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The JeuxDeMots Project is 10 Years Old: what Assessments?

Games4NLP – LREC - May 2018

What are GWAPs?

- Games (meant to be funny, addictive, pleasant…)
- Designed for
  - Data acquisition
  - Problem solving
- Dubbed collective intelligence
- Core assumption

A large number of ordinary people
is more efficient than
a small number of specialists

Amazon Mechanical Turk?

- Online crowdsourcing, Microworking

- Legal issues
  - Piece work is not legal in many countries
- Ethical issues
  - Some people try to live from their work for AMT
- Quality issues:
  - Very poor quality (people maximize number of microtasks done)
  - Requires effort and money to check data
    - Not so economical in the end after all…

- see « Amazon Mechanical Turk: Gold Mine or Coal Mine? » by Karen Fort, Gilles Adda, K. Bretonnel Cohen

GWAPs… some properties

- A good player ⇔ good data
- Beware of various biases
- Difficult to be funny AND efficient

- In general, short life span (many gwaps are dead before long)
- Often the expected results are overestimated

CONTEXT OF THE JEUXDEMOTS PROJECT

SEMANTIC ANALYSIS OF TEXTS WITH PROPAGATION ALGORITHMS ON/WITH A LEXICO-SEMANTIC NETWORK

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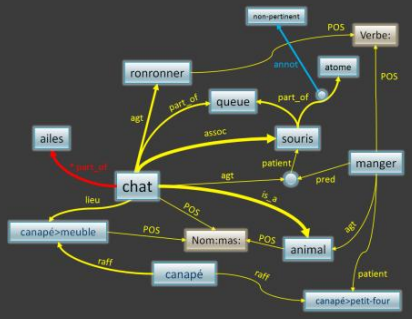
A KNOWLEDGE (DATA)BASE, A GRAPH WITH WORDS, SENSES/USAGES/RELATIONS



ACQUISITION OF LEXICAL, TERMINOLOGICAL, ONTOLOGICAL INFORMATION …

- What for ?
  - applications needing lexical, common sens and specialized field knowledge
    - Report analysis in medical imaging (Imaios)
    - Offer/demand matching in tourism (Bedycasa)
    - Debate management (SucceedTogether)
    - Class factorization in software eng. (Orange, Berger Levrault)
- How ?
  - Automatically (extracting for corpora) ?

    knowledge is not always explicitly present in texts

    not exclusively, not totally – a lot of implicit knowledge
  - By hand? Long – (too) costly – normative – static data

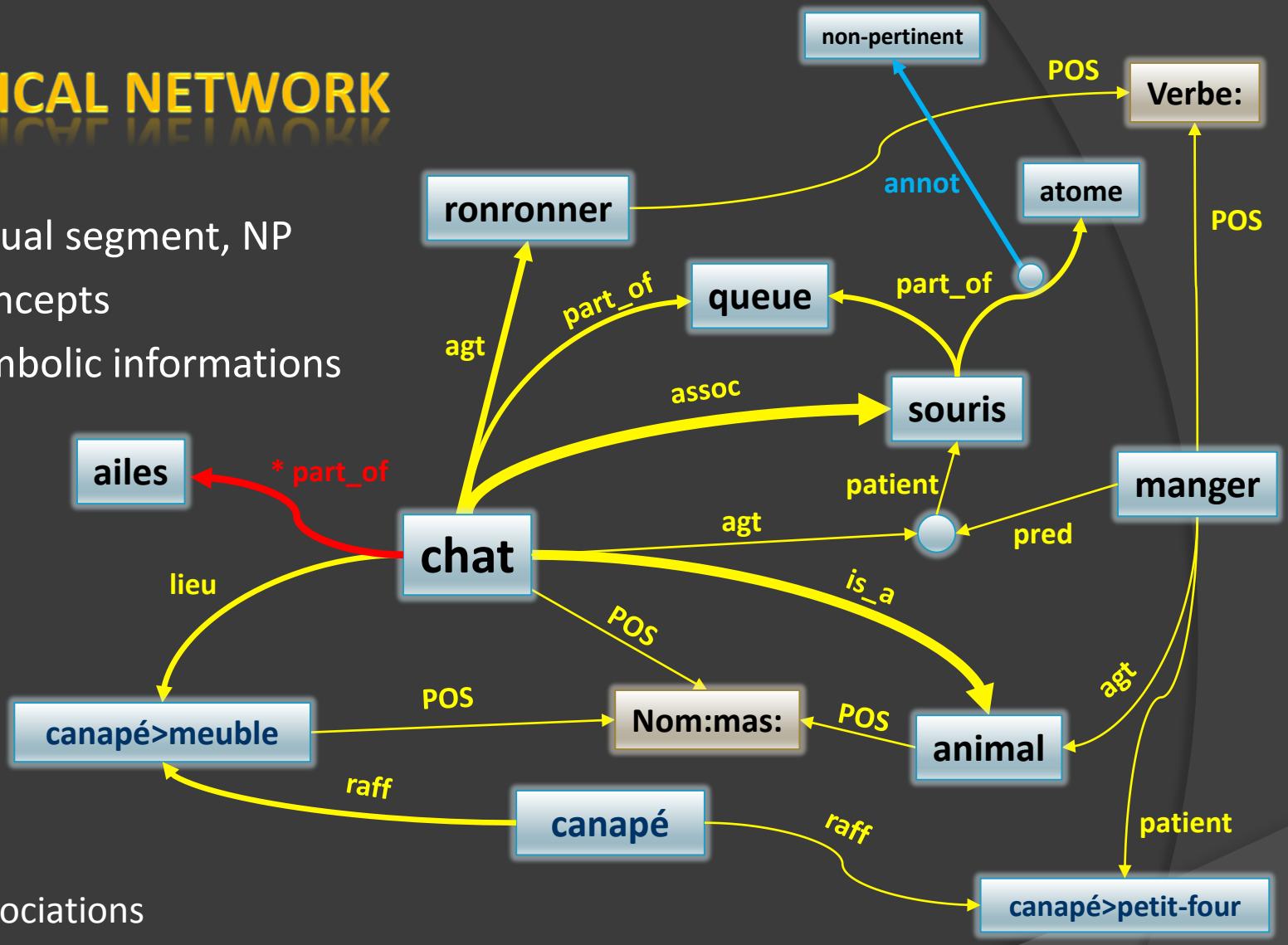
… AS A LEXICAL NETWORK

Nodes

- Terms, textual segment, NP
- Usages, concepts
- Various symbolic informations

Relations

- Typed
- Directed
- Weighted



free idea associations

hypernyms – hyponymes – part-of – whole– mater/substance …
synonymes – antonyms– locutions – magn/antimagn …
agent - patients – instruments – locations– causes/consequences – telic role– temporal values…

LEXICAL ACQUISITION WITH GWAPS

GAME WITH A PURPOSE

Jeux de mots

HYPOTHESIS :

FOR THE DEVELOPER, DATA ACQUISITION THROUGH GWAP IS
FREE • FAST • EFFICIENT •PROVIDES NON-NEGOCIATED ANSWERS

AND FOR PLAYERS THE GAME WILL/MUST BE
EXCITING • REWARDING • ADDICTIVE

JDM PLAY EXAMPLE

lutin

Niveau : 51

Réponses données par kaput : petit • agaçant • taquin • pétulant • espiègle • enfant • gobelin • gnome • farfadet • tourmenter • esprit follet • Bretagne • être fantastique • lutiner • petit

Réponses données par egaillat : grelot • oreille • habit • Schtroumpfs • malicieux • nez • créature légendaire • taquin • oreilles • elfe • fée • forêt • nuton • Puck • Père Noël • espiègle • mythologie • légende • vert • esprit follet • bonnet • créature • conte • être imaginaire • gnome • chapeau • petit • troll • korrigan • farfadet

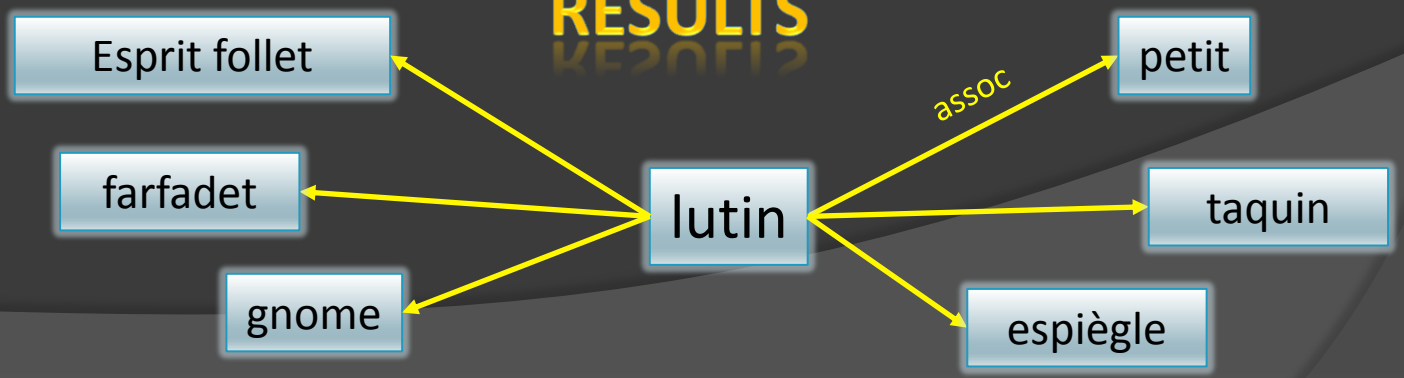
petit • taquin • espiègle • gnome • farfadet • esprit follet

HOMOLOGUÉ RECORD JEUX DE MOTS

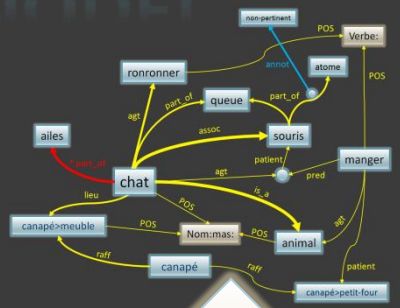
Vous gagnez 300 crédits et 8 point(s) d'honneur

J'aime Soyez le premier de vos amis à indiquer que vous aimez ça.

RESULTS



INTERACTION MODEL



lexical network

game 1

term
+
instruction

game 2

term
+
instruction

creation / strengthening of relations

confrontation

propositions **Intersection** propositions

player 1

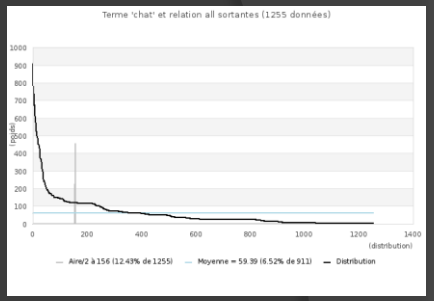
rewards

player 2

PLAYER ACTIVITY REGULATION

Filtering – matching of player pairs

- Iterated Minimal Consensus (weighting)
- Minimizing noise, maximizing *recall* (long tail)



Features

- Word pseudo-randomly selected
- Other player(s) unknown during play
- Asynchronous games

Points

- more if relation is weak
- less if relation is strong

PLAYER DILEMNA

THINKING LIKE WE THINK
THE OTHER PLAYER THINKS
AND
BEING ORIGINAL

QUANTITATIVE EVALUATION

- More than 1.6 M JDM plays done
  Around 30 000 h playing time
- Some players have more than 3000 h of playing

What we got:

- > 2 000 000 terms + many word forms in the network
- > 230 000 000 lexical relations

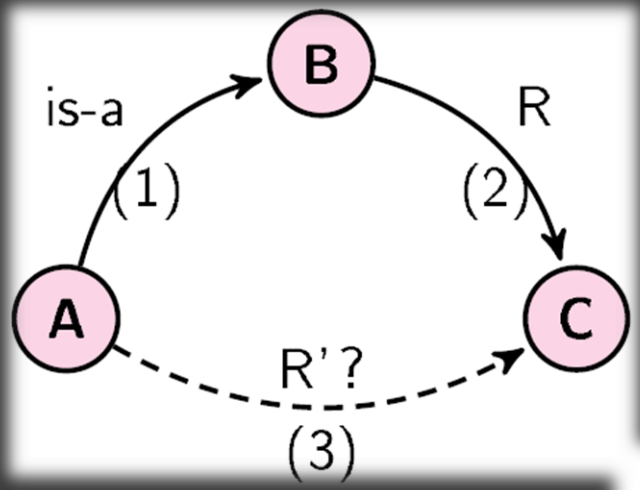
- > 26 000 refined terms and > 70 000 usages
- > 870 000 negative relations

never ending learning process
new words, NP, refinements… new relations

Other games

Counter games

CONSOLIDATION AND CHECKING WITH INFERENCES - DEDUCTION

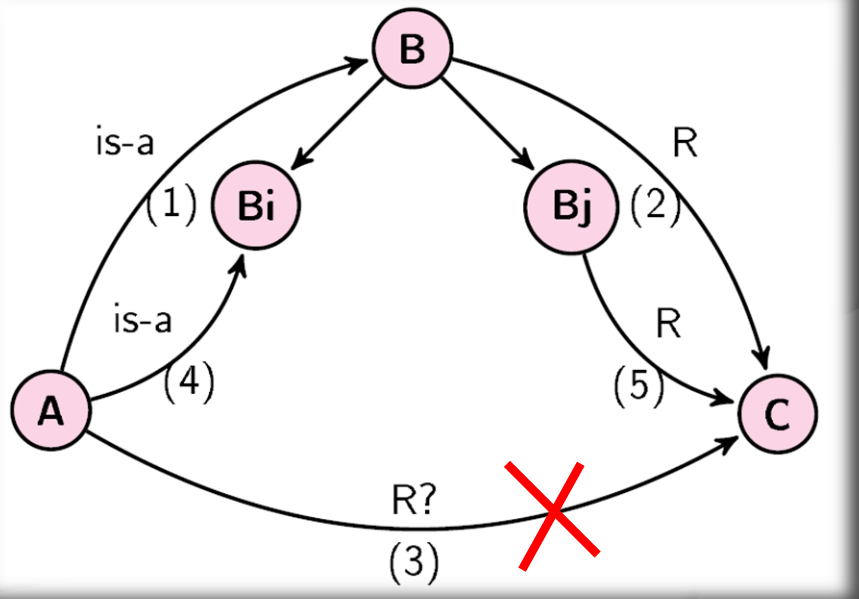


From the most general toward the most specific

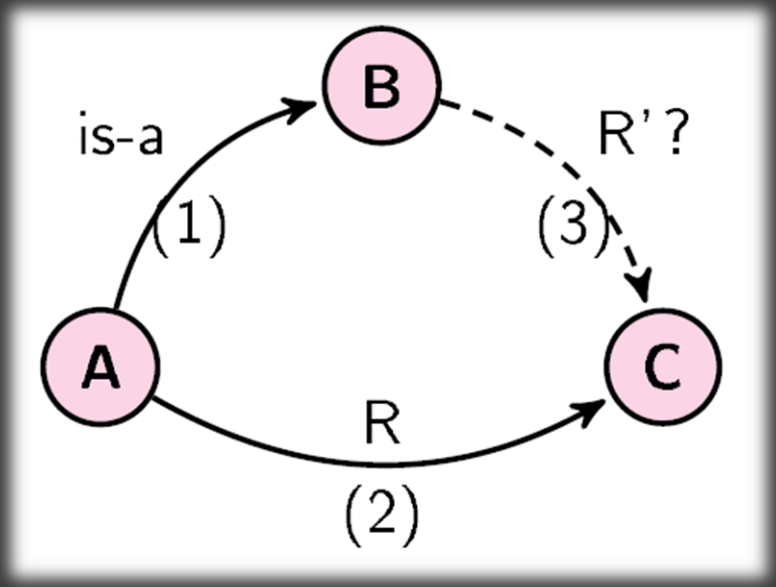
Logical and statistical blocking because of polysemy - for example:

- livre > lecture
- livre > monnaie
- livre > masse

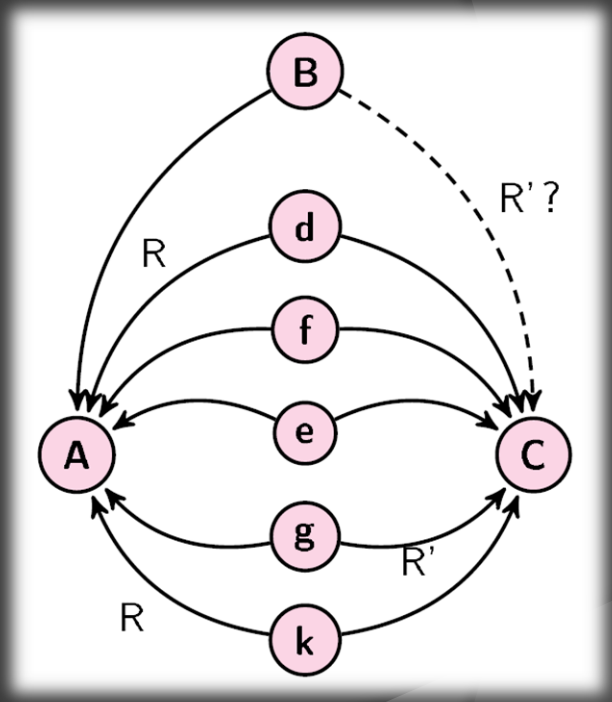
* Bible *is-a* livre & livre *carac* convertible
=> Bible *carac* convertible



CONSOLIDATION AND CHECKING USING INFERENCES – INDUCTION AND ABDUCTION



From specific to general



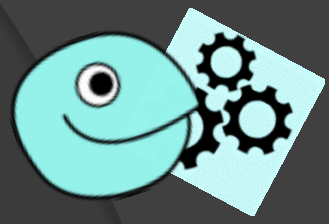
imitation of examples

The 3 inference types = detector

- of error in premises (1%)
- of exceptions (< 1%)
- of missing refinements (3%)
- of irrelevant correct relations (3%)

About 93 % of the infered relations are correct and relevant

SOME REFINEMENTS



- For polysemy and word usages

gloses

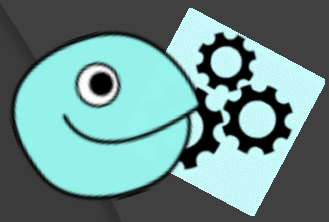
- avocat --r-raff_sem--> avocat>fruit
- avocat --r-raff_sem--> avocat>justice

- grippe --r-raff_sem--> grippe>maladie
- grippe --r-raff_sem--> grippe>virus

➢ 26 000 termes raffinés

➢ et > 66 000 usages

SOME REFINEMENTS



- Decision tree, example with frégate

  --r-raff_sem--> frégate>navire

  --r-raff_sem--> frégate>navire>moderne

  --r-raff_sem--> frégate>navire>ancien

  --r-raff_sem--> frégate>oiseau

  …

Navire de guerre ancien ou moderne.

(Navigation) (Marine) (Militaire) Navire de guerre qui n'avait qu'une seule batterie couverte et qui portait de vingt à soixante bouches à feu. […]

(Marine) (Militaire) Navire de guerre (moderne) de taille moyenne, capable d'assurer plusieurs types de missions. […]

(Ornithologie) Oiseau de mer palmipède, d'une très grande envergure, et qui saisit à la surf… poissons dont il se nourrit. […]

Automobile du constructeur Renault.

(Argot polytechnicien) (Désuet) Bicorne. […]

(Sexualité) Jeune homosexuel, giton. […]

WSD = selecting proper refinements

Activation algorithm through relations with other terms

NEGATIVE RELATIONS

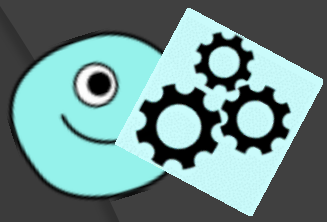
Allow to represent

> 870 000 negative relations in the lexical network

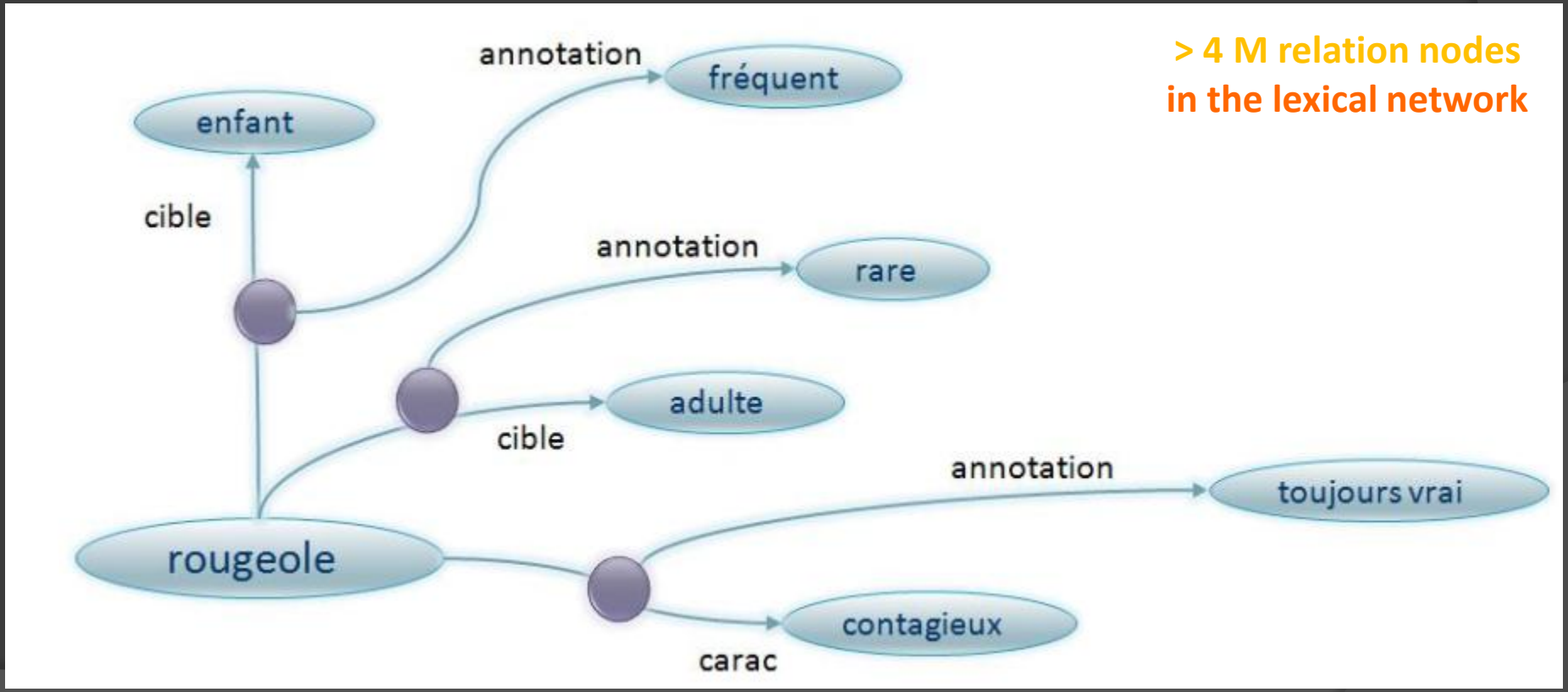
- exceptions
  - autruche --r-agent-1<0--> voler
- Inductive inferences potentially relevant, but wrong
  - ver de terre --r-agent-1<0--> mordre
- contrastive informations between refinements
  - avocat>fruit --r-agent-1<0--> plaider
  - avocat>justice --r-has-part<0--> noyau>fruit

Negative relations can be used as inhibition in WSD

RELATION ANNOTATIONS



- Reification of a relation
  with new associated informations



> 4 M relation nodes in the lexical network

AGGREGATIONS

- Another reification form

  lion --r_agent-1 -> dévorer

> 3366 aggregated forms in the lexical network

  lion [agent] dévorer

  -- r_patient -> gazelle, zèbre

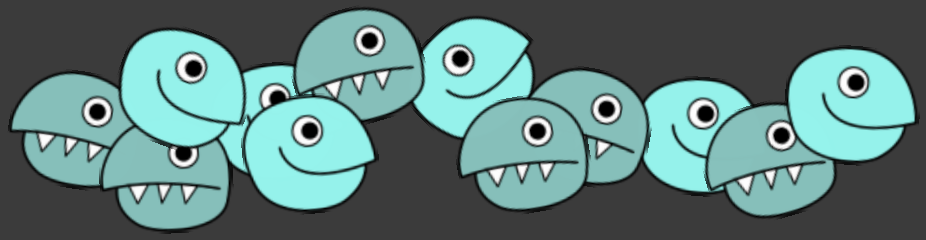
  (lion [agent] dévorer) [patient] gazelle

  -- r_action lieu -> savane

  -- r_manner -> férocement

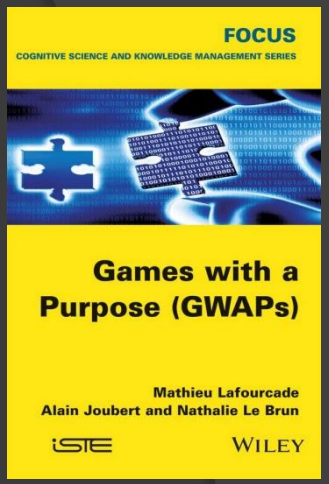
FIRST GENERAL CONCLUSIONS

- Lexical resources
  - If not too specialized
  - Can be built with native speakers
  - As many as you can, but a dozen can be enough…
    if motivated

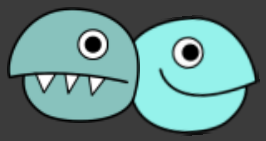


Not expensive – reliable ‘coz collected data are redundant

MORE JDM CONCLUSIONS



- Since sept. 2007 (~ 10 years)
  - > 230 millions relations between over 2 000 000 terms and around 100 relation types
  - annotated relations (relevant, possible, not relevant)
    → the largest network of this type
    → used for research and by some companies
- Evaluation
  - Collation of various points of view
  - Implicit relations (not present in texts) are captured by instruction forcing (players are invited to be explicit)

gwap  crowdsourcing 

- Relevant for general knowledge but also for specific domains (great surprise!)
- With GWAP (JDM, Askit, LikeIt, …) but also with direct contributions
- In general, virtuous circle is difficult to identify
  playing well ←→ producing proper data

EVEN MORE CONCLUSIONS

Some ethical aspects

- many involved players (some with more than 3000 hrs of play)
- no memory in the lexical network of who has made what
  (only temporary storage of games still to be retrieved)
- players are anonymous (login + pwd + email)
- less than 1% troll / vandalism – corrected as soon as discovered

- The data are made by the crowd...
  ... and should return to the crowd

→ Freely available

THANK YOU

Jeux de mots

JEUXDEMOTS.ORG

QUESTIONS