

Framing situations in the Dutch Language

from structured data to text and back from text to structured data on situations

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http://dutchframenet.nl

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Language as data

- Empirical approach to language (science, education, technology)
 - Language use defines the problem space rather than theoretical models
- How to properly sample language use:
 - data biases, data dynamics, capture all variation and ambiguity, capture the context
- Annotation is an interpretation of language use —> annotated corpora
- Lexical resources and ontologies are structured abstractions (or generalisations) from these interpretations (annotations)
- This traditional process can be described as *text-to-data*

We propose a new method: data-to-text, which helps us to get from text-to-data

A text tells a story

A murder and conviction: what, who, when and where

Jury **convicts** man in woman's death Saturday, 28 September 2013 01 : 43. A jury in eastern Oklahoma has convicted a Spiro man of two counts of first - degree **murder** in the 2012 **shooting death** of his **pregnant** girlfriend. The jury **deliberated** almost seven hours Thursday before **convicting** 27 - year - old Christopher Kenyon Simpson in the death of 20 - year - old Ka'loni Flynn , of Fort Smith , Ark . The jury **recommended** the maximum **sentence** of life in prison without parole.

FrameNet

- Charles Fillmore, The case for case (1968):
 - abstract semantic roles (agent, patient, instrument) in addition to syntactic relations (subject, object)
- Baker, Collin F., Charles J. Fillmore, and John B. Lowe. "The berkeley framenet project." 1998.
 - situation dependent roles Perpetrator, Crime, Victim, Offense, Verdict, Sentence
 - words evoke a situational Frame with encyclopaedic knowledge



Do case roles define the predicate or does the predicate define the case roles?

A text tells a story what, who, where, when



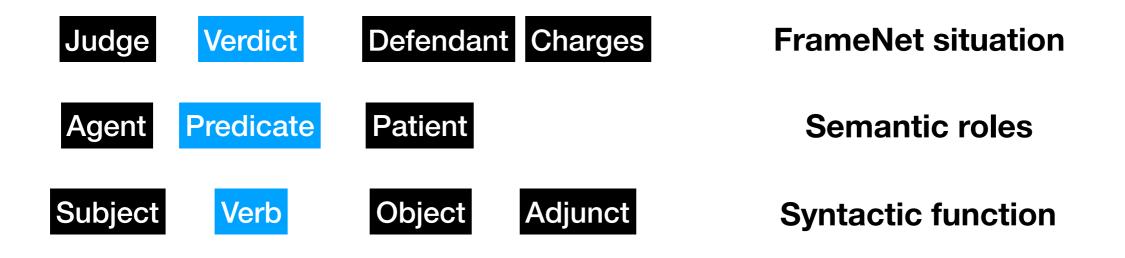
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A text tells a story what, who, where, when



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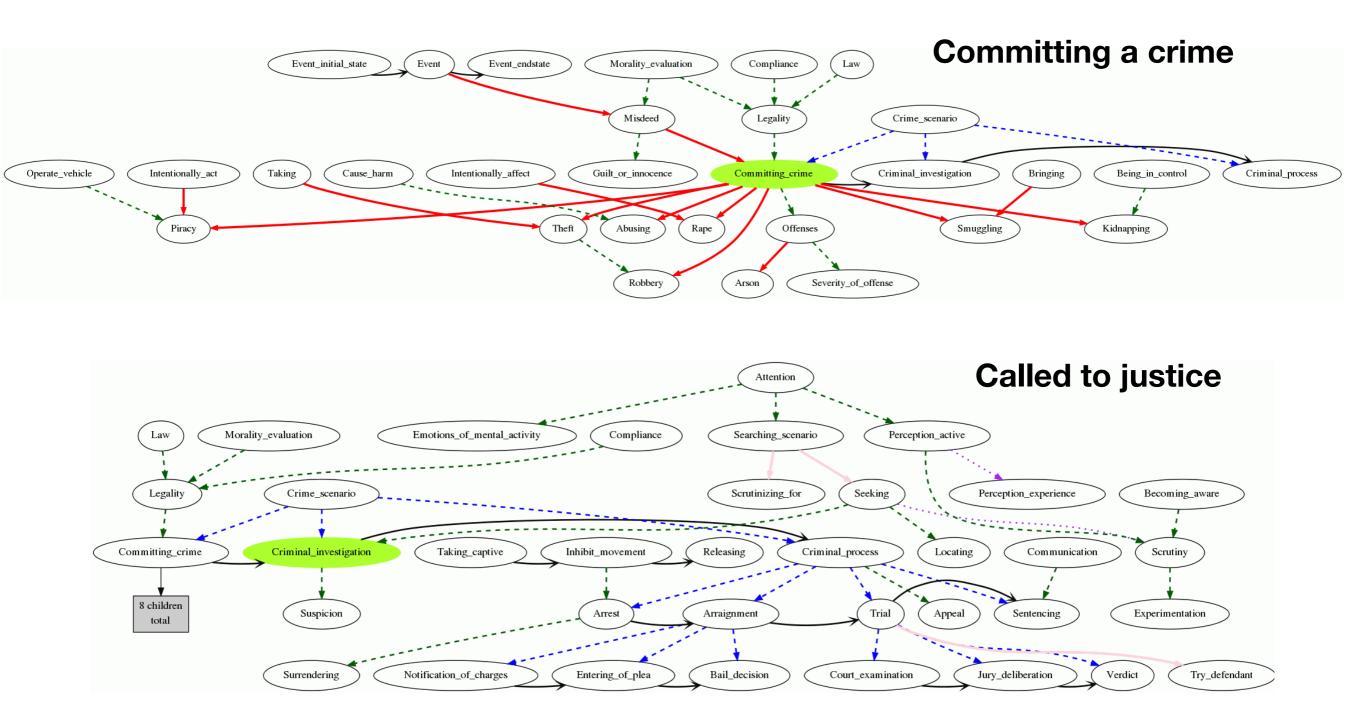


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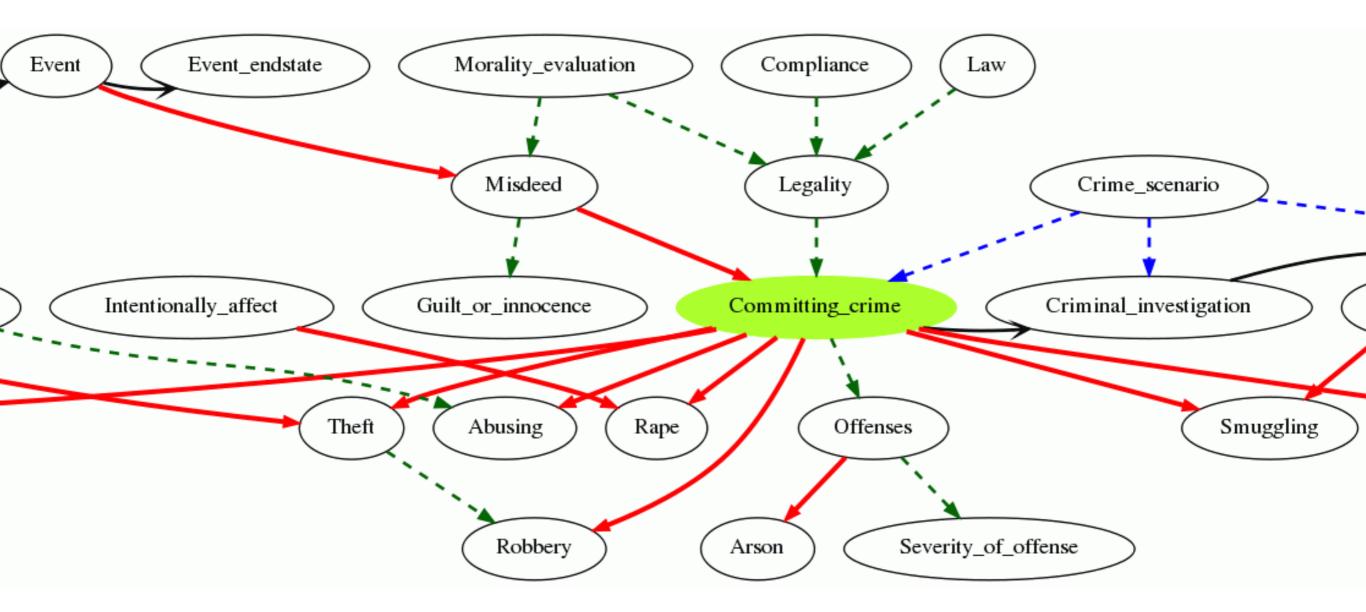
FrameNet data structure

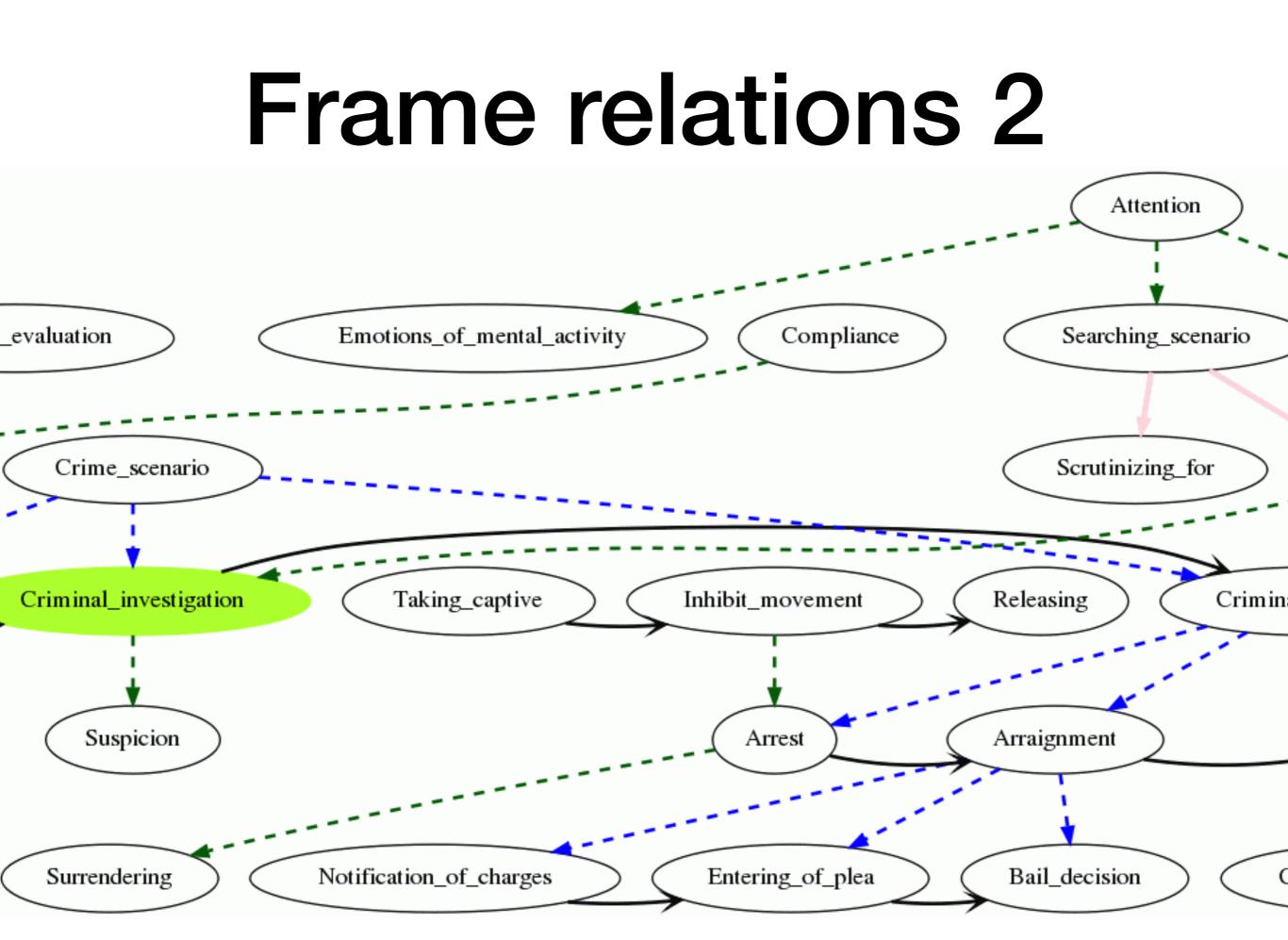
- Frame: Verdict
- Frame Elements: Case, Charges, Defendant, Finding, Judge
- Lexical Units: verdict.n, ruling.n, pronounce.v, not guilty.a, guilty.a, finding.a, find.v, conviction.n, convict.v, clear.v, acquittal.n, acquit.v
- Frame: Offense
- Frame Elements: Perpetrator, Victim
- Lexical Units: arson.n, assault.n, battery.n, burglary.n, child abuse.n, conspiracy.n, copyright infringement.n, felony.n, fraud.n, hijacking.n, homicide.n, indecent assault.n, kidnapping.n, larceny.n, manslaughter.n, murder.n, negligence.n, possession.n, rape.n, robbery.n, sabotage.n, sexual assault.n, sexual harassment.n, statutory rape.n, theft.n, treason.n
- Frame: Arson inherits-from —> Offense
- Lexical Units: arson.n, arsonist.n
- **Definition**: A Perpetrator intentionally sets fire to his own or someone else's property, often in order to collect an insurance payment on this property.
- **Example**: Two men were charged with ARSON.

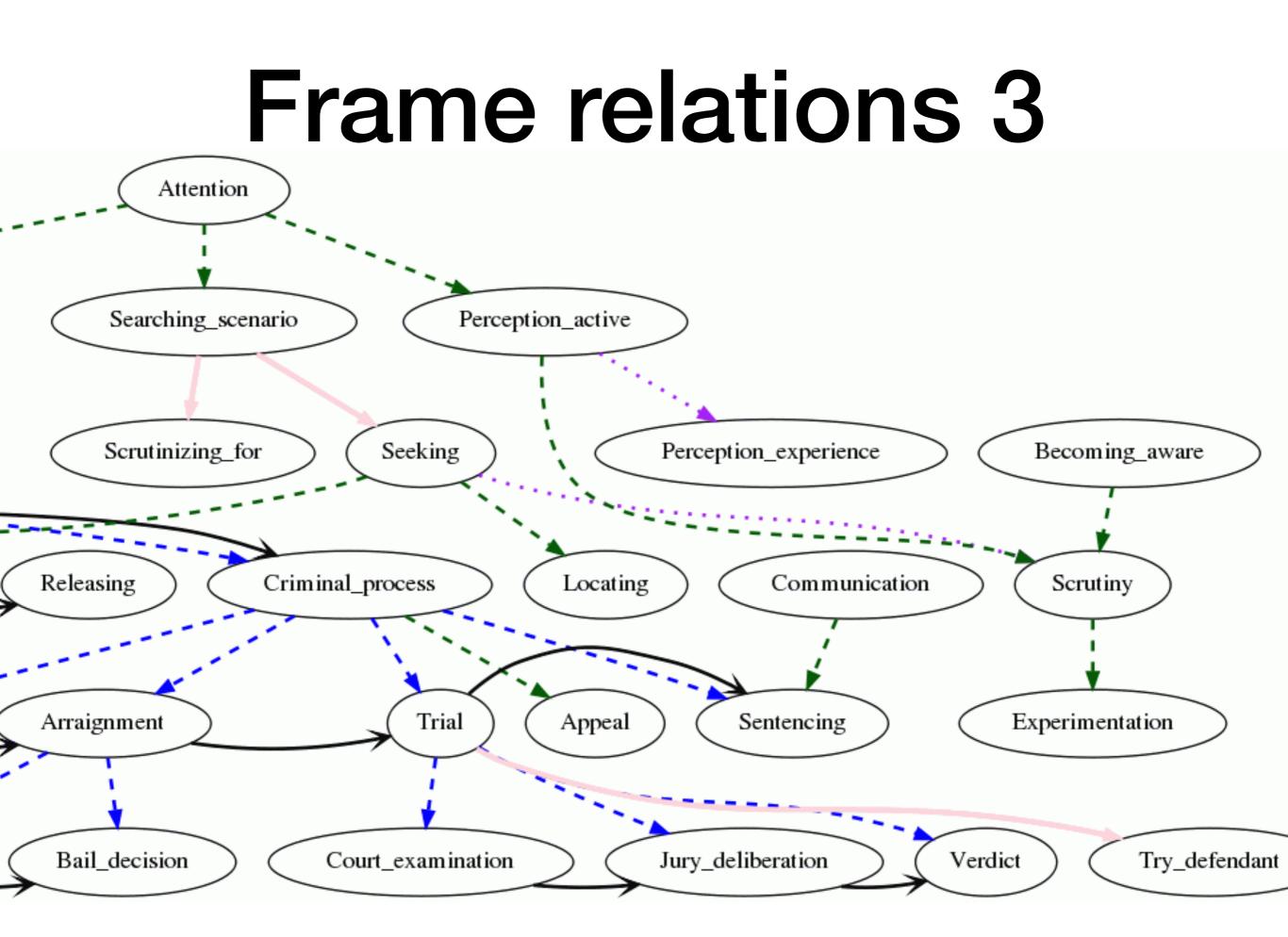
Frame relations



Frame relations 1







FrameNet Status

- 1,087 lexicalised frames
- 10,542 frame elements
- 13,640 lexical units in English
- 202,232 annotations in English texts
- FrameNet in other languages: French, Swedish, Japanese, Portuguese, Chinese, German, Spanish, Korean
- Global fragment project: <u>https://www.globalframenet.org</u>

FrameNet annotation

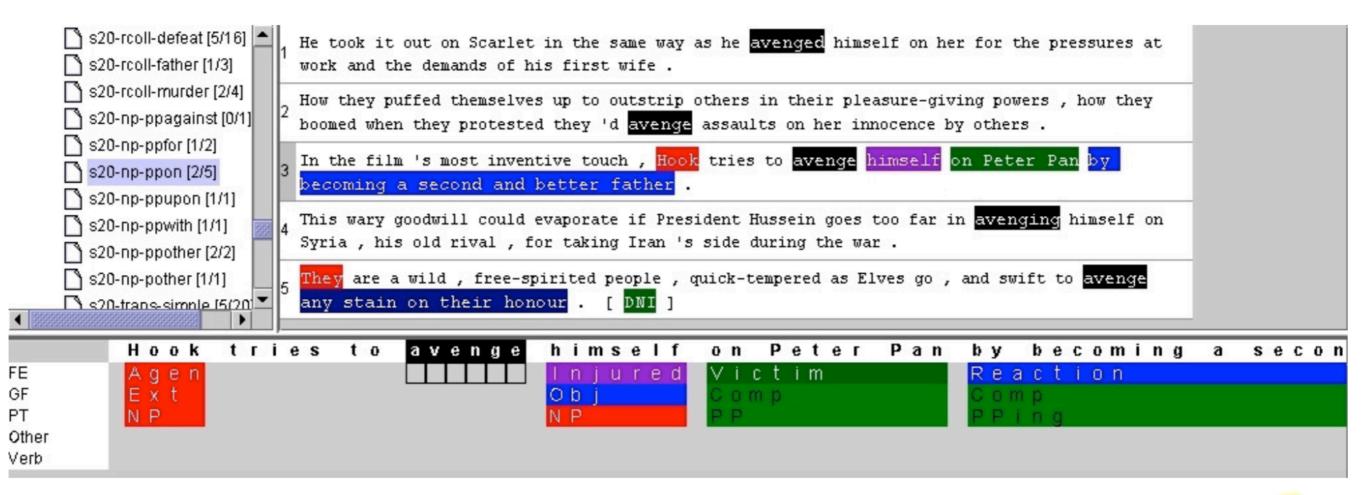


Figure 3.14: Annotation window with target LU avenge.v



If you have a lexicon, you can lookup the frames and elements

• If NOT, you need to consider all possible relevant frames and elements in each sentence

Some issues

- Coverage is low: frames, lexical units and annotations are unbalanced or even absent (30% frames, 10% lexical units, 50% of the words lack annotations in test data set, Palmer & Sporleder 2010)
- Frames do not form an ontology and lexical units evoke a frame: arson & arsonist
- Annotation is expensive, slow, incomplete and inconsistent:
 - 20 years to build the English FrameNet AND still not sufficient
 - annotations fit the frames instead of fitting the frames to the texts
- Sentence-based and not Document-based, Syntax-based and not SITUATION-BASED
- There is no FrameNet lexicon for Dutch (!!!)

ANNOTATING DUTCH CORPUS WITH FRAMES AND ELEMENTS

4 student assistants worked for 6 months (8 hours/week), supervised by a PostDoc

Nr. of files	116
Annotated verb tokens	5,250
Annotated verb types	1,335
Unique frames	671
Unique lexical units (lemma-frame combinations)*	4,755
Average nr. lexical units per frame	7

Agreem	ent	Percentage
Strict frame a	greement	47%
Loniont framo agroomont	hierarchical relations	51%
Lenient frame agreement	all relations	54%
Frame element agreem	ent for same frame	79%

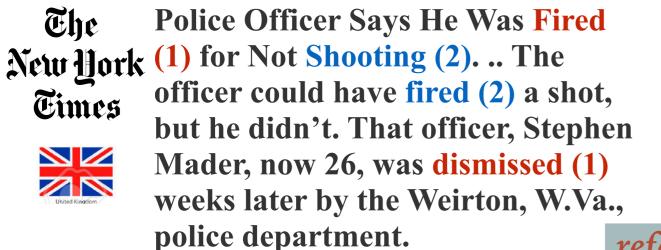
* double annotations, not resolving disagreements

FROM-DATA-TO-TEXT INSTEAD OF FROM-TEXT-TO-DATA

- Annotating situations in text is expensive, slow and difficult and there is no guarantee that the different text that describe the same situation will get the same annotation
- ► Our solution:
 - Start from a registration of situations
 - ► Find texts that report on the same situation
 - Annotate these texts together given the knowledge of the situation
- Vossen, Piek, Filip Ilievski, Marten Postma, and Roxane Segers. "Don't Annotate, but Validate: a Data-to-Text Method for Capturing Event Data." LREC-2018.

FROM-TEXT-TO-DATA: HOW TO KNOW THAT TEXTS ARE ABOUT THE SAME EVENT?

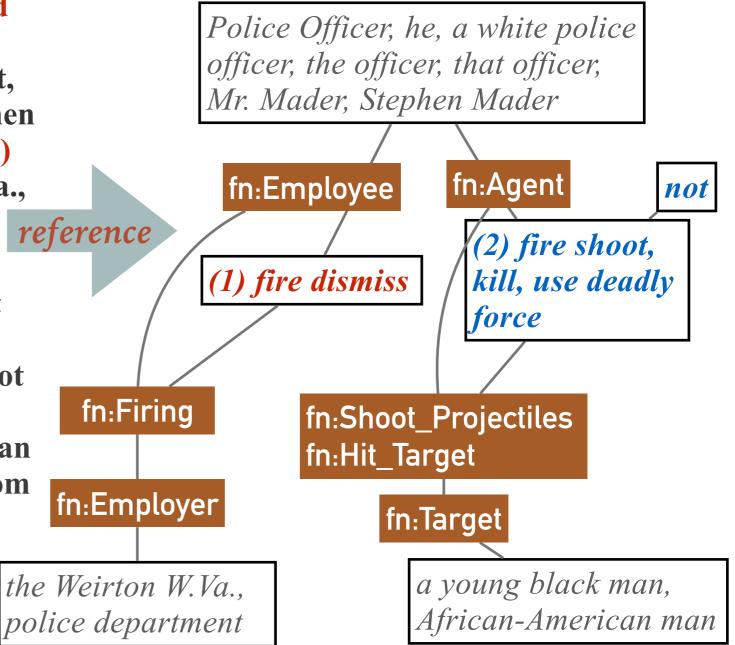
News texts



Newsweek

The Weirton Police Department terminated (1) Mr. Mader's employment because he chose not to use deadly force to shoot (2) and kill (2) and African-American man, who was suicidal, and whom Mr. Mader reasonably believed did not pose a risk of death or serious bodily injury,

Event-Graph



FROM-TEXT-TO-DATA: HOW TO KNOW THAT TEXTS ARE ABOUT THE SAME EVENT?

News texts

The Eimes

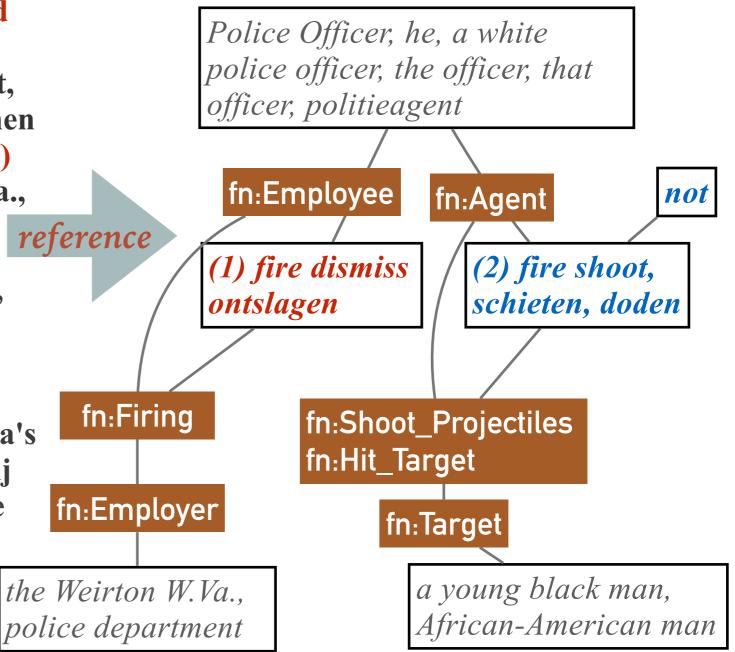
Police Officer Says He Was Fired New Hork (1) for Not Shooting (2). .. The officer could have fired (2) a shot, but he didn't. That officer, Stephen Mader, now 26, was dismissed (1) weeks later by the Weirton, W.Va., police department.

nl.upost .info

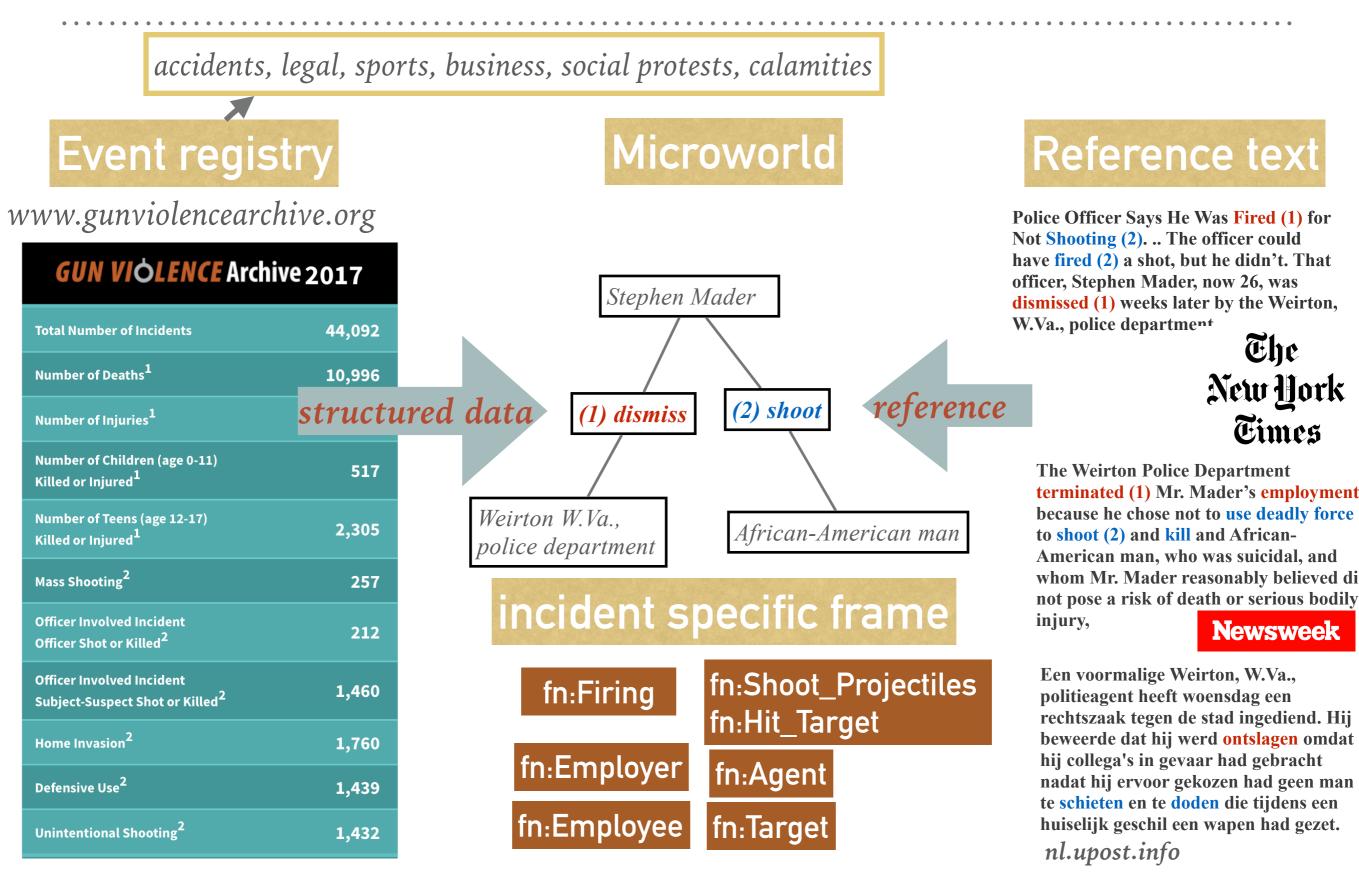


Een voormalige Weirton, W.Va., politieagent heeft woensdag een rechtszaak tegen de stad ingediend. Hij beweerde dat hij werd ontslagen omdat hij collega's in gevaar had gebracht nadat hij ervoor gekozen had geen man te schieten en te doden die tijdens een huiselijk geschil een wapen had gezet.

Event-Graph



FROM-DATA-TO-TEXT FOR A GIVEN TYPE OF EVENT

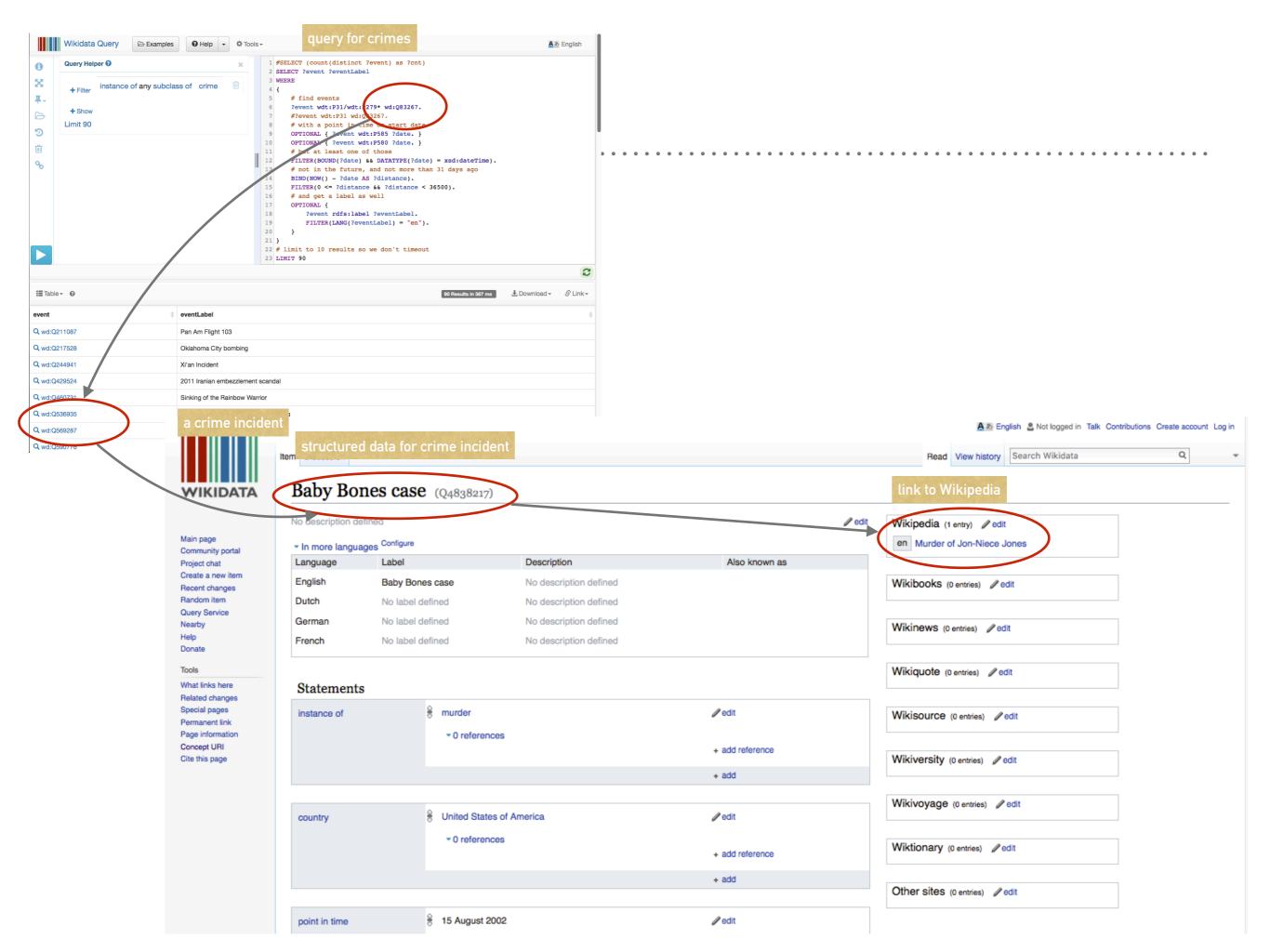


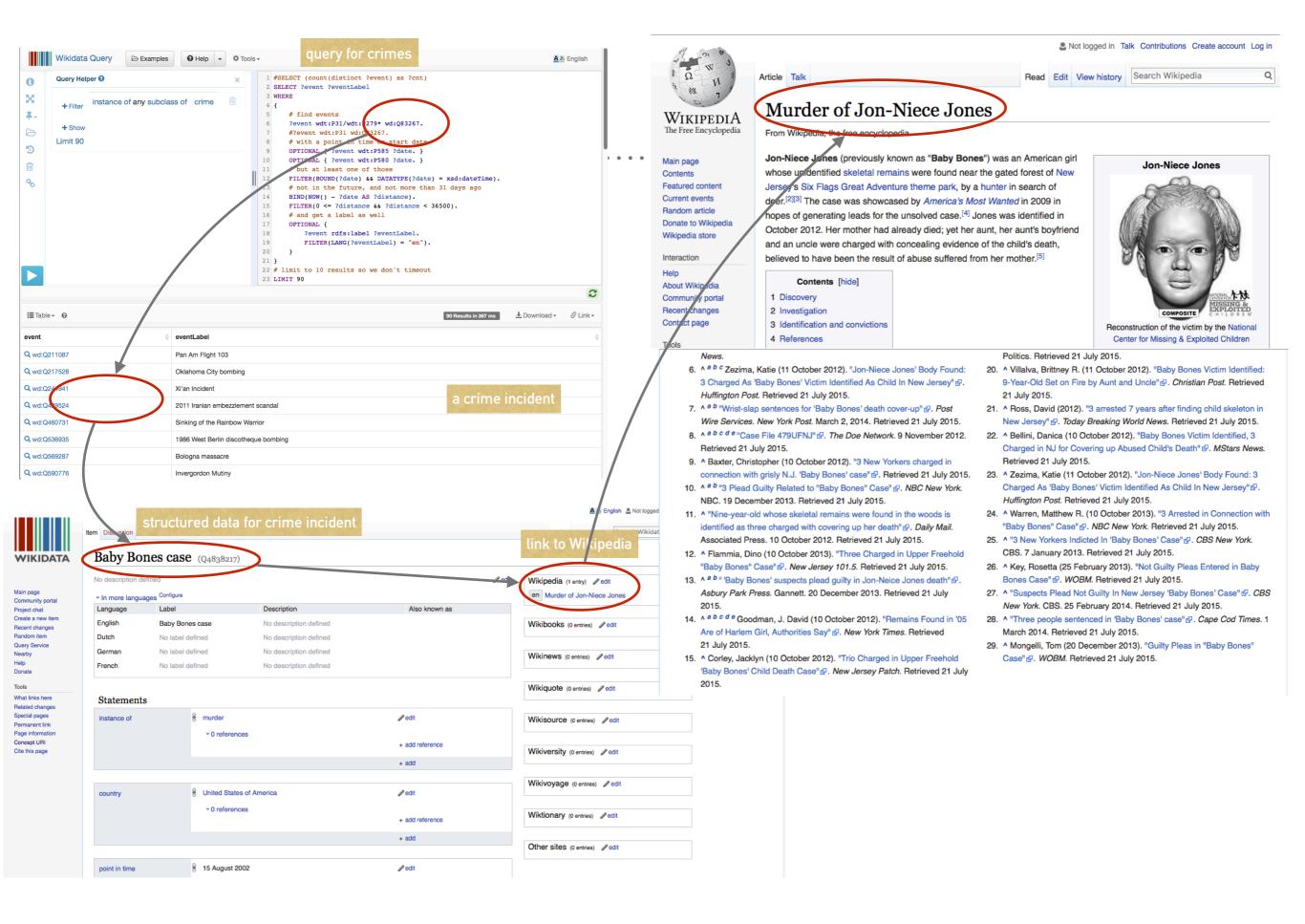
FROM-DATA-TO-TEXT

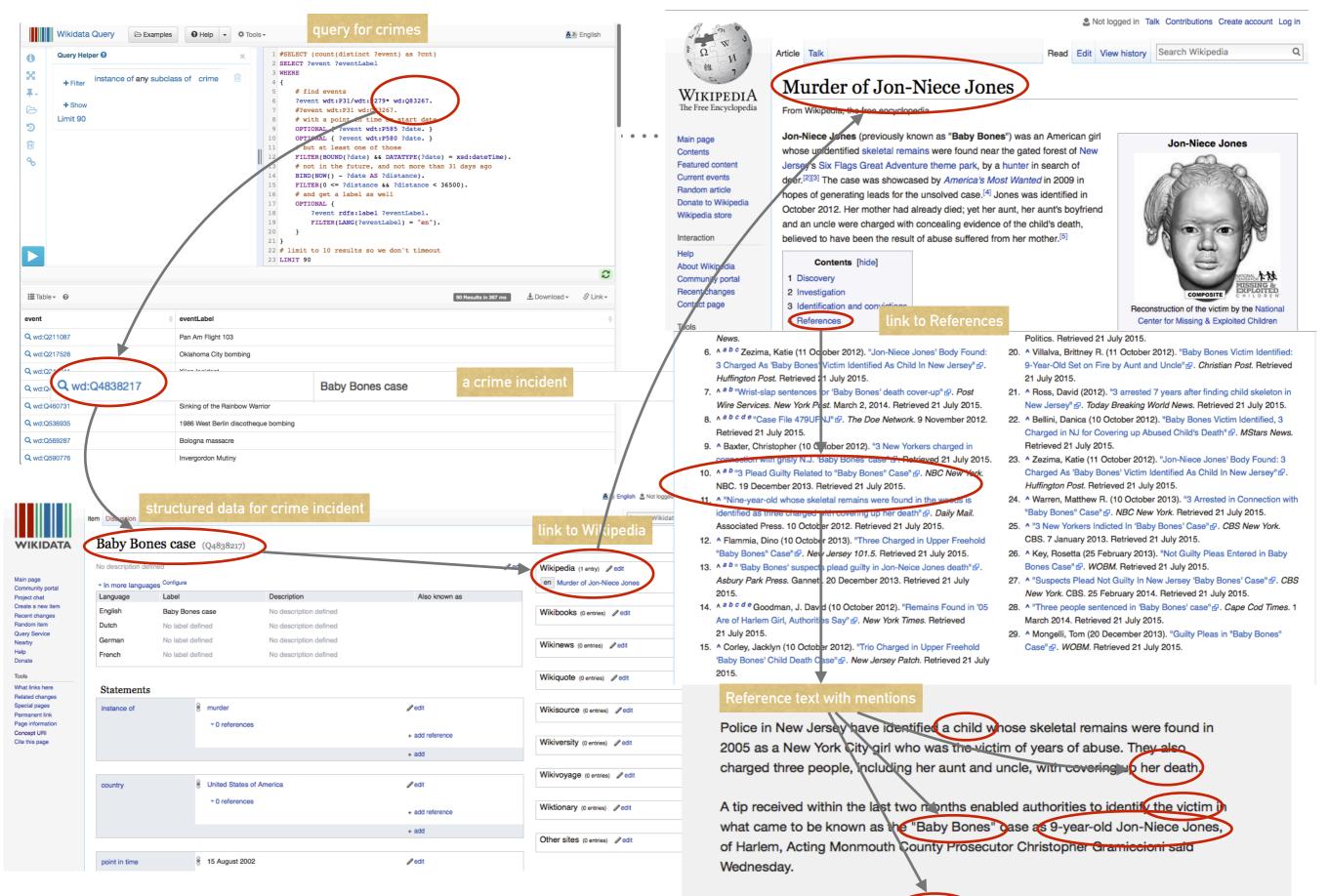
► Advantages:

- Structured information for establishing reference is already given
- Everything that is related to the type of incident needs to be annotated but the set of frames and elements is small and coherent
- Everything that is not related to the type of incident can be ignored (speech acts, cognitive verbs, side-stories)
- ► less conservative annotations, more (true) variation
- ► faster, higher agreement
- better starting point for cross-lingual interoperability

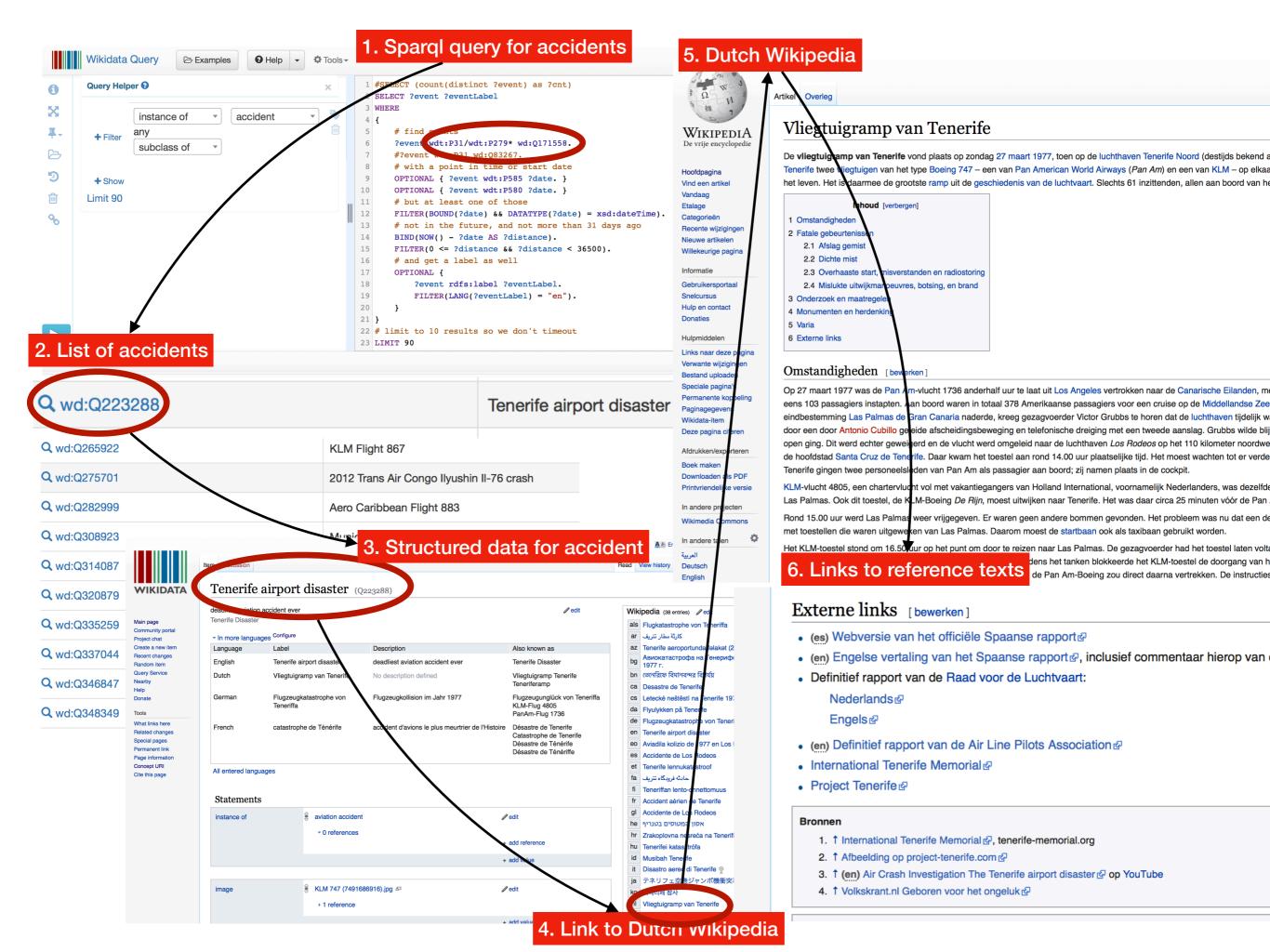
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Query Helper I + Filter + Show Limit 90	2 SELECT 3 WHERE 4 { 5 # f 6 ?ev 7 #?e 8 # w 9 OPT 10 OPT 10 OPT 11 # b 12 FIL 13 # n 14 BIN 15 FIL 16 # a 17 OPT 18 19 20 } 21 }	<pre>(count(distinct ?event) as ?cnt) ?event ?eventLabel ind events ent wdt:P31/wdt:P279* wd:Q83267. vent wdt:P31 wd:Q83267. ith a point in time or start date IONAL { ?event wdt:P585 ?date. } IONAL { ?event wdt:P580 ?date. } ut at least one of those TER(BOUND(?date) && DATATYPE(?date) = xsd:dateTime). ot in the future, and not more than 31 days ago D(NOW() - ?date AS ?distance). TER(0 <= ?distance && ?distance < 36500). nd get a label as well IONAL { ?event rdfs:label ?eventLabel. FILTER(LANG(?eventLabel) = "en"). to 10 results so we don't timeout 0</pre>	
			0
Table - 🕜		90 Results in 367 ms	Link →
event 🔶	eventLabel		\$
Q wd:Q211087	Pan Am Flight 103		
Q wd:Q217528	Oklahoma City bombing		
Q wd:Q244941	Xi'an Incident		
Q wd:Q429524	2011 Iranian embezzlement scandal		
Q wd:Q460731	Sinking of the Rainbow Warrior		
Q wd:Q536935	1986 West Berlin discotheque bombing		
Q wd:Q569287	Bologna massacre		
Q wd:Q590776	Invergordon Mutiny		







The investigation found that the girl died at the Harlem home of her aunt, Likisha Jones, on Aug. 15, 2002, following years of abuse by the child's mother, Elisha Jones, the prosecutor said.



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https:// www.volkskrant.nl/ archief/geboren-voorhet-ongeluk~a3307696/

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Nieuws	Cultuur & Leven	deVa	lkski	ant	t
Archief					
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Frènk van def	R LINDEN 29 augustus 2012, 0	00:00			
(f) 🕑					

8. Reference text in the wayback machine

https://web.archive.org/web/ 20171012150057/https:// www.volkskrant.nl/archief/ geboren-voor-hetongeluk~a3307696/



Ton Valkenburg was 'de James Dean van de Bollenstreek'. Bij de grootste luchtvaartramp tot nu toe, 35 jaar geleden op Tenerife, verloor hij vrouw en kinderen. Dorpsgenoot Frénk van der Linden reconstrueert leven en dood van een rijke loser en een charmante ploert met geheimen. 'Wie iets van het menselijk tekort wil begrijpen, moet zich in Ton verdiepen.'

FRÈNK VAN DER LINDEN 29 augustus 2012, 00:00

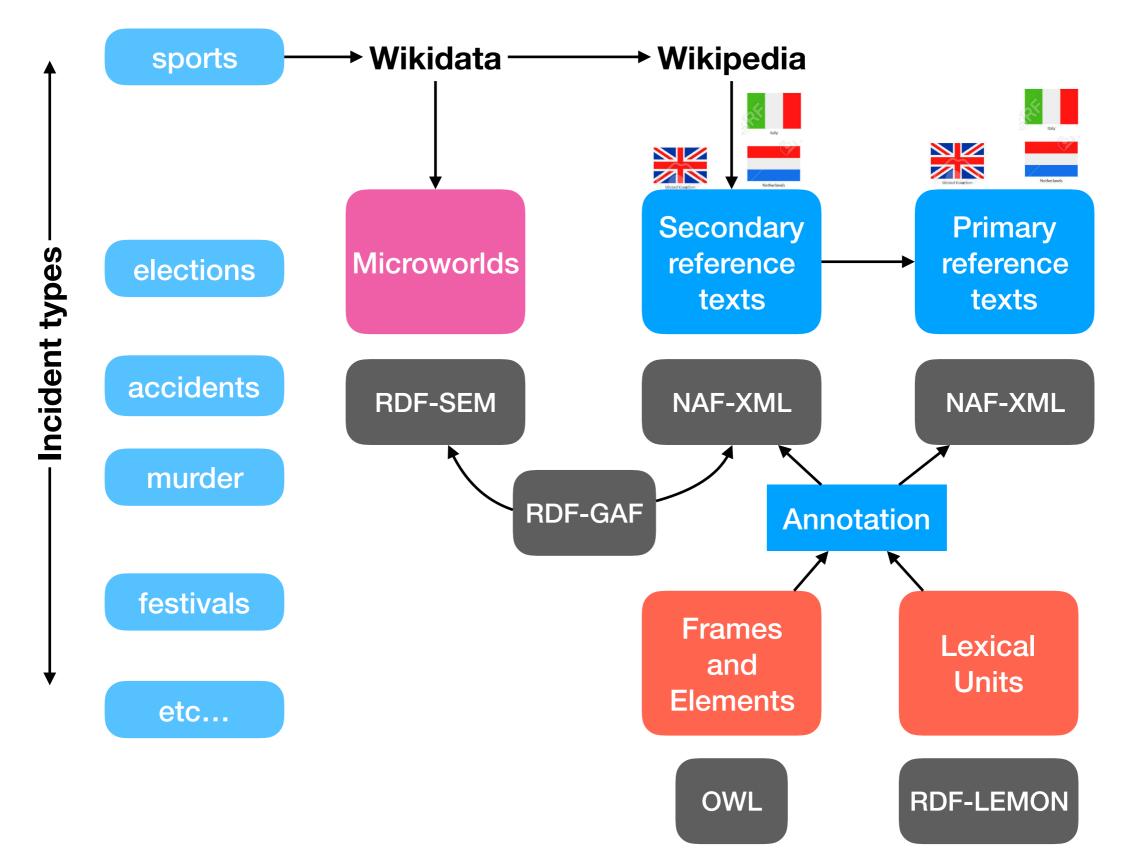
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STRUCTURED EVENT DATA

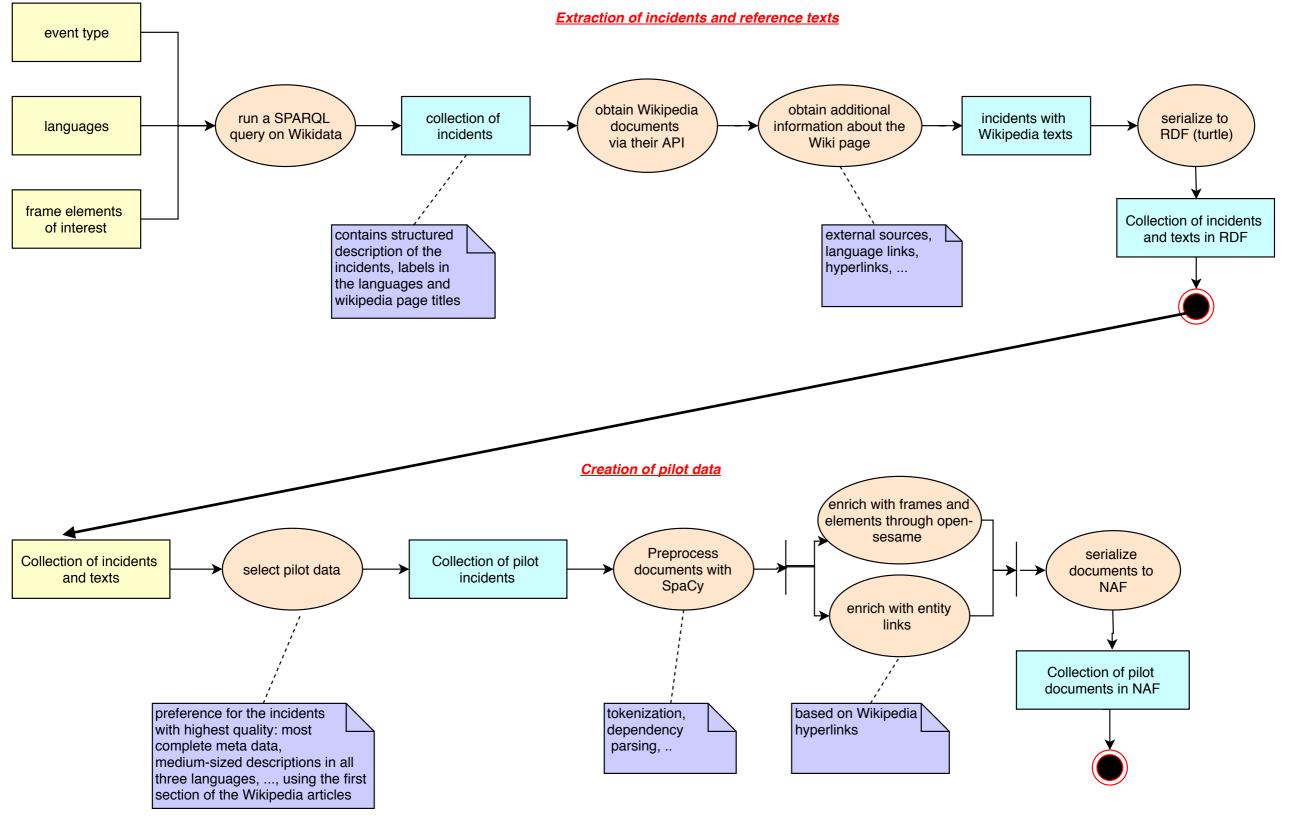
DBpedia (Knuth et al., 2015; Elbassuoni et al., 2010), Wikidata (Vrandečić and Krötzsch, 2014), and YAGO2 (Hoffart et al., 2013)

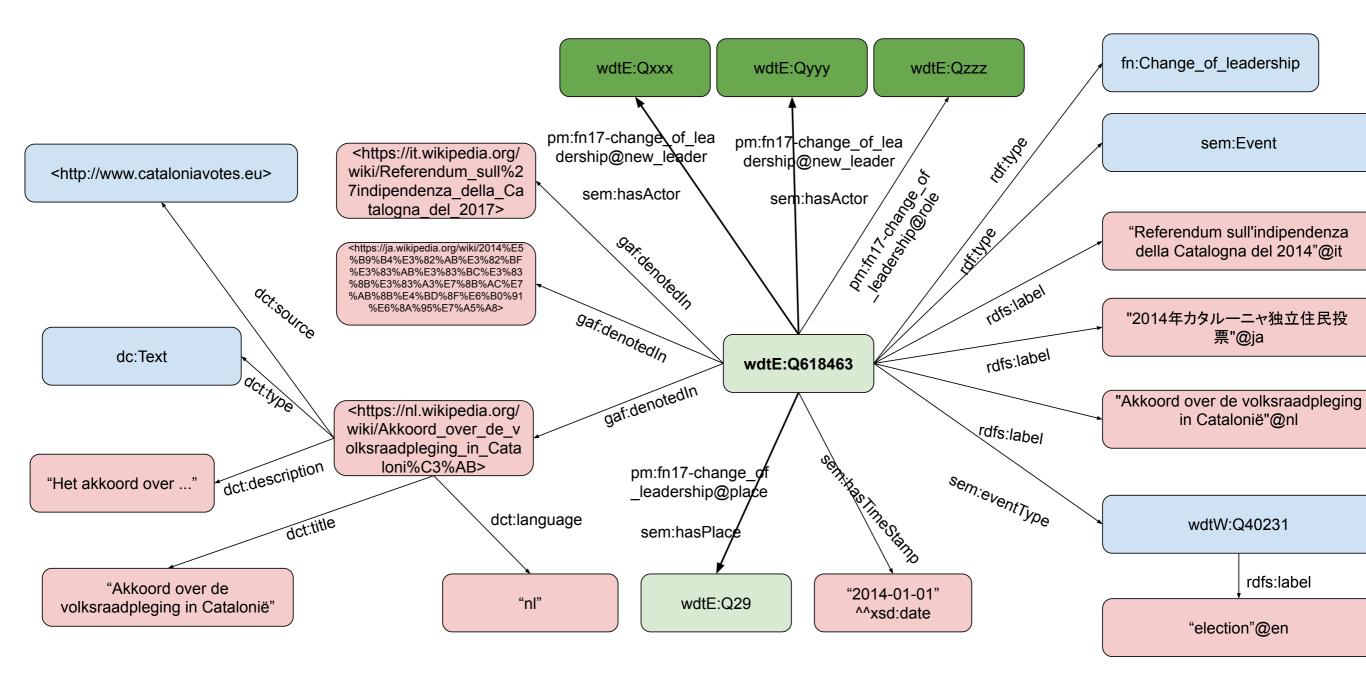
event class	wikidata ID	# events
explosion	Q179057	55
crime	Q83267	1.468
natural disaster	Q8065	1.160
accident	Q171558	2.126
sport competition	Q13406554	41.245
election	Q40231	8.178
referendum	Q43109	134
voting	Q189760	17.110
TOTAL		71.476

Data-to-Text Platform



Extraction Process





Dublin Core (**dc**): FrameNet (**fn**): Simple Event Model (**sem**): Grounded Annotation FrameWork (**gaf**): Others (**rdfs, rdf, owl time**)

meta data on sources conceptual situational schema events, participants, time and location relations anchoring instances to mentions in sources

Pilot data

- number of incidents: 211
- event types: 175 elections, 36 murders
- total number of text files 633
- Files per language: {'en': 215, 'nl': 212, 'it': 212}
- about 12 hours to generate the data

Initial statistics on elections

Most common hyperlinks extracted from Wikipedia pages (we only use the first section)

Freq	Italian Entity	Freq	Dutch Entity	Freq	English Entity
57	Primo ministrare	25	parlement	21	Prime Minister
19	Presidente	16	vijfde frans republiek	15	Socialist Party
14	Cile	15	chileens	14	National Assembly
14	Partito Socialdemocratico	13	zweed	14	Fifth Republic
14	2007	11	2006	14	President
13	2011	10	presidentsverkiezing	13	Sweden
13	Primo Ministro	10	2011	12	Chile
13	Svezia	9	2004	11	François Mitterrand
12	2005	9	president	10	Labour Party
11	2006	8	2005	10	Riksdag
	2000				

Most dominant frames (using open-sesame)

ection	Frame	Freq		murder	Frame
nange_of_le	adership	686	-		Killing
Le	adership	443			Attack
nterior_profile	_relation	340		Calend	dric_unit
Caler	dric_unit	280		Cardinal_r	numbers
Ordinal_	numbers	255		Statement	
Time_vector		211		Lea	adership
А	ggregate	191			People
Cardinal_	numbers	183		Locale	e_by_use
	Getting	158			Weapon
C	ontaining	155		Time	e_vector

Conclusion

- Data-to-text PLATFORM to create massive data on situations and there framing across languages
- All code, annotations and lexicons available as open source:
 - <u>http://dutchframenet.nl</u>
- Capture more variation and more representative data
- Supervised and unsupervised machine-learning on the data to create semantic role labellers
- Challenges:
 - cover all types of incidents and situations
 - speech-acts, cognitive events