SEMANTIC ACCOUNTS OF RISK PERCEPTION

A Data Scientific Approach

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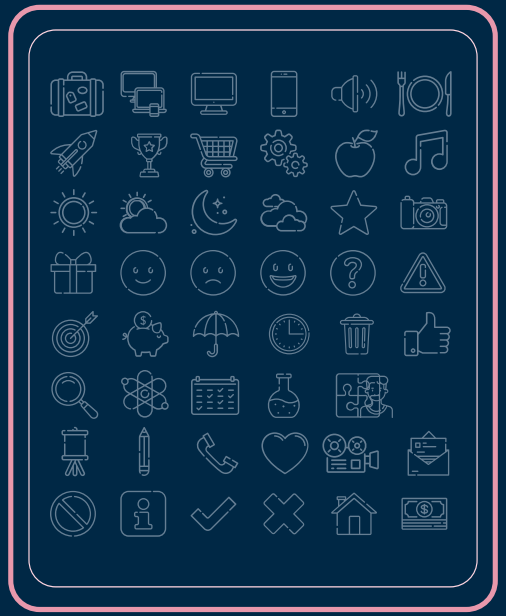
WHY STUDY RISK PERCEPTION?

Slovic et al. (1982):

- Improve methods for eliciting opinions about risk
- Understand and anticipate public responses to hazards
- Improve communication of risk information between the public, researchers, and policymakers



THE PSYCHOMETRIC PARADIGM

Risk Source = **E.g. Car**

	1						7	
voluntary	○	○	○	○	●	○	○	involuntary
non-fatal	○	○	●	○	○	○	○	fatal
immediate	○	●	○	○	○	○	○	delayed
calm	○	○	○	○	●	○	○	dread
catastrophic	○	○	○	○	○	○	●	chronic
controllable	○	○	○	●	○	○	○	uncontrollable
known	○	○	●	○	○	○	○	known
known-sci	○	○	○	○	●	○	○	unknown-sci
new	○	○	○	●	○	○	○	new

PREDICTING RISK PERCEPTION

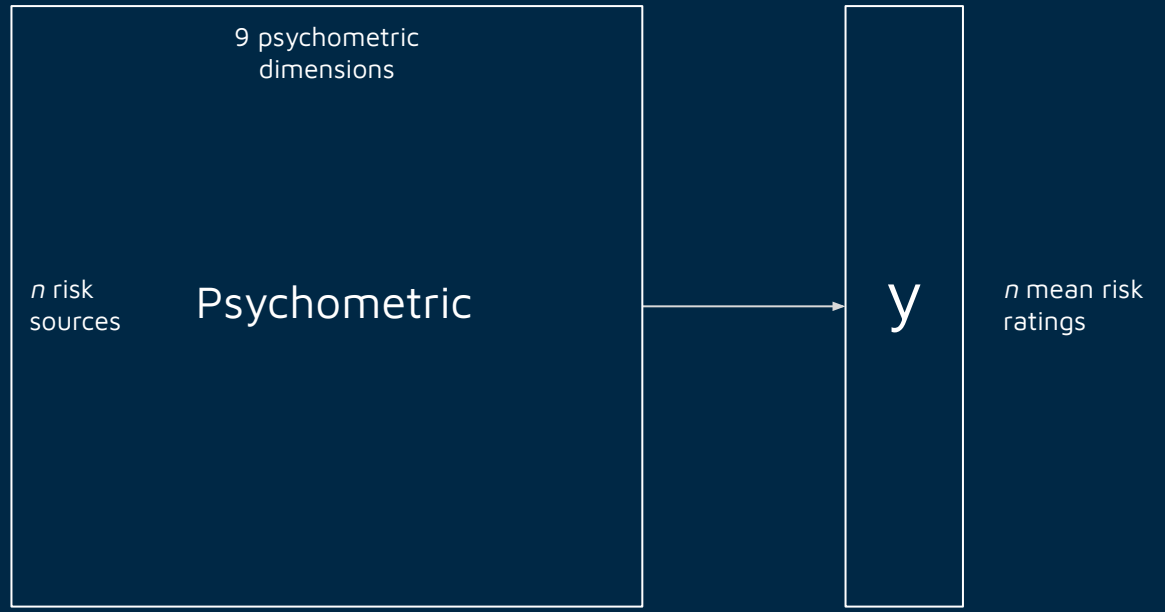
On a scale of -100 (safe) to +100 (risky) how risky would you rate the following?:

E.g. chess, dog, nuclear power

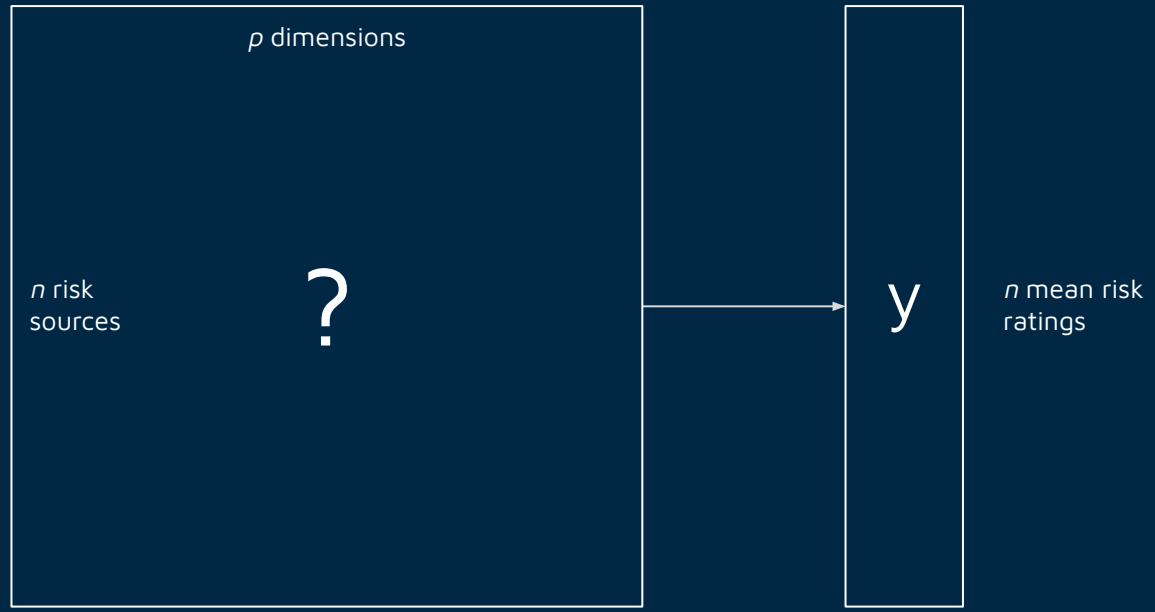
→ y

n mean risk ratings

PREDICTING RISK PERCEPTION



ALTERNATIVE ACCOUNTS?



SEMANTIC ACCOUNTS!

Distributional Hypothesis: words with similar meanings tend to occur in similar contexts (Firth, 1957; Harris, 1954)

↓

... formalisation ...

↓

cat = [0.7, 1.1, -1.9, ... , 0.2]

SEMANTIC ACCOUNTS (BHATIA, 2019)

Baseline Model

01

PSYCHOMETRIC

Fischhoff et al. (1978)

Semantic Account

02

TEXT (Pre-trained)

E.g. GloVe

ALTERNATIVE DATA?

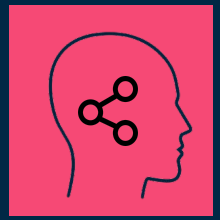
Text-Based Models

E.g. Common Crawl

10^{11} words

Free Associations

SWOW (De Deyne et al., 2019)



10^{6} words

Cue	Response
cat	fur
...	...
war	guns

WHY FREE ASSOCIATIONS?

WHICH MODELS?

Baseline Model

Semantic Accounts

01

PSYCHOMETRIC

02

TEXT (Pre-trained)

GloVe

03

FREE ASSOCIATION

SWOW

MORE VALIDATION DATA

Bhatia (2019)

306 risk sources

X

Hussain et al. (2022)

698 risk sources

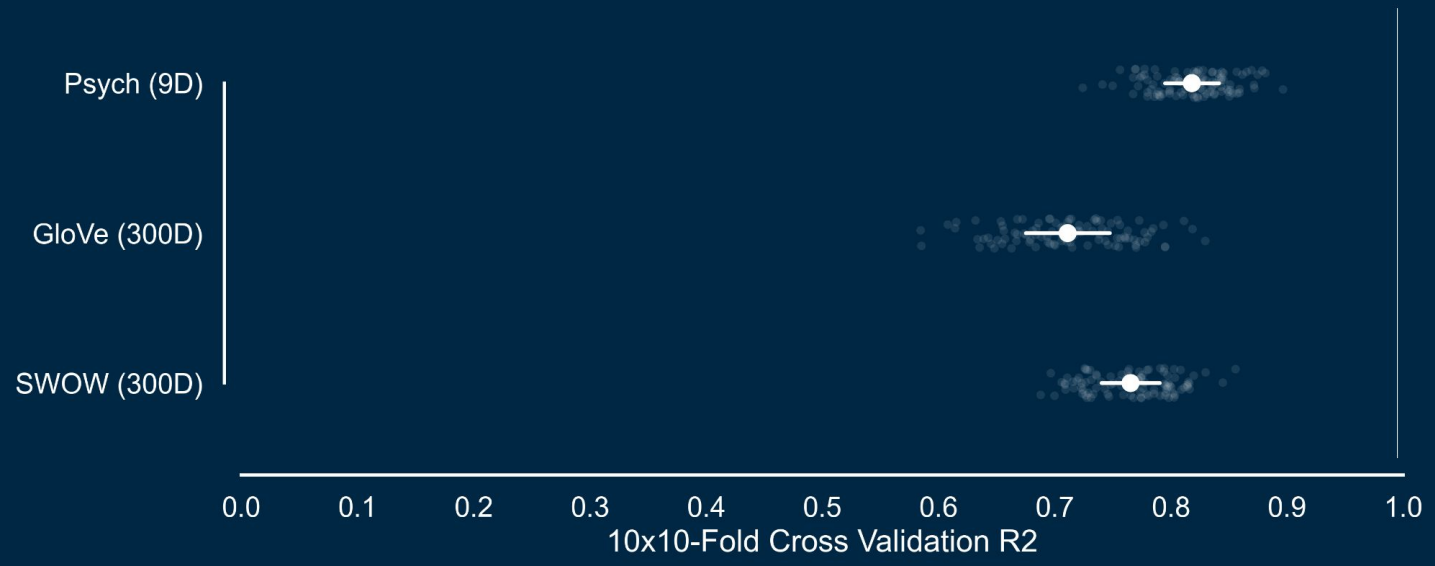
Regularized Regression

y

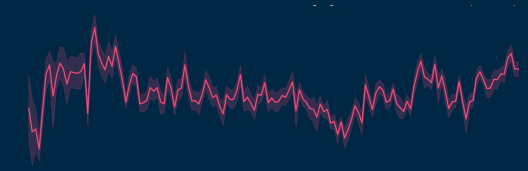
1004 mean risk ratings

2360 +1509 Prolific participants,
1st language English
95% approval rating

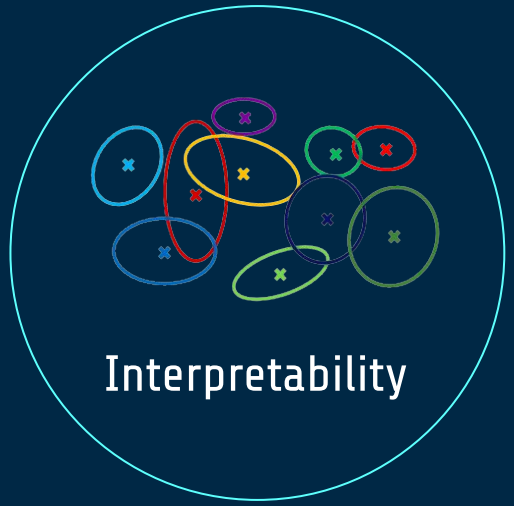
MODEL COMPARISON



WHAT NEXT?



Application

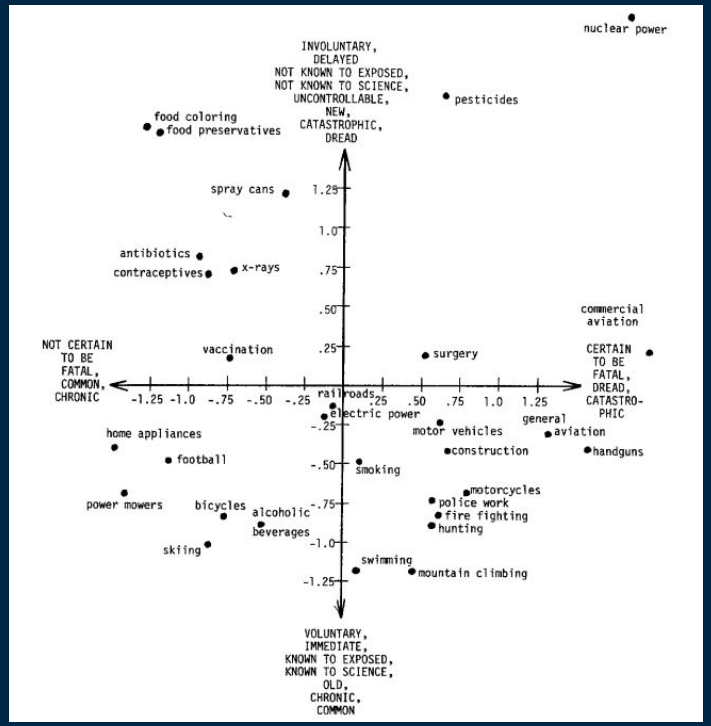


Interpretability

INTERPRETABILITY (& HACKATHON)

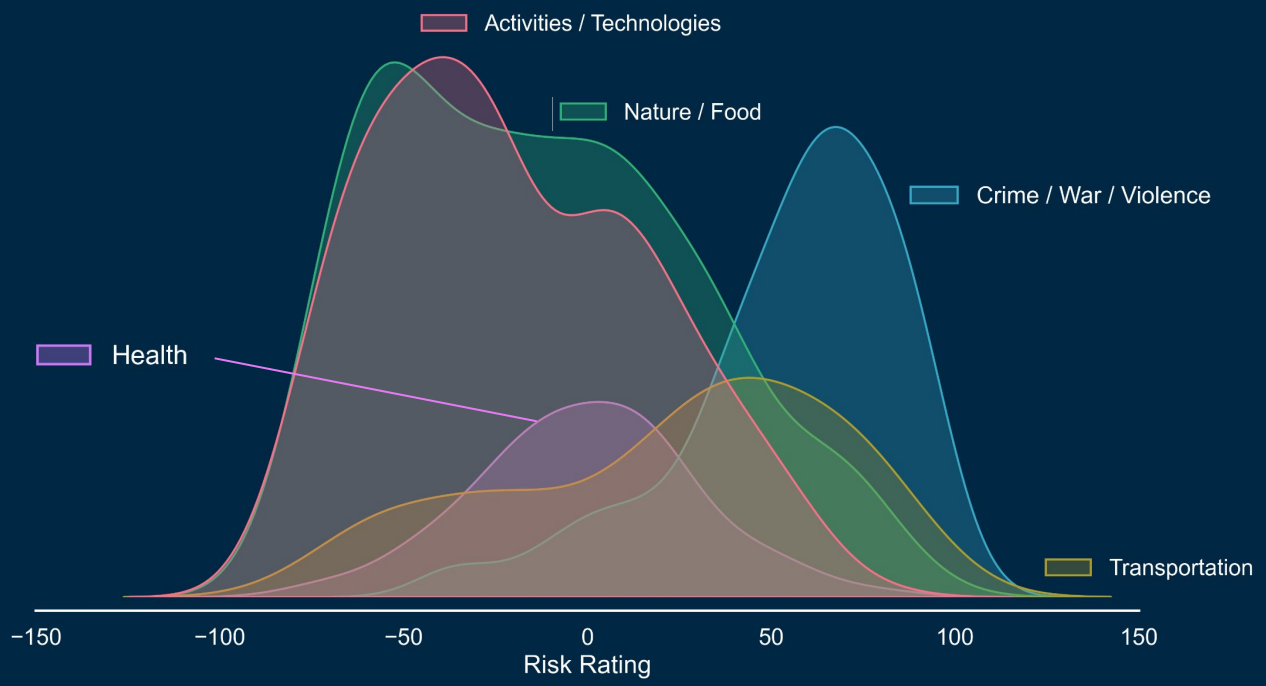
Fischhoff et al. (1978):

‘Technological Risk’



‘Severity’

INTERPRETABILITY (& HACKATHON)



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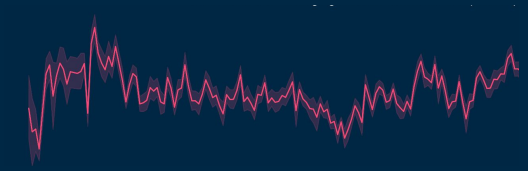

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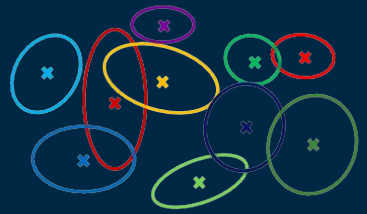
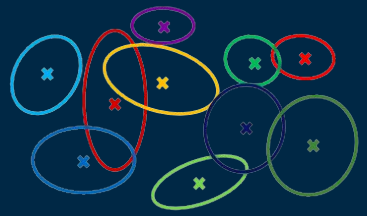


Interpretability

WHAT NEXT?



Interpretability

HACKATHON DATASET

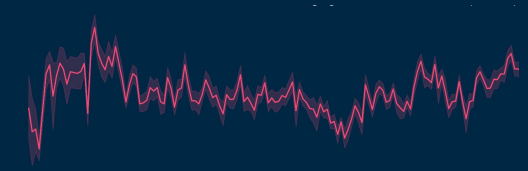
word	cluster	risk_rating	*9 x psych Ds*	*9 x psych PCs*	in_Fisch	psych_pred_risk	glove_pred_risk	swow_pred_risk

Task 1:
Description

Task 2:
Interpretability

Task 3:
Model Comparison

WHAT NEXT?



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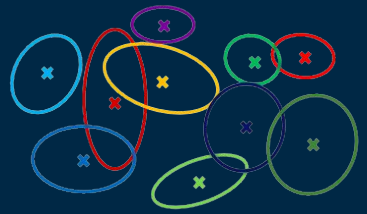

Interpretability

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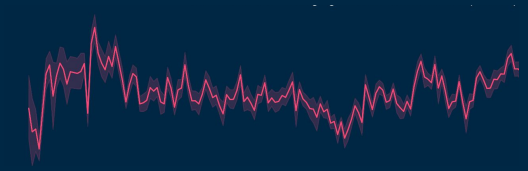
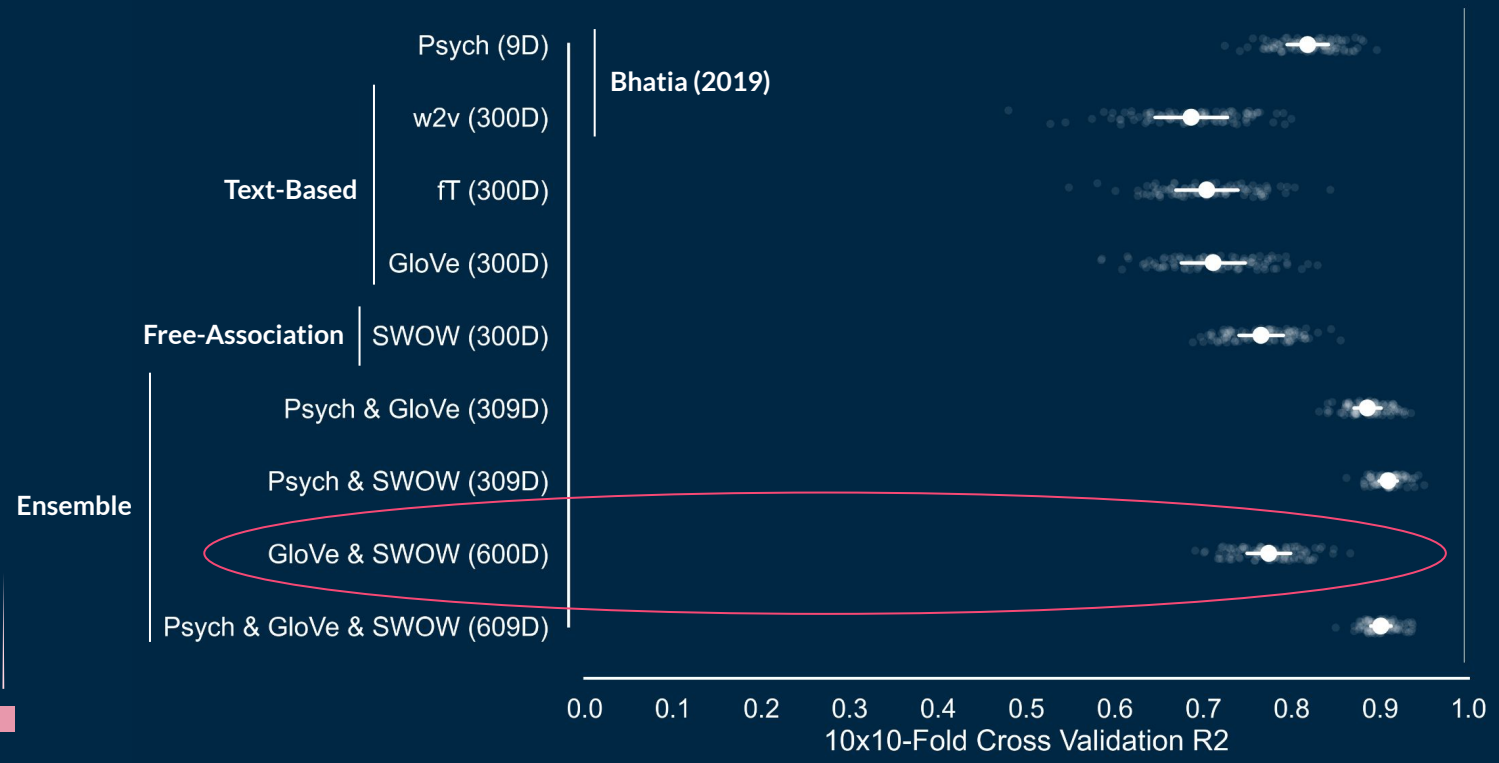


Application

APPLICATION: RISK FROM TEXT

Speech / Tweet / Article

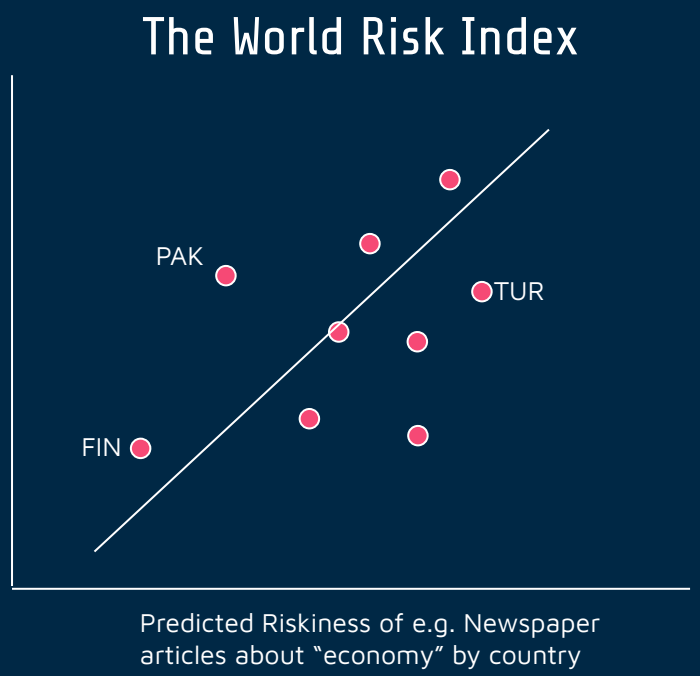
RESULTS


Psych (9D)
Bhatia (2019)
w2v (300D)
Text-Based
fT (300D)
GloVe (300D)
Free-Association
SWOW (300D)
Psych & GloVe (309D)
Psych & SWOW (309D)
Ensemble
GloVe & SWOW (600D)
Psych & GloVe & SWOW (609D)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
10x10-Fold Cross Validation R2

APPLICATION

Following Ahir et al. (2022):

E.g. GDP Growth,
Stock Market Volatility,
Exchange Rate Volatility



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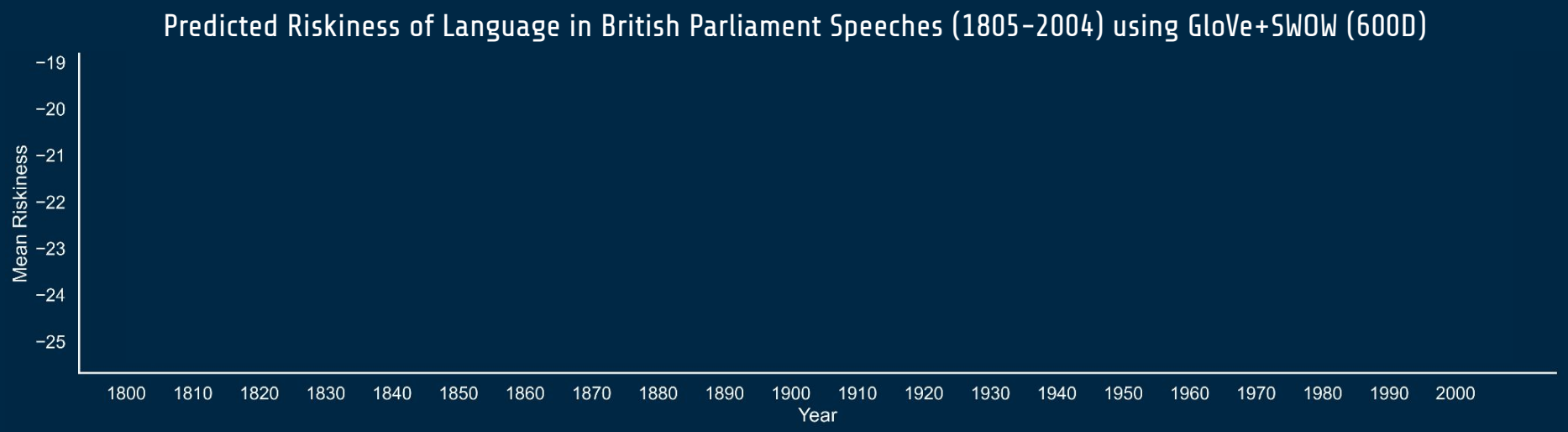

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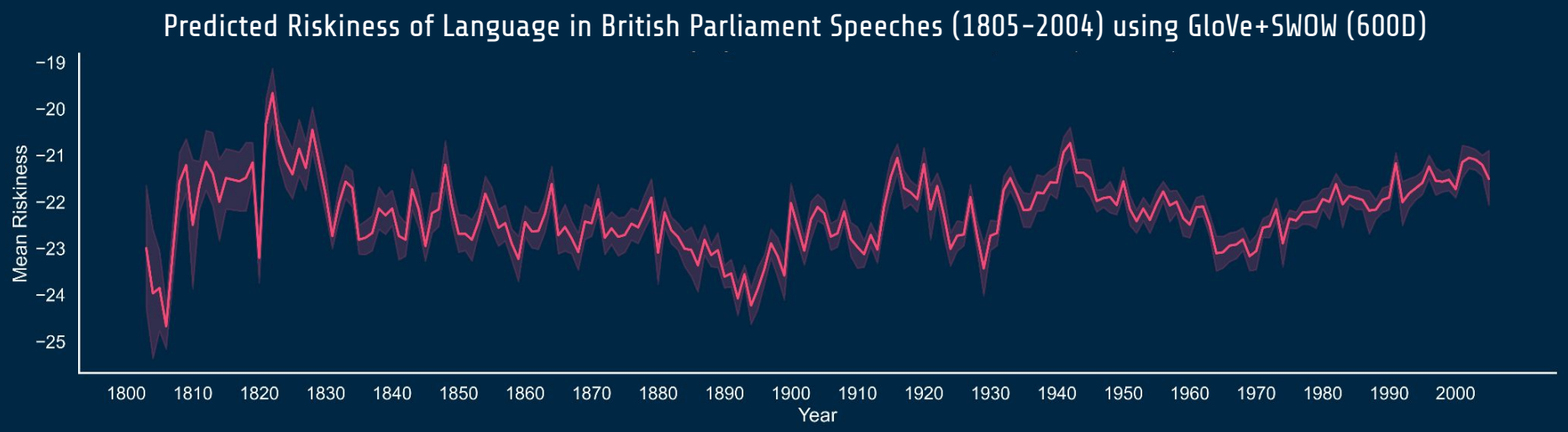

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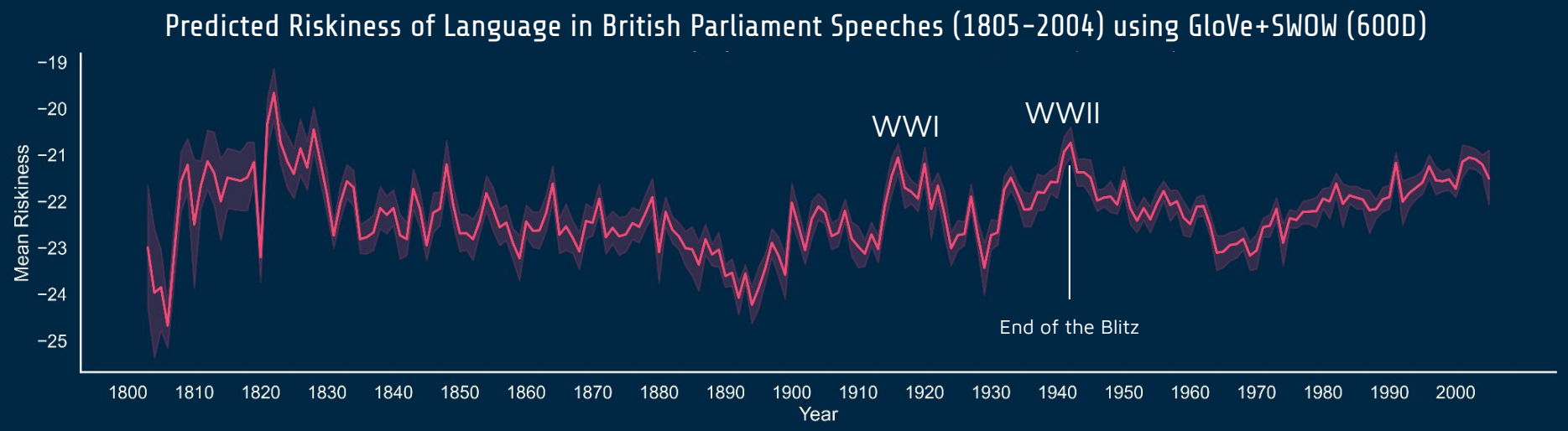

APPLICATION: RISK FROM TEXT

Predicted Riskiness of Language in British Parliament Speeches (1805-2004) using GloVe+SWOW (600D)

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