



Verb-mediated Composition of Attitude Relations Comprising Reader and Writer Perspective

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Overview

- ▶ **Attitude detection**: Who is for/against who?
- ▶ **Verb**-based approach using a **lexicon**
- ▶ Take **event factuality** and **negation** into account
- ▶ Add **transitive inference** in embedded subclauses
→ Complex **interplay** between **matrix verb** and **subclause**
- ▶ **Writer** perspective: How are entities depicted in discourse?
- ▶ **Reader** perspective: How is this depiction of entities related to the a priori
- ▶ What are the **roles** of the entities given the two perspectives?

Verb lexicon

Manually crafted resource. For ~ **1600 verb senses** (~ 1000 verb lemmas) encode:

- ▶ **Attitude relation** it induces between entities
- ▶ The **polar roles** it casts on its **arguments/complements**

Verb	Polar roles		Relation
	source	target	
<i>help</i>	<i>benefactor</i> ⁺	<i>beneficiary</i> ⁺	advocate
<i>murder</i>	<i>villain</i> ⁻	<i>victim</i> ⁻	adversary
<i>criticize</i>	<i>entity</i>	<i>neg. eff.</i> ⁻	adversary
<i>suffer</i>	<i>neg. eff.</i> ⁻	-	-
<i>survive</i>	<i>beneficiary</i> ⁺	-	-

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Verb lexicon: Truth commitment and Event factuality

- ▶ Verbs cast **Truth commitment** (T_c) on embedded subclause (True, False, None)
- ▶ Events in **subclauses** have an **event factuality** that is affected by
 - ▶ Truth commitment (T_c) of the **matrix verb**
 - ▶ **Affirmative status** of the subclause and the matrix verb

Example	$T_c(\text{matrix})$	Fact. emd.
<i>He managed to cook</i>	True	fact.
<i>He managed not to lie</i>	True	counter-fact.
<i>He didn't manage not to lie</i>	False	counter-fact.
<i>She hopes he wins</i>	None	non-fact.
<i>She hopes he doesn't wins</i>	None	non-fact.

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Complex transitive inference with complement clauses

Truth commitment + Factuality + Negation = Relations (Roles)

Example	T _c	Fact. emb.	Relations
<i>X criticizes that Y helps Z</i>	TRUE	fact.	X adversary Y Y advocates Z X adversary Z
<i>X criticizes that Y doesn't help Z</i>	TRUE	cfact.	X adversary Y Y adversary Z X advocate Z
<i>X hopes that Y helps Z</i>	None	nfact.	X advocates Z Y advocates Z
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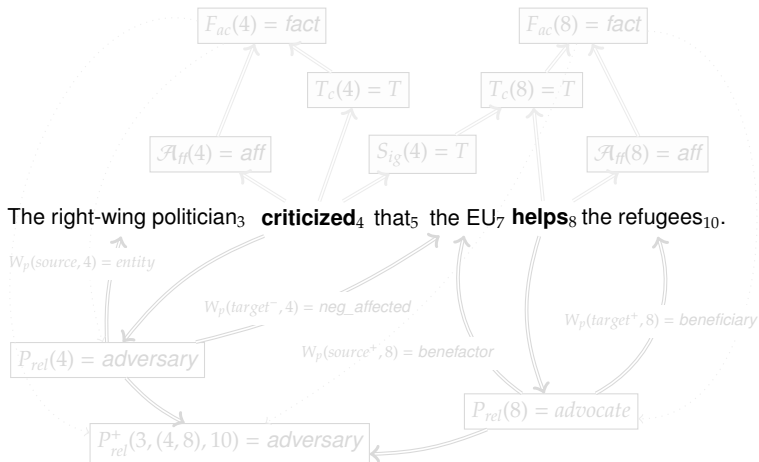
Writer perspective

- ▶ **Writer** frames entities by her/his way of reporting on them
- ▶ **Attitude relations** are induced based on verbs
- ▶ **Polar roles** are inferred based on argument of verb
- ▶ Someone who kills is a **villain**; someone who receives help is a **beneficiary** etc.
- ▶ Induction is constrained by **factuality/negation**

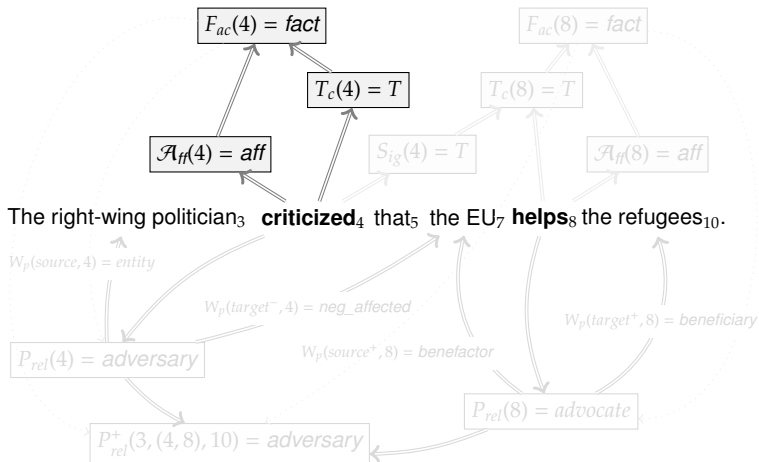
	<i>source</i>	<i>target</i>
Moral	benefactor, villain	beneficiary, victim
Non-moral	pos./neg. actor	pos./neg. affected

- ▶ Distinction moral/non-moral depends on verb (*kill* vs. *criticize*)

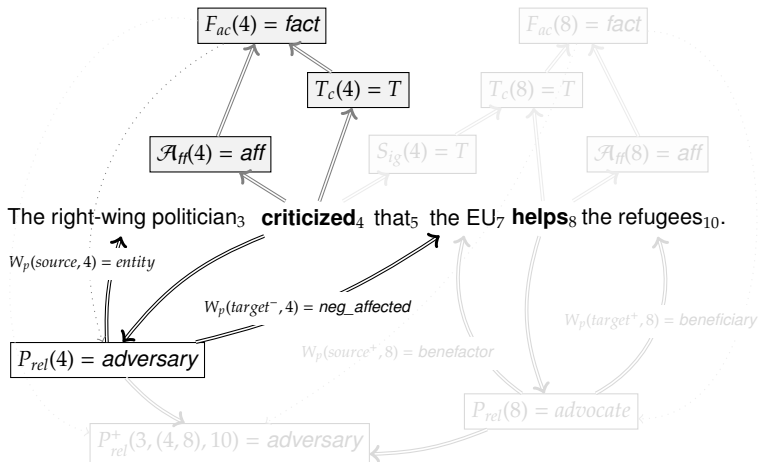
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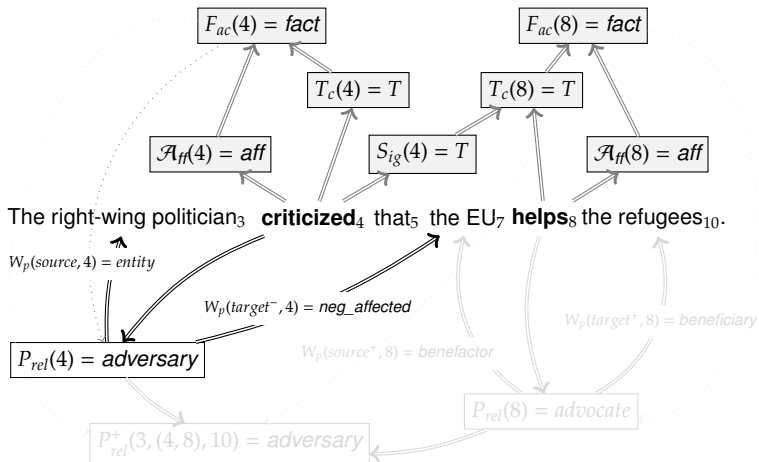
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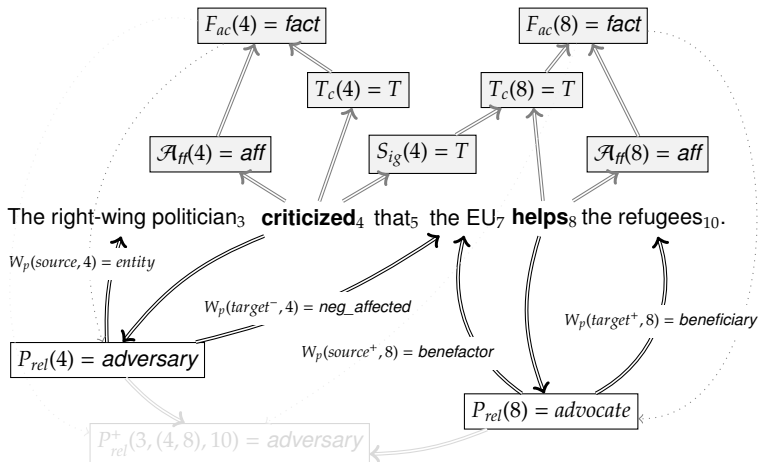
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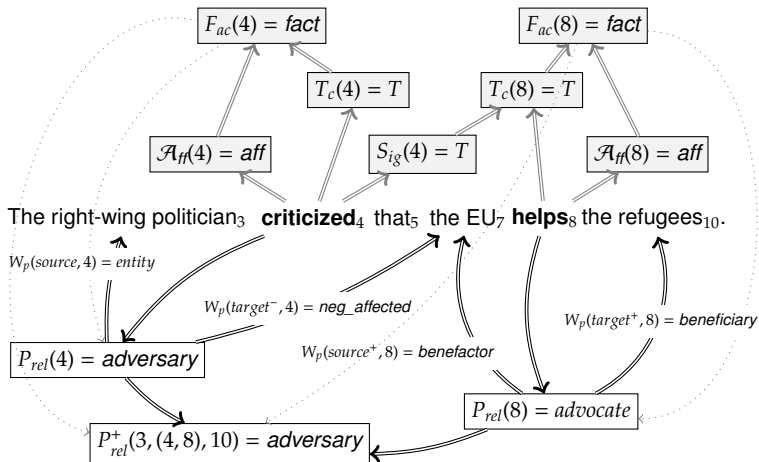
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Reader perspective

- ▶ **Reader** has a priori view of the world: Moral values, political views
- ▶ Independent of writer perspective/verb-based role assignment in writer perspective

	actors	concepts
Political	MyProponent, MyOpponent	
Moral	MyValueConfirmer/Contemner	MyValues, MyAversions

- ▶ Proponent/Opponent (list): Donald Trump, Angela Merkel, EU
- ▶ Values/Aversions (sentiment lexicon): crime, love
- ▶ ValueConfirmer/Contemner (sentiment lexicon + composition): corrupt minister, honest politician

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Example: Transitive inference

"The right-wing politician criticized that the EU helps the refugees."

Writer perspective

- ▶ Right-wing politician adversary EU
 - ▶ *neg.eff.*⁻ EU
- ▶ EU advocate refugee
 - ▶ *benefactor*⁺ EU
 - ▶ *beneficiary*⁺ refugee
- ▶ Right-wing politician adversary refugee

Reader perspective (assuming left/liberal)

- ▶ Right-wing politician: MyValueContemner
- ▶ EU: MyProponent
- ▶ Refugee: MyProponent

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Combining Reader/Writer perspective

Five tuple:

$\langle \text{Reader}(\text{source}).\text{Writer}(\text{source}).\text{Relation}.\text{Reader}(\text{target}).\text{Writer}(\text{target}) \rangle$

e.g. The right-wing politician criticizes the EU

$\langle \text{MyValueContemner}.\text{Entity}.\text{Adversary}.\text{MyProponent}.\text{NegAffected} \rangle$

"A MyValueContemner as an entity is an adversary of MyProponent that is negatively affected"

Charged relation tuples

Interesting interaction between Reader and Writer perspective

Relation Tuple

⟨**some**, entity, is, **adversary**, of, **myAversions**, neg_affected⟩

e.g. *someone condemns terror* (→ *NewProp?*)

⟨**myProp**, benefactor, **advocate**, **myValContemner**, beneficiary⟩

e.g. *US supports dictator* (→ *NoLongerProp?*)

⟨**some**, villain, **adversary**, **myValues**, neg_affected ⟩

e.g. *someone ridicules human behaviour* (→ *NewOpponent?*)

Cf. our LSDSem/EACL 2017 paper: "Stance Detection in Facebook Posts of a German Right-wing Party"

Evaluation: Precision and error analysis

- ▶ **Precision** evaluation including relations (**adversary**, **advocate**) and roles (**victim**, **myAversions** . . .)
- ▶ Output over 3.5 Mio. sentences from ZEIT and Spiegel (German periodicals)
- ▶ Sample two instances of each of roughly 200 salient tuples (e.g. *MyProponent.Villain.Adversary.MyProponent.Victim*), i.e. 400 instances
- ▶ Two annotators annotate precision **errors** (90% agreement), no false negatives
- ▶ **Guideline:** Relations and roles converted to natural language entailments, do you intuitively agree with them given the sentence?

Evaluation: Precision and error analysis

	Role	Prec
	advocate	0.73
	adversary	0.74
Writer	neg_affected	0.70
	pos_affected	0.58
	villain	0.70
	victim	0.65
	beneficiary	0.43
	benefactor	0.35
	Reader	myValues
myAversions		0.91
myValueConfirmer		0.71
myValueContemner		0.86

- ▶ Reader roles are easier (lookup + composition)
- ▶ Writer roles prec. varies
- ▶ **Errors:** 50% preprocessing (parsing, PAS extraction), 30% semantics (verb polysemy, negation), 20% factuality detection

Evaluation: Lexicon ablation and Recall

- ▶ 80 manually crafted sentences with multiple subclauses, 80 real sentences (German periodicals Spiegel/ZEIT)
- ▶ Test **coverage** and impact of **lexicon** and **verb signatures** (effect on **factuality** of embedded clauses)
- ▶ Evaluate **adversary** / **advocate** relations
- ▶ Set factuality of subclauses to either True/Non-factual/False if matrix verb is negated (True if not negated)

Subclause Fact.	R	P	F1
False	69.36	69.06	69.21
Non-fact	71.62	75.36	73.44
True	75.23	74.88	75.06
Lexicon	75.20	83.50	79.10

→ Lexicon with verb signatures has a large impact on precision

Conclusion

- ▶ Verb-based attitude detection model, purely lexicon-based
- ▶ Model truth commitment and event factuality
- ▶ Transitive inference of attitudes through subclauses
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