French d 'illusions
a case of illusion guided by grammaticality

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Introduction: grammatical illusions

- Comprehenders sometimes process ungrammatical sentences as if they were acceptable

(1)*More people have been to Russia than you have.

Interesting because they show a disconnect between grammaticality and what we perceive to be acceptable

Explanations for some GI

Interference at a superficial level

- The string looks like a grammatical string in comparative illusions

(2) a. More people have been to Russia than you think.
   b.*More people have been to Russia than you have.

Explanations for some GI

- The licensor is close-by in NPI illusions

(3) 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.

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

Explanations for some GI

Interference rooted in grammatical rules

- Recent studies show that grammatical illusions are not always superficial:
- The acceptability of comparative illusions is contingent on the comparative supporting an event comparison reading (Wellwood et al. 2015)

Outline

1. Background on French DPs and quantifiers
2. A new grammatical illusion in European French involving de-NP licensing
3. Grammatical illusion is tied to the property of certain quantifiers (not superficial)
4. Hypothesis and test

French DPs

- French does not have bare plurals

(4) a. J' ai lu ... le livre. 'the book'
    I have read

    b.   un livre. 'a book'

    c.   des livres. 'some books'

    d.   *livres. ' books'

    e.   *de livres. 'books'

French DPs

■ determinerless de-Phrases must be licensed by certain quantifiers

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

(6) 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 ...

(7) *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

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

French deP Vs NPIs

- From a certain angle, French dePs and NPIs look the same: a phrase (deP or NPI) needs to be licensed by an operator that is not necessarily local
- It has been shown (Vasishth et al. 2008) that quantifiers can illusorily license NPIs in English and German

Can French quantifiers likewise intrusively license dePs?

Is deP licensing fallible?

- Grammatical

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

- Ungrammatical

(10)*J' ai envoyé à des gens d' invitations.
    I have sent   to some people some invitations
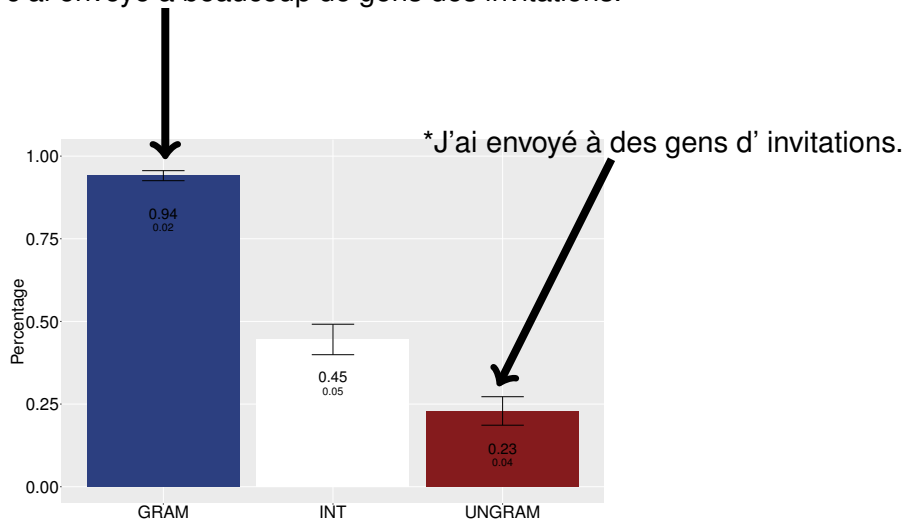*Int. I sent invitations to many people.*

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

Is deP licensing fallible?

- Grammatical

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

- Intrusive

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

- Ungrammatical

(13)*J' ai   envoyé à des gens d'   invitations.
   I have sent   to some people some invitations
   Int. I sent invitations to many people.

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

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
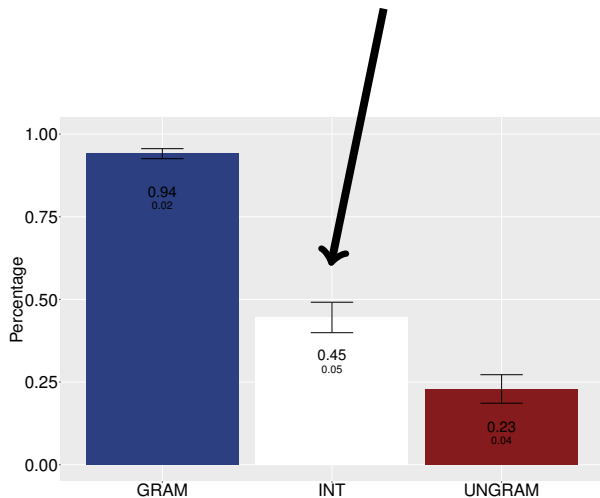- Link distributed via RISC mailing list (CNRS)

| ? | 2000ms |

. . .

| de gens | 350ms |

| à beaucoup | 350ms |

| J'ai donné | 350ms |
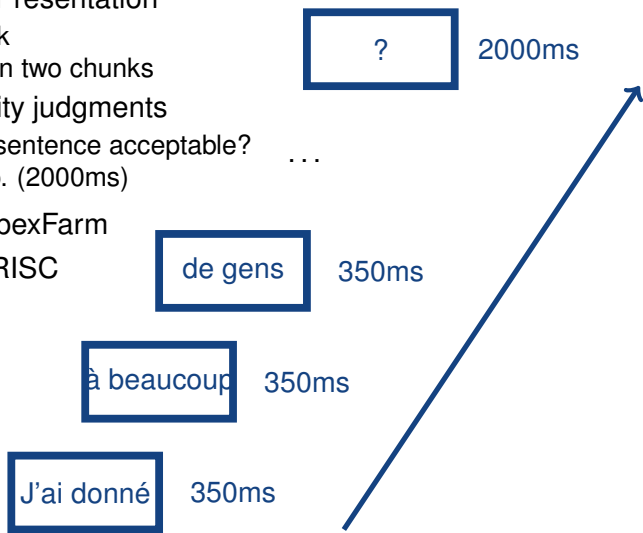
Experiment 1 (n=40)

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)

*J'ai envoyé à beaucoup de gens d' invitations.
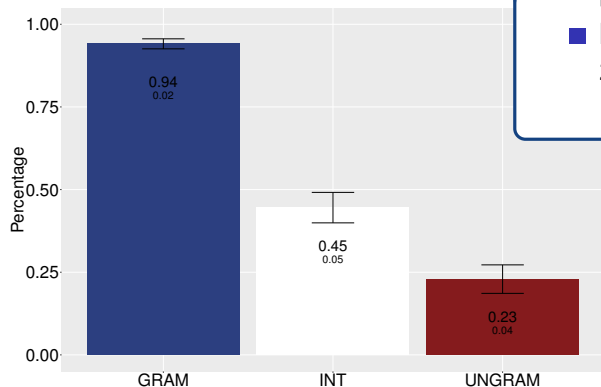
Experiment 1 (n=40)

Results

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

Experiment 1: summary and future directions

Experiment 1 has established that quantifiers can intrusively license dePs

- Just like a quantifier can intrusively license an NPI non-locally, a quantifier can intrusively license a deP non-locally
- This is supposedly linked to the fact that quantifiers in French (e.g. *beaucoup* 'many') can establish grammatical long-distance dependencies with their licensees (a.k.a. Quantification At a Distance)

Experiment 1: summary and future directions

Hypothesis 1: A quantifier's ability to establish a grammatical long-distance dependency is what permits intrusive licensing of deP

Prediction: a quantifier that is just like *beaucoup* 'many' except that it can't establish a long-distance dependency with the deP it licenses will not give rise to intrusion

- Can we find such quantifiers?

Not all Quantifiers float

(14) 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

Not all Quantifiers float

(15) 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		
GRAM	INT	UNGRAM	+QAD
GRAM	INT	UNGRAM	-QAD

Intrusion

- Intrusion, +QAD

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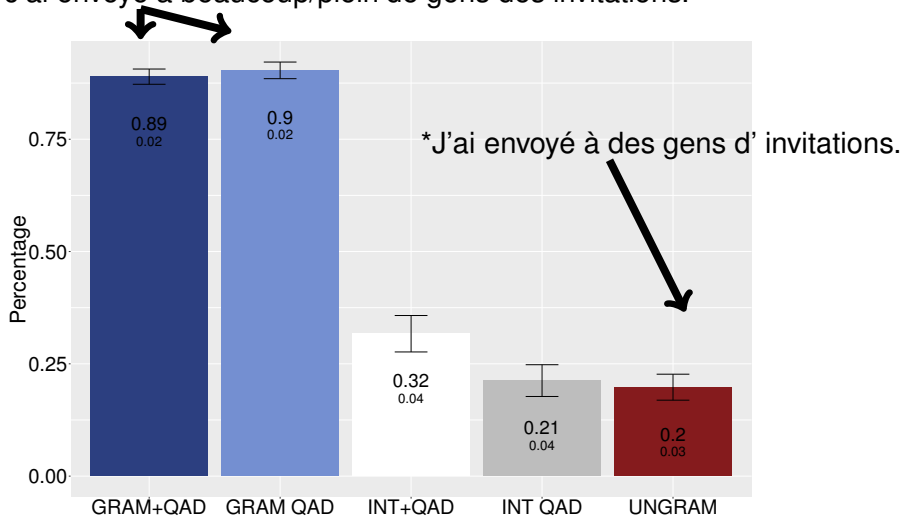
(17)*J' ai envoyé à plein de gens d' invitations.
    I have sent   to many DE people some invitations
    I sent invitations to many people.

Intrusion: across the board intrusion?

- Intrusion, +QAD

(18) *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

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

- If both +QAD/-QAD quantifiers produce intrusion, we should have INT+QAD, INT-QAD > UNGRAM

Intrusion: intrusion contingent on +QAD?

- Intrusion, +QAD

(20)*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

(21)*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?
- If only +QAD quantifiers produce intrusion, we should have INT+QAD>INT-QAD, UNGRAM

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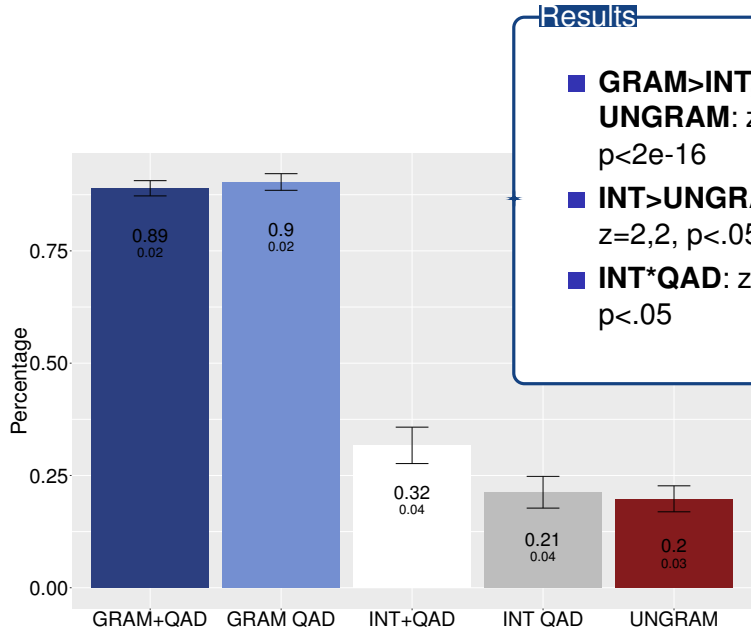
*J'ai envoyé à des gens d' invitations.

Experiment 2 (n=50)

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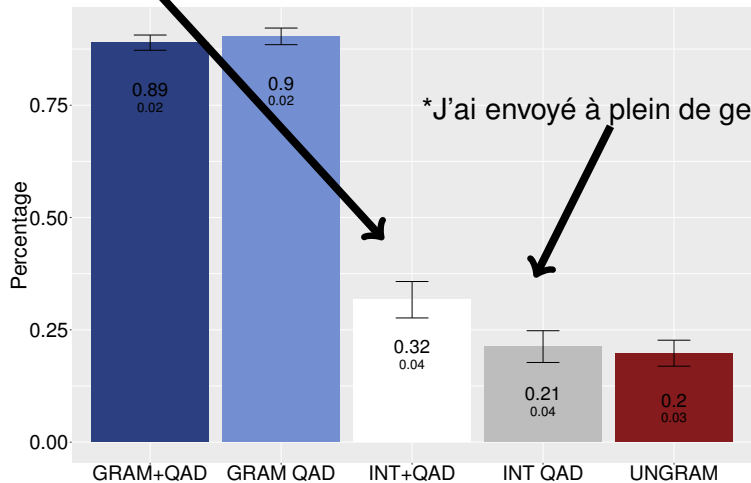
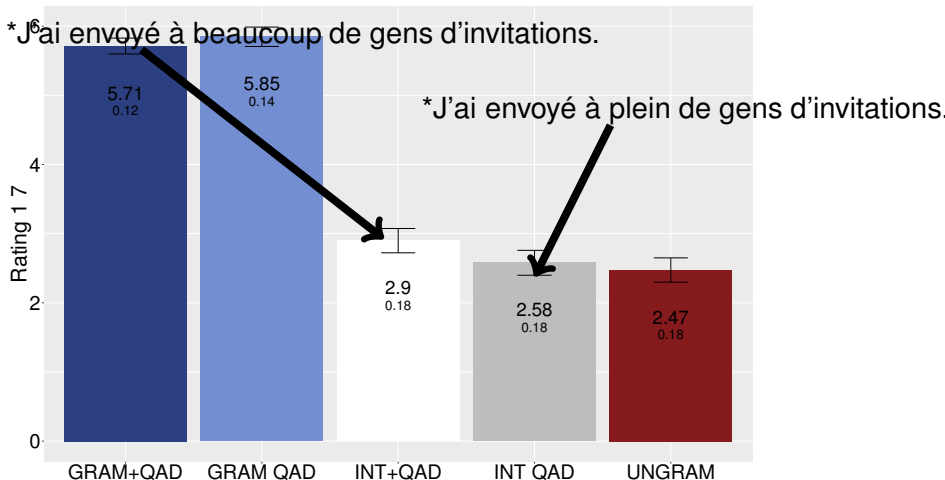*J'ai envoyé à plein de gens d'invitations.

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

- In experiment 3, we replicated the results of experiment 2 offline (with Likert scale)

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

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

Results

- **GRAM>INT, UNGRAM**: t=14.505, p<2e-16
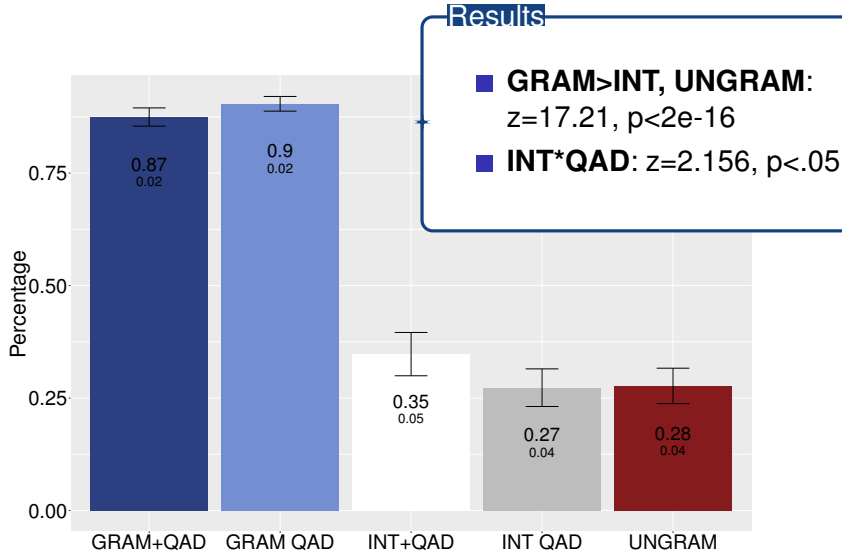- **INT>UNGRAM**: t=2.83, p<.01
- **INT*QAD**: t=2.415, p<.05
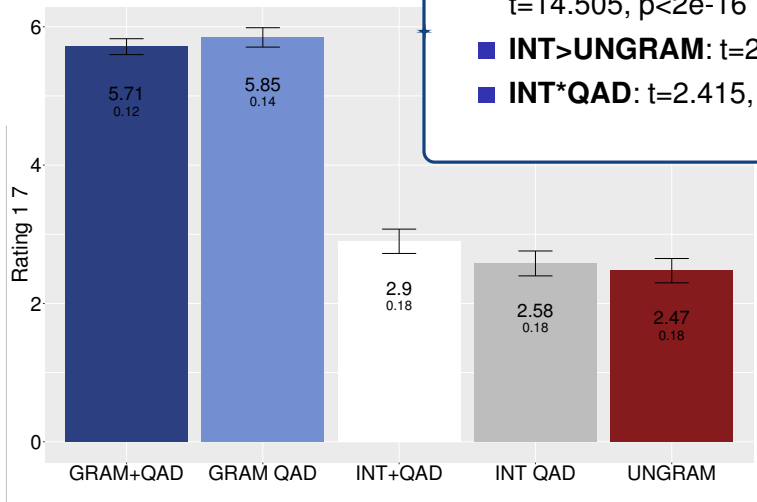
Replicability: experiment 4 (n=42)

- In experiment 4, 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 4 (n=42)

Results

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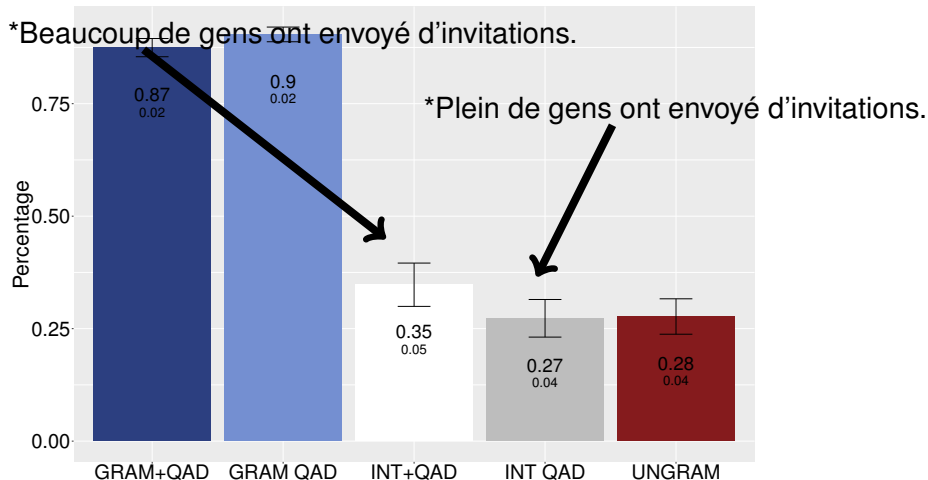
Correlation between intrusion and QAD

- In experiments 1, 2, 3, and 4, we observed a significant interaction of QAD and intrusion
- Only +QAD Qs create illusory licensing
- This is unexpected under a memory retrieval account given that -QAD and +QAD Qs occupy the same position in the string and are in the same constituent
- Because deP illusions are restricted to those Qs that can float, this raises the possibility that a similar operation to QAD is responsible for the illusory licensing

Hypothesis

- Let's entertain the idea that there is a causal link between the ability to QAD and the ability to intrusively license dePs
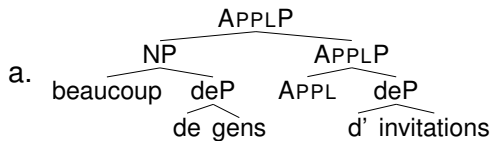
Hypothesis 2

The comprehender can repair INT+QAD structures by reanalyzing their structure such that the quantifier binds both dePs.

- This is only possible with +QAD quantifiers since -QAD quantifiers cannot establish long-distance dependencies

Hypothesis: illustration

- Indexed +QAD Qs covertly move over both dePs and a co-indexed bound trace is inserted next to each one

(22) Q in goal position

a.
```
                APPLP
          NP            APPLP
     beaucoup  deP    APPL    deP
              de gens       d' invitations
```

b.*J' ai   envoyé à [beaucoup de gens] [d' invitations].
  I have sent   to many   DE people DE invitations

Hypothesis: illustration

- Indexed +QAD Qs covertly move over both dePs and a co-indexed bound trace is inserted next to each one
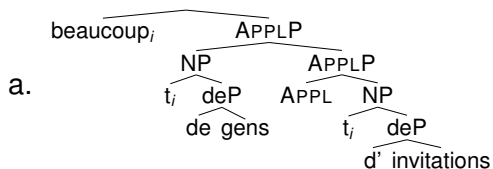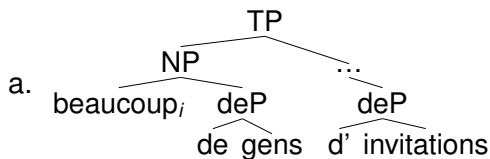
(23) Q in goal position

a.

b.*J' ai   envoyé à beaucoup$_i$ [t$_i$ de gens] [t$_i$ d' invitations].
  I   have sent   to many   DE people   DE invitations

Hypothesis: illustration

- Indexed +QAD Qs covertly move over both dePs and a co-indexed bound trace is inserted next to each one

(24) Q in subject position

a.
```
                TP
         _____
        NP               ...
     _____      
  beaucoup_i  deP       deP
           _____   _____
           de gens    d' invitations
```

b.*[Beaucoup de gens] ont envoyé [d' invitations].
   many   DE people have sent   DE invitations

Hypothesis: illustration

- Indexed +QAD Qs covertly move over both dePs and a co-indexed bound trace is inserted next to each one
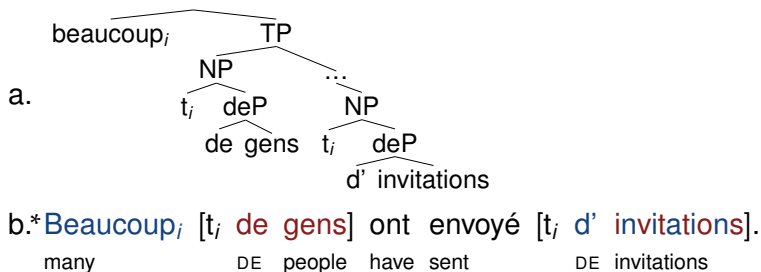
(25) Q in subject position

a.

```
      beaucoup_i        TP
                  NP        ...
                t_i  deP      NP
                   de gens  t_i  deP
                              d' invitations
```

b.*Beaucoup_i [t_i de gens] ont envoyé [t_i d' invitations].
   many   DE people have sent   DE invitations

Hypothesis, prediction

- This predicts that a spuriously licensed deP is interpreted as bound by Q
- Doubly quantified interpretation

(26) *Beaucoup$_i$ t$_i$ de gens ont envoyé t$_i$ d' invitations.

     many   DE people have sent   DE invitations

    Many people have sent many invitations.

Experiment 5: interpretation (n=126)

- Single-trial experiment

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

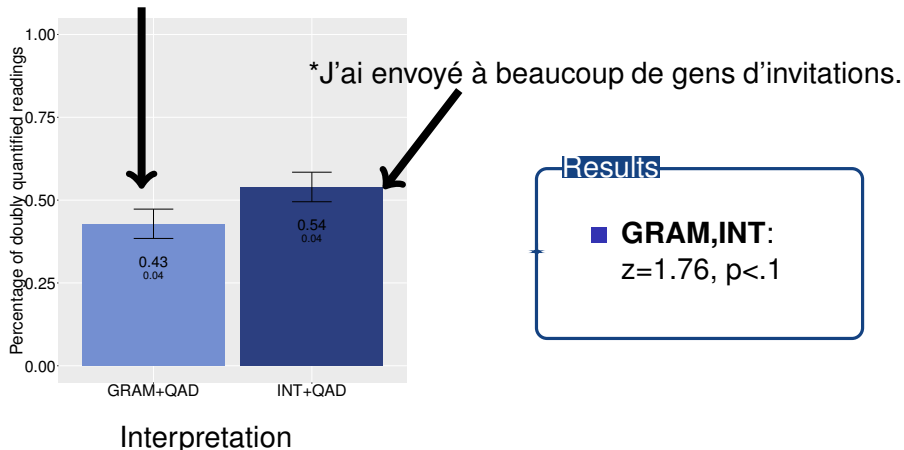- What is the best reformulation?

(28) A. Each person received at least one invitation.   [simple Q]
    B. Each person received many invitations.   [double Q]

Experiment 5: interpretation (n=126)

- No significant effect of intepretation

J'ai envoyé à beaucoup de gens des invitations.

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

Results

- **GRAM,INT**: z=1.76, p<.1

Experiment 5: interpretation (n=126)

- We replicably observed an interaction of quantifier type and intrusion
- This led us to hypothesize a causal link between the possibility to Quantify At a Distance and the possibility to intrusively license a deP
- This hypothesis made a prediction about the interpretation of intrusive structures
- We tested this prediction in experiment 5 but we could not bear it out

Future directions and open questions

- We might have been underpowered because of too few (1) observations / condition
- We wonder about the link between acceptability and meaningfulness
    - The prediction made by our hypothesis crucially relied on another hypothesis: if a speaker finds a sentence acceptable, then they can assign a meaning to it
    - But it is not clear that the relation between acceptability and meaningfulness is this straight-forward
- Maybe illusions of grammaticality differ in whether acceptability reflects the assignment of a meaning to the illusory construction

no int. correlates	int. correlates
agreement attraction errors	comparative illusions (Wellwood et al. 2015)
	logophlexives (Sloggett et al. 2016)

Conclusion

- We replicably observed an interaction of quantifier type and intrusion
- This led us to hypothesize a causal link between the possibility to Quantify At a Distance and the possibility to intrusively license a deP
- We think that this constitutes good evidence that intrusive licensing is not solely conditioned by memory
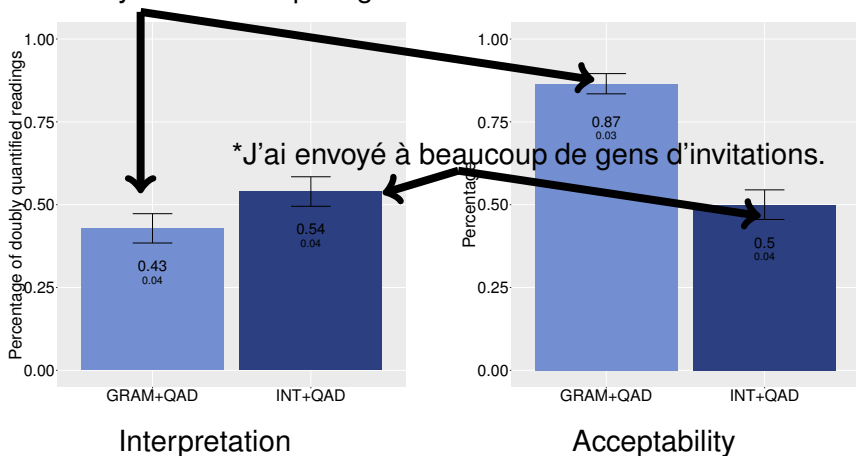
Thank you!

- No significant effect of intepretation, significant effect of acceptability

J'ai envoyé à beaucoup de gens des invitations.

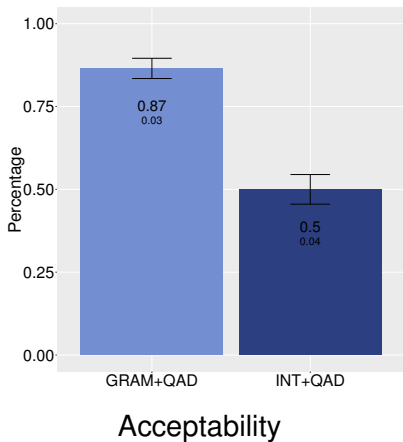*J'ai envoyé à beaucoup de gens d'invitations.

- Significant effect of acceptability

Results

- **GRAM>INT**:
  z=4.87, p<.001

Acceptability

- Potential issue: What about the fact that B (double quantification reading) entails A (single quantification reading)?

(29) What is the best reformulation?

  A. Each person received at least one invitation.　　　[simple Q]

  B. Each person received many invitations.　　　[double Q]

- One strategy is to always choose A since it's always going to be an interpretation that is compatible

[**APPENDIX**] **Interpretation task: answer**

1 We trained people

(30)   Alexandre tore apart Aurélien's red winter coat during the break.

   A. Alexandre tore apart a coat during the break.

   B. Alexandre tore apart a red coat during the break.

(31) Feedback:
   B is a better answer than A

2 Methodology used successfully in Frazier and Clifton 2011 where they probe the interpretation of doubly quantified sentences

(32)   Many students often turn in their assignments late.

   A. The number of students who turn in their assignments late is large.

   B. The number of students who frequently turn in their assignments late is large.