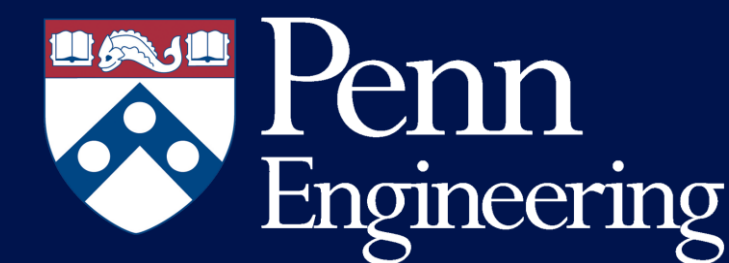


# Task Aware Representations of Sentences Improves Seizure Freedom Classification in Data-Limited Settings

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## Can TARS improve epilepsy classification in the zero and few shot cases?

- Xie et al. demonstrates a natural language processing approach to extracting seizure freedom from free-form clinician notes [1]
- Model performance decreased when generalized to notes that were not explicitly trained on
- Epilepsy classification can be used to track patient progress, treatment efficacy, and gain insights into factors influencing seizure freedom for better medical decision-making

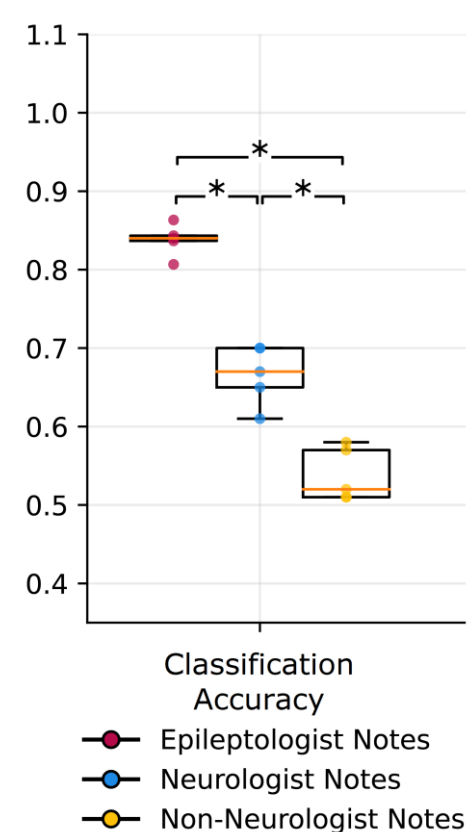


TARS - Interstellar

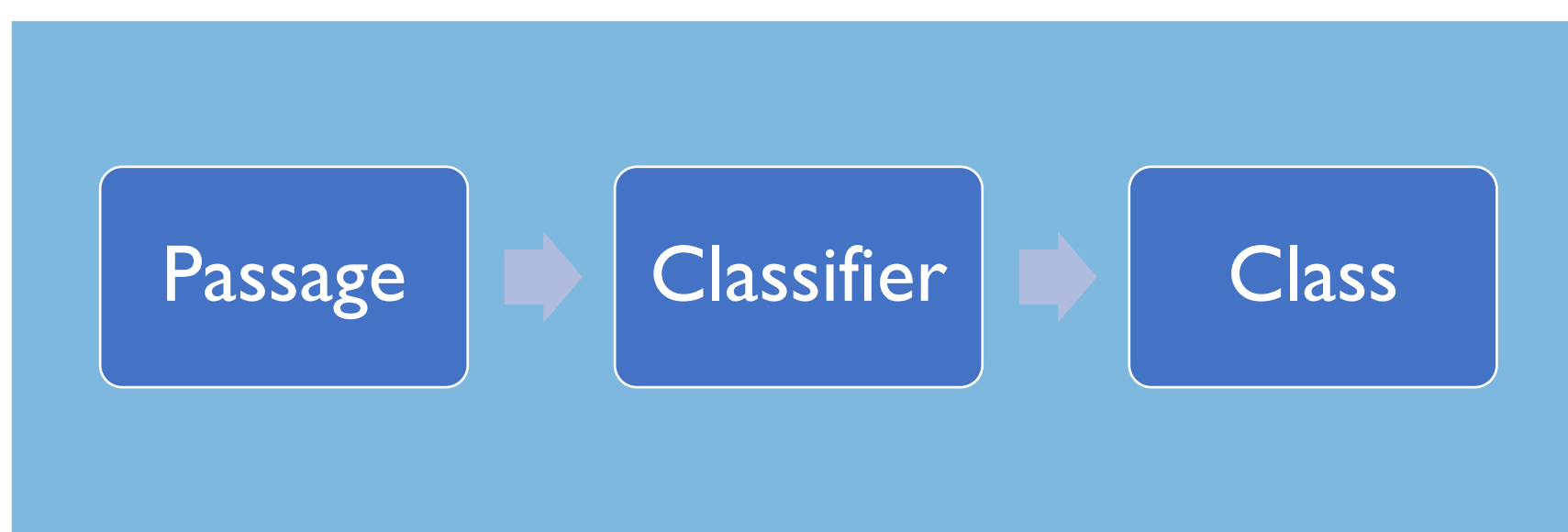
## Methods

### Original Generalization Results Performed Poorly on Unseen Data

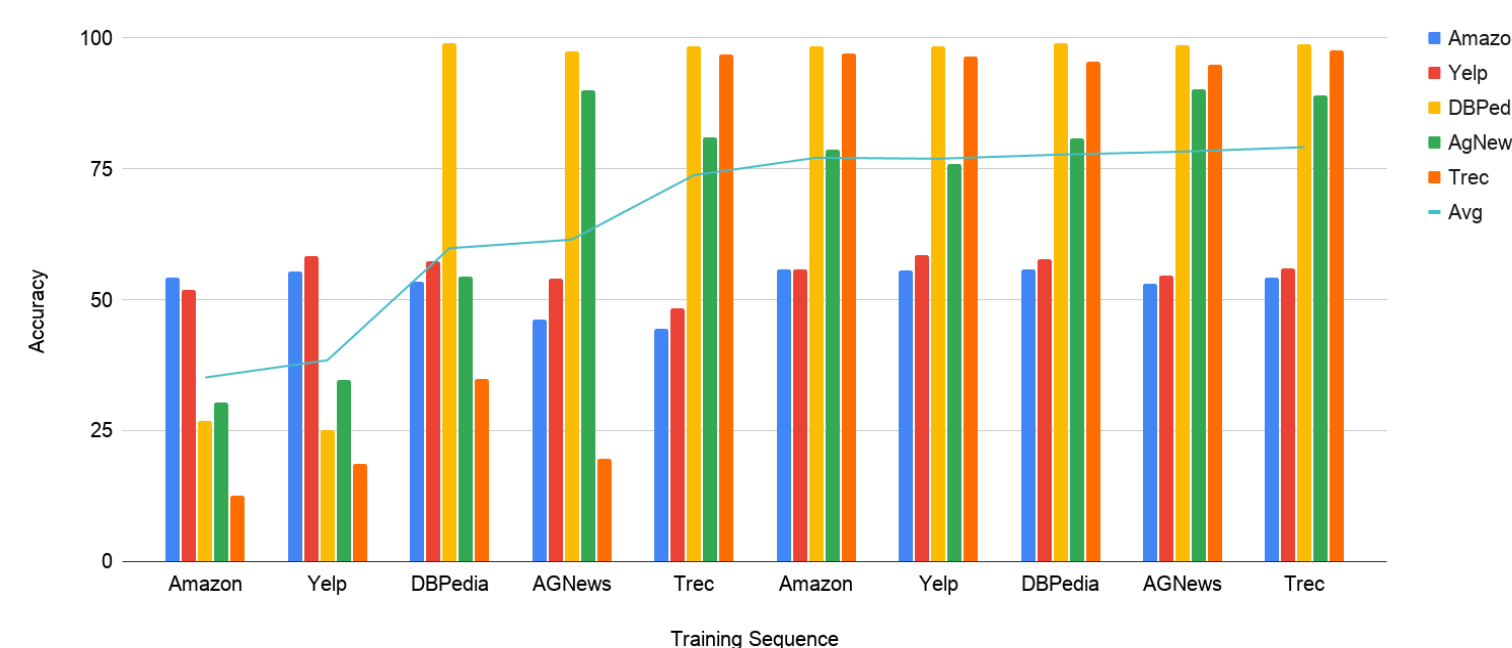
Annotations	Epileptologist (400)	Neurologist (100)	General (100)
Classification	Epileptologist (400)	Neurologist (100)	General (100)
Seizure Free	30%	33%	30%
Not seizure-free	62%	47%	35%
Seizure Freedom Unclear	8%	20%	35%



### BERT (Bidirectional Encoder Representation from Transformers)



### TARS (Task Aware Representations of Sentences for Generic Text Classification)



## Results

### TARS performs well in zero and few shot cases

K = 0

Accuracy 77.3/66.3

Baseline Mean  
Null Mean  
Null Model

#### Target Class Samples

K = 1

Accuracy: 78.3/68.0

K = 2

Accuracy: 78.0/68.2

K = 4

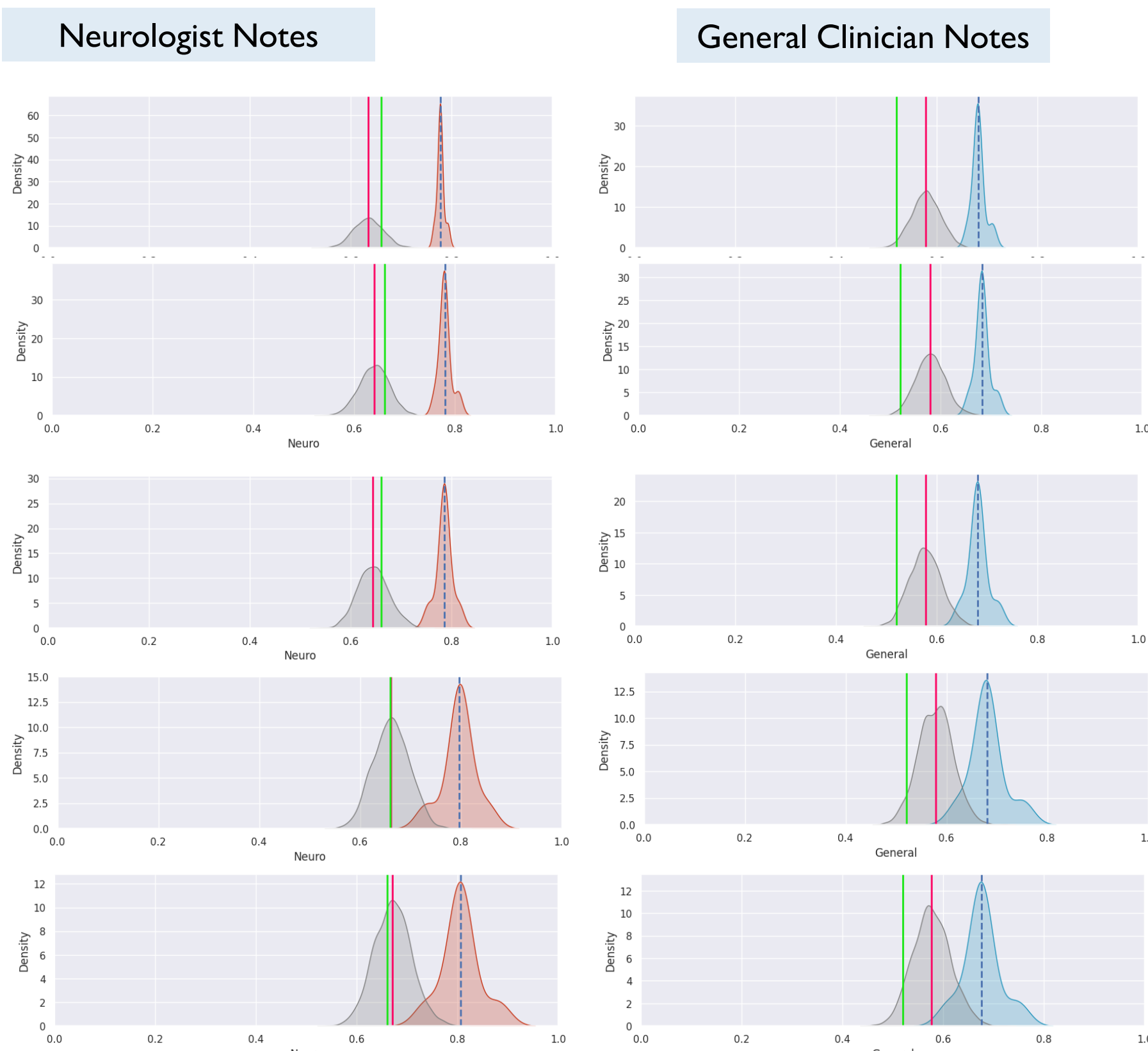
Accuracy: 79.5/68.2

K = 8

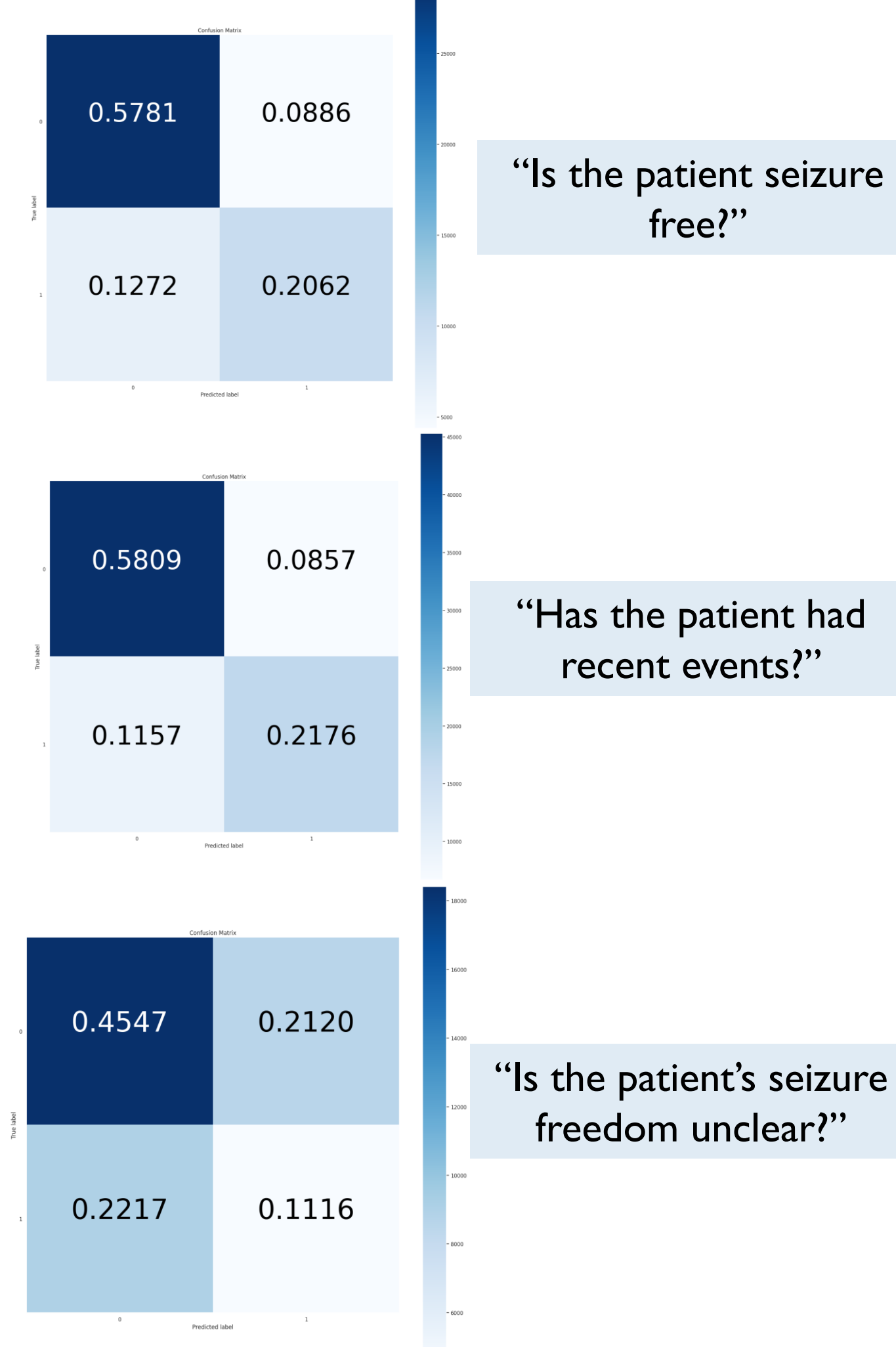
Accuracy: 79.6/66.6

K = 10

Accuracy: 81.3/67.7



### Confusion Matrices



## Conclusions

### Findings

- We improved classification accuracy by ~15/~10% in the zero-shot and one-shot scenario for neurologist and generalist notes, respectively
- Additional target class samples provides no additional information in general clinician notes
- The model is able to extract information from neurologist notes in the underlying null distribution

### Limitations

- Our analysis is limited to a small patient population
- Natural language models are quite receptive to seed changes so further seeding would have yielded a closer approximation to the true mean
- The model struggles to accurately classify when seizure freedom is unclear

### Acknowledgements

CNT Staff and Data Managers