results

Better and Fairer!



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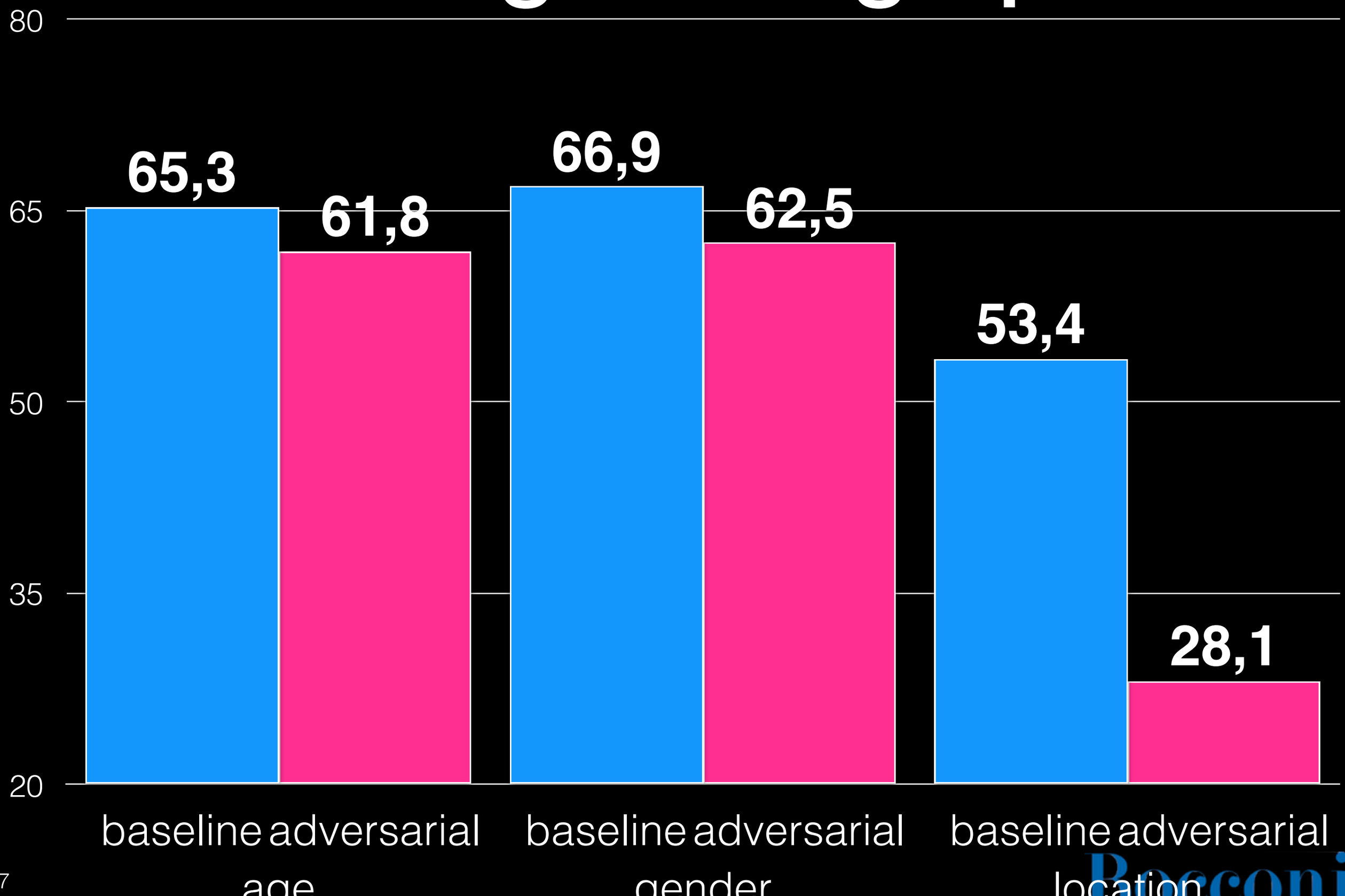
Li et al. (ACL 2018)

Protecting Demographics



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Wrapping Up

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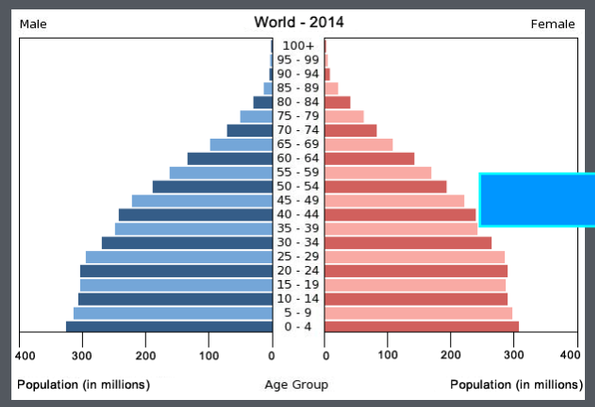
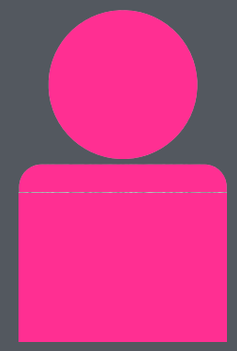
Sources of Bias



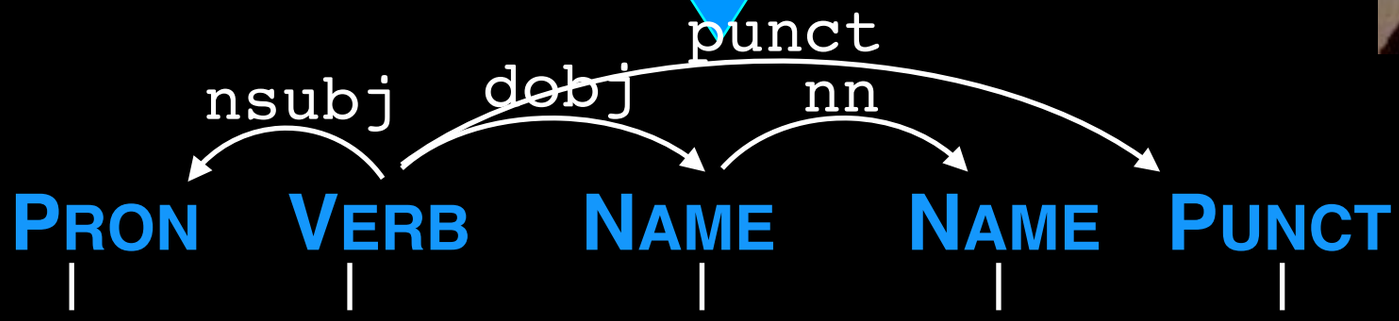
SELECTION



ANNOTATION

MODELS

DESIGN



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Open Questions

- Carrots or sticks (GDPR)?
- Do we have to be more humble? How? Where?
- What about normative vs. descriptive ethics?
- Consequences for privacy, security, and user dignity?
- What if you have to choose between ethics and performance?
- Are we asking a lot from small companies?
- Research into bias creates biased data sets. Does it have to?
- Where does it stop: what about unknown sources of bias?

Take-home points

- Beware of **bias** from **data**, **models**, or **design**
- Apply **countermeasures** and check
- Ask yourself: "*Am I comfortable having my system classify myself?*"