Quantification at A Distance and grammatical illusions
the case of French de-NP licensing

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What is a grammatical illusion?

- Comprehenders sometimes judge ungrammatical sentences as if they were acceptable (at least at first blush): 1b > 1c

(1) GRAM: **No** man who had a beard was **ever** thrifty.

   INT: *[_{DP} A man [who had **no** beard]] was **ever** thrifty.

   UNGRAM: *A man who had a beard was **ever** thrifty.

- This is observed
  - acceptability judgements (Phillips, Wagers, and Lau 2011)
  - ERP measures (Drenhaus, Saddy, and Frisch 2004)
  - eye-tracking measures (Vasishth, Brüssow, Lewis, and Drenhaus 2008)

Memory retrieval

- In online processing, the input is parsed incrementally
- When *ever* is reached, the encoding of its licensor needs to be retrieved
- Retrieval operates by matching the cues of an item in need of licensing with features of previously parsed items that are now stored in memory
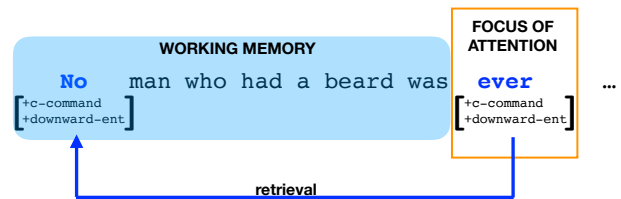
Figure: Retrieval (Vasishth et al. 2008)
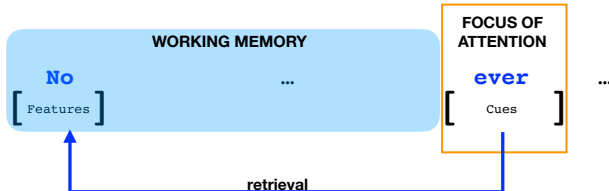
Memory retrieval account

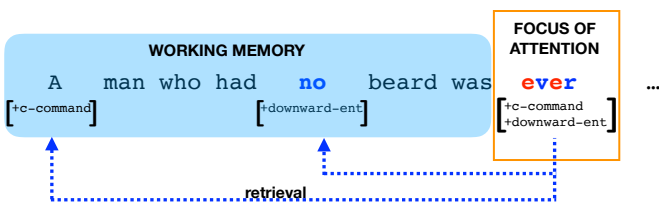- **Memory-retrieval account** (Vasishth et al. 2008, Parker and Phillips 2016): the **NPI** has cues that need to be matched with the features of a **licensor**
  - **GRAM: full matching**
  - INT: partial matching
  - UNGRAM: no matching

Memory retrieval account

- **Memory-retrieval account** (Vasishth et al. 2008, Parker et al. 2016): the **NPI** has cues that need to be matched with the features of a **licensor**
  - GRAM: full matching
  - **INT: partial matching**
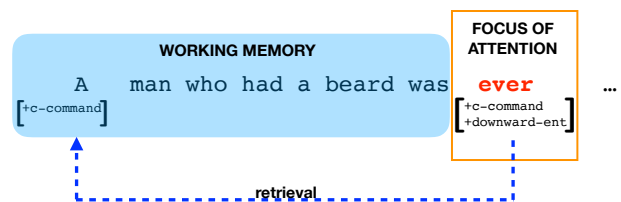 - UNGRAM: no matching

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Memory retrieval account

- **Memory-retrieval account** (Vasishth et al. 2008, Parker et al. 2016): the **NPI** has cues that need to be matched with the features of a **licensor**
  - GRAM: full matching
  - INT: partial matching
  - **UNGRAM: no matching**

Memory retrieval: a very general mechanism

- Memory retrieval is a very general mechanism for forming long-distance dependencies in real-time processing
- It is expected to be involved
  - across a variety of constructions
  - across a variety of languages
- Question: Is Quantification At a Distance in (European) French susceptible to the same retrieval mechanism?
- Claims of this talk:
  1. New grammatical illusion: de-NP licensing in (European) French
  2. Abstract syntactic cues guide memory retrieval

Outline

1. Quantification and de-NP licensing
2. Experiment 1: can de-NP be intrusively licensed?
3. Two types of de-NP licensing quantifiers
4. Experiments 2-4: only certain quantifiers intrusively license de-NPs
5. Intrusive de-NP licensing in cue-based retrieval
6. Conclusion

French DPs

- French does not have bare plurals but it has de-NPs which must be licensed

(2) a.*J' ai lu livres.
   I have read book.PL

   b. J' ai lu des livres.
   I have read INDEF.PL book.PL
   I have read books.

   c.*J' ai lu de livres.
   I have read DE book.PL

French DPs

- Determinerless de-NPs must be licensed by certain quantifiers

(3) a. J' ai lu ... beaucoup de livres. 'many books'
   I have read many DE book.PL

   b. pas mal de livres. 'quite a few books'

   c. suffisament de livres. 'enough books'

   d. trop de livres. 'too many books'

   e. énormément de livres. 'a ton of books'

   f. de plus en plus de livres. 'more and more books'

French DPs

- Quantification At a Distance (QAD) is allowed ...

(4) J' ai beaucoup lu de livres.
   I have many read DE livres
   I have read many livres.

French DPs

- Quantification At a Distance (QAD) is allowed ...
- but c-command is required ...

(5)*L' homme [qui a beaucoup lu] a de livres.
   the man who has many read has DE livres
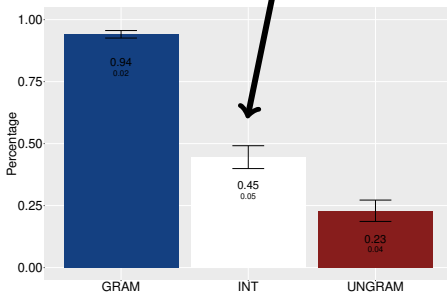   *Int. The man [who has read a lot] has (a lot of) books.*

French DPs

- Quantification At a Distance (QAD) is allowed ...
- but c-command is required ...
- and double quantification is not allowed

(6) *Beaucoup de gens ont lu de livres.
    many   DE   people   have   read   DE   books
    Int. Many people have read many books.

Memory-retrieval and French de-NPs

- From a certain angle, French de-NPs and NPIs look the same: a phrase (de-NP or NPI) needs to be licensed by an operator in a particular syntactic configuration

(7) GRAM: **No** man who had a beard was **ever** thrifty.
      INT: *[DP A man [who had **no** beard]] was **ever** thrifty.
      UNGRAM: *A man who had a beard was **ever** thrifty.

(8) GRAM: Des   gens ont lu   **beaucoup de livres**.
             INDEF.PL people have read a_lot   DE books
             Some people have read many books.
      INT: ***Beaucoup** de gens ont lu **de livres**.
      UNGRAM: *Des gens ont lu **de livres**.

Memory-retrieval and French de-NPs

- From a certain angle, French de-NPs and NPIs look the same: a phrase (de-NP or NPI) needs to be licensed by an operator in a particular syntactic configuration

(9) GRAM: Des   gens ont lu   **beaucoup de livres**.
             INDEF.PL people have read a_lot   DE books
             Some people have read many books.
      INT: ***Beaucoup** de gens ont lu **de livres**.
      UNGRAM: *Des gens ont lu **de livres**.

- Besides, memory retrieval is very general so it should show up across languages and across constructions

Can French quantifiers likewise intrusively license de-NPs?

Methodology

- Rapid Serial Visual Presentation
  - 350-440ms/chunk
  - 100ms in between two chunks
- Speeded acceptability judgments
  - Question: Is the sentence acceptable?
  - Answer: Yes / No. (2000ms)
- Experiment run on IbexFarm
- Link distributed via RISC mailing list (CNRS)

?   2000ms

...

de gens   350ms

à beaucoup   350ms

J'ai donné   350ms

Conditions and stimuli

- Grammatical

(10) J' ai   envoyé à beaucoup de gens des   invitations...
     I   have sent   to many   DE   people INDEF.PL invitations
     I sent invitations to many people...

- Intrusive

(11)*J' ai   envoyé à beaucoup de gens d' invitations...
     I   have sent   to many   DE   people DE invitations
     Int. I sent invitations to many people...

- Ungrammatical

(12)*J' ai   envoyé à des   gens d' invitations...
     I   have sent   to INDEF.PL people DE invitations
     Int. I sent invitations to people...

Thanks to Emmanuel Chemla for suggesting that we use this specific construction.

Experiment 1 (n=40)

J'ai envoyé à beaucoup de gens des invitations.

*J'ai envoyé à des gens d' invitations.

GRAM: 0.94 (0.02)
INT: 0.45 (0.05)
UNGRAM: 0.23 (0.04)

3

Experiment 1 (n=40)

*J'ai envoyé à beaucoup de gens d' invitations.

Experiment 1 (n=40)

Results

- **GRAM>INT, UNGRAM**: z=8.77, p<2e-16
- **INT>UNGRAM**: z=3.93, p<8.05e-5

Experiment 1: summary

Experiment 1 has established that quantifiers can intrusively license de-NPs

- Just like a quantifier can intrusively license an NPI non-locally, a quantifier can intrusively license a de-NP non-locally

- This follows from cue-based retrieval:
  de-NPs and NPIs have cues that can be retrieved and matched in memory (even when they are in a position that is not grammatically accessible)

Experiment 1: more questions

- Illusory licensing occurs for de-NP licensing in French
- But how sensitive to syntactic structure is this search?

Where can intrusive de-NP licensing occur?

- Hypothesis:
  the syntax of *beaucoup*-type quantifiers is what allows them to
  (i) quantify at a distance, and
  (ii) intrusively license a de-NP
- Prediction: only *beaucoup*-type quantifiers can produce illusory licensing

beaucoup-type quantifiers can be far (property 1)

- *beaucoup*-type quantifiers can Quantify At a Distance

(13) a. J' ai lu beaucoup de livres.
    I have read many DE books
    I have read many books.

b. J' ai beaucoup lu de livres.
    I have many read DE books
    I have read many books.

- +QAD: beaucoup, trop, suffisament, énormément, peu, de plus en plus, pas mal

plein-type quantifiers cannot be far (property 1)

- *plein*-type quantifiers cannot Quantify At a Distance

(14) a. J' ai lu plein de livres.
    I have read many DE books
    I have read many books.

b.*J' ai plein lu de livres.
    I have many read DE books
    I have read many books.

- -QAD: plein, nombre, quantité
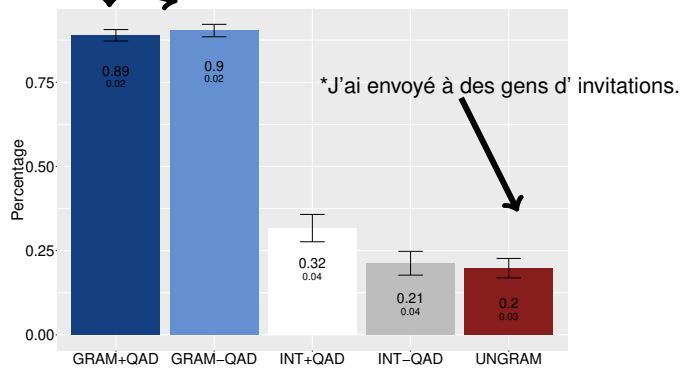
Intrusion

- Experiment 1

GRAM │ INT │ UNGRAM

Intrusion

- Experiment 2

| GRAM │ INT │ UNGRAM ‖ +QAD |
| GRAM │ INT │ UNGRAM ‖ -QAD |

Intrusion

- Experiment 2

| GRAM │ INT │ UNGRAM ‖ +QAD |
| GRAM │ INT │ UNGRAM ‖ -QAD |

Intrusion

- Intrusion, +QAD

(15) *J' ai envoyé à beaucoup de gens d' invitations...
I have sent to many DE people some invitations
I sent invitations to many people...

- Intrusion, -QAD

(16) *J' ai envoyé à plein de gens d' invitations...
I have sent to many DE people some invitations
I sent invitations to many people...

Intrusion: across the board intrusion?

- Intrusion, +QAD

(17) *J' ai envoyé à beaucoup de gens d' invitations...
I have sent to many DE people some invitations
I sent invitations to many people...

- Intrusion, -QAD

(18) *J' ai envoyé à plein de gens d' invitations...
I have sent to many DE people some invitations
I sent invitations to many people...

- Does the ability to form long-distance dependencies condition intrusion? No
- Prediction: we should have INT+QAD, INT-QAD > UNGRAM

Intrusion contingent on +QAD?

- Intrusion, +QAD

(19) *J' ai envoyé à beaucoup de gens d' invitations...
I have sent to many DE people some invitations
I sent invitations to many people...

- Intrusion, -QAD

(20) *J' ai envoyé à plein de gens d' invitations...
I have sent to many DE people some invitations
I sent invitations to many people...

- Does the ability to form long-distance dependencies condition intrusion? Yes
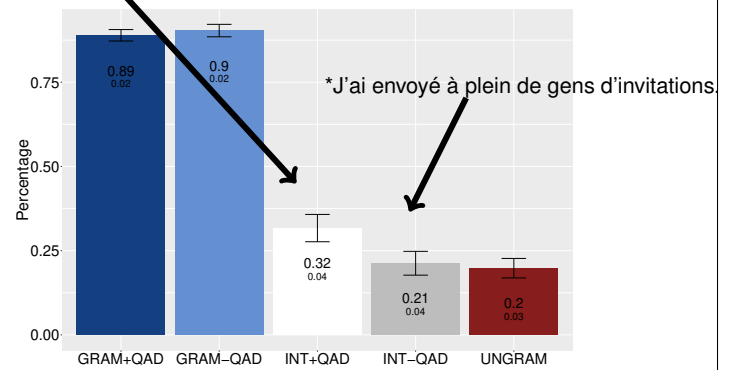- Prediction: we should have INT+QAD>INT-QAD, UNGRAM

Experiment 2 (n=50)
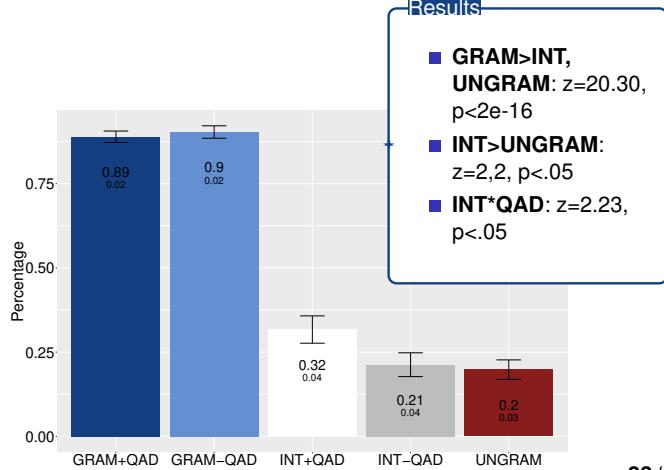
J'ai envoyé à beaucoup/plein de gens des invitations.

*J'ai envoyé à des gens d' invitations.

Experiment 2 (n=50)

*J'ai envoyé à beaucoup de gens d'invitations.

*J'ai envoyé à plein de gens d'invitations.

Experiment 2 (n=50)

Results

- **GRAM>INT, UNGRAM**: z=20.30, p<2e-16
- **INT>UNGRAM**: z=2,2, p<.05
- **INT*QAD**: z=2.23, p<.05

Interim summary

- de-NPs can be intrusively licensed (exp. 1-2)
- Only quantifiers that quantify at a distance intrusively license de-NPs (exp. 2)
- This follows from our hypothesis that the possibility to intrusively license and the possibility to Quantify At a Distance are linked
- We further replicated this result with another construction

Replicability: experiment 3 (n=42)

- In experiment 3, we replicated the results of experiment 2 with the quantifier in subject position
  - Intrusion, +QAD

(21) *Beaucoup de gens ont envoyé d' invitations.
   a_lot   DE people have sent   DE invitations

  - Intrusion, -QAD

(22) *Plein de gens ont envoyé d' invitations.
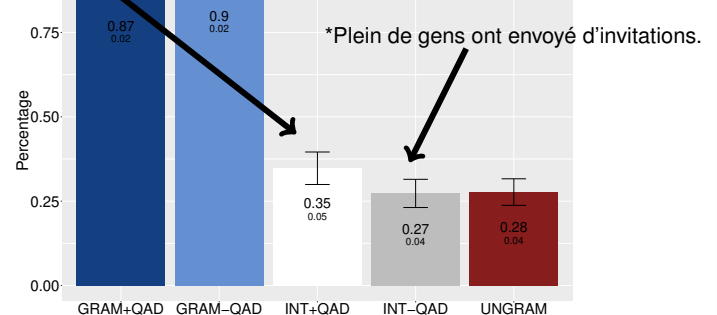   a_lot   DE people have sent   DE invitations

- Does the illusion disappear with distance?

Replicability: experiment 3 (n=42)

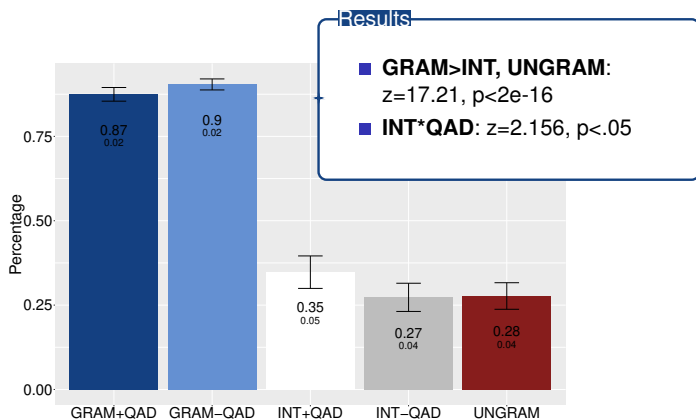- In experiment 3, we replicated the results of experiment 2 with the quantifier in subject position

*Beaucoup de gens ont envoyé d'invitations.

*Plein de gens ont envoyé d'invitations.

Replicability: experiment 3 (n=42)

Results

- **GRAM>INT, UNGRAM**: z=17.21, p<2e-16
- **INT*QAD**: z=2.156, p<.05

(bar chart values: GRAM+QAD 0.87 (0.02), GRAM−QAD 0.9 (0.02), INT+QAD 0.35 (0.05), INT−QAD 0.27 (0.04), UNGRAM 0.28 (0.04); y-axis Percentage)

Correlation between intrusion and QAD

- In experiments 1-3, we observed a significant interaction of quantifier type and intrusion
  - de-NP can be intrusively licensed
  - only certain quantifiers can give rise to the intrusive licensing
- The quantifiers that create illusory licensing are the ones that can Quantify at A Distance (Property 1)
- Is there a causal link? What is it?
- Hypothesis: the syntax of +QAD quantifiers is what allows them to (i) quantify at a distance (Property 1), and (ii) intrusively license a de-NP
- There are two other properties that distinguish +QAD and -QAD quantifiers

beaucoup-type quantifiers as adverbs (property 2)

- *beaucoup*-type quantifiers can be VP adverbs unlike *plein*-type quantifiers (Kayne 1975)

(23) a. J' ai beaucoup dormi.
    I have a_lot slept
    I've slept a lot.

   b.*J' ai plein dormi.
    I have a_lot slept
    Int. I've slept a lot.

Syntax of *beaucoup*-type quantifiers

- Kayne 2002; 2008 makes the proposal that a sentence like (24a) has the underlying structure in (24b).

(24) a. J' ai lu beaucoup de livres.
    I have read many DE books
    I read many books.

   b. J'ai lu beaucoup$_{Adv}$ MANY$_{Adj}$ NUMBER$_{Noun}$ de livres.

- Prediction: *beaucoup* can have the distribution of a DP

beaucoup-type quantifiers as DPs (property 3)

- *beaucoup*-type quantifiers can be used as if they were DPs unlike *plein*-type quantifiers

(25) a. J' ai fait beaucoup pour les pauvres.
    I have done a_lot for the poor
    I did a lot for the poor.

   b.*J' ai fait plein pour les pauvres.
    I have done a_lot for the poor
    Int. I did a lot for the poor.

Two types of de-NP licensing quantifiers

	beaucoup	plein
QAD	✓	x
adverb	✓	x
DP	✓	x

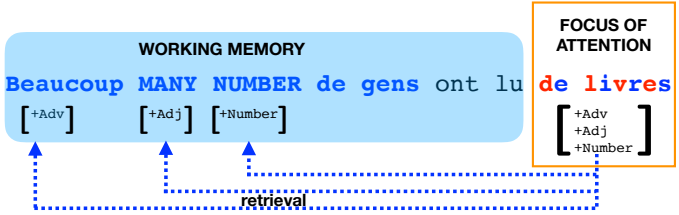**Table:** Properties of *beaucoup* and *plein*-type quantifiers

(26) a. J' ai lu beaucoup de livres.
    I have read many DE books
    I read many books.

   b. J'ai lu beaucoup$_{Adv}$ MANY$_{Adj}$ NUMBER$_{Noun}$ de livres.

- These covert elements provide features matched in memory
  - If the right account is Kayne 2002/2008, the features are syntactic
  - Even in other accounts (e.g. Burnett 2009), the features are syntactic
- We propose that *plein* is an adjective

Claim

- Abstract, non-surface syntactic cues are used in memory retrieval
- There is a category difference and the search process is indexing that difference
- Committing to what the exact syntactic difference is is beyond the scope of this study (it would require a syntactic study of these DPs)
- But, as a hypothesis, we can take Kayne 2002, 2008's proposal:
  - beaucoup de gens: beaucoup MANY NUMBER de gens
  - plein de gens: plein de gens

Claim and memory retrieval

- Retrieval in +QAD intrusive sentence

Conclusion

- Finding 1: de-NPs can be intrusively licensed
- Finding 2: only a subset of de-NP licensing quantifiers, namely *beaucoup*-type quantifiers, give rise to intrusive licensing
- Claim/hypothesis: the syntax of *beaucoup*-type quantifiers is what allows them to
  1. intrusively license a de-NP
  2. quantify at a distance
  3. be used as adverbs
  4. be used as DPs
- If our hypothesis is right, this constitutes evidence that intrusive licensing is also conditioned by abstract syntactic cues

Thank you!

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