

# THE PERCEPTION + PRODUCTION OF CLUSTER MISPRONOUNCIATIONS, FOR LISTENERS AND LEARNERS

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“Thanks for getting my  
[spun]!”



L1 adult listeners



L1 child learners



L2 adult listeners

“Thanks for getting my  
[spun]!”

**/spun/**

/pun/ /əspun/

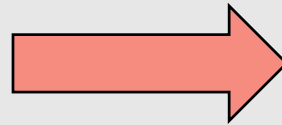
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[spun]

[əs.pun]

**[pun]**

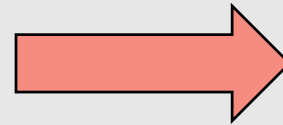
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**[pun]**

**L1 child learners**

*Accurate perception,  
inaccurate production*

L2 adult listeners

# L1 phonology as L2 perceptual filter

Well-known ex: Japanese illusory epenthetic vowels

\* [ebzo] → /e.bV.zo/ (Dupoux et al, 1999)

L2 filtering attenuated in advanced L2 learners...

\* improvement at distinguishing e.g. *sport* ~ *port* ~ *support*  
(esp. Carlson et al, 2018)

Accent accommodation + flexibility

- \* more accent experience, more accommodation
- \* this includes L2 learners!

(Bent and Barlow, 2003;  
Baese Berk et al 2013)

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L1 child learners

**L2 adult listeners**

“Thanks for getting my  
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**[əs.pun]**  
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L1 child learners

**L2 adult listeners**



“Thanks for getting my  
[spun]!”

/spun/  
/pun/  
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**[əs.pun]**  
[spun]  
[pun]

L1 child learners

**L2 adult listeners**

*(sometimes) ... Inaccurate perception*  
*(& actually) ... Accurate production*

**Big RQ: *WHEN* do the factors that influence learners' repairs in production also influence their ability to recognize repairs in perception?**

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With respect to:

- \* ***repair type?*** (deletion vs. epenthesis)
- \* ***repair location?*** (initial vs. medial in cluster)
- \* ***cluster sonority?*** (e.g. s+stop vs. stop+approx)
- Does **lexical status** matter? (real vs nonword)

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- Does **lexical status** matter? (real vs nonword)

And when is the production/perception connection the same for **L1 and L2 learners/listeners?**

# Learning English onset clusters:

## ***Most Common*** production repairs

	Repair type	Repair location	
Child L1	<b>Deletion</b> (epenthesis)		
Adult L2	<b>Epenthesis</b> (deletion)		

### Selected references

Pater and Barlow (2003), Smith (1973); cf. Goad and Rose (2004);  
Carlisle (1994); Broselow (1992); cf. Eckman and Iverson (1993)

# Learning English onset clusters:

## ***Most Common** production repairs*

	Repair type	Repair location, by Sonority	
Child L1	<b>Deletion</b> (epenthesis)	<b>Medial</b> for rising sonority: $/p_1l_2.../ \rightarrow [p_1...]$	<b>Initial</b> for falling sonority: $/s_1p_2.../ \rightarrow [p_2...]$
Adult L2	<b>Epenthesis</b> (deletion)		

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Adult L2	<b>Epenthesis</b> (deletion)	<b>Medial</b> for rising sonority: $/pl.../ \rightarrow [pV.l...]$	<b>Initial</b> for falling sonority: $/sp.../ \rightarrow [Vs.p...]$

### Selected references

Pater and Barlow (2003), Smith (1973); cf. Goad and Rose (2004);  
Carlisle (1994); Broselow (1992); cf. Eckman and Iverson (1993)

# Materials – 2 repair types @ 2 positions

	<b>#CC cluster (no repair)</b>	<b>Initial deletion</b>	<b>Medial Deletion</b>	<b>Initial epenthesis</b>	<b>Medial epenthesis</b>
Real Words	<b>freezer</b>	['ɹizəɹ]	['fizəɹ]	[əf'ɹizəɹ]	[fə'ɹizəɹ]
	<b>snowman</b>	['noumæn]	['soumæn]	[əs'noumæn]	[sə'noumæn]
Nonce words	<b>frugash</b>	['ɹugæʃ]	['fugæʃ]	[əf'ɹugæʃ]	[fə'ɹugæʃ]
	<b>snelack</b>	['nɛlæk]	['sɛlæk]	[əs'nɛlæk]	[sə'nɛlæk]

	<b>#CC cluster (no repair)</b>	<b>Initial deletion</b>	<b>Medial Deletion</b>	<b>Initial epenthesis</b>	<b>Medial epenthesis</b>
Real Words	<b>frog</b>	[ɹag]	[fag]	[əf'ɹag]	[fə'ɹag]
	<b>snake</b>	[neɪk]	[seɪk]	[əs'neɪk]	[sə'neɪk]
Nonce words	<b>freg</b>	[ɹɛg]	[fɛg]	[əf'ɹɛg]	[fə'ɹɛg]
	<b>snace</b>	[neɪs]	[seɪs]	[əs'neɪs]	[sə'neɪs]



# Materials: cluster types

Real Words	Monosyllabic	Bisyllabic
s + C	<b>sp</b> oon	space <b>sh</b> ip
	<b>sch</b> ool	skate <b>bo</b> ard
	<b>sm</b> oke	smil <b>ing</b>
	<b>sn</b> ake	sno <b>wm</b> an
	<b>sl</b> ide	sleep <b>ing</b>
	<b>sw</b> ing	swim <b>ming</b>
Obstruent + approx.	<b>pl</b> ate	plan <b>et</b>
	<b>cl</b> ock	clo <b>se</b> t
	<b>fl</b> ip	flow <b>er</b>
	<b>fr</b> og	free <b>ze</b> r
	<b>p</b> iano	mus <b>ic</b>

Nonce Words	Monosyllabic	Bisyllabic
s + C	<b>sp</b> awl	spig <b>er</b> n
	<b>ske</b> eb	skoov <b>og</b> ue
	<b>sn</b> ace	snel <b>ack</b>
	<b>sm</b> ook	smou <b>lep</b>
	<b>sl</b> in	slays <b>il</b>
	<b>sw</b> ack	swut <b>ack</b>
Obstruent + approx.	<b>pl</b> ag	plauth <b>im</b>
	<b>kl</b> aith	kleeb <b>at</b>
	<b>fr</b> eg	froog <b>ash</b>
	<b>fl</b> ope	flay <b>ben</b>
	<b>py</b> uck	pjave <b>p</b>
	<b>me</b> wd	mja <b>he</b> p

# 1. Nonce word AX discrimination task

One of:

Init.Del. ['ɹʊgæʃ]


Med.Del. ['fʊgæʃ]


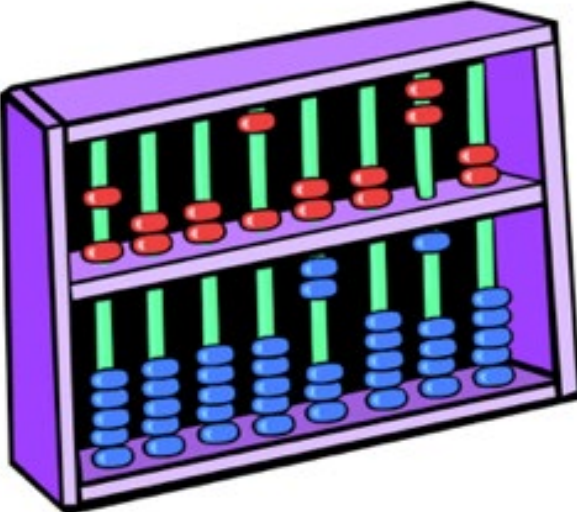

Init. Epen [əf'ɹʊgæʃ]


Med. Epen [fə'ɹʊgæʃ]

or

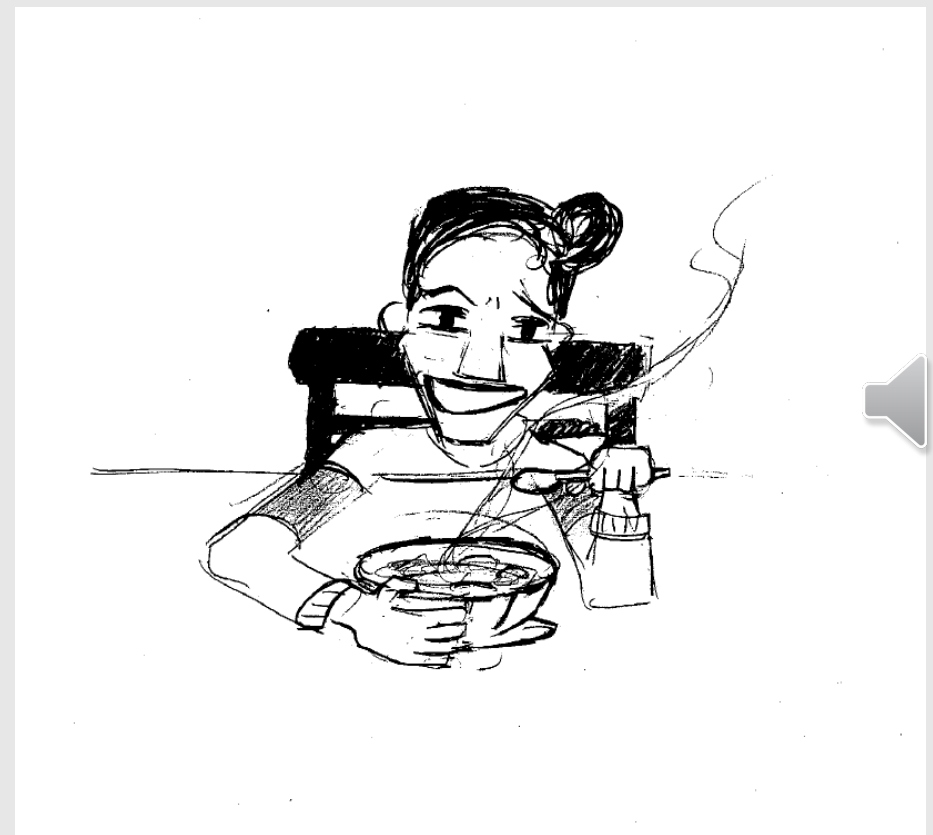
Same: ['fɹʊgæʃ]

 ***Did they say the same thing?***

 ['fɹʊgæʃ]

## 2. Real word production task



### 3. Real word 2AFC acceptability task

**Who said it best?**



['spun]

One of:

Init.Del. ['pun]

Med.Del. ['sun]

Init. Epen [əs'pun]

Med. Epen [sə'pun]

# Participant groups

Monolingual English adults	n = 29	<ul style="list-style-type: none"><li>• Learned English from birth</li><li>• No other language &lt; 3yrs</li></ul>
Bilingual English+ adults	n = 29	<ul style="list-style-type: none"><li>• Learned both languages<ul style="list-style-type: none"><li>- either &lt; 3yrs</li><li>- or &lt; 5yrs and high proficiency self-rating</li></ul></li></ul>
L2 English-speaking adults	n = 51	<ul style="list-style-type: none"><li>• Met the monolingual criteria in another language</li><li>• Enrolled in English-only university degree program</li></ul>
L1 English-learning kids (5-8yrs)	n = 33	<ul style="list-style-type: none"><li>• Learned English from birth</li><li>• No significant exposure to any other language</li></ul>

# Results from Production

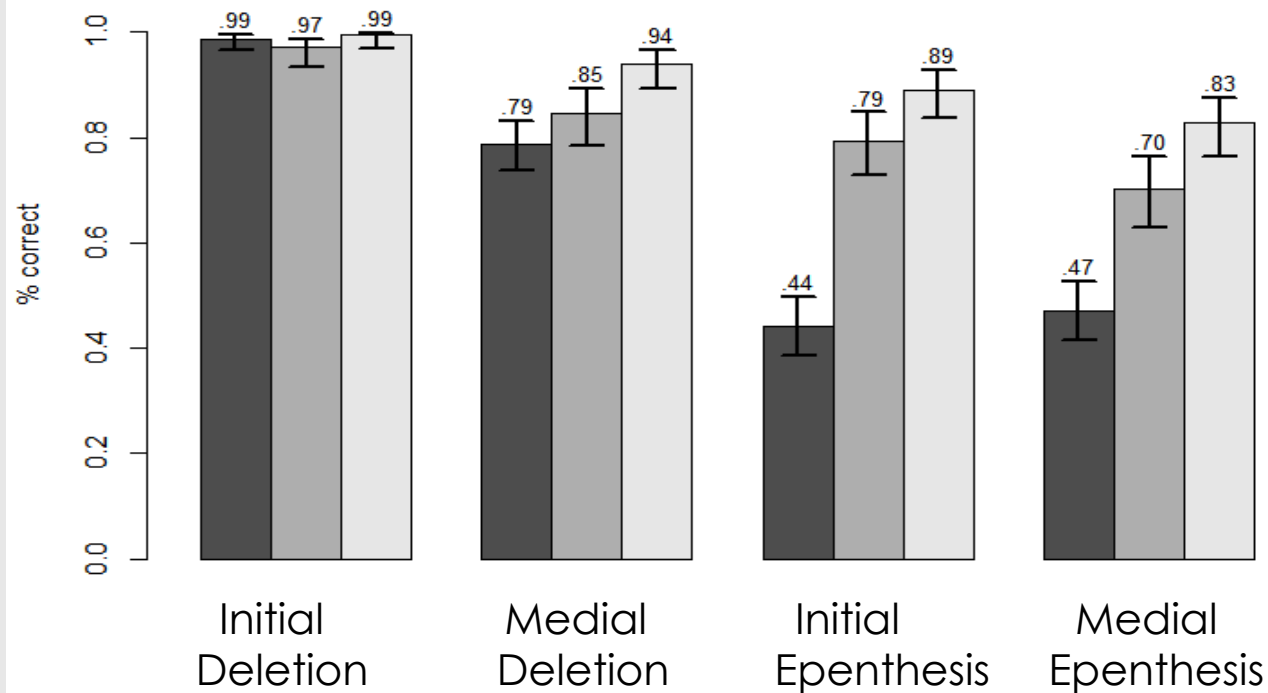
## **... *everyone is proficient***

Adults: < 2% of trials had production errors  
- all seemed like speech errors

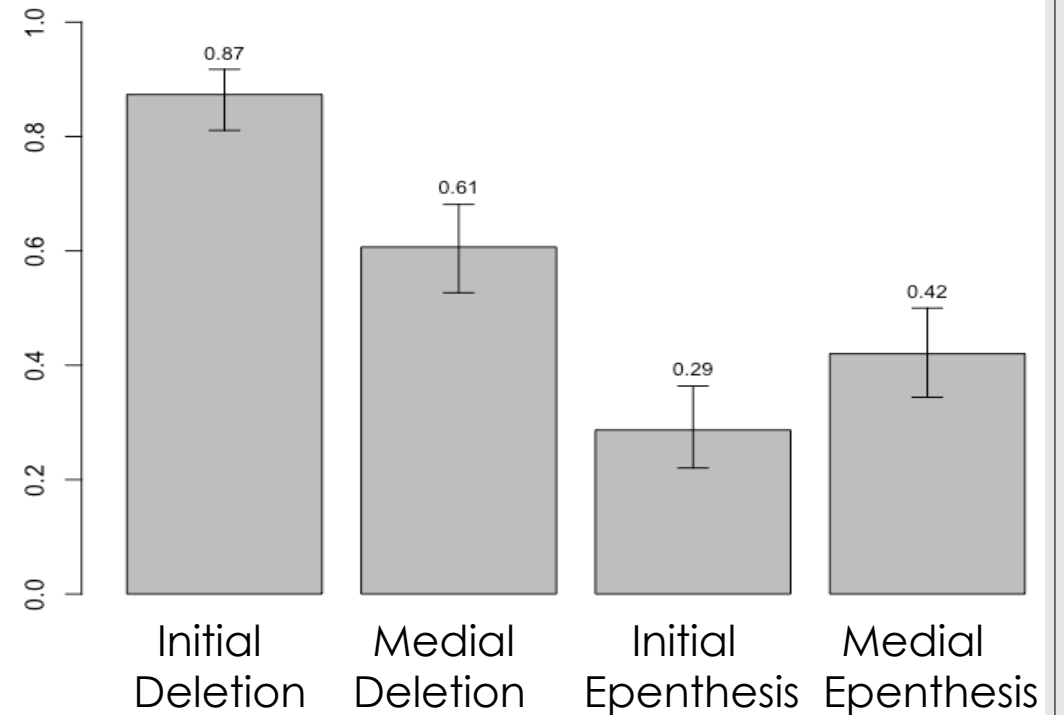
Children: 59/638 productions ( ~7%)  
- 50 were segmental errors ('fweezer')  
- 8 cluster deletions, 1 cluster epenthesis

# Results: Nonword AX discrimination

## Adults



## Children (5-8 yrs)



**L2** **Bilingual** **Monolingual**

	Nonwords (different trials)			
	$\beta$	SE	Z	p-value
<b>Position: Initial</b>	-1.89	0.50	-3.76	<b>0.0002</b>
<b>Change: Epenthesis</b>	0.80	0.27	2.91	<b>0.004</b>
Lg Background: L2	0.38	0.26	1.45	0.14
<b>Lg Background: Mono</b>	-1.10	0.39	-2.81	<b>0.005</b>
Cluster Type: S	0.09	0.11	0.88	0.38
<b>Syllable Count</b>	0.74	0.11	6.63	<b>&lt;0.0001</b>
Who is correct	-0.10	0.11	-0.96	0.33
<b>Position x Change</b>	1.44	0.56	2.55	<b>0.01</b>
Position x Lg: L2	-1.15	0.73	-1.58	0.11
Position x Lg: Mono	-0.51	1.17	-0.44	0.66
<b>Change x Lg: L2</b>	0.68	0.33	2.04	<b>0.04</b>
Change x Lg: Mono	0.41	0.47	0.88	0.38
<b>Pos x Change x Lg – L2</b>	1.71	0.79	2.17	<b>0.03</b>
Pos x Chge x Lg – mono	0.41	1.24	0.33	0.74

## Results: Adult Nonce Words (LMER model)

*What makes a Different pair (cluster vs. repair) more likely to be judged the Same?*

- **initial repairs** overall
- **epenthesis** repairs overall
- ... but more **medial deletion**
- bisyllabic words
- not Monolinguals



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Interactions with lang bkgd:

- **L2 adults** do especially worse with ***epenthesis***
- ... more so with ***initial epenthesis***

# Results: Adult vs. Child Nonce Word Models

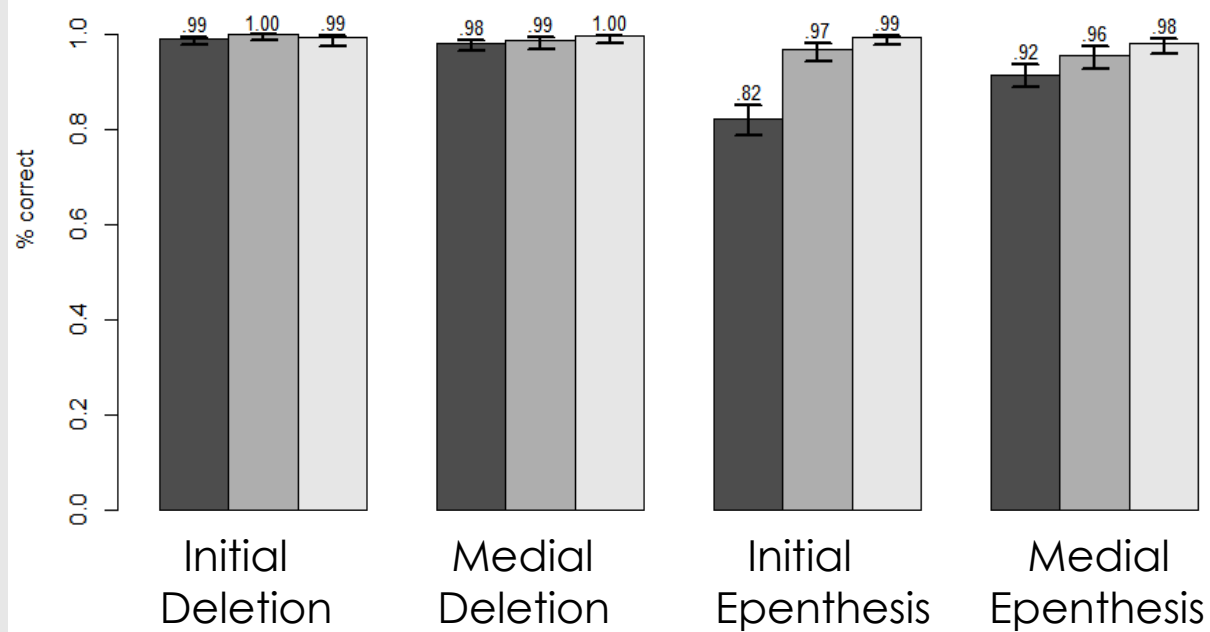
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Change x Lg: L2	0.68	0.33	2.04	0.04
Pos x Change x Lg – L2	1.71	0.79	2.17	0.03

Children	Nonwords (different trials)			
	$\beta$	SE	Z	p-value
<b>Position: Initial</b>	-1.49	0.36	-2.51	<b>&lt;0.0001</b>
<b>Change: Epenthesis</b>	0.75	0.24	3.17	<b>0.002</b>
Cluster Type: S	-0.18	0.18	-0.96	0.34
<b>Syllable Count</b>	0.37	0.19	1.99	<b>0.046</b>
<b>Position x Change</b>	2.09	0.39	5.40	<b>&lt;0.0001</b>

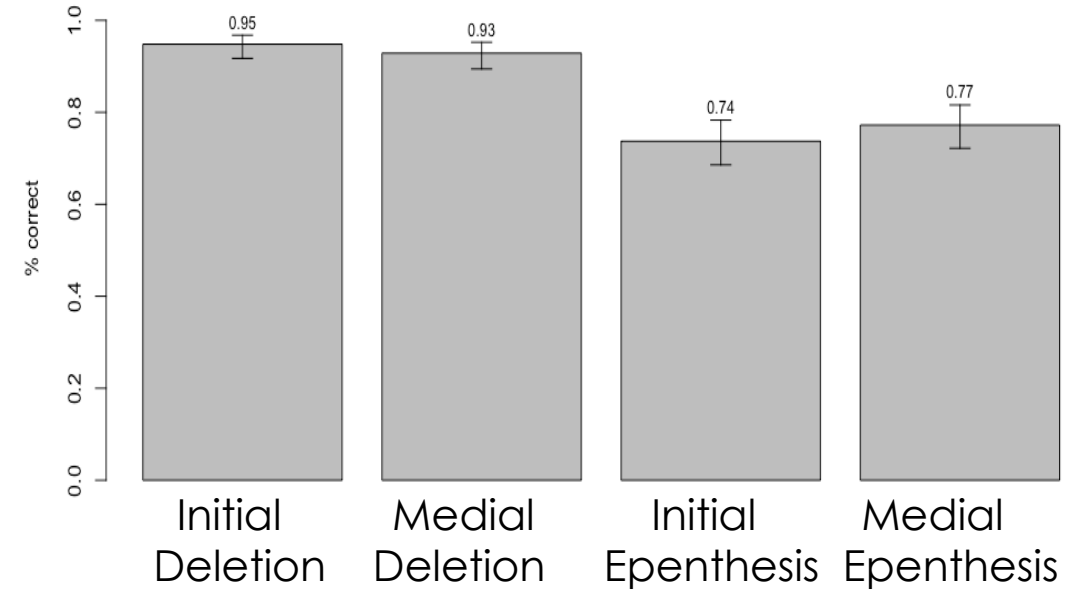
*L1 learning children look quite similar to L2 English-speaking adults*

# Results: Real word 2AFC acceptability

## Adults



## Children (5-8 yrs)



 **L2**       **Bilingual**       **Monolingual**

# Real words: Adults vs. Child Results

Adults	B	SE	Z	p-value
Position: Initial	-14.02	360.97	-0.04	0.97
Change: Epenthesis	1.32	0.58	2.28	<b>0.02</b>
Lg Background: L2	0.35	0.60	0.59	0.56
Lg Background: Mono	-1.42	1.12	-1.27	0.21
Cluster Type: S	-0.65	0.16	-4.10	<b>&lt;0.0001</b>
Syllable Count	-0.03	0.15	-0.17	0.86

Children	B	SE	Z	p-value
Position: Initial	-0.31	0.34	-0.92	0.36
Change: Epenthesis	1.34	0.26	5.13	<b>&lt;0.0001</b>
Cluster Type: S	-0.30	-0.17	-1.83	0.07
Syllable Count	-0.32	0.17	-1.91	0.06
Who is correct: tee	-0.06	-0.17	-0.34	0.74
Position x Change	0.55	0.39	1.40	0.16

*What makes a repair more likely to be incorrectly chosen as 'best'?*

For both groups:

\***epenthesis** repair

\*a **NON sC cluster** (marginal for kids)

# Comparing these results with production repairs

- |                         |   |
|-------------------------|---|
| <b>Repair type:</b>     | <b><i>epenthesis is harder to notice</i></b><br><i>- matches adult L2 production, not child L1</i>  |
| <b>Repair position:</b> | <b><i>medial deletion is harder to notice than initial</i></b><br><i>- matches everybody!</i><br><b><i>initial repairs are overall harder to notice</i></b><br><i>- matches nobody!</i> |
| <b>Cluster type:</b>    | <b><i>overall doesn't matter</i></b><br><i>- matches nobody!</i>  |
| <b>Lexical status:</b>  | <b><i>nonce words make the task far harder</i></b><br><i>- results not coming from 'flexibility'</i>  |

# Conclusions + Future Steps

## **Confirmation:**

*L1 child production repairs, in onset clusters, are mostly unrelated to perceptual biases*

*... L2 adult production repairs are more complicatedly related*

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## Observation:

*L1 child and L2 adult perceptual biases, here, are very similar*

*... **Interpretation:** general result of inexperience with input?*

*... **Q:** irrelevance of cluster sonority?! (cf. Ettlinger, Finn & Hudson Kam, 2012)*

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## **Confirmation:**

*L1 child production repairs, in onset clusters, are mostly unrelated to perceptual biases*

*... L2 adult production repairs are more complicatedly related*

## **Observation:**

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## **The Big Next Goal:**

*How do child L2 learners do in these tasks?*

*... particularly those who are still making production errors?*



# Acknowledgments

*SSHRC Insight Grant 435-2015-0176 awarded to A.M. Tessier + A. Farris-Trimble*

*The SFU Phonological Processing Lab, especially Kevin Kong, Rilla MacDonald, Rachel Wang, Rebekah Gingrich*

*2012 UROP RA program, University of Michigan*

*Audiences at Michigan, Michigan State, UBC, Washington University in St. Louis, AMP 2016 and SRCDD 2019*

*All the participants and their parents!*



# THANK YOU!

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