

# Annotating Reduced Argument Scope Using QA-SRL

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# Contributions

1. Focus on **minimal** argument spans
2. Linguistic constructions characterizing minimality
3. Reliable crowdsourcing of minimal arguments annotation

# Argument Span

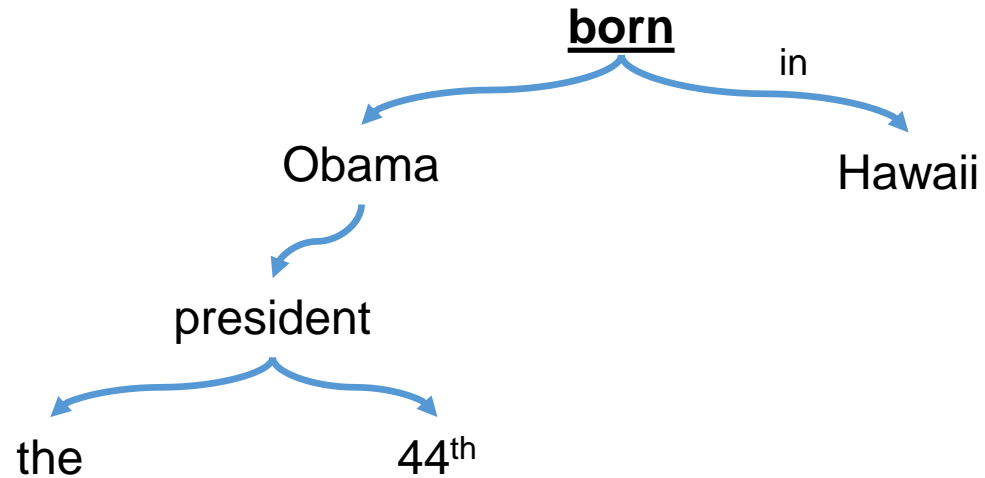
# Argument Span

*Obama, the 44<sup>th</sup> president, was born in Hawaii*

- Arguments are typically perceived as answering **role questions**
  - Who was born somewhere?
  - Where was someone born?

# Argument Span: “Inclusive” Approach

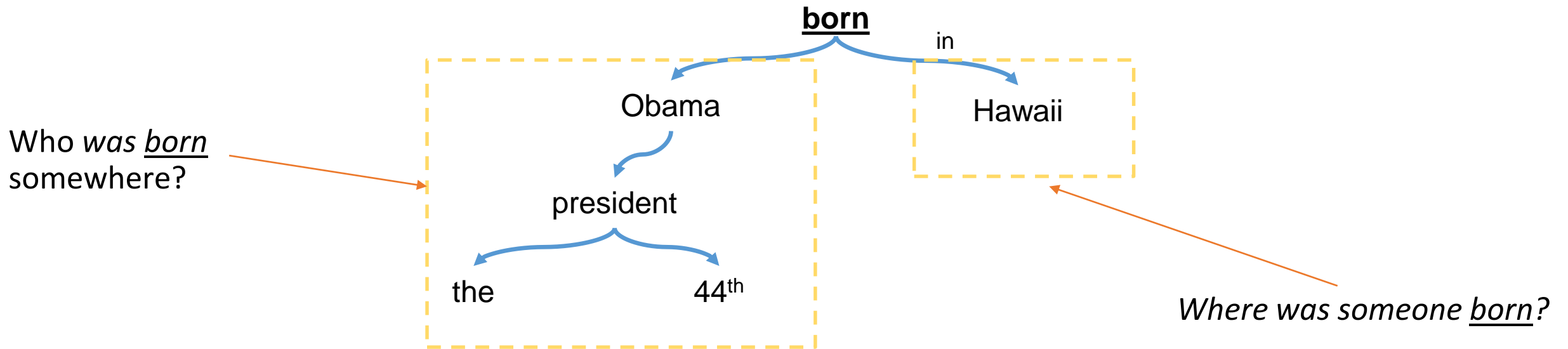
- Arguments are full syntactic constituents



- PropBank
- FrameNet
- AMR

# Argument Span: “Inclusive” Approach

- Arguments are full syntactic constituents



- PropBank
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# Can we go shorter?

**Obama**, the 44<sup>th</sup> president, was born in Hawaii

Who was born  
somewhere?

- More concise, yet sufficient answer

# Motivation: Applications

- **Sentence Simplification**

Barack Obama, the 44<sup>th</sup> president, thanked vice president Joe Biden and Hillary Clinton, the secretary of state



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- **Knowledge Representation**

- **Question Answering**

# Motivation: Qualitative Evidence

- Having **shorter arguments** improved performance in
  - **Open IE** (Corro et al., 2013)
  - **TAC-KBP Slot Filling Task** (Angeli et al. ,2015)
  - **Text Comprehension** (Stanovsky et al., 2015)

What is a minimal span?

# Problem Formulation

- Given:
  - $p$  - predicate in a sentence
    - *Obama, the newly elected president, flew to Russia*
  - $a = \{w_1, \dots, w_n\}$  - non-reduced “PropBank” argument
    - *Obama, the newly elected president*
  - $Q(p, a)$  - argument role question
    - *Who flew somewhere?*

# Problem Formulation

- Find:

$M(p, a)$ - a set of minimally scoped arguments, **jointly answering  $Q$**

Barack Obama, the 44<sup>th</sup> president, thanked vice president Joe Biden and Hillary Clinton, the secretary of state

- $Q_1$ : Who thanked someone?
- $Q_2$ : Who was thanked?

$M(Q_1)$ : Barack Obama

$M(Q_2)$ : Joe Biden; Hillary Clinton

# Background: QA-SRL Annotation

- Recently, He et al. (2015) suggested pred-arg annotation by explicitly asking and answering **argument role questions**
- Published a large predicate-argument corpus annotated by QA pairs
  - Utilized in our annotation as follows...

# Expert Annotation Experiment

- Using **questions** annotated in QA-SRL
  - **Re-answer** with minimal arguments
  - Annotated 260 arguments in 100 predicates

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Annotation	Argument	Word
Expert - IAA	94.6%	97.1%

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Our criterion can be **consistently annotated** by experts

# Linguistic Characterization of Minimality

1. Removal of tokens from  $a$   
=> **Omission of *non-restrictive modification***
2. Splitting  $a$   
=> **Decoupling *distributive coordinations***

# Restrictive vs. Non-Restrictive

- Restrictive

- *She wore the necklace **that her mother gave her***

- Non – Restrictive

- ***Obama** ~~, the newly elected president,~~ flew to Russia*

# Distributive vs. Non-Distributive

- Distributive
  - *Obama and Clinton* were born in America
- Non-Distributive
  - *John and Mary* met at the university

# Distributive vs. Non-Distributive

- Distributive

- **Obama** and **Clinton** were born in America

✓ **Obama** was born in America

✓ **Clinton** was born in America

- Non-Distributive

- **John and Mary** met at the university

✗ **John** met at the university

✗ **Mary** met at the university

# Impact on PropBank

<b>Arguments reduced</b>	<b>24%</b>
Non-Restrictive	19%
Distributive	5%

The average reduced argument shrunk by 58%

Our annotation **significantly reduces** PropBank argument spans

# Non-expert Annotation

# Does QA-SRL Captures Minimality?

- QA-SRL guidelines do not specifically aim to minimize arguments

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Non-experts **intuitively minimize** argument span

# Can We Do Better?

- Ask **turkers** to re-answer the QA-SRL questions:
  - “Specify the shortest possible answer from which the entity is identifiable”

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Explicit guidelines yield **more consistent** argument spans

# Conclusion

- **Minimal argument scope**
  - Motivated by applications
- Linguistic characterization of argument minimality
  - Removing **non-restrictive modification** (long paper in ACL)
  - Decoupling **distributive coordinations**
- **Consistent and intuitive non-expert annotation**

Thanks for listening!