Event extraction using iterative optimization

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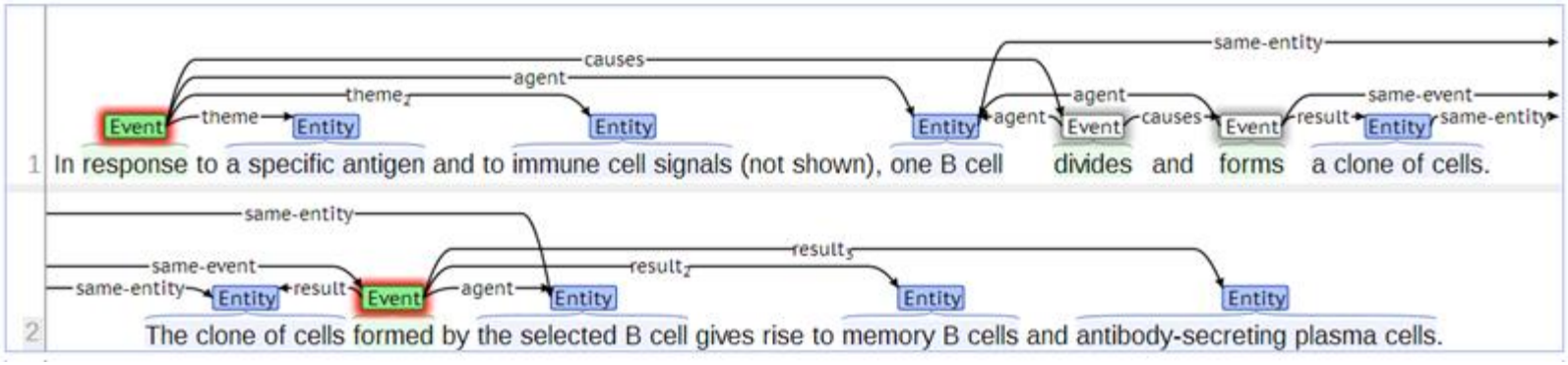
Project goal

In response to a specific antigen and to immune cell signals (not shown), one B cell divides and forms a clone of cells. The remaining B cells, which have antigen receptors specific for other antigens, do not respond. The clone of cells formed by the selected B cell gives rise to memory B cells and antibody-secreting plasma cells.

Model



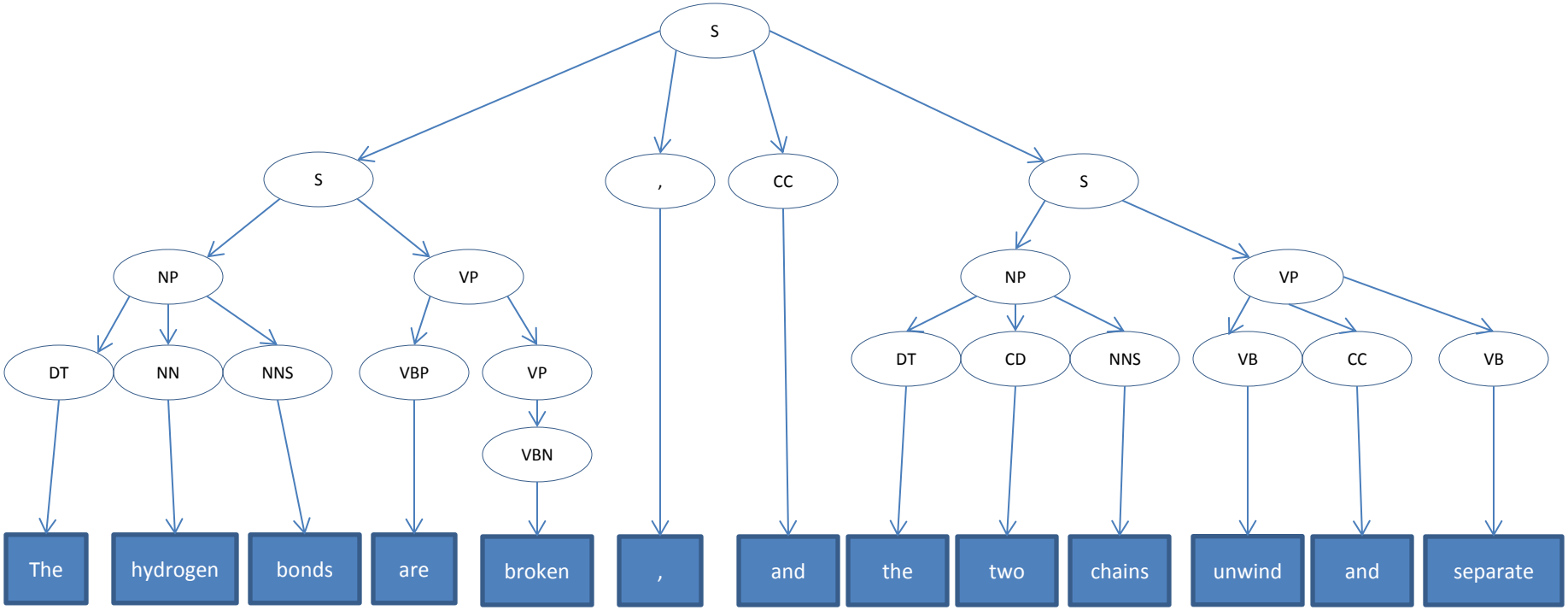
Stages

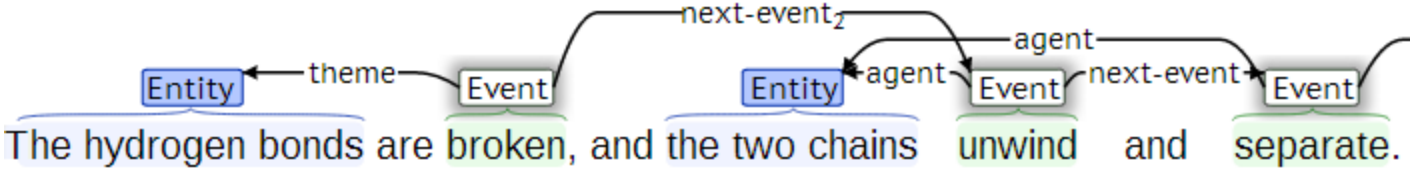
- Three high level stages
  - Event/trigger prediction
  - Entity (argument) identification for triggers
  - Semantic role labeling the entities identified
- MaxEnt based classifier for prediction
- Features
  - Lexical
  - Dependency tree based
  - Parse tree based

We use Stanford CoreNLP Toolkit

Representation

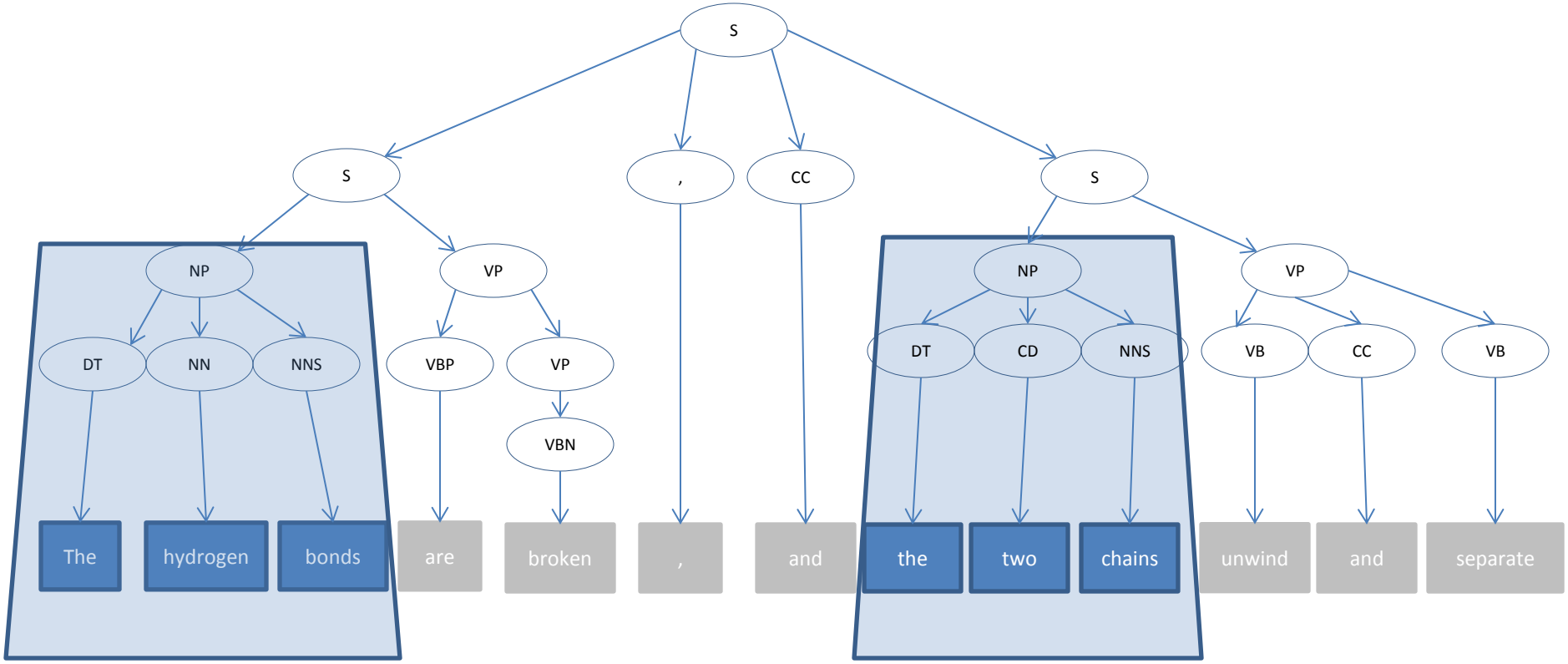
The hydrogen bonds are broken, and the two chains unwind and separate.

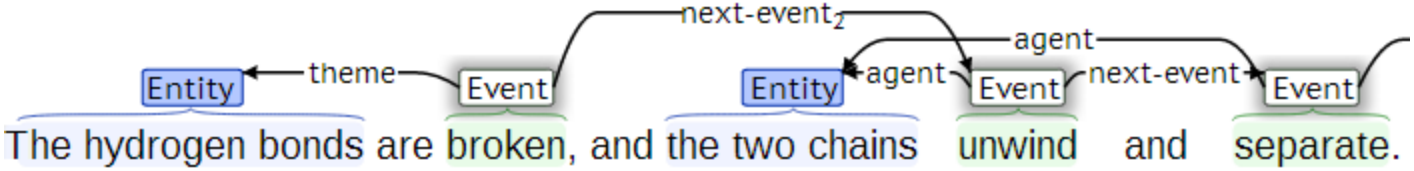




Example of representation - Entities

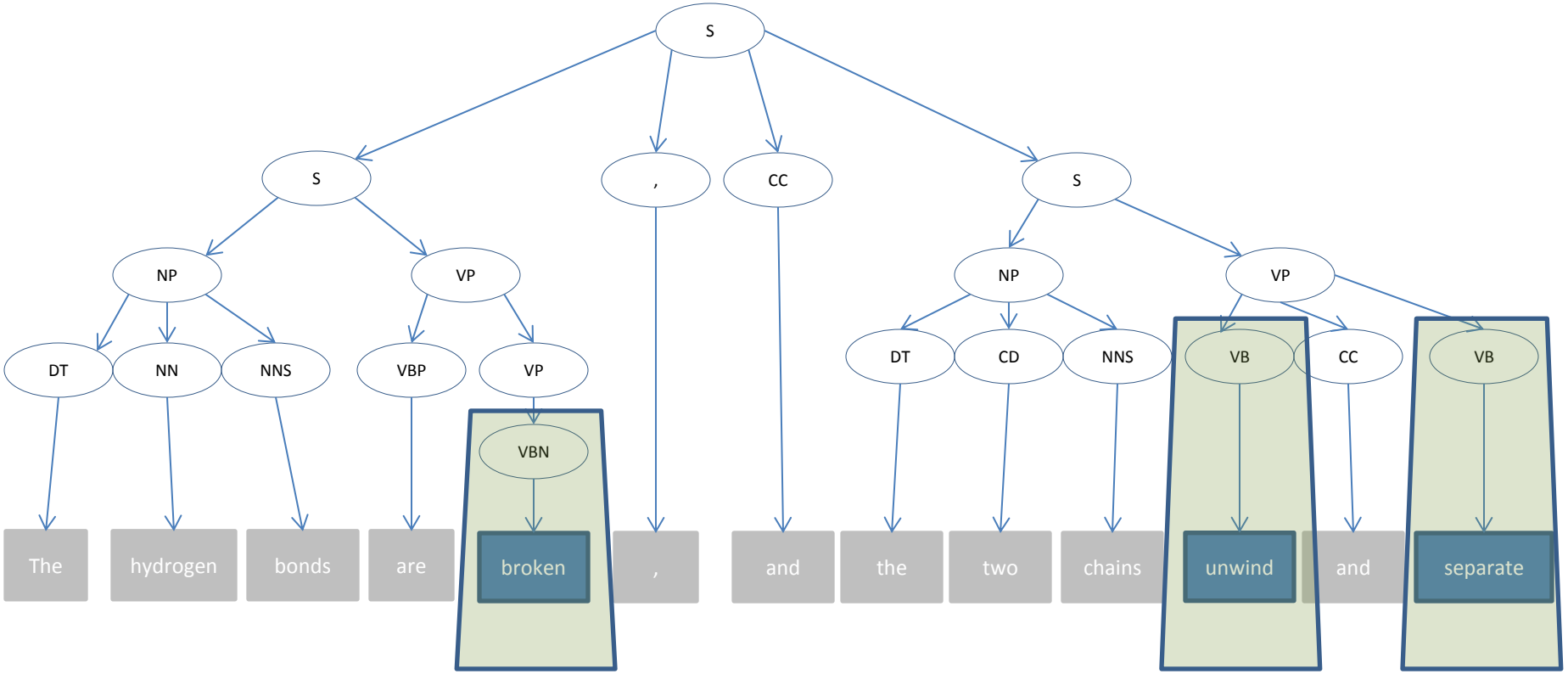
The hydrogen bonds are broken, and the two chains unwind and separate.

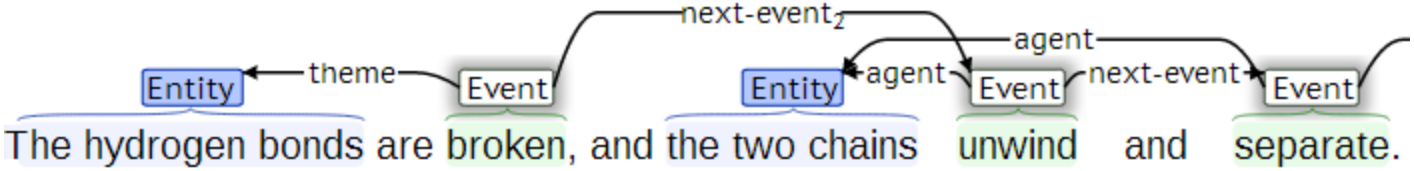




Example of representation – Event triggers

The hydrogen bonds are broken, and the two chains unwind and separate.

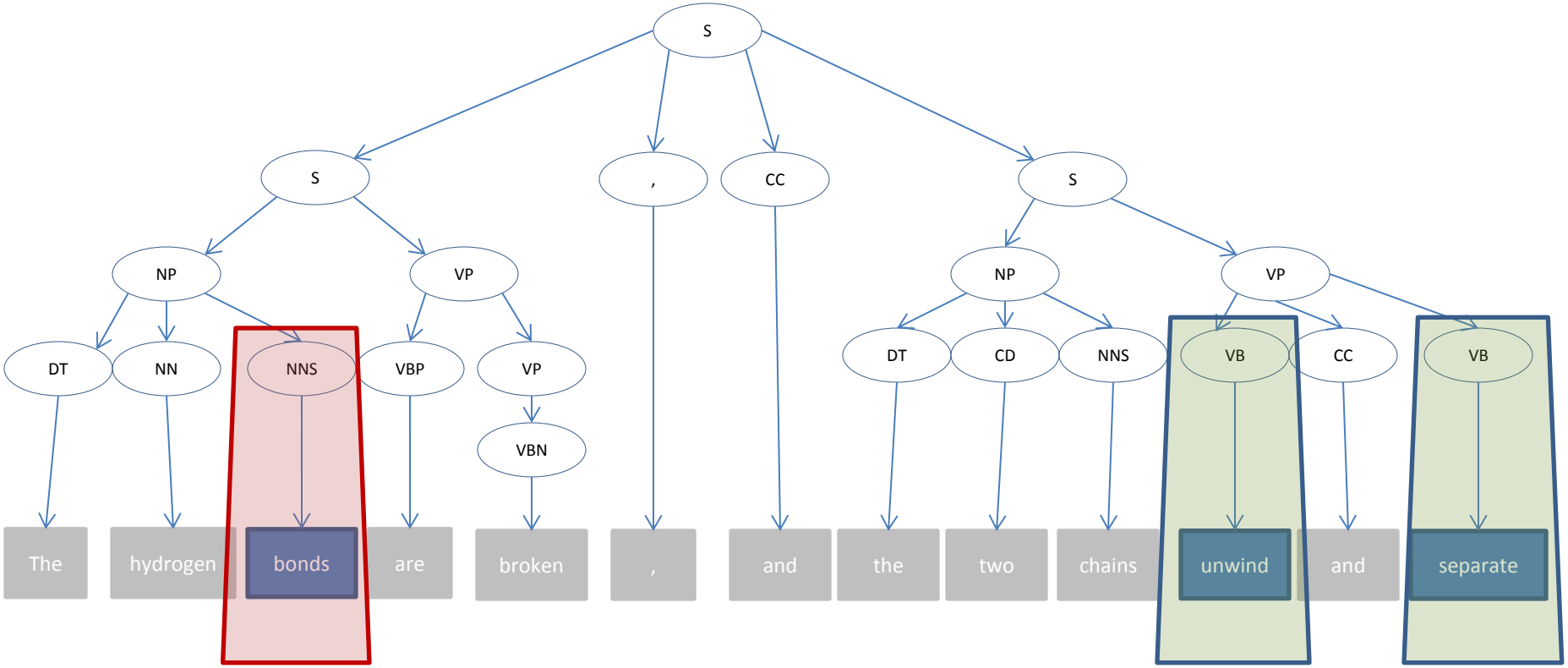


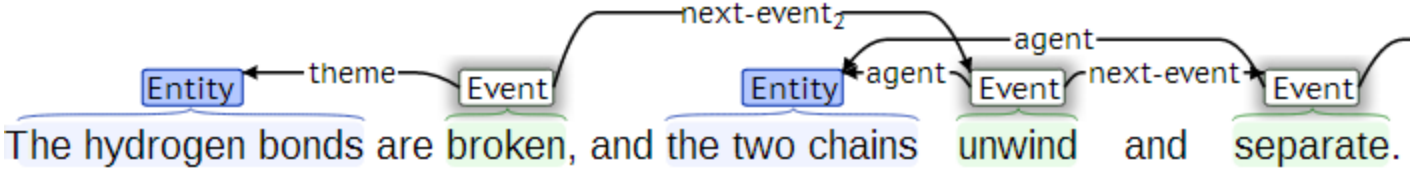


MODELS

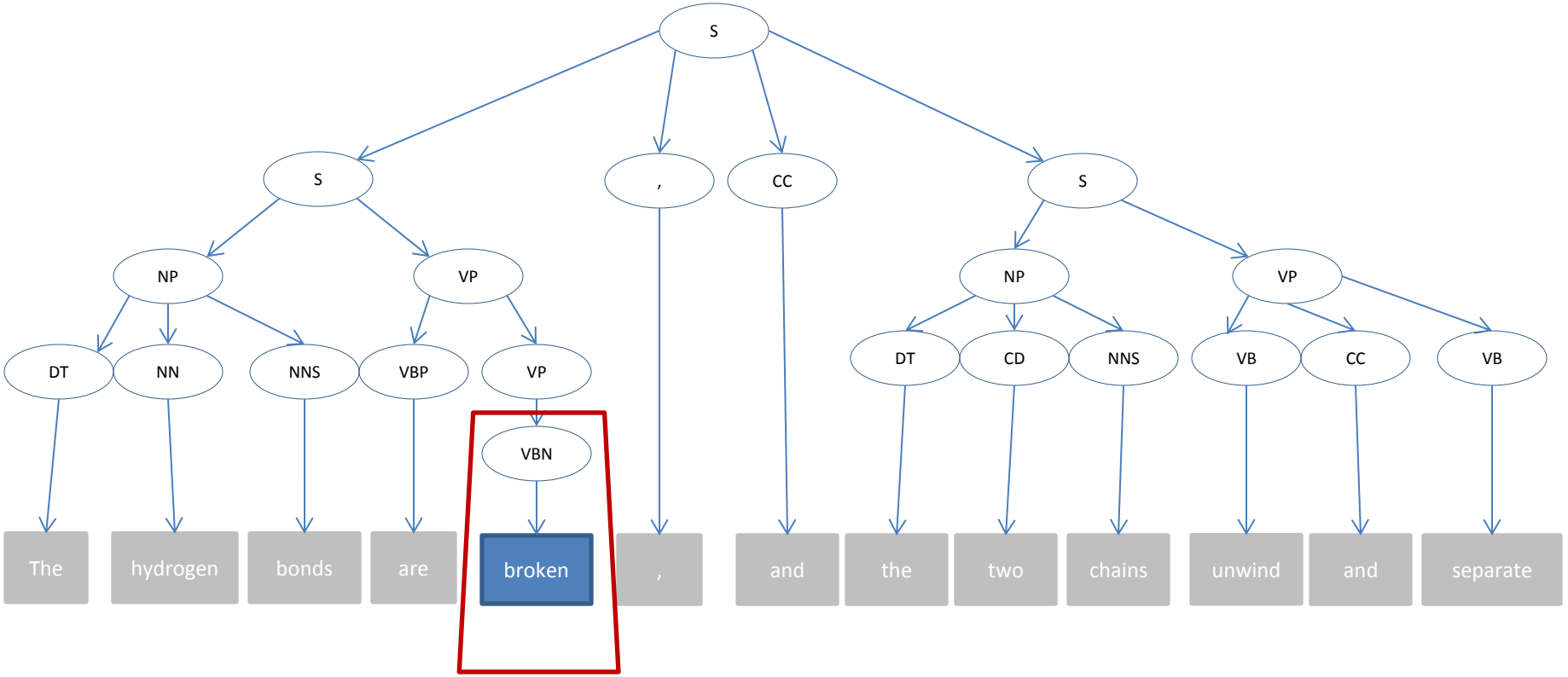
Event trigger prediction

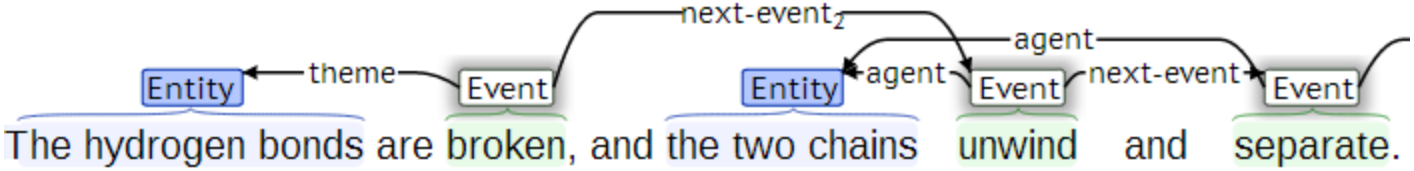
$$P(word \in \{TRIGGER\} \mid sentence)$$





Event trigger prediction





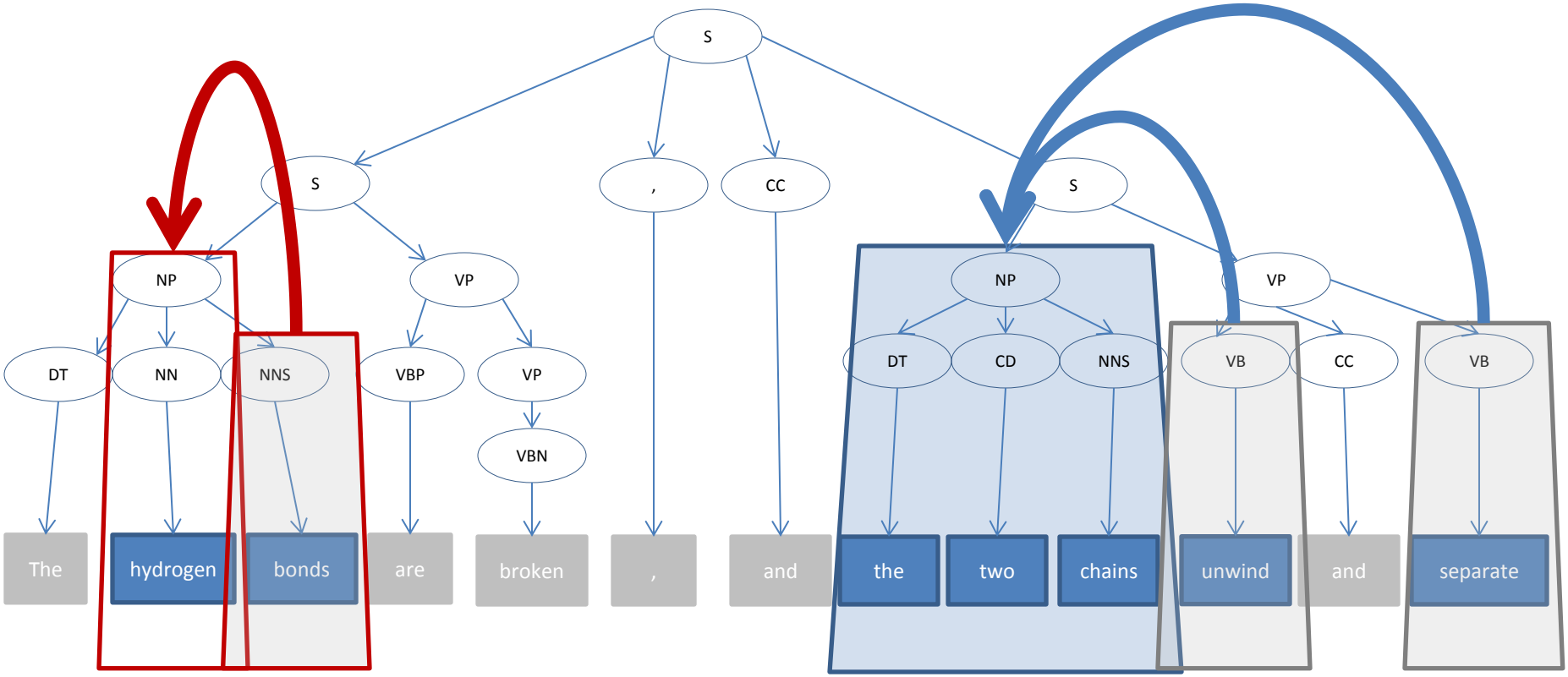
Event argument prediction

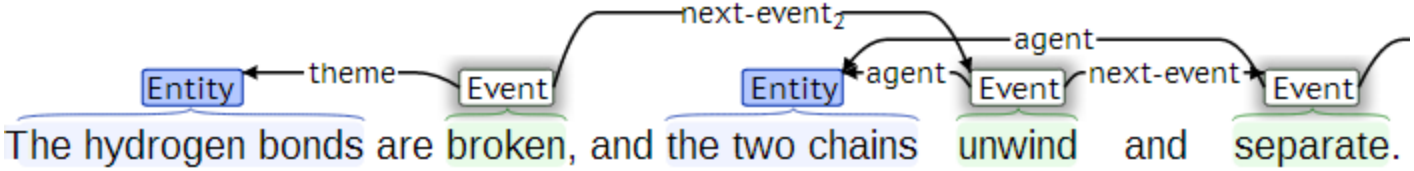
- For each trigger

$$P(phrase = argument \mid trigger, sentence)$$

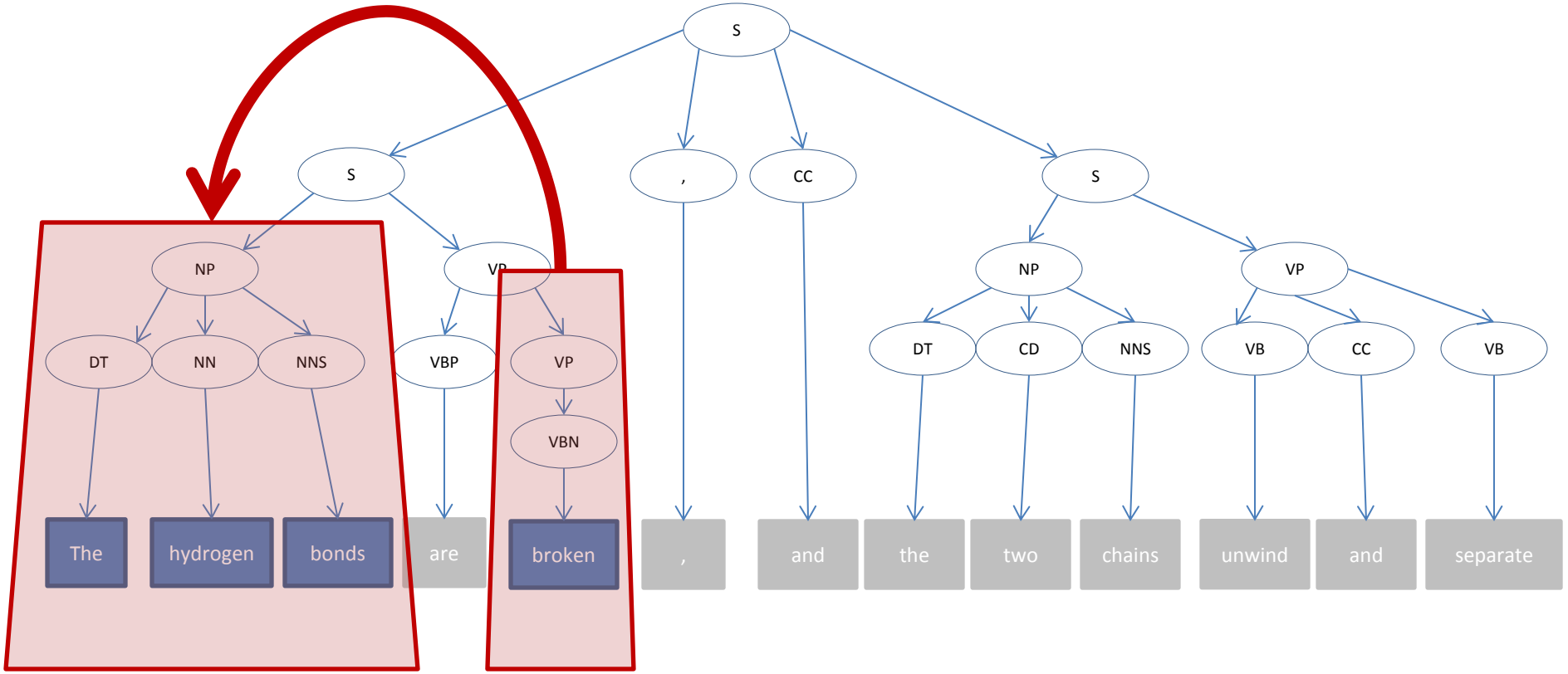
- Non overlapping constraint
  - Dynamic program

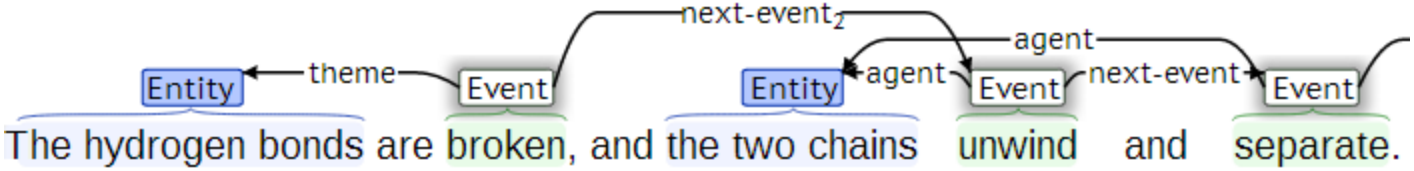
Entity prediction for trigger





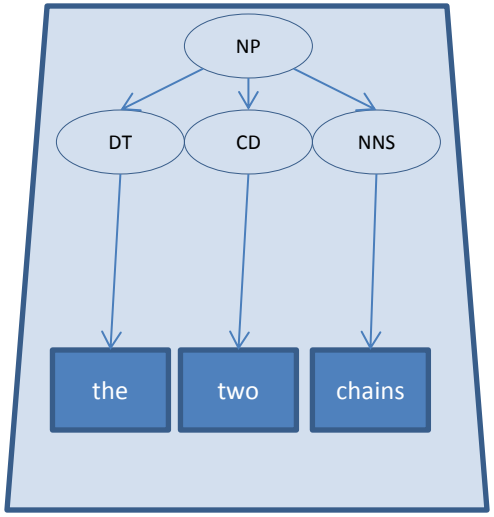
Entity prediction for trigger



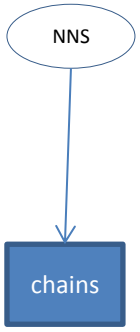


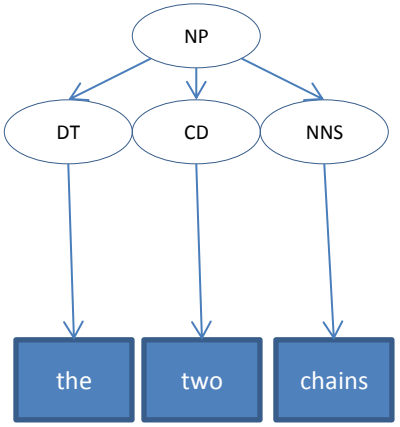
Dynamic program

Actual

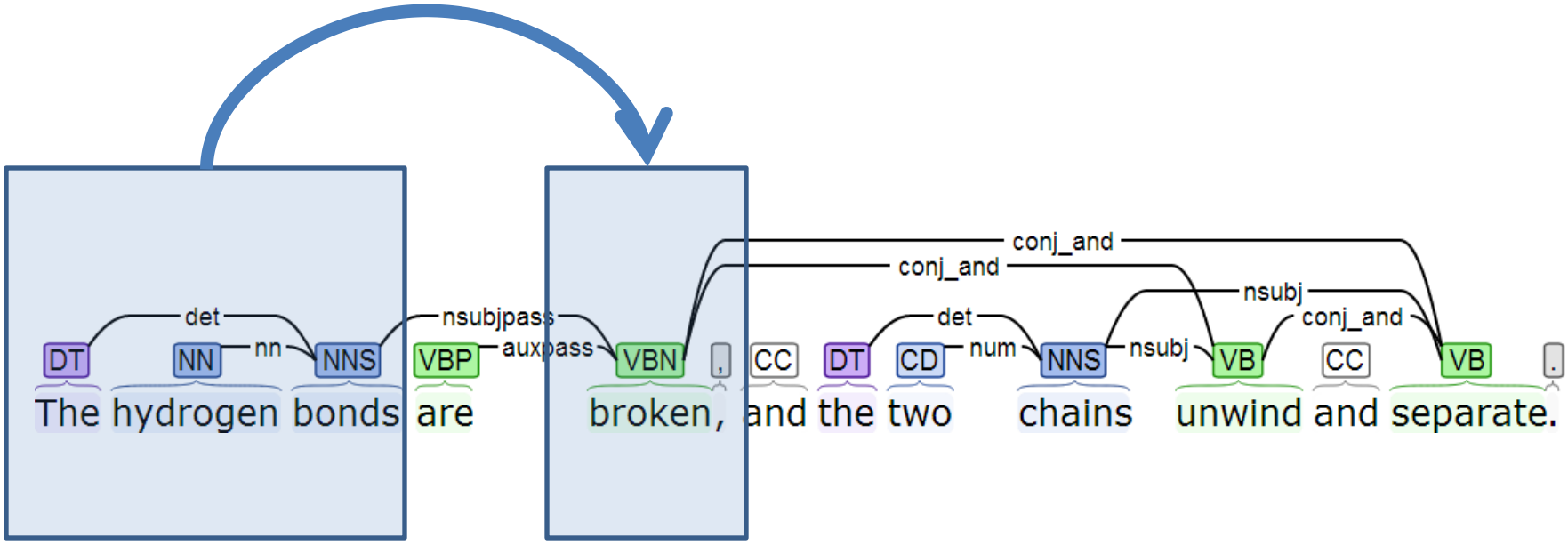


Predicts both

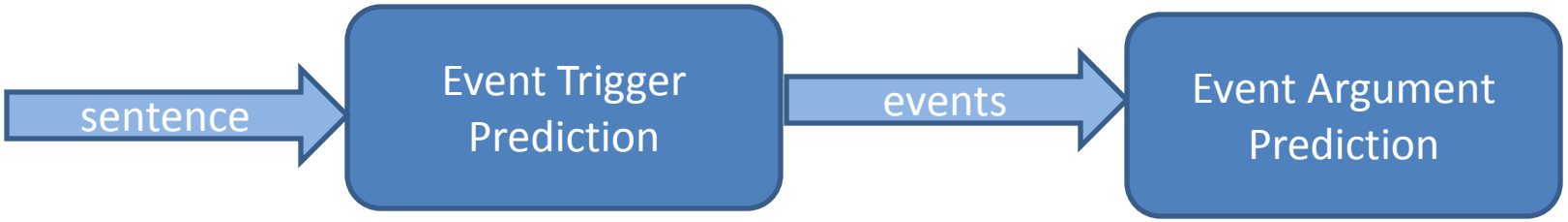




Dependency parse



Iterative optimization



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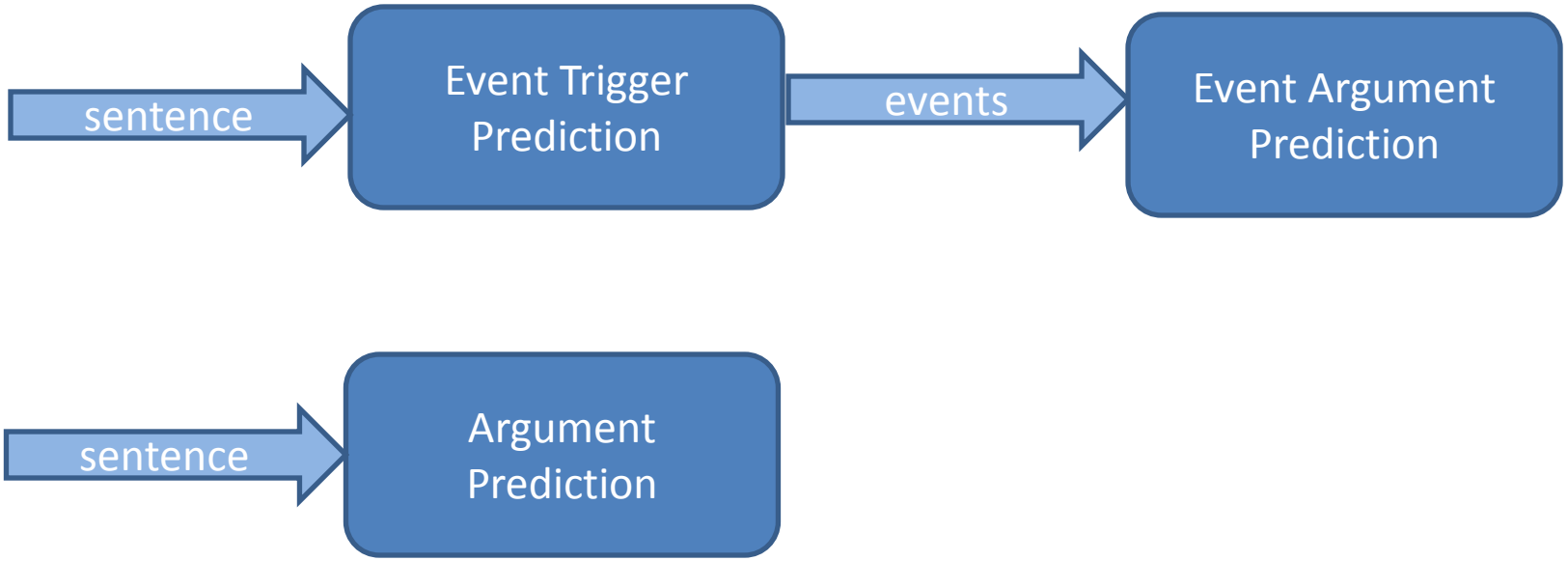
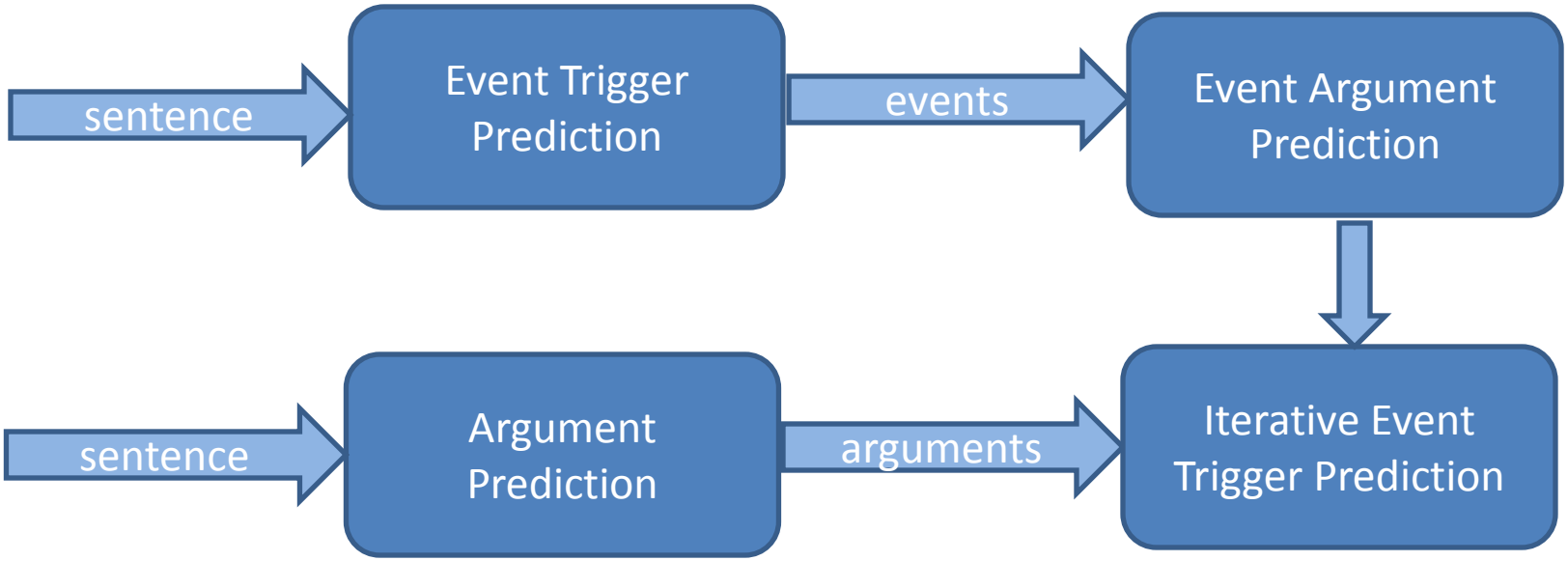
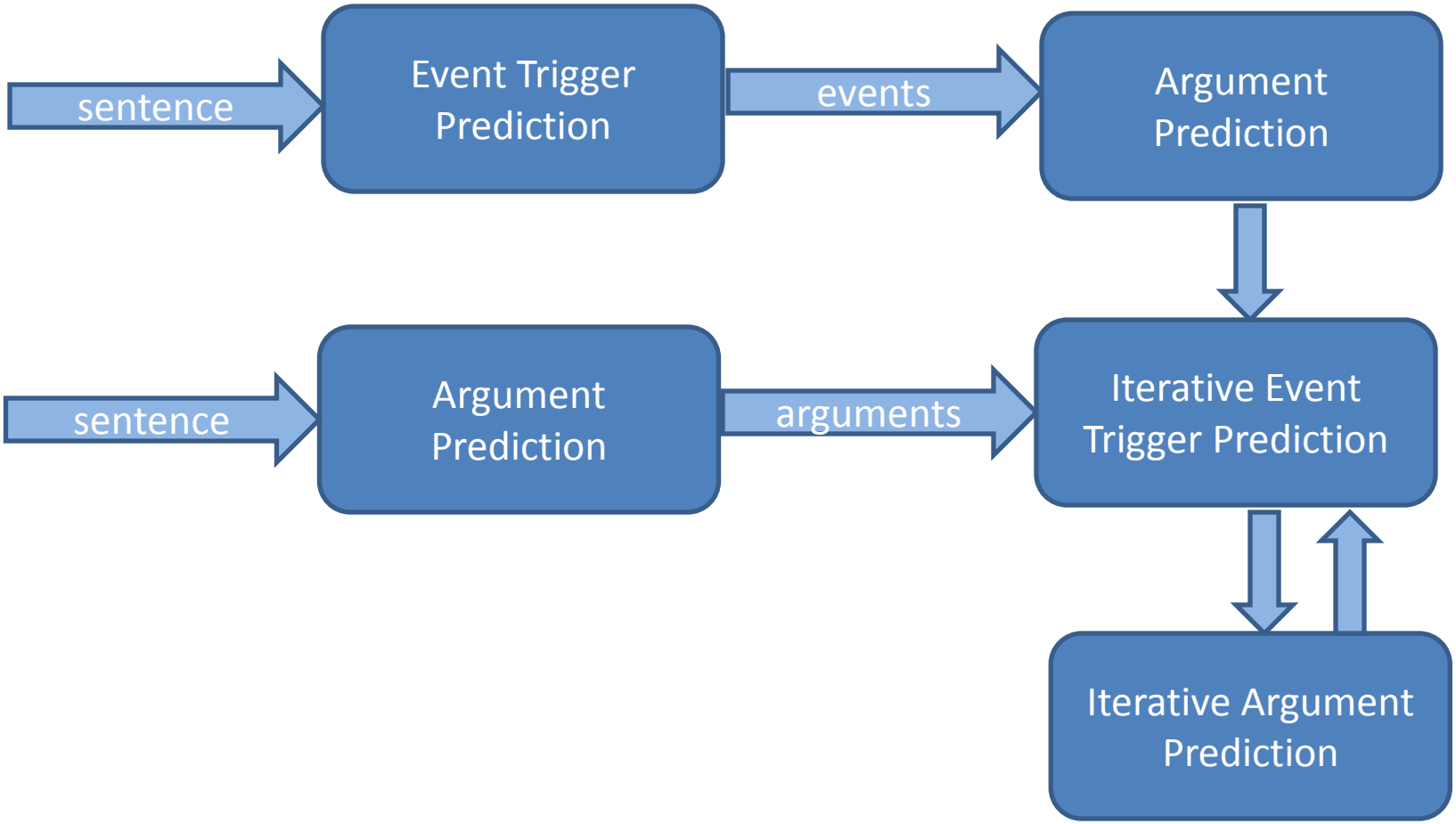


Iterative optimization

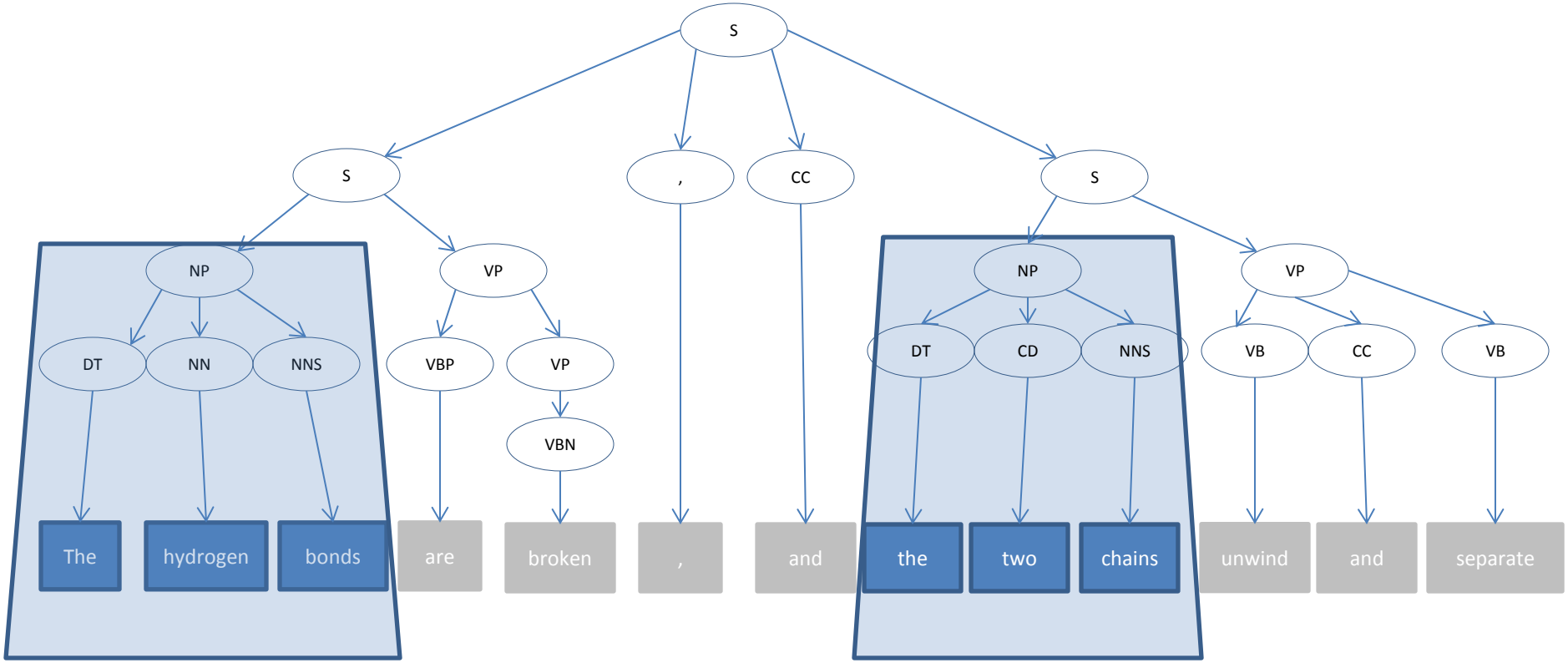


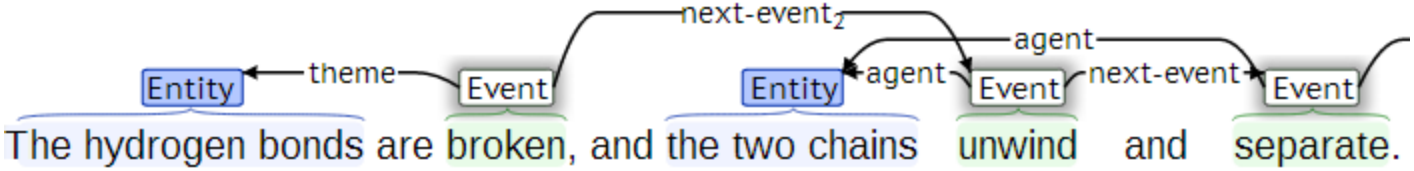
Iterative optimization



Argument Prediction

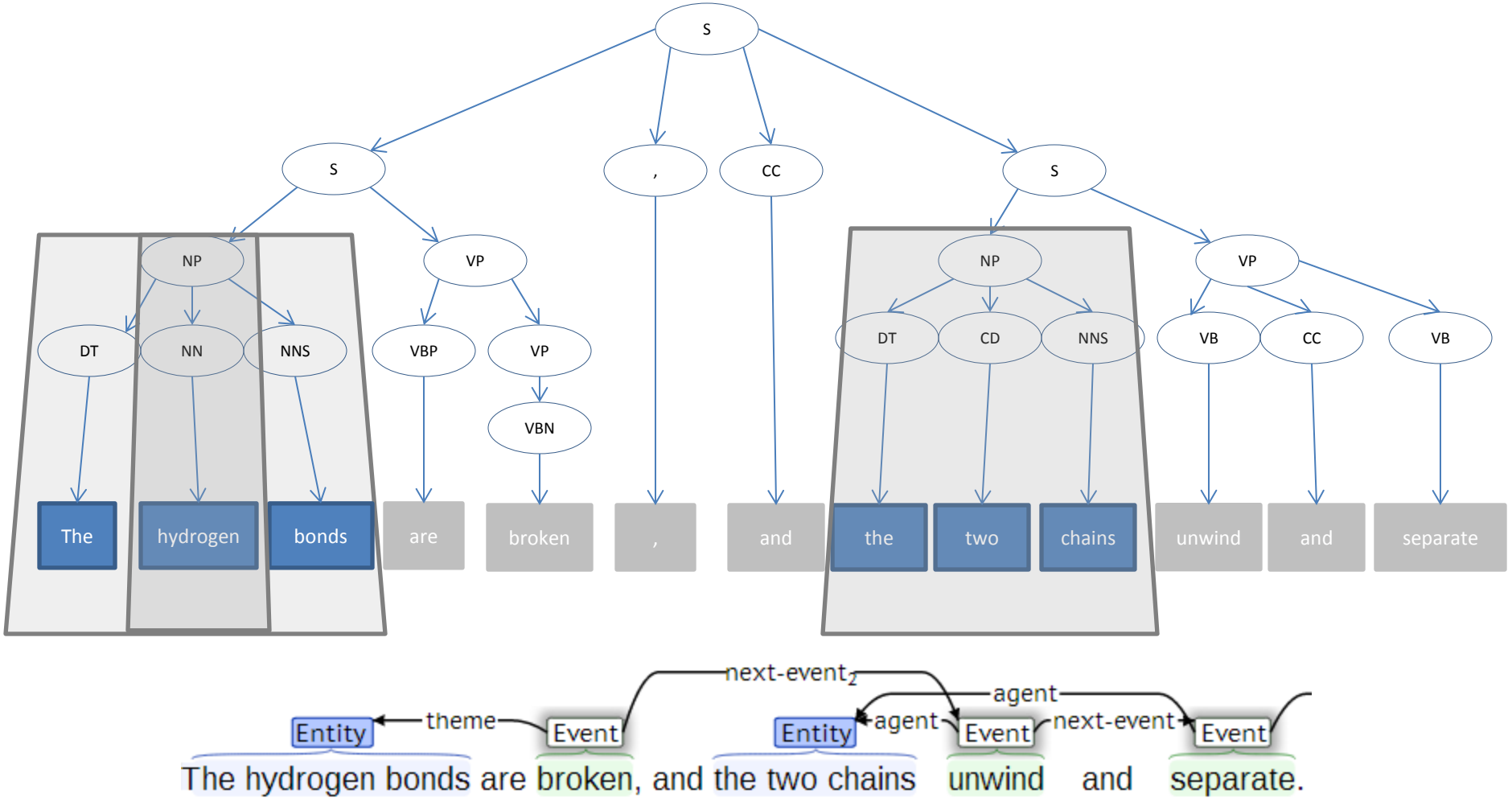
$P(phrase = argument \mid sentence)$





Iterative trigger prediction

$$P(word \in \{TRIGGER\} \mid \{ENTITIES\}, sentence)$$



Example of representation - Triggers

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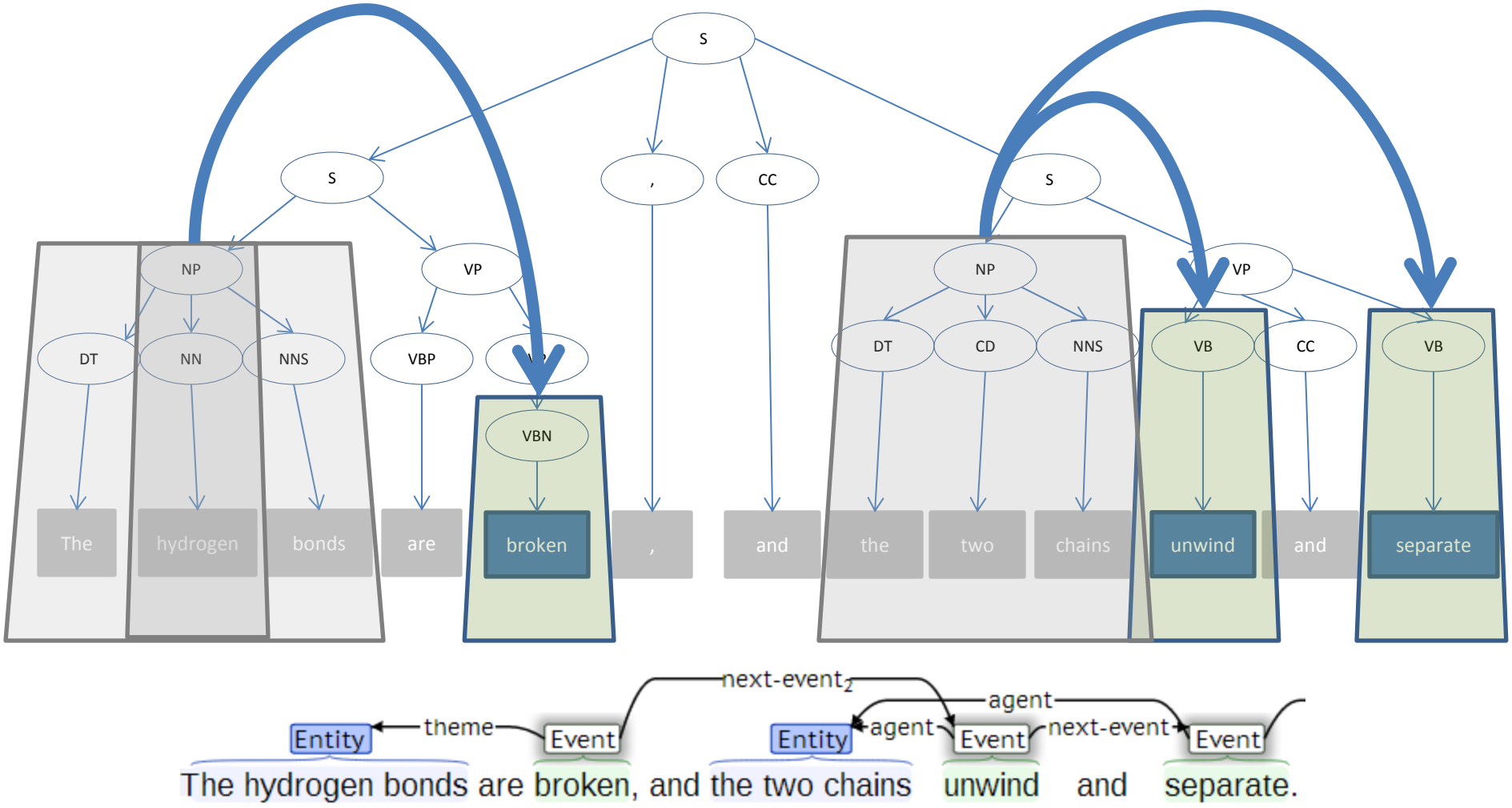

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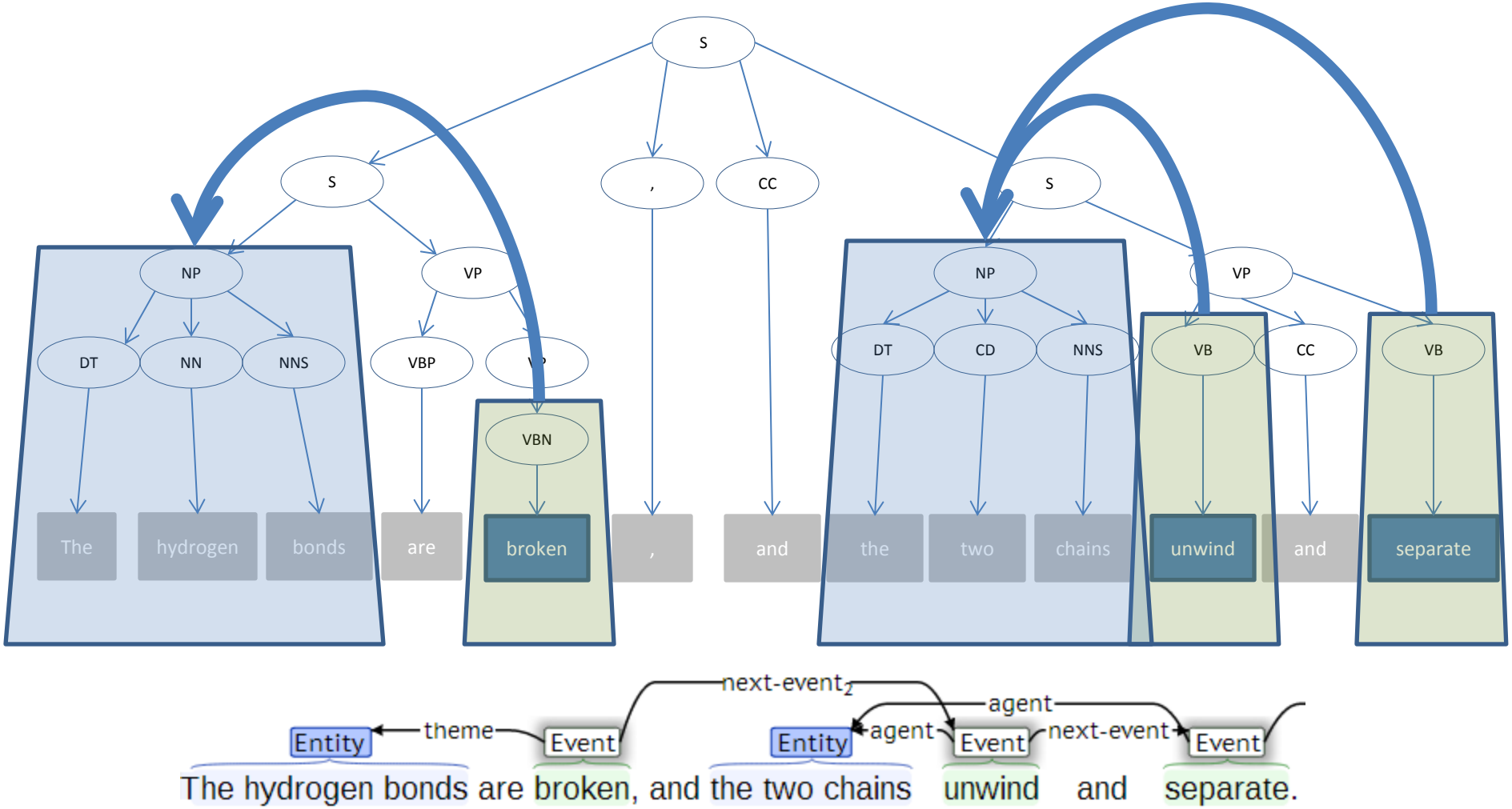

Results

Event prediction

Type	Precision	Recall	F1
Baseline	0.466	0.734	0.567
Basic	0.690	0.656	0.668
Iterative			

Event-Entity prediction

Type	Precision	Recall	F1
Baseline			
Basic			
Iterative			

Next steps

- Improve performance of classifiers
  - Add more features
- Semantic role labeling