

# Human judgements on causation in French texts\*

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# What is causal ?

- John's ear fell; he took a shower.
- He broke his arm while skiing.
- It is triangle; it has three sides.

## Traditional test of causation: intuition

- John's ear fell; he took a shower.
- Does it seem causal to you ?
- Can you reword it as "Taking a shower caused John's ear to fall." ?
- Need an *a priori* knowledge.

# Linguistic tests

- Can you say *It is triangle because it has three sides ?*
- What about *John went home because his car is not in the parking any longer ?*
- Linguistic tests tend to be **ambiguous**.

## Need for complex guidelines

- These tests are **not sufficient** to identify causation.
- We need to study causation in human judgement and its features.

# Overview

- What **tests** do people use when they think about causation ?
- Are there simpler clues that are statistically **associated** with causation ?
- Do our **guidelines** work ?

All of this in a French framework.

## Intuitive features of causation

- What tests do people use when they think about causation ?
- Does this text contain a causal relation ? **Justify** your answer.

## Example (translated from French)

### Example

*Context : In a murder trial. X confessed the murder of Hughes.*

*The fact that similarities exist between the murder of Worms and the murder of Hughes convinced the policemen that X was also responsible for the death of Worms which happened sooner. They continued their questioning of X.*



## Setting of the experiment

- Short segments of text from the BAF corpus.
- The texts contain *parce que*, *donc* or *mais*.
- In most of the texts the **markers** are removed.
- 9 subjects, 10 segments per subject.

## Types of answer

- Rewording:

*Une explication est donnée.*

*Je ne vois pas de relation causale.*

- Linguistic tests:

*parce que, donc, c'est parce que, est le fruit de, entraîne, permet, est la cause de . . .*

- Presence of an explicit marker:

*'donc' apparaît. Donc introduit une conséquence.*

*Le 'mais' exprime une nuance, une restriction dans ce cas précis.*

## Types of answer

- Presence of a non-causal relation:

*C'est une description. La 2<sup>ème</sup> phrase apporte seulement une précision.*

- Other:

??

## Number of justifications of each type

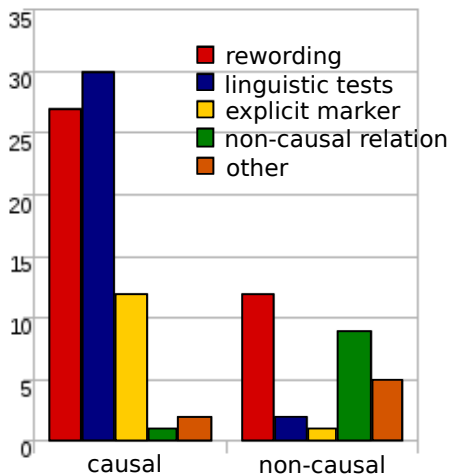


Figure: No real-world justification. Many rewordings.

# Conclusions on elicitation of intuitive tests of causation

- Difficulty to obtain systematic justifications.
- Lack of variety in justifications.
- High amount of rewording

Human reasoning **does not** consciously make use of intuitive tests of causation.

# Association of the judgement of causation and its features

- Which features are **statistically associated** to judgements of causation ?
- These features can be used in annotation guidelines.

# Experiment

- Features from the previous experiment and from theoretical work.
- **Judgements** on causation and its features on 24 artificial sentences that are ambiguous to causation.
- 4 subjects.

## Example

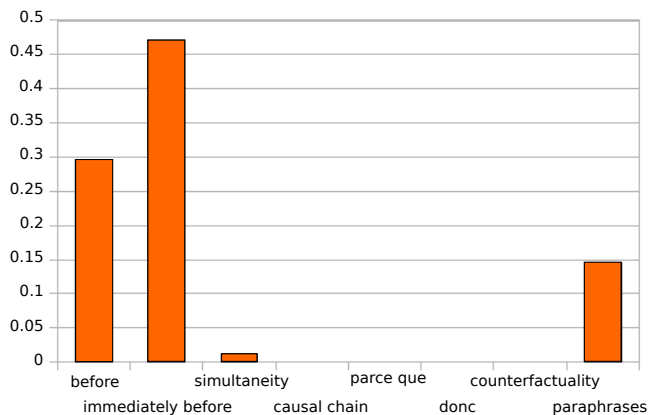
I put the chicken in the oven, I'm cooking.

# Features

- Temporal order.
- Ability to build a causal chain.
- Linguistics test by using *parce que* (because) and *donc* (so).
- Counterfactuality.
- Paraphrases.



## Results



**Figure:** *P*-value of Fisher's exact test of association for each feature and the presence of causation.

# Guidelines

- There is no easily usable necessary and sufficient condition for causation.
- Annotators must rely on **intuition**.
- Features of causation are necessary but not sufficient conditions.
- Some features can rule out non-causal cases
- Some can help annotators to clarify their intuition.

# Tests of causation

- From **divergences** between our predictions and annotators answers.
- From divergences between experts.

## Annotation experiment

- 4 Annotators.
- 15 short texts from *De la terre à la lune*.
- No training, only the guidelines.
- Low pairwise agreement.
- $\kappa = 0.84$  between the majority of the annotators answers and our judgements.

### Example

Bref, il ne fut plus permis, même au moins lettré des Yankees, d'ignorer un seul des faits relatifs à son satellite, ni à la plus bornée des vieilles mistress d'admettre encore de superstitieuses erreurs à son endroit. *La science leur arrivait sous toutes les formes; elle les pénétait par les yeux et les oreilles;* impossible d'être un âne...en astronomie.

# Features that help to rule out non-causal occurrences

- Temporal order
- Counterfactuality.
- Ontological asymmetry.

## Features that help to clarify intuition

- Ability to build causal chains.
- Linguistic tests.

# Conclusion

- If there exist features of causation that are used in human reasoning, they are **not conscious**.
- There exist features of causation that are **associated** with causation, e.g. causal chains, linguistic tests and counterfactuality.
- Our understanding of causation can be effectively **transmitted** through our instructions