

# Intra-sentential code switching at the syntax-prosody interface

---

Mandy Cartner & Julia Horvath

May 8, 2025

*CGG34, UNED, Madrid*

# Intra-sentential code-switching (ICS)

ICS is the use of more than one language within a sentence, e.g., (1).

- 1) Los ciudadanos están *supporting the program* Spanish/*English*

The citizens are

‘The citizens are supporting the program’

from López, Alexiadou & Veenstra (2017)

# Intra-sentential code-switching (ICS)

Studies show that ICS is **grammatically constrained**.

- 1) Los ciudadanos están *supporting the program*

Spanish/*English*

The citizens are

‘The citizens are supporting the program’

- 2) \*Tú habías *told that story*

You had

‘You had told that story’

from López, Alexiadou & Veenstra (2017)

# A “null theory” of ICS

We pursue the null hypothesis that bilinguals’ patterns of ICS derive from **general** properties of the Language Faculty, avoiding constraints specific to the practice of ICS.

Mahootian (1993); MacSwan (1999)

This in turn suggests that ICS can provide valuable insight into the organization of grammar.

# Shared syntactic component

Bilingual grammar has a **single syntactic component**:

(Gosselin, 2021; López, 2020; MacSwan, 1999)

- ▶ Syntax is assumed to be uniform across languages (e.g., Chomsky, 2001).
- ▶ ICS may take place between the head and tail of a syntactic dependency.

2) Ich weis nicht, welches Buch Juan compró

German/Spanish

I know not which book Juan bought

‘I don’t know which book Juan bought’

from López et al. (2017)

3) I wonder he bought muet yesterday

English/Korean

what

‘I wonder what he bought yesterday’

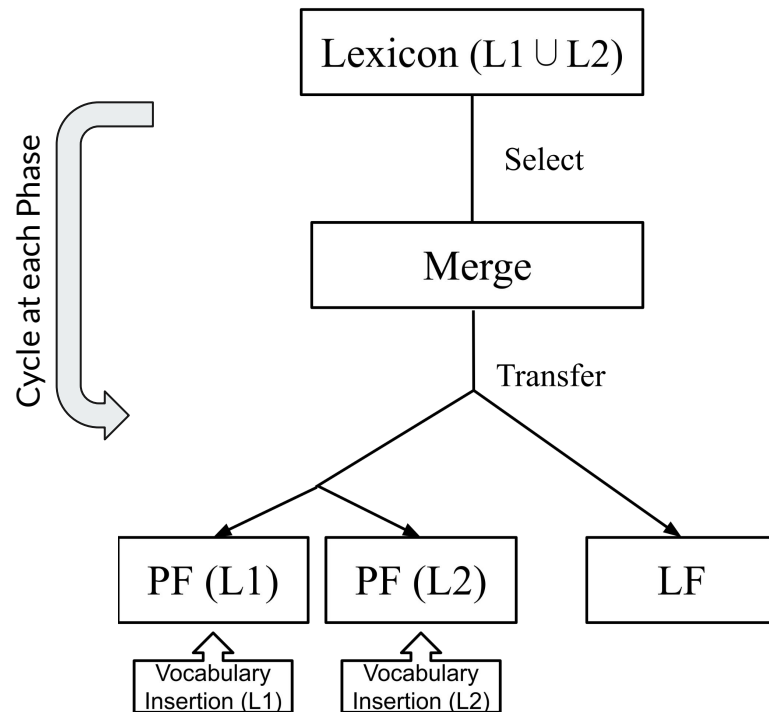
from Finer (2014)

# ICS as a post-syntactic phenomenon

Our proposed Distributed Morphology (DM) model of bilingual grammar:

- ▶ **Shared pre-syntactic lexicon.**
- ▶ **Shared syntax.**
- ▶ **Language-specific PFs:**  
language specific exponence (Vocabulary Insertion)  
and language specific rules (e.g., prosodification, linearization).  
(MacSwan, 1999; Olson, 2019; Gosselin, 2021)

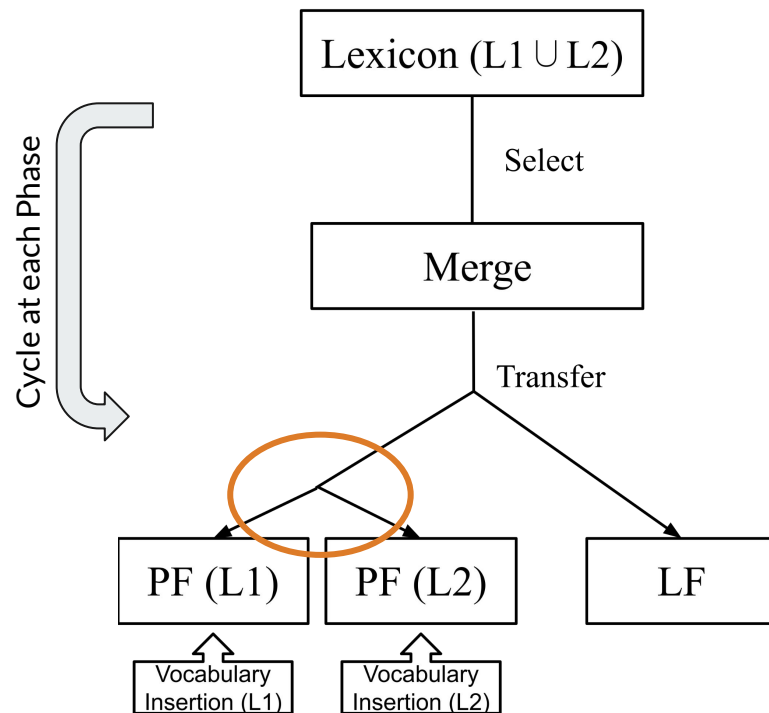
(cf. López, 2020)



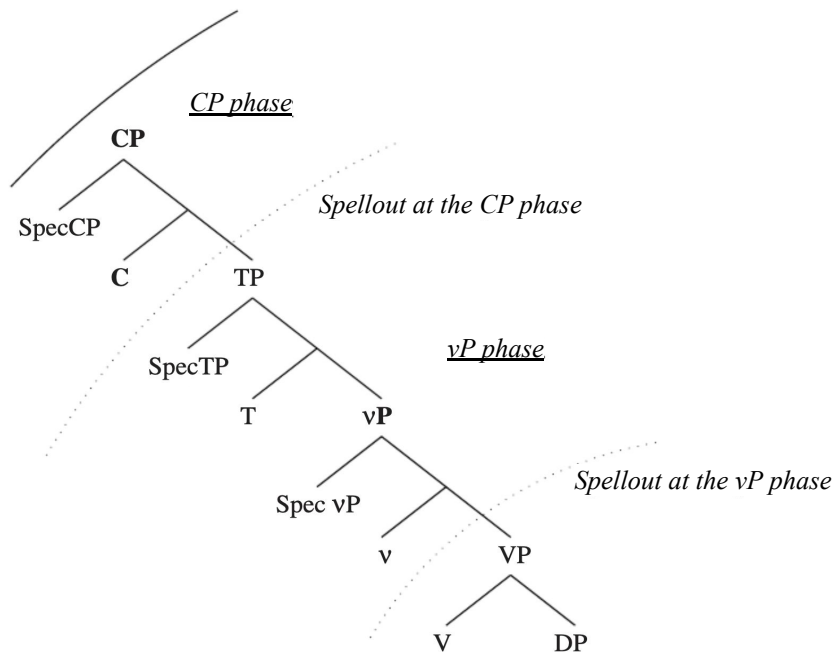
# ICS as a post-syntactic phenomenon

Does the mapping between syntactic structure and phonological form constrain possible ICS junctures?

Can any unit of derivation be divided between two PFs, or must some stay intact, defining a **minimal unit for ICS**?



# ICS by Phase



López, Alexiadou and Veenstra (2017):

**ICS is only possible between phasal complements.**

Each phase head's complement must be **spelled-out in one phonological system**, and thus cannot involve ICS internal to it.



# ICS by Phase

## ICS at the vP phase:

- 4) Los ciudadanos están [*supporting the program*]

Spanish/*English*

The citizens are

‘The citizens are supporting the program’

- 5) \*Tú [*habías told that story*]

You had

‘You had told that story’

from López, Alexiadou & Veenstra (2017)

# ICS by Phase

## ICS at the CP phase:

- 6) Ich weis nicht, [CP welches Buch [TP *Juan compró*]] German/*Spanish*  
I know not which book Juan bought  
'I don't know which book Juan bought'
- 7) \*Ich glaube [CP dass [TP *Juan trabaja en esta fábrica*]]  
I believe that Juan works in this factory.  
'I believe that Juan works in this factory'

from López, Alexiadou & Veenstra (2017)

# ICS by prosodic phrase

We compare López, Alexiadou & Veenstra (2017)'s proposal to an alternative, which will be derived from the proposed model of bilingual grammar:

**ICS by prosodic phrase:** ICS is only possible between *prosodic phrases*.

ICS by prosodic phrase predicts ICS patterns to be **sensitive to prosodic size**: Prosodically dependent material, like function words, should match the language of their host lexical phrase.

# Phase edge predictions

	Phasal complements (spell-out domains)	Prosodic phrases
<i>that</i> + TP	✓	✗
<i>which NP</i> + TP	✓	✓
<i>what</i> + TP	✓	✗

# Methodology

Sporadic judgments often lead to empirical disagreements.

Judgments on ICS vary considerably based on external factors, like the speakers' language background, the modality of presentations, etc.

(Gullberg et al., 2009; González-Vilbazo et al., 2013; Badiola et al., 2017; Koronkiewicz & Ebert, 2018)

Empirical disagreements are difficult to resolve when these factors are not controlled for and reported.

Item ref #	Descriptive boundaries (+ = code switch)	Reported in ...	in disagreement with ...
1a	<i>because</i> + CP	Gumperz 1976	Poplack 1981 Sankoff and Poplack 1981 Mahootian 1993
1b	<i>conj</i> + CP	Gumperz 1976	Poplack 1977 McClure 1981
2	<i>that</i> + IP	Belazi, Rubin and Toribio 1994	Bentahila and Davies 1983 Mahootian 1993
3a	<i>have</i> + VP	Belazi, Rubin and Toribio 1994	Di Sciullo, Muysken and Singh 1986
3b	<i>modal</i> + VP	Belazi, Rubin and Toribio 1994	Di Sciullo, Muysken and Singh 1986
3c	<i>to</i> + V	Timm 1975	Lipski 1978 Poplack 1981 McClure 1981
3d	Aux + V	Timm 1975	Lipski 1978 Poplack 1981 McClure 1981 Mahootian 1993
3e	Neg + V	Timm 1975	
4a	Q + NP	Belazi, Rubin and Toribio 1994	Bentahila and Davies 1992 Mahootian 1993
4b	Demonstrative + NP	Belazi, Rubin and Toribio 1994	Nishimura 1985 Bentahila and Davies 1992 Mahootian 1993
4c	Article + NP	Belazi, Rubin and Toribio 1994	Brown 1986 Bentahila and Davies 1992 Mahootian 1993
5a	N + Adj Adj from Adj- N language, N from N- Adj language	Gumperz 1976 Lipski 1978 Belazi, Rubin and Toribio 1994	Bokamba 1989 Mahootian and Santorini 1996

# Methodology

- ▶ **Auditory judgment tasks:** Sentences were pre-recorded by a Hebrew-English bilingual.
- ▶ All sentences included **multi-word ICS**, to avoid confusion with borrowing.
- ▶ Each study includes 2 experiments:
  - A: Hebrew to English
  - B: English to Hebrew
- ▶ Each experiment included **48 early Hebrew-English bilinguals**, all answered the Bilingual Language Profile questionnaire.

Birdsong et al. (2012)

# Experiments 1A-B: CP edge

## Materials

### *that* complementizer

C-TP mis.

ha-melcarit hodi'a še- *the restaurant is closing soon*  
the-waitress announced that

C-TP match

ha-melcarit hodi'a *that the restaurant is closing soon*  
the-waitress announced

# Experiments 1A-B: CP edge

## Materials

### bare *wh* word

*wh*-TP mis.

ha-mazkira badka mi *is supposed to come in today*  
the-secretary checked who

*wh*-TP match

ha-mazkira badka *who is supposed to come in today*  
the-secretary checked

### lexical *wh* phrase

*wh*-TP mis.

ha-mazkira badka eize mitlamed *is supposed to come in today*  
the-secretary checked which intern

*wh*-TP match

ha-mazkira badka *which intern is supposed to come in today*  
the-secretary checked



# Experiments 1A-B: CP edge

## Results

### *that* complementizer

Participants preferred sentences in which the complementizer **matched** rather than mismatched the language of the embedded clause.

#### Exp 1A: Hebrew to English

Mismatch *avg.* 3.99 / 6

Match *avg.* 4.39 / 6

Est.	Est Err	95% l	95% u
0.38	0.18	0.02	0.74

#### Exp 1B: English to Hebrew

Mismatch *avg.* 4.02 / 6

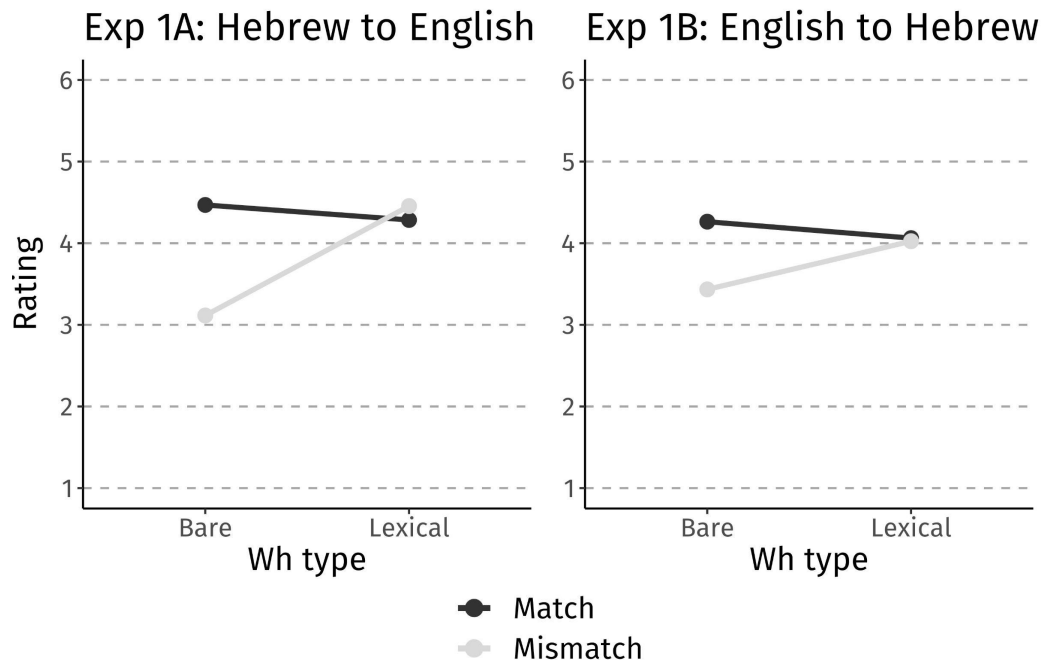
Match *avg.* 4.23 / 6

Est.	Est Err	95% l	95% u
0.22	0.11	-0.01	0.44

# Experiments 1A-B: CP edge

## Results

### *wh*-interrogatives



A bare *wh*-word should match the embedded clause; a lexical *wh*-phrase need not.

Exp 1A– *match*  $\times$  *wh type*:

Est.	Est Err	95% l	95% u
0.33	0.05	0.22	0.43

Exp 1B– *match*  $\times$  *wh type*:

Est.	Est Err	95% l	95% u
0.16	0.05	0.06	0.26

# Phase edge predictions

	Phasal complements (spell-out domains)	Prosodic phrases
<i>that</i> + TP	✓	✗
<i>which NP</i> + TP	✓	✓
<i>what</i> + TP	✓	✗
<i>the</i> + NP	✓	✗

# Experiments 2A-B: DP edge

## Materials

### NP-V match

D-NP mis.

In my opinion, the *nose* *šel ha-xibur dey šanui be-maxloket*  
topic of the-essay somewhat lies in-debate

D-NP match

In my opinion, *ha-nose* *šel ha-xibur dey šanui be-maxloket*  
the-topic of the-essay somewhat lies in-debate

### NP-V mismatch

D-NP mis.

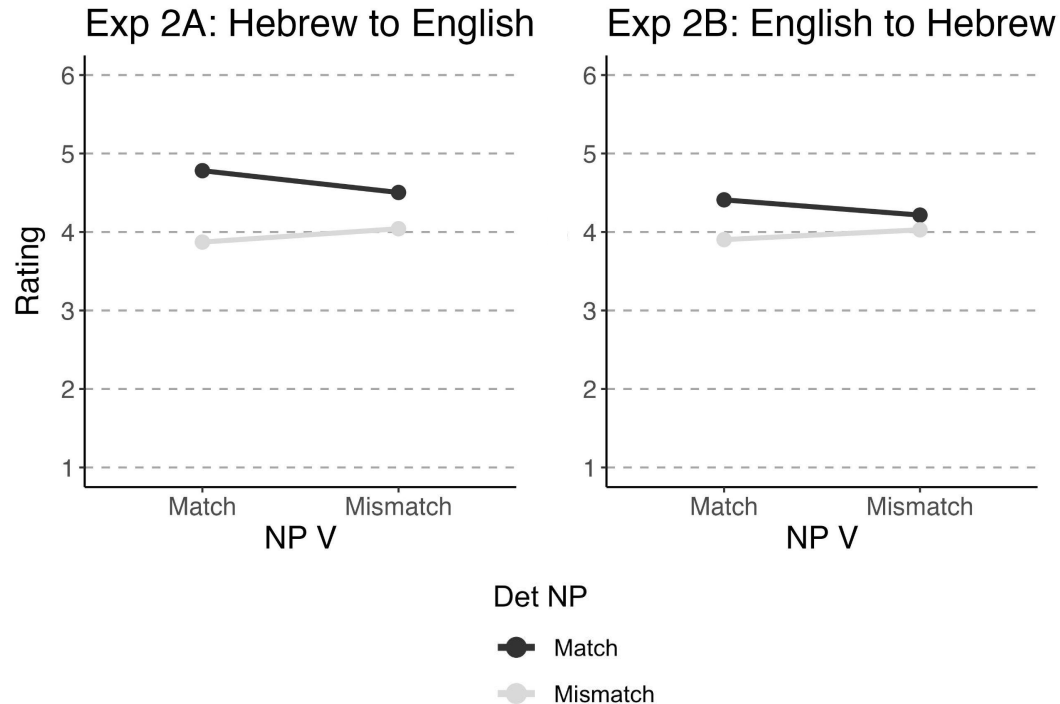
In my opinion, the *nose* *šel ha-xibur* is a little controversial  
topic of the-essay

D-NP match

In my opinion, *ha-nose* *šel ha-xibur* is a little controversial  
the-topic of the-essay

# Experiments 2A-B: DP edge

## Results



Participants prefer the determiner and noun to match in language.

Exp 2A– *Det NP*:

Est.	Est Err	95% l	95% u
-0.29	0.07	-0.44	-0.15

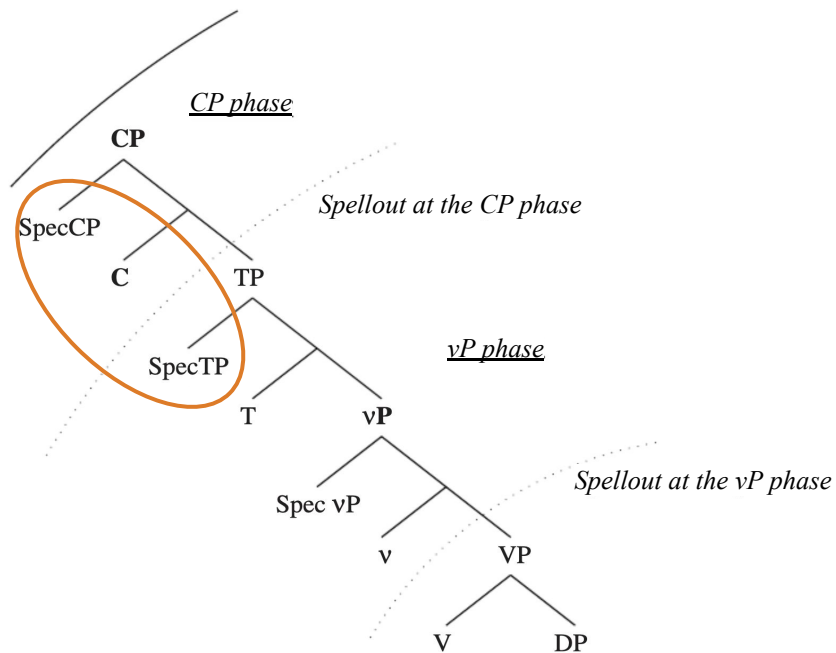
Exp 2B– *Det NP*:

Est.	Est Err	95% l	95% u
-0.13	0.05	-0.23	-0.03

# Phase edge predictions

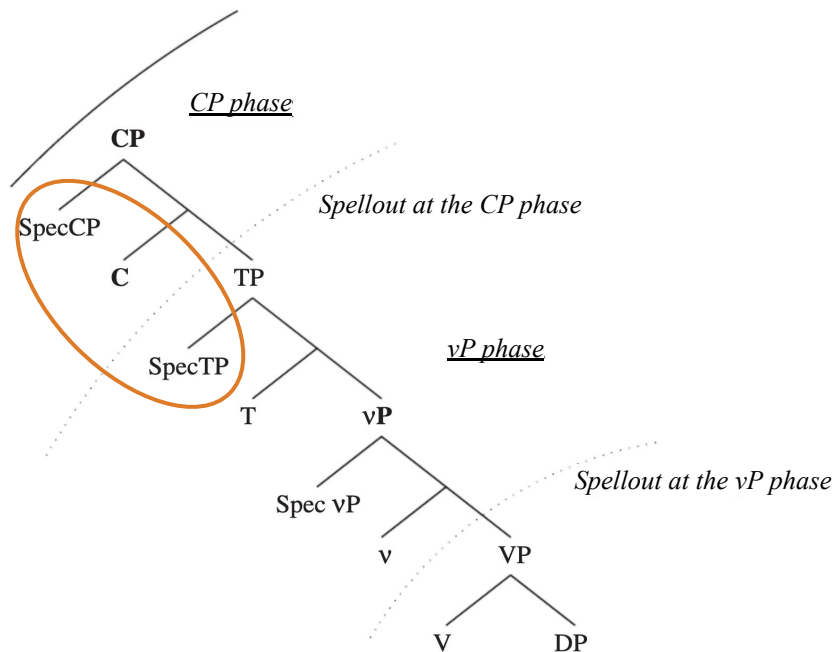
	Phasal complements (spell-out domains)	Prosodic phrases
<i>that</i> + TP	✓	✗
<i>which NP</i> + TP	✓	✓
<i>what</i> + TP	✓	✗
<i>the</i> + NP	✓	✗

# Phases and prosody



The language of functional material at the phase **edge** is determined by the phase's **complement**, despite the assumption that the two belong to separate spell-out domains.

# Phases and prosody



Phonological interactions across the phase edge motivate the idea that **full phases** are sent to spell-out.

Palestinian Arabic:

(8) **ʔinnu** l-mħalme  
that the-teacher

(9) **ʔin**-ha  
that-she

Bošković (2016), example from Shlonsky (1994)



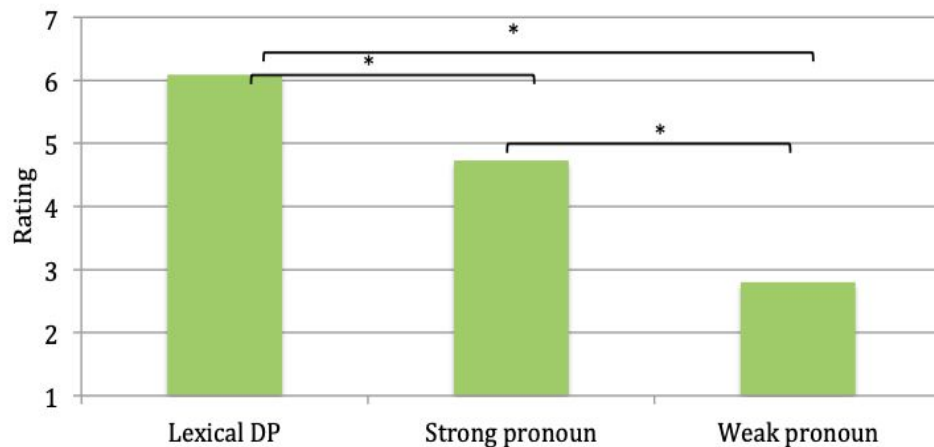
# Pronouns and ICS

ICS between a **pronominal subject and verb** is generally considered degraded.

**Koronkiewicz (2014)** reports that when a subject pronoun is strong- modified, coordinated, stressed, or in a cleft/hanging topic construction- ICS is acceptable.

This suggests that the above constraint is **prosodic**.

We use pronouns to further investigate the relationship between cyclic spell-out and a prosodic restriction on ICS.



# Experiments 3A-B: Pronouns

## Materials

### Finite clauses

*pron-V mis.*

The teacher saw that they *meramim ba-bxina*  
cheat on.the-exam

*pron-V match*

The teacher saw *še-hem meramim ba-bxina*  
that-they cheat on.the-exam

### Non-finite clauses (ECM)

*pron-V mis.*

The teacher saw them *meramim ba-bxina*  
cheat on.the-exam

*pron-V match*

The teacher saw *otam meramim ba-bxina*  
them cheat on.the-exam

# Experiments 3A-B: Pronouns

## Predictions

### Finite clauses

*pron-V mis.*

The teacher saw [that they *meramim ba-bxina*]  
cheat on.the-exam



*pron-V match*

The teacher saw [*še-hem meramim ba-bxina*]  
that-they cheat on.the-exam



### Non-finite clauses (ECM)

*pron-V mis.*

The teacher [saw them *meramim ba-bxina*]  
cheat on.the-exam



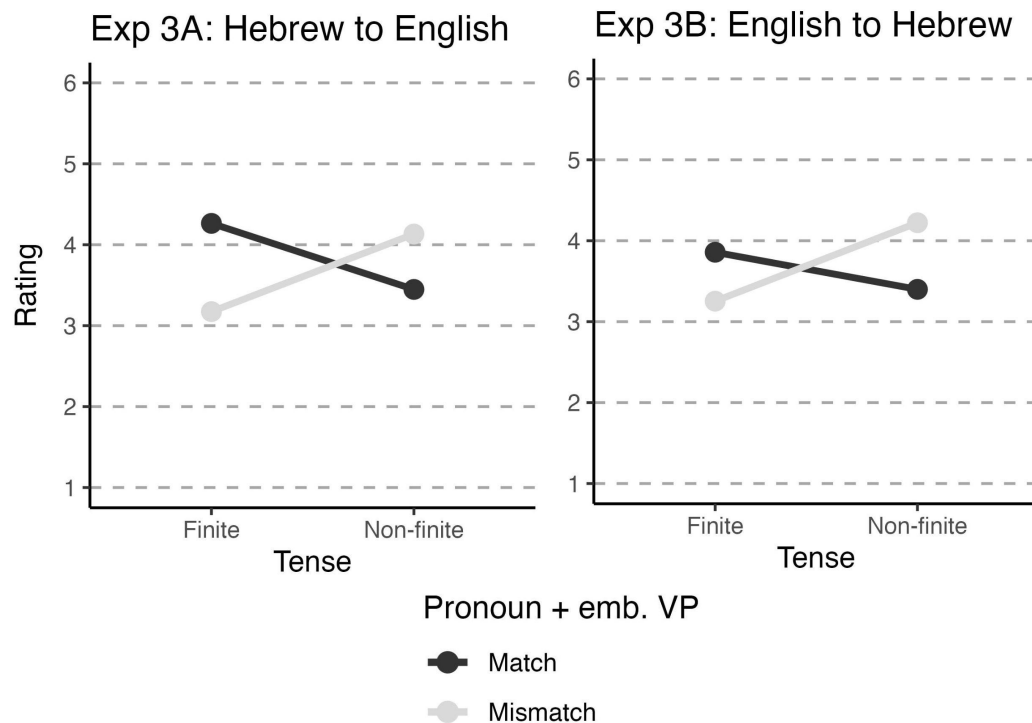
*pron-V match*

The teacher [saw *otam meramim ba-bxina*]  
them cheat on.the-exam



# Experiments 3A-B: Pronouns

## Results



In finite clauses, the pronoun should match the emb. verb; in nonfinite clauses, the pronoun should match the matrix verb.

Exp 3A- *match*  $\times$  *tense*:

Est.	Est Err	95% l	95% u
0.36	0.06	0.24	0.49

Exp 3B- *match*  $\times$  *tense*:

Est.	Est Err	95% l	95% u
0.28	0.05	0.18	0.39

# Discussion

Spell-out domains inadequately predict ICS patterns, contra López et al. (2017).

Instead, our results support the proposal that ICS is only possible between **prosodic phrases**.

The material within each prosodic phrase must be drawn from a **single vocabulary component** due to the application of language-specific rules.

## ? Implementation

VI >> Prosodification	Prosodification >> VI
Intra-p-phrase CS cannot be parsed at later PF stages, leading to a crash. (cf. MacSwan 1999 on intra-word ICS)	Only one vocabulary component may be accessed at each prosodic phrase.

# Discussion

The prosodic restriction we report respects the boundaries defined by *full phases*, rather than *phasal complements*.

This joins a plethora of independent monolingual prosodic phenomena that pose challenges to the classic version of phase theory, challenging the conception of phases as **interface units**, governing locality across modules.

Kratzer & Selkirk (2007); Cheng & Downing (2012);  
d'Alessandro & Scheer (2015); Bošković (2016)

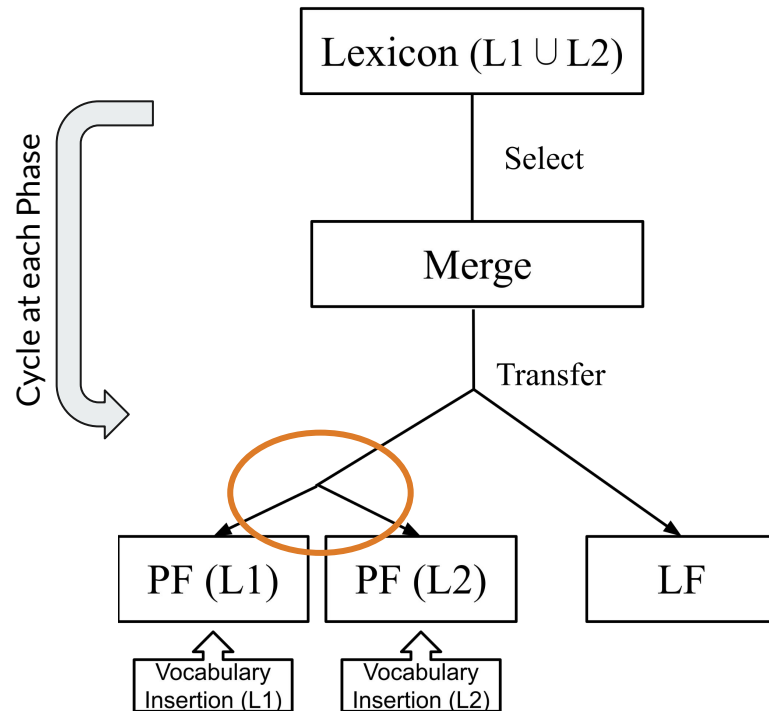
# Discussion

This model of bilingual grammar adheres to a growing line of research that attributes cross linguistic variation to the PF interface.

Chomsky (2019)

Investigation of ICS patterns can help in determining whether cases of cross-linguistic variation should be attributed to PF:

- ? Contrasting word order
- ? Displacement requirements
- ?  $\phi$ -feature agreement



# Thank you!

mandycartner@mail.tau.ac.il

---

Thanks to Gilly Hoffman Even and Nathan Lewin for recording the materials used in our experiments, and to audience at TAU and UMass Amherst for feedback and discussion.



This research was supported by a Collaborative Research Grant from the Cukier-Goldstein-Goren Center for Mind and Language (MILA) (PIs: J. Horvath and A. Meltzer-Asscher 2021-23)

*CGG34, UNED, Madrid*