

# towards an inferential lexicon of event selecting predicates for french

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IWCS 2017, September 21

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motivation

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## Inferential lexicon for French

- ▶ describes effect of **predicates** selecting **event denoting arguments**
- ▶ on **event argument**
- ▶ in terms of **certainty** and **polarity**

He *failed to*<sub>event selecting predicate</sub> resign<sub>embedded event</sub>  
**resign**<sub>event</sub> → certain, polarity – (did not happen)

## Long-term goal

- ▶ Factuality assessment of events in French newspaper texts
- ▶ Cf. [Saurí and Pustejovsky, 2012] for English

# automatic factuality assessment

[Saurí and Pustejovsky, 2009, Saurí and Pustejovsky, 2012]:

- ▶ automatically determine **certainty** and **polarity** of events.

[Saurí and Pustejovsky, 2012]’s *DeFacto*:

- ▶ computes factuality using **3 lexical resources**
  - ▶ polarity particles: *not, none, ...*
  - ▶ modality particles: *may, necessary, ...*
  - ▶ **event selecting predicats (ESPs)**: *manage to, fail to, ...*

**This work:**

- ▶ build a seed lexicon of **event selecting predicates** for **French**
- ▶ capturing the effect on the **factuality of embedded events**

Motivation

Related work

Towards a French ESP lexicon

Findings

Conclusion and Outlook

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related work

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## English FactBank and French TimeBank

[Saurí and Pustejovsky, 2009,  
Saurí and Pustejovsky, 2012, Bittar, 2010,  
Bittar et al., 2011]

## Lexicon from *Language and Natural Reasoning* (Stanford)

[Karttunen, 1971, Nairn et al., 2006]

[Saurí and Pustejovsky, 2009, Saurí and Pustejovsky, 2012]:

- ▶ corpus annotated with event factuality
- ▶ TimeBank [Pustejovsky et al., 2005]: **events** are assigned **factuality profiles**
  - ▶ manually [Saurí and Pustejovsky, 2009]
  - ▶ automatically [Saurí and Pustejovsky, 2012]
- ▶ automatic detection based on a lexicon of **event selecting predicates**

	CT (certain)		PR (probable)		PS (possible)	
polarity	+	-	+	-	+	-
<b>fail</b>	CT-	CT+	PR-	PR+	PS-	PS+

- ▶ She has **failed** to leave<sub>e</sub> the country.

CT+ → CT-



# the french timebank

[Bittar, 2010, Bittar et al., 2011]

- ▶ same principles as the English TimeBank
- ▶ additional markup for linguistic phenomena not yet covered and specific to French

Most relevant for this work

- ▶ modal, implicative, factive verbs marked up as events (fully acceptable with *perfective and imperfective* aspect)
- ▶ account of grammatical tense/aspect system of French eg. *imparfait* (not grammaticalised in English)

French TimeBank offers

- ▶ a sample of French ESPs used in newspaper texts
- ▶ typical embedded events

# inferential lexicon

- ▶ lexical resource for English from *Language and Natural Reasoning* group (Stanford) [Nairn et al., 2006]
- ▶ complement-taking verbs (ESP<sub>s</sub>, ≈ 250)
- ▶ classified w.r.t. polarity of complement clauses (EMB) obtained under positive and negative polarity of ESPs
- ▶ She has **failed** to **leave**<sub>e</sub> the country.      ESP<sub>+</sub> → EMB<sub>-</sub>
- ▶ She has **not failed** to **leave**<sub>e</sub> the country.      ESP<sub>-</sub> → EMB<sub>+</sub>

ESP	polarity		signature	semantic class
	+	-		
<b>fail to</b>	-	+	-1 1	2-way implicative

# inferential lexicon: probabilistic signatures

- ▶ introduced by [Karttunen et al., 2016, Karttunen, 2016]
- ▶ reflect the variable **strength** of the inference

be able  $\rightarrow 0.9 | - 1$

- ▶ under **polarity+**  $\rightsquigarrow$  strong (but defeasible) inference

*Ann was able to speak up*  $\rightsquigarrow$  Ann very probably did speak up

- ▶ **but...**
  - ▶ few examples ( $\approx 40$ ),
  - ▶ not empirically validated (yet).

# inferential classification

	Polarity of ESP		Sample predicate	Signature
	+	-		
<b>factives</b>	+	+	<i>forget that</i>	<b>1</b>   <b>1</b>
<b>counterfactuals</b>	-	-	<i>pretend that</i>	<b>-1</b>   <b>-1</b>
<b>2-way</b>	+	-	<i>manage to</i>	<b>1</b>   <b>-1</b>
<b>implicatives</b>	-	+	<i>fail to</i>	<b>-1</b>   <b>1</b>
<b>1-way</b>	+	N	<i>force to</i>	<b>1</b>  0.5
<b>+implicatives</b>	-	N	<i>prevent to</i>	<b>-1</b>  0.7
<b>1-way</b>	N	-	<i>get chance to</i>	0.9  <b>-1</b>
<b>-implicatives</b>	N	+	<i>hesitate to</i>	N  <b>1</b>
<b>Neutral</b>	N	N	<i>want to</i>	N N

towards a french esp lexicon

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# towards a french ESP lexicon: our experiments

## Observation

Inferential semantic classes → ESP lexicon

ESP	+	-	signature	semantic class
fail to	-	+	-1 1	2-way implicative



			embedded event	
			CT	
			+	-
ESP	fail to	+	CT-	CT+
	fail to	-	CT+	CT-

# towards a french ESP lexicon: our experiments

## Recipe adopted for our French ESP lexicon:

1. start with **verbs** in

inferential classification translated to French



ESPs in French TimeBank

2. collect **verbal readings** as delineated in French lexicons
3. assign **probabilistic inferential signatures** to **readings**

## Our research questions:

- ▶ do **inferential signatures** vary with **outer aspect** and **animacy** of the (deep) subject?
- ▶ do **inferential signatures** vary with other **semantic/syntactic properties**?

ESPs from French TimeBank FTiB  
[Bittar, 2010, Bittar et al., 2011]



manual translations of inferential classification by  
[Nairn et al., 2006]

 49 French verbs



# our data: readings


1. Extraction of all **readings** for **49 French verb lemmas** from two French valency lexicons:

LVF - [François et al., 2007]

*refuser 09* Il refuse que Pierre sorte.

Lglex - [Constant and Tolone, 2010]

*refuser (Table 9)* J'ai refusé que Max prenne ma voiture.

  $\approx$  930 readings

2. Manual selection of ESP readings & and suppression of duplicates

  $\approx$  170 readings

# our data: annotation

170 readings → 3 probabilistic inferential signatures by FM

- ▶ with two different aspectual values: **perfective PFV** and **imperfective IMP**
  - ▶ French: inferential profiles vary with outer aspect [Hacquard, 2006]
- ▶ **±animate (deep) subject** for **perfective aspect**
  - ▶ inferential profiles vary with animacy of (deep) subject [Martin and Schäfer, 2012]

value	strength of inference
<b>±1</b>	<b>certain</b>
<b>±0.9</b>	<b>very (un-)likely</b>
<b>±0.8</b>	<b>(un-)likely</b>
<b>±0.7</b>	<b>(not) very possible</b>
<b>±0.6</b>	<b>(not) quite possible</b>
<b>N</b>	<b>no inference</b>

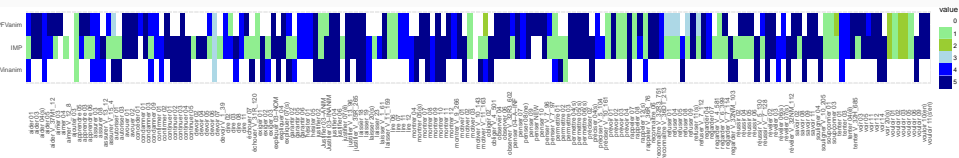
## *obliger 02*

Pierre/cela a obligé Marie à partir.

'Peter/something force-PAST-PFV.3SG Mary to go.'

PFV+anim	PFV-anim	IMP
0.9 N	1 N	N N

# our data: annotation



col	description	sample sign.	#sign.	inferential classes
5	max inference	$1 1, 1  - 1$	177	(counter-)factives, 2-way implicatives
4	max under 1 polarity	$1 N, 0.9  - 1$	77	1-way implicatives
3	strong, not max, under 2 polarities	$0.9  - 0.9$	9	2-way quasi implicatives
2	strong, not max, under 1 polarity	$0.9 N, N  - 0.9$	8	1-way quasi implicatives
1	neutral, no inference	$N N$	78	neutral
0	not applicable or not grammatical	NA or UNGR	161	

- ▶ signatures for either PFV+anim or PFV-anim context
- ▶ PFV+anim > PFV-anim  $\leadsto$  ESPs often [+anim] only
- ▶ PFV darker than IMP  $\leadsto$  stronger inferences with PFV

findings



Counts-based evidence for co-variation of **inferential profile** with:

**Semantics:** outer aspect and animacy

**Syntax:** types of embedded clauses

Counts-based evidence for co-variation of **inferential profile** with:

**Semantics:** outer aspect and animacy

**Syntax:** types of embedded clauses

# outer aspect: **implicatives** (but not **factives**) have an aspect-dependent profile

**factives**: same entailment under both polarities, signature  
 $1|1$  or  $-1|-1$

**implicatives**: entailment at least under one polarity eg.  
 $1|-1$ ,  $1|N$ ,  $-0.7|-1$

	with IMP signature	IMP sign $\neq$ PFV sign
<b>Factives under PFV</b>	54	2 (4%)
<b>Implic. under PFV</b>	77	36 (48%)



**factive verbs**: no influence of outer aspect

**implicative verbs**: more change with outer aspect

# outer aspect: imperfective aspect weakens implicativity

Observation for **implicatives**:

PFV entailment

IMP at most a **defeasible** inference

- ▶ A ce moment-là, elle **a réussi** à s'enfuir<sub>EMB</sub>.  
#Mais finalement, elle ne s'est pas enfuie.  
'At that moment, she managed to escape. But at the end, she didn't escape.'
- ▶ A ce moment-là, elle **réussissait** (encore) à s'enfuir<sub>EMB</sub>.  
OK Mais finalement, elle ne s'est pas enfuie.  
'At that moment, she 'was still managing' to escape. But at the end, she didn't escape.'



# outer aspect: imperfective aspect weakens implicativity

Question about **implicatives**:

- ▶ Does *réussir* instantiate a more general pattern?
- ▶ Is the inference generally stronger with **PFV** than with **IMP**?

77 **implicative readings** with **PFV** & **IMP**:

IMP $\rightsquigarrow$ weaker infer	IMP $\rightsquigarrow$ stronger infer	no change
44.2% (34)	2.6% (2)	53.2% (41)



- ▶ inferential profile often varies with outer aspect;
- ▶ inference with IMP almost always weaker.

# animacy: stronger inference with –animate subject

Reminder:

- ▶ Pierre/cela a obligé Marie à partir=*obliger* 02  
'Peter/this oblige-PFV-3SG Mary to go.'
- ▶ *obliger* 02 PFV/+ANIM: 0.9|N
- ▶ *obliger* 02 PFV/-ANIM: 1|-0.9

Most **implicatives** (8 of 13) with PFV+anim and PFV-anim

→ PFV-anim triggers **stronger inference**

Most **factives** (33 of 42) require an animate subject.

Counts-based evidence for co-variation of **inferential profile** with:

**Semantics:** outer aspect and animacy

**Syntax:** types of embedded clauses

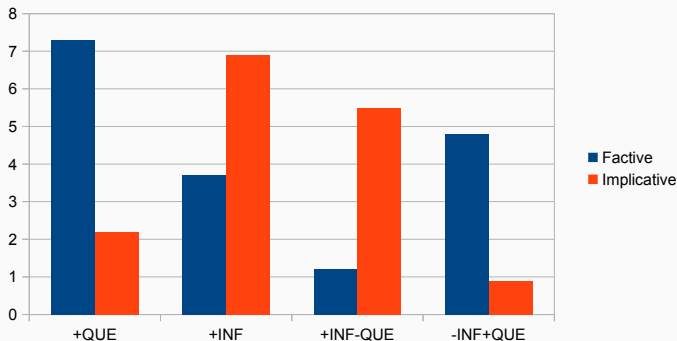
# syntax disambiguates verbs with implicative and factive readings

Previous observations for English:

- ▶ [White, 2014] — verbs which can be either **implicative** or **factive** are disambiguated by the type of clauses they embed:
  - ▶ *remember that* (**factive**)
  - ▶ *remember to* (**implicative**)
- ▶ [Landau, 2001] — **implicatives**
  - ▶ do not take finite (*that*)-clauses
  - ▶ take infinitival complement clauses

# syntax disambiguates verbs with implicative and factive readings

French: 20 verbs w. (41) **factive** and (45) **implicative** readings  
~> clear differences in the embedded clauses accepted by  
**implicative** vs. **factive** readings:



## conclusion and outlook

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- ▶ Set up of a (small) seed lexicon for French
  - ▶ based on **inferential properties** of **ESPs**
  - ▶ capturing the effect of **ESPs**
    - **certainty and polarity of the embedded event**
- ▶ Can be used to automatically determine factuality of embedded events
- ▶ Support of **hypotheses** for French about **ESP inferences**:
  1. implicatives, but not factives have an **aspect dependent** inferential profile in French
  2. – **implicativity** with **IMP aspect**
  3. – **implicativity** with **+ animate subject**
  4. syntactic type of embedded clauses:
    - implicatives** : + infinitive clause, – tensed clause
    - factives** : – infinitive clause, + tensed clause

- ▶ Use annotated data as seed
  - ▶ to identify semantic/syntactic properties characteristic of inferential classes
  - ▶ to look for similar candidates
- ▶ Check hypotheses on larger data sets
- ▶ (Semi-)automatically determine inferential signature?



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