

# Ontological Scaffolding for Ontology-Free Representations of Complex Situations

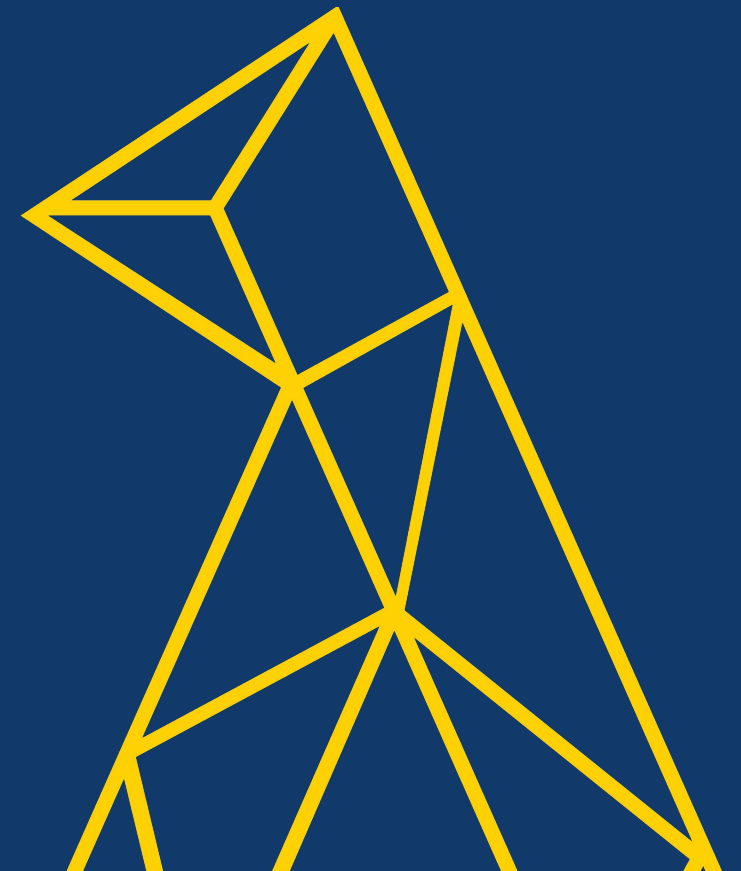
**Aaron Steven White**

University of Rochester

**ILFC Seminar**

GdR LIFT

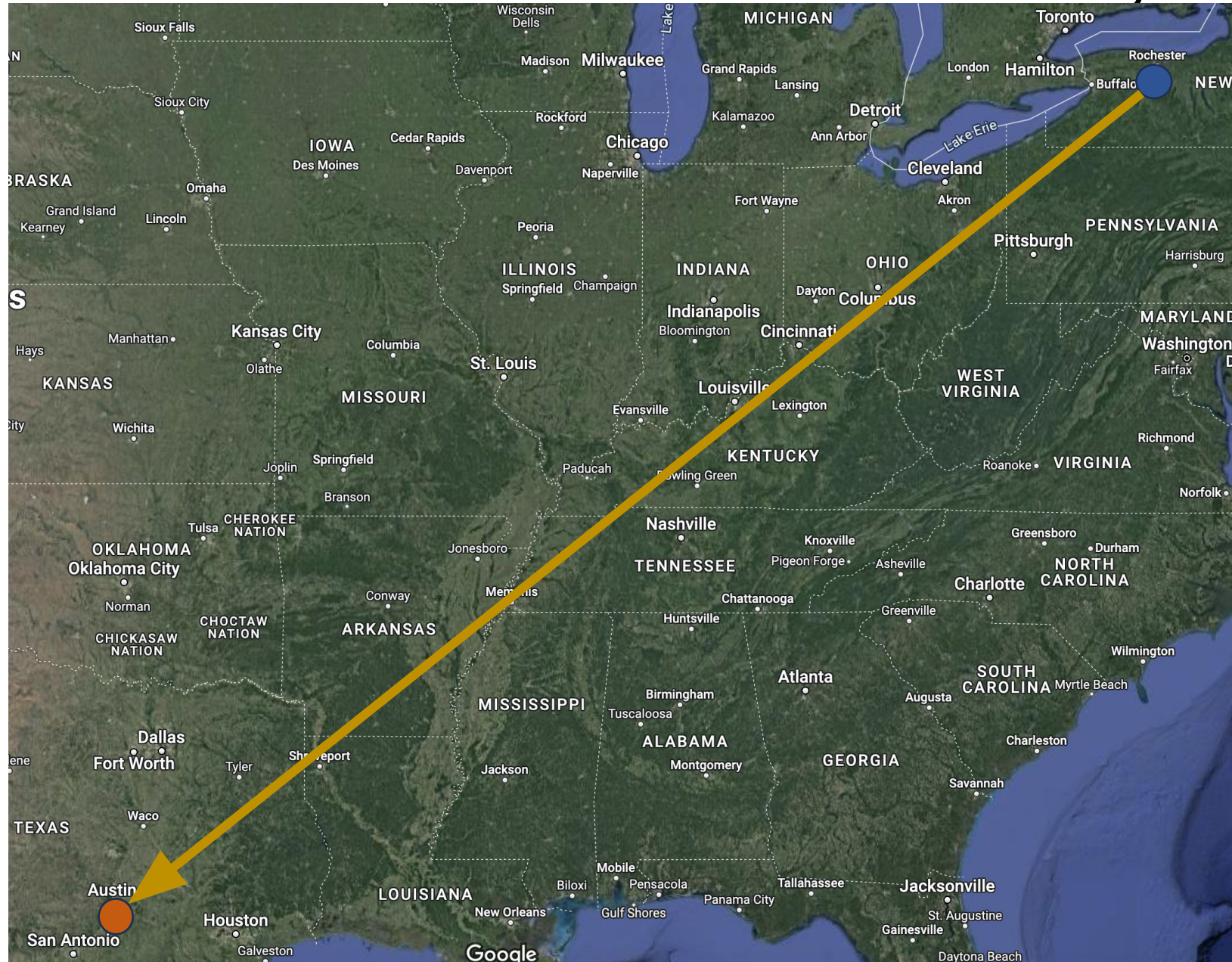
10 April 2024



## **What we do**

We use natural language to convey information about *situations*: things that happen or stuff that is true.

# I traveled from Rochester to Austin last year.



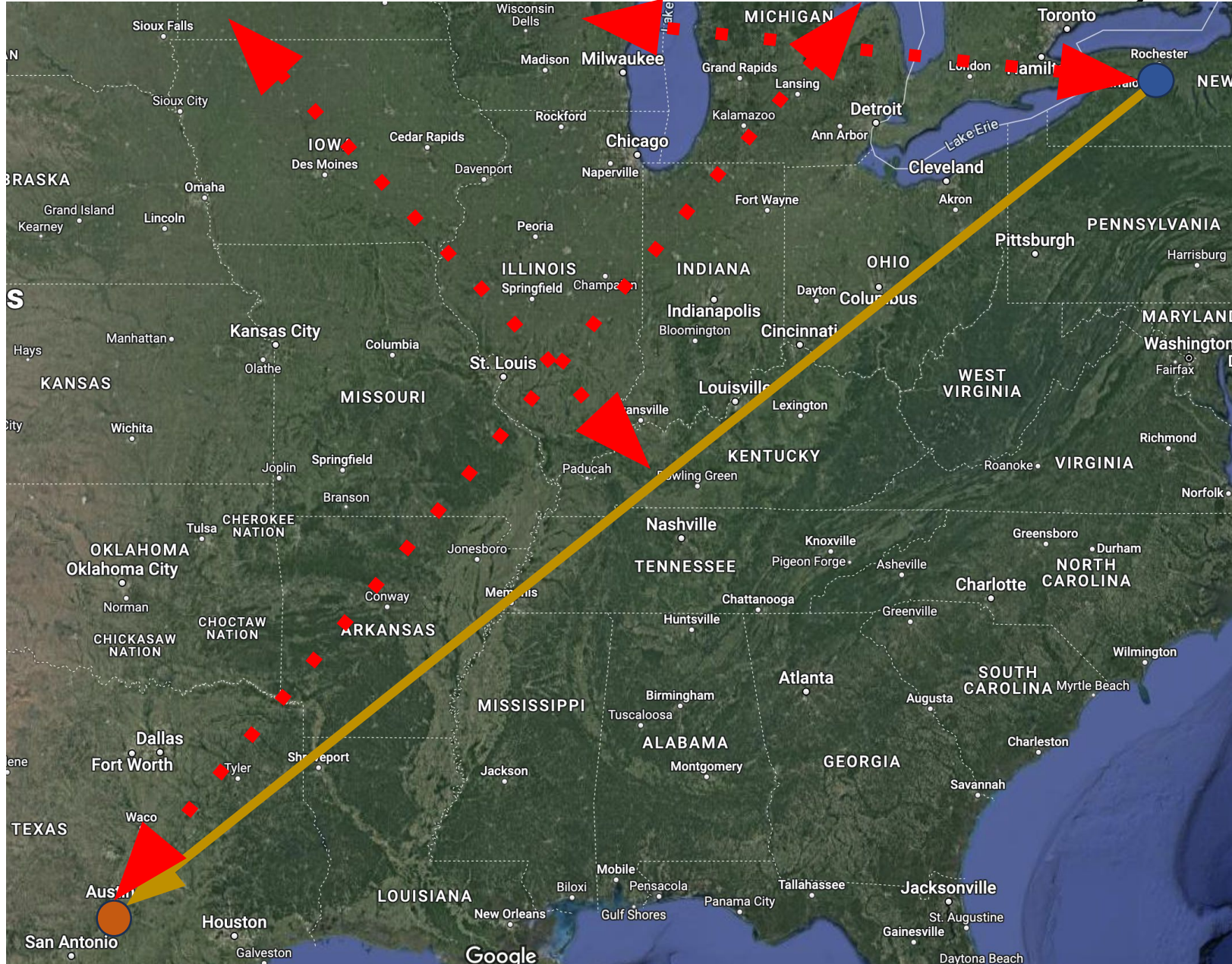
## **What we do**

We use natural language to convey information about *situations*: things that happen or stuff that is true.

## **How we do this**

Systematic relationships between the way we conceptualize situations and the way we describe them.

I traveled from Rochester to Austin last year.



## **What we do**

We use natural language to convey information about *situations*: things that happen or stuff that is true.

## **How we do this**

Systematic relationships between the way we conceptualize situations and the way we describe them.

## **What this allows us to do**

Draw inferences that go beyond what one strictly says in describing a situation.

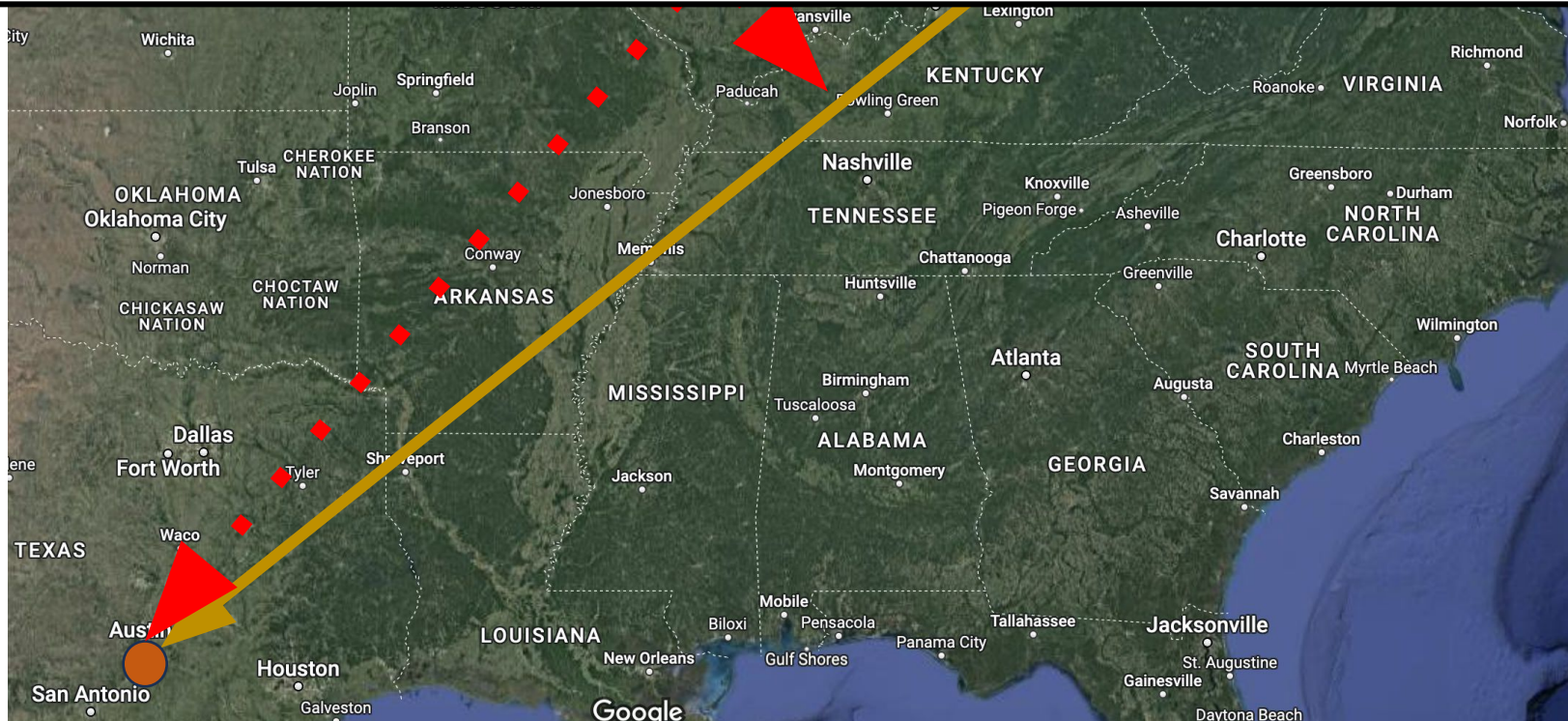
I traveled from Rochester to Austin last year.



Aaron was in Austin last year.

Aaron was in Rochester before he was in Austin.

Aaron changed location over the course of the travel.



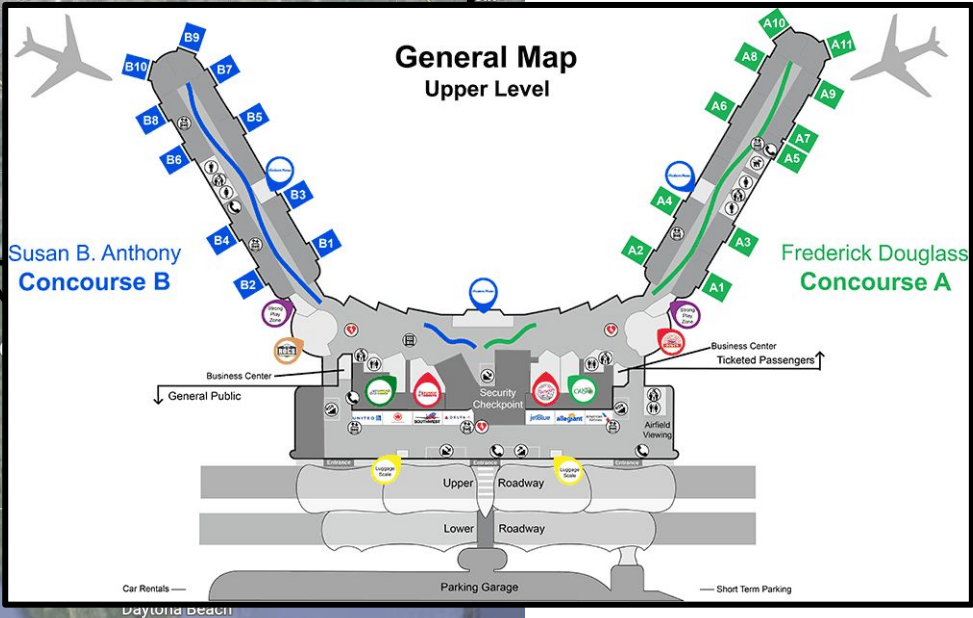
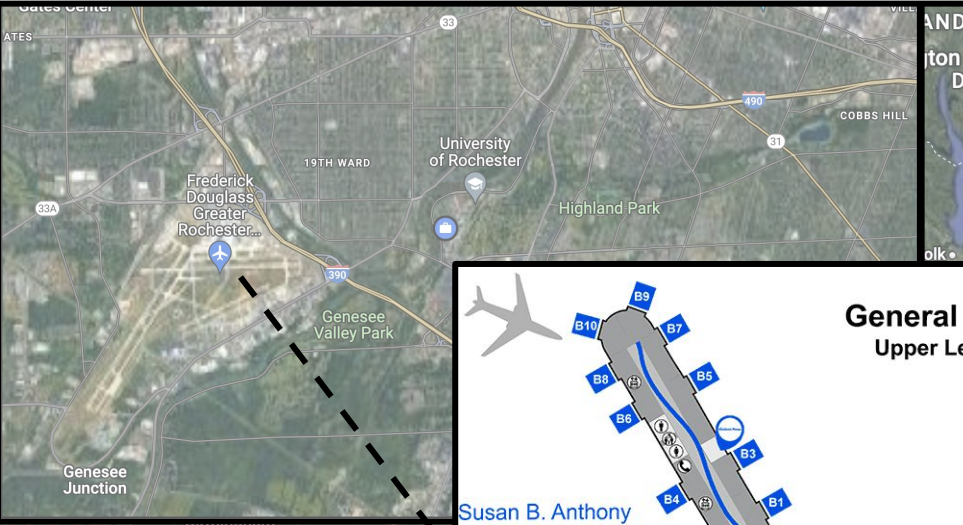
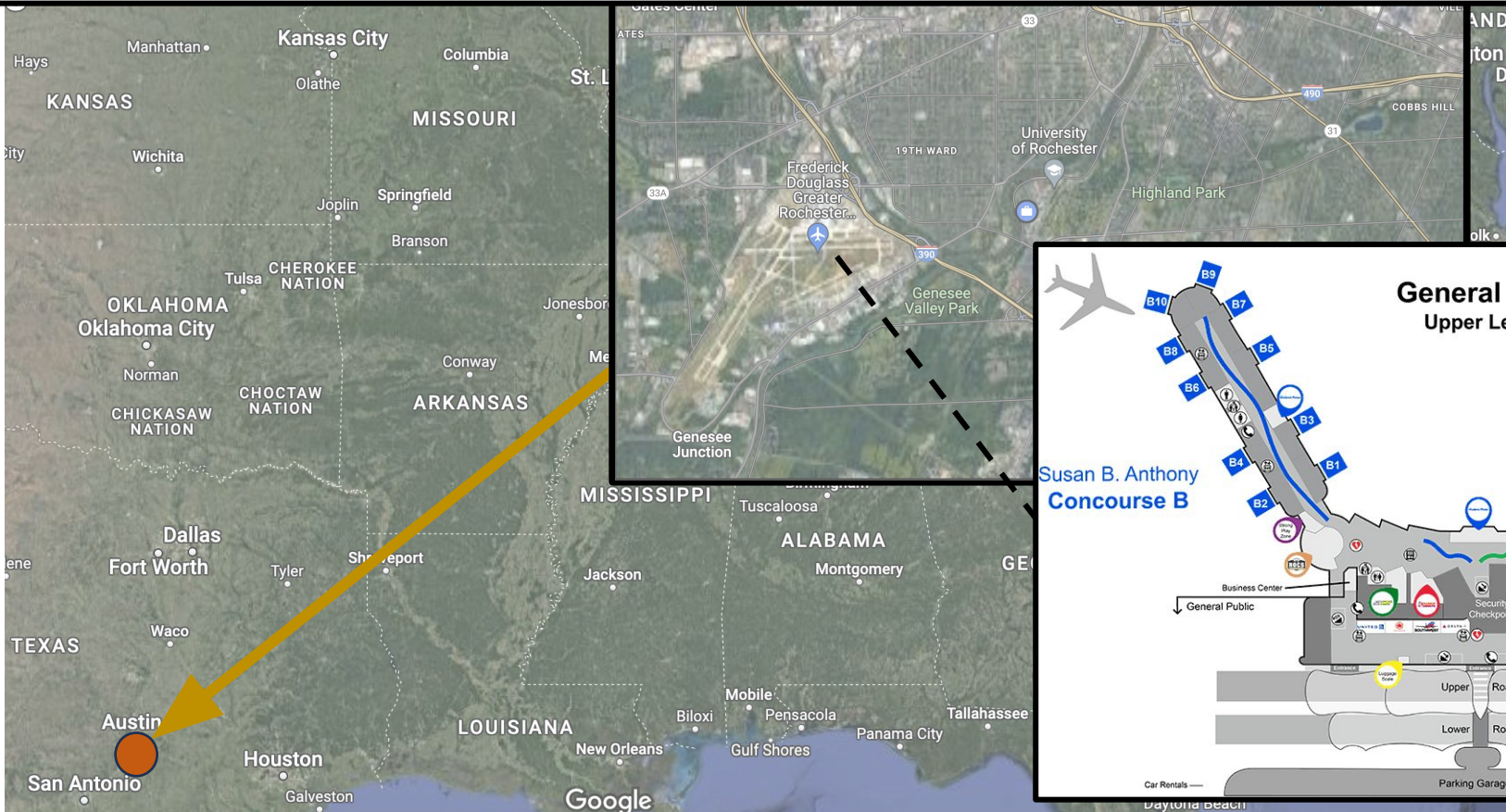
I traveled from Rochester to Austin yesterday.



Aaron took a flight last year.

Aaron traveled to the Rochester airport last year.

Aaron went through airport security at the Rochester airport last year.





## Question

How do we design systems that capture the inferences we draw about situations based on their descriptions?

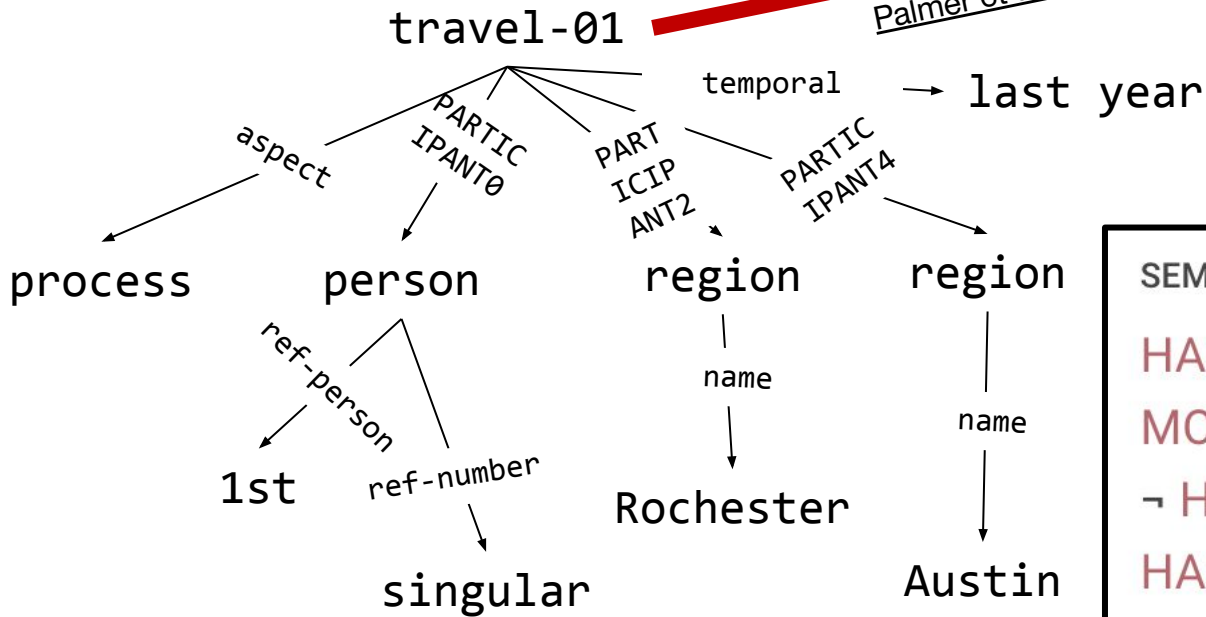
## **Ontology-factored approach**

Map situation description to symbolic situation ontology and draw inferences using rules stated over that ontology.

# I traveled from Rochester to Austin last year.

**Uniform Meaning Representation**  
*Van Gysel et al. 2021*

**PropBank**  
*Palmer et al. 2005*



ROLESET ID: TRAVEL.01

Role Description:  
travel, voyaging

Aliases:  
TRAVEL TRAVELING TRAVELLED TRAVEL TRAVELLING

Roles:  
Arg0-PPT: traveller (VN Roles: 51.3.2-1-theme)  
Arg1-LOC: location or path (VN Roles: 51.3.2-1-location)  
Arg2-DIR: start point  
Arg4-GOL: destination

SEMANTICS:

HAS\_LOCATION( e1 , Theme , ?Initial\_Location )  
MOTION( e2 , Theme , Trajectory )  
¬ HAS\_LOCATION( e2 , Theme , ?Initial\_Location )  
HAS\_LOCATION( e3 , Theme , ?Destination )

Full Class View

PAD  
OWL  
RAMBLE  
STROLL  
SWEEP  
TRAVEL  
WADE

NP V NP  
The horse hopped the fence.  
SHOW DEPENDENCY PARSE TREE

SYNTAX:  
Theme VERB Trajectory

SEMANTICS:  
HAS\_LOCATION( e1 , Theme , ?Initial\_Location )  
MOTION( e2 , Theme , Trajectory )  
¬ HAS\_LOCATION( e2 , Theme , ?Initial\_Location )  
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Aaron was in Rochester yesterday.

VerbNet  
Kipper-Schuler 2005

## **Challenge #1: Expense**

Ontologies and annotated corpora are expensive to build and maintain because they require highly trained experts.

## **Challenge #2: Brittleness**

Ontologies do not easily capture the ways in which context modulates the inferences that we draw.

An assassin in Colombia killed a federal judge on a Medellin street.



The assassin chose to be involved in killing the judge.

The antibody then kills the cell.



The antibody chose to be involved in killing the cell.

She was untrained and, in one botched job, killed a client.



She chose to be involved in killing the client.

ALIVE( e1 , Patient )

DO( e2 , ?Agent )

**Definition:**

Actor in an event who initiates and carries out the event intentionally or consciously, and who exists independently of the event.

**Example:**

THEY decided to go.

## Question

How do we design systems that capture the inferences we draw about situations based on their descriptions?

### **Ontology-factored approach**

Map situation description to symbolic situation ontology and draw inferences using rules stated over that ontology.

### **Ontology-free approach**

Map situation descriptions to natural language strings expressing the inferences of interest.

# QA-SRL/QAMR

UCD *finished* the 2006 championship as Dublin champions ,  
by *beating* St Vincents in the final .

*finished*

Who finished something? - UCD

What did someone finish? - the 2006 championship

What did someone finish something as? - Dublin champions

How did someone finish something? - by beating St Vincents in the final

*beating*

Who beat someone? - UCD

When did someone beat someone? - in the final

Who did someone beat? - St Vincents

## **Challenge: Lack of Abstraction**

Not clear how to determine an interesting set of inferences with which to represent a situation.

## **Ontologies as Representational Scaffolding**

1. Ontologies provide guidance about what the interesting, more abstract inferences are.
2. These more abstract inferences are directly associated with a text, as in ontology-free approaches.



## **Challenge: Inferential Coverage**

How do we ensure that we capture inferences at varying levels of granularity?

I traveled from Rochester to Austin yesterday.

More abstract  
Broader coverage

Aaron was in Rochester yesterday.

Aaron was in Austin

Aaron was in Rochester before he was in Austin.

Aaron changed location over the course of the travel.

More concrete  
Narrower coverage

Aaron took a flight

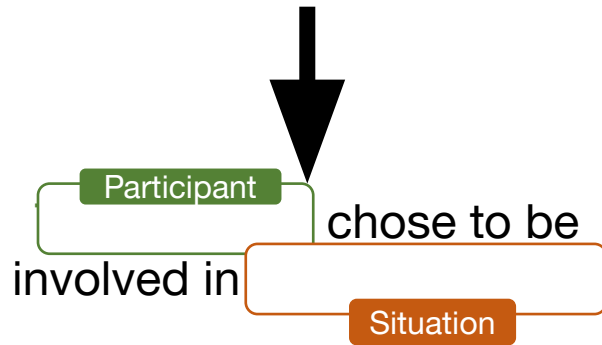
Aaron traveled to the Rochester airport yesterday.

Aaron went through airport security at the Rochester airport yesterday.

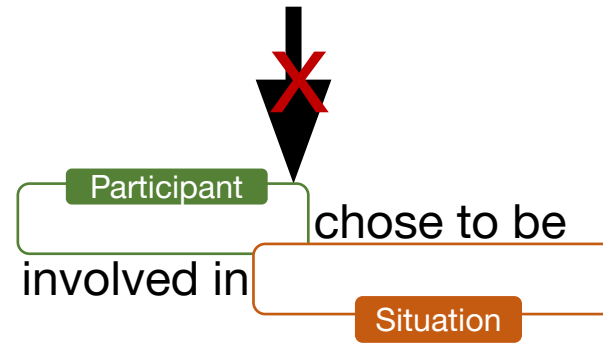
## **Part 1: Light Scaffolding**

Highly abstract ontologies as light scaffolding for building sets of broadly applicable inference templates.

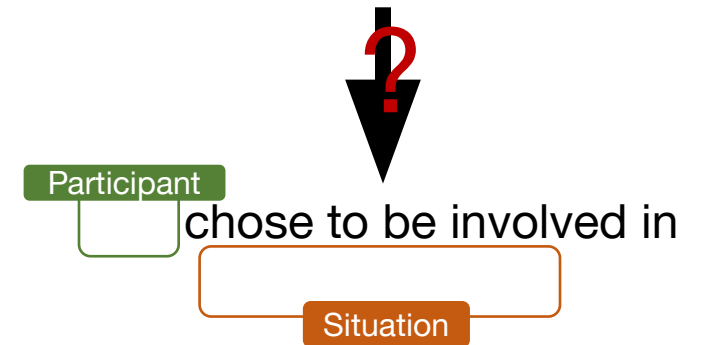
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ALIVE( e1 , Patient )

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**Definition:**

Actor in an event who initiates and carries out the event intentionally or consciously, and who exists independently of the event.

**Example:**

THEY decided to go.

## **Part 1: Light Scaffolding**

Highly abstract ontologies as light scaffolding for building sets of broadly applicable inference templates.

## **Part 2: Heavy Scaffolding**

More concrete ontologies as heavy scaffolding for building sets of more targeted inference templates.

**Employee [Empee]** The person whom the **Employer** takes on as an **Employee**, obligating them to perform some **Task** in order to receive **Compensation**.  
*I was just HIRED yesterday!*

**Employer [Emper]** The person (or institution) that takes on an **Employee**, giving them **Compensation** in return for the performance of an assigned **Task**.  
 Semantic Type: Sentient  
*Last month, IBM HIRED Mike Zisman to head up its storage software group.*

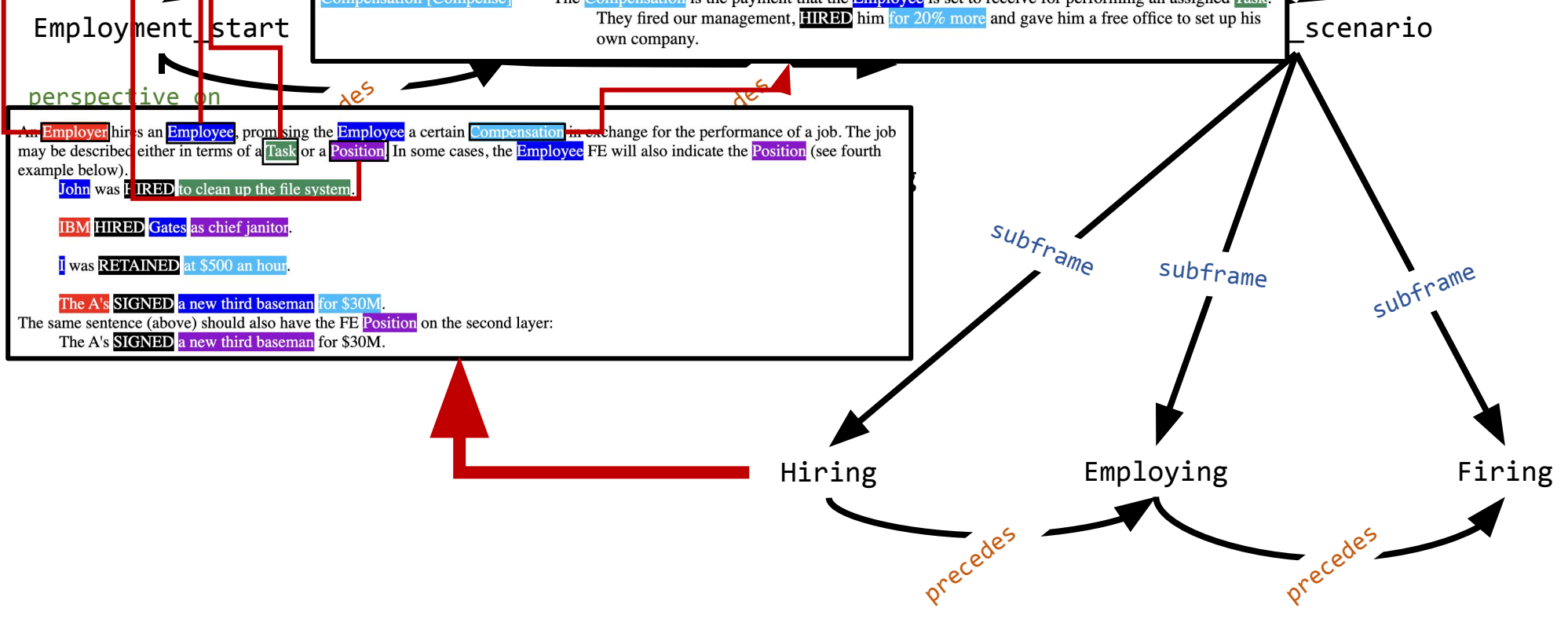
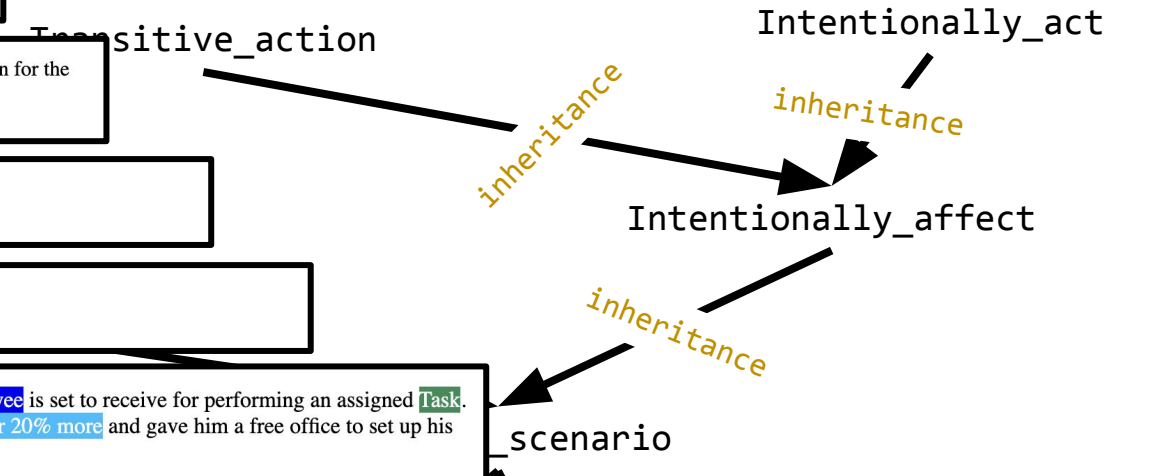
**Position [Posit]** The label given to a particular type of employment.  
*Look, I wasn't HIRED as your waitress!*

**Task [Task]** The action that the **Employee** is taken on by the **Employer** to do.  
*I was HIRED just to empty the trash cans.*

**Compensation [Compense]** The **Compensation** is the payment that the **Employee** is set to receive for performing an assigned **Task**.  
*They fired our management, HIRED him for 20% more and gave him a free office to set up his own company.*

**Employment\_start**  
*perspective on*

An **Employer** hires an **Employee**, promising the **Employee** a certain **Compensation** in exchange for the performance of a job. The job may be described either in terms of a **Task** or a **Position**. In some cases, the **Employee** FE will also indicate the **Position** (see fourth example below).  
*John was HIRED to clean up the file system.*  
*IBM HIRED Gates as chief janitor.*  
*I was RETAINED at \$500 an hour.*  
*The A's SIGNED a new third baseman for \$30M.*  
 The same sentence (above) should also have the FE **Position** on the second layer:  
 The A's **SIGNED** a new third baseman for \$30M.



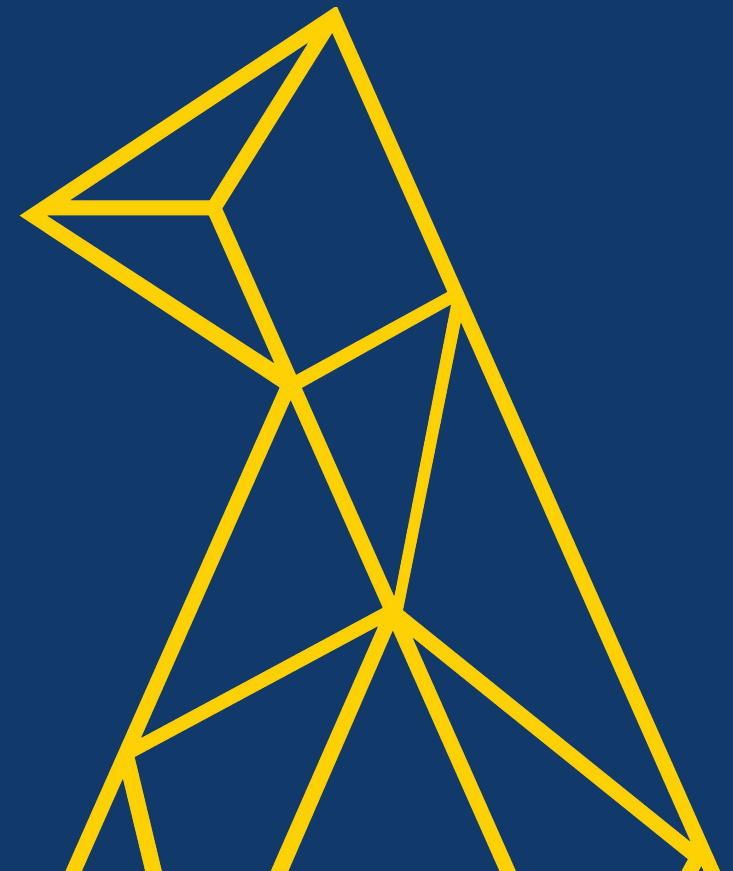
## **Disclaimer**

I do not intend to make claims about human cognition anywhere in this talk.

## **Goal**

Laying out a program for how to build representations of complex situations balancing expressivity and flexibility.

# Light Scaffolding





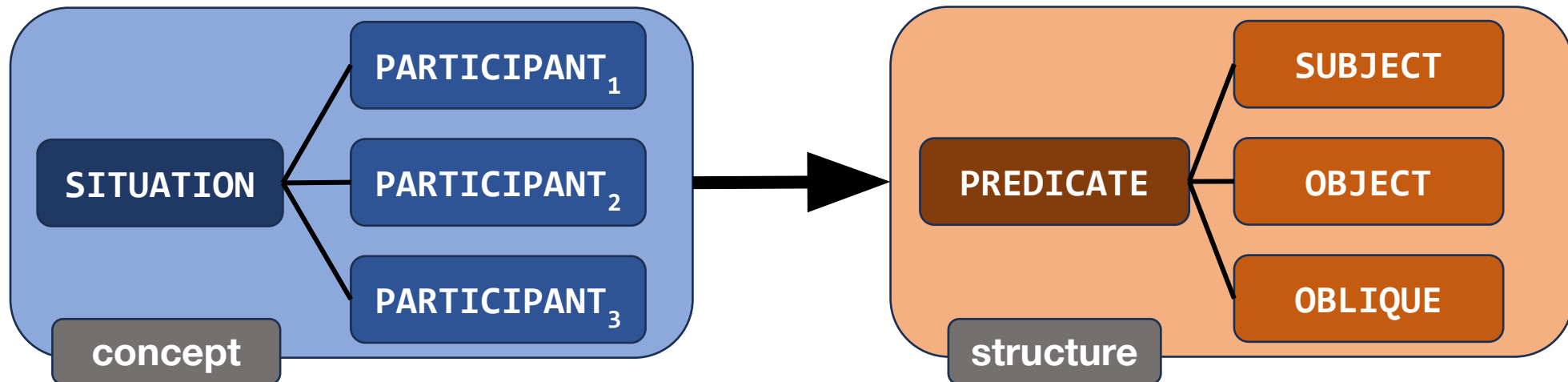
## Goal

Find a set of inference templates that are both interesting and broadly applicable across many situations.

## Idea

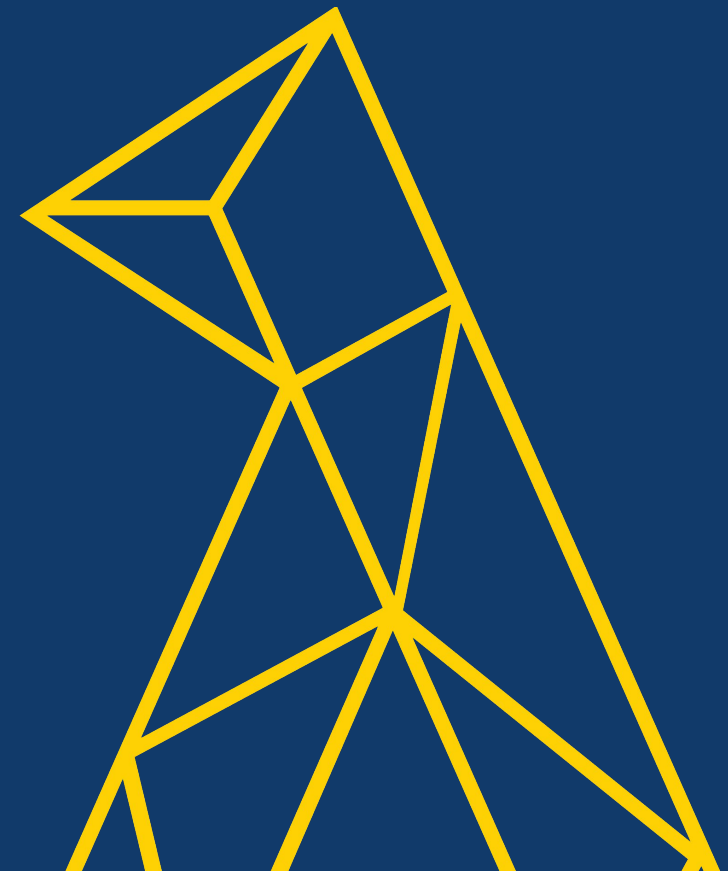
Inferences relevant to mapping from concepts to linguistic structure tend to be inferences humans really care about.

## Example #1: Linking Theory



# Light Scaffolding

Participant relations



MELT

MELTER

MELTEE

MELT-WITH

The chef melted the

The butter

The chef melted the butter with a steady low heat.

A steady low heat melted the

The butter ??? melted the chef.

**MELT**

MELTER

MELTEE

MELT-WITH

AGENT

PATIENT

INSTRUMENT

subject

subject

object

The

*A* The butter melted the chef.

low

~~butter~~  
melted.

**MELT**

MELTER

MELTEE

MELT-WITH



AGENT

PATIENT

INSTRUMENT

MELTER is volitional in MELT.

MELTEE changes in MELT.

MELT-WITH is used to MELT.

## **Dowty's idea**

Having more prototypically agentive properties compared to other roles makes a role more likely to map to SUBJ.

## **Upshot**

Inferences relevant to linking theory are probably ones humans tend to care a lot about.

Protoagent

- PARTICIPANT chose to be involved in SITUATION.
- PARTICIPANT caused SITUATION to happen.
- PARTICIPANT was aware of being involved in SITUATION.
- PARTICIPANT changed location during SITUATION.
- PARTICIPANT existed before SITUATION began.
- PARTICIPANT existed during SITUATION.
- PARTICIPANT existed after SITUATION stopped.

Protopatient

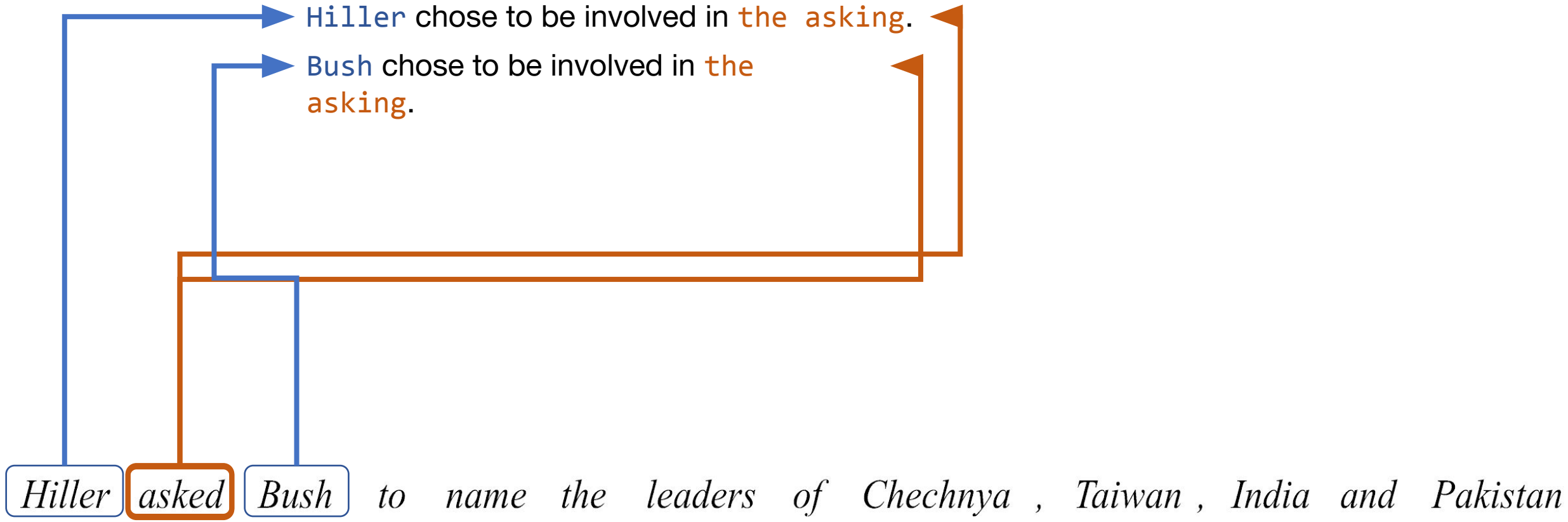
- PARTICIPANT changed possession during SITUATION.
- PARTICIPANT was used in carrying out SITUATION.
- PARTICIPANT was changed or somehow altered during or by the end of SITUATION.
- SITUATION happened for the benefit of PARTICIPANT.
  - The change in PARTICIPANT happened throughout the SITUATION.
  - Only a part or portion of PARTICIPANT was involved in SITUATION.



## Two steps

1. Find relevant **SITUATION**-**PARTICIPANT** pairs.

PARTICIPANT chose to be involved in SITUATION.

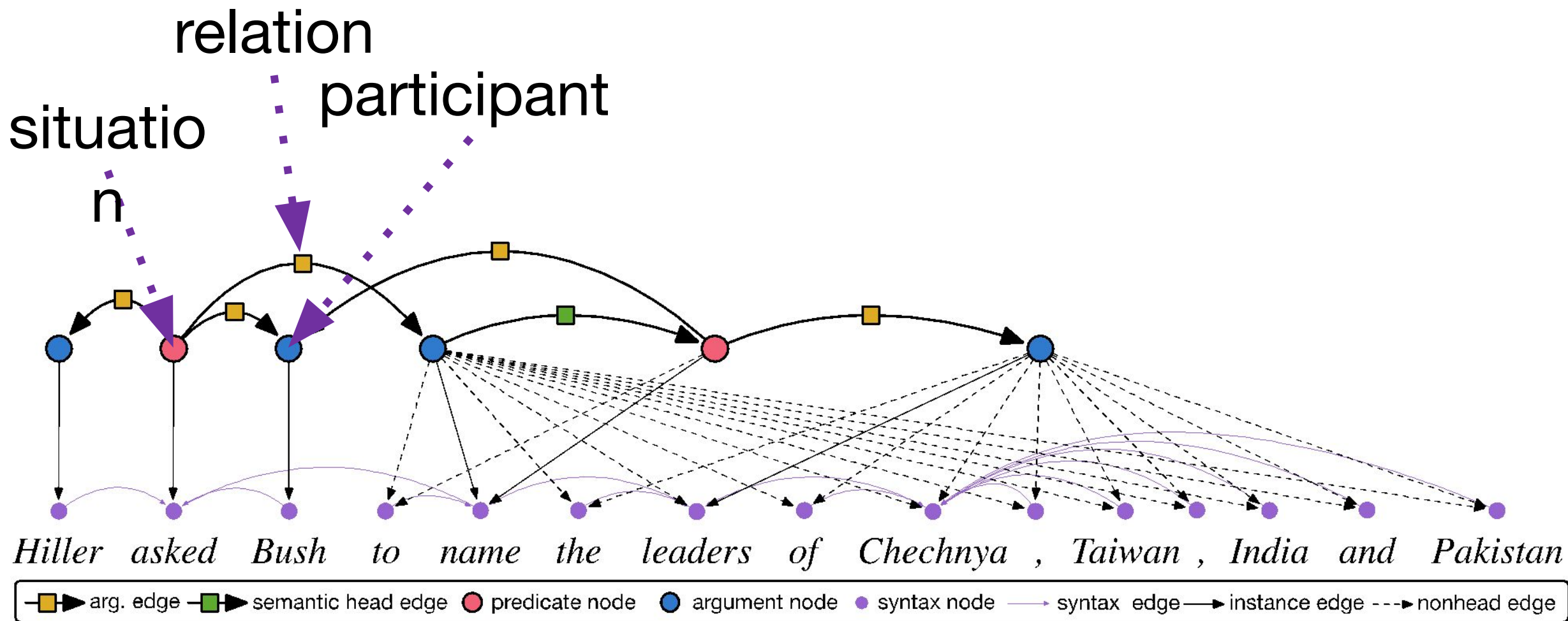


## Two steps

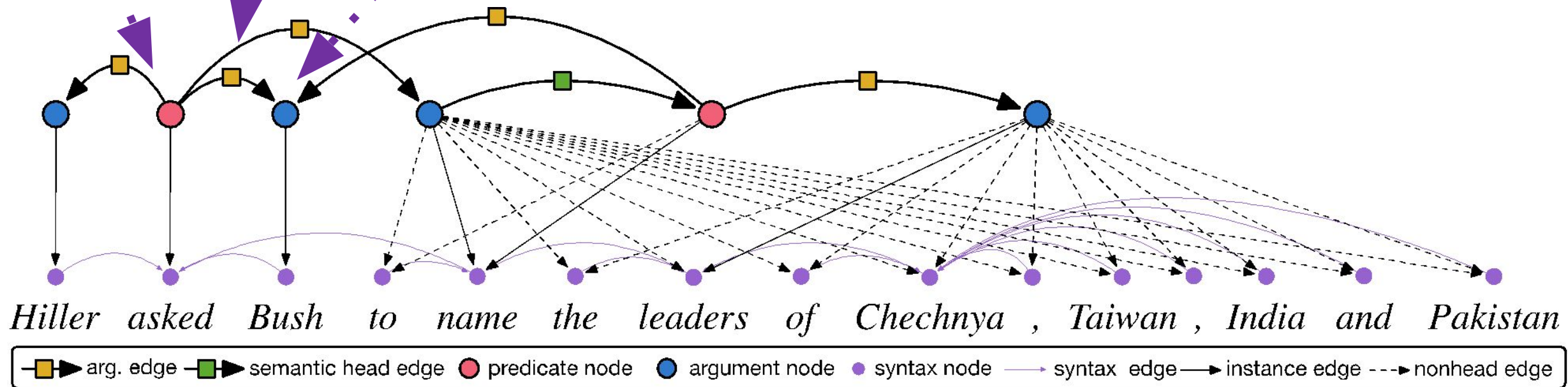
1. Find relevant **SITUATION**-**PARTICIPANT** pairs.

## Requirement

Very light scaffolding ontology including at least SITUATION, PARTICIPANT, and RELATION.



relation  
 event participant



## **Rule-based approach** White et al. 2016, Zhang et al. 2017 based on Rudinger and Van Durme 2014

A set of rules defined on top of Universal Dependencies syntactic annotations.

## **Transductive parsing approach** Stengel-Eskin 2020, 2021 based on Zhang et al. 2019

Encoder-decoder networks that take raw sentence and produce semantic graph on the decoder side.

## Two steps

1. Find relevant **SITUATION**-**PARTICIPANT** pairs.
2. Figure out which inferences hold of which pairs.

## Requirement

Very light scaffolding ontology including at least **SITUATION**, **PARTICIPANT**, and **RELATION**.

PARTICIPANT chose to be involved in SITUATION.

+ Hiller chose to be involved in the asking.

■ Bush chose to be involved in the asking.

*Hiller asked Bush to name the leaders of Chechnya , Taiwan , India and Pakistan*



Hiller asked Bush to name the leaders of Chechnya, Taiwan, India, and Pakistan.

How likely is it that Hiller chose to be involved in the asking?



very unlikely   somewhat unlikely   not enough information   somewhat likely   very likely

Hiller asked Bush to name the leaders of Chechnya, Taiwan, India, and Pakistan.

How likely is it that Bush chose to be involved in the asking?



very unlikely   somewhat unlikely   not enough information   somewhat likely   very likely

## Data

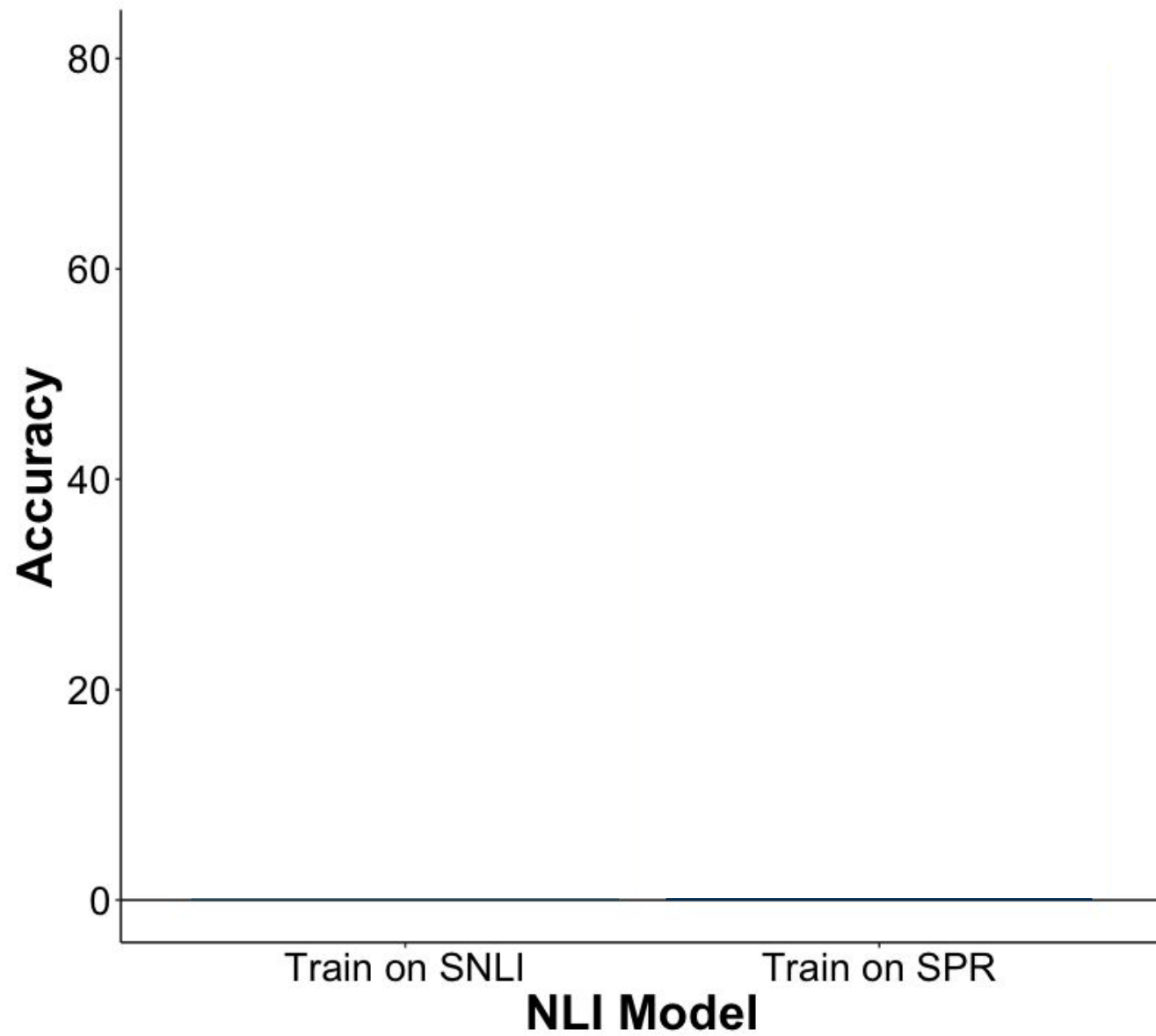
~10k predicate-argument pairs from Penn TreeBank +  
~6k predicate-argument pairs from Universal  
Dependencies English Web Treebank.

## Question

How well can we predict these inferences using models trained on general natural language inference datasets?

## Approach White et al. 2017

Train model on SNLI v. our data and test on our data.



## Upshot

We don't get these properties for free from general purpose models.

## Challenge

Light scaffolding is currently sentence-bound, meaning it's hard to capture information about complex situations.

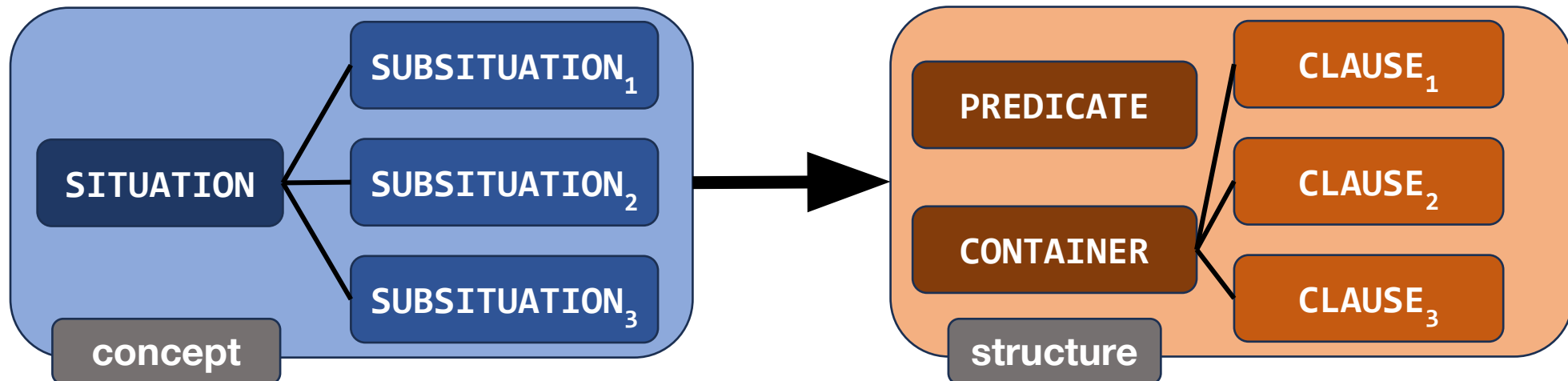
## Approach White et al. 2017

Augment light scaffolding with cross-sentential relations and construct inference templates for those relations.

## Idea

Inferences relevant to mapping from concepts to linguistic structure tend to be inferences humans really care about.

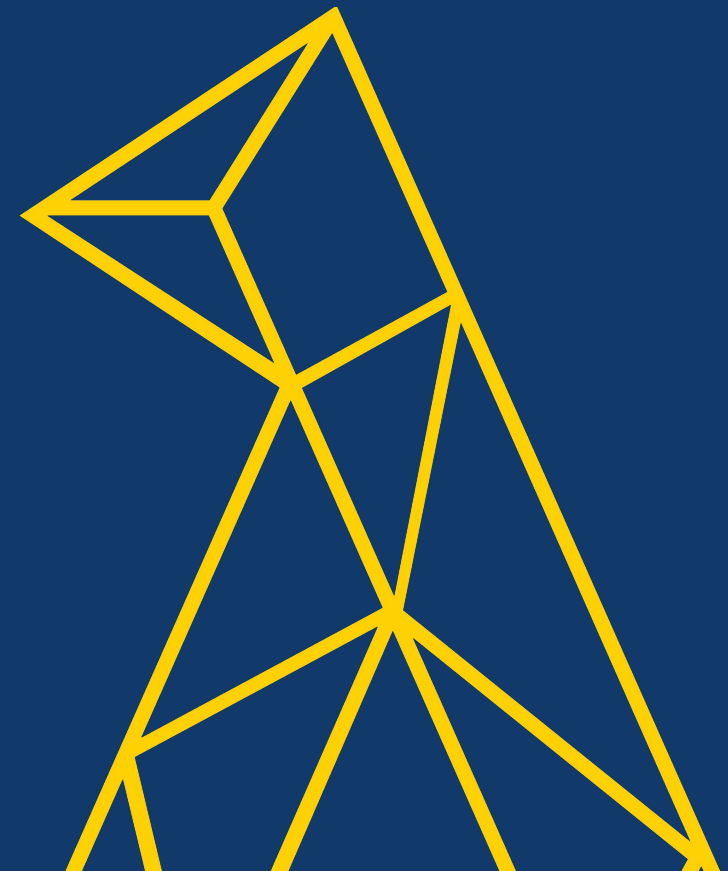
## Example #2: Event Structure



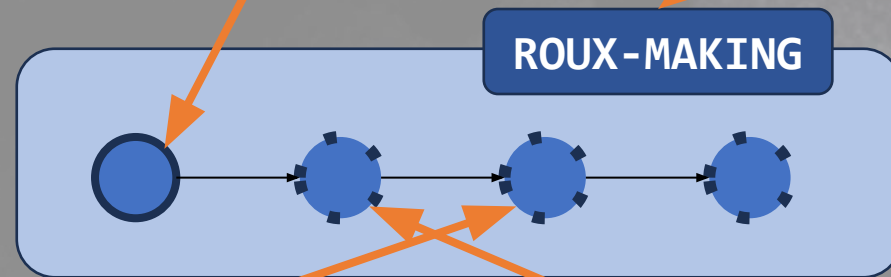


# Light Scaffolding

Situation relations



The chef began to make the  
roux.



Before adding the flour, she melted the butter.

Making the roux took some amount of time.

Adding the flour was part of making the roux.

Melting the butter ended before adding the flour

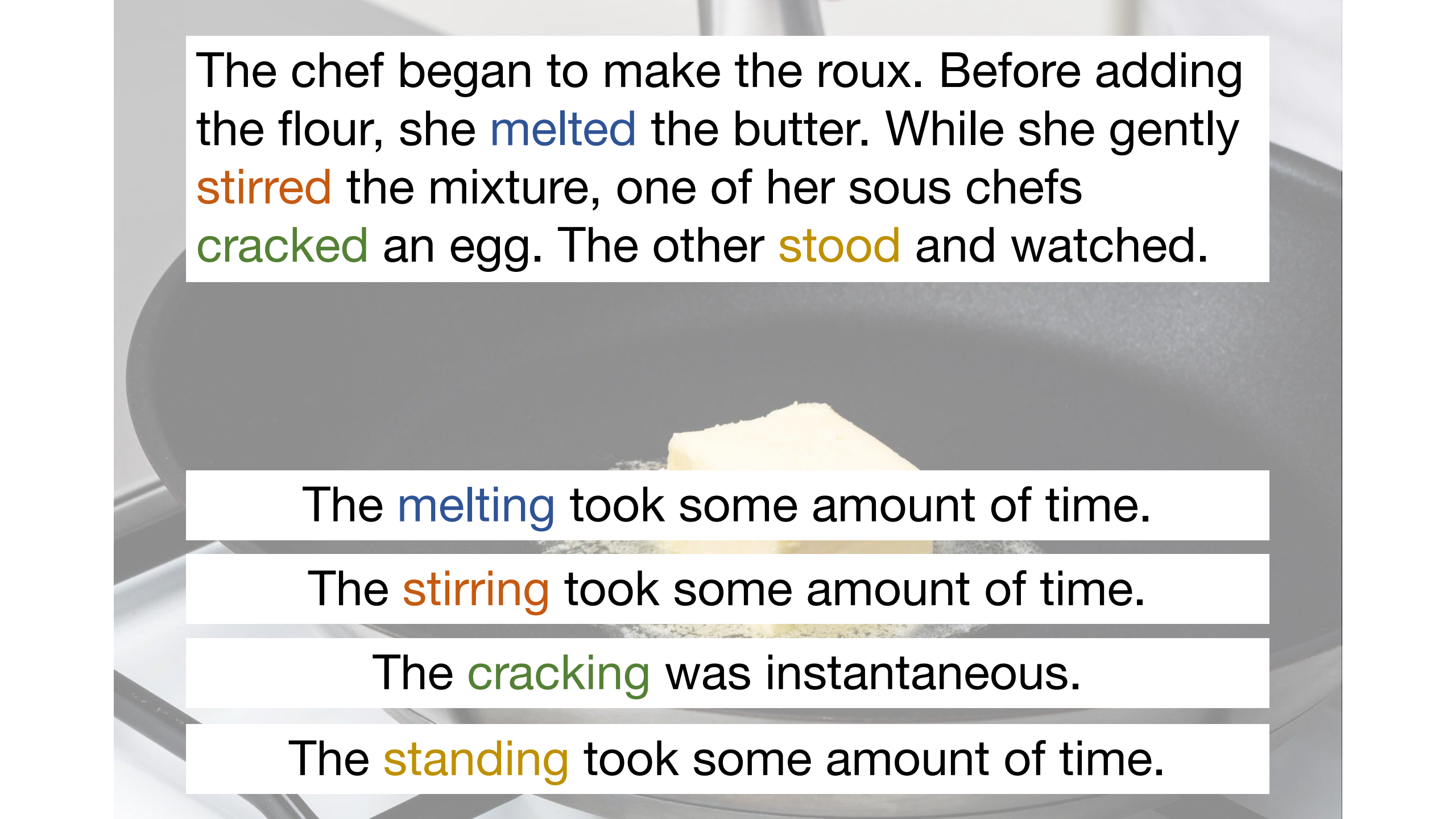
## **Idea #1** Vendler 1957

Situations fall into classes based on their temporal progression.

## **Idea #2**

These classes can be decomposed in terms of the inferences they trigger about their temporal progression and the relations among their subevents.

Kenny 1963, Lakoff 1965, Verkuyl 1972, Bennett and Partee 1978, Mourelatos 1978, Dowty 1979, Jackendoff 1990, Pustejovsky 1995, i.a.



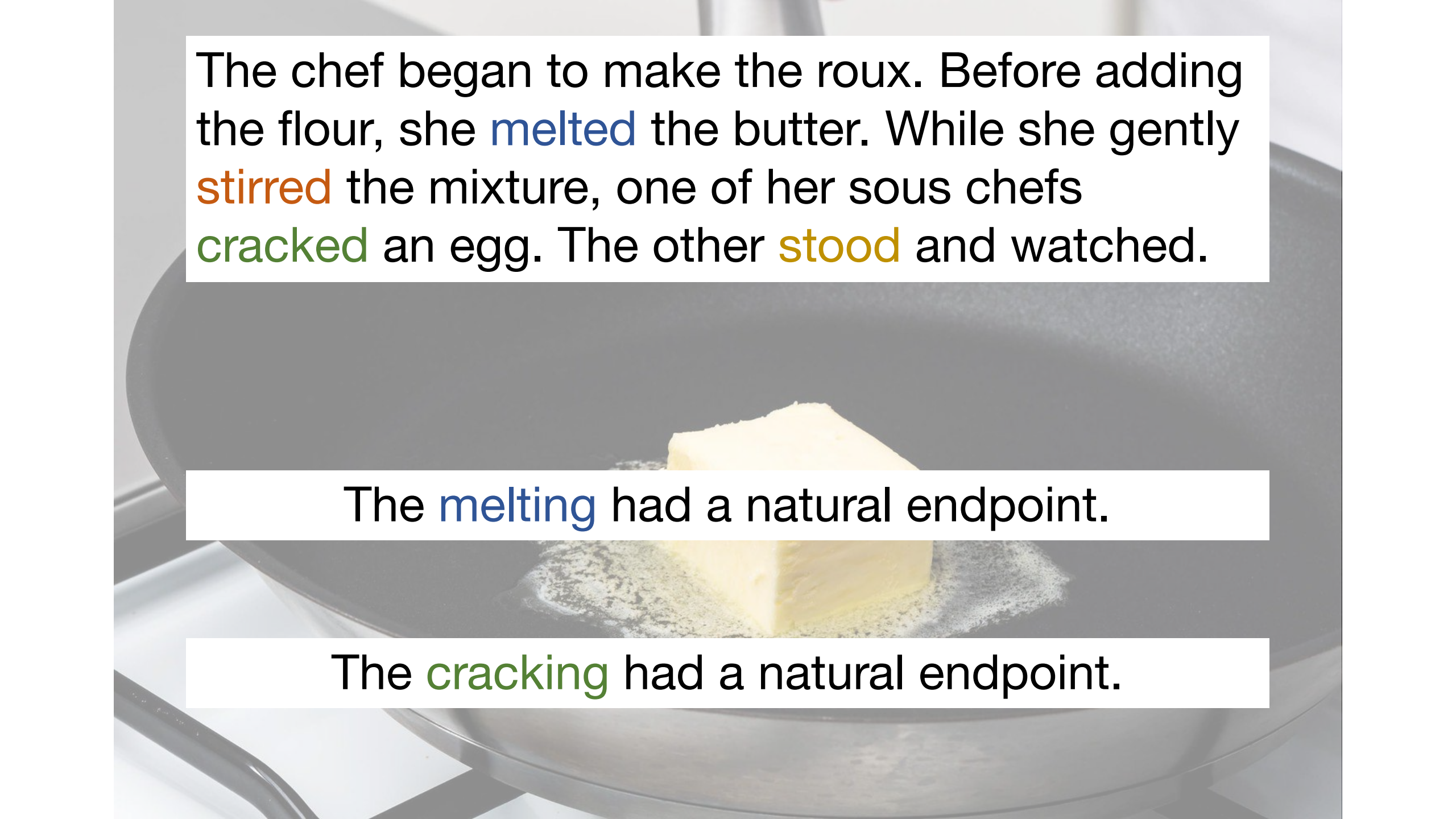
The chef began to make the roux. Before adding the flour, she **melted** the butter. While she gently **stirred** the mixture, one of her sous chefs **cracked** an egg. The other **stood** and watched.

The **melting** took some amount of time.

The **stirring** took some amount of time.

The **cracking** was instantaneous.

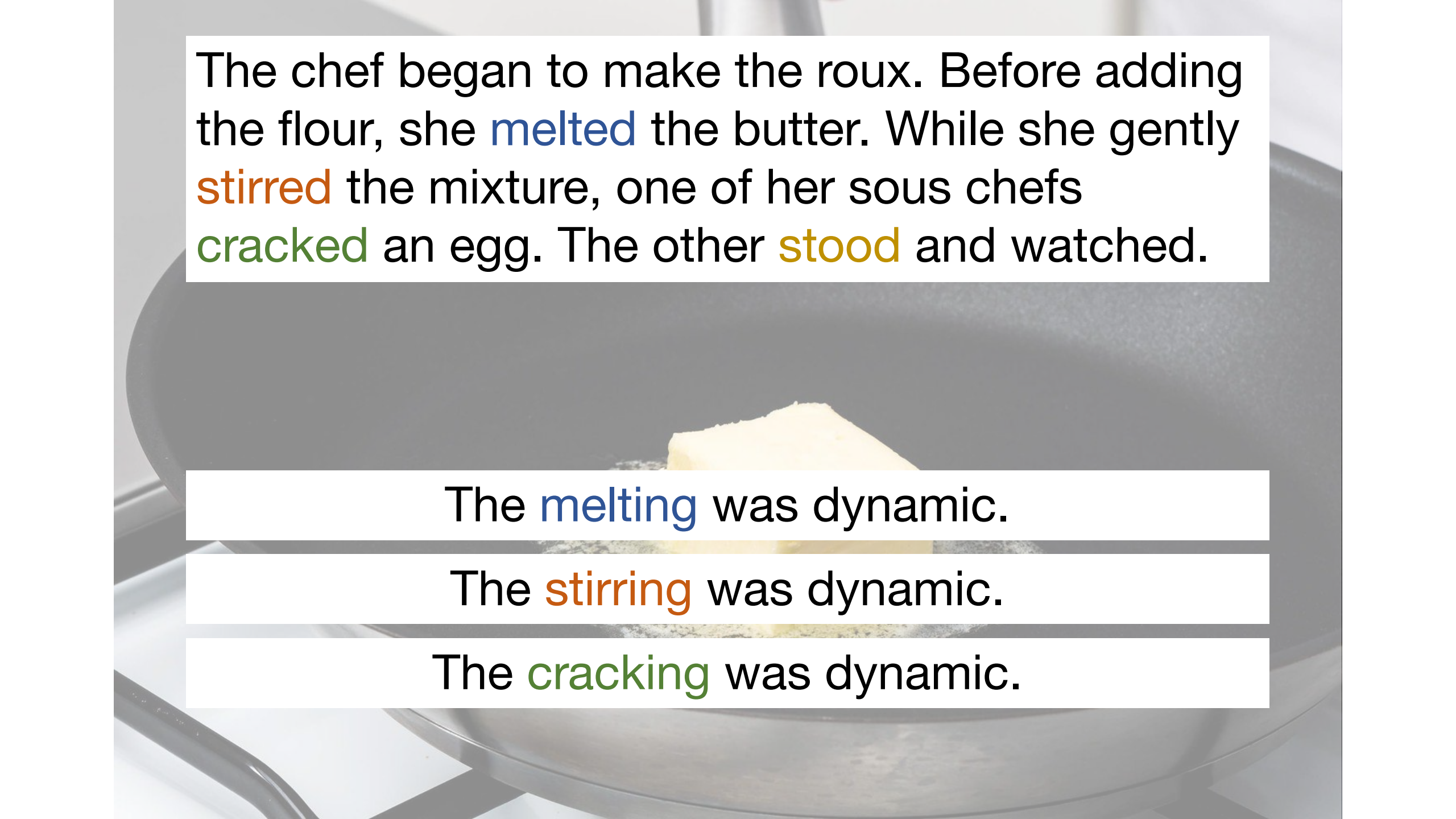
The **standing** took some amount of time.



The chef began to make the roux. Before adding the flour, she **melted** the butter. While she gently **stirred** the mixture, one of her sous chefs **cracked** an egg. The other **stood** and watched.

The **melting** had a natural endpoint.

The **cracking** had a natural endpoint.



The chef began to make the roux. Before adding the flour, she **melted** the butter. While she gently **stirred** the mixture, one of her sous chefs **cracked** an egg. The other **stood** and watched.

The **melting** was dynamic.

The **stirring** was dynamic.

The **cracking** was dynamic.

Event  
internal

**SITUATION** lasted TIME-UNIT.

**SITUATION** was dynamic.

**SITUATION** had natural parts.

Parts of **SITUATION** are similar to each other.

Parts of **SITUATION** lasted TIME-UNIT on average.

Event  
mereology

**SITUATION1** was part of **SITUATION2**.

**SITUATION2** was part of **SITUATION1**.

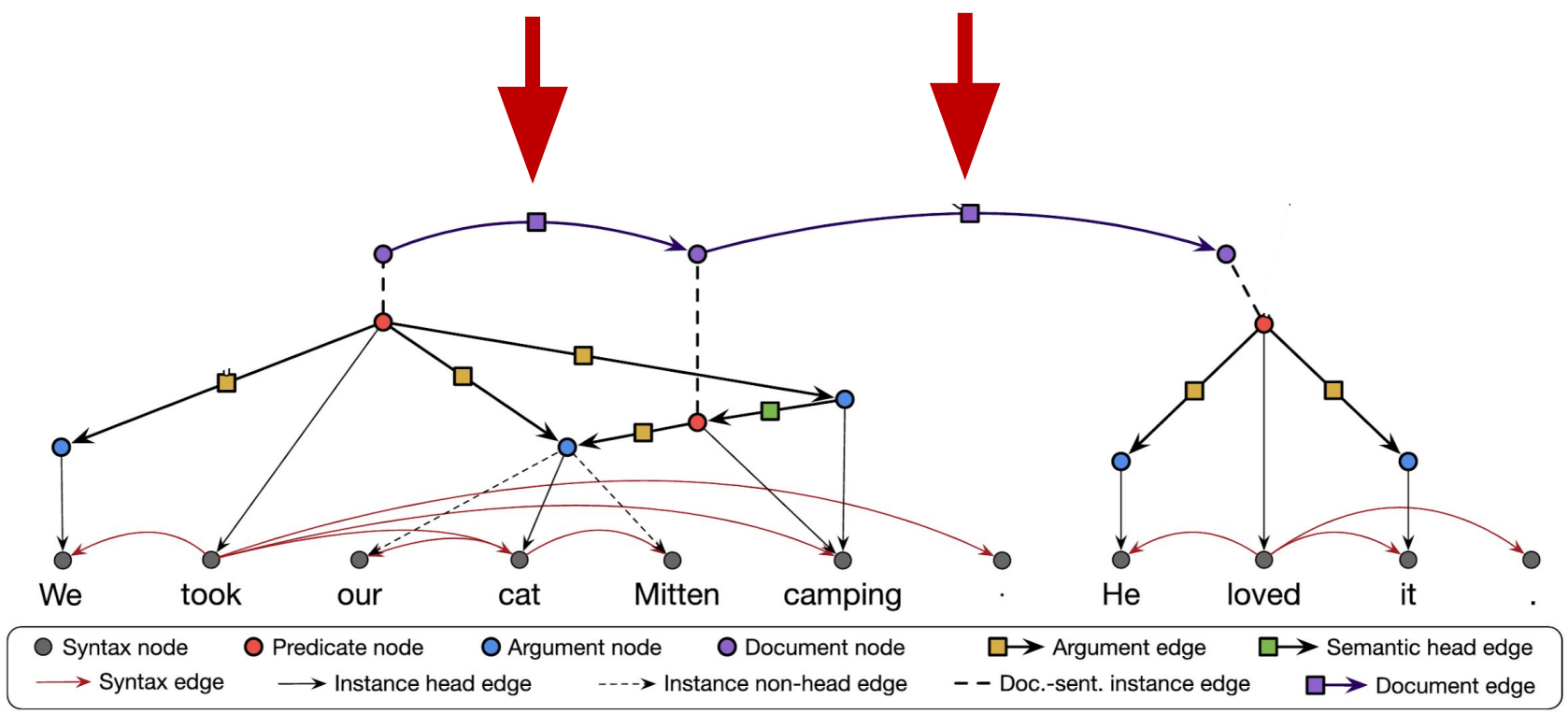
Temporal  
relations

**SITUATION1** started before **SITUATION2** started.

**SITUATION1** ended before **SITUATION2** started.

**SITUATION1** started before **SITUATION2** ended.

**SITUATION1** ended before **SITUATION2** ended.





## Data

~32k predicates from UD-EWT for

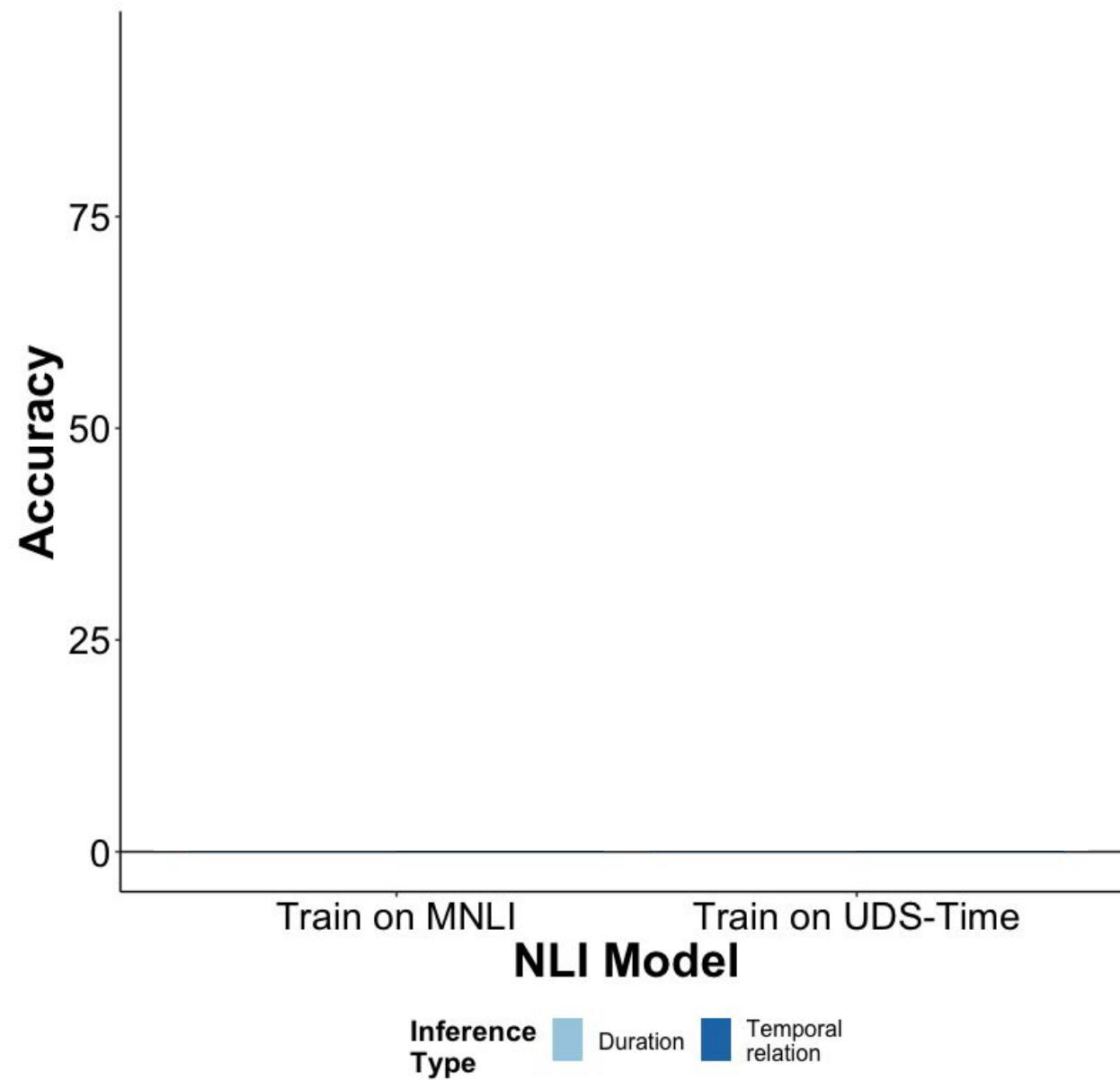
~70k predicate-predicate pairs from UD-EWT

## Question

How well can we predict these inferences using models trained on general natural language inference datasets?

## Approach Vashishtha et al. 2020

Train model on MNLI v. our data and test on our data, focusing specifically on temporal duration and relations.



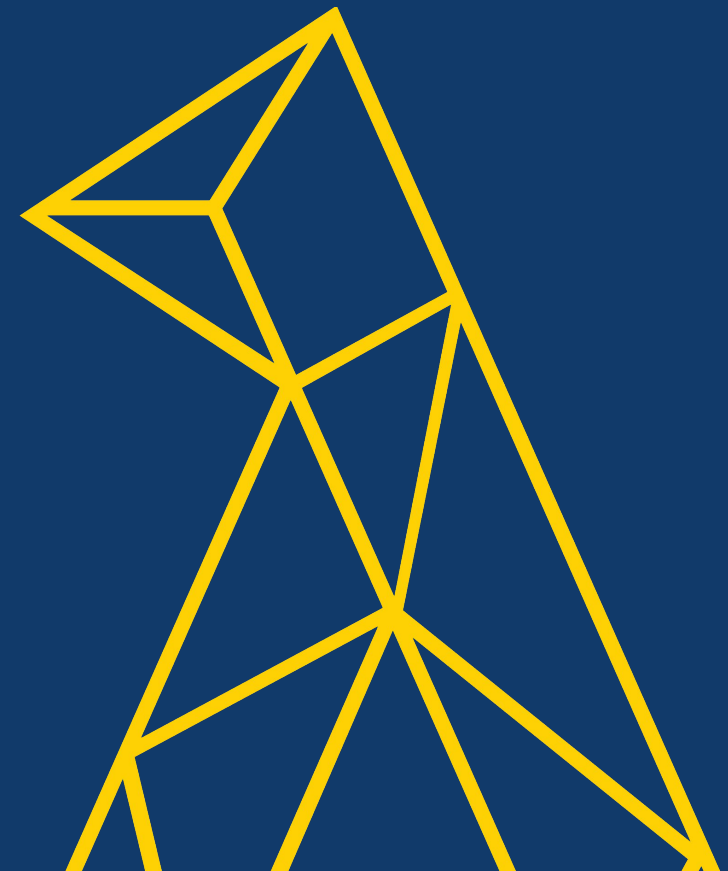
## Upshot

We don't get these properties for free from general purpose models.

And again based on preliminary results from prompting Llama2 and GPT, this remains true. You need fine-tuning.

# Light Scaffolding

Interim Discussion



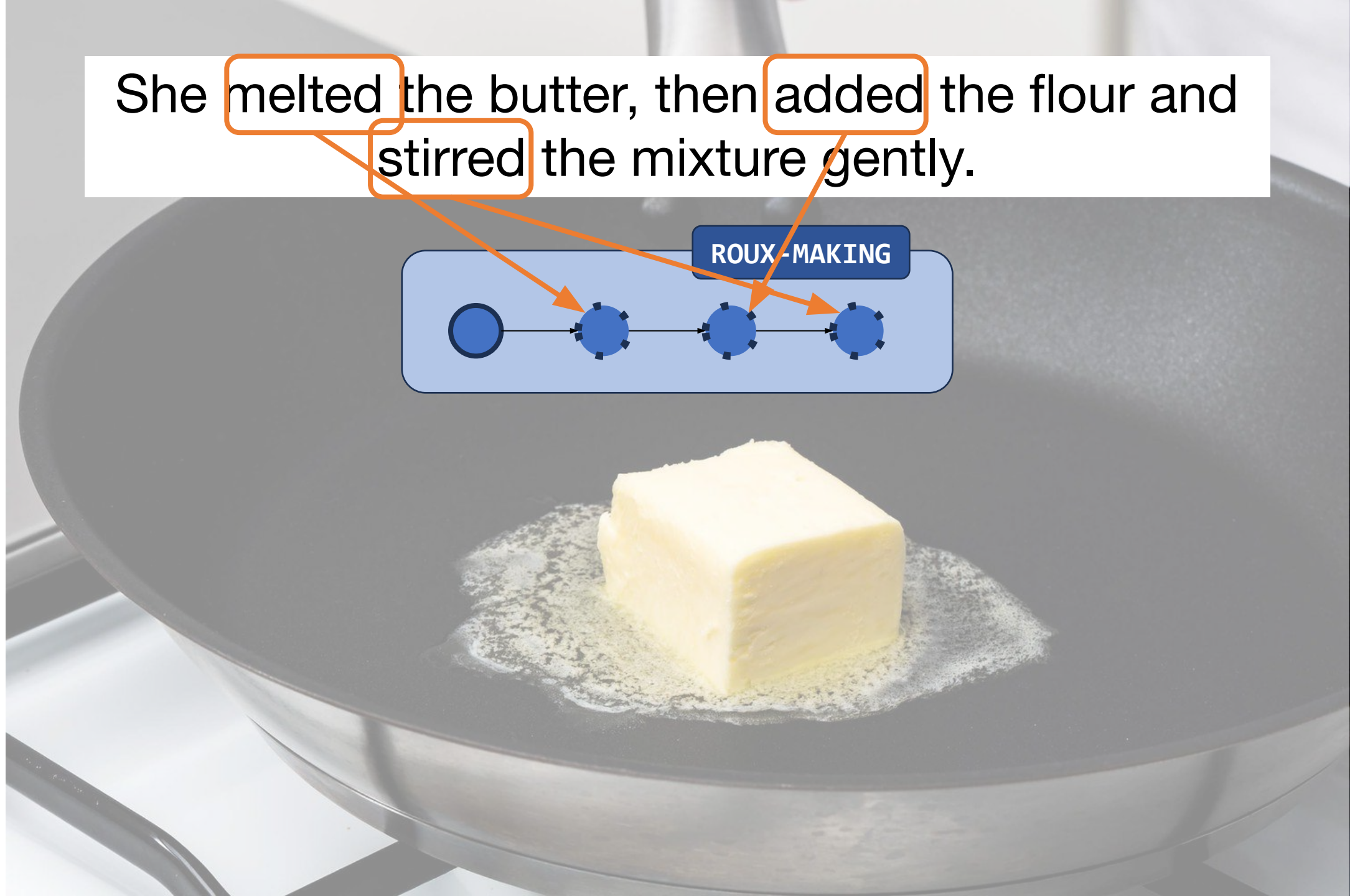
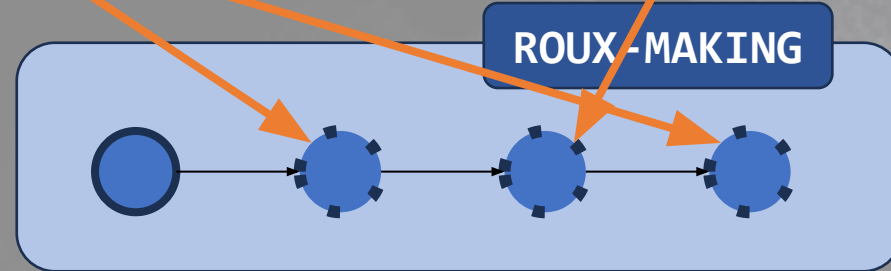
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Find a set of inference templates that are both interesting and broadly applicable across many situations.

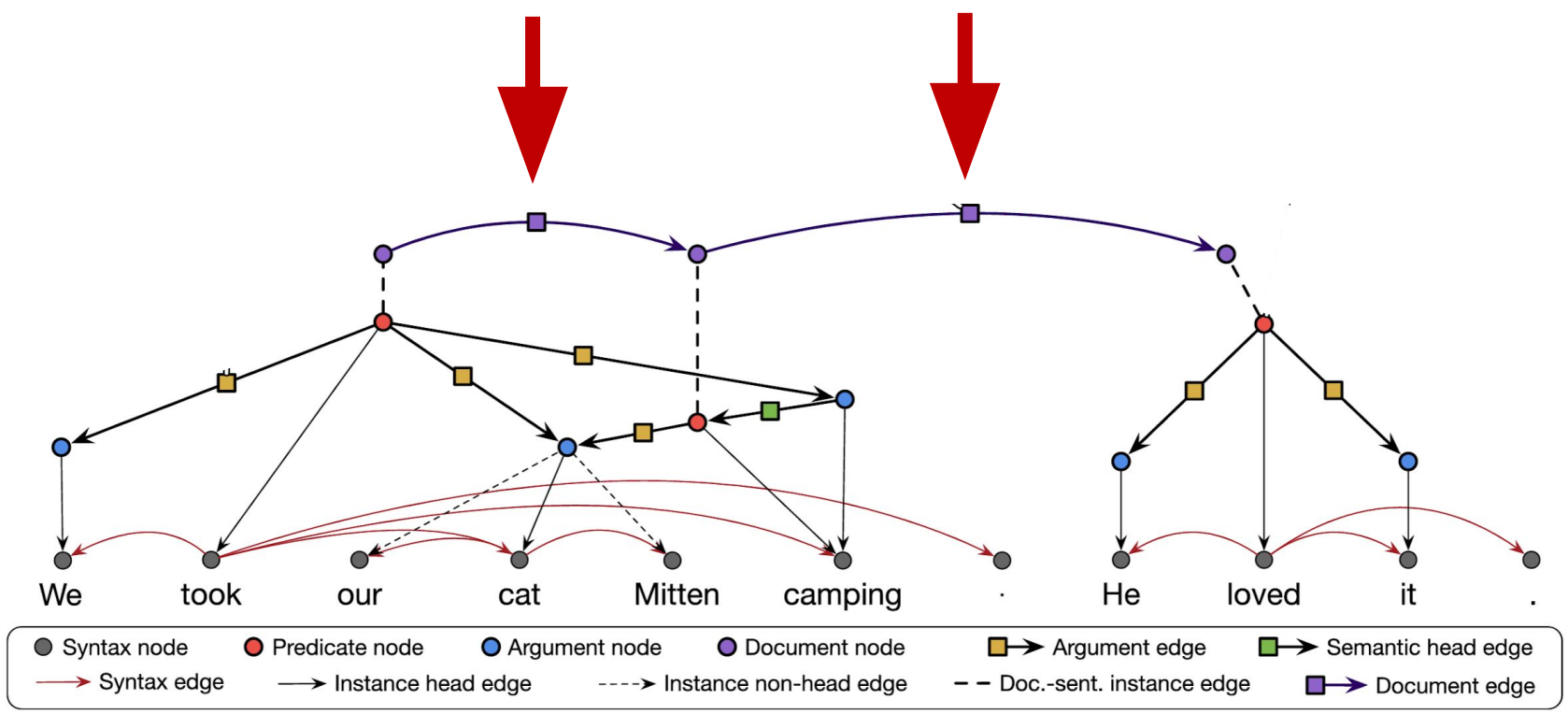
## Challenge

Not all situation descriptions are anchored by a predicate; yet, we can draw inferences about that situation.

She melted the butter, then added the flour and stirred the mixture gently.







● Syntax node    ● Predicate node    ● Argument node    ● Document node    □→ Argument edge    □→ Semantic head edge  
 → Syntax edge    → Instance head edge    - - - Instance non-head edge    - - Doc.-sent. instance edge    □→ Document edge

## Challenge

Not all situation descriptions are anchored by a predicate; yet, we can draw inferences about that situation.

## Approach

Lift the requirement that a situation needs to be anchored by a predicate.

## **Task**

Generalized template extraction

## **Similar to**

Event argument extraction, which extends semantic role labeling from the sentence level to the document level.

She melted the butter. Then, she added the flour. And finally, she stirred the mixture gently.

**Template 1: MAKE-ROUX**

MAKER: {"She"}

FAT: {"the butter"}

THICKENER: {"the flour"}

ROUX: {"the mixture"}

HEATING-SURFACE: NULL

HEATING-METHOD: NULL

STIRRING-IMPLEMENT: NULL

**Template 2: MELT**

MELTER: {"She"}

MELTEE: {"the butter"}

HEATING-SURFACE: NULL

HEATING-METHOD: NULL

**Template 3: MIX**

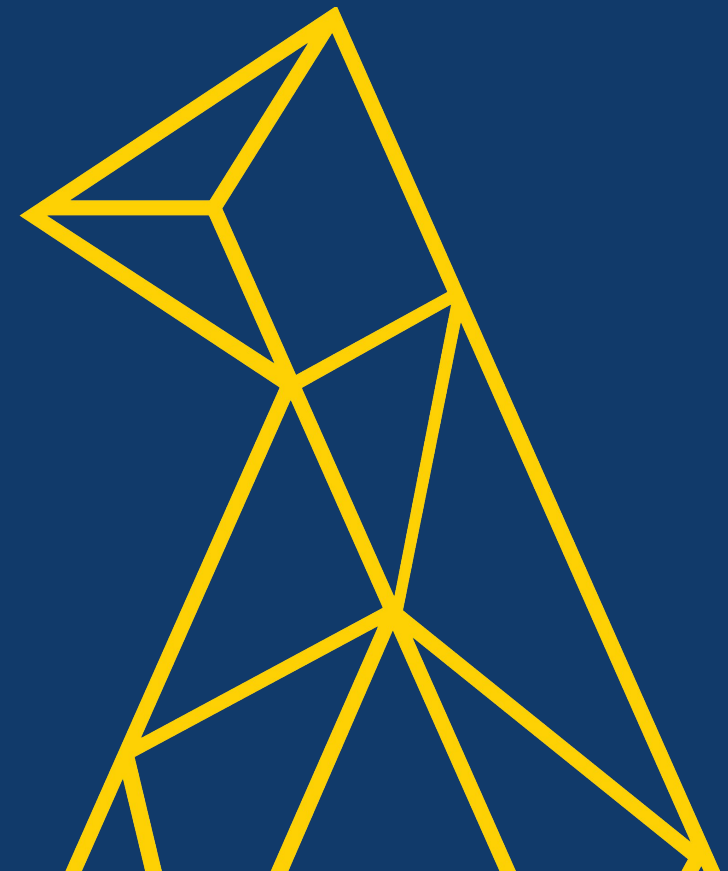
MIXER: {"She"}

MIXING-IMPLEMENT: NULL

INGREDIENTS: {"the butter", "the flour"}

RESULT: {"the mixture"}

# Heavy Scaffolding



## Goal

Develop more targeted inference templates using more concrete ontologies.

**Employee [Empee]** The person whom the **Employer** takes on as an **Employee**, obligating them to perform some **Task** in order to receive **Compensation**.  
*I was just HIRED yesterday!*

**Employer [Emper]** The person (or institution) that takes on an **Employee**, giving them **Compensation** in return for the performance of an assigned **Task**.  
 Semantic Type: Sentient  
*Last month, IBM HIRED Mike Zisman to head up its storage software group.*

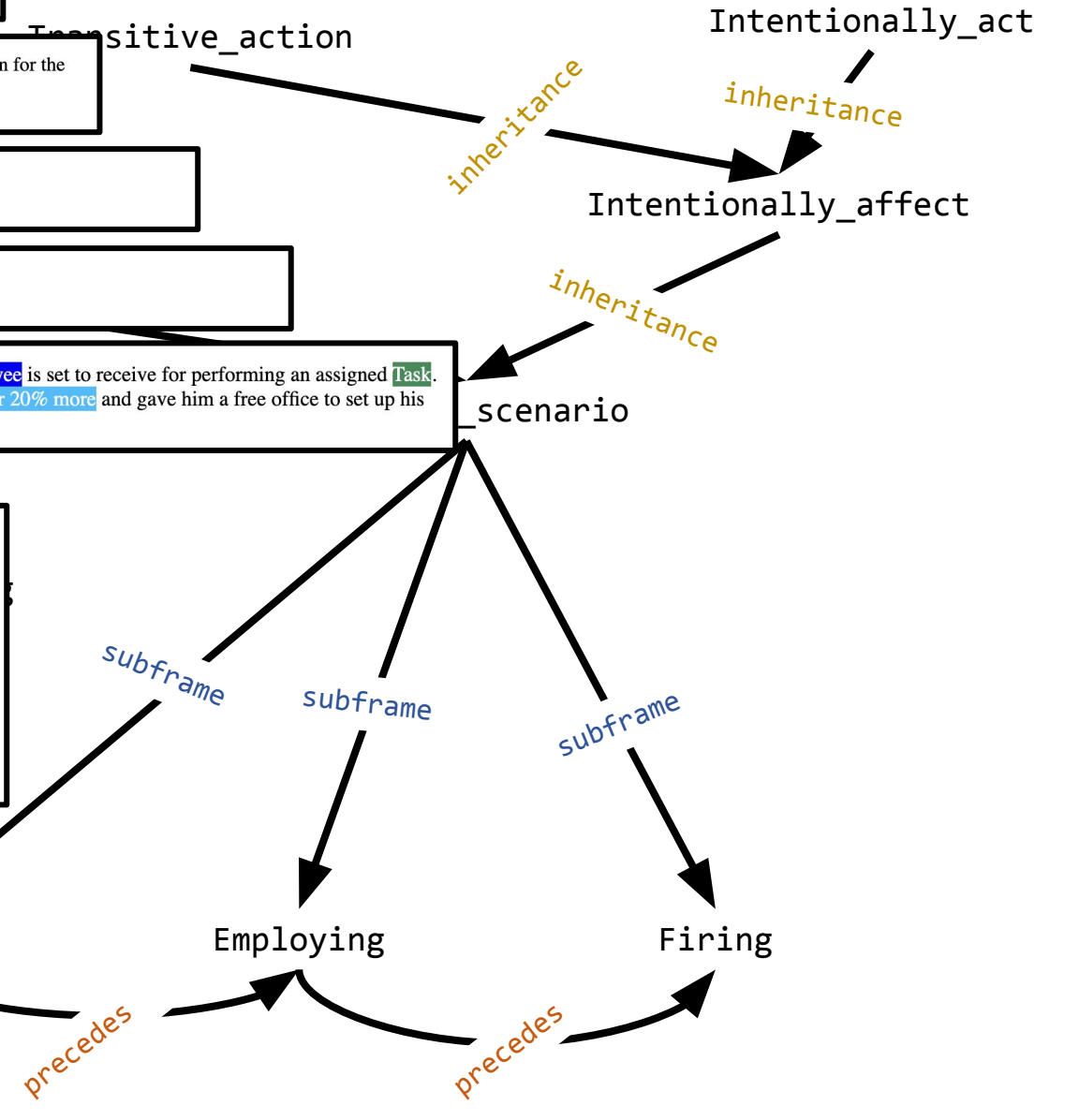
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**Compensation [Compense]** The **Compensation** is the payment that the **Employee** is set to receive for performing an assigned **Task**.  
*They fired our management, HIRED him for 20% more and gave him a free office to set up his own company.*

**Employment\_start**  
*perspective on*

An **Employer** hires an **Employee**, promising the **Employee** a certain **Compensation** in exchange for the performance of a job. The job may be described either in terms of a **Task** or a **Position**. In some cases, the **Employee** FE will also indicate the **Position** (see fourth example below).  
*John was HIRED to clean up the file system.*  
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 The same sentence (above) should also have the FE **Position** on the second layer:  
 The A's **SIGNED** a new third baseman for \$30M.



## Goal

Develop more targeted inference templates using more concrete ontologies.

## Idea

Datasets annotated with broad-coverage ontologies provide guidance about candidate inferences.



## Challenge #1

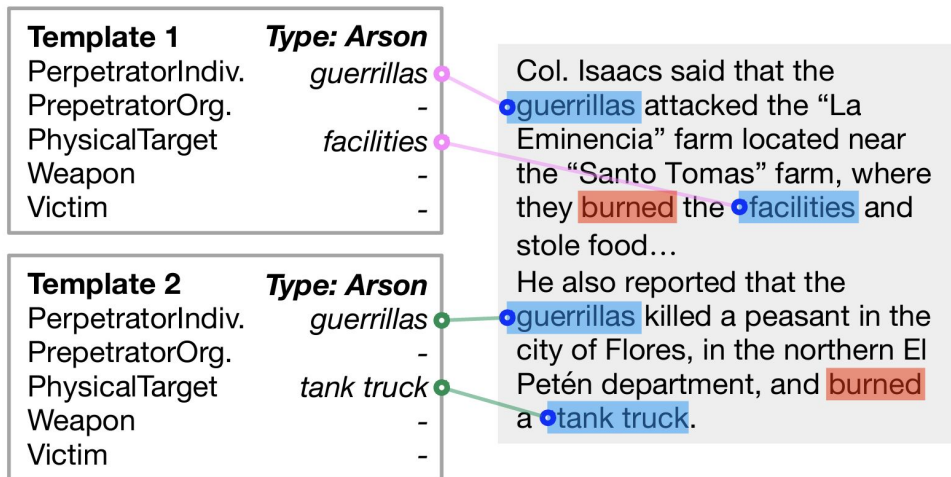
We don't quite have the perfect dataset for generating these sorts of candidate inferences at scale.

1. Datasets annotated with broad-coverage ontologies\* tend to be annotated at the sentence level.
2. Datasets annotated at the document-level tend to be annotated with narrow ontologies.

\*that anchor to the text and have the sorts of rich glosses we need

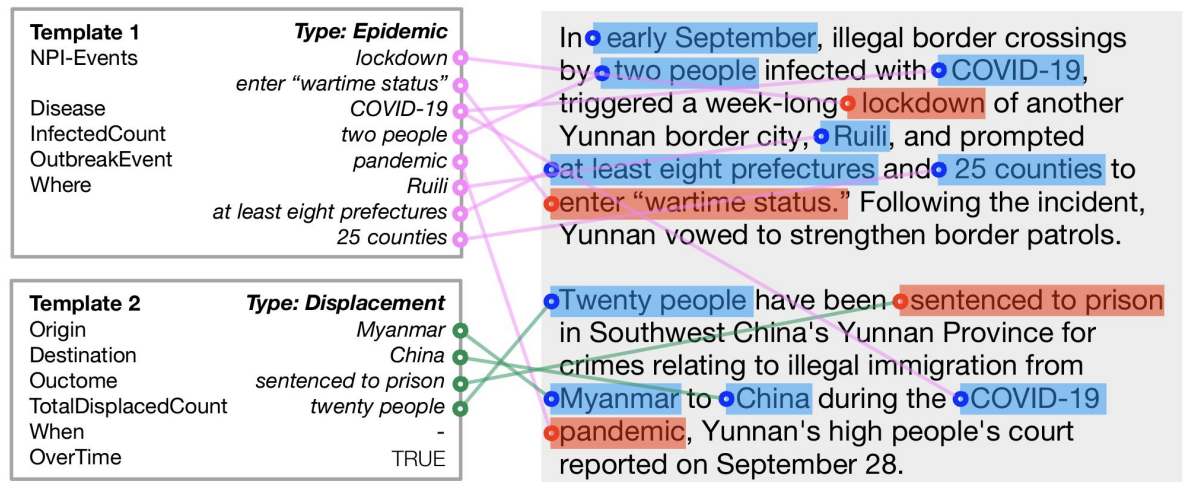
## MUC-4 Ontology

- arson
- attack
- bombing
- kidnapping
- murder
- robbery



## IARPA BETTER Granular Ontology

- incidents of corruption
- natural disasters
- human migration events
- disease outbreaks or epidemics
- protests or demonstrations
- acts of terrorism



## Challenge #2

Even for datasets annotated with highly constrained ontologies, it is hard to predict templates.

Model (Encoder)	SciREX						MUC-4								
	CEAF-REE <sub>def</sub>			CEAF-RME			CEAF-REE <sub>def</sub>			CEAF-REE <sub>impl</sub>			CEAF-RME		
	P	R	F <sub>1</sub>	P	R	F <sub>1</sub>	P	R	F <sub>1</sub>	P	R	F <sub>1</sub>	P	R	F <sub>1</sub>
TEMPGEN (BART <sub>base</sub> )	8.	<b>This is a hard task!</b>									46.4	58.3	31.0	40.5	
TEMPGEN (BART <sub>large</sub> )	19.	<b>This is a hard task!</b>									47.2	<b>61.3</b>	32.9	42.8	
GTT (BERT <sub>base</sub> )	-	<b>This is a hard task!</b>									50.2	55.0	36.8	44.1	
ITERX (BERT <sub>base</sub> )	16.2	7.6	10.4	16.2	17.4	16.8	41.3	<b>27.9</b>	33.3	52.3	<b>51.1</b>	51.7	47.2	<b>45.0</b>	46.1
ITERX (BART <sub>base</sub> <sup>enc</sup> )	15.0	<b>15.0</b>	15.0	14.3	35.4	20.3	39.2	24.8	30.4	49.8	45.7	47.6	44.8	40.1	42.3
ITERX (T5 <sub>large</sub> <sup>enc</sup> )	<b>26.4</b>	12.4	<b>16.9</b>	<b>25.0</b>	<b>40.6</b>	<b>31.0</b>	53.5	26.2	<b>35.2</b>	60.9	46.9	<b>53.0</b>	55.8	42.4	<b>48.2</b>



## Challenge #2

Even for datasets annotated with highly constrained ontologies, it is hard to predict templates.

## Upshot

We need to work on getting template extraction systems working on broad-coverage ontologies before we start using them to generate candidate inferences.

## **Subgoal #1**

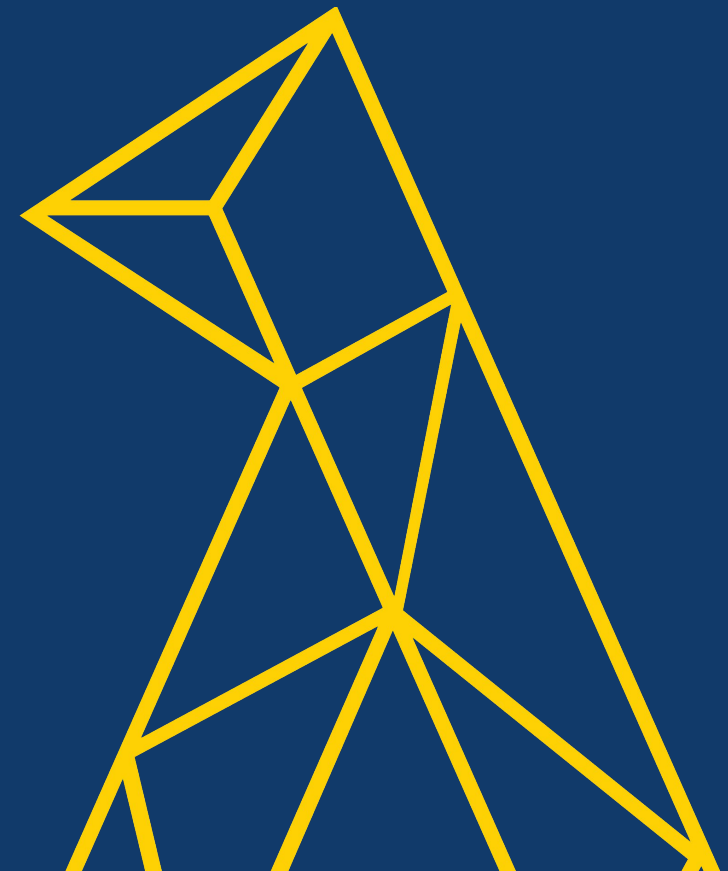
Develop a broad-coverage dataset for generalized template extraction.

## **Subgoal #2**

Provide some baseline models for predicting those data.

# Heavy Scaffolding

Event individuation



## Challenge

Difficult for annotators to agree on how many instances of a particular complex situation type are described by text.



A bomb exploded today in a Lima restaurant, and a second device that had been placed in the same establishment was deactivated by the Peruvian National Police. There were no victims, and the explosion caused very little damage to the restaurant...Guerrillas of the Tupac Amaru Revolutionary Movement (MRTA) have claimed credit for the terrorist act....

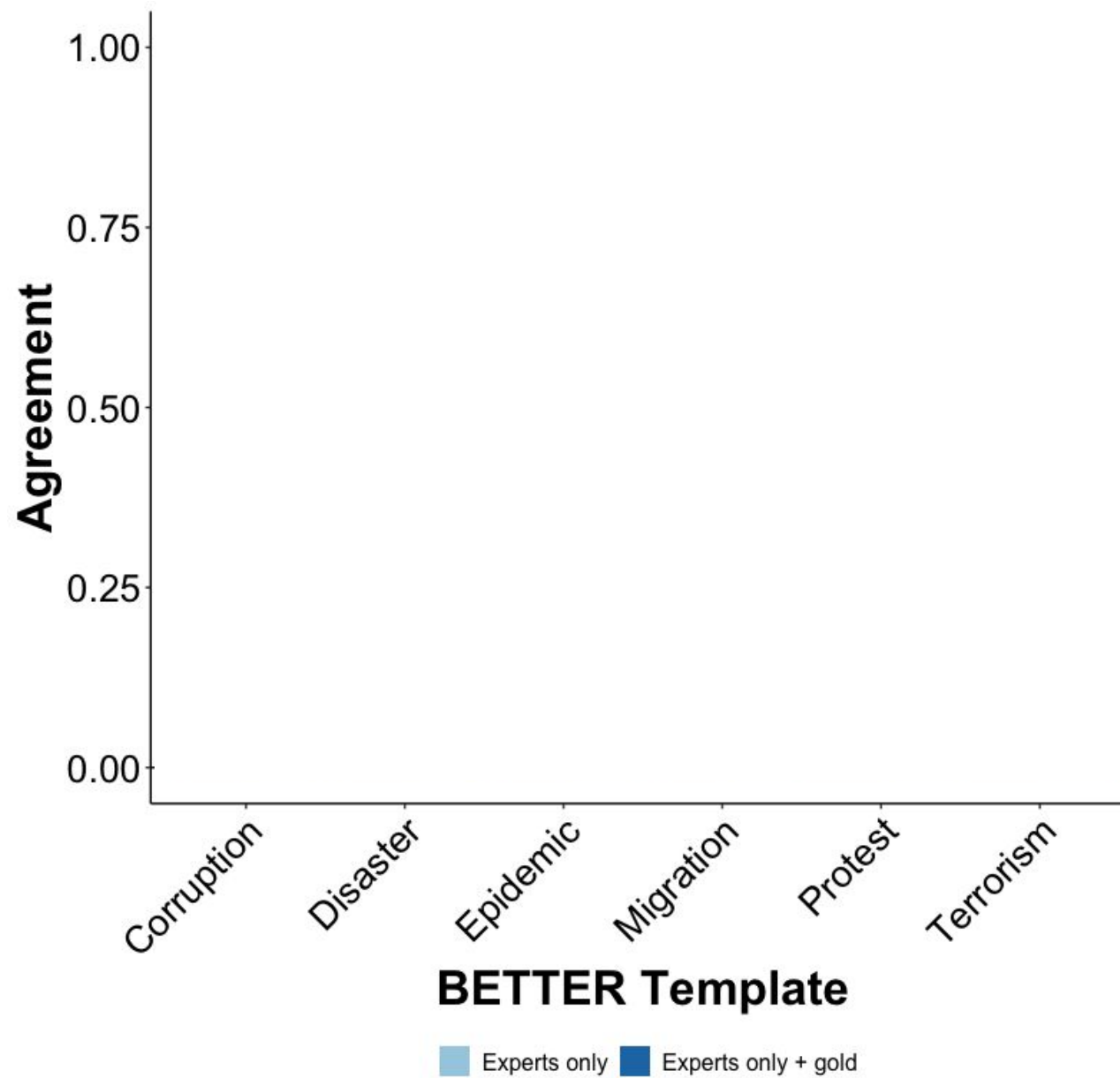
<b>Type:</b> Bombing	<b>Type:</b> Bombing
<b>PerpInd:</b> <i>Guerrillas</i>	<b>PerpInd:</b> <i>Guerrillas</i>
<b>PerpOrg:</b> <i>Tupac Amaru Revolutionary Movement, MRTA</i>	<b>PerpOrg:</b> <i>Tupac Amaru Revolutionary Movement, MRTA</i>
<b>Target:</b> <i>restaurant</i>	<b>Target:</b> <i>restaurant</i>
<b>Victim:</b>	<b>Victim:</b>
<b>Weapon:</b> <i>bomb</i>	<b>Weapon:</b>

## **Approach**

Have three experts reannotate portions of the MUC-4 and BETTER data for number of instances of a template.

## **Evaluation**

Compare agreement among experts annotations and with gold annotation.



## Challenge

Difficult for annotators to agree on how many instances of a particular complex situation type are described by text.

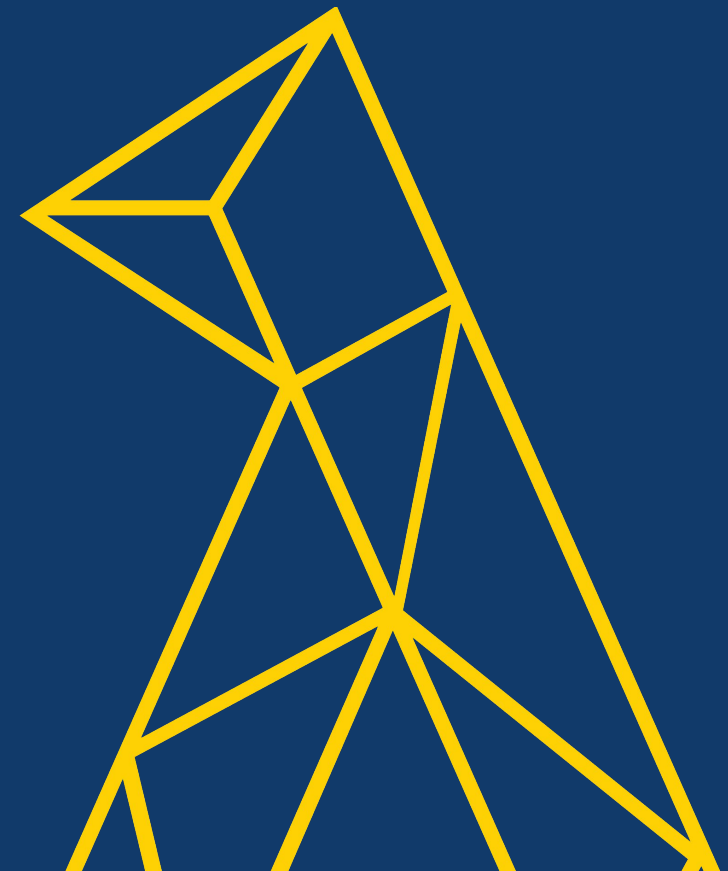
## Approach: Cross-document arg extraction\*

Explicitly point to a complex situation description in one document and fill a template for it in another.

\*Related to but distinct from similar tasks like Event Linking (Nothman 2012), Cross-Document Event Coreference (Bagga and Baldwin 1999, Cybulska and Vossen 2014, (Eirewetal.,2021,2022), and Predicate-Argument Alignment (Roth and Franke 2012, Wolfe et al. 2013, 2015).

# Heavy Scaffolding

Cross-document argument  
extraction



## Report

On 16 July 2007 the inquiry was **adjourned** until 4 September with a final deadline for the submission of evidence of 14 August 2007 . On 11 September 2007 the inquiry was again adjourned until 19 September to allow the Highways Agency to review traffic evidence , with further adjournments until 18 December .

Is the **highlighted event** in Report mentioned in the **Source**?

Source Validation

YES

## Source

THE public in Tintwistle by Highways Agen wrong . All t the inquiry , will now have

Data available at:

<https://github.com/FACTSlab/FAMuS>

The agency told the inquiry , at **Stalybridge Civic Hall** , it had made a ` significant error ' in its estimation of how much traffic would use the road by underestimating journey times on the A616 trunk road ...

Inspector **John Watson** , chairing the inquiry , adjourned the hearing ...and said the new evidence should be heard and parties who have already given evidence be allowed to return .

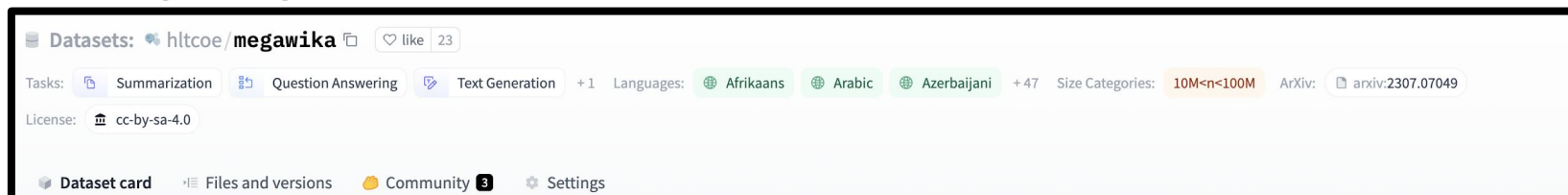
Cross Document Argument  
ion

Source

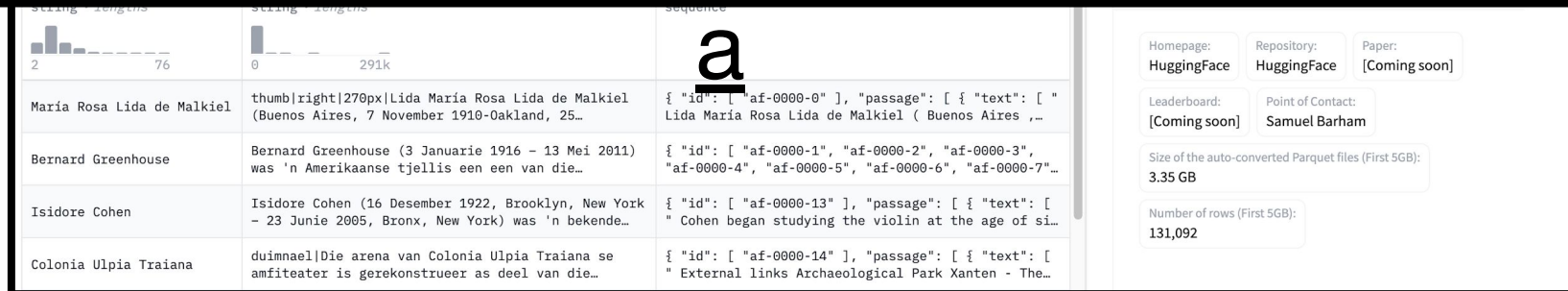
Activity	"the inquiry"	public inquiry into the controversial Mottram - Tintwistle bypass"
Agent	-	"John Watson"
Place	-	"Stalybridge Civic Hall"
Time	"16 July 2007"	"when the Highways Agency admitted it had got its figures wrong"



# Base Corpus Barham et al. 2023

MegaWika: >71 million source-report pairs over 50 diverse languages



Available at  
<https://huggingface.co/datasets/hltcoe/megawika>



string_lengths	sequence
	
Maria Rosa Lida de Malkiel	thumb right 270px Lida Maria Rosa Lida de Malkiel (Buenos Aires, 7 November 1910-Oakland, 25...
Bernard Greenhouse	Bernard Greenhouse (3 Januarie 1916 - 13 Mei 2011) was 'n Amerikaanse tjellis een een van die...
Isidore Cohen	Isidore Cohen (16 Desember 1922, Brooklyn, New York - 23 Junie 2005, Bronx, New York) was 'n bekende...
Colonia Ulpia Traiana	duimnael Die arena van Colonia Ulpia Traiana se amfiteater is gerekonstrueer as deel van die...

**Longdendale Bypass**

Article Talk

From Wikipedia, the free encyclopedia

**The Longdendale Bypass** (also known as the **A57/A628 Mottram-in-Longdendale, Hollingworth & Tintwistle Bypass**) is a long-planned road scheme in England by the **Highways Agency**. The aim is to alleviate traffic congestion on the **A57 road/A628 road/A616 road** routes that presently pass through the villages. There is both support and opposition for this long-planned scheme which will pass through the valley of Longdendale and part of the **Peak District National Park**.

After nearly fifty years, part of the road scheme – the **Mottram Bypass** and **Glossop Spur** – was approved by the **Highways Agency** on 2 December 2014.

**Background** [edit]

The existing **A628** trunk road connects the **M67** from Manchester to the **M1** in South Yorkshire. A single-carriageway road through the villages of Mottram in Longdendale, Hollingworth and Tintwistle and through the **Peak District National Park**, it is used by a relatively large number of heavy goods vehicles. Supporters of the scheme say that the **A628** is one of the most congested A-road routes in the country, with high volumes of traffic (including HGVs) using a road which is totally unsuitable for the volume and nature of traffic it carries<sup>[1]</sup> and that there is no viable alternative to a bypass.<sup>[2]</sup> A survey in 2010 found that the junction of the **A57** and **M67** was the most congested in Manchester.<sup>[3]</sup>

Concern has been raised that the scheme would not have improved safety on the Woodhead Pass, where the majority of serious accidents occur.<sup>[4]</sup>

**Route** [edit]

The scheme envisaged a new dual carriageway that would have headed north-east from the eastern end of the **M67**, passed under the **A6018** Roe Cross Road, Old Road and Old Hall Lane in a 170-metre (558 ft) tunnel approximately 120 metres (394 ft) north of the point where those roads converge. To the east of this area the route would have continued onto a roundabout which provides for a link road down to the **A57** at Mottram Moor. To the east of the roundabout, the preferred route would have proceeded north-east through the **Swallows Wood** nature reserve, then curved south-east to join the existing **A628** east of Tintwistle near Townhead Farm. Another proposed local authority road, the 'Glossop Spur', would have linked to the **A57** at Woolley Bridge.<sup>[5]</sup>

The Department for Transport published both a map of the immediate area<sup>[6]</sup> and another showing routes across the Peak District and the location of Flouch,<sup>[7]</sup> which were scheduled to have associated traffic works. An independently produced overlay for Google maps is also available.<sup>[8]</sup> <sup>[1]</sup>

**History** [edit]

See also: *Road protest (UK)*

Since 1971 residents of Tameside have been working and lobbying, with local politicians, for a better solution for the **A57/A628** connection of Manchester and Sheffield to the **M67** – passing through villages of Mottram and Hollingworth, as well as affecting those around it. The plans were restored in the *Conservative* government's *Roads for Prosperity* white paper in 1983 following a public consultation process. A preferred route was selected in October 1993 but work was suspended in 1996 following further government works of the national road-building programme work. In December 2014 the scheme was approved.

In July 1998 the incumbent *Labour* government published the results of its own review in the document *A New Deal for Trunk Roads in England*<sup>[9]</sup> and included the bypass as a scheme to be progressed through the preparatory stages. In November 2002, the Highways Agency submitted a report to the regional planning bodies (North West, East Midlands, Yorkshire and the Humber). The scheme received support from the communities affected by the bypass in the form of a petition with 9,000 signatures that was delivered to Downing Street in February 2003.<sup>[10]</sup> In this submission, they formed the conclusion that there were no realistic alternatives to a bypass of the villages to solve the problems that existed. In April 2003 the bypass entered the Targeted Programme of Improvements, recognising the likelihood of increased traffic along the route and including proposals to discourage road users from switching from other cross-Pennine routes.<sup>[11]</sup>

Under the *Early Contractor Involvement* (ECI) initiative the Highways Agency appointed Mottvion to take the scheme forward. The ECI allows for detailed planning work to be carried out while the scheme moves through statutory procedures.<sup>[12]</sup> On 31 January 2006 the Secretary of State for Transport published formal proposals in the form of Draft Orders to construct the bypass, make good the older roads, and introduce 'route restraint measures'. The public and other interested organisations were allowed a period of 13 weeks until 5 May 2006 to express their opinions on the proposals.<sup>[13]</sup> In May 2006 the Highways Agency released information under the *Freedom of Information Act* of all properties they had purchased in connection with the scheme during the previous 30 years,<sup>[14]</sup> and an updated copy was also released in August 2008.<sup>[15]</sup>

By the end of the consultation period 1,400 people had written letters expressing their objection to the scheme, with a further 1,000 in favour. Stephen Ladyman, then Minister of State for Transport, stated that "life for people in Mottram, Tintwistle and Hollingworth should be greatly improved by this bypass. Getting traffic out of the villages will make them a safer and healthier place to live".<sup>[16]</sup> Objections were also received from the Countryside Agency, English Nature, the Peak District National Park Authority and the National Trust.<sup>[17]</sup> The North West Regional Assembly had presented advice to ministers in January 2006 and then in June 2006 provided a revised sequencing of priority schemes.<sup>[18]</sup><sup>[19]</sup>

On 6 July 2006 the Secretary of State for Transport responded to these revised sequences and confirmed that funding provision could be made for the Longdendale Bypass and in December 2006 Rebecca Lush, a long-standing road protester and founder of Road Block, claimed the scheme was "particularly inappropriate and damaging".<sup>[14]</sup> In January 2007 Stephen Ladyman stated that construction work was expected to start in spring 2013.<sup>[17]</sup>

The change to the proposed timing and costs required a review of the environmental statement, which was duly republished with associated draft orders on 8 February 2007. There followed a six-week consultation period during which the Peak District authority responded.<sup>[14]</sup> Having been estimated at £90 million in 2003,<sup>[16]</sup> the cost of the proposal was estimated to have risen to £240–£315m in 2008.<sup>[19]</sup>

On 2 December 2014, the government announced that it will be investing £170m on the **A57**, **A628** and **A628** trans-Pennine route, including a bypass for the village of Mottram.<sup>[20]</sup> The Chancellor of the Exchequer, George Osborne, has given the go-ahead for an initial scheme of at least £170 million to resolve the traffic issue through Mottram and to build a link road to Glossop. The government will also consult on whether to extend the proposed scheme to relieve pressure on Tintwistle as well. In addition to the works announced, there are also studies and proposals into the possibility of a tunnel under the Peak District to link Manchester with Sheffield, with some of the proposed tunnel routes using the existing **M67** route to link the **M60** and **M1** motorways.<sup>[21][22]</sup>

Plans for a dual-carriageway bypass taking a different route were displayed in 2020. At that time, it was stated work would begin in 2023. The plans were priced at £226 million.<sup>[23]</sup>

**Public inquiry** [edit]

*Further information: Public inquiry*

Details of the public inquiry were announced in April 2007.<sup>[24]</sup> It was to be run by Persona Associates with John Watson as Inspector.<sup>[24]</sup> An official public inquiry website<sup>[25]</sup> was launched offering news, transcripts and documentation for download.

The inquiry opened on 26 June 2007.<sup>[24]</sup> On 16 July 2007 the inquiry was adjourned until 4 September with a final deadline for the submission of evidence of 14 August 2007.<sup>[24]</sup> On 11 September 2007 the inquiry was again adjourned until 19 September to allow the Highways Agency to review traffic evidence,<sup>[26]</sup> with further adjournments until 18 December.<sup>[24][27]</sup>

On 4 December 2007 the Highways Agency published *Route Restraint Measures – Explanation of the Further Change in the Traffic Forecasts* and suggested that this data would not be available until Easter 2008.<sup>[28]</sup> The inquiry reviewed this new information on 18 December 2007 at which time it was adjourned to allow the Highways Agency to correct their traffic modelling. The inspector commented that "it was the fifth iteration of the traffic model since the original announcement in February 2006". The inquiry was then "Adjourned Indefinitely Pending the Publication of Revised Evidence by The Highways Agency and Tameside MBC".<sup>[24]</sup>

On 3 March 2008 the Highways Agency responded to queries from the inspector indicating that it expected to have revised evidence available by October 2008.<sup>[29]</sup>

In September 2008 the Highways Agency indicated that the revised information would now be available for public consultation in May 2009 and that the public inquiry could start again in Autumn 2009.<sup>[30]</sup>

In February 2009 the Campaign for Better Transport reported that funding for the road scheme would not be available before 2016.<sup>[31]</sup>

In March 2009 the Highways Agency announced that it was pulling out of the public inquiry, citing the decision of the *Regional Leaders' Forum*, 4NW, to delay the start of the scheme by at least four years. The accompanying press release stated that "the extended period of time between the publication of the draft proposals for the scheme in 2007 and the earliest date at which the inquiry might be reconvened" was a further factor in the decision to withdraw.<sup>[32]</sup>

# Longdendale Bypass

Article Talk

From Wikipedia, the free encyclopedia

Coordinates: 53°27′56″N 1°59′59″W﻿ / ﻿

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## Public inquiry [edit]

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# Inquiry into bypass halted

THE public inquiry into the controversial Mottram-Tintwistle bypass was dramatically halted when the Highways Agency admitted it had got its figures wrong. All the traffic evidence it has put before the inquiry, which has been running since June, will now have to be reviewed.

Barham et al. 2023



## Corpus Barham et al. 2023

MegaWika: >71 million source-report pairs over 50 diverse languages

## Ontology

FrameNet as the underlying event ontology for broad-coverage of situation types (events, states, processes).

\*Related to but distinct from similar tasks like Event Linking (Nothman 2012), Cross-Document Event Coreference (Bagga and Baldwin 1999, Cybulska and Vossen 2014, (Eirewetal.,2021,2022), and Predicate-Argument Alignment (Roth and Franke 2012, Wolfe et al. 2013, 2015).

Select Event Type:

None of the Event Type matches the highlighted span

Does the Source Text contain the exact same event highlighted in the Passage Text?

Your Answer for Event Type:

Event Definition:

The words in this frame describe situations in which a Perpetrator carries off and holds the Victim against his or her will by force. "

'Two men kidnapped a Millwall soccer club employee, police said last night.'

Event Example: Two men **kidnapped** a Millwall soccer club employee, police said last night.

Description Following the events of the first Super Chinese World game , the world has been saved and Rub -A-Doc has invited the leaders of the world , including the Emperor Chin of Chinaland to a galactic peace conference . However the conference is disrupted when alien invaders capture all members of the peace conference and declare themselves rulers of the galaxy . To back up this claim , the invaders

# Source Validation

255 situation types from FrameNet

- **5 positive source validation (SV)** examples for each event type
- **5 negative source validation (SV)** examples for each event type

Select Event Type:

Active Event Type:

Event Definition:

The words in this frame describe situations in which a Perpetrator carries off and holds the Victim against his or her will by force. "'Two men kidnapped a Millwall soccer club employee, police said last night.'

Event Example: Two men kidnapped a Millwall soccer club employee, police said last night.

Passage Text

has been saved and has... has invited the leaders of the world, including the Emperor Chin of Chinaland to a galactic peace conference. However the conference is disrupted when alien invaders capture all members of the peace conference and declare themselves rulers of the galaxy. To back up this claim, the invaders have assigned several champions as lieutenants. Hearing that things are once again in trouble, ninja warriors Ryu and Jack quickly enlist the help of the people of Futureland to build a spaceship and attack one of the champions.

Active Role:  Answer:

Roles:

Role Definition: The Victim is the person who is carried off and held against his/her will.

# Cross-Document Argument Extraction

For each positive source validation, annotate roles in report and source.

## **Baselines: Source Validation**

1. Lemma: target lemma is found in the source.
2. Longformer: document pair classifier
3. ChatGPT: prompt-based

---

<b>Model</b>	<b>Accuracy</b>	<b>P</b>	<b>R</b>	<b>F1</b>
Majority	50.00	-	-	-
Lemma	<b>78.04</b>	<b>88.65</b>	64.31	74.55
Longformer	72.35	66.38	<b>90.59</b>	<b>76.62</b>
ChatGPT	67.45	82.96	43.92	57.44

---

## **Baselines: Source Validation**

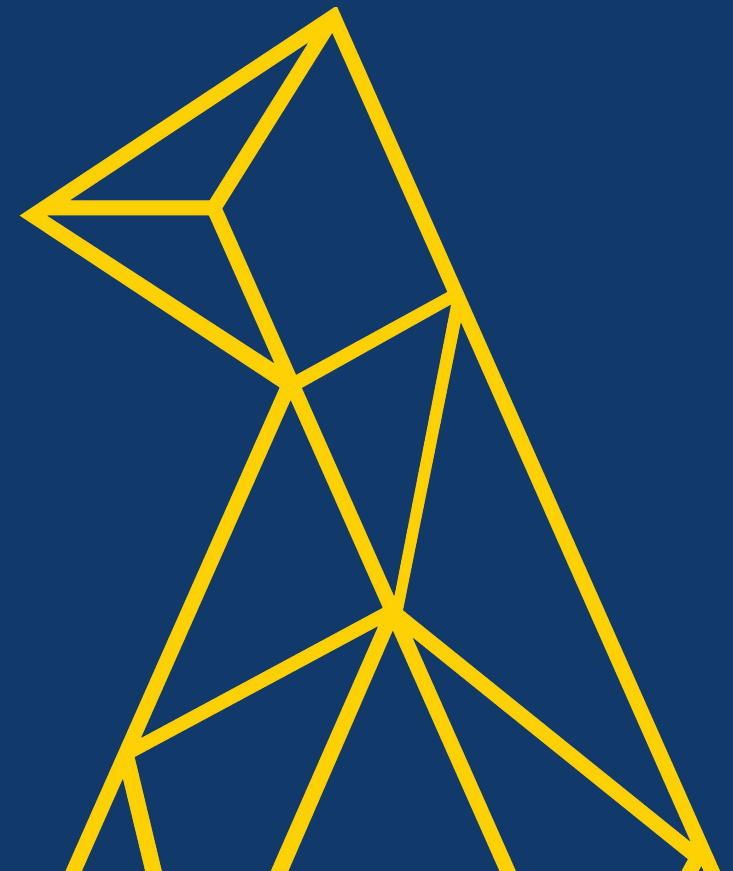
1. Lemma: target lemma is found in the source.
2. Longformer: document pair classifier
3. ChatGPT: prompt-based

## **Baselines: Cross-Doc Argument Extraction**

1. Report: ignore the source and use spans from report
2. IterX: structured prediction model
3. Longformer-QA: fine-tuned QA model
4. ChatGPT and Llama2: few-shot prompting models

		Report						Source					
		CEAF-RME $_{\phi_3}$			CEAF-RME $_a$			CEAF-RME $_{\phi_3}$			CEAF-RME $_a$		
Model		P	R	F <sub>1</sub>	P	R	F <sub>1</sub>	P	R	F <sub>1</sub>	P	R	F <sub>1</sub>
-rb	IterX <sub>gold</sub>	73.11	72.00	72.55	73.56	72.44	73.00	70.46	69.16	69.80	70.58	69.28	69.92
	IterX <sub>gold+pred</sub>	40.57	29.38	37.8	42.24	30.59	37.8	25.07	10.82	17.11	29.85	12.88	17.00
	IterX <sub>pred</sub>	37.63	24.14	29.41	42.16	27.04	32.94	20.83	8.63	12.21	27.63	11.45	16.19
	Longformer-QA	<b>43.56</b>	<b>40.14</b>	<b>41.78</b>	<b>56.01</b>	<b>51.61</b>	<b>53.72</b>	<b>25.53</b>	<b>22.21</b>	<b>23.75</b>	<b>38.85</b>	<b>33.80</b>	<b>36.15</b>
	Char											.39	31.78
Llar											.36	17.42	
<b>This task is hard for all models.</b>													
+rb	Rep											.88	<b>43.48</b>
	IterX <sub>gold</sub>	-	-	-	-	-	-	60.38	75.95	67.28	64.12	80.65	71.45
	IterX <sub>gold+pred</sub>	-	-	-	-	-	-	24.43	19.56	21.73	38.47	30.82	34.22
	IterX <sub>pred</sub>	-	-	-	-	-	-	22.24	17.38	19.51	37.42	29.24	32.83
	Longformer-QA	-	-	-	-	-	-	<b>24.12</b>	<b>25.89</b>	<b>24.97</b>	38.41	<b>41.24</b>	39.77
	ChatGPT	-	-	-	-	-	-	15.93	17.95	16.88	34.99	39.42	37.07
Llama-2-13b-chat	-	-	-	-	-	-	17.11	8.52	11.4	20.24	17.11	17.56	

# Conclusion





## Question

How do we design systems that capture the inferences we draw about situations based on their descriptions?

### **Ontology-factored approach**

Map situation description to symbolic situation ontology and draw inferences using rules stated over that ontology.

### **Ontology-free approach**

Map situation descriptions to natural language strings expressing the inferences of interest.

## **Challenge #1: Expense**

Ontologies and annotated corpora are expensive to build and maintain because they require highly trained experts.

## **Challenge #2: Brittleness**

Ontologies do not easily capture the ways in which context modulates the inferences that we draw.

## **Challenge: Lack of Abstraction**

Not clear how to determine an interesting set of inferences with which to represent a situation.

## **Ontologies as Representational Scaffolding**

1. Ontologies provide guidance about what the interesting, more abstract inferences are.
2. These more abstract inferences are directly associated with a text, as in ontology-free approaches.

## **Part 1: Light Scaffolding**

Highly abstract ontologies as light scaffolding for building sets of broadly applicable inference templates.

## **Part 2: Heavy Scaffolding**

More concrete ontologies as heavy scaffolding for building sets of more targeted inference templates.

## **Future Directions**

Improve performance of cross-document argument extraction systems as a means to guide targeted inference selection for downstream annotation.

## Thanks!

Supported by NSF-BCS-2040831 (*Computational Modeling of the Internal Structure of Events*), University of Rochester, JHU HLT COE, DARPA AIDA, DARPA KAIROS, and IARPA BETTER.



**Kyle Rawlins**  
JHU



**Ben Van Durme**  
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**Jordan Boyd-Graber**  
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**Rachel Rudinger**  
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**Lelia Glass**  
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**Anqi Liu**  
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**Kevn Duh**  
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**Sid Vashishtha**  
Rochester



**Will Gantt**  
Rochester



**Yunmo Chen**  
JHU



**Sam Barham**  
JHU



**Mahsa Yarmohammadi**  
JHU



**Kenton Murray**  
JHU



**Reno Kriz**  
JHU



**Aarsal Imtiaz**  
Everlaw



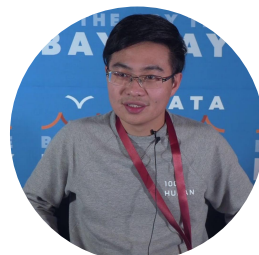
**Chandrashekar Nair**  
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