glow

The Differential Representation of Number and Gender in Spanish

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THE QUESTIONS

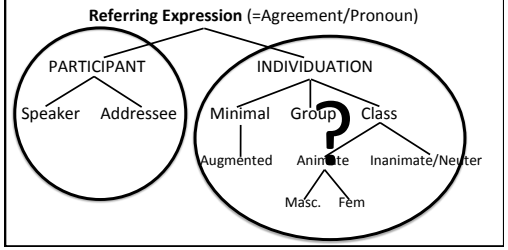
Setting the stage

Phi-feature geometry: Phi-features are internally structured in a hierarchical way

(Harley & Ritter 2002, Béjar & Rezac 2009, Preminger 2014, a.o.)

Hierarchy

Feature geometry (Harley & Ritter 2002)



Relationship between Number and Gender under agreement

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

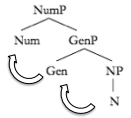
Gender bundled with Number

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)—but see Kramer (2009, 2013) for equally valid empirical considerations against this view
- Theoretical considerations: Elimination of a projection that lacks *consistent* semantics (Chomsky 1995)—but this is not an issue if one assumes feature **valuation** rather than **interpretability** as the determining force in agreement (Pesetsky & Torrego 2007; Preminger 2014)

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)

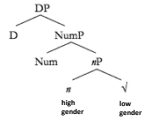


If N raises through Gen to Num the order Stem-Gen-Num is predicted, consistent with cross-linguistic facts

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

Gender: Independent and distributed

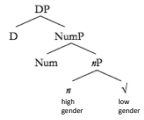
- Distributed gender: gender as a feature on *n* (natural gender) and on the root (lexical gender)



high gender ~ natural gender,
Sp. *el marido/la mujer*
low gender ~ lexical gender,
Sp. *el alimento/la comida*

Gender: Independent and distributed

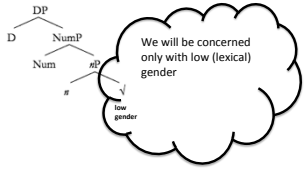
Distributed gender: gender as a feature on *n* (natural gender) and on the root (lexical gender); (cf. Kramer 2009; 2013 and references therein)



Greek ellipsis facts:
PF-deletion of nPs with high gender preserves NumP
(Merchant 2014)

Gender: Independent and distributed

- Distributed gender: gender as a feature on *n* (natural gender) and on the root (lexical gender)



Research questions

Question 1: Are Number and Gender projected and valued together or are they independent?

Can these possibilities be assessed experimentally?

Evaluating the two options

- Needed: a language with both Number and Gender agreement
- 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'

Visibility of feature values

- A value can be
  - specified (present, visible, active, marked), or
  - unspecified (absent, invisible, inert, unmarked)
- We will be using **(un)specified,** atheoretically
  - **specified** → **+**
  - **unspecified** → **absent**

Establishing semantic specification

Taghlib test: "Only the unmarked [unspecified-ZMG] form of a pair of two features can be used to refer to a plurality of individuals, only some of which have the marked [specified—ZMG] property."

(Greenberg 1966; Sauerland et al. 2005)

Number: semantic specification

Singular reference included with use of the plural

Number: Feature content

*You are welcome to bring **your children***

*Every boy should bring **his sisters** to the party*

*el certificado médico para la tenencia de **animales peligros***

→Singular reference included with use of the plural

Number: Feature content

*You are welcome to bring **your child***

*Every boy should bring **his sister** to the party*

*el certificado médico para la tenencia del **animale peligro***

→ Plural reference NOT included with use of the singular
(experimentally supported by Sauerland et al., 2005)

Number: Feature content

Theories of number: two features, SG and PL, hosted in NumP on the DP spine

[[SG]] = λP: ∀x∈P[μ(x) = 1]. P
[[PL]] = λP. P

(Sauerland 2003; Scontras 2013a, b)

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*

Spanish gender: Feature content

Taghlib test:
- *el padre* (M) 'father'
- *la madre* (F) 'mother'
- *los padres* (M) 'parents', i.e., 'mother and father'

→ Feminine reference included with use of the masculine

- *las madres* (F) 'mothers', NOT 'mother and father'

→ Masculine reference NOT included with use of the feminine

Spanish gender: Feature content

Reference to groups: agreement with coordinate structures including M and F nouns is always masculine (virile agreement)

el libro$_{M}$ *y la pintura*$_{F}$ *son preciosos*$_{M.PL}$/**presiosas*$_{F.PL}$
'the book and the painting are expensive'

Spanish gender: Feature content

- Harris (1991): Spanish gender is ***single-valued:*** feminine vs. unspecified (absence of feminine)

  "Unmarked gender: literally the absence of any information about gender in lexical entries"
- Main arguments:
  - When in doubt use masculine (incl. neologisms)
  - Group of people with mixed gender → masculine agreement

Spanish gender: Feature content

- Alternative: Spanish gender is ***multi-valued,*** but feminine is more visible or marked (Roca 1989; Domínguez et al. 1999; Alarcón 2006)

Summary of Spanish features

Number:
PL is morphologically specified
SG is semantically specified
Theory of number posits two active features

Gender:
M and F equally specified morphologically
F may be semantically specified (Harris 1991); is M unspecified?
One or two active features?

Research questions

Question 1: Are Number and Gender projected and valued together or are they independent? Can this valuation be assessed experimentally?

Question 2: What is the content (value composition) of the Number and Gender features in Spanish?

Can we assess their content experimentally?

THE TOOL: SPANISH NUMBER/ GENDER AGREEMENT EXPERIMENT

Assumptions

- Relationship between grammar and parser: grammar is the parser (Phillips 2010, 2013)
- Grammar and language processing are part of the same system, at different levels of abstraction
- By investigating processing, we may be able to access mental representations

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:

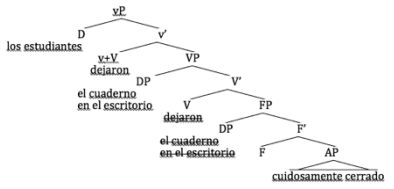
  … *considerar* DP *extremamente* Adj …

  (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**."

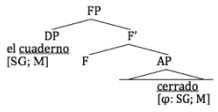


(**Spanish:** Contreras 1987; 1995; Jiménez-Fernández & Spyropoulos 2013; **beyond Spanish:** Cardinaletti & Guasti 1995; Basilico 2003; Progovac 2006; Citko 2011, a.o.)

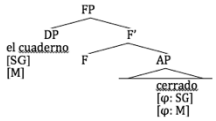
Feature valuation

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

Number design (gender held constant)

(SUBJ) VERB **NP1** PREP **NP2** ADVERB **ADJ…**

Three factors:

NP1 number (SG vs. PL)
NP2 number (SG vs. PL)
ADJ number (SG vs. PL)

8 conditions

Number design

Example NP1-M NP2-M item

NP1	NP2	ADJ	
SG	SG	SG	Los estudiantes dejaron el cuaderno en el escritorio cuidadosamente cerrado
SG	SG	PL	Los estudiantes dejaron el cuaderno en el escritorio cuidadosamente cerrados
SG	PL	SG	Los estudiantes dejaron el cuaderno en los escritorios cuidadosamente cerrado
SG	**PL**	**PL**	Los estudiantes dejaron el **cuaderno en** los escritorios cuidadosamente cerra**dos**
PL	**SG**	**SG**	Los estudiantes dejaron los **cuadernos** en el escritorio cuidadosamente cerrado
PL	SG	PL	Los estudiantes dejaron los cuadernos en el escritorio cuidadosamente cerrados
PL	PL	SG	Los estudiantes dejaron los cuadernos en los escritorios cuidadosamente cerrado
PL	PL	PL	Los estudiantes dejaron los cuadernos en los escritorios cuidadosamente cerrados

Number Design

Ungrammatical		Grammatical	
SPP	SSP	SPS	SSS
PSS	PPS	PSP	PPP

Gender design (number held constant)

(SUBJ) VERB **NP1** PREP **NP2** ADVERB **ADJ…**

Three factors:

NP1 gender (M vs. F)
NP2 gender (M vs. F)
ADJ gender (M vs. F)

8 conditions

Gender design

Example NP1-SG NP2-SG item

NP1	NP2	ADJ	
M	M	M	Los estudiantes dejaron el cuaderno en el escritorio cuidadosamente cerrado
M	**M**	**F**	**Los estudiantes dejaron el cuaderno en el escritorio cuidadosamente cerrada**
M	F	M	Los estudiantes dejaron el cuaderno en la estantería cuidadosamente cerrado
M	**F**	**F**	**Los estudiantes dejaron el cuaderno en la estantería cuidadosamente cerrada**
F	**M**	**M**	**Los estudiantes dejaron la libreta en el escritorio cuidadosamente cerrado**
F	M	F	Los estudiantes dejaron la libreta en el escritorio cuidadosamente cerrada
F	**F**	**M**	**Los estudiantes dejaron la libreta en la estantería cuidadosamente cerrado**
F	F	F	Los estudiantes dejaron la libreta en la estantería cuidadosamente cerrada

Gender Design

Ungrammatical		Grammatical	
MFF	MMF	MFM	MMM
FMM	FFM	FMF	FFF

Question 1: Predictions

Question 1: Are Number and Gender bundled or are they independent?

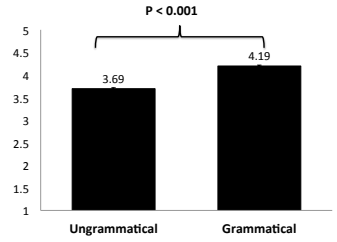
Bundled Num and Gen

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

Independent Num and Gen

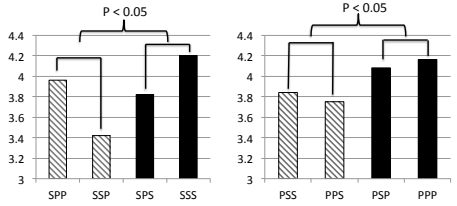
- Ungrammaticality on number and ungrammaticality on gender do not have to be rated the same

Average overall ratings: Beyond the absolute numbers



Results: Number

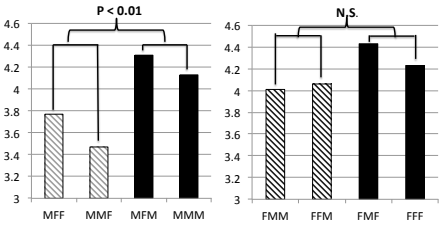
grammaticality effect for SG and PL



Results: Gender

M head noun: grammaticality effect

F head noun: no grammaticality effect



Question 1: 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

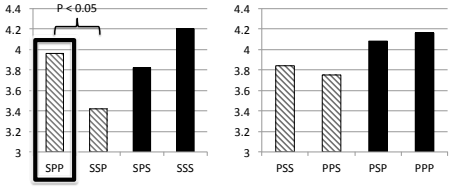
the key to the cabinets were lost
head noun local noun

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.)

Results: Number

agreement attraction from PL



Agreement attraction

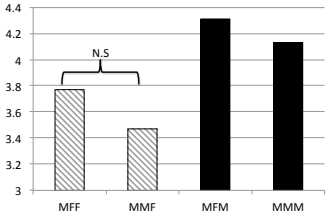
- If Number and Gender are bundled, Number attraction should result in Gender attraction
- It does NOT:

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

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

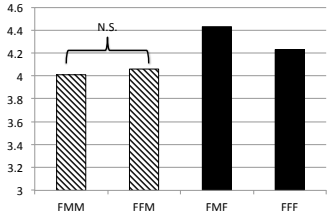
Results: Gender

No attraction from the feminine



Results: Gender

No attraction from the masculine



Question 1: 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

Research questions

Question 2 (rephrased): Are Number and Gender multi-valued or single-valued categories?

Question 2: Predictions

Both Num and Gen are multi-valued

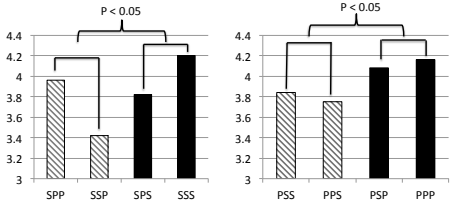
- Grammaticality effects should be the same across Num and Gen

Num is multi-valued, Gen is single-valued

- Grammaticality effects should be observed for both values in Num and only for the specified value in Gen

Results: Number

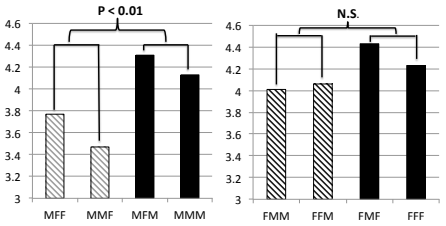
grammaticality effect for SG and PL



Results: Gender

M head noun: grammaticality effect

F head noun: no grammaticality effect



Results: Agreeing adjective

- for Gender, only feminine adjectives yield grammaticality effects
- masculine adjectives can agree with feminine head nouns
  - such agreement is rated as high as grammatical sentences

Results: Agreeing adjective

The ungrammatical:

*Los estudiantes dejaron la carta en la mesa cuidadosamente **cerrado*** (rated **4.1**)

rated equally high as the grammatical:

*Los estudiantes dejaron la carta en la mesa cuidadosamente **cerrada*** (rated **4.2**)

Question 2: Predictions

Both Num and Gen are multi-valued ✘

- Grammaticality effects should be the same across Num and Gen
- Ungrammaticality detection should take the same time across Num and Gen

Num is multi-valued, Gen is single-valued ✔

- Grammaticality effects should be observed for both values in Num and only for the specified value in Gen
- Ungrammaticality detection should take longer in Num than in Gen

Predictions

- If Number is multi-valued and Gender is single-valued,
- Number valuation should take longer:
  - Dealing with two features instead of just the presence/absence of a single feature (cf. Béjar 2003: 39ff.)

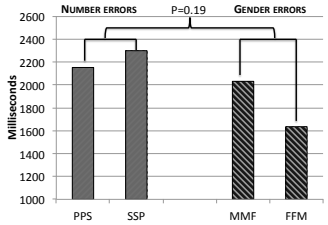
Predictions

- Gender errors should be resolved faster than number errors
- If both probe and goal have specified feature (as in Number), matching should take longer than if only one of them is specified (as in Gender)

Probe and Goal match?	Value?	
YES	specified	
YES	unspecified	
NO	specified	**number error**
NO	unspecified	**gender error**

Results: Ungrammaticality detection

reaction times (*ms*) for number vs. gender errors



Question 2: Predictions

Both Num and Gen are multi-valued ✘

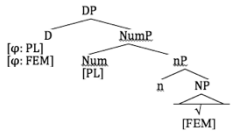
Num is multi-valued, Gen is single-valued ✔

- Grammaticality effects should be observed for both values in Num and only for the specified value in Gen
- Ungrammaticality detection should take longer in Num than in Gen

THE ANSWERS

Discussion

Question 1: Are the phi-features Num and Gen valued together or separately?



Answer: Separately

Num ≠ Gen

Discussion

Additional evidence for severing Num and Gen: eventive nominals have gender but do not pluralize and have no NumP

la construcción de los puentes

**las construcciones de los puentes*

'the construction(*s) of the bridges'

(cf. Alexiadou et al. 2010)

Discussion

- **Question 2**: What is the content of Number and Gender features, respectively?
  - For Number, both SG and PL show grammaticality effects
  - This matches current thinking on the feature content of Number: both SG and PL are specified
  - For Spanish Gender, only feminine adjectives yield grammaticality effects
  - This matches Harris (1991) on the feature content of Gender: only feminine is specifie

In conclusion

Question 1: Are Number and Gender projected and valued together or are they independent?

They are independent; valuation in Spanish is done separately

Can this valuation be assessed experimentally?

Yes (see also Antón-Méndez et al. 2002, for production data that speak to the same result)

In conclusion

Question 2: What is the content (value composition) of each feature?

*In Spanish, Number is **multi**-valued and Gender is **single**-valued*

Can we assess their content experimentally?

Yes, and similar methodology could be applied to:

other languages

other categories whose status is under debate

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