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Some puzzles in agreement and concord

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Outline

- Agreement and concord
- Phi-feature geometry
- Phi-features in the nominal domain
- Experimental work on agreement

Agreement and concord

Agreement in a broad sense

- Any instance in which the form of one morphosyntactic element covaries in phi-features with the form of another morphosyntactic element elsewhere in the structure

Agreement in a broad sense

- Any instance in which the form of one morphosyntactic element covaries in phi-features with the form of another morphosyntactic element elsewhere in the structure
- Phi-features:
  - person
  - number
  - gender/noun-class

Agreement in a broad sense

- Any instance in which the form of one morphosyntactic element covaries in phi-features with the form of another morphosyntactic element elsewhere in the structure
- Not all morphosyntactic elements are created equal
  - Certain nodes come into the derivation with a “need” for a phi-feature which is met when the node acquires that phi-feature values from a nominal

Agreement in a broad sense

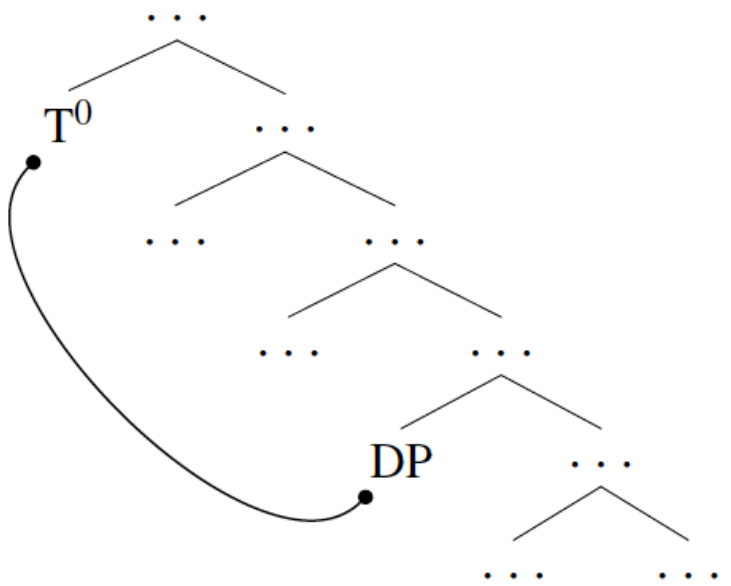
- Not all morphosyntactic elements are created equal
  - Some morphosyntactic elements (nominals) carry a particular feature (person, number, gender).
    These constituents are called agreement goals or triggers
  - Other morphosyntactic elements need to receive a particular feature from the carrier of that feature in the structure. These constituents “in need” are called agreement probes or targets

Two main means of modeling agreement

- Agreement
- Concord

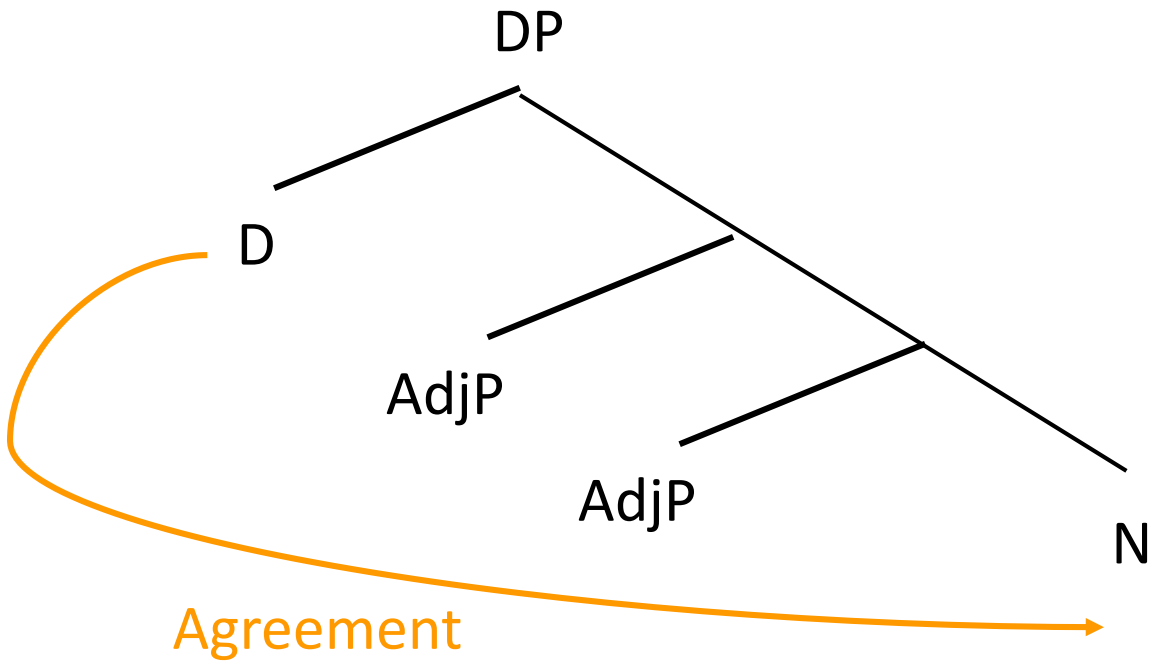
Agreement in the narrow sense: 1

- Relationship between the probe and the goal: c-command, local



Agreement in the narrow sense: 2

- Typically modeled as relationship between functional material (C, T, v, D, a, n) as probe and nominal as goal

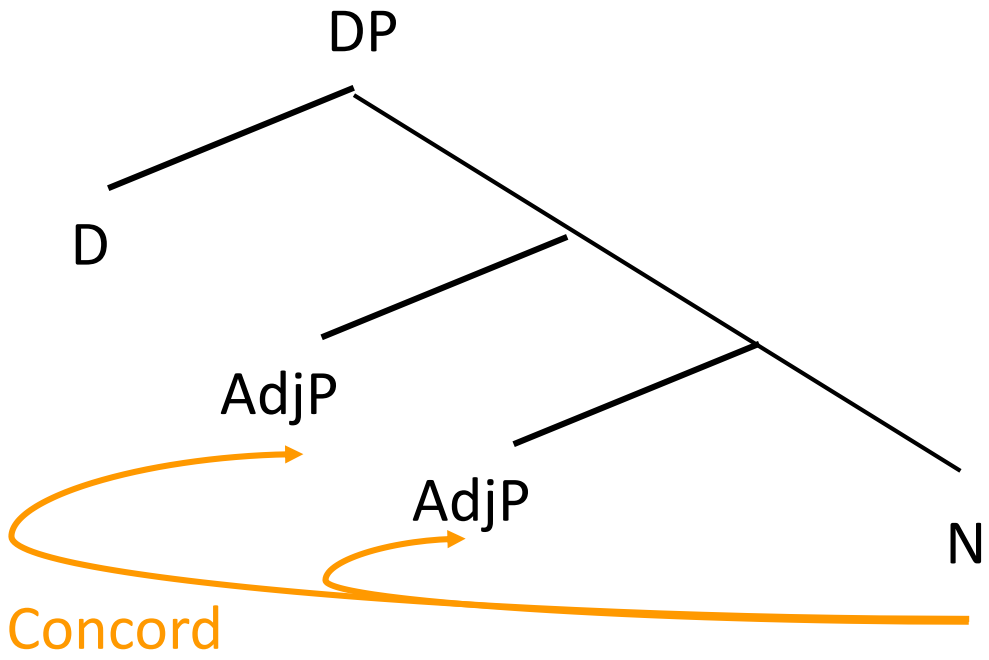


Concord

Copying of features from a lexical element to other lexical elements;

not constrained by c-command, but

constrained by locality



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Phi-feature geometry

Structure of phi-features

- phi-features are not always equipollent, e.g,

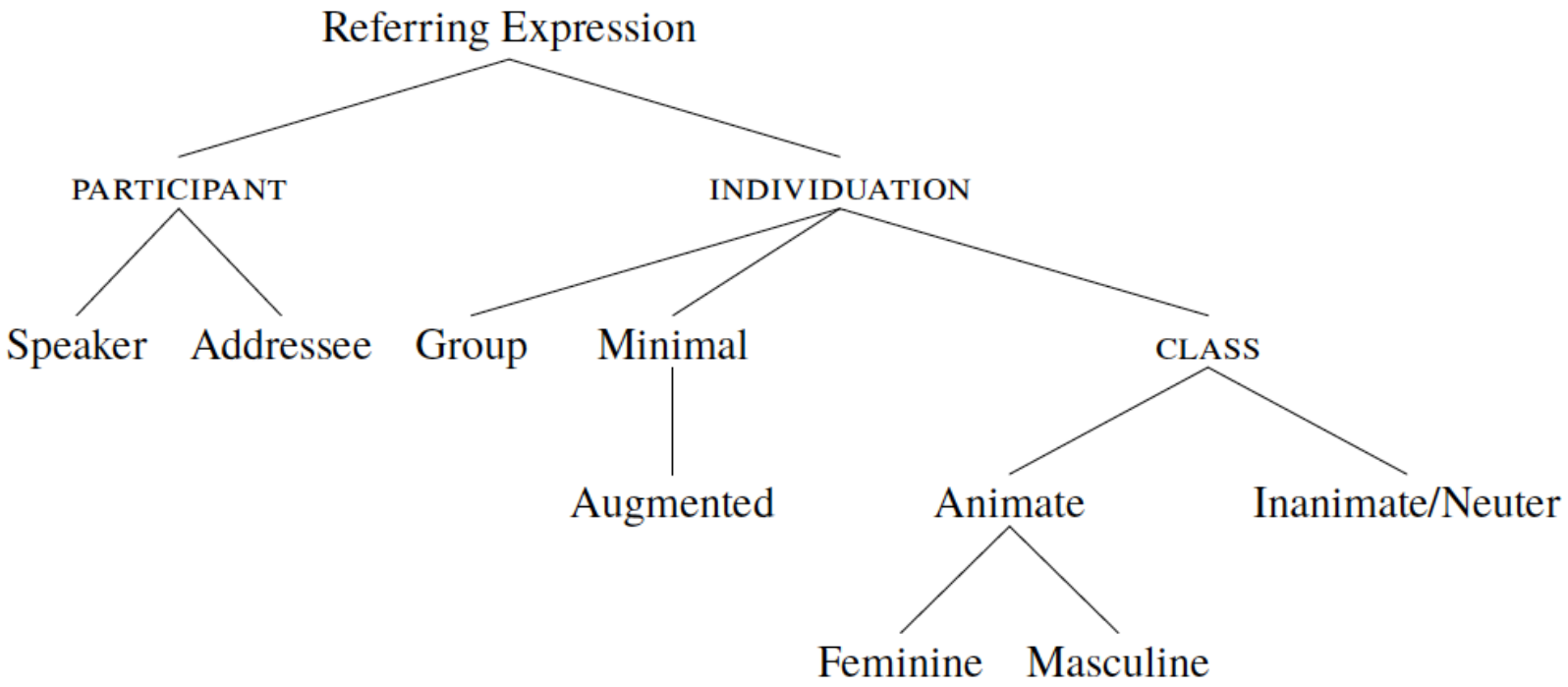
  <plural> is defined, and <singular> is “absence of number”

- certain privative features cannot be present unless another designated feature is present

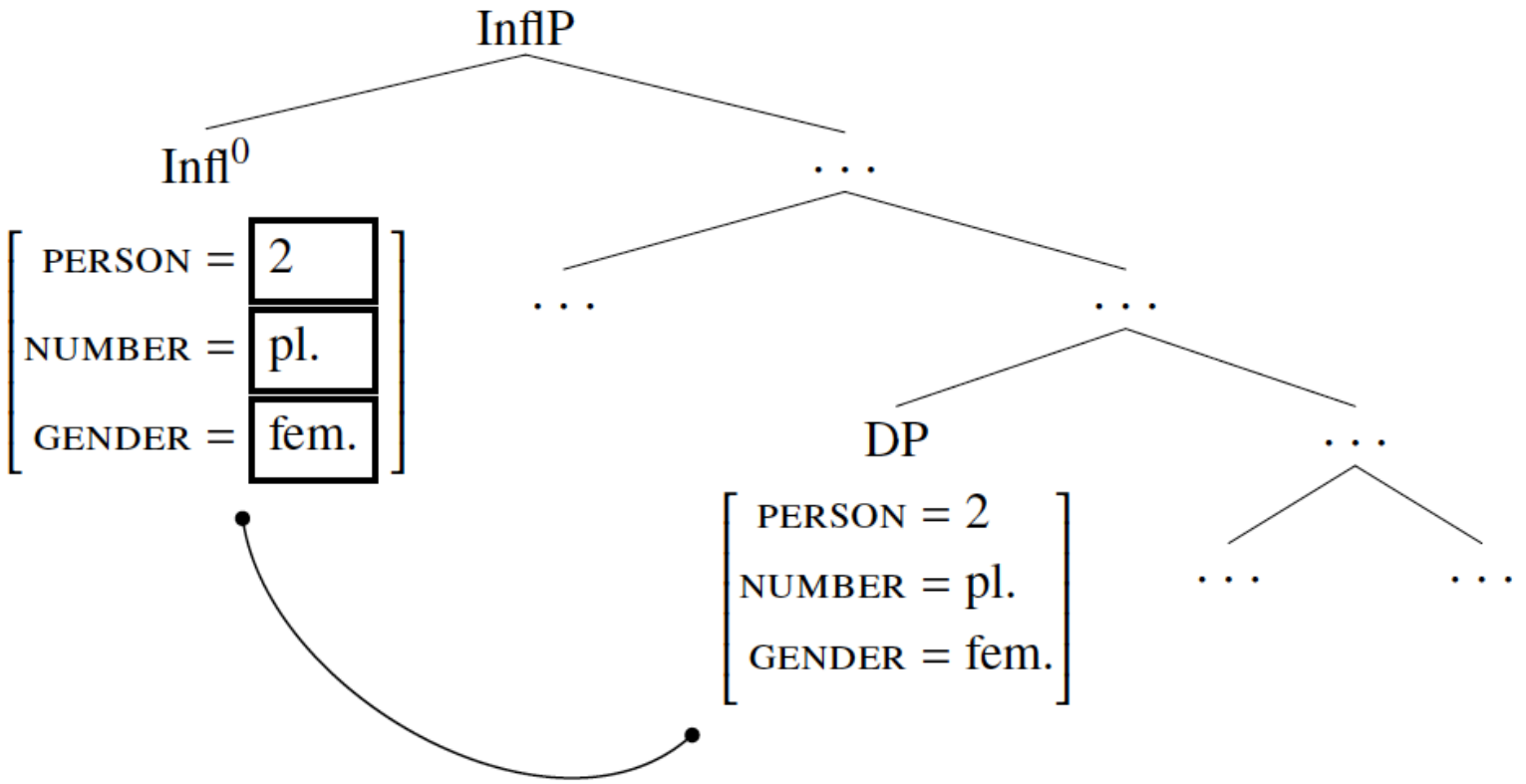
  no language has a <dual> unless it also has <singular> and <plural>

- taken together, these observations suggest a tree structure for phi-features and their interdependencies

Phi-feature geometry (Harley & Ritter 2002)



Phi-feature valuation



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Phi-features in the nominal domain

Features in the nominal domain

- various modifiers of nouns (e.g., determiners, demonstratives, adjectives) inflect for the same features of the head noun
- typical features encoded in such inflection:
  - Gender
  - Number
  - Definiteness
  - Case
  - ~~Person~~

} phi-features

Nominal feature matching

- various modifiers of nouns (e.g., determiners, demonstratives, adjectives) inflect for the same features of the head noun
- Typical features encoded in such inflection:

  - Gender
  - Number

  - Definiteness
  - Case

Concord systems by feature

Norris (2019), 103-language sample

Feature	Yes	%	No	%
Gender	58	56.3%	45	43.7%
Number	91	88.3%	12	11.7%
Case	30	29.1%	73	70.9%
Definiteness	9	8.7%	94	91.3%

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Experimental work on agreement: General considerations

Main research questions

1. For each phi-feature, are all the values in that feature category fully specified?
2. What is the hierarchical relationship and representation of [NUMBER] and [GENDER]?

Main research questions: Feature specification

For each phi-feature, are all the values in that feature category fully specified?

Consider person:

[+participant], [-participant]

[+participant], absence of person

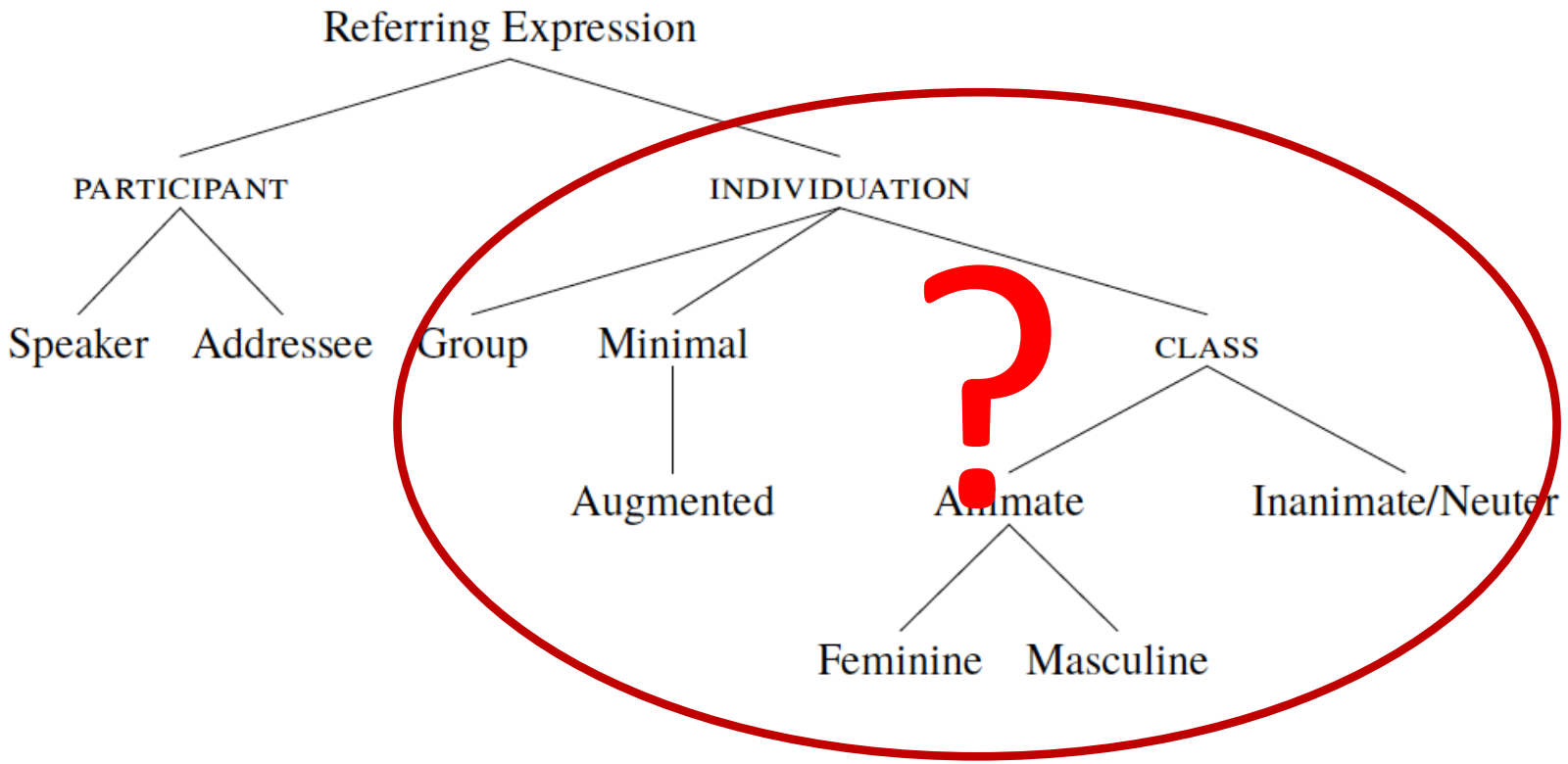
Consider gender:

[+masculine], [+feminine], etc.

[+feminine], [-feminine], etc.

[+feminine], absence of gender

Main research questions: hierarchical relationship and representation of [NUMBER] and [GENDER]



Main research questions in experiments

1. For each phi-feature, are all the values in that feature category fully specified? Russian eye-tracking
2. What is the hierarchical relationship and representation of [NUMBER] and [GENDER]? Spanish agreement attraction

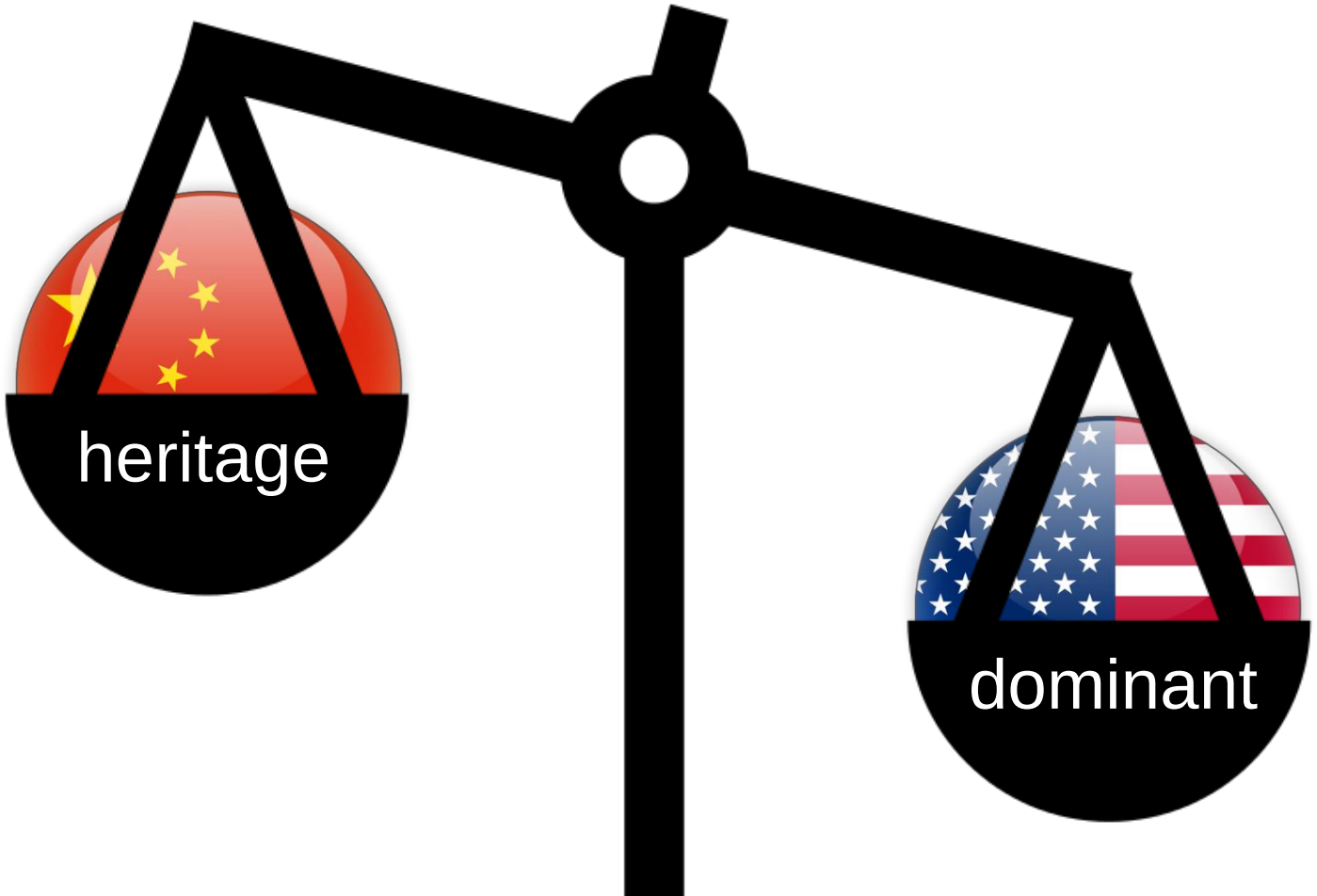
Relevant subject populations

- Baseline controls
- Heritage speakers

An aside on heritage speakers

heritage speaker

unbalanced bilingual



Where's the gain?

- Heritage speakers are ubiquitous and constitute a readily available test population
- Heritage languages often amplify tendencies that are incipient in the baseline
- By examining finer aspects of heritage language grammars we can put our existing theories to better test and can use the new empirical results to feed back into linguistic theory

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- By examining finer aspects of heritage language grammars we can put our existing theories to better test and can use the new empirical results to feed back into linguistic theory
- Win-win scenario: we learn what makes heritage languages work, and our accounts of linguistic phenomena become more sophisticated

Heritage language vs baseline

- Heritage languages often amplify tendencies that are incipient in the baseline
- However we should not expect isomorphism between the baseline and heritage grammars; the list of grammatical divergences between the two groups keeps growing (see Scontras et al. 2018; Polinsky & Scontras 2019; Polinsky 2018)

Heritage language vs baseline

- **Matching grammar** where a heritage language amplifies tendencies in the baseline

- **Divergent grammar** where the two languages have different underlying representations

Heritage language vs baseline

- **Matching grammar** where a heritage language amplifies tendencies in the baseline

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Today's talk: examples of both types of relationship with respect to new puzzles in gender marking

Main research questions in experiments

1. For each phi-feature, are all the values in that feature category fully specified? Russian eye-tracking
2. What is the hierarchical relationship and representation of [NUMBER] and [GENDER]? Spanish agreement attraction
3. Are baseline controls and heritage speakers alike in their representation of phi-features?

   Matching grammar, amplified: Russian gender

   Divergent grammar: Spanish gender and number

Experimental work on agreement: Feature specification

Grammatical agreement in Russian (NP)

- Gender and Number agreement in NP:

serebristyj	*samolet*	'[a/the] silver$_{\text{Masc-Sg-Nom}}$ plane$_{\text{Masc-Sg-Nom}}$'
serebristaya	*ptica*	'[a/the] silver$_{\text{Fem-Sg-Nom}}$ bird$_{\text{Fem-Sg-Nom}}$'
serebristoe	*oblako*	'[a/the] silver$_{\text{Neut-Sg-Nom}}$ cloud$_{\text{Neut-Sg-Nom}}$'
serebristye	*oblaka*	'[a/the] silver$_{\text{Pl-Nom}}$ clouds$_{\text{Pl-Nom}}$'

Grammatical agreement in Russian (S-V)

- Discourse-opening sentences with unergative verbs are [Locative]-Verb-Subject (Loc-V-S)

- Gender and Number between Subject and Verb (V-S):
  - Only in the Past Tense:
    - *letel* *serebristyj* *samolet* ‘flew$_{\text{Masc-Sg}}$ silver$_{\text{Masc-Sg}}$ plane$_{\text{Masc-Sg}}$’
    - *letela* *serebristaya* *ptica* ‘flew$_{\text{Femc-Sg}}$ silver$_{\text{Fem-Sg}}$ bird$_{\text{Fem-Sg}}$’
    - *leteli* *serebristoe* *oblaka* ‘flew$_{\text{Pl}}$ silver$_{\text{Pl}}$ clouds$_{\text{Pl}}$’

- The study crucially depended on the fact that the agreement targets (Adj and V) precede the agreement trigger (N)

Specific goals

- Is the grammatical agreement information (Gender and Number) predictive for heritage Russian bilingual speakers?
  - --Do they identify the referent Noun before they hear it? Or, do they use the grammatical agreement only during the integration stage (after they have heard the referent Noun)?
  - --Time course of the grammatical agreement information
- How are Number vs. Gender represented?
  - --Is Number 'stronger' (interpretable?) than Gender?
- Hierarchy of values in Gender, Masc vs Fem:
  - --Default/markedness/universality/dominant language transfer?

Heritage speakers: Methodological challenges

- Reading is challenging or impossible
- Complex tasks are challenging
  --Cloze tasks
  --Grammaticality judgments

- Eye-tracking (e.g., the Visual World paradigm) is perfect
  --Grammatical gender effects have been studied in the VWP to investigate spoken word recognition
  --"*Click on [Det-NP]"* where the gender of the Det facilitated recognition of nouns of the same gender (Dahan et al., 2000; Lew-Williams & Fernald, 2007, 2010; Kroff et al., 2010)

Simple materials

- No structural ambiguities (no garden-path sentences)
- No complexity (simple Loc-V-S sentences)
- No morphological ambiguities/complexity
- [Relatively] simple lexical content

Participants

- Monolingual Controls:

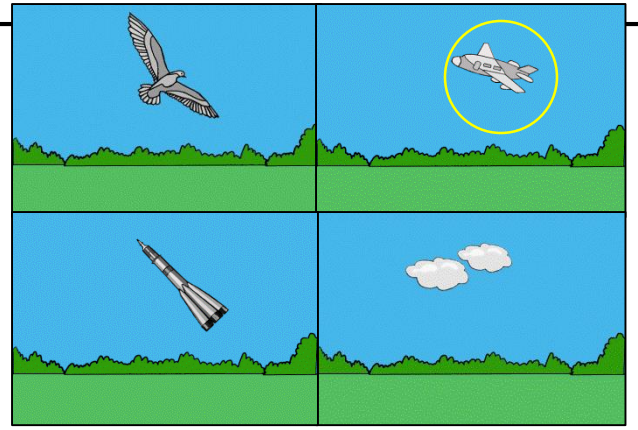
  N=25 (mean age: 20; all women; students at the Moscow State Pedagogical University)

- Bilingual Heritage Russian Speakers:

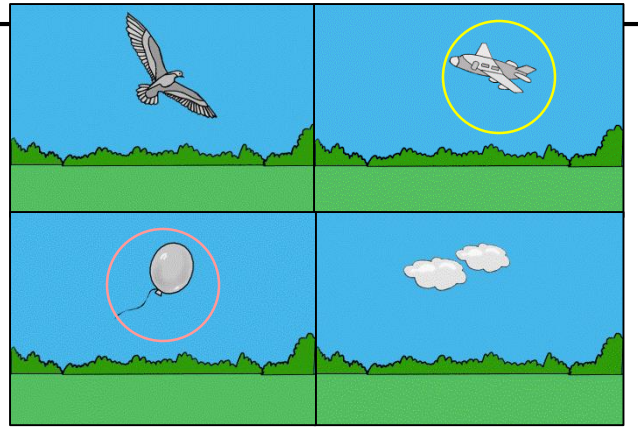
  N=40 (mean age: 19.4; 12 men; students at the CUNY College of Staten Island

Visual Context

Different Gender



Same Gender



'In the sky, flew$_{Masc}$ a silver$_{Masc}$ plane.'

TARGET: *plane*$_{Masc}$
2 Sg Fem Distractors: *bird* and *rocket*
1 Pl distractor: *clouds*

Target: *plane*$_{Masc}$
Gender Competitor: *balloon*$_{Masc}$
1 Fem and 1 Pl Distractors

'In the sky, flew$_{Pl}$ silver$_{Pl}$ clouds.'
TARGET: *clouds*
Distractors: everything else

Procedure and Measures

- Sentence-picture matching task: Listen to the sentence and click on the correct picture (Target)
- Pictures were animated
- Measures:
  - Accuracy
  - RT (clicking)
  - Eye movements (ISCAN ETL-500 remote eye-tracker)
- Duration: 10 min

Predictions

- Accuracy should be at ceiling for all groups

- RTs: Monolinguals should be faster than heritage speakers

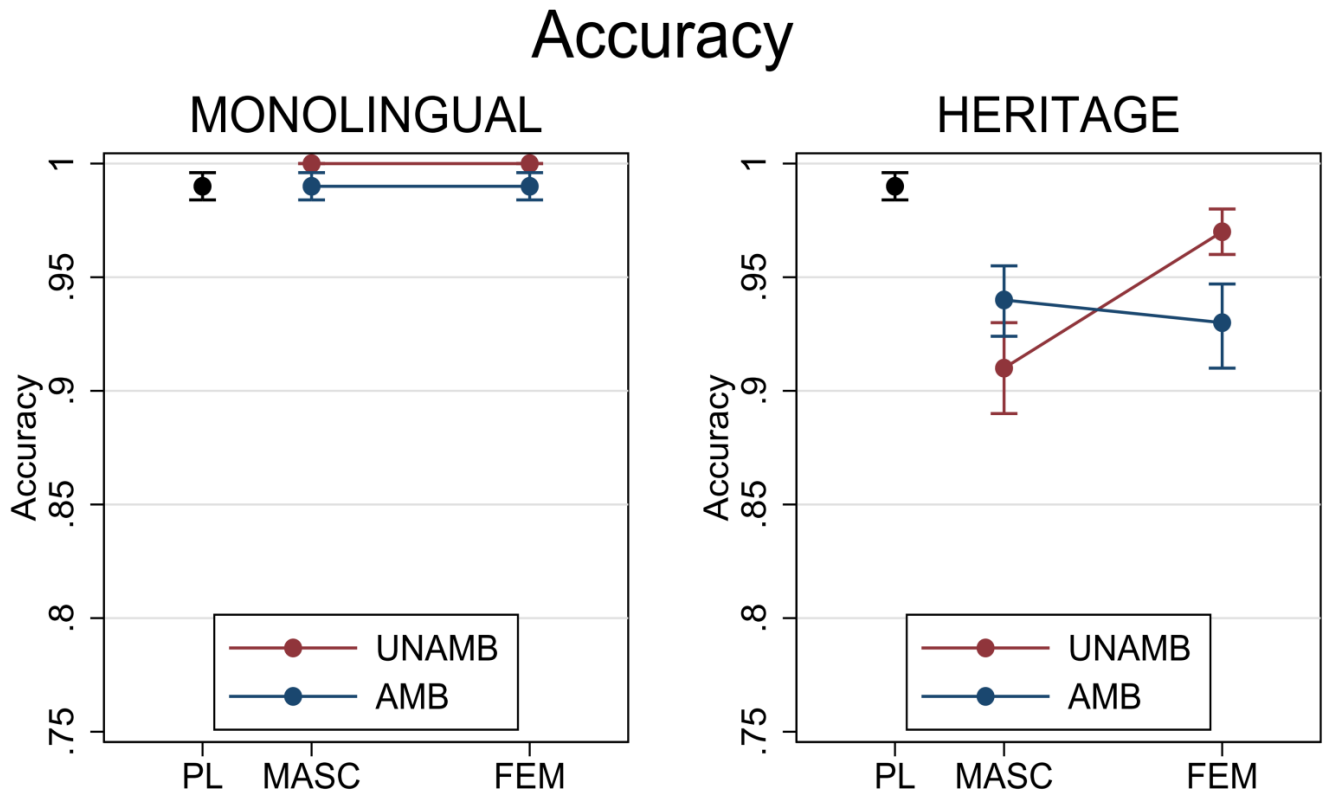
- Eye movements:

  --Identification of TARGET should be faster in the PL and DIFF-GENDER than in the SAME conditions (a divergence of looks to T vs. D/C) → during the Adj region;

  --Number should be more predictive than Gender;

  --Masc vs. Fem?

Results: Accuracy



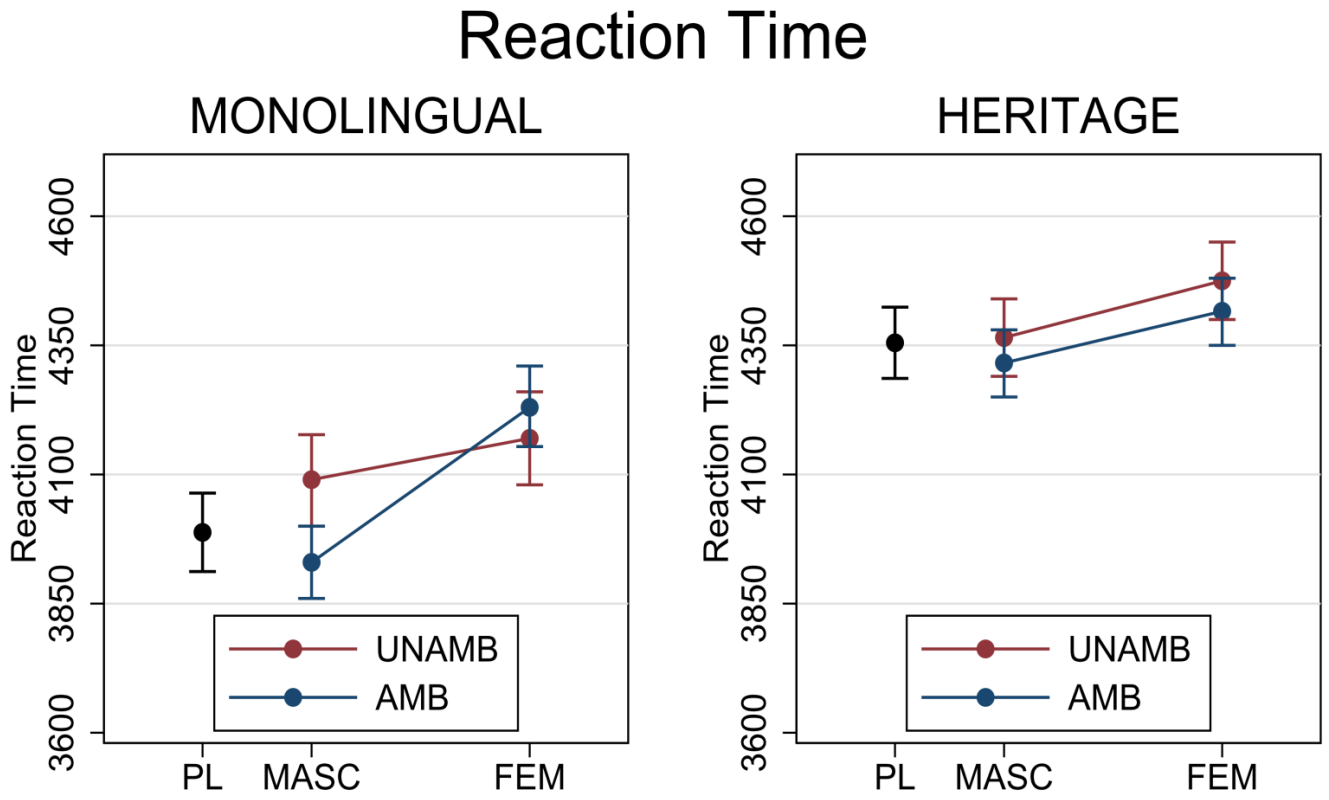
Sig. effect of Group:

HER are less accurate than MON.

MON: ceiling.

HER: Gender × Context interaction: Highest accuracy PL, then FEM-UNAMB

Results: RTs

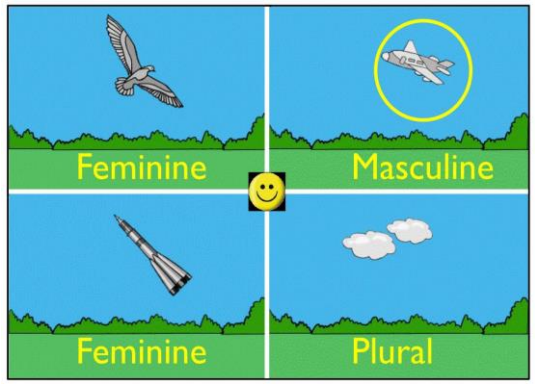


Sig. effect of Group:

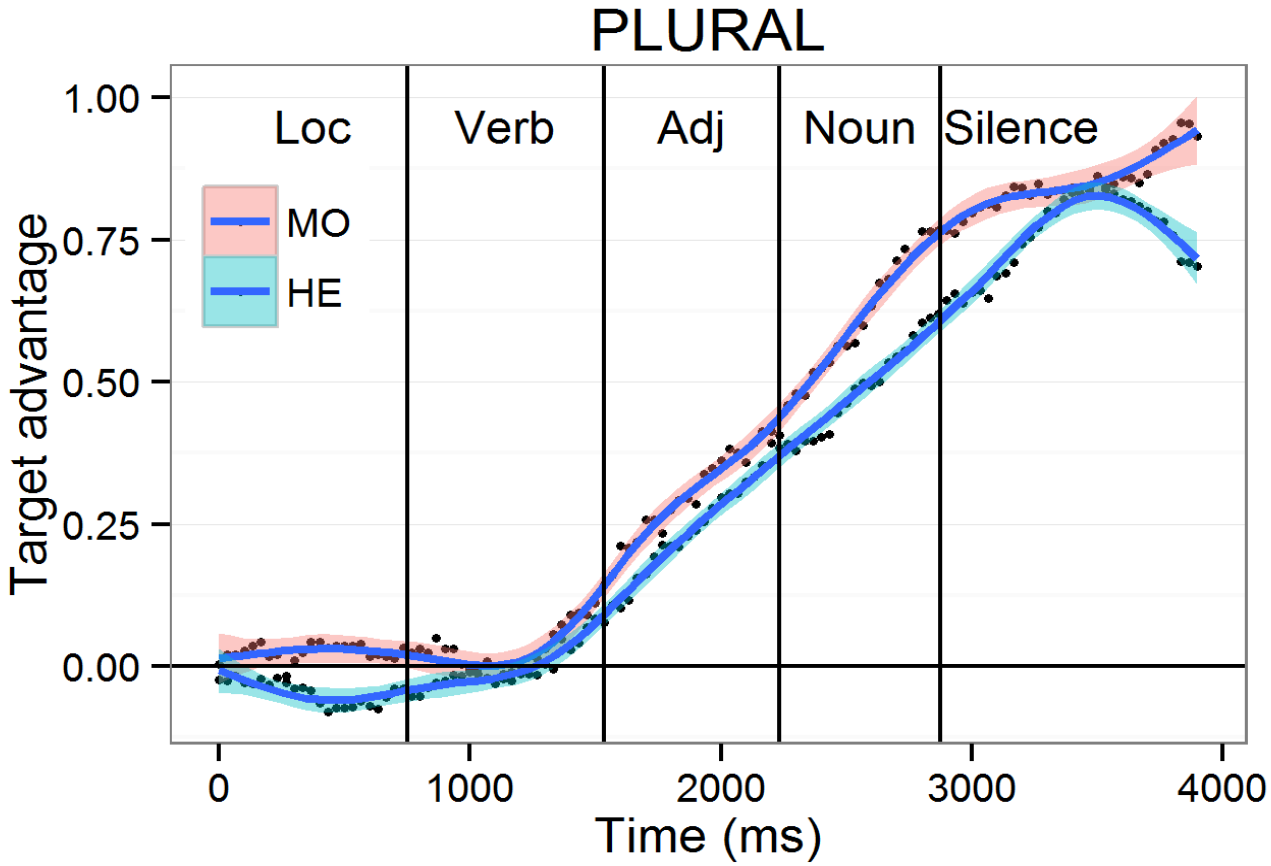
HER are slower than MON.

Sig. effect of Gender:

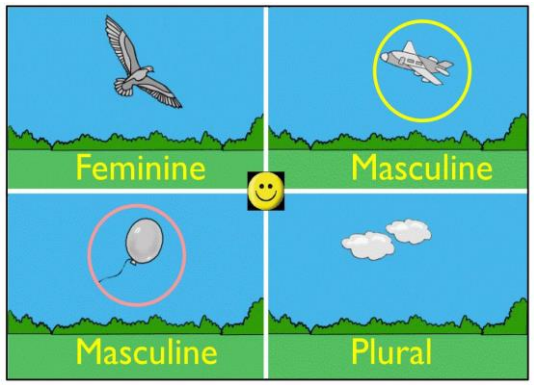
FEM is longer than MASC.



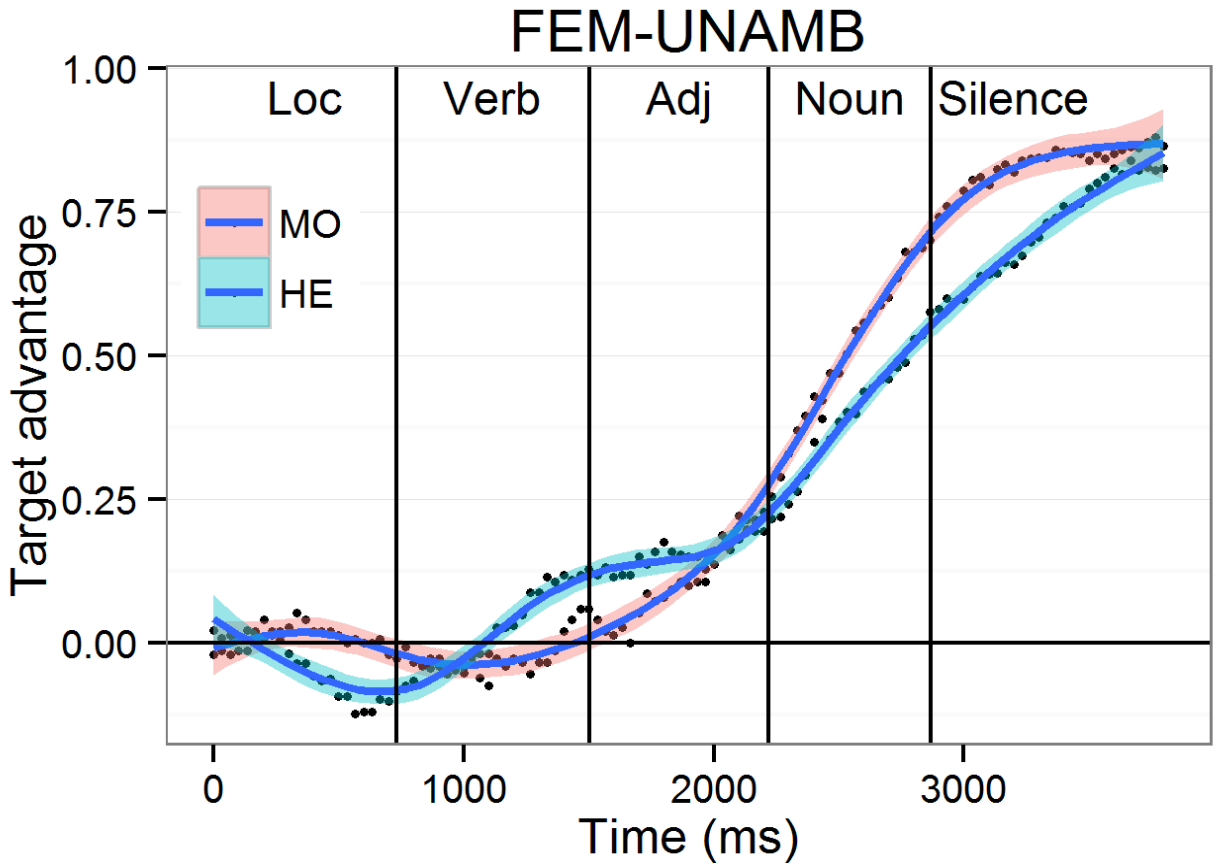
Eye movements: PLURAL

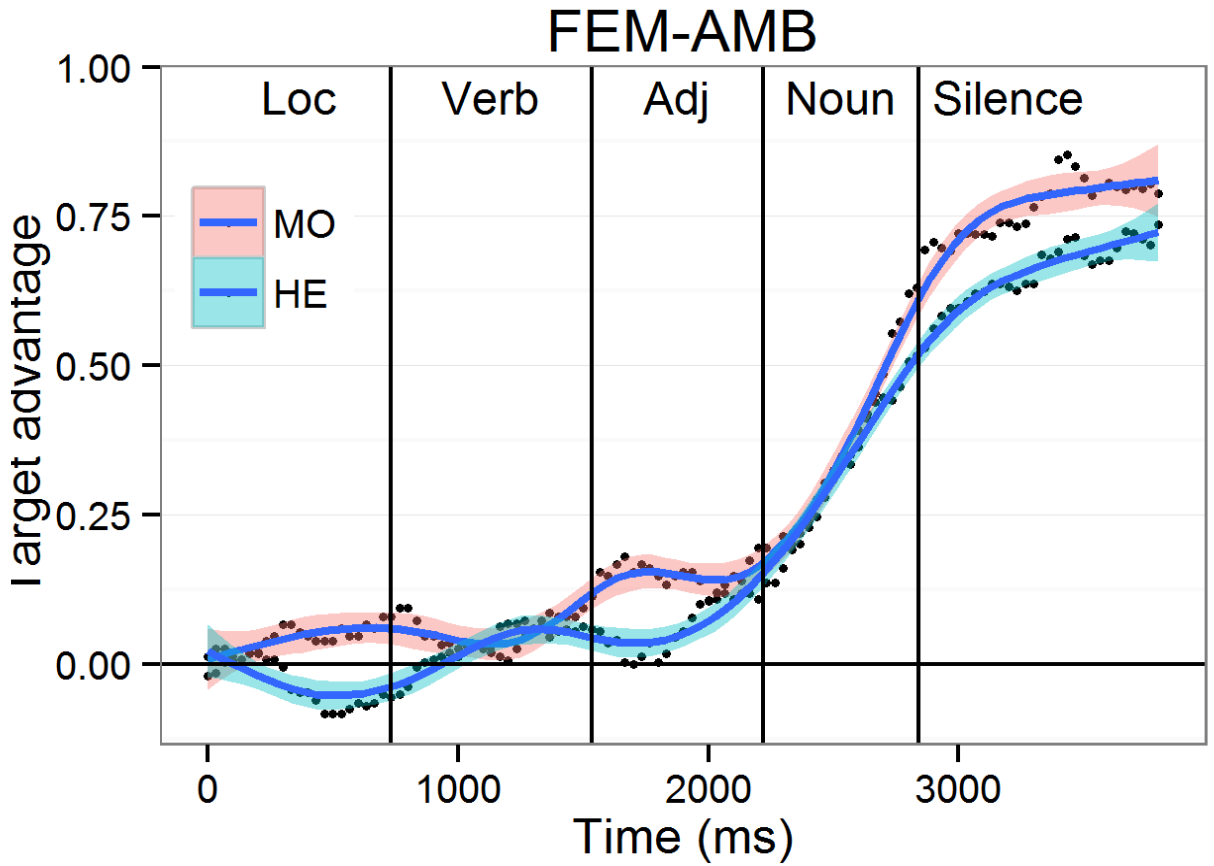


Po nebu leteli serebristye oblaka.

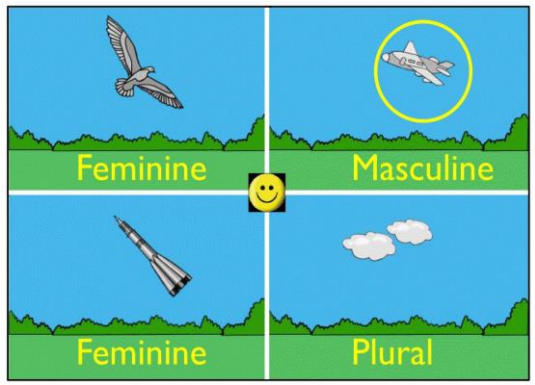


Eye movements: FEMININE

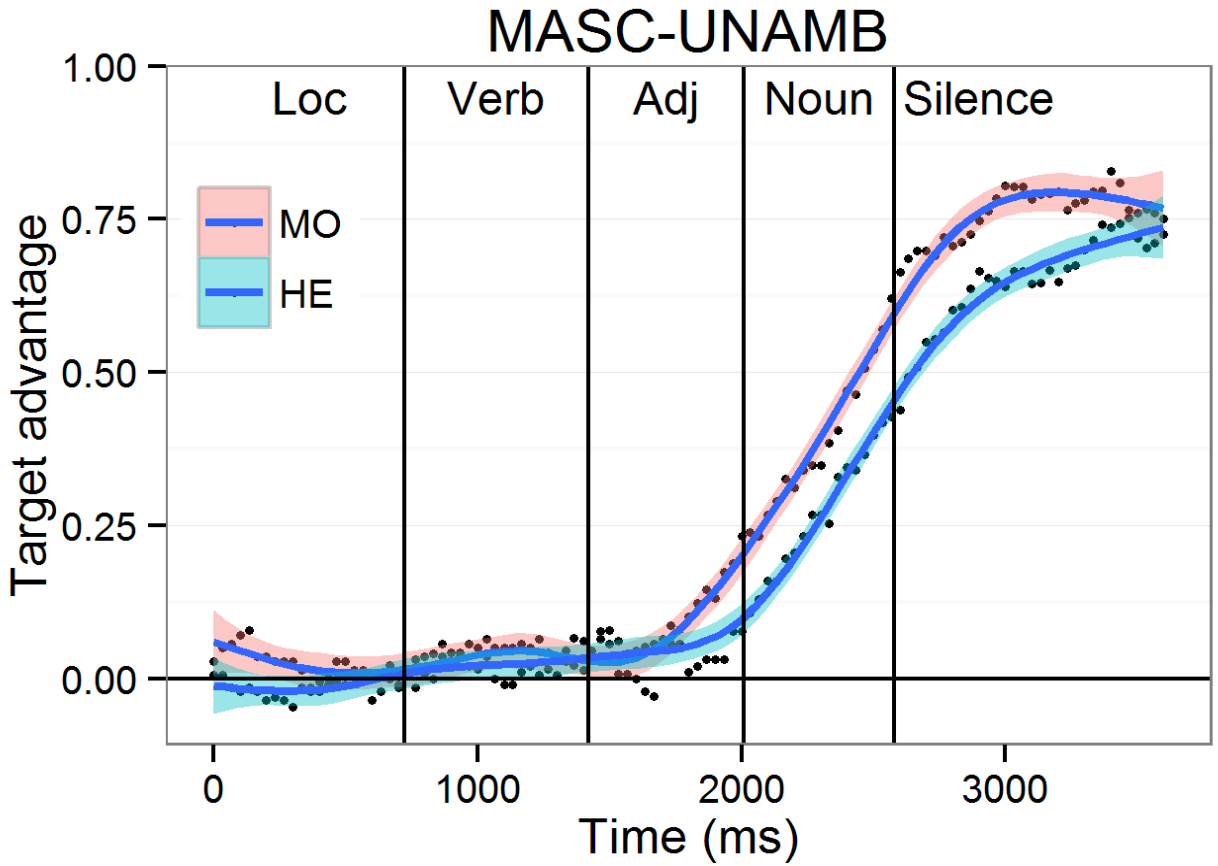


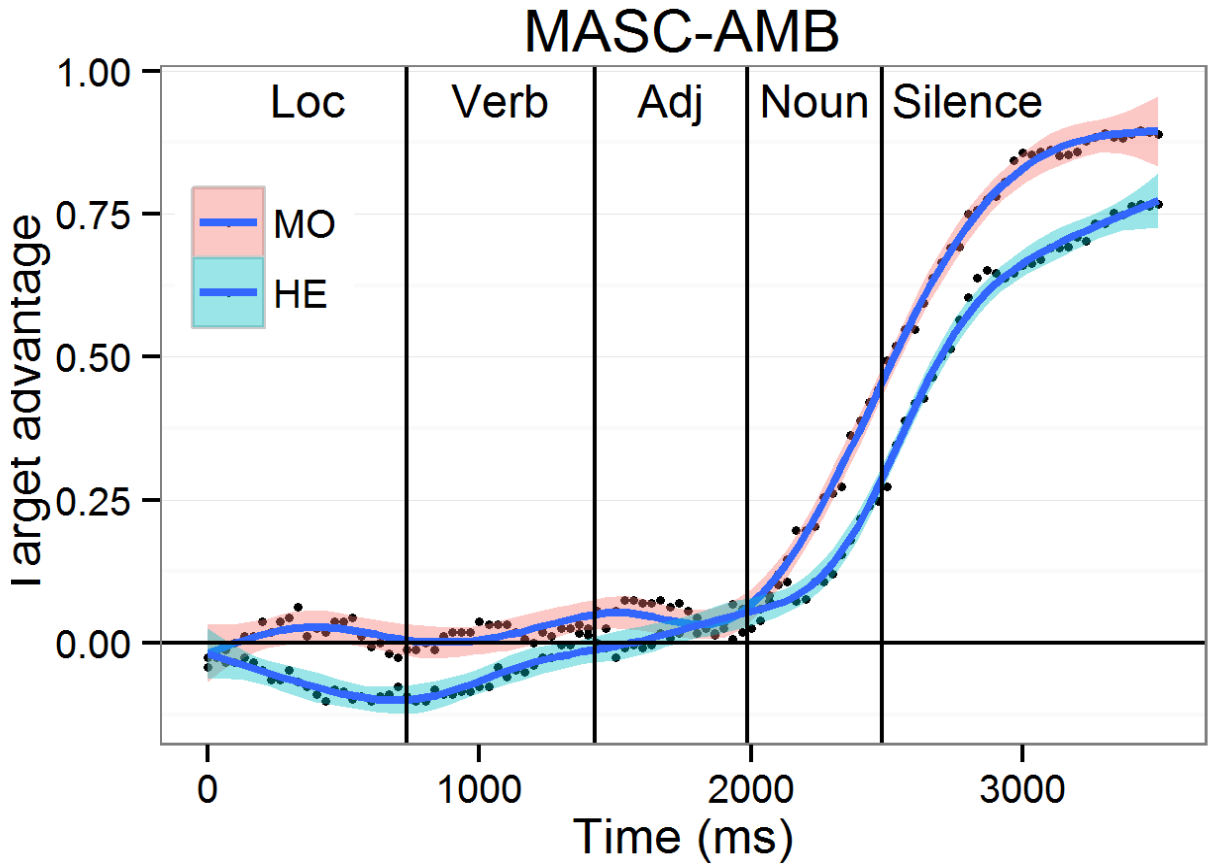


Po nebu letela serebristaya ptica.



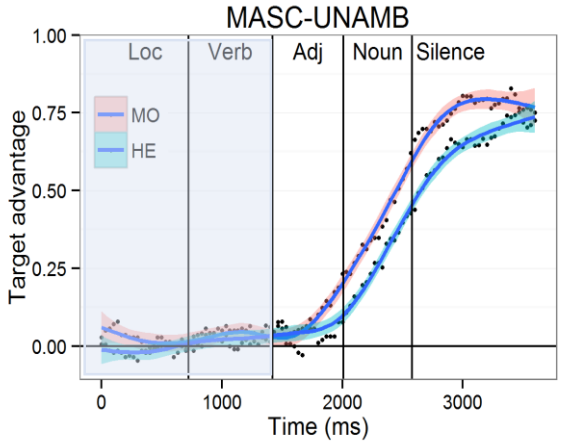
Eye movements: MASCULINE

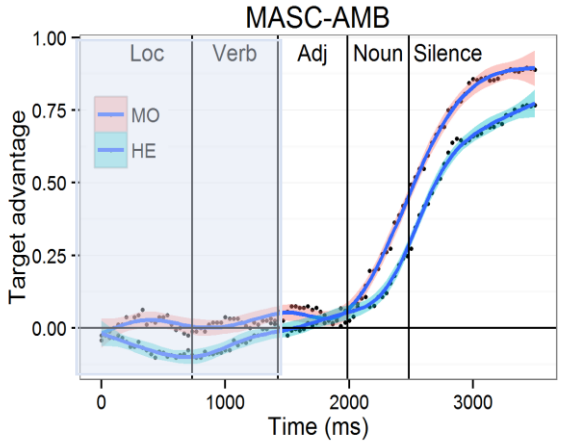


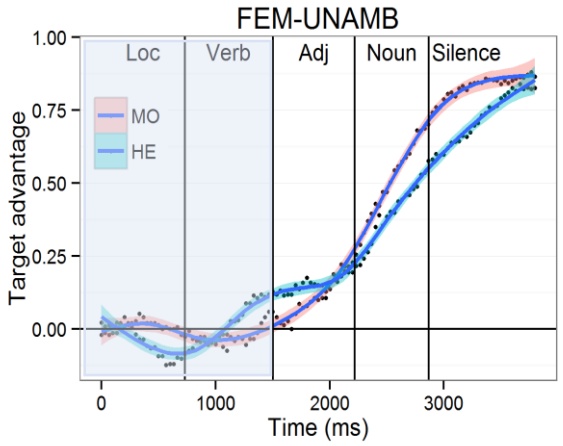


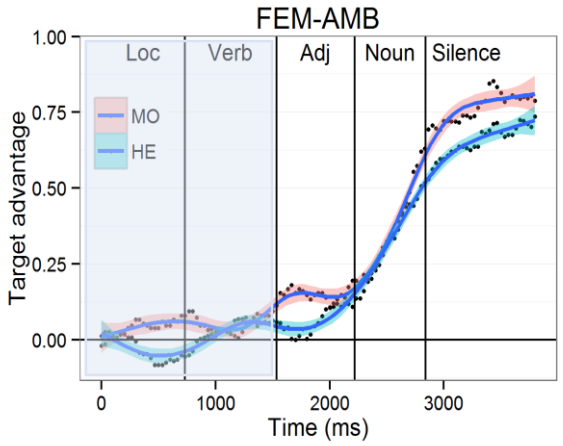
Po nebu letel serebristyi samolet.

Eye movements

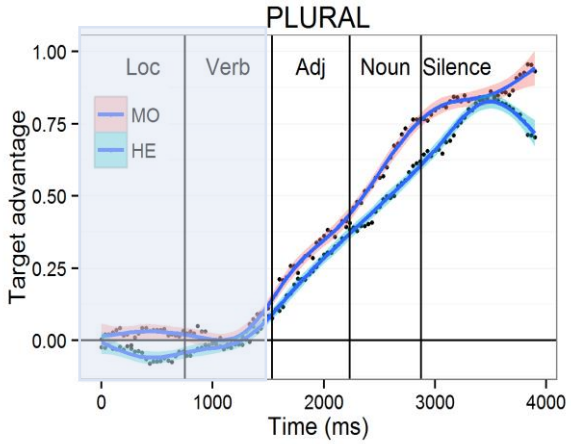








Significant effect of Group:
MON > HER



Noun: Sig. effect of Gender:
FEM > MASC
Silence: Gender effect is stronger for HER than MON

Conclusions

- Heritage speakers were less accurate and slower than monolinguals in online processing of the grammatical gender information (for both NUMBER and GENDER).
- Time course: NUMBER was predictive but GENDER was not.
- FEM was more salient than MASC, for both groups
- Heritage speakers amplified the tendency present in the baseline

Experimental work on agreement: Relationship between [number] and [gender]

Relationship between Number and Gender under agreement

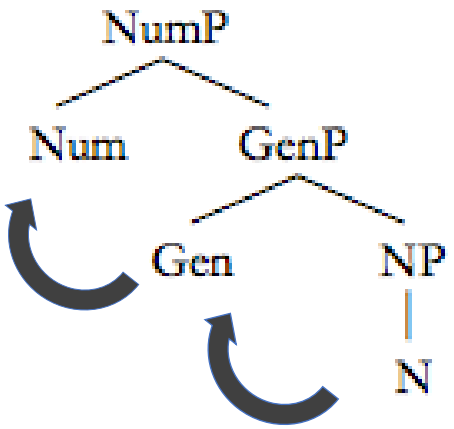
- Gender is bundled with Number
- Gender is projected and valued separately

Gender bundled with Number

- No separate GenP; gender morphology can be accounted for as a feature on Num (Ritter 1993; also Carstens 2000, 2003)
  - Empirical considerations (ambigenerics; gender on inanimates is uninterpretable)
  - Theoretical considerations: Elimination of a projection that lacks *consistent* semantics (Chomsky 1995)

Gender independent of Number

- Gender morphology on a nominal stem heads its own projection, with NumP dominating GenP (Picallo 1991; Carminati 2005; Antón-Méndez et al. 2002)

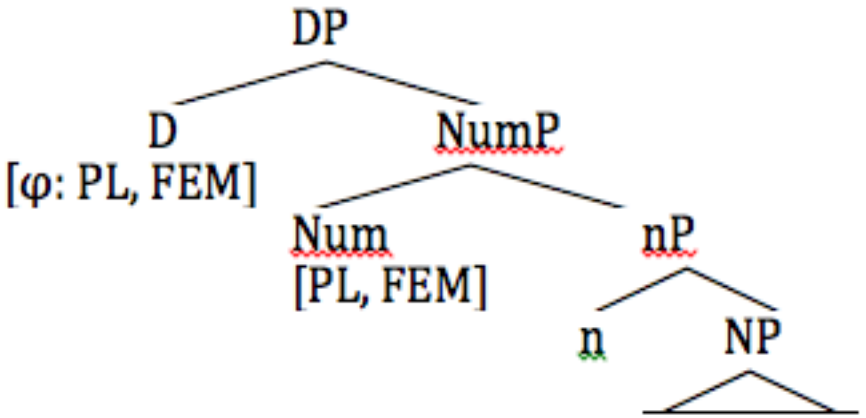


If N raises through Gen to Num the order Stem-Gen-Num is predicted, consistent with cross-linguistic facts

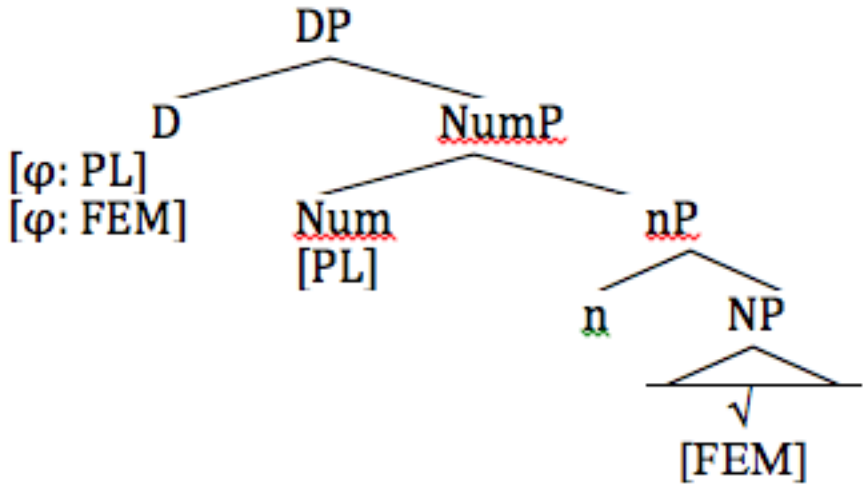
e.g., Spanish *libr*$_{N}$-*o*$_{Gen}$-*s*$_{Num}$

Number and Gender: Two options

bundled



independent



Evaluating the two options

- Spanish has both Number and Gender on DPs entering into agreement
  - Two numbers, singular and plural
  - Two genders, masculine and feminine

Spanish agreement

- Determiners, adjectives, and participles agree in number and gender with noun

el cuaderno cerrado	*los cuadernos cerrados*
la manzana roja	*las manzanas rojas*
el árbol alto	*los árboles altos*

- Gender and number agreement also maintained in anaphors

Los cuadernos, no los tengo

'the notebooks, I don't have them'

Spanish gender: Feature content

- Distribution:
  - masculine 53%,
  - feminine 47%
- Equally specified morphologically
  - Most common word marker associated with feminine: *-a*
  - Most common word marker associated with masculine: *-o*

Desiderata

- Create a potential conflict in phi-features (number vs gender) – i.e., agreement error

- Keep the goal and probe at a distance (in contrast to many existing studies where they are adjacent)

Desiderata and Spanish

- What we need:
  - Create a potential conflict in phi-features (number vs gender)
  - Keep the goal and probe at a distance

- What Spanish has to offer:

  Small clauses with agreeing adjectival predicate:

  … considerar DP *extremamente* Adj …

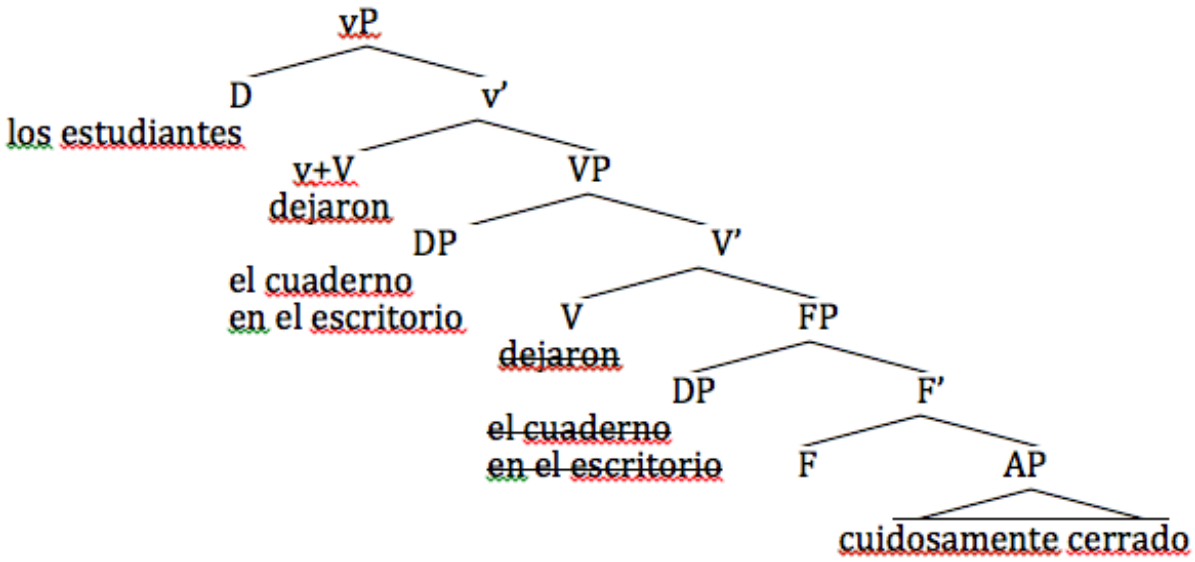
  (SUBJ) VERB [$_{DP}$ **DP1** [$_{PP}$P **DP2**]] ADVERB **ADJ...**

(Contreras 1987; 1995; Jiménez-Fernández & Spyropoulos 2013)

Small clause structure

Los estudiantes dejaron **el cuaderno** en **el escritorio** cuidosamente **cerrado**

"The students left **the notebook** on **the desk** carefully **closed**."

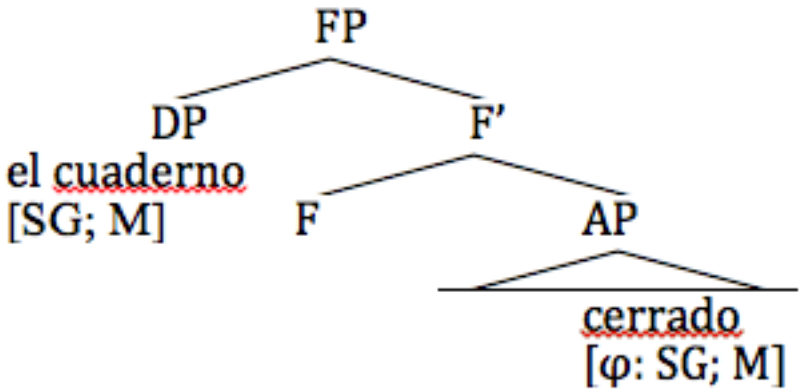


(**Spanish:** Contreras 1987; 1995; Jiménez-Fernández & Spyropoulos 2013;
beyond Spanish: Cardinaletti & Guasti 1995; Basilico 2003; Progovac 2006; Citko 2011, a.o.)

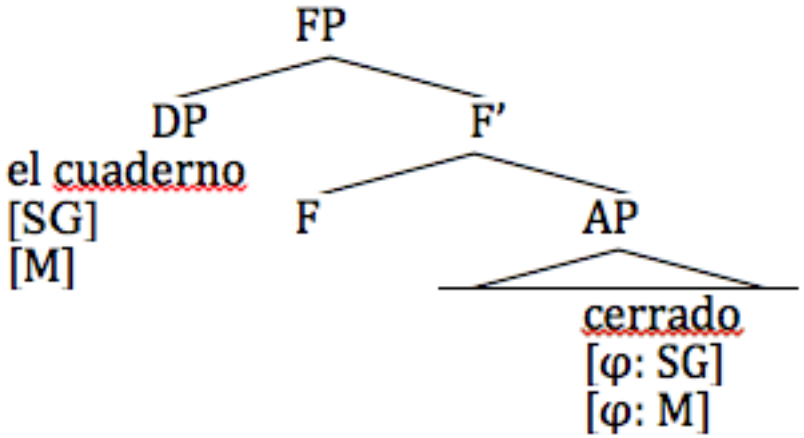
Feature valuation

Los estudiantes dejaron **el cuaderno** en **el escritorio** cuidosamente **cerrado**

bundled Num and Gen



Independent Num and Gen



Experimental design

- Auditory stimuli (N=16)
- Recorded by a male native speaker of Spanish
- Participants: 60 native speakers of Spanish
- Measures
  - Acceptability rating (1-5, 1: impossible, 5: completely possible)
  - Response time

Are number and gender together or not? Predictions

Bundled Num and Gen

- Ungrammaticality on number and ungrammaticality on gender should be rated the same

Are number and gender together or not? Predictions

Bundled Num and Gen

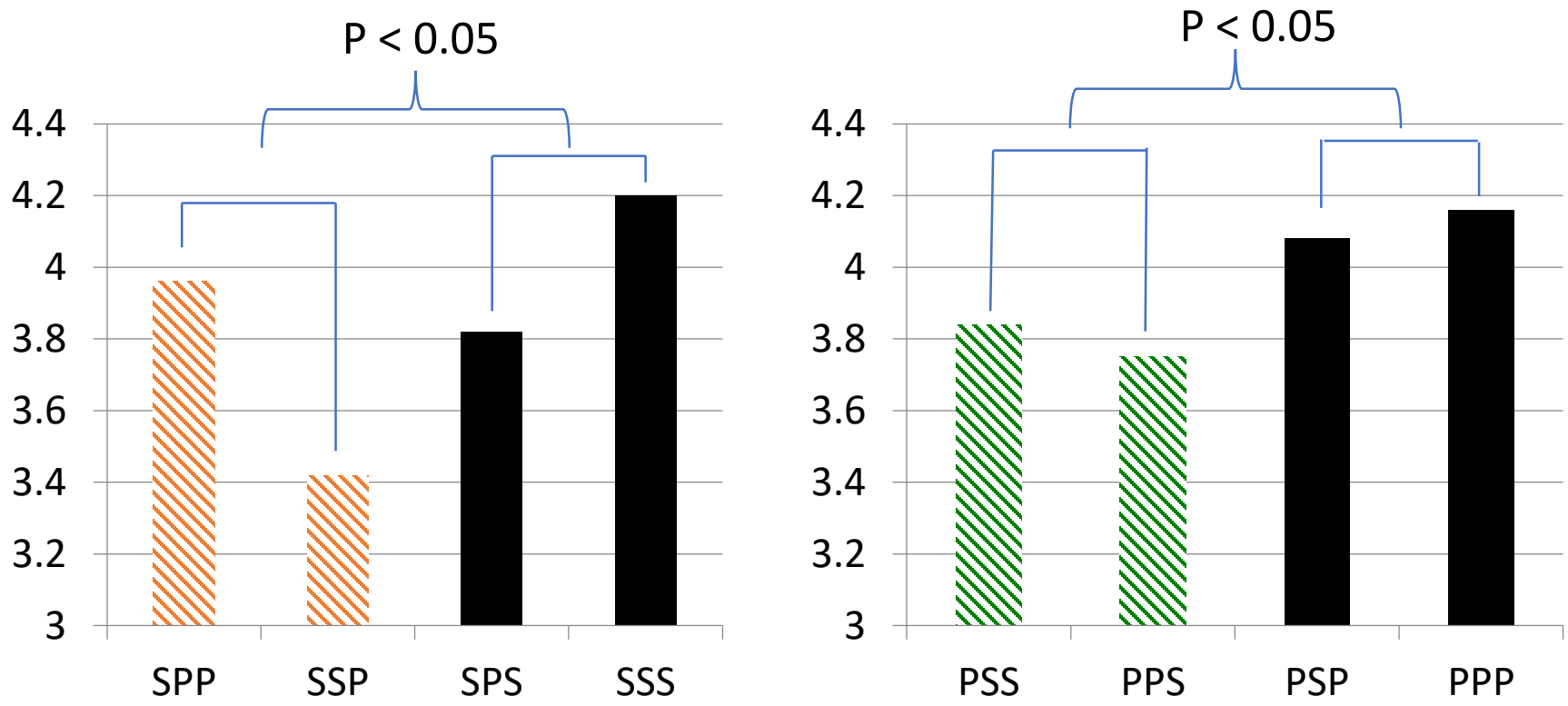
- Ungrammaticality on number and ungrammaticality on gender should be rated the same

Independent Num and Gen

- Ungrammaticality on number and ungrammaticality on gender do not have to be rated the same

Results: Number

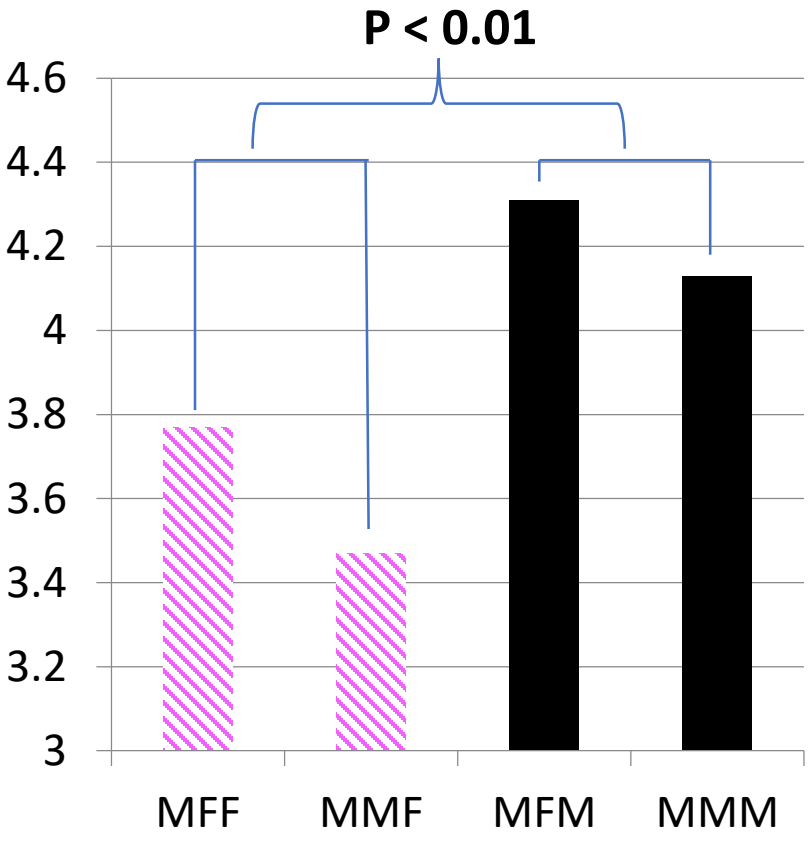
grammaticality effect for SG and PL



Results: Gender

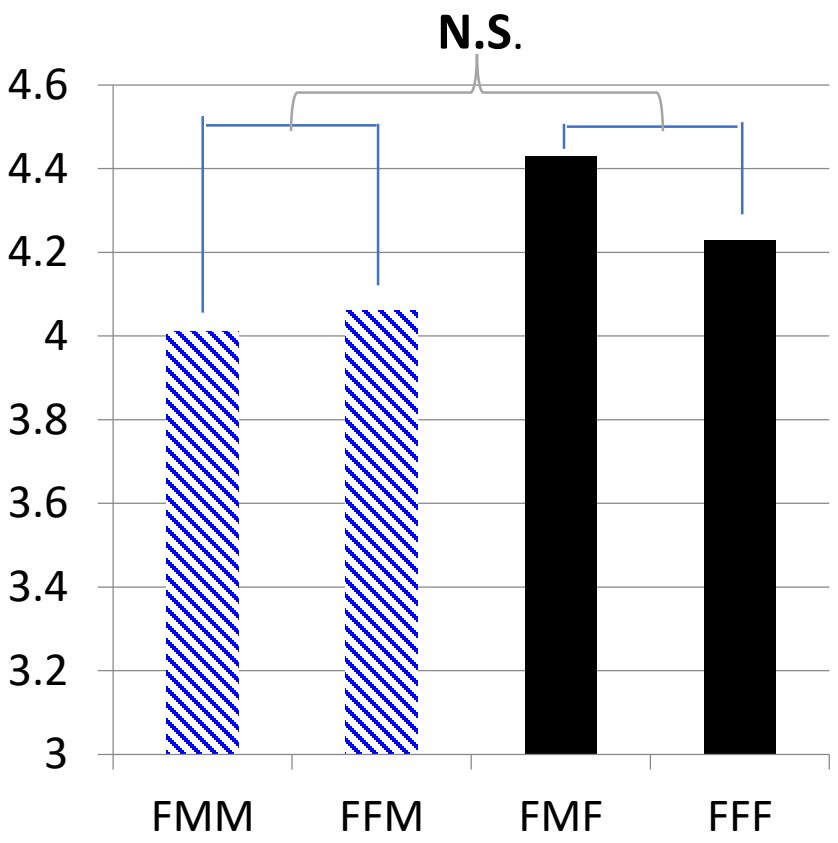
M head noun:

grammaticality effect



F head noun:

no grammaticality effect



Back to predictions

Bundled Num and Gen

- Ungrammaticality on number and ungrammaticality on gender should be rated the same

Independent Num and Gen

- Ungrammaticality on number and ungrammaticality on gender do not have to be rated the same

Back to predictions

Bundled Num and Gen

- Ungrammaticality on number and ungrammaticality on gender should be rated the same
- Agreement attraction effects in one category should lead to agreement attraction effects in the other category

Independent Num and Gen

- Ungrammaticality on number and ungrammaticality on gender do not have to be rated the same
- Agreement attraction effects in Num should be independent of agreement attraction effects in Gen

Agreement attraction

the key to the cabinets were lost

head noun **local noun**

Grammatical feature of local noun displaces grammatical feature of head noun

(Bock & Eberhard 1993; Franck et al. 2006; den Dikken 2001; Wagers et al. 2009, a.o.)

Agreement attraction

the key to the cabinets were lost

>>

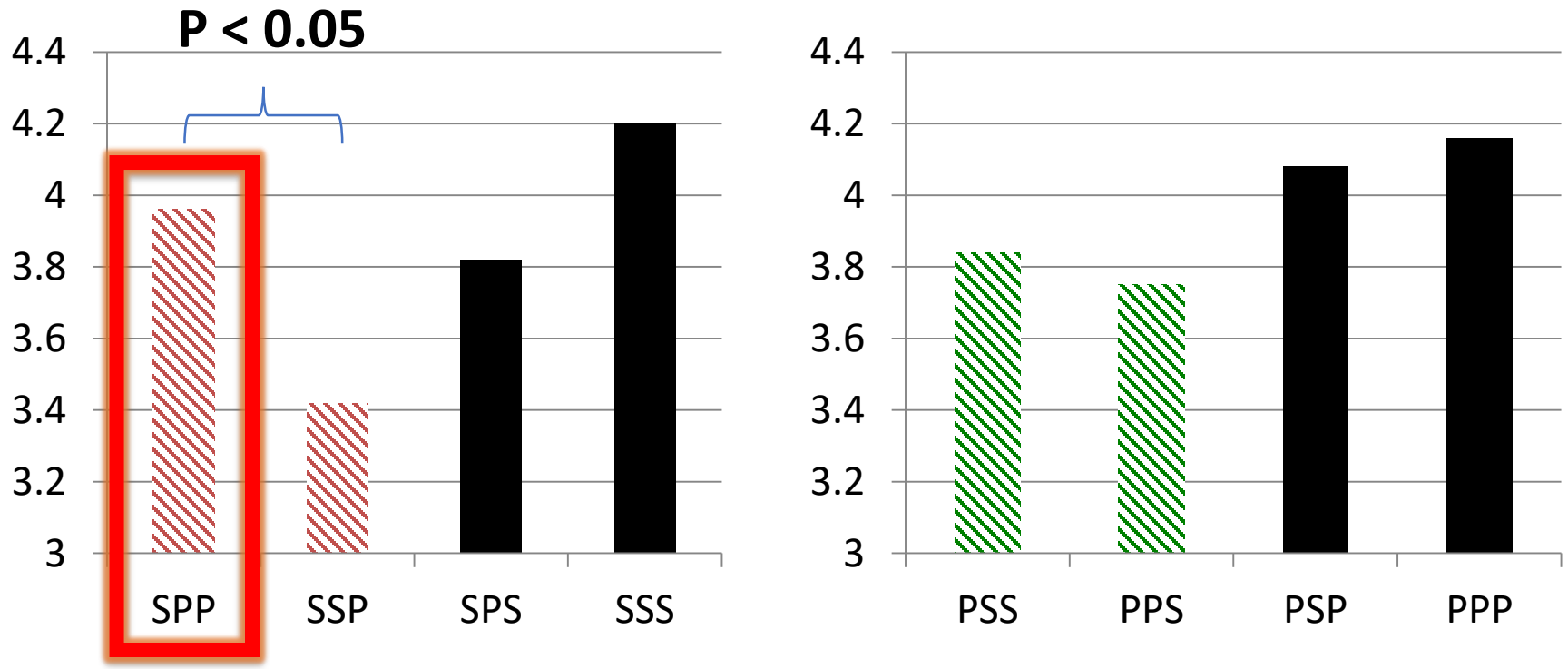
the keys to the cabinet was lost

Hence PL as the driving force for attraction
(see Phillips 2013 and references therein)

Attraction is driven by morphological visibility

Results: Number

agreement attraction from PL



Agreement attraction

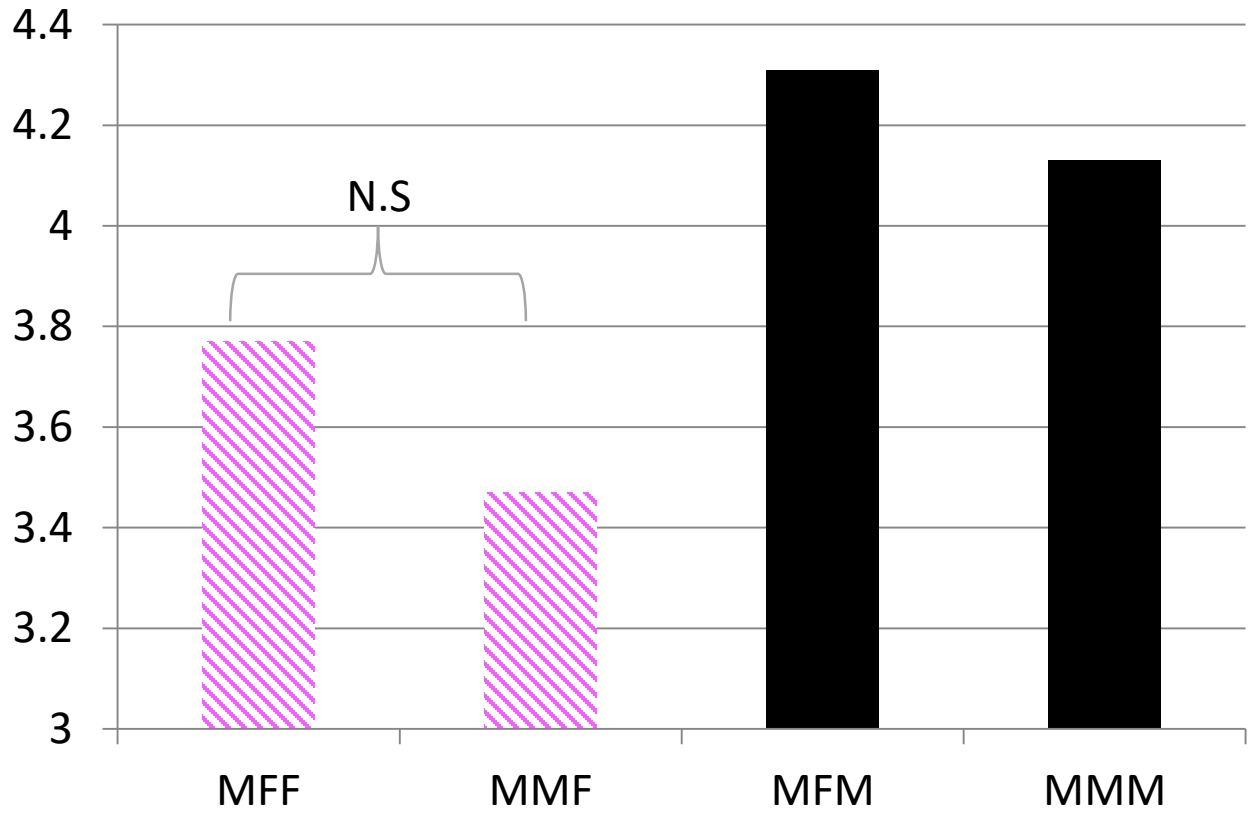
- If Number and Gender are bundled, Number attraction should result in Gender attraction
- It does NOT:

F-SG M-PL M-PL **3.3** (RT 2007 *ms*)

F-SG F-PL F-PL **4.3** (RT 1905 *ms*)

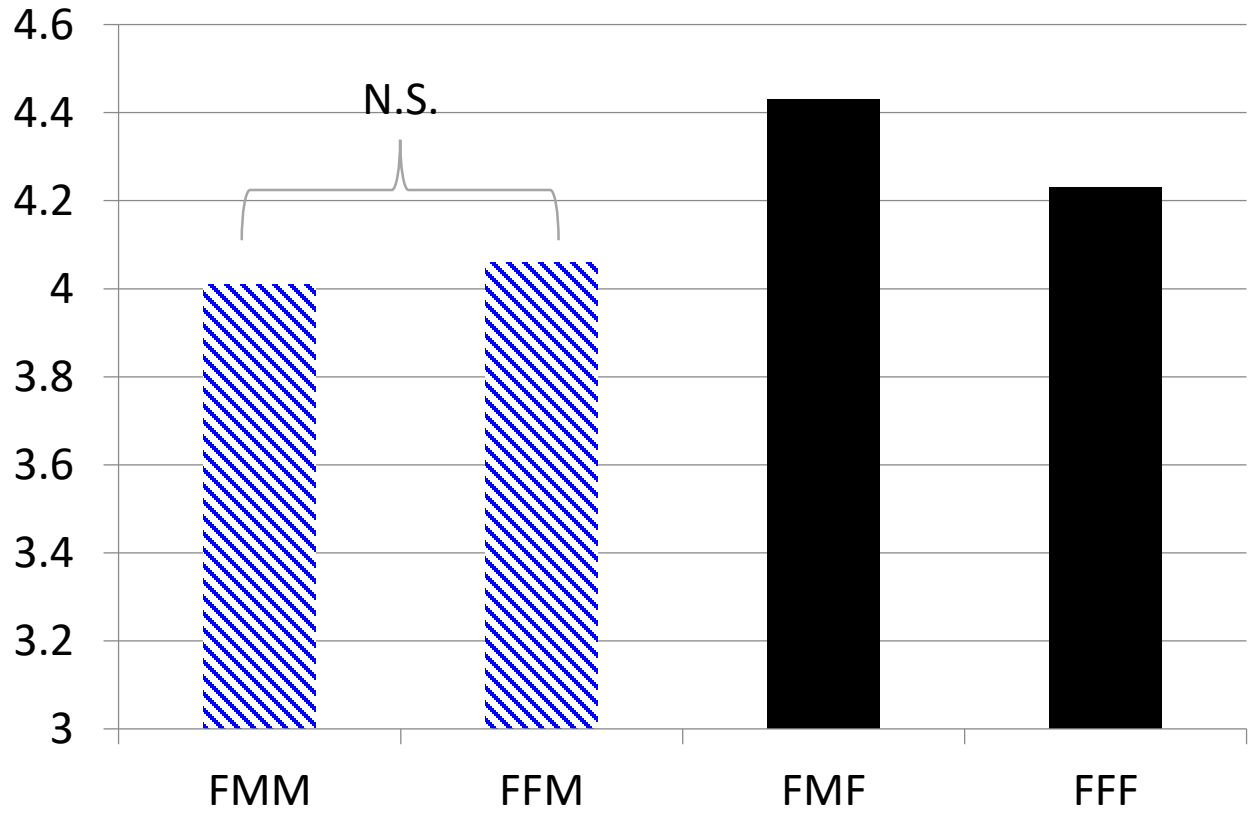
Results: Gender

No attraction from the feminine



Results: Gender

No attraction from the masculine

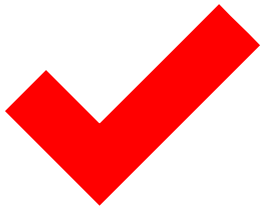


Back to predictions

Bundled Num and Gen

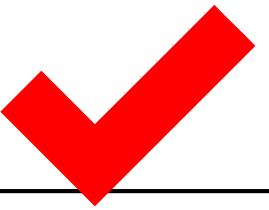
- Agreement attraction effects in one category should lead to agreement attraction effects in the other category

Independent Num and Gen



- Agreement attraction effects in Num should be independent of agreement attraction effects in Gen

Back to predictions



Bundled Num and Gen

Independent Num and Gen

- Ungrammaticality on number and ungrammaticality on gender are not rated the same
- Agreement attraction effects in Num are independent of agreement attraction effects in Gen

From the experimental results to theory

Phi-features Number and Gender are separate and are organized hierarchically in such a way that number is accessed before gender

Main research questions

1. For each phi-feature, are all the values in that feature category fully specified?

No; Russian data show that masculine is absence of gender

2. What is the hierarchical relationship and representation of [NUMBER] and [GENDER]?

The two categories are represented separately and accessed hierarchically in baseline Spanish

Spanish heritage speakers

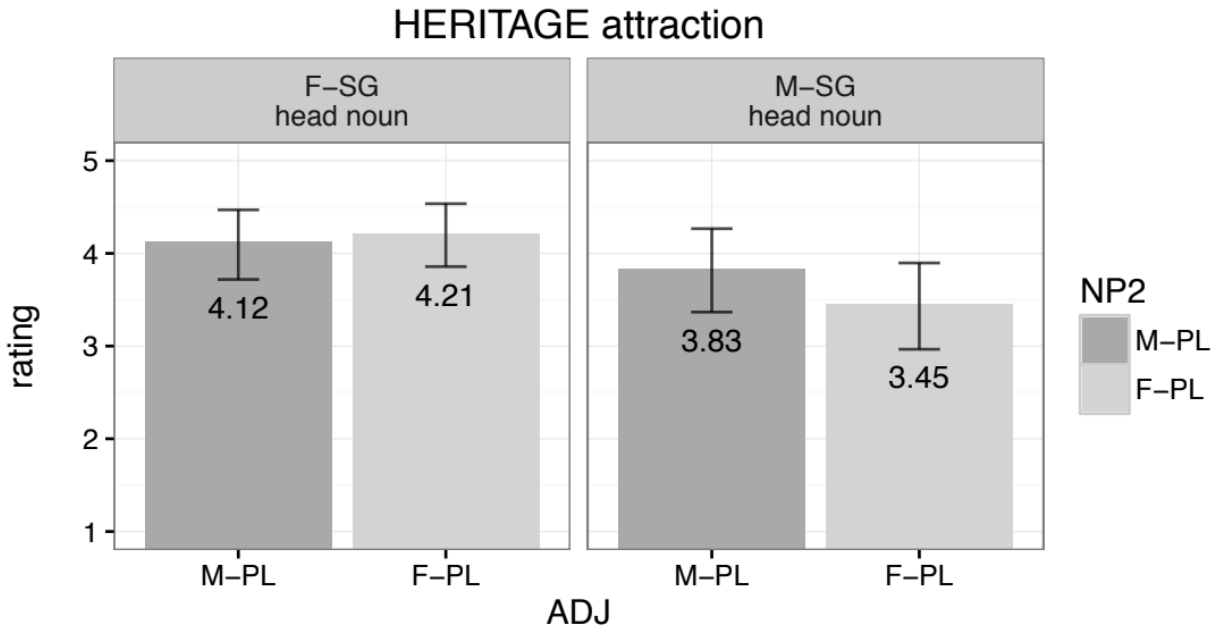
- What about heritage Spanish grammar?

Heritage Spanish: Predictions

- If number and gender are split, agreement attraction in one feature need not lead to agreement attraction in the other feature
- If number and gender are bundled, agreement attraction in one feature should lead to agreement attraction in the other feature

Heritage Spanish: Results (in brief)

No significant difference between F-SG M-PL M-PL (1) and F-SG F-PL F-PL (2) (or analogous masculine head noun conditions):



(1) Los estudiantes dejaron la libreta en los escritorios cuidadosamente cerrados.
(2) Los estudiantes dejaron la libreta en las estanterías cuidadosamente cerradas.

Heritage Spanish: Results (in brief)

- Conditions with agreement attraction in one feature were rated the same as conditions with agreement attraction in two features, not higher.

Heritage Spanish

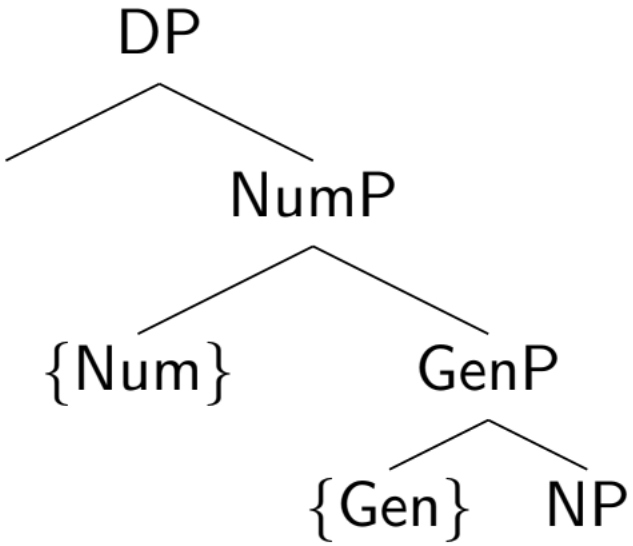
- Conditions with agreement attraction in one feature were rated the same as conditions with agreement attraction in two features, not higher.

- Number and gender are **bundled** in Heritage Spanish
- Heritage Spanish grammar is different from the baseline in the treatment of phi-features

Baseline vs heritage grammar

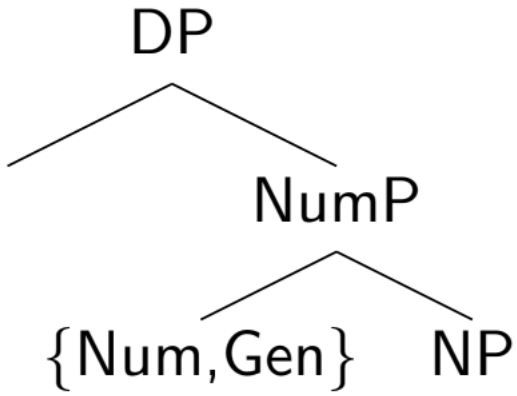
The heritage grammar bundles number and gender, so it has restructured the baseline grammar.

(12) **Split (baseline)**:



→

(13) **Bundled (heritage)**:



Implications for change

- Step 1: Split representation replaced by a bundled representation
- Step 2: Feature bundle is opaque, which may lead to interpretive instability… If there is no consistent intrepretation of a feature (bundle), it loses its utility
- Step 3: Feature specification of the bundle may be lost altogether, resulting in an empty feature projection → This results in a more general decline in morphological richness, leading eventually to the attrition of agreement; typical of heritage grammars and creoles

Restructuring in a heritage language

- In the case of restructuring of agreement in heritage Spanish, the difference is due to structural difference in how number and gender features are projected.
- In fact, the trajectory we put forth suggests that the gradual impoverishment of morphological richness is driven by systematic pressures which can be predicted on the basis of syntactic structures.

Conclusions

1. For each phi-feature, are all the values in that feature category fully specified? No: Russian eye-tracking
2. What is the hierarchical relationship and representation of [NUMBER] and [GENDER]? Split: Spanish agreement attraction
3. Are baseline controls and heritage speakers alike in their representation of phi-features?
    -Matching grammar, amplified: Russian gender
    -Divergent grammar: Spanish gender and number

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- Can we predict when and where heritage language will amplify tendencies in the baseline vs developing a divergent representation?

Thank you! Questions?