L2 re-categorization of an ‘old’ phonological contrast

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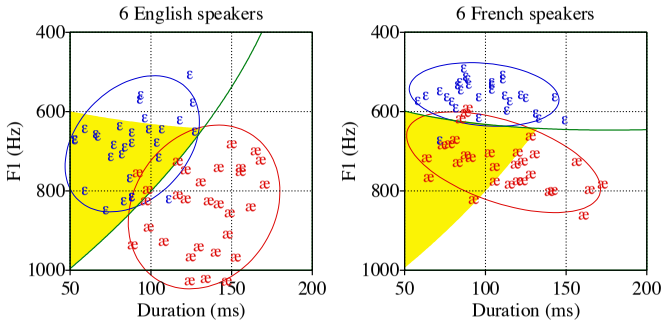
Abstract

Canadian French (CF) natives, Canadian English (CE) natives, and CE learners of CF provide evidence for the following:
A. Cue trading in perception reflects relative cue use in production.
B. Listeners use their native cue trading to classify foreign speech.
C. L2 learners gradually adapt their cue trading to the target language.

A1. NATIVE PRODUCTION OF CE AND CF /æ/ AND /ɛ/

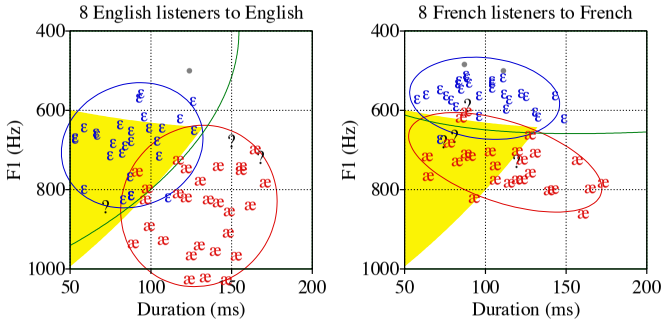


(ellipses: 2σ contour of Gaussian fit; green: equal likelihood curve; yellow: region of difference)

- 3 male and 3 female speakers for each language.
- 5 CVC contexts: *bVk*, *bVg*, *bVs*, *sVk*, *vVst*.
- average F1 made equal for males and females (multiplication or division by 1.09024).

Interpretation:
- for the CF /æ/-/ɛ/ contrast, native speakers use the F1 cue only.
- for the CE /æ/-/ɛ/ contrast, native speakers use both F1 and duration.

A2. NATIVE CATEGORIZATION OF CE AND CF /æ/ AND /ɛ/

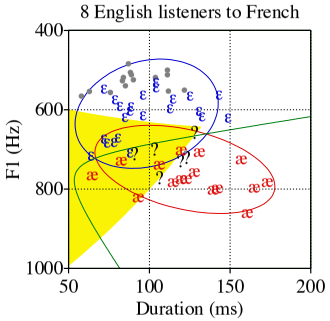


(red: 6 to 8 /æ/ responses; blue: 6 to 8 /ɛ/ responses;
? = 6 to 8 mixed /æ/+/ɛ/ responses; • = less than 6 /æ/+/ɛ/ responses)

- CE listeners chose from /æ/ (*at*) /ɛ/ (*pet*), /e/ (*say*), /ɪ/ (*it*), /i/ (*see*).
- CF listeners chose from /æ/ (*bace*), /ɛ/ (*bèss*), /e/ (*bé*), /ɪ/ (*biss*), /i/ (*bise*).

Interpretation of A1 and A2:
- cue use in perception reflects cue use in production (maximum-likelihood strategy).

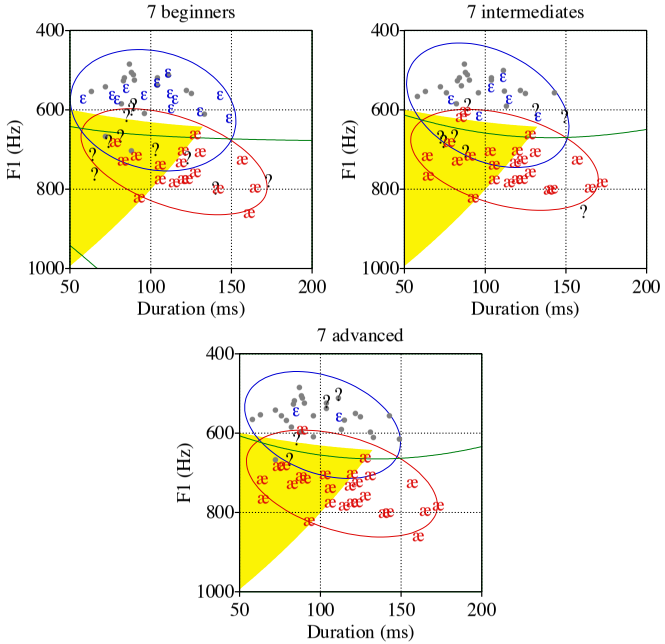
B. CROSS-LANGUAGE CATEGORIZATION OF CF /æ/ AND /ɛ/



Observations:
- short CF vowels around 700 Hz are /æ/ for CF natives, but /ɛ/ for CE listeners.
- for CE listeners, CF vowels around 700 Hz are /ɛ/ when short, /æ/ when long.

Interpretation:
- CE listeners use their native cue trading relations when listening to CF vowels.

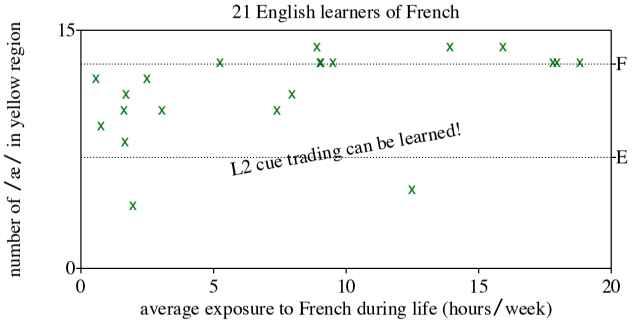
C1. CE LEARNERS OF CF



- 21 Canadian English learners were divided into three levels of proficiency on the basis of their average exposure to Canadian French during life.

Observation: in the yellow region, /ɛ/ responses decrease, /æ/ responses increase.

C2. SECOND-LANGUAGE PERCEPTUAL DEVELOPMENT



(F = average for the 8 CF natives; E = average for the 8 CE listeners to CF)

Correlation: $\tau_b = 0.45$ (one-sided p from zero: 0.23%).

Observation:
- L2 perception of CF /æ/ improves, especially in the yellow region.

Interpretation of L1 transfer:
- for CF /æ/, L2 learners reuse their CE-native lexical symbol /æ/.
- the initial interlanguage /æ/-/ɛ/ boundary reflects CE cue trading.

Interpretation of L2 development:
- the final interlanguage /æ/-/ɛ/ boundary reflects CF cue trading.

C3. MODELLING IN OPTIMALITY THEORY

The shift in auditory cue weighting can be modelled in Stochastic OT with the Gradual Learning Algorithm. Simplified:

- initial ranking in the interlanguage:
  “short is not /æ/” >> { “high is not /æ/” , “low is not /ɛ/” } >> “long is not /æ/”
- final ranking in the interlanguage:
  { “high is not /æ/” , “low is not /ɛ/” } >> { “short is not /æ/” >> “long is not /æ/”}

Conclusions

- initial L2 transfer of L1 lexical symbols and L1 auditory cue weighting.
- development of L2 auditory cue weighting towards target-appropriate performance.

Summary of responses:

Stimulus language	Response language	Listeners	Intended vowel	/æ/	/ɛ/	/e/	/ɪ/	/i/
English	English	8 English	/æ/	224	6	10	0	0
			/ɛ/	12	211	4	13	0
French	French	8 French	/æ/	218	22	0	0	0
			/ɛ/	3	219	6	8	4
French	English	8 English	/æ/	153	**80**	6	1	0
			/ɛ/	1	146	5	**87**	1
French	French	7 beginners	/æ/	151	**41**	18	0	0
			/ɛ/	4	112	**45**	**43**	6
French	French	7 intermediate	/æ/	176	**26**	7	1	0
			/ɛ/	9	108	**81**	11	1
French	French	7 advanced	/æ/	180	**15**	15	0	0
			/ɛ/	8	94	**79**	29	0