Proficiency, experience, and dominance as predictors of code-switching grammaticality sensitivity in late L2 bilinguals

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Introduction

- Code-switching (CS), defined as the alternation of languages within a conversation or sentence (Poplack, 1980), has long been shown to follow regular, rule-governed patterns among bilinguals
- Foundational work in the 1960s-70s first documented this regularity (Gumperz, 1967, 1977; Lipski, 1978; Poplack, 1980; Timm, 1975; Wentz, 1977), and it has continued to anchor CS research since (see Parafita Couto et al., 2023, for an overview)
- Offers a unique window into bilingual grammatical knowledge

Example

- Syntactic restriction:
  - Switching between a subject pronoun and a finite verb is generally considered ungrammatical (1)
  - Switching after a full lexical subject is fine (2)

(1) * ***Él* is playing in the park.**
'He is playing in the park.'

(2) ***El niño* is playing in the park.**
'The boy is playing in the park.'

Does this extend to all bilinguals?

- Such CS research has traditionally focused on early bilinguals; for example, Poplack (1980) noted that intrasentential CS seemed to require the skill of bilinguals who learned both languages in childhood
- Late L2 bilinguals remain understudied, despite evidence that they also engage in intrasentential CS
- **Research goal:** This study asks whether late L2 bilinguals acquire such CS constraints, examining how three individual-difference variables potentially affect that acquisition in two different tasks:
  - (i) L2 proficiency, (ii) CS experience, and (iii) language dominance
  - Acceptability judgment task (AJT) vs. elicited production task (EPT)

Theoretical Approaches to CS Restrictions

- Grammar-focused theories split into two broad camps:
  - **Asymmetric approaches**, such as the Matrix Language Frame model (Myers-Scotton, 1993, 1997; refined by Myers-Scotton & Jake, 2000), which treat one language as the morphosyntactic frame and the other as supplying content
  - **Null-theory approaches**, such as the Functional Head Constraint (Belazi et al., 1994), the minimalist approach (MacSwan, 1999, 2014), and exoskeletal models (Grimstad et al., 2018), reject CS-specific grammar, deriving restrictions instead from Universal Grammar and the formal features of the grammars involved
- **Usage-based/constructionist approaches** (e.g., Wasserscheidt, 2020) move beyond a narrow focus on formal linguistic features, treating CS patterns as grammatical constructions learned through entrenchment from bilingual input and shaped by frequency, community norms, and domain-general cognition
- Importantly, all treat CS restrictions as acquirable grammatical knowledge

Late L2 CS

- Pedagogical focus:
  - L1 use in the classroom (Üstünel & Seedhouse, 2005)
  - CS as a communicative tool under limited proficiency (Cahyani et al., 2018)
- Common assumption:
  - L2-acquisition gaps are the sole cause of their CS
  - However, both late *and early* bilinguals use CS to navigate communicative difficulty (Gardner-Chloros, 2009)
  - Should extend the parallel logic to all bilinguals: Sometimes switch because they have to, but also sometimes switch because they can
- As proficiency grows, late L2 bilinguals can shift from using CS as a "crutch" to using it competently in bilingual contexts (Cheng & Butler, 1989; Hill-Zirker, 2007)
  - Forming part of their L2 grammatical system

Experimental Studies on Late L2 CS Restrictions

STUDY	TASK	BILINGUALS	SWITCHES	FINDINGS
Toribio (2001)	AJT	L1-English **L2-Spanish**	Variety of functional switches (e.g., auxiliary, complementizer, and negation)	**Proficiency effect**; advanced learners rejected ungrammatical switches, beginners often accepted them
Giancaspro (2015)	AJT	L1-English **L2-Spanish** and **heritage** speakers of Spanish	Auxiliary and subject pronoun	**No proficiency effect**; L2 group patterned with heritage speakers, rejecting ungrammatical switches regardless of proficiency
Koronkiewicz (2018)	AJT	L1-English **L2-Spanish** and **heritage** speakers of Spanish	Present-perfect auxiliary and subject pronoun	**Proficiency and CS experience effect**; L2 speakers patterned with heritage speakers if they scored higher in L2 proficiency or if they reported experience with CS
Koronkiewicz et al. (2026)	AJT and EPT	L1-English **L2-French**	Present-perfect auxiliary and subject pronoun	**Proficiency effect for acceptability** task, but **not production**; **no effects for CS experience**

What about other factors, like dominance? Prior work has proxied dominance through proficiency (Petersen, 1988; Lanza, 1990) or L1 status (Fernández Fuertes et al., 2016; Liceras, 2016), or linked it to switch complexity (Basnight-Brown & Altarriba, 2007), but its role as a continuous predictor of syntactic restrictions remains unexplored

Current Study

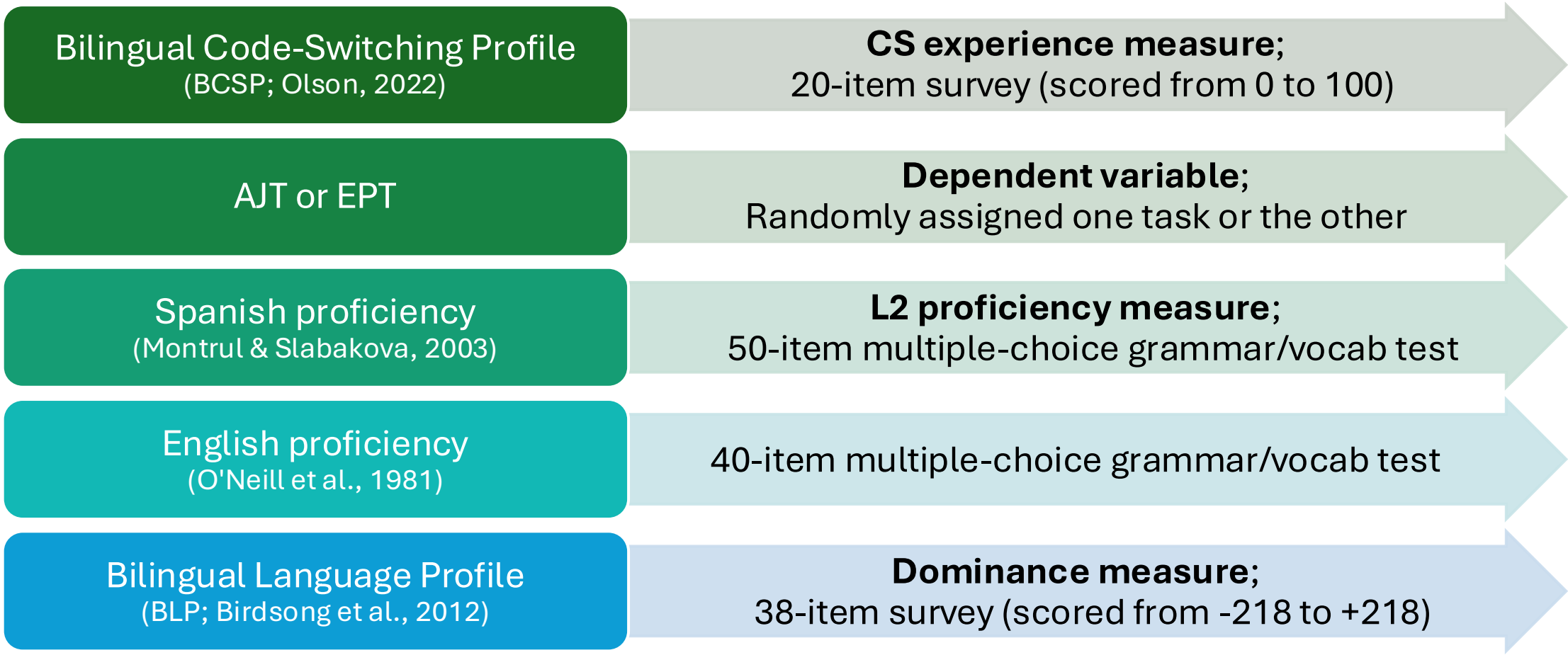
Research Questions

- For US L1-English L2-Spanish bilinguals, is CS constraint sensitivity predicted by:
  - **L2 proficiency**?
  - **CS experience**?
  - **Language dominance**?
- And does it differ regarding **acceptability** vs. **production**?

Hypotheses

- Higher proficiency, greater CS experience, and lower English dominance (i.e., being more “balanced”) are expected to predict rejection/avoidance of ungrammatical switches
- Regarding task, we expect the effects to be more pronounced in acceptability

Procedure


Bilingual Code-Switching Profile
(BCSP; Olson, 2022)
CS experience measure;
20-item survey (scored from 0 to 100)
AJT or EPT
Dependent variable;
Randomly assigned one task or the other
Spanish proficiency
(Montrul & Slabakova, 2003)
L2 proficiency measure;
50-item multiple-choice grammar/vocab test
English proficiency
(O'Neill et al., 1981)
40-item multiple-choice grammar/vocab test
Bilingual Language Profile
(BLP; Birdsong et al., 2012)
Dominance measure;
38-item survey (scored from -218 to +218)

AJT Design

Three blocks (each randomized per participant):

- CS stimuli (*n* = 72)
- Monolingual Spanish stimuli (*n* = 18)
- Monolingual English stimuli (*n* = 18)
- Monolingual versions of all sentences were rated to confirm any unacceptability stemmed from the switch itself rather than other factors (Ebert & Koronkiewicz, 2018)

7-point Likert acceptability scale

- 1 = *completely unacceptable*, 7 = *completely acceptable*

48 target CS sentences:

- 12 subject pronoun + finite verb switches (expected to be ungrammatical)
- 12 present-perfect auxiliary + participle switches (expected to be ungrammatical)
- 24 matched grammatical comparison stimuli with switch point shifted to after the verb
- Half Spanish-to-English and half vice versa; six lexicalizations per structure type

24 unrelated filler items

Scientists have anunciado un nuevo tratamiento esta semana.

	Completely unacceptable	Mostly unacceptable	Somewhat unacceptable	Unsure	Somewhat acceptable	Mostly acceptable	Completely acceptable
¿Qué te parece esta oración?	● ✓	○	○	○	○	○	○

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	Completely unacceptable	Mostly unacceptable	Somewhat unacceptable	Unsure	Somewhat acceptable	Mostly acceptable	Completely acceptable
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EPT Design

36 CS ITEMS

- Single block randomized per participant
  - 12 pronoun prompts
  - 12 auxiliary prompts
  - 12 filler prompts
- Designed off the AJT items
  - *** She found out that we hablamos varias lenguas → We… / lenguas**
    'She found out that we speak various languages' → 'We… / languages'

PROMPT DESIGN

- Each prompt included one English and one Spanish word or chunk (balanced for direction)
  - **We**… / **lenguas**
    'We… languages'
  - **Últimamente ese hombre**… / **read**
    'Lately that guy… read'
- Asked the participants to write a sentence combining both parts (along with whatever other words they wanted to include)
- Contextual photo provided for each prompt

RESPONSES

- Grammaticality coded based on what language they used for the verb, as that would indicate whether there was a switch violation or not
- We … / lenguas =
  - **We** *speak* muchas **lenguas**
  - * **We** *hablamos* muchas **lenguas**
- Últimamente ese hombre… / read =
  - **Últimamente ese hombre** *has* **read** a lot
  - * **Últimamente ese hombre** *ha* **read** a lot
- Structures that varied from that format were coded as mistrials, as were responses that altered the words or chunks provided in the prompt

Últimamente ese hombre... / read

Últimamente ese hombre has read a lot

X

Participants

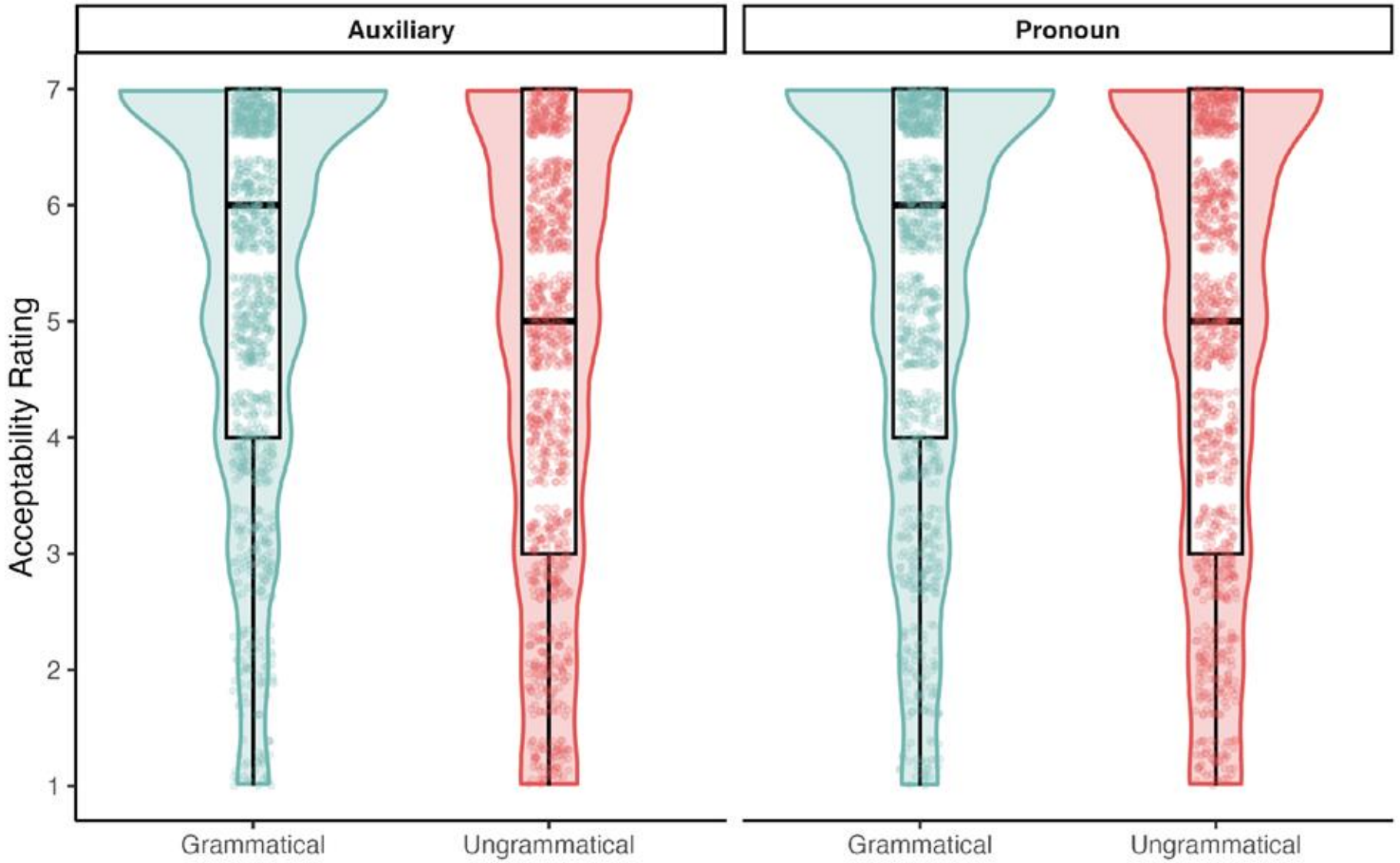
- Spanish-English bilinguals residing in the US, recruited from undergraduate Spanish courses (Year 1-4) via extra-credit incentive (*N* = 229)
- Eligibility based on the language-history portion of the BLP (Birdsong et al., 2012):
  - L1 English learned naturalistically and L2 Spanish learned via formal instruction (i.e., excluding heritage speakers)
- Final sample:
  - 201 participants who completed all parts of the study
  - 103 completed the AJT; 98 completed the EPT

Participant Background

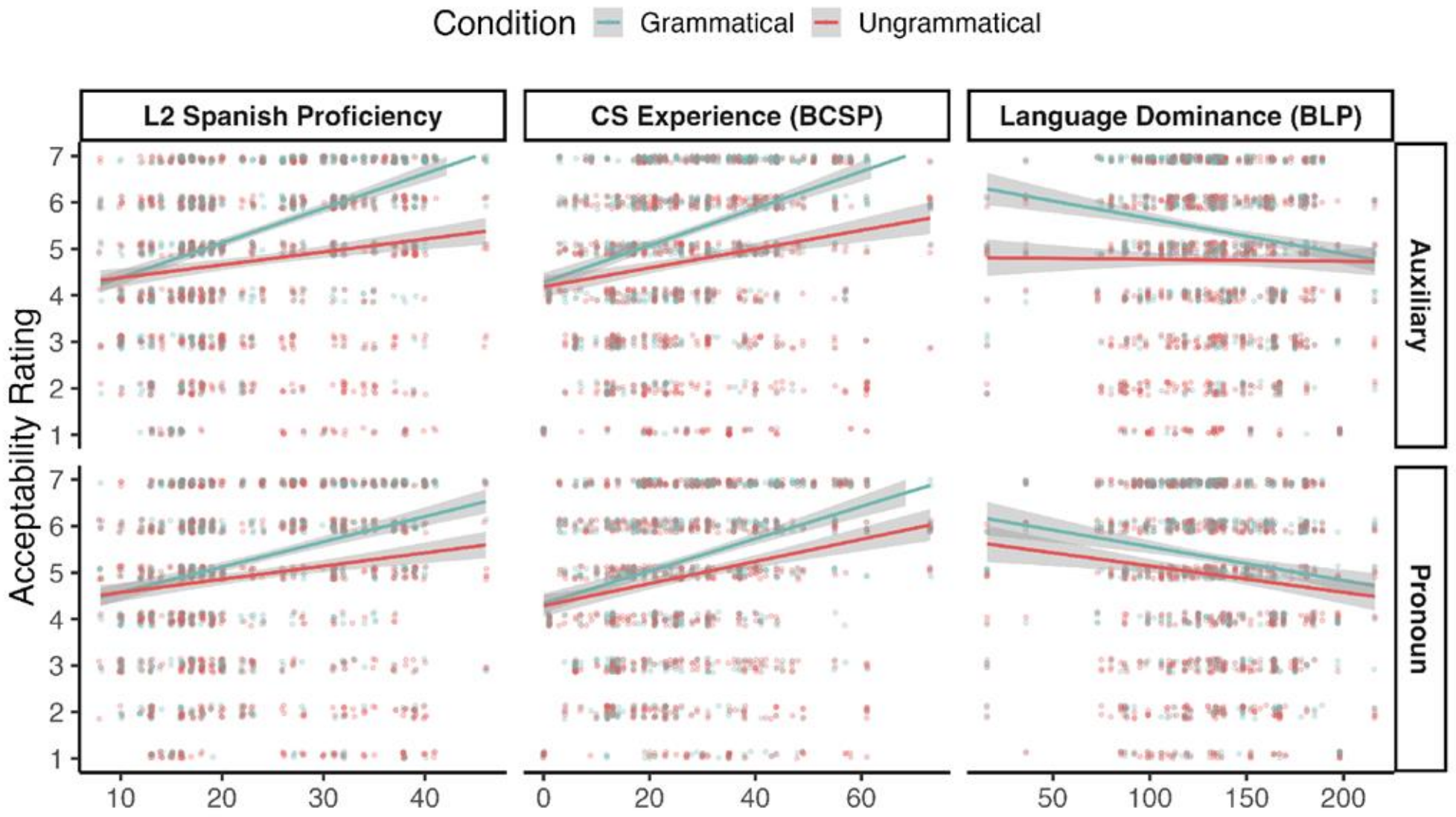
		AJT Group (*n* = 103)		EPT Group (*n* = 98)	
		M (SD)	Min - Max	*M (SD)*	Min - Max
AGE		20.0 (2.3)	18.0 - 35.0	19.4 (1.6)	18.0 - 23.0
ENGLISH	*Age of Acquisition*	0.1 (0.4)	0.0 - 3.0	0.1 (0.4)	0.0 - 2.0
	Proficiency Score[1]	35.7 (5.1)	12.0 - 39.0	36.1 (3.9)	12.0 - 39.0
	Self-Rating Score[2]	5.9 (0.3)	3.2 - 6.0	6.0 (0.1)	5.2 - 6.0
SPANISH	*Age of Acquisition*	12.6 (4.4)	2.0 - 20.0	12.0 (4.0)	3.0 - 20.0
	Proficiency Score[3]	23.8 (9.2)	8.0 - 46.0	22.5 (8.6)	7.0 - 39.0
	Self-Rating Score	3.0 (1.1)	0.0 - 5.8	2.7 (1.1)	0.2 - 5.8
BCSP SCORE[4]		28.5 (15.0)	0.0 - 73.0	29.5 (15.4)	0.0 - 65.8
BLP SCORE[5]		131.2 (34.0)	16.0 - 216.0	138.9 (32.7)	40.4 - 201.9

[1] 0 to 40 for English (O'Neill et al., 1981); [2] 0 to 6, where 0 indicated *not well at all* and 6 indicated *very well*; [3] 0 to 50 for Spanish (Montrul & Slabakova, 2003); [4] 0 to 100, where 100 indicated maximum CS experience (Olson, 2022); -218 to +218, where positive scores indicated greater English language dominance (Birdsong et al., 2012)

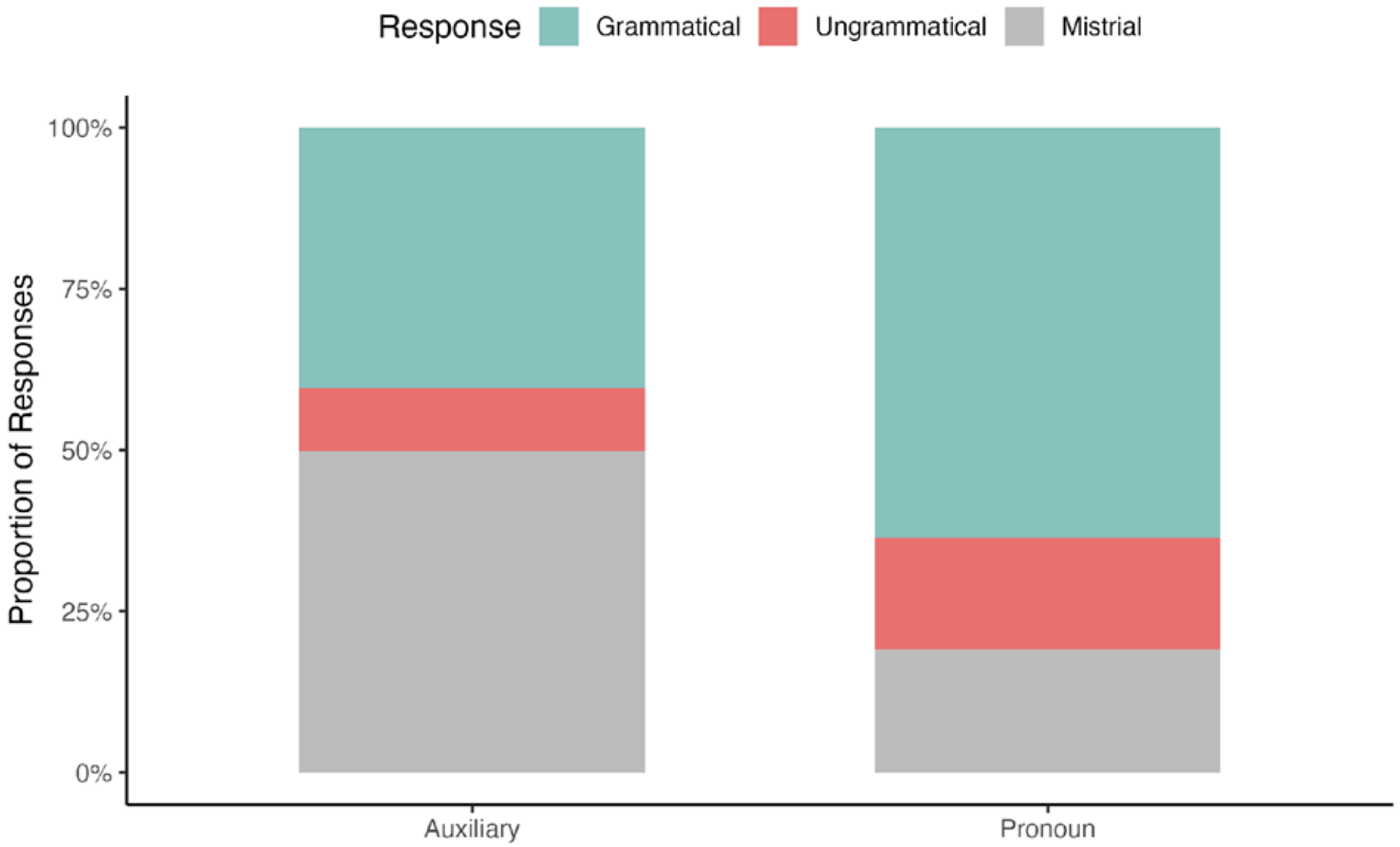
Acceptability Ratings by Condition and Structure



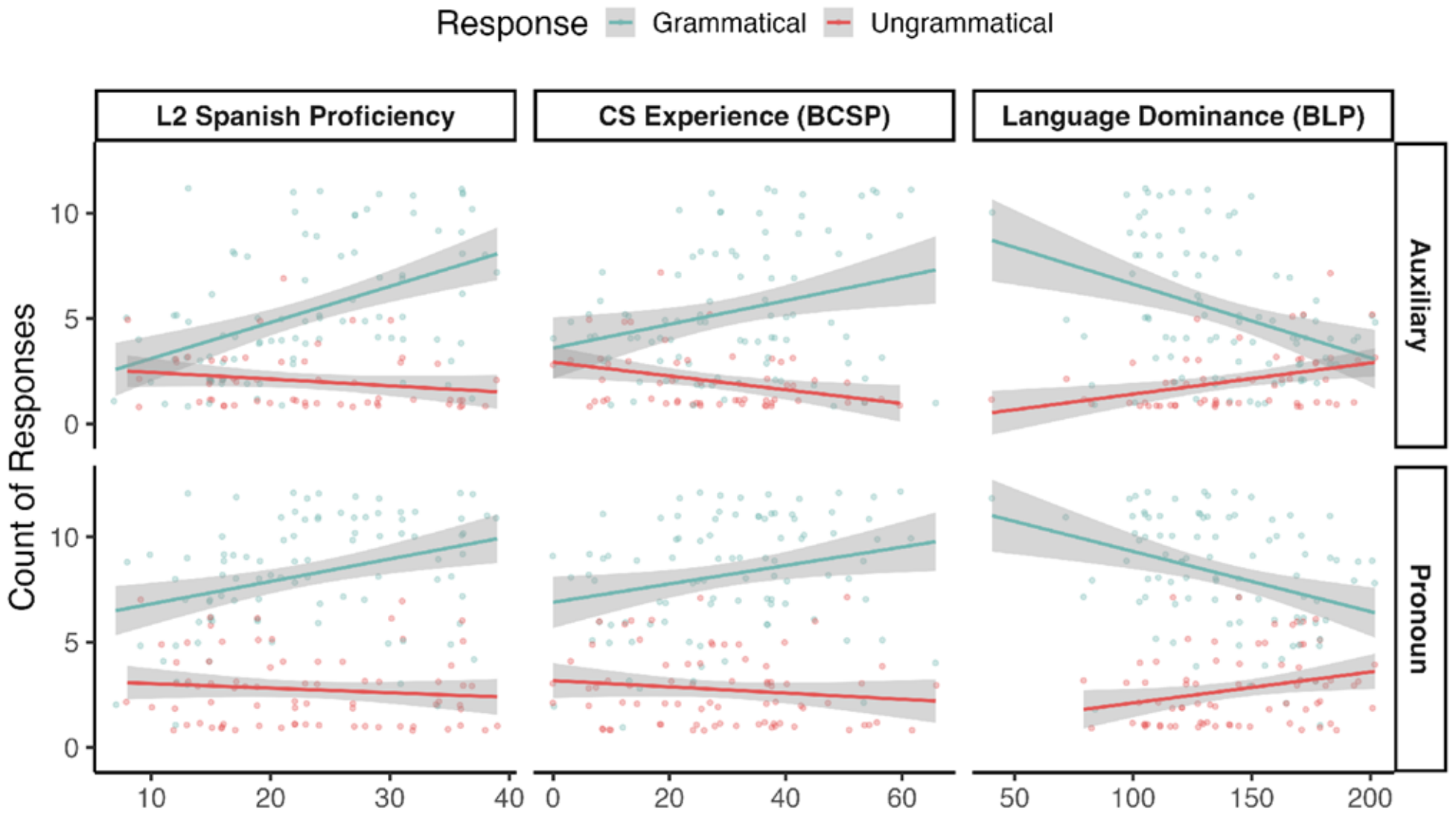
Acceptability Ratings by Proficiency, Experience and Dominance



Proportion of Production Response Types by Condition and Structure



Production Responses by Proficiency, Experience and Dominance



Analysis

- **FOR BOTH TASKS:**
  - Separate models for pronoun and auxiliary structures
  - Each predictor (L2 proficiency, CS experience score, dominance score) tested against a baseline model via likelihood ratio test; then all three combined in one model
- **FOR THE AJT:**
  - Ratings analyzed with cumulative link mixed models (CLMMs; ordinal, Christensen, 2022)
  - Predictors interact with grammatical condition
- **FOR THE EPT:**
  - Binary responses (excluding mistrials) analyzed with logistic mixed models (GLMMs; lme4, Bates et al., 2015)
  - Predictors as main effects only (no grammaticality contrast within the task)

Summary of Significant Effects by Model, Task and Structure

	TASK	STRUCTURE	L2 PROFICIENCY	CS EXPERIENCE (BSCP)	DOMINANCE (BLP)
INDIVIDUAL	AJT	*Auxiliary*	*	*	*
		Pronoun	*	*	*
	EPT	*Auxiliary*	*	*	*
		Pronoun	—	*	—
COMBINED	AJT	*Auxiliary*	*	*	—
		Pronoun	*	—	—
	EPT	*Auxiliary*	*	*	—
		Pronoun	—	—	*

Asterisks indicate a significant effect ($p < .05$), whereas dashes indicate a non-significant effect

Overview of Findings

- Hypotheses were partially supported
- All three predictors were significant, but combined models revealed a division of labor

CS experience matters

- BCSP's effect replicates prior findings (Koronkiewicz, 2018)
- The present study extends this in two ways:
  - CS experience **measured continuously**, not through self-report groups, so the effect isn't an artifact of grouping
  - Evidence that experience **impacts production** too, not just acceptability
- This makes sense: CS experience is the only predictor reflecting direct exposure to switching, consistent with usage-based/constructionist approaches
  - But experience *helps* rather than being *required*, since some low-BCSP participants still showed sensitivity to the constraints, consistent with grammar-based approaches (i.e., acquisition despite limited input)

Why did proficiency matter more for AJT?

- AJT taps grammatical competence more directly, with fewer processing demands (Schütze & Sprouse, 2014)
  - So a more developed L2 grammar shows up clearly in judgments, matching the strong proficiency effects there
- EPT requires retrieval, planning, and choosing where to switch
  - So it reflects bilingual use (e.g., CS experience) more than competence alone

Why dominance underperformed in combined models?

- **Dominance is hard to isolate**
  - In classroom learners especially, dominance is tied to proficiency and CS experience almost by definition
  - In general, lower Spanish proficiency means more English dominance, and more CS means less English dominance
  - BLP also includes self-reported proficiency and language use, so it overlaps with the other two measures
- **Dominance is broad**
  - BLP combines history, use, proficiency, and attitudes into one global score
  - Its predictive power likely comes from components already captured more precisely by the proficiency and experience measures, not from dominance as a separate construct

Additional Findings

- Effects were stronger for auxiliary than pronoun switches
  - Replicates prior findings suggesting such constraints are acquired in stages (Koronkiewicz, 2018)
  - Possibly due to salience: Switching inside the auxiliary-participle unit breaks a tighter construction, while both languages easily allow various material between a subject and its verb
- Results differ from L2 French findings (Koronkiewicz et al., 2026), where CS experience predicted neither judgment nor production patterns
  - Possibly due to exposure: Spanish-English CS is more common in the US context, so Spanish learners' BCSP scores likely reflect real first-hand experience with the phenomenon
  - French-English CS is likely rarer for the US learners, so their BCSP scores may reflect general attitudes toward mixing more than actual experience
  - Also, 201 participants here vs. 54 in the French study

Limitations

- Different groups, so task-based differences may not be based solely on task demands (even though the groups did have comparable backgrounds)
- Both tasks were in the written modality
  - Has been shown not to be an issue in with acceptability (Koronkiewicz & Ebert, 2018), but it's unclear if production patterns may differ
- No early bilingual comparison group included here, so it's unclear how closely late L2 sensitivity approximates community bilingual norms
- The three predictors are directly interrelated, especially in this population
  - Studies with more divergent dominance/proficiency profiles are needed to isolate independent contributions

Conclusions

Late L2 bilinguals **can** acquire structural CS constraints

All three individual-difference measures mattered individually, but **CS experience** seemed to show the most consistent effect overall and **proficiency** was the strongest for acceptability

In combined models, **dominance** was mostly subsumed by the other two factors

OVERALL: How CS knowledge surfaces with late L2 bilinguals depends on both **task** (judgment vs. production) and the **linguistic experience** each bilingual brings

¡Gracias!

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