Using an imitation task and PHON software to study L2 phonological acquisition by young French learners of English

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early stages of phonological acquisition, young learners

- French primary-school learners of English as a foreign language (L2 English)
- three (unrelated) studies, different exposure to English
- 102 Francophone monolinguals, 55 bi/plurilingual children (n=157)
- ages from 6 to 10
- data from four (different) imitation tasks, transcribed with PHON software
- overarching research questions

  characteristics of early L2 English pronunciation

  shared or contrasting characteristics (ages, language profile, learning conditions)

  contribution of phonological learning/ knowledge/ skill to L2 knowledge/ skill

phonological acquisition in early foreign-language (instructed) contexts

psycholinguistic *vs.* language-teaching theories: major disconnect

European Task-based LT/L methodology

(*European Framework for Languages,* 2000 > French national syllabus)

- (obsolete) language-learning theory (*CEF*, ch 6): Chomsky's LAD via Krashen (Hilton 2014, 2021)

  using a language = learning it (the "user-learner")

  by communicating, learner will *pick up* ('acquire') the new formal system
- explicit language exercises (pronunciation, vocabulary, grammar) are unecessary
- native-speaker model rejected (CEF p. 5), esp. for pronunciation

  'identity' value of non-native accent (Perez Cañado 2022)

  Jenkins (2001): minimal intelligibility features of English as a *lingua franca*

NB: production bias - effects of approximate phonology on **comprehension** rarely mentioned/ studied

L1, L2 acquisition research

- acquisition of L1 prosodic features begins before birth (receptive knowledge: Fifer & Moon 1994; Gervain 2018)
- first 12 months (Kuhl et al. 2006; Florin 2019):

  acquisition of L1 phonemic categories (reception)

  concerted effort for articulation of language sounds
- phonological knowledge the basis for lexical/ language acquisition (Christophe et al. 1997)

  brains more 'committed' to L1 phonemes at 8 months >> better language knowledge & skill at age 2 (Kuhl et al. 2008)

  bilinguals: strong, **separate** neural networks for each language's sounds and sound patterns; little or no interference (Pérez et al. 2018)
- in adults: powerful effects of receptive training on acquisition of new phonemic categories, even in adults, long-time LL (Iverson et al. 2003)

L1, L2 acquisition research

- human capacity for imitation – instinctive, universal

  basis for all cultural learning (Tomasello 2016), including language

- importance of visual information in language comprehension and learning

  visual speech = visible articulatory gestures (Hardison 2003)

  neglected in language classrooms/ communicative methodology

  Erdener + Burnham (2005): audiovisual presentation enhances L2 lexical learning

- *foreign*-language phonological acquisition (in classrooms)

  enhanced/ reinforced by exposure to nativelike models (Flege et al. 2003)

  complicated by simultaneous use of orthographic system (more opaque languages and L1/L2 shared graphemes: Escudero 2015; Bassetti 2017; Mairano et al. 2018)

  perception before production -? inconclusive/ mixed findings (influenced by lexical knowledge, L2/L1 GPCs); *both* must be trained (Sakai & Moorman 2018, Messum & Young 2021)

L2 phonological acquisition in young learners

- classroom L2 teaching/ learning: “younger is better” policy/ ideology

  most European countries lowering age for beginning language instruction

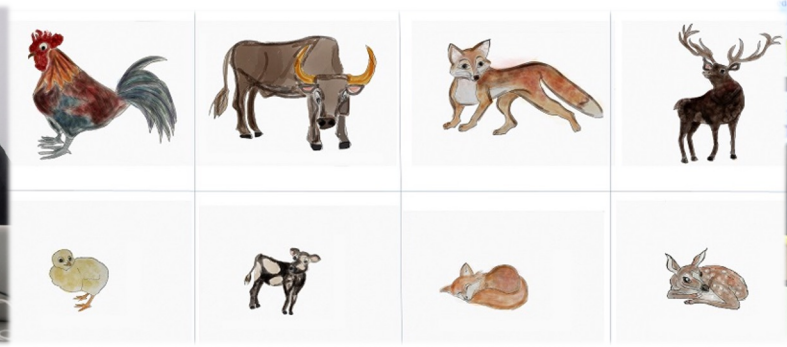
  (usually without accompanying methodology, teacher training, resources: Enever 2018)

- (only) advantage of younger learners: phonological (Muñoz 2007)
  - greater plasticity of phonological networks
  - also less social inhibition, “identity” yet to emerge
- importance of explicit focus on **phonology** in early L2 instruction

  more recent European Commission texts (2018) now make this point

our studies, findings

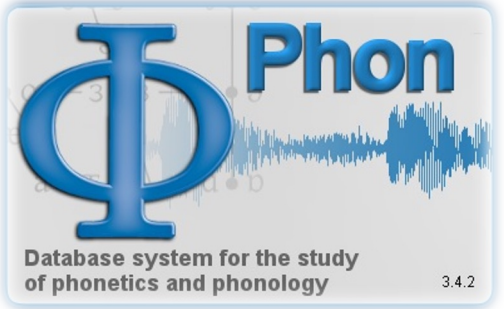
(brief overview)

study	n=	first year of Eng study	LL ages	lang profile	study focus & structure
1	54	CP (Year 1) CE2 (Year 3)	6 (25 LL) 8 (29 LL)	monolinguals (43) bi/ plurilinguals (7) [unknown (4)]	2 schools* (same *regroupement scolaire*); effect of T pronunciation **[part of larger study]**
2	63	CP CE2	6 (25) 8 (38)	monolinguals (26) bilinguals (37)	2 schools; effects of previous exposure and learning condition (presence/ absence of visual speech) **focus of study**
3	[157] 40	[CE2-CM2] CM2 (Year 5)	[7 – 10] 8 (1) 9 (31) 10 (8)	monolinguals (29) bi/ plurilinguals (11)	2 schools (3 total); effects and implementation of immersion learning (CLIL maths) **[part of larger study]**

* all participating schools are public primary schools in urban (Study 2) or periurban communities (Studies 1 & 3)

imitation task + PHON software



- "elicited imitation" task used in SLA research to study general proficiency

  immediate repetition of L2 utterances, increasing complexity

  scored qualitatively by judges (0 to 4 points for each utterance)

  robust measure (Tracy-Ventura et al. 2014 for review)

- learner imitations transcribed with PHON transcription software:

  https://phon.ca (Hedlund & Rose 2020)

  quantitative measures of L2 imitation skill (nb, % phonemes matching "target", etc.)

- powerful tools for studying developing L2 phonology

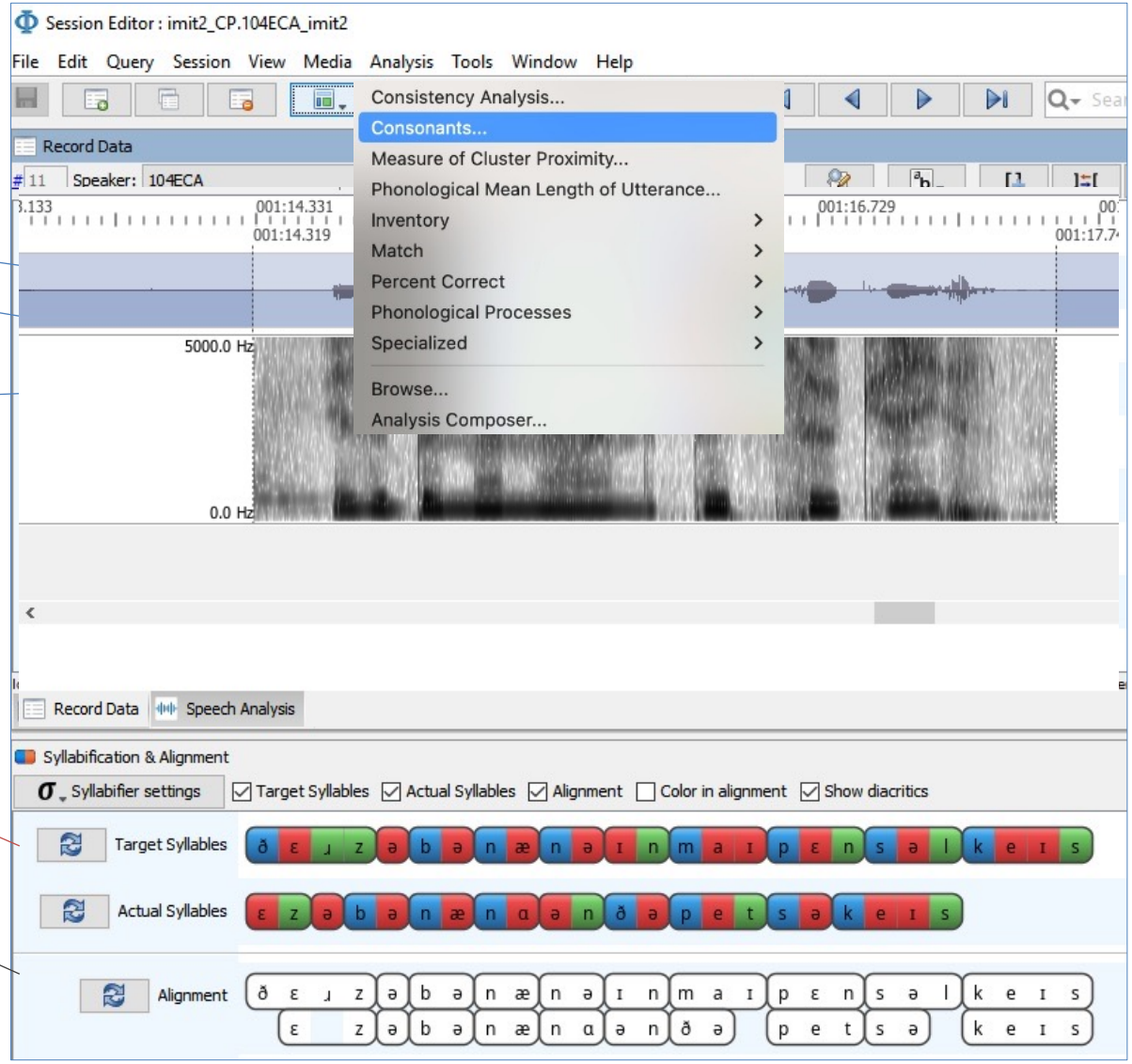
correlations, PHON values with human ratings (study 1, imitation task 1):

- *r*=.68*** nb correct phones
- *r*=.62*** % correct phones
- *r*=.66*** % word matches
- *r*=.58*** % stress match (prosody)

examples, PHON transcription window

1. lexical transcription of target utterances
2. automatic generation of “target” IPA values (edited to correspond to stimuli heard)
3. phonetic transcription of “actual” phonemes produced by learner
   first transcriber anglophone; verification by francophone (Rose 2017)
4. PRAAT incorporated for for fine-grained analysis during transcription
5. automatic phoneme position identification
6. automatic alignment (requiring manual adjustment, due to distance from L1 targets)

some challenges for automatic analyses, since lexical targets not always closely matched by learner imitation



additional information on learners & learning context

	study 1 (years 1 & 3)	study 3 (year 5s)
imitation task	time 1 (Feb), time 2 (May)	time 1 (March) time 2 (cancelled covid)
other English measures	reception: auditory discrimination, listening (in-house test) open production (from pictures)	listening, production (Cambridge *Starters* tests)
learner variables	L1 verbal (French vocabulary, listening) cognitive measures (digit span, reverse DS, attention, nonword repetition) socio-affective profile (year 1 only) motivation for English, language profile	Math grades, French grades cognitive profile (result of psychometric testing: dyslexic, dyscalculic, learning difficulties, normal) motivation for English, language profile
institutional variables	teacher interviews three weeks of filmed lessons (each classroom), transcribed and coded (interactions)	focus group; pre-/ post-questionnaires, regular group exchanges (in CLIL teacher training context)

study 2 (years 1 & 3)
single word repetition task, 1 week after group word-learning intervention
word recognition, recall, auditory discrimination
cognitive measures (digit span, sustained attention) teacher rating of L1 reading skill language profile (parental questionnaire)

study 1 – *Seine&Marne Primary English Corpus*

Year 1: 25 learners (15 girls, 10 boys)

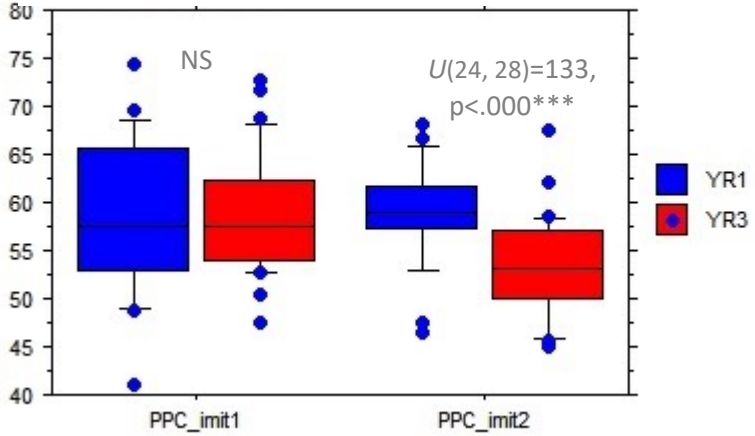
- 20 mins of English (first subject), 4 days/ week
- linguistically confident teacher (English major), near-native phonology
- insistence on Anglophone pronunciation of new words (rejection of approximations, focused imitation)
- approx. 2000 words per week produced by T (MLU 2.8), 700 by learners (60% group prod)

Year 3: 29 learners (15 girls, 14 boys)

- 45 mins of English, 2 days/ week
- teacher linguistically unsure, in particular her pronunciation in particular (structured interview)
- little classroom focus on pronunciation
- approx. 1000 words per week produced by T (MLU 2.3), 400 by learners (70% individual prod)

imitation stimuli derived from filmed lessons
imitation 1 task in mid-February (16 target utterances)
imitation 2 in late May (12 target utterances, 6 from imit1)

imitation in February and May, by class
(percent phonemes 'correct')



difference due to vowel sounds $U_{(24,28)}=76$; p<.000***

Yr1 learners	59.5% vowels correct (range 44.4-70.3)
YR3 learners	48.8% vowels correct (range 38.6-58.6)

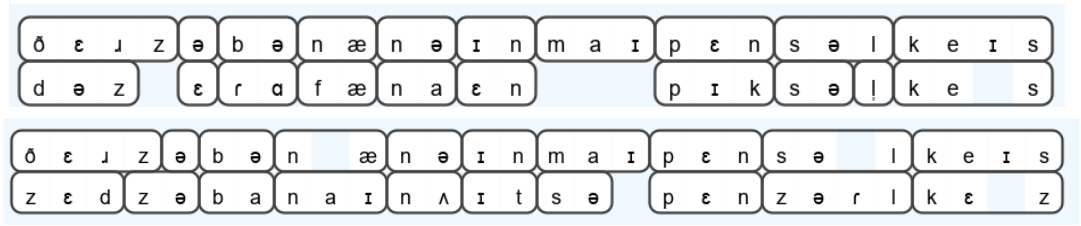
phonological consistency; development over time

first word of *who are you?* in February, by class (four months of English)

Session	Speaker	Record #	Orthography	IPA Target	IPA Actual
imit1_CP.104ECA_imit1	104ECA	9	who	ˈhuː	ˈhuː
imit1_CP.106JD_imit1	106JC	9	who	ˈhuː	ˈhuː
imit1_CP.107BF_imit1	107BF	9	who	ˈhuː	ˈwiː
imit1_CP.109ANG_imit1	109ANG	9	who	ˈhuː	ˈhuː
imit1_CP.111OL_imit1	111OL	9	who	ˈhuː	ˈhuː
imit1_CP.112DL_imit1	112DL	9	who	ˈhuː	ˈhuː
imit1_CP.113CMT_imit1	113CMT	9	who	ˈhuː	ˈhuː
imit1_CP.114OO_imit1	114OO	9	who	ˈhuː	ˈhuː
imit1_CP.115MO_imit1	115MO	9	who	ˈhuː	ˈhu
imit1_CP.116MPA_imit1	116MPA	9	who	ˈhuː	ˈhuː
imit1_CP.117EP_imit1	117EP	9	who	ˈhuː	ˈhuː
imit1_CP.119MPO_imit1	119MPO	9	who	ˈhuː	ˈhuː
imit1_CP.122RR_imit1	122RR	9	who	ˈhuː	ˈhuː
imit1_CP.123PS_imit1	123PS	9	who	ˈhuː	ˈhuː
imit1_CP.124ET_imit1	124ET	9	who	ˈhuː	ˈhuː
imit1_CP.125AV_imit1	125AV	9	who	ˈhuː	ˈhuː

Session	Speaker	Record #	Orthography	IPA Target	IPA Actual
imit1_CE2.201LA_imit1	201LA	9	who	ˈhuː	ˈuː
imit1_CE2.202TB_imit1	202TB	9	who	ˈhuː	ˈwiː
imit1_CE2.203IB_imit1	203IB	9	who	ˈhuː	ˈhuː
imit1_CE2.204PB_imit1	204PB	9	who	ˈhuː	ˈfouː
imit1_CE2.206MCO_imit1	206MCO	9	who	ˈhuː	ˈho
imit1_CE2.208SDU_imit1	208SDU	9	who	ˈhuː	ˈʧuː
imit1_CE2.209AND_imit1	209AND	9	who	ˈhuː	ˈhjuːˀ
imit1_CE2.210MGI_imit1	210MGI	9	who	ˈhuː	ˈhuː
imit1_CE2.211DGU_imit1	211DGU	9	who	ˈhuː	ˈhuː
imit1_CE2.212AJ_imit1	212AJ	9	who	ˈhuː	ˈuː
imit1_CE2.213CL_imit1	213CL	9	who	ˈhuː	ˈuː
imit1_CE2.214JL_imit1	214JL	9	who	ˈhuː	ˈho
imit1_CE2.215CMN_imit1	215CMN	9	who	ˈhuː	ˈhuː
imit1_CE2.216EM_imit1	216EM	9	who	ˈhuː	ˈhoʊ
imit1_CE2.217PO_imit1	217PO	9	who	ˈhuː	ˈhuː
imit1_CE2.218FP_imit1	218FP	9	who	ˈhuː	ˈho
imit1_CE2.219MPF_imit1	219MPF	9	who	ˈhuː	ˈhuː
imit1_CE2.220JP_imit1	220JP	9	who	ˈhuː	ˈuː
imit1_CE2.221AR_imit1	221AR	9	who	ˈhuː	ˈhuː
imit1_CE2.222AS_imit1	222AS	9	who	ˈhuː	ˈhuː
imit1_CE2.223VV_imit1	223VV	9	who	ˈhuː	ˈho
imit1_CE2.224QZ_imit1	224QZ	9	who	ˈhuː	ˈhʌ
imit1_CE2.225TBL_imit1	225TBL	9	who	ˈhuː	ˈhuː

	Seine&Marne items in May	nb_sylls	target_ phones	corr_ min	corr_ max	Year 1 PPC	Year 3 PPC
1	four boys	2	7	2	7	71,4	76,7
2	who are you?	3	6	1	6	75,0	58,0
3	six pencils	3	11	4	11	78,0	75,4
4	seven books	3	9	6	9	91,7	86,0
5	how old are you?	4	11	3	10	63,3	65,3
6	today is Thursday	5	14	3	12	59,5	53,7
7	there's a monkey on the table!	8	20	0	16	60,4	44,1
8	there's a banana in my pencil case!	10	26	0	18	53,5	44,2
9	I like chocolate	4	12	5	12	83,3	69,1
10	would you like an orange?	6	16	0	13	54,7	49,1
11	we need some eggs	4	11	0	9	44,7	45,5
12	is everybody ready? (CP) do you like jam on your pancakes? (CE)	7 8	14 24	0 7	12 20	42,9	54,2



Year 3 learner in Feb in May

there's a banana in my pencil case!

effects of lexical knowledge (content words); development of function words

EMILE-Gex corpus (imitation task data a subset of two Year 5 classes: same school, avg age 9;6 in both classes) – immersive L2 learning

Year 5, class A: 20 learners (11 girls, 9 boys)

- 1h30 English lessons + 6h CLIL (Sports, Math & Art)
- teacher: school principal with 15 yrs experience, B2 level in English
- 4 bi/plurilinguals (2 with English)
- 1 dyslexic, 5 learning difficulties, 1 Deaf

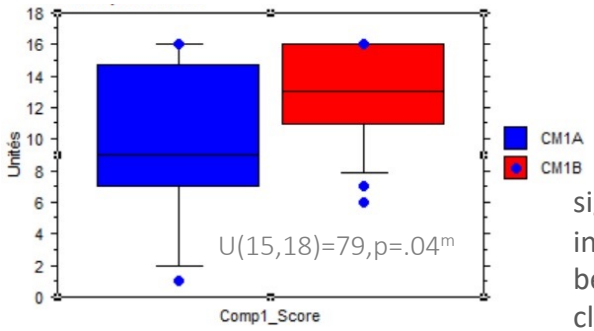
Year 5, class B: 20 learners (14 girls, 6 boys)

- 1h30 English lessons + 6h CLIL (Sports, Math & Art)
- teacher: 6 yrs experience, English major, C2 level in English; instigator of CLIL program in her school
- 6 bilinguals (3 with English)
- 2 dyslexics, 1 learning difficulties

for analyses, 2 boys' files removed from class A (technical problem + Deaf learner); Anglophone LL removed from most analyses

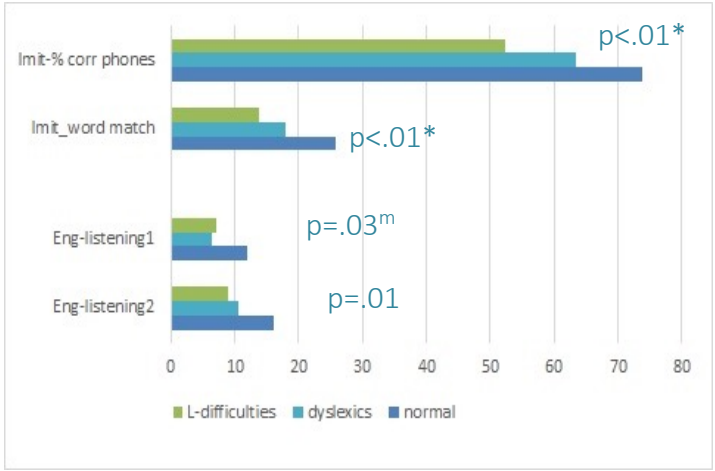
imitation stimuli derived from planned curriculum (math lessons)
imitation task in mid-March (11 target utterances), with no follow-up ☹

English listening 1 scores, by Year 5 group



significant differences in imitation results between the two classes disappear when children with learning difficulties are removed

Imitation and other measures, by cognitive profile



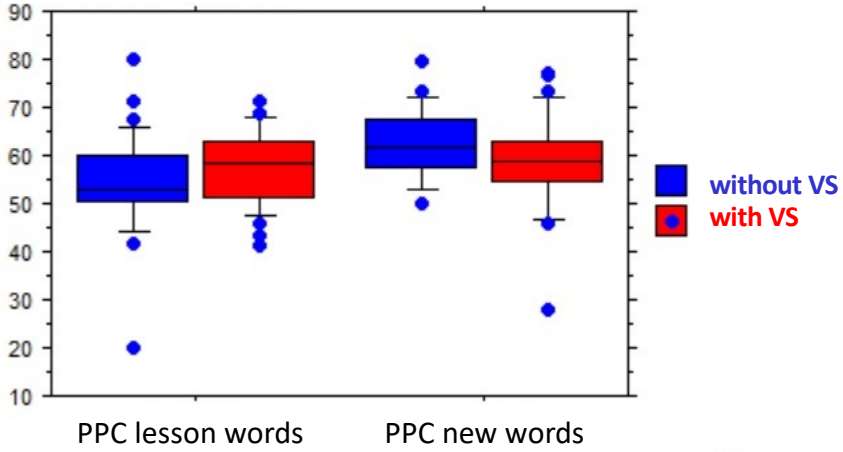
Correlations between imitation and L2 listening

	with Anglophones *r* =	without Anglos *r* =
Listening 1 and imitation (% correct **phones**)	.73***	.63**
Listening 1 and imitation (% correct **vowels**)	.73***	.62**
Listening 2 and imitation (% correct **phones**)	.572**	.50*
Listening 2 and imitation % correct **vowels**	.51**	.42m (p=.03)
Listening 1 and imitation prosody (% **stress match**)	.75***	.65***

Visual Speech project

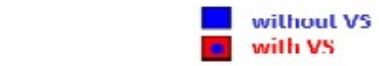
- 23 girls, 31 boys – 2 schools, Year 1 & Year 3
- word-learning paradigm with total beginners (6 year-olds in October), and post-beginners (8 year-olds in May)
- group learning paradigm: picture slides, each word heard 6 times, repeated out loud 5 times;
  in 'Visual Speech' condition, audiovisual vignette added to learning slide (10 minute learning protocol)
- word-repetition (imitation) task, 1 week after learning protocol: 8 lesson words, and 8 new (unknown) words

no effect of condition on imitation measures:

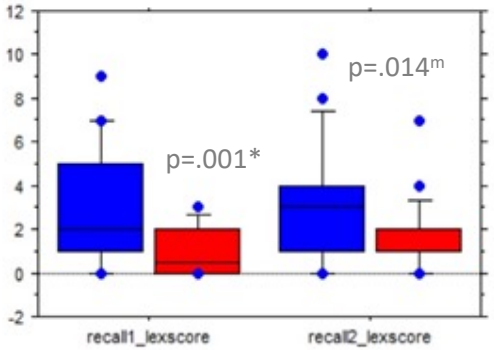


but interesting things going on, phonetically (whole group)

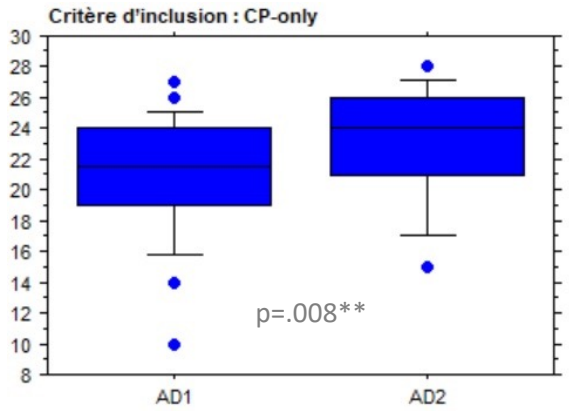
	repetition **lesson words**	repetition **new words**	*Wilcoxon signed ranks*
phones correct	54.3	61.8	K<U (z=-3.26, p=.001)
vowels correct	50	38.5	K>U (z=-3.5, p<.000***)
consonants correct	58.6	71.4	K<U (z=-6.5, p<.000)



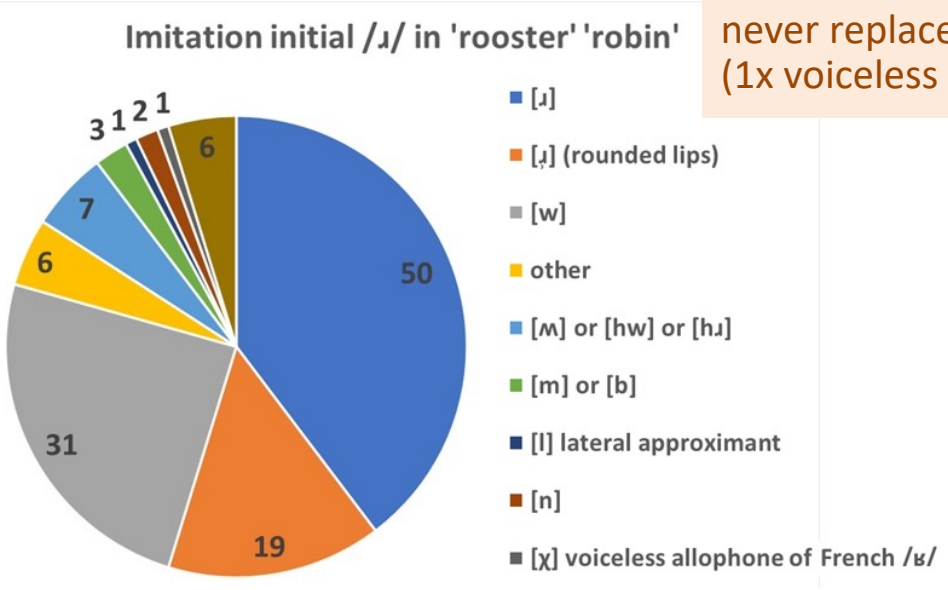
[Visual Speech paradigm has a negative effect on productive recall – but not on word recognition]



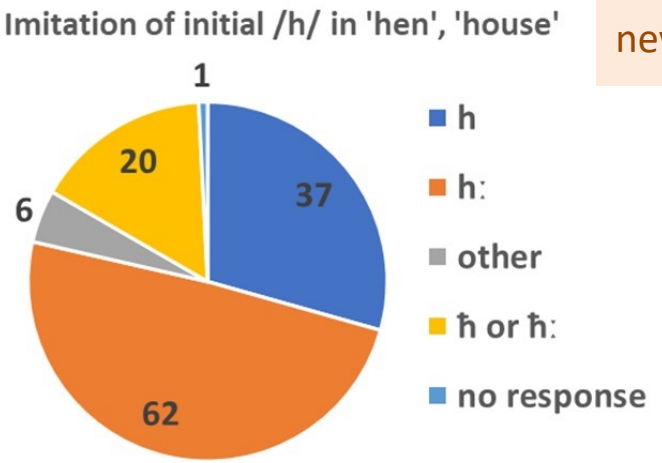
interesting effect of word-learning paradigm on **auditory discrimination task** for young beginning learners (2 weeks pre/ immediate post)



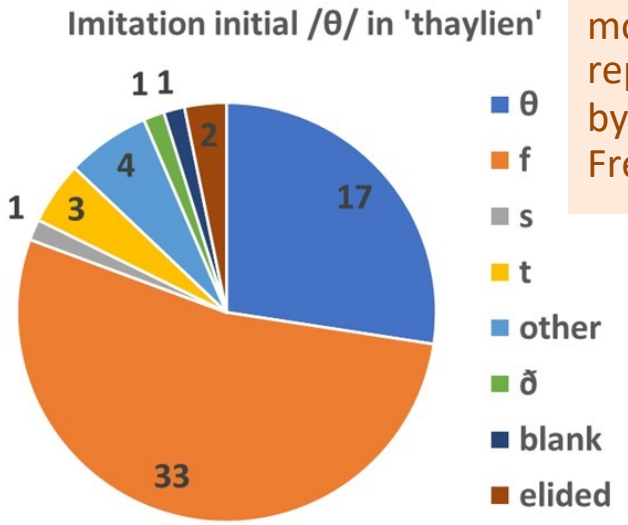
consonants in early development



never replaced by French rhotic [ʁ] (1x voiceless variant [χ])

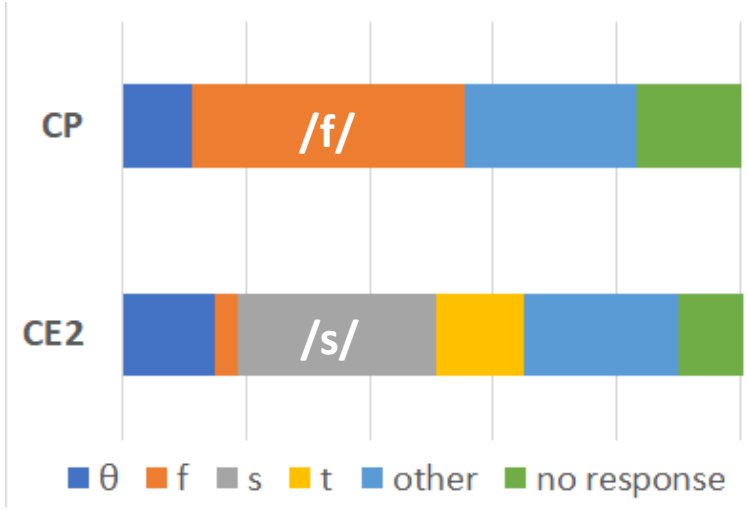


never elided!



most frequently replaced by [f], rarely by [s] (frequent in French EFL)

Seine&Marne realizations of /θ/ in *thursday*



final remarks

- data begging for multivariate analyses, detailed analyses of outliers/ individuals with particular cognitive, linguistic or social profiles (Complex Dynamic Systems paradigm)
  - hidden structure in interactions between multiple variables
  - good projects/questions: concerning identity, affinity with target culture, ability/ inability to perceive/ generate new phonemic categories, L1 imitative skill, etc.
- essential to look at fine-grained phonetic and prosodic characteristics of learner productions, if we want a full picture of the dynamic processes at work in language acquisition (>> effects on perception & listening)
- problems still to be sorted with automatic item analyses in PHON version 3.4.2, due to changes in transcription conventions
  - invitation for collaborators: our data is your data!

Thank you

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PHON Consistency Analyses (*en attente*)

PHON Consistency analyses: 4 categories of phonemes

- Accurate & Consistent
- Inaccurate & Consistent
- Accurate & Inconsistent
- Inaccurate & Inconsistent