Articulatory Settings of French & English Monolinguals & Bilinguals

4pSC29

第4回日米音響 学会ジョイント ミーティング 2006年12月1日

Objectives

Measure Articulatory Setting (AS) in English & French monolinguals Compare monolingual results to AS in English-French bilinguals

Background

· Different languages sound different because of:

- > different phonemes + .
- ➤ different phonologies/phonetics + ...
- > different articulatory settings

. When speaking a foreign language, one's articulators (i.e., the tongue, jaw, lips, etc.) seem to have a whole different underlying posture. This underlying or default posture is a language's articulatory setting (AS).

· Some have insisted that learning the pronunciation of an L2 first involves learning its AS (Honikman, 1964; Mompeán-González, 2003)

· AS is something that has interested phoneticians for centuries (e.g., Wallis, 1653/1972), but until recently (Gick et al., 2004) had never been instrumentally verified. Why?...

- > People couldn't measure it
- Measurement techniques didn't exist (Heffner, 1950)
- > People wouldn't measure it
- Focused more on specific articulatory movements than underlying AS (O'Connor, 1973)
- > People shouldn't measure it??

- Because segmental context always influences positions of the articulators, it makes it impossible to distinguish AS from setting required for segments (Laver, 1980)

· Gick et al. (2004) compared AS across languages using existing x-ray movies of speech (Munhall et al., 1994) to measure interspeech posture (ISP).

- > ISP is defined as the position of the articulators, during interutterance pauses, when they are motionless (but still in speech mode - Öhman, 1967; Perkell, 1969).
- > Found significant differences between Canadian English and Québécois French for the position of the tongue and the protrusion of the lips.

The Present Study

· Replicates Gick et al. (2004) using stricter controls for phonetic context surrounding the inter-utterance pauses. Uses new ultrasound and Optotrak data instead of existing x-ray data.

· Measures the AS for bilingual speakers in both monolingual and bilingual modes of speech.



Ian Wilson University of Aizu Aizu-Wakamatsu, Japan

Method

Subjects:

- 10 monolingual Canadian-English speakers (reduced to 7) • 12 monolingual Québécois-French speakers (reduced to 8) • 11 bilingual English-French speakers (reduced to 9)
- Trials
- · Monolingual subject trials: > 6 blocks of 30 utterances (= 180 rest positions per subject)
- · Bilingual subject trials: > 2 English blocks, 2 French blocks, 2 mixed language blocks
- > Before mixed language blocks, subject was informed that language of the next sentence is randomly selected
- i.e., subject must be ready to produce either language

Data collection setting









Bryan Gick University of British Columbia Vancouver, Canada



4th Joint Meeting of the Acoustical Society of America and the Acoustical Society of Japan

Dec.1. 2006

Results

E 65 - 0 0

đ.,

English 5 participants

English articipants

Monolingual Results Tongue tip height Degree of lip narrowing Participant number 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Participant number 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 ∞ Å Å 88. ¢ é Ö ė e. English French A participante 40 T 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 English higher English more narrowed t(9.5) = 2.60, p = .0277



t(11.0) = 2.83, p = .0163

Bilingual Results

		TONGUE				JAW	LIPS						
	Subj	TTht	TBht	TDht	TRm	JAWI	ULlo	LLlo	ULpr	LLpr	Lvap	Lhap	Lnar
Perceived as both	21	E>F	-	-	F>E	E>F	-	E>F	E>F	E>F	E>F	•	
	17	(n/a)											
	22	-	-	-	-	-	F>E	E>F	E>F	E>F	E>F	-	n/a
	19	-	E>F	E>F	-	F>E	-	F>E	E>F	E>F	F>E	E>F	F>E
Perceived as Fre only	18	-	E>F	E>F	-	F>E	F>E	F>E	F>E	F>E	-	-	
	23	E>F	E>F	-		-	-	-	E>F	E>F	-		
	20	F>E	-	-	-	•	-	-	-	-	-	-	-
Perceived as Eng only	24	-	-	-	F>E	E>F	-	-	-	-	-	F>E	E>F
Perceived as Neither	16	-	-	F>E	F>E	E>F	F>E	E>F	-	-	E>F	E>F	F>E

- · For bilinguals perceived to be native speakers of both languages. >Bilingual-mode ISP was never different from both monolingualmode ISPs
- >For upper and lower lip protrusion, bilingual-mode ISP = the monolingual-mode ISP of dominantly-used language

Discussion and Conclusions

- · AS, as seen through ISP, differs across English and French monolingual groups
- > English tongue tip higher
- > English lips more protruded
- > English lips more narrowed from maximum spread
- · Differences across a given bilingual's AS in each language were similar to differences across monolingual groups
 - > Similar results for tongue tip height
 - > Identical results for lip protrusion
 - > Different results for lip narrowing
- · Bilingual-mode AS is simply the AS of the dominantly-used language at that time
 - Suggests that differences between bilingual mode and monolingual mode (Grosiean, 1998) do not hold at the phonetic level
- · In the field of L2 acquisition, especially that of pronunciation teaching, these results provide much-needed quantitative evidence to support the teaching of AS

Future Research

- · Determine whether AS is correlated to type and/or token frequency of phonemes in a language
- · Test whether AS differs for natural speech vs. read speech, nonsense words vs. real words (i.e., whether AS is task dependent)
- · Test what is perceptually salient in AS (i.e. if learned, how it is learned?) Test how much can be read in the face
- · Determine how AS differs from absolute rest position
- · Discover under what circumstances AS is activated (e.g., when listening to speech, etc.)

References

- Gick, Wilson, Koch, & Cook. (2004) Language-specific articulatory settings: Evidence from inter-utterance rest position. Phonetica, 61, 220-
- 23.3. Groejan (1996) Studying bilinguals: Methodological and conceptual issues. *Bilingualans: Language and Cognition*, 1, 131-149. Heffine (1996) General phonetics: Madiona, Wi: The University of Wisconsin Press. Honikrana (1964) Articultarety settings. In D. Abercronbie, D. B. Fry, P. A. D. MacCarby, N. C. Scott, & J. L. M. Tim (Eds.) In Honour of Datiel Jonet (or pp. 73-84). London: Longman.
- Laver, J. (1980) The phonetic description of voice quality. Cambridge, U.K.: Cambridge University Pres
- mean-surgence and the strength of the stren
- Munhall, Vatikiotis-Bateson, & Tohkura (1994) X-ray film database for speech research, ATR technical report TR-H-116. ATR Human Information Processing Research Laboratories, Kyoto. Thornauton Froessing Research Laboratories, Kytoto.
 O'Connor (1973) Phonetics. Harmondosworth: Penguin.
 Öhrman (1967) Peripheral Motor Commands in Labial Articulation. STL-QPSR 4/1967 RIT Stockholm.
- Perkell (1969) Physiology of speech production: Results and implications of a quantit neradiographic study. Cambridge MA: MII
- rroso. Walis (1630) Grammatica linguae anglicanae. Edited/translated by J. A. Kemp, 1972. London, U.K.: Longman. Wilson (2006) Articulatory settings of French and English monolingual and bilingual speakers. Ph.D. dissertation, University of British Columbia

Acknowledgements

University of Aizu Competitive Research Funding. Canada Foundation for Innovation. Natural Sciences and Engineering Research Council of Canada, Eric Vatkitotis-Bateson, Stefka Marinova-Todi, Jason Chang, Fiona Campbell, Doug Pulleyblank, Anne-Marie Conte, Ritu Kumar, Rose-Marie Déchaine, Joe Stemberger, Fei Xu, Maciej Mizerski, Jean-François Plante, Elaine Orpe, & audiences at Ultrafest, ASA Vancouver, and UPenn





0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 English more protruded t(10.3) = 2.64, p = .0242