How Ambiguous are French Double Negative Sequences?

Viviane Déprez Jeremy Yeaton

Background

Experiment 1: Picture Choice
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Results
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Experiment 2a:Context Influence
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Nobody Say Nothing!

1. Negative Concord (NC): A single negation reading of a sequence of Negative Concord Items (NCI)
   Nobody say anything
2. Double negation (DN):
   Nobody say nothing → Everybody say something

French, while assumed to favor NC, permits both:
Personne ne dit rien.

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Theoretical models of NC

Three main families of theory:

1. NC = NPI dependencies ($\neg\exists x, y$ or $\forall x, y \neg [x$ said $y]$)
   (Laka 1990, Giannakidou 1998)
   - NCI = NPI = non-negative indefinite expression
   - SNeg = semantically negative

   Prediction: No DN readings in NC dependencies as in
   NPI dependencies (But see Nicolae & Falaus 2016 for
   Romanian)

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Theoretical models of NC

② NC = Agree dependency ($\neg\exists x, y[x$ said $y]$) (Zeijlstra 2004, Biberauer & Zeijlstra 2012)

- NCI = non-negative indefinite expression with a grammatical feature [INEG] or [UNEG]
- The [INEG] vs [UNEG] distinction is parametric:
  DN languages: NCI = [INEG], SNEG = [INEG]
  NC langauges: NCI always [UNEG], SNEG = [INEG] in non-strict NC (e.g.: Italian), but [UNEG] for strict NC languages (Haitian Creole)

Prediction: DN in DN languages, NC in NC languages, no ambiguity, except for historically shifting languages

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Theoretical models of NC

3. NC = Resumptive Quantification
   (NO $< x, y >$ [x said y]) (De Swart 2010)
   - NCI = negative quantifiers
   - SNEG = semantically inert
   - Possible DN readings

   Prediction: Possible DN readings in all NC languages

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A dual approach:
Déprez (1997, 2000, 2011)

Two core types of NC relations by the nature of the NCI:

1. Resumptive Quantification with NCI = Negative Q
2. NPI-like dependencies with NCI = non-quantificational indefinite expressions

FR-NCI: NCI high within DP/XP structure

(1) $[_{DP/XP}$ **NCI** D ... $[_{NP/FP}$ 0]]

- Are like bare Negative Quantifiers
- NC = Resumptive Quantification, allows for DN readings

HC-NCI: NCI low within DP/XP structure

(2) $[_{DP/XP}$ 0 ... $[_{NP/FP}$ **NCI**]]

- Are like bare nominals with a null D: indefinite expressions that must be bound by a NEG operator (pa) = NPI

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A dual approach:
Déprez (1997, 2000, 2011)

- Micro-parametric proposal
- NCIs do not need to all be identical in a given language, even if languages tend to have NCI paradigms
- Differences in NCIs are **not** subordinate to the nature of sentential negation

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A more generalized approach: Déprez (2011)

Negative interpretability at the edge

- Neg features are "interpretable" for computation at phase edge
- Otherwise, NEGF = "uninterpretable" & needs licensing (derivational time bombs, cf. Preminger 2011, Kalin 2016)
- NEGF at DP edge = interpretable = Negative quantifier $[_{DP}$ personne $[_D$ de $[.autre\dots]]]$
  Grammaticalized DP internal focus position
- NEGF within DP = uninterpretable & needs licensing $[_{DP}\ 0\dots[_{FP}\dots[_{nP}\ pèsonn]]]$
- NEGF at vP edge = visible at sentential level (NegF inside vP needs licensing–PIC)
  $[_{TP}$ J'ai $[_{vP}$ rien $[_{vP}$ fait $[_{VP}\ ]]]$ Demotic French (Massot 2013), Norwegian V-move (Svenonius 2002)

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Experiment 1: Picture Choice

Research Questions:

1. In the absence of context, is NC the preferred interpretation in French?
   Prediction: Yes, according to the literature.

2. To what extent does the nature of the NCIs play a role in predicting interpretations?
   - Syntactic position
   - Parallelism
   - Structure of the NCIs themselves

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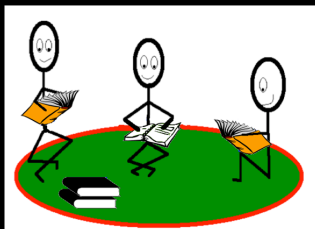Discussion

Experiment
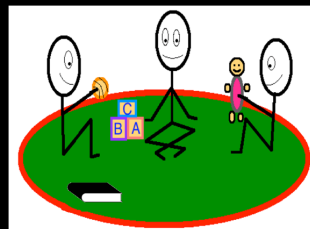2b: Prosody
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The Task

Binary choice between pictures

- Pictures represent possible NC/DN reading for an ambiguous French sentence with 2 negative expressions
- Preference task: speakers freely chose which reading was most salient
  - Avoids normativity issues that may arise from a judgment task
- Trial format:
  1. Presentation of sentence
  2. Read sentence and click to reveal pictures
  3. Click to select image corresponding to interpretation (RT)
  4. Required to provide justification on some items
- Pseudo-randomized to avoid ordering effects and left/right preference

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Stimulus

No student reads no book.

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Stimulus

4 conditions × 8 tokens each = 32 critical conditions items:

- 8 Pro-Pro: Simple Parallel
  Personne ne mange rien
  "Nobody is eating nothing"

- 8 DP-DP : Complex Parallel
  Aucun élève ne lit aucun livre
  "No student is reading no book"

- 8 Pro-DP: Simple Subject Non-Parallel
  Personne ne chante aucune chanson
  "Nobody is singing no song"

- 8 DP-Pro : Complex Subject Non-parallel
  Aucun enfant ne boit rien
  "No child is drinking nothing"

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Stimulus

4 control conditions to ensure availability of single negation
and DN readings:

- 8 Double Negative: *Pas un enfant ne lit rien*
  "No child is reading nothing"

- 8 Negative polarity: *Personne ne lit quoique ce soit*
  "No one reads anything"

- 8 Negative quantifiers: *Les enfants ne lisent rien*
  "The children are reading nothing"

- 8 universal readings: *Tout le monde lit quelque chose*
  "Everyone is reading something"

32 additional fillers (96 total items)
Justification for picture choice every 10 items

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Participants

French

- 38 native speakers of French
  - Collected from the Universities of Caen & Lyon
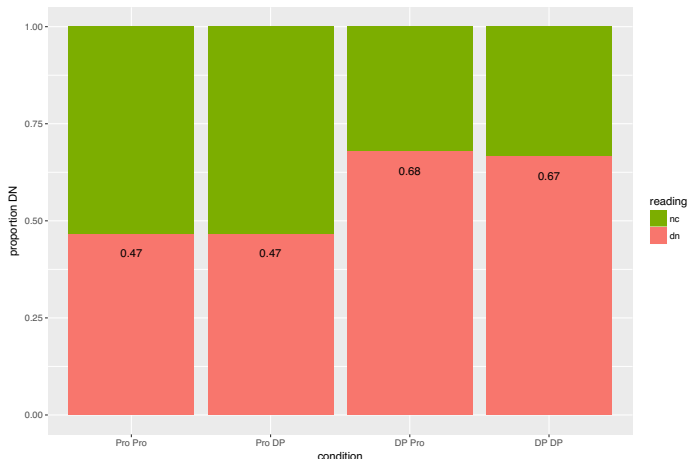 - Aged 18-26

Conducted in parallel with the same experiment in English:

English

Presumed DN language (but see Blanchette 2013)

- 22 native speakers of English
  - Undergraduates at Rutgers University in New Jersey

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French Results by Condition

- No major NC preference: DN dominates in 2 conditions
- DPs trigger slightly more DN overall (p=0.02), especially in subject position (p=0.003)

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French Results by Participant

- Participants were consistently good on controls
- Varying levels of DN preference through conditions

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Overall French & English

- DN/NC preference in French closely resembles that of English (presumed DN language)
- DN preference with all conditions together (p<0.001)

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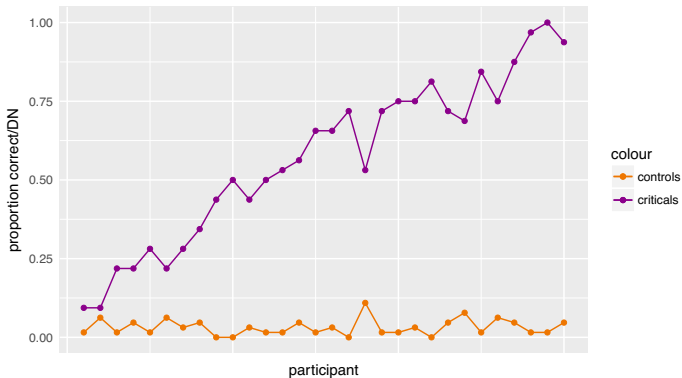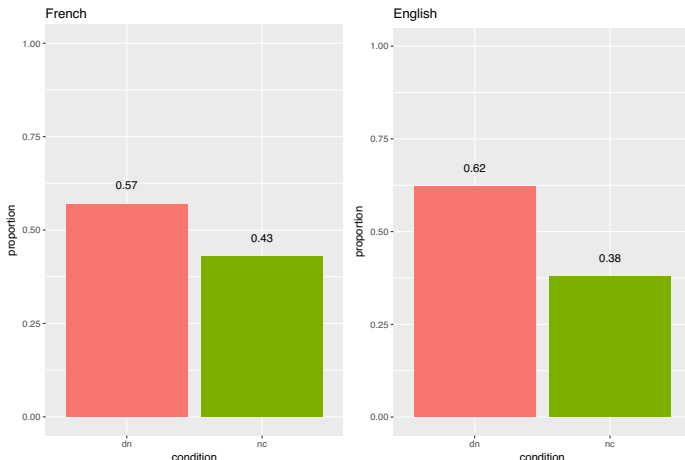Discussion

Conclusions

Back to the research questions

1 Is NC a default choice in French?

- NC does not appear to be the default reading in French–there is no overall preference for NC
- Seems to be an overall preference for DN, taking all critical conditions together (thought both are hard, per RTs)

2 How does the nature of NCI affect interpretation?

- **Structural Parallelism** does not appear to impact reading choice, contrary to May (1989) and Déprez (2000) conjecture.
- **DP Structure** matters. Significant distinction between Pro-Pro and DP-DP sequences, with DP-DP and DP-Pro favoring DN.
- **Syntactic Position** matters. DP in preverbal subject position (at TP edge) significantly favors DN, as opposed to Pro subject.

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Theoretical Significance

- DN is not as marked as expected from the literature and can sometimes be preferred. This suggests that there are languages where DN is no more marked than NC.

- Neg relations are not homogenously interpreted even within a single language; they depend on the nature of the NCI and position in sentence.

- Calls into question the macroparametric approach:
  - Does not make sense to classify French as a DN or NC language, since the DN/NC preference varies across conditions
  - Both interpretations remain readily available.
  - Macro-parameter accounts for neither the strong presence of both NC and DN in French, nor the distinctions observed in the different conditions

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Experiment 2a: Context Infuence

Research Question:

1. Does context succeed in influencing/ determining NC or DN interpretations in French?
   Prediction: Yes, if NC/DN is a matter of ambiguity influenced by pragmatics, and not a syntactic parameter.

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The Task

- Native French speakers were presented with simple, ambiguous transitive sentences with one (Control) or two (Critical) NCIs in context
- They were then asked to (at their own pace)
    1. Read the entirety silently for comprehension
    2. Read it aloud (as though to a child)
    3. Respond to T/F question
- Responses were recorded on an Asus Orion PRO gaming headset with a noise filtering microphone
- Recording took place at the *Laboratoire sur le Langage, le Cerveau, et la Cognition (L2C2)* in Bron, France
- Total experimental time ≤ 20 minutes

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Some Examples

NC Context

1. *Dans notre famille, on est tous allergique à l'alcool :*
   (In our family, we are all allergic to alcohol)

DN Context

2. *Chez les jeunes, la consommation d'alcool est effrayante :*
   (Among the youth, the rate of alcohol consumption is frightening)

Ambiguous Critical Item

3. **Personne ne boit rien dans les soirées.**
   (Nobody drinks nothing/ anything at parties)

Interpretation Verification

4. *Ils ne boivent pas d'alcool.*
   (They don't drink alcohol)
   = **T** for NC interpretation
   = **F** or DN interpretation

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Stimuli

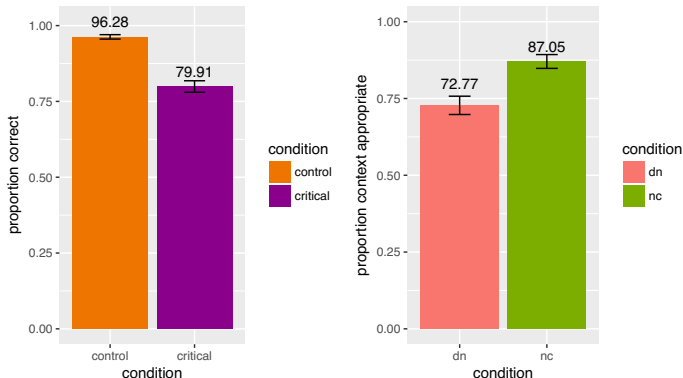- 40 total context/sentence pairs (8 items $\times$ 5 conditions):
  1. 8 $\times$ **Double Negative:** *Personne ne boit rien ici*
  2. 8 $\times$ **Negative Concord:** *Personne ne boit rien ici*
  3. 8 $\times$ **Negative Object:** *Marie ne boit rien ici*
  4. 8 $\times$ **Negative Subject:** *Personne ne boit d'eau ici*
  5. 8 $\times$ **Fillers**

- Pseudorandomized

- DN contexts did not resort to contradictions

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Participants

- 28 native French speakers (M=10)
- Age 18-45 (mostly students at University of Lyon)
- Representative of diverse regions of France
- All had a minimum of a university degree

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Results: Controls and Criticals

- Participants were overall good at the task/ obedient to context
- Overall slight preference for NC, but DN still frequent

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Results: Participants

- Varying DN/NC preference (as seen in picture choice)
- More subjects biased toward NC, but one biased toward DN

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Back to the research question

1 Does context succeed in influencing/ determining NC or
DN interpretations in French?

- Yes it does, pointing to ambiguity, not syntactic parameter.
- NC and DN are still both quite available in French (neither
  an NC nor DN language)
    - Does not fit macro-parametric approach
    - Could fit either resumptive quantification or
      micro-parametric approaches
- Context generally allows for disambiguation, but not
  universally across speakers: some are all NC and rarely all
  DN
- Further research is needed investigating the nature of the
  contexts

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Experiment 2b: Prosody

Research Questions:

1. Is prosody used in disambiguating French transitive sentences with two NCIs?
   Prediction: Yes (cf. Spanish, Catalan–Espinal et al 2011, 2016–and English–Blanchette et al 2018).

2. What are the prosodic indicators which are employed by speakers to mark these differences?
   Prediction: Speakers will use a high pitch accent and extended duration to mark DN readings (Féry 2000, Avanzi et al 2014)

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Stimuli & Participants

The same experiment as 2a.
Stimuli specifications:

- Same 8 frequent monosyllabic verbs
- Same number of syllables in target sentence
- Final PP to avoid sentence boundary L tone on object NCI
- Maximized use of sonorants where possible

Participants:

- 20 native French speakers (M=4)
- Age 18-45 (mostly students at University of Lyon)
- Representative of diverse regions of France

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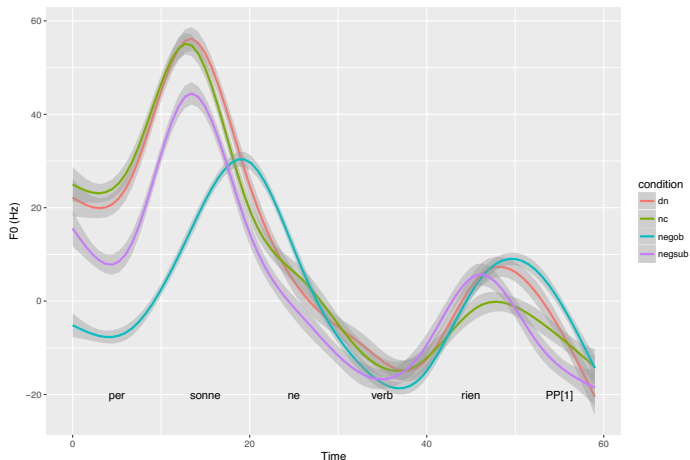Results
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Data

Condition	Structure	Abbreviation	n
Double Negation	NCI-NCI	DN	137
Negative Concord	NCI-NCI	NC	140
Subtotal Criticals			277
Single Negative Object	DP-NCI	NegOb	149
Single Negative Subject	NCI-DP	NegSub	149
Total			575

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Analysis

- Utterances were excised from context and text-aligned using **EasyAlign** *(J.-Ph. Goldman, 2011)* in **Praat** *(Boersma & Weenink, 2015)*
- Extracted for each syllable using **ProsodyPro** *(Xu, 2013)*:
  - Duration
  - 10 time-normalized F0 measurements
- Only the first 6 syllables are included:
  per sonne ne [verb] rien PP[1]
- F0 values were de-meaned
- Analysis: LM, LMEM
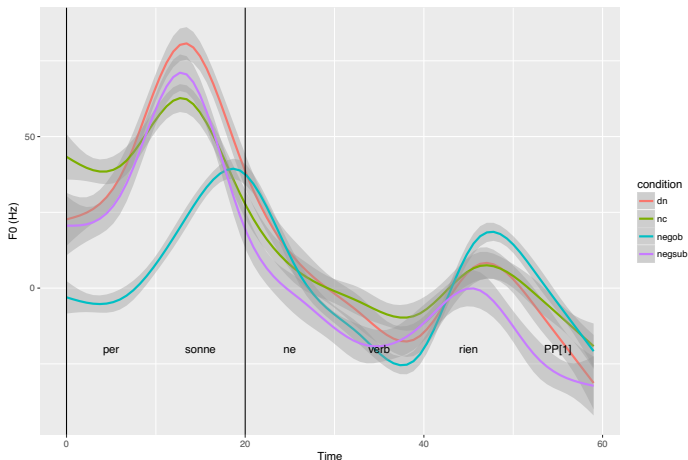- Removed 1,136/33,790 (3.4%) data points
  $\geq 3\sigma$ from μ

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Aggregated Pitch Contours

- Differences seen on subject and object between conditions (n=20)

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Group 1: Subject NCI

- High pitch accent on subject NCI in DN, no difference on object NCI (n=4)

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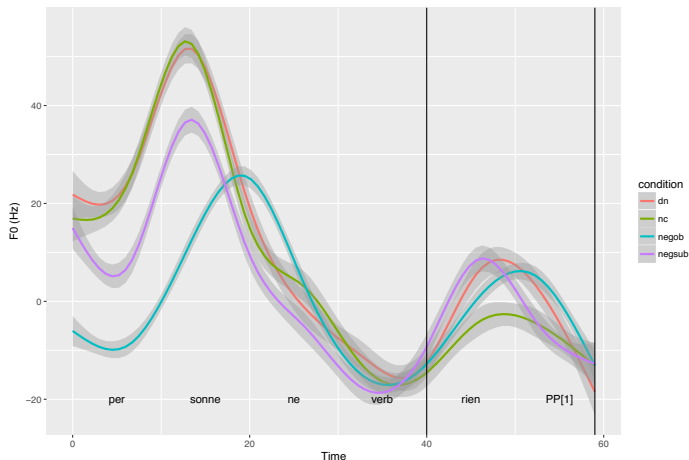
Group2: Object NCI

- High pitch accent on object NCI in DN, no difference on subject NCI (n=14)

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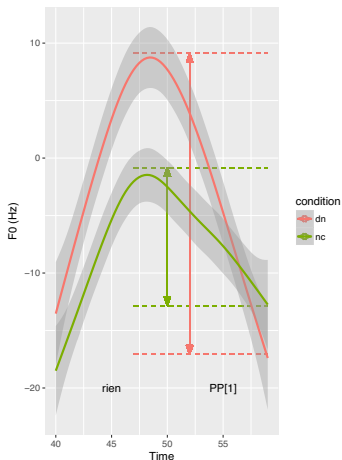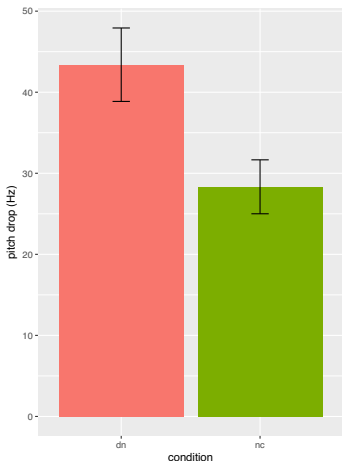Experiment
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A Closer Look: Group 2
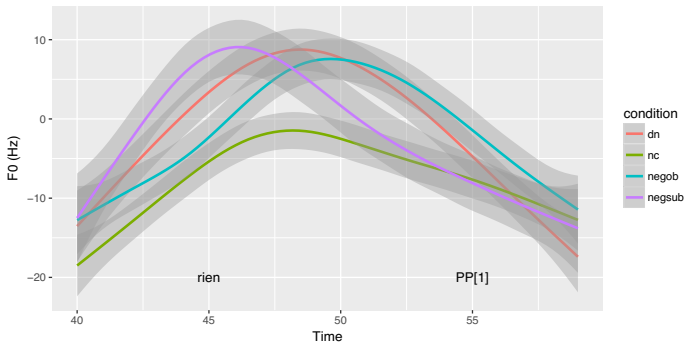
- Group 2 only (n=14)
- Three other conditions (including non-NCI object) appear very similar, while NC is much flatter

How
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Double
Negative
Sequences?

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Déprez
Jeremy
Yeaton

Background

Experiment 1:
Picture Choice
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Discussion

Experiment
2a:Context
Influence
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Experiment
2b: Prosody
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A Closer Look: *rien* peak
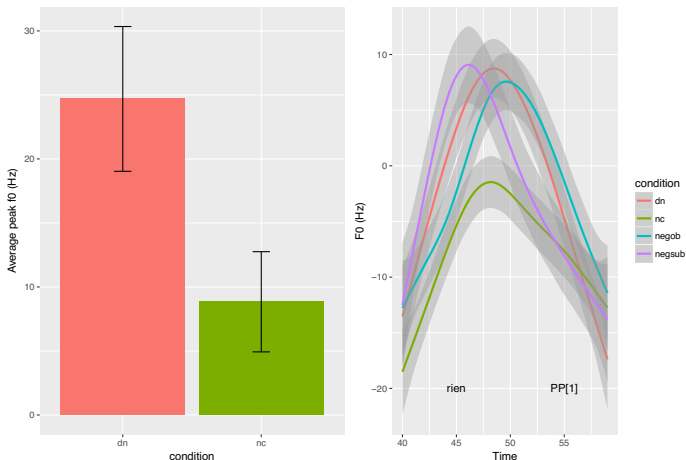
- Group 2 only (n=14)
- Peak on NC much lower than on DN

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A Closer Look: *rien* drop

- Group 2 only (n=14)
- NC has much lower slope into the following syllable

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NC Flattening

Linear Model:
F0~ timeseries + condition + time × condition

1. Interaction effect of *timeseries × condition*:
   NC ($t = -4.558, p = 5.25e - 06$)***
   NegSub ($t = 4.011, p = 6.11e - 05$)***
   NegOb ($t = 2.549, p = 0.0108$)*

2. Main effect of *condition*:
   NC ($t = -5.077, p = 3.93e - 07$)***
   NegSub ($t = -4.771, p = 1.87e - 06$)***
   NegOb ($t = -2.006, p = 0.0449$)*

3. Significant effect of *timeseries* across conditions

LM LMEM ANOVA

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Back to the research questions

1. Is prosody used in disambiguating French transitive sentences with two NCIs?
   - Yes, with significant differences shown between DN and NC conditions in both f0 and duration.
2. What are the prosodic indicators employed by speakers to mark these differences?
   - NC seems to be marked by a flattening of pitch.

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Discussion: f0

The f0 distinctions we see on the second NCI are realizations of phrasing and tone:

NC

- Focus on *personne*
- *rien* is phrased as part of VP
  L*   H-   L*   H-/L-   L%
  (([$_{DP}$**Personne**]$_{AP}$)([$_{VP}$ne V **rien**]$_{AP}$)...([$_{PP}$...PP...]$_{AP}$)$_{IP}$)

DN

- Focus on *personne*
- VP is "dephrased" *(Féry 2010)*
- Focus on *rien*, which forms its own phrase
  L*   H-   L*   LH-   L%
  (([$_{DP}$**Personne**]$_{AP}$) ne V ([$_{DP}$**rien**]$_{AP}$)...([$_{PP}$...PP...]$_{AP}$)$_{IP}$)

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Conclusions

- The availability of both readings is inconsistent with a Macro-Parametric approach

- Our results are consistent with a Resumptive Quantification and Micro-Parametric approach

- The acoustic cues that we see in French to mark phrasing might be clues to Syntax:
  - **NC:** NCI_2 is phrased within the VP & has H-
    $[_{TP}$Personne [ne dit $[_{vP}[_{VP}$~~dit~~ rien]]]]
    NCI_2 remains inside VP, so its NEG *feature is not interpretable since it is not at an edge*
  - **DN:** NCI_2 forms its own prosodic phrase with LH-
    $[_{TP}$Personne [ne dit $[_{vP}$ rien $[_{VP}$ ~~rien~~]]]]
    NCI_2 is at vP edge where its NEG *feature is interpretable*

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Outstanding Questions and Next Steps

- Are the prosodic differences actually perceptible to speakers? (Perception experiment ongoing.)

- Might speakers emphasize these features more in a situation with less clear context?

- Is all NC Resumptive Quantification? Presumably not:
  - Catalan and Spanish have a clear preference for NC (Déprez et al 2015)
  - Basque has no DN under essentially the same experimental conditions (Etxeberria et al 2018)

- How can we investigate the processing cost of these different readings? Does one have a higher cost?

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Thank you for your attention!

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R Output: Linear Model

```
Call:
lm(formula = demeaned_f0 ~ series * condition + series + condition,
    data = over46)

Residuals:
    Min      1Q  Median      3Q     Max
-87.291 -12.271   0.894  11.842  97.834

Coefficients:
                        Estimate Std. Error t value Pr(>|t|)
(Intercept)             128.7891     7.0734  18.207  < 2e-16 ***
series                   -2.4613     0.1332 -18.483  < 2e-16 ***
conditionnc             -50.4014     9.9274  -5.077 3.93e-07 ***
conditionnegob          -19.6224     9.7837  -2.006   0.0449 *
conditionnegsub         -47.1537     9.8829  -4.771 1.87e-06 ***
series:conditionnc        0.8520     0.1869   4.558 5.25e-06 ***
series:conditionnegob     0.4695     0.1842   2.549   0.0108 *
series:conditionnegsub    0.7461     0.1860   4.011 6.11e-05 ***
---
Signif. codes:  0 *** 0.001 ** 0.01 * 0.05 . 0.1   1

Residual standard error: 20.76 on 7267 degrees of freedom
Multiple R-squared:  0.1558,  Adjusted R-squared:  0.155
F-statistic: 191.7 on 7 and 7267 DF,  p-value: < 2.2e-16
```

Back to results

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R Output: LMEM

```
Linear mixed model fit by REML ['lmerMod']
Formula: demeaned_f0 ~ series * condition + condition + series + (1 +      condition | subj)
   Data: over46

REML criterion at convergence: 63525.4

Scaled residuals:
    Min      1Q  Median      3Q     Max
-4.7017 -0.5404 -0.0309  0.4849  5.4231

Random effects:
 Groups   Name           Variance Std.Dev. Corr
 subj     (Intercept)     60.61   7.785
          conditionnc     59.59   7.719   -0.15
          conditionnegob  83.66   9.147   -0.38 0.59
          conditionnegsub 49.58   7.041   -0.31 0.18 0.54
 Residual                353.04  18.789
Number of obs: 7275, groups:  subj, 20

Fixed effects:
                       Estimate Std. Error t value
(Intercept)            130.2274     6.6366  19.622
series                  -2.4844     0.1206 -20.606
conditionnc            -52.0684     9.1518  -5.689
conditionnegob         -21.5778     9.0914  -2.373
conditionnegsub        -46.9842     9.0858  -5.171
series:conditionnc       0.8770     0.1692   5.182
series:conditionnegob    0.4982     0.1668   2.987
series:conditionnegsub   0.7371     0.1684   4.376

Correlation of Fixed Effects:
            (Intr) series cndtnnc cndtnngb cndtnngs srs:cndtnnc srs:cndtnngb
series      -0.963
```

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R Output: ANOVA

```
Data: over46
Models:
full.lm: demeaned_f0 ~ series * condition + condition + series
ser_cond_slope.lmer: demeaned_f0 ~ series * condition + condition + series + (1 +
ser_cond_slope.lmer:         condition | subj)
                    Df    AIC   BIC logLik deviance  Chisq Chi Df Pr(>Chisq)
full.lm              9 64787 64849 -32385    64769
ser_cond_slope.lmer 19 63565 63696 -31763    63527 1242.2     10  < 2.2e-16 ***
---
Signif. codes:  0 *** 0.001 ** 0.01 * 0.05 . 0.1   1
```

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