REGIONAL VARIATION IN THE ALLOPHONES OF CANADIAN ENGLISH /æ/

Charles Boberg
Department of Linguistics, McGill University, Montreal, QC, H3A 1A7; charles.boberg@mcgill.ca

1. INTRODUCTION

This paper reports on regional variation in the phonetic realization of /æ/, or "short-a", the vowel of *bat*, *bad*, *band* and *bag*, in Canadian English (CE). Labov (1991) called /æ/ one of two "pivot points" that determine the larger patterns of vowel shifting that serve to differentiate regional varieties of North American English at the phonetic level. These are variables of phonemic contrast in the front and back corners of the lower vowel space: in the back, the potential contrast is between /ɑ/ (LOT) and /ɔ/ (THOUGHT); in the front, it is between lax /æ/ (TRAP), the main development of Middle English short /a/, and what Labov labels /æh/, a tensed variant that occurs before voiceless fricatives, like its British "broad-a" counterpart (BATH), as well as before variable sets of voiced obstruents and nasals. CE has only one phoneme in each corner, so that TRAP and BATH both have /æ/ and LOT and THOUGHT both have /ɑ/. The latter lack of contrast is referred to as the low-back merger, and has been suggested as the structural impetus for what Labov, Ash and Boberg (2006) found to be the main distinguishing phonetic characteristic of CE in comparison with adjacent American varieties, the Canadian Vowel Shift (Clarke, Elms and Youssef 1995). The Canadian Shift involves the lowering and retraction of the short front vowels /ɪ, ɛ, æ/ (KIT, DRESS and TRAP), led by the retraction of /æ/, first noted by Esling and Warkentyne (1993), into the low-central space made vacant by the low-back merger (American dialects without this merger tend to have /ɑ/ in this position, blocking any retraction of /æ/).

Labov *et al*. (2006) find that among the dialects with a single low-front phoneme there are three main allophonic systems. In the U.S. Inland North, the whole /æ/ class is tensed, rising to mid-front position. Much of the Midland and West exhibit a "nasal system", in which /æ/ is regularly tensed and raised before nasals (/æN/, e.g. *band*, *ram*), so that pre-nasal tokens form a distinct set from the rest of the distribution (e.g. *bat*, *bad*), which remains in low-front position. CE is characterized by a "continuous short-a system", in which allophones of /æ/ form a phonetic continuum along the low-front margin of the vowel space, from low-front *bat* to raised and fronted *band*. Crucial in this classification is the behavior of /æ/ before /g/ (*bag*). In "nasal" systems, /æg/ is lax, remaining with the rest of the /æ/ distribution; in Canada, by contrast, /æg/ shows an intermediate degree of tensing, distinct from both the more advanced tensing of /æN/ and the absence of tensing in *bat* or *bad*. Further research with a Canadian focus, reported here and in Boberg (2008, 2010), finds that this is a simplification, obscuring important regional differences. While this "continuous" system does apply across the country, it is realized slightly differently in each region.

2. METHODS

This paper presents data from the *Phonetics of Canadian English* project carried out by the author at McGill University between 1999 and 2005 and first reported in Boberg (2008, 2010); these earlier sources contain full methodological details. The data below are from word list productions elicited during recorded sociolinguistic interviews with 86 undergraduate students from every region of Canada. The word lists, which contained 145 words representing all of the vowels of English in a range of allophonic contexts, were analyzed acoustically using Kay Elemetrics' CSL 4400 system, with single-point nuclear measurements of F1 and F2 taken at the F1 maximum or at a point of inflection in F2 representing the central tendency of the formant trajectories. The formant data were then normalized using the additive point system of Nearey (1978). This paper focuses on the 16 tokens of /æ/, including 4 pre-nasal tokens (*band*, *ham*, *stamp*, *tan*), 3 before /g/ (*bag*, *gag*, *tag*), 3 before /r/ (*barrel*, *carry*, *charity*) and 6 others (*bad*, *sack*, *sad*, *sat*, *tap*, *tally*).

3. RESULTS

The results of the acoustic analysis are presented in Fig. 1 and Table 1.

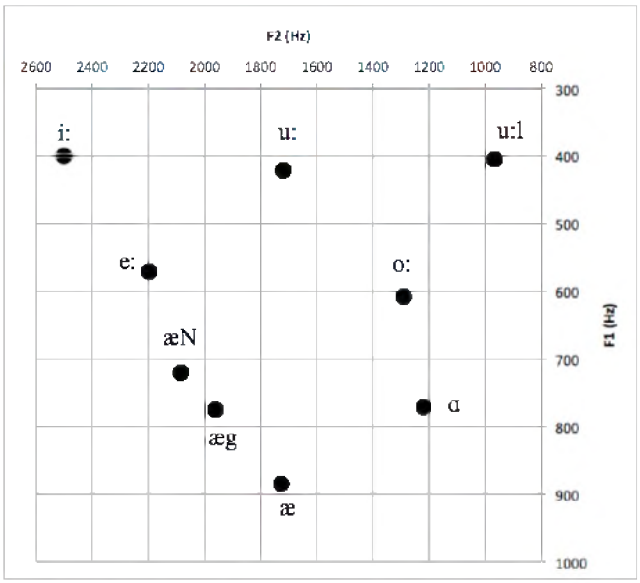

Figure 1. Mean formant values for CE vowels (n=86)

Table 1. Regional means and standard deviations for position of raised /æ/ allophones relative to main distribution (Cartesian distances in Hz).

	/æ/ - /æg/		/æ/ - /æN/	
Region (n)	*Mean*	*S.D.*	*Mean*	*S.D.*
BC (12)	335	129	382	147
Prairies (15)	358	161	356	143
S. Ontario (7)	318	115	522	143
Gr. Toronto (8)	244	92	458	73
E. Ontario (9)	316	95	535	148
QC (Mtl, 13)	157	78	328	175
Maritimes (16)	244	75	410	128
Nfld (6)	139	88	310	81
CANADA (86)	270	130	404	151

4. DISCUSSION AND CONCLUSIONS

Figure 1 shows the mean positions of /æ/ and its two raised allophones in F1/F2 space, together with a selection of other vowels (FLEECE, GOOSE, *pool*, FACE, GOAT and LOT), included here to establish the general outline of the space. It can be seen that, as a result of the Canadian Shift, modern CE is developing a triangular vowel system, with a single low-central vowel, /æ/, now considerably lower than /ɑ/ and aligned in F2 space directly below the main distribution of /u:/, which has been strongly centralized; only the pre-lateral allophones of /u:/ remain in high-back position. In the lower-front quadrant, the raised allophones of /æ/ are positioned along the frontal periphery, halfway between the main /æ/ distribution and that of /e:/ (FACE); the distinct position of /æg/ confirms the classification of Labov *et al.*

A multivariate statistical analysis (in SPSS) of the effect of speakers' home regions on vowel production, found a significant effect on the position of both /æg/ and /æN/, measured in terms of either absolute values of F1 and F2, or Cartesian distance between each allophone and the main distribution of /æ/ (Boberg 2010: 203). Regional means and standard deviations of the distance measures are shown in Table 1, which reveals three distinct patterns. In Western Canada, including BC and the Prairies, /æ/ is raised equally before nasals and /g/, the two distance measures being roughly equivalent. In comparison, the three Ontario regions have more advanced raising before nasals but less before /g/, a pattern they share with the Maritimes. This similarity may have historical roots, arising from initial settlement of these regions by former American colonists (the "United Empire Loyalists") fleeing the American Revolution. By contrast, Quebec (mostly greater Montreal) and Newfoundland, areas with more British and less Loyalist influence, show comparatively little raising, falling below the Canadian mean given in the last row of the table. In Montreal, this has a striking auditory effect, particularly in the speech of the city's large Italian and Jewish ethnic minorities, who show even less raising than speakers of British ethnic origin (Boberg 2010: 222), producing *band* and *bag* with more or less the same vowel as *bat*.

Another distinguishing feature of Quebec and Newfoundland English, not shown in Figure 1, is resistance to the neutralization of the contrast between /æ/ and /ɛ/ before intervocalic /r/, as in *marry* and *merry*, or *barrel* and *beryl*, which prevails across the rest of Canada and much of the middle and western U.S. In Montreal and in much of Newfoundland /ær/ retains its low-front quality, whereas from Ottawa to Victoria it is merged with /ɛr/.

A further regional peculiarity, first identified by Labov *et al.* (2006: 223), was found in the Maritime region, where several speakers produced raised tokens of /æ/ before /d/; Boberg (2010: 238) illustrates this in the speech of an older man from Nova Scotia. This phonetic pattern is normally associated with the two-phoneme systems of the U.S. Mid-Atlantic coast, particularly New York City and Philadelphia, where /æd/ is among the environments that feature the tense phoneme, /æh/ (with some lexical exceptions). While there is no evidence of an analogous phonemic split in the Maritimes, raised vowels in *bad* and *sad* do resemble the American pattern at the phonetic level, and may be a relic of an older, colonial /æ/ pattern brought to the region by the Loyalists, who were the most important element in the initial English-speaking settlement of Nova Scotia and New Brunswick. Among younger Maritime speakers, this pattern appears to be recessive.

Thus, what at first seems to be a homogeneous, trans-national feature of CE, its "continuous short-a system" with less raising of /æg/ than of /æN/, turns out to be subtly differentiated among Canada's regions. Pre-velar raising is maximal in the West; pre-nasal raising is strongest in the old Loyalist areas of Ontario and the Maritimes; and Quebec and Newfoundland, exceptions to general Canadian cultural and linguistic patterns in so many ways, are distinct in this respect too, with little raising in either environment. CE is perhaps less uniform than it is often imagined to be.

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