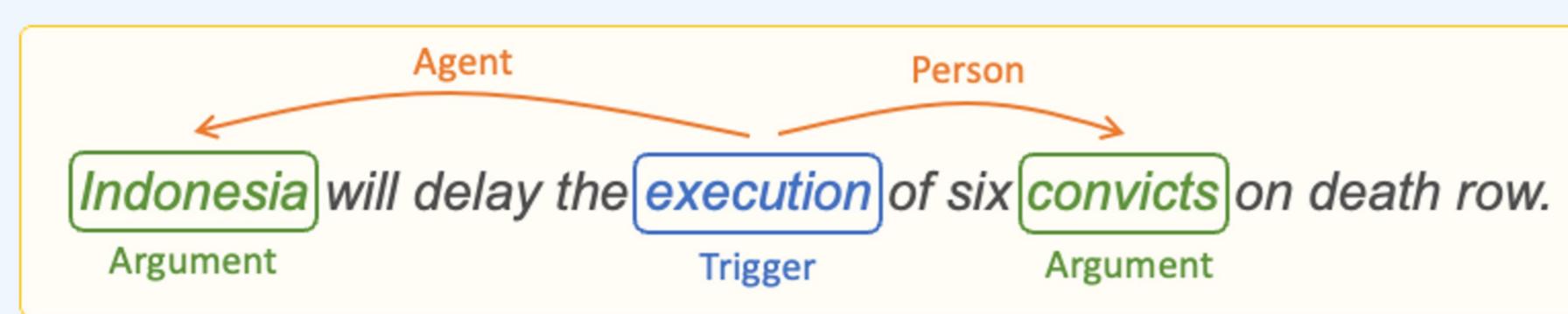


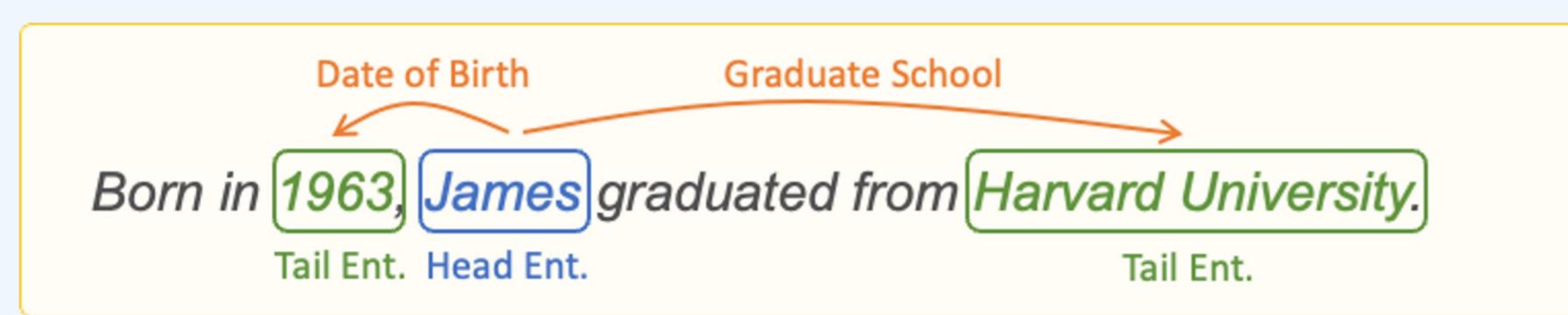
I-Hung Hsu<sup>\*1</sup> Kuan-Hao Huang<sup>\*2</sup> Shuning Zhang<sup>3</sup> Wenxin Cheng<sup>2</sup>Premkumar Natarajan<sup>1</sup> Kai-Wei Chang<sup>2</sup> Nanyun Peng<sup>2</sup><sup>1</sup> Information Science Institute, University of Southern California<sup>2</sup> University of California, Los Angeles <sup>3</sup> Tsinghua University

## Relational Structure Extraction

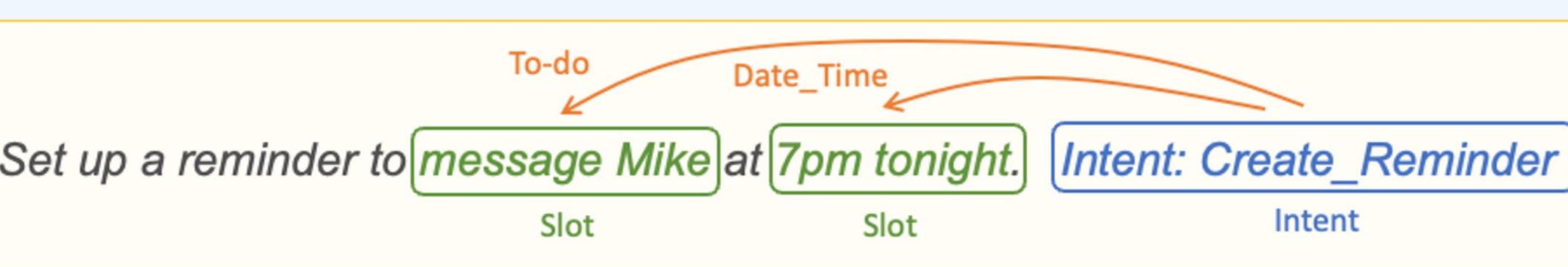
End-to-End Event Extraction



End-to-End Relation Extraction



Task-Oriented Semantic Parsing



## Our Contributions

### Prior work

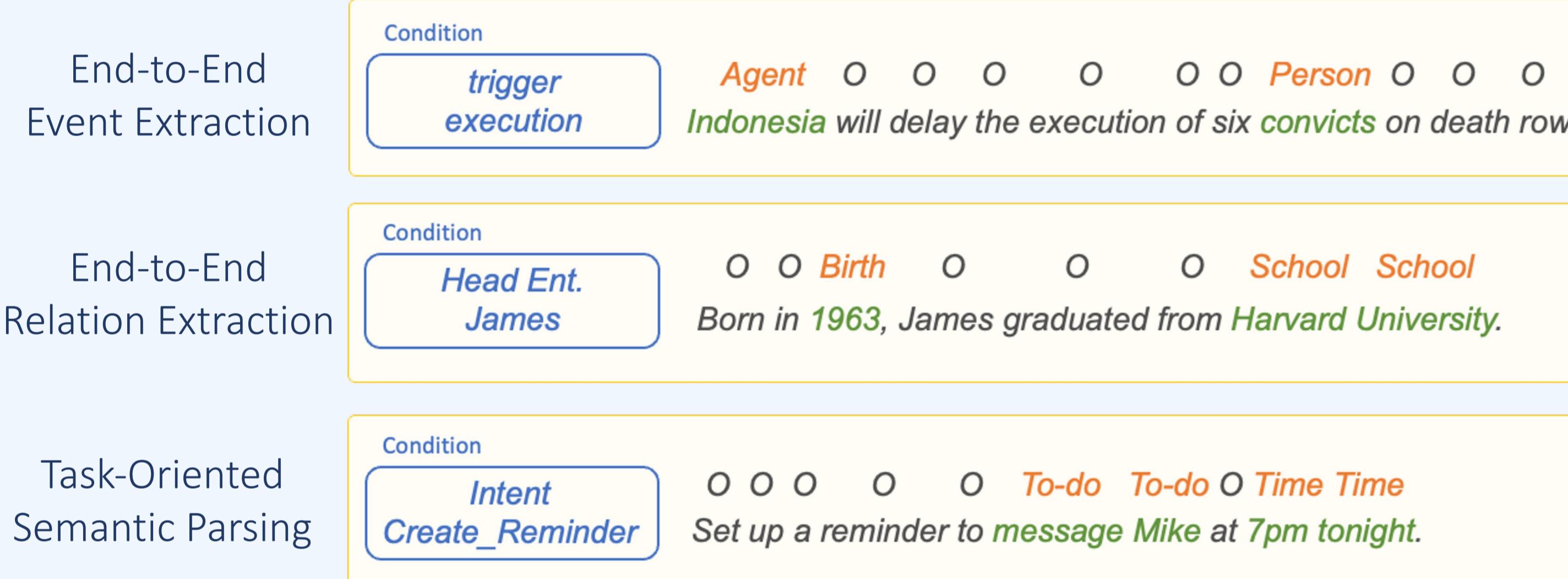
- Design a **specific** and complicated model for **each task**

### Our work

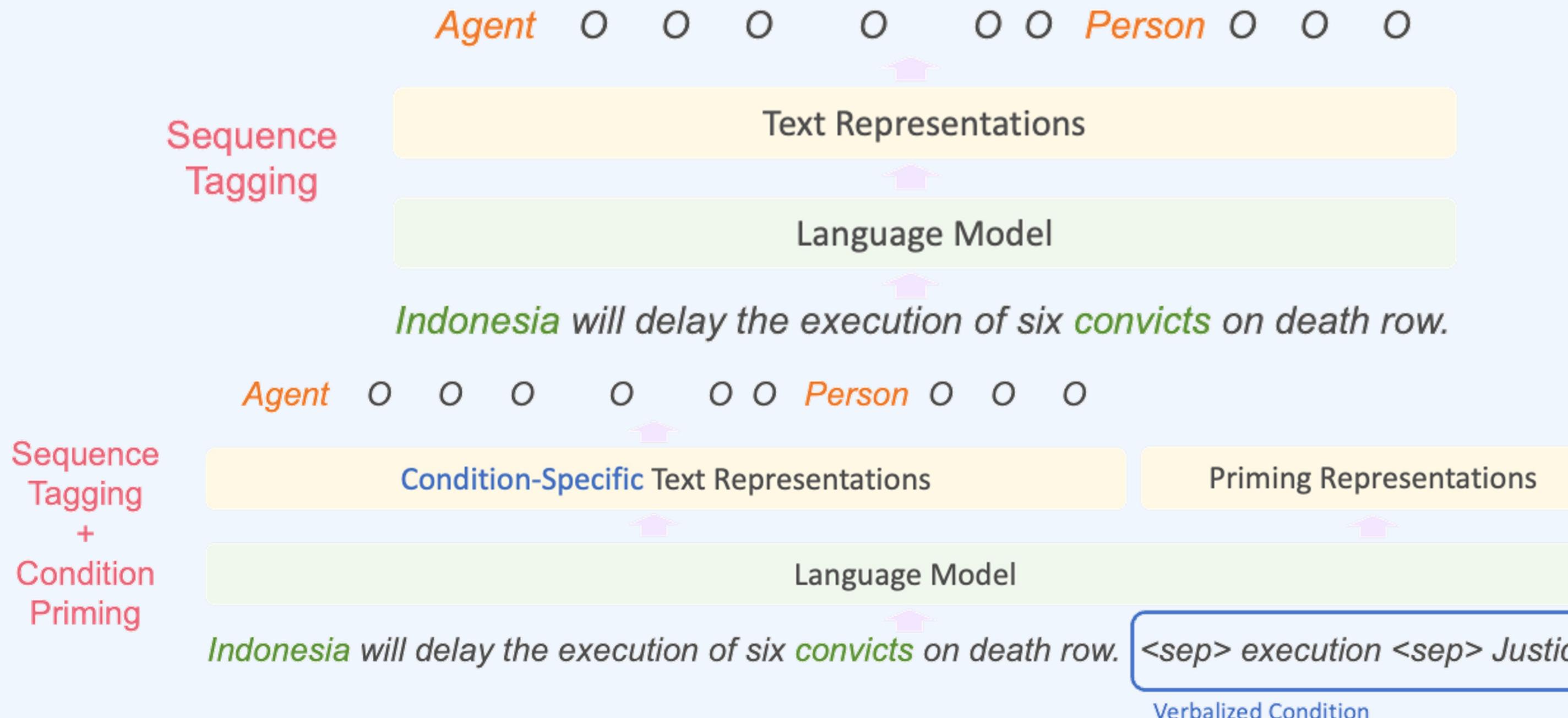
- Take a unified view of relational structure extraction
- Propose TAGPRIME, simple but effective for **all tasks**
- Adapt **priming techniques** to boost performance

## A Unified View of Relational Structure Extraction

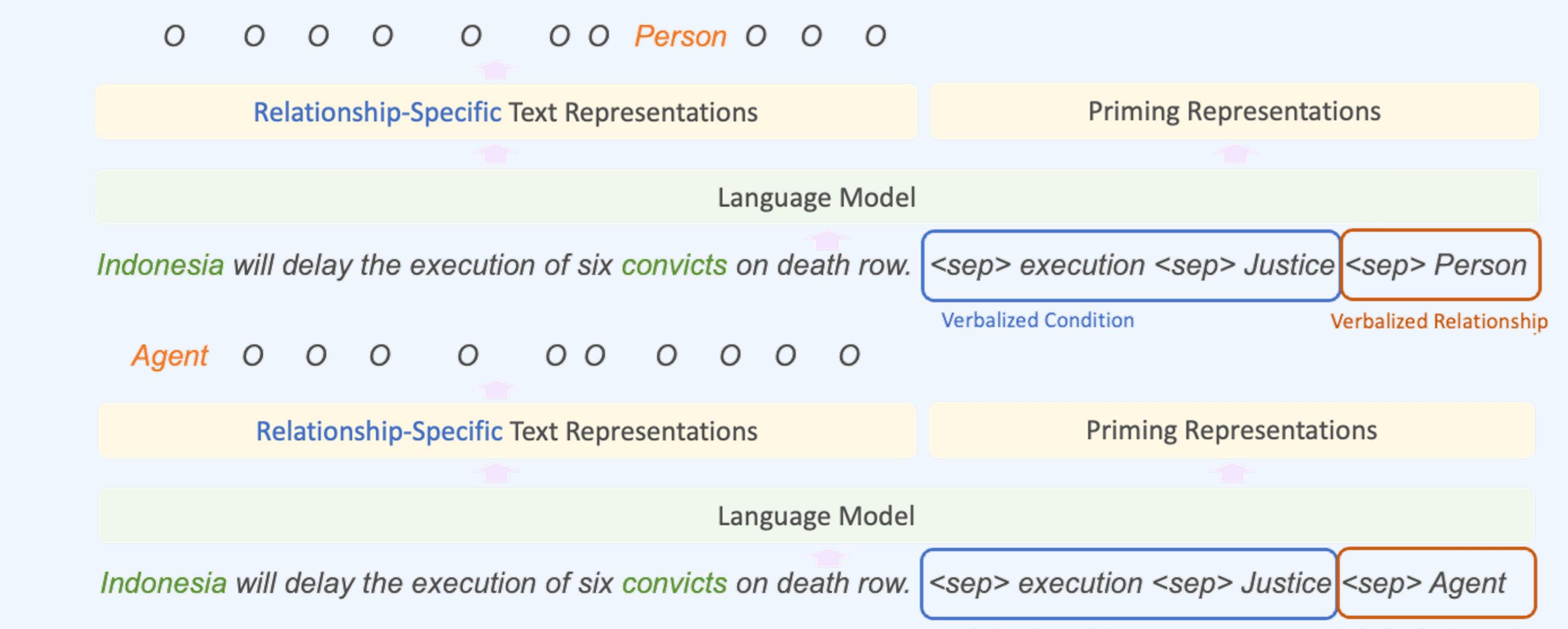
Extract word spans and corresponding relationships based on conditions



## Condition Priming



## Relationship Priming



## Comparison Between Features and Priming

**Input Text:** Tim Ewart of ITN News reports on evidence of atrocities at an abandoned Iraqi military base

**Target:** Tim Ewart ITN News Iraqi military base

**MLP**

Pre-trained Language Model

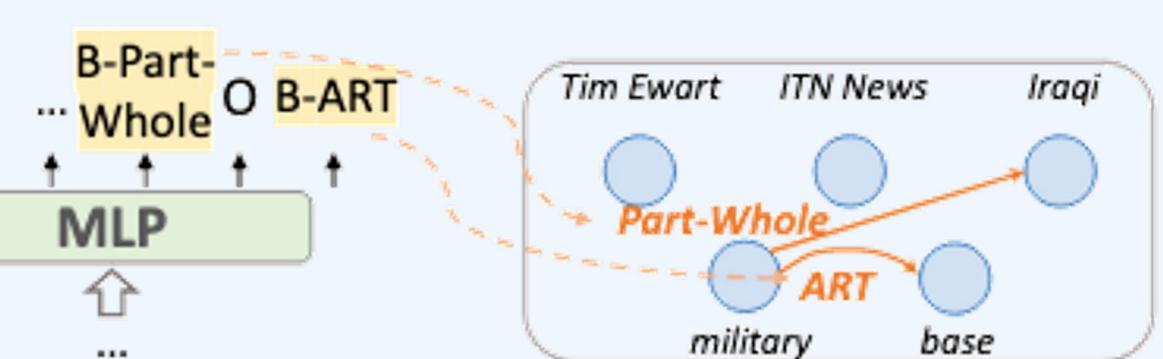
Input Text [SEP] Verbalized Condition

military [SEP] Organization

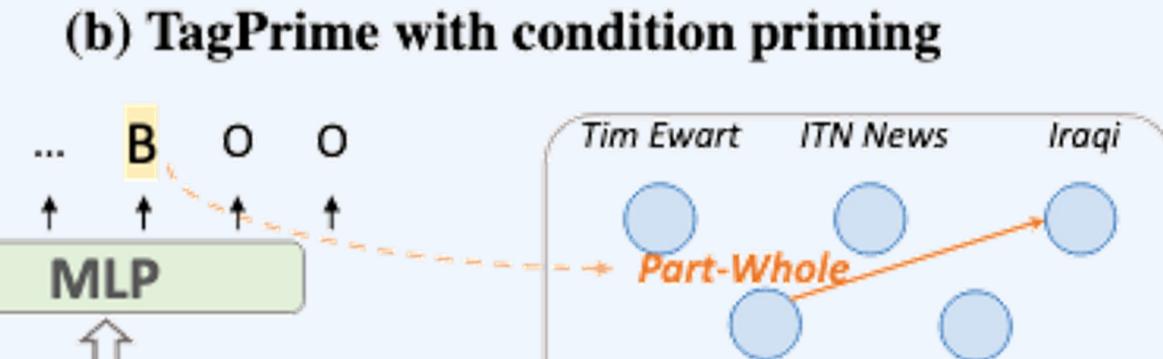
is part of

(a) Sequence tagging model with conditional features

Learnable Conditional Features



(b) TagPrime with condition priming



Pre-trained Language Model

Input Text [SEP] Verbalized Condition [SEP] Verbalized Relationship

military [SEP] Organization

is part of

(c) TagPrime with condition & relationship priming

## Task 1: End-to-End Event Extraction

Model	ACE05-E (en)			ACE05-E (zh)			ERE (en)			ERE (es)		
	Tri-C	Arg-I	Arg-C	Tri-C	Arg-I	Arg-C	Tri-C	Arg-I	Arg-C	Tri-C	Arg-I	Arg-C
DyGIE++* (Wadden et al., 2019)	69.7	53.0	48.8	72.3	63.0	59.3	58.0	51.4	48.0	65.8	49.2	46.6
TANL (Paolini et al., 2021)	68.4	50.1	47.6	-	-	-	54.7	46.6	43.2	-	-	-
Text2Event (Lu et al., 2021)	71.9	-	53.8	-	-	-	59.4	-	48.3	-	-	-
OneIE* (Lin et al., 2020)	74.7	59.2	56.8	73.3	63.4	60.5	57.0	50.1	46.5	66.5	54.5	52.2
DEGREE (Hsu et al., 2022b)	73.3	-	55.8	-	-	-	57.1	-	49.6	-	-	-
TAGPRIME w/ Cond. Priming	74.6	<b>60.0</b>	56.8	71.9	63.2	60.5	57.3	52.1	49.3	66.3	<b>55.2</b>	52.6
TAGPRIME w/ Cond. & Rela. Priming	74.6	59.8	<b>58.3</b>	71.9	64.7	<b>62.4</b>	57.3	<b>52.4</b>	<b>49.9</b>	66.3	55.1	<b>53.6</b>

## Task 2: End-to-End Relation Extraction

Model	ACE05-R			ACE04-R		
	Ent	Rel	Rel+	Ent	Rel	Rel+
Table-Sequence (Wang and Lu, 2020)	89.5	67.6	64.3	88.6	63.3	59.6
PFN (Yan et al., 2021)	89.0	-	66.8	89.3	-	62.5
Cascade-SRN (late fusion) (Wang et al., 2022)	89.4	-	65.9	-	-	-
Cascade-SRN (early fusion) (Wang et al., 2022)	89.8	-	67.1	-	-	-
PURE (Zhong and Chen, 2021)	89.7	69.0	65.6	88.8	64.7	60.2
PURE° (Zhong and Chen, 2021)	90.9	69.4	67.0	90.3	66.1	62.2
UniRE° (Wang et al., 2021)	90.2	-	66.0	89.5	-	<b>63.0</b>
TAGPRIME w/ Cond. Priming	89.6	69.7	67.3	89.0	65.2	61.6
TAGPRIME w/ Cond. & Rela. Priming	89.6	<b>70.4</b>	<b>68.1</b>	89.0	<b>66.2</b>	62.3

## Task 3: Task-Oriented Semantic Parsing

Model	MTOP (en)			MTOP (es)			MTOP (fr)			MTOP (de)		
	Intent	Slot-I	Slot-C									
JointBERT (Li et al., 2021)	96.7	-	92.8	95.2	-	89.9	94.8	-	88.3	95.7	-	88.0
JointBERT (reproduced)	97.1	94.2	92.7	96.6	91.6	89.5	95.8	90.2	87.7	96.5	89.2	87.6
TAGPRIME + Cond. Priming	97.1	<b>94.8</b>	93.4	96.6	91.6	90.3	95.8	<b>90.6</b>	88.6	96.5	<b>89.6</b>	87.9
TAGPRIME + Cond. & Rela. Priming	97.1	94.7	<b>93.5</b>	96.6	<b>91.8</b>	<b>90.7</b>	95.8	<b>90.6</b>	<b>89.1</b>	96.5	89.5	<b>88.1</b>

## Ablation Studies

Cond. Feat.	Rela. Feat.	ACE05-E (en)	ACE05-E (zh)	MTOP (es)	MTOP (fr)	ACE05-R (en)	ACE04-R (en)	Average
Feat. Prim.	Feat. Prim.	Arg-I	Arg-C	Slot-I	Slot-C	Rel	Rel+	
✗	✗	57.8	54.2	60.2	57.2	91.8	90.2	67.8
✓	✗	58.1	55.3	60.4	58.1	<b>92.0</b>	90.4	67.5
✗	✓	59.6	56.7	62.0	59.7	91.8	90.4	69.6
✓	✓	<b>60.0</b>	56.8	63.2	60.5	91.6	90.3	69.7
✓	✓	57.3	55.3	61.4	59.4	91.7</td		