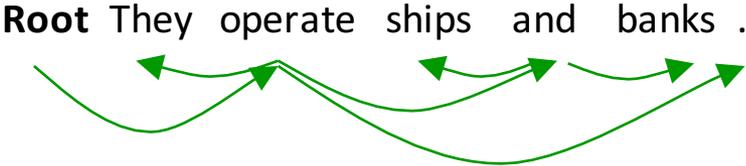
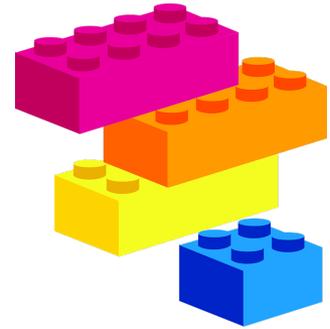


Suppose you want to make **joint** prediction

Task	Input	Output
Part-of-speech Tagging	They operate ships and banks.	
Dependency Parsing	They operate ships and banks.	
Segmentation		

Credit Assignment Compiler



Sequential_RUN(*examples*)

```
1: for  $i = 1$  to  $\text{len}(\text{examples})$  do
2:    $\text{prediction} \leftarrow \text{predict}(\text{examples}[i], \text{examples}[i].\text{label})$ 
3:    $\text{loss}(\text{prediction} \neq \text{examples}[i].\text{label})$ 
4: end for
```

- ❖ Write the decoder, providing some side information for training
- ❖ Library functions:
 - ❖ **predict**: returns individual predictions.
 - ❖ **loss**: declares the joint loss.

Credit Assignment Compiler [NIPS 16]

- ❖ Credit assignment problem:
When making a mistake, which local decision should be blamed?
- ❖ Handled automatically by the underlying learning system

Runs **Run()** many times to learn **predict()** that yields low **loss()**.

⇒ turns **Run()** and training data into model updates

Credit Assignment Compiler in VW

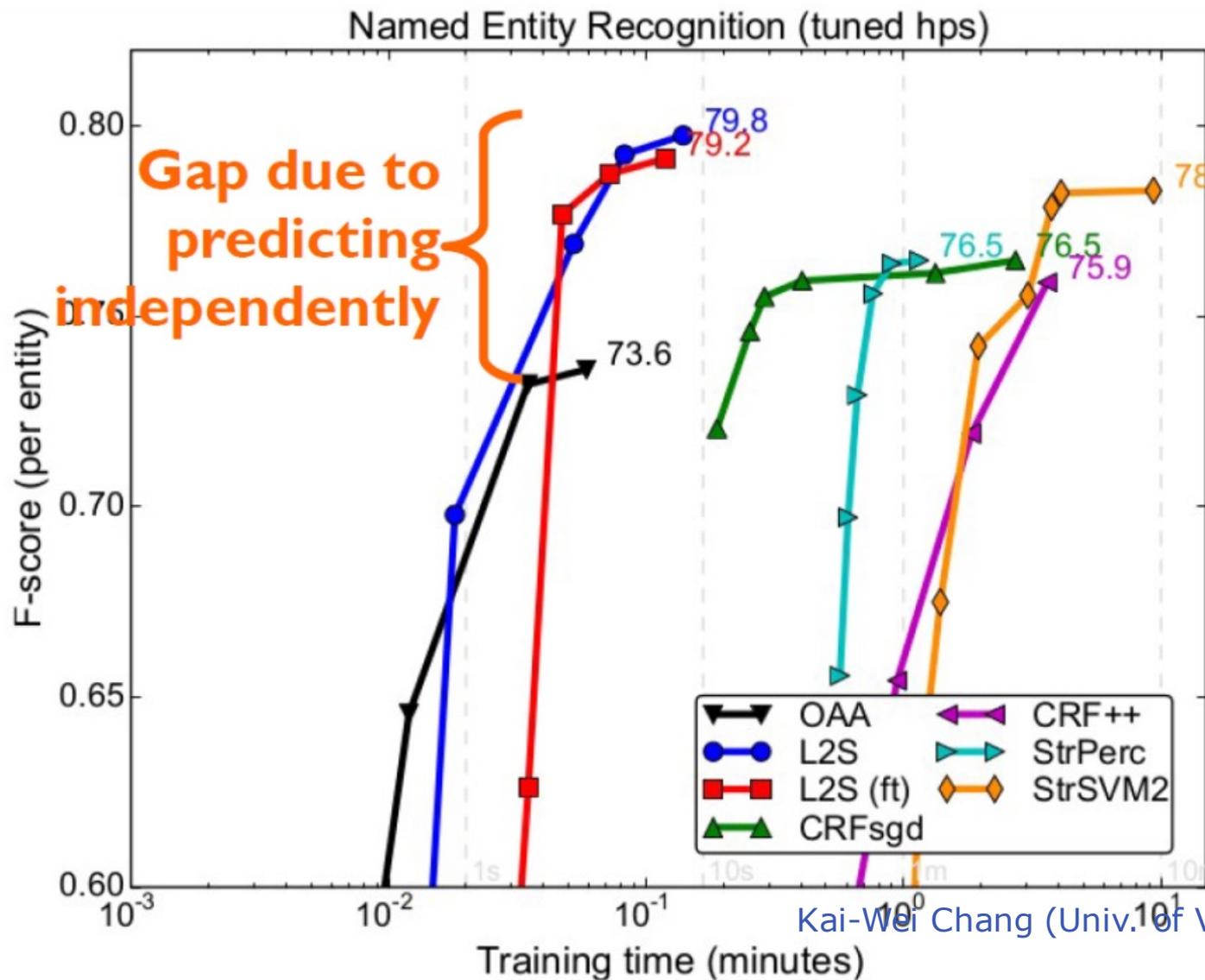
❖ **Predefined models and feature templates**

```
vw -b 24 -d wsj.train.vw -c --search_task sequence \  
  --search 45 --search_neighbor_features -1:w,1:w \  
  --affix -1w,+1w -f wsj.weights
```

❖ **Base learners:**

online learning models, neural networks, etc.

Training Time v.s. Test Accuracy

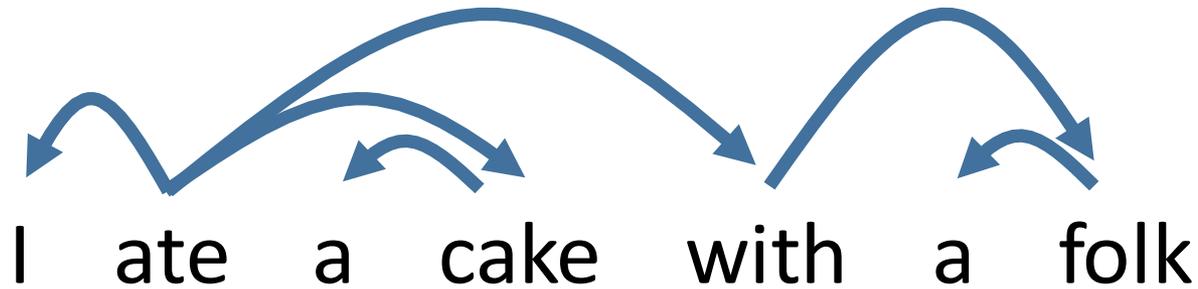


Tutorials and Demos

- ❖ Sequential labeler

- ❖ Dependency parser

identifying relationship between words



- ❖ Tutorials: <http://hunch.net/~l2s>