



University of Pennsylvania Working Papers in Linguistics

Volume 11

Issue 2 *Selected Papers from NWAV 33*

Article 11

1-1-2005

Belle's Body Just Caught the Fit Gnat: The Perception of Northern Cities Shifted Vowels by Local Speakers

Dennis R. Preston

This paper is posted at ScholarlyCommons. <http://repository.upenn.edu/pwpl/vol11/iss2/11>

For more information, please contact libraryrepository@pobox.upenn.edu.

Belle's Body Just Caught the Fit Gnat: The Perception of Northern Cities
Shifted Vowels by Local Speakers

Belle's Body Just Caught the Fit Gnat: The Perception of Northern Cities Shifted Vowels by Local Speakers

Dennis R. Preston

This paper addresses four questions concerning the comprehension of single words in areas where a dramatic vowel shift is underway or near completion.

1) Do locals have an advantage in understanding words that contain advanced tokens of change-in-progress vowels? Labov and Ash (1997) say yes, but Rakerd and Plichta (2003) say no, particularly for isolated words. Both show an advantage for locals when the words are placed in carrier phrases (which contain no clues to the target word's identity).

2) Can the notion 'local' also reflect demographic details (e.g., sex, age, status, urbanity, ethnicity) in such studies of comprehension? Labov and Ash (1997) suggest an advantage for more locally oriented speakers.

3) When vowels are misunderstood, are they misunderstood in the direction of the position of vowels in the pre-shifted system (Labov and Ash 1997) or in the direction of vowel positions in the newer one?

4) What historical, phonetic, and other characteristics of the vowels involved in a dramatic shift influence their different comprehension rates?

Figure 1 shows the F1-F2 positions of nine vowels of American English from two previous studies in which single-word comprehension tasks played a part. The dotted line shows the position of these vowels in the Peterson and Barney study (1950), and the solid line links the vowel positions determined by Hillenbrand et al. (1995). Since the vowel samples played in the present study were all from female speakers, only female vowel positions are shown from these two earlier studies. The Peterson and Barney values are very much those of the typical vowel triangle associated with American English vowels; the Hillenbrand et al. positions, however, show considerable influence of the NCS: short *i* lowering and backing; short *e* lowering and backing, *æ* fronting and raising, short *o* fronting, and open *oh* lowering and fronting; only the backing of wedge *ʌ* is not represented, and that is a late step in the NCS process.

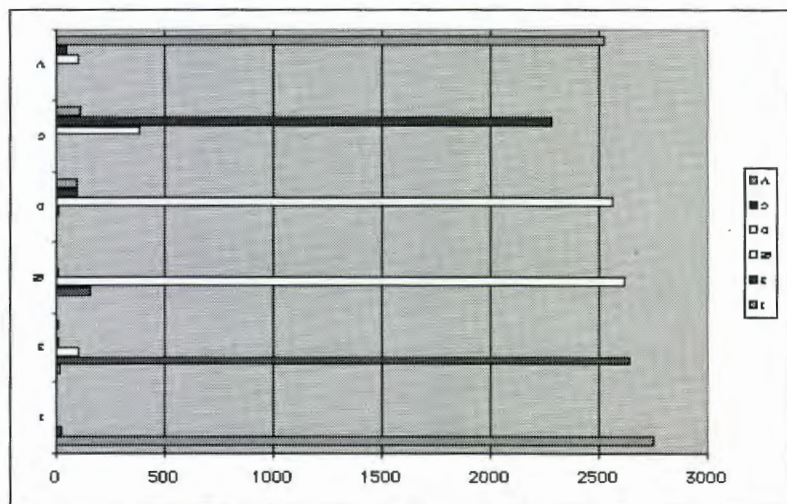


Figure 2: Peterson and Barney comprehension test results

Figure 3 shows that the Hillenbrand et al. results are very similar, in spite of the apparently shifted position of these NCS items. The 139 talkers were again men, women, and children, but they were predominantly from southeastern and southwestern Michigan, a fact reflected in the NCS shift of their vowels. There were twenty undergraduate student listeners from Western Michigan University. None were recruited from the talker population, but all were at least minimally trained in phonetics. Each hearer heard each vowel of the twelve tested once from each talker, but only the vowels involved in the NCS are presented here. Except for open oh (.82), the results are again better than .90 for all items (based on about 2,780 hearings of each item).

Although the Peterson and Barney results are perhaps not too surprising, from the position of the vowels in the Hillenbrand et al. representation seen in Figure 2, one might have expected worse results. It is important to remember, however, that the results are overall; i.e., Hillenbrand et al. do not divide the results for either hearers or talkers by sex. We might assume, therefore, that the more conservative (i.e., less NCS-influenced) pattern of the male speakers helped improve the overall scores. Moreover, since the hearers were undergraduate students from Western Michigan University, many of them would have been under the same influence as the speakers and that may also have improved the comprehension rate. Finally, since the hearers were all at least minimally phonetically trained, that too may have provided some advantage.

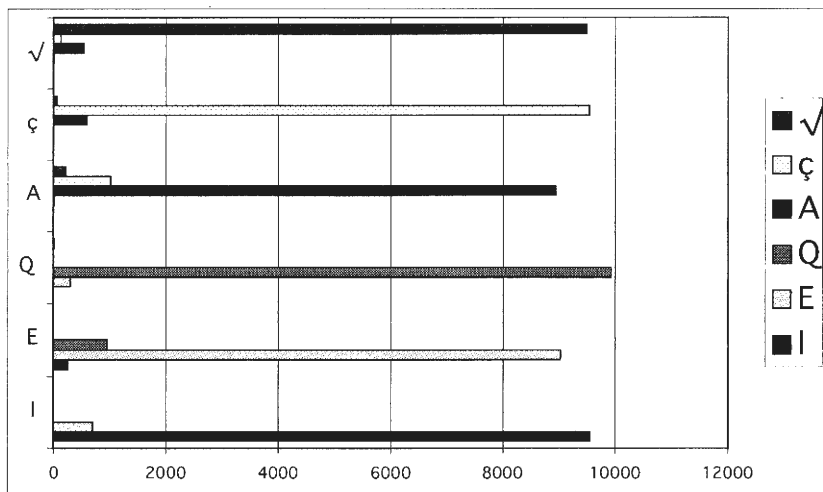


Figure 3: Hillenbrand et al. comprehension test results

At best, however, Hillenbrand et al. was an accidental study of the ability of locals to understand NCS vowels. First, the men and children speakers did not have such radically shifted systems, and the values shown in Figure 2 for women are averages; some may have been considerably less shifted. Additionally, there was no discrimination among hearers; some were undoubtedly younger women from urban southeastern Michigan whose systems would have been even more advanced than that seen in Figure 2. Others, however, may have been young men or women from central or northern Michigan or the Upper Peninsula of Michigan where the shift has had moderate, little, or even no influence. Some would not have been Michiganders at all, and their dialect backgrounds are unknown.

The current study focuses on the ability of locals who have been shown to participate in the NCS to various degrees to understand single-word items that are radically shifted to positions in the new system, as shown in Fig. 4.

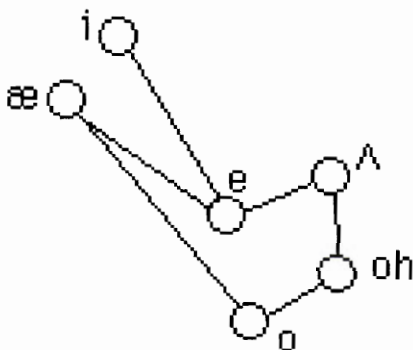


Figure 4: "Janice R," 15-year-old European American female, Detroit, MI
(adapted from Figure 2 in Labov 1996)

The following advanced NCS tokens (all spoken by young women from urban southeastern Michigan) were played (twice) for the respondents: *bag, cut, big, can, bond, bed (=bud), hawk, done, sock, tin, hot, caught, pat, Ben (=bun), dawn, bed (=bad)* NB: All likely misunderstandings are real words, e.g., *bag* as *beg* or *big*; *cut* as *caught*, etc.

Four vowels not involved in the NCS (*boot, beet, bait, and boat*) were also included in the test but showed little or no misunderstanding, with correct comprehension rates of .96, .98, .98, and .99, respectively. In contrast, the best NCS vowel comprehension rate (for short *æ*) was .85.

The respondents wrote down the word they heard, and items were judged correct if the intended vowel was indicated, not the entire word (e.g., *pig* was judged correct for *big*).

To avoid age-related hearing-loss comparison difficulties, young respondents (15–30) only are reported on here. The five groups studied were as follows:

1. EAUS = Southern urban Michiganders, European American (N=70)
2. EAY = Southern urban Michiganders, European American immigrants from Appalachia (N=2)
3. EARS = Southern rural Michiganders, European American (N=17)
4. EARM = Mid-Michigan rural Michiganders, European American (N=39)
5. AAUS = Southern urban Michiganders, African American (N=24)

All groups were relatively evenly distributed by sex. These five were entered as one factor group for the VARBRUL run, and the characteristics of sex and

status (although status for the EAUS was uniformly middle class) were also tabulated as factor groups, as were the six individual vowels of the NCS themselves. The dependent variable was accuracy of comprehension of the vowel.

Based on previous work in the area (e.g., Evans et al. 2000), I expected the groups to be ordered as follows as regards comprehension, if comprehension can be linked to the degree of participation in the shift:

EAUS > EARS > EARM > EAY > AAUS

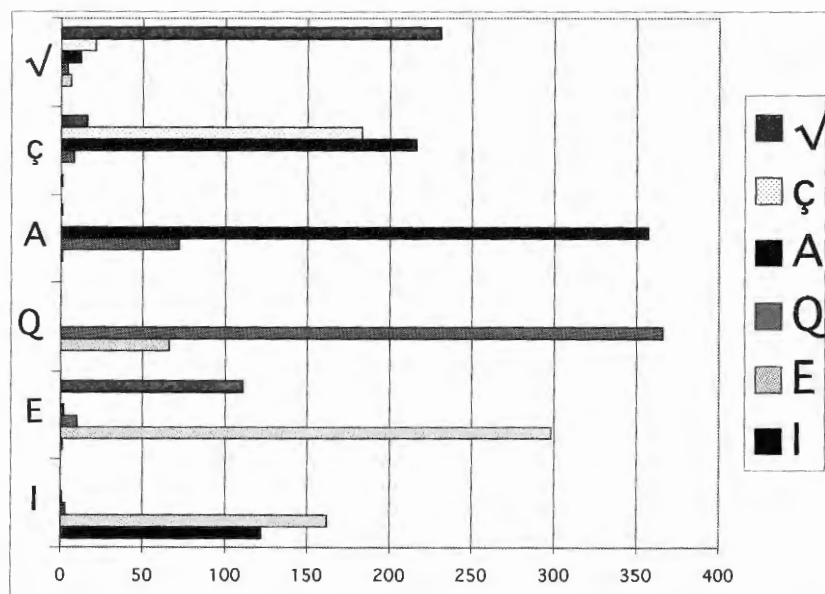


Figure 5: Comprehension results from the present study

Figure 5 shows the overall results of the study, and these single-word tokens obviously cause considerable confusion. Two vowels (open oh and short i) do not even reach the .50 level. Ash (1988) also finds less than .50 comprehension by Chicagoans of radically shifted open oh and short e. The overall results of a GoldVarb run are shown in Table 1.

There is some rearrangement of the order of groups from the prediction given above, but the group that has completed or nearly completed the NCS (EAUS) is the one which comprehends best, and the group that has been shown to participate least in the NCS (AAUS) comprehends worst. The rural speakers from southern Michigan (EARS), since they are closer to the areas

where the change has already taken place and in greater contact with speakers of it, are slightly ahead of the Mid-Michigan (EARM) group, which is farther geographically from the centers of change.

Factor Groups	Weight	Percentage	Correct/Total
Group			
EAUS	.54	.71	795/1121
EAY	.535	.70	23/33
EARS	.50	.68	185/272
EARM	.46	.65	305/569
AAUS	.42	.62	249/404
Sex			
Female	.n.s.	.69	961/1400
Male	.n.s.	.66	596/899
Status			
Middle	n.s.	.69	1399/2041
Working	n.s.	.61	158/258
Vowels			
short æ	.70	.85	366/432
short o	.67	.83	357/431
wedge ʌ	.64	.80	231/287
short e	.49	.69	298/429
short i	.24	.42	122/288
open oh	.24	.42	183/432

Table 1: Overall GoldVarb results

Although there are only two respondents in the Appalachian immigrant group (EAY), their comprehension rate is the same as the EAUS group. As earlier work has shown, however (e.g., Evans 2001), the younger members of this group, although not completely culturally integrated into surrounding urban southeastern Michigan, are apparently completely integrated linguistically. The lower ranking for this group in the prediction above would have been realized only if older speakers (immigrants themselves from such areas as Kentucky, Tennessee, and West Virginia) had been tested. The prejudice against their "hillbilly" speech was considerable when they came to southeastern Michigan, and the grandchildren of immigrants have given it up entirely and participate in local patterns of use and change.

	Young	Middle	Old
EARM	.70	.70	.65
AAUS	.68	.68	.60
EAY	.76	.66	.64

Table 2: Correctness percentages for all ages among three research groups (NB: These scores are higher than those shown in Table 1 since they include correct recognition of the non-NCS vowels /iy/, /uw/, /ow/, and /ey/.)

Table 2 provides additional data from middle aged and older speakers and shows how the youngest EAY speakers are even better comprehenders of these items than the EARM and AAUS respondents, both of whom have been in Michigan longer, the AAUS respondents even in urban southeastern Michigan longer. The change is not only greater from oldest to youngest for this group, but it is more recent, occurring between the middle and younger age groups entirely.

Although, as Table 1 shows, neither status nor sex was significant, both show trends in the expected direction; women are more advanced speakers of the NCS, and they apparently comprehend somewhat better. The NCS is change from below and attracts no negative stereotypes; as a result, it is more advanced among middle- and even upper-middle-class speakers.

These results allow me to return to two of the questions asked at first. There does appear to be a clear advantage in comprehension for local groups; that is, the shift is strongest in the urban areas of southeastern Michigan, and that group (EAUS) leads in comprehension. The shift is weaker in both rural southern Michigan (EARS) and rural Mid-Michigan (EARM), and those two groups lag behind in comprehension. It is possible to conclude from these data, therefore, that local people more intensely involved in linguistic change are better comprehenders of even single-word exemplars of that change. This is similar to the findings of Labov and Ash (1997), who found a local advantage, although it was better expressed when tokens were embedded in carrier phrases. This finding is, however, different from that of Rakerd and Plichta (2003), who found that locals did not continue to interpret advanced resynthesized tokens of an NCS vowel as the same as less advanced ones unless those words were embedded in carrier phrases.

In both these earlier studies, however, the nonlocals were not geographically marginal to the center of the change; they were from completely different speech areas (e.g., Chicago or Philadelphia hearers listening to Birmingham speakers or Upper Peninsula Michigan speakers listening to increasingly advanced tokens of an NCS vowel).

The second question asked in the present study addressed demographic

characteristics of the hearers, and Tables 1 and 2 suggest that there are such features which prefer comprehension:

Ethnicity: European American
 Sex: female
 Status: middle
 Age: younger

As much previous work has shown, these are the characteristics of speakers most advanced in the shift.

The third question asked if vowels were misunderstood as "pre-shift" or "post-shift" items. Figure 6 helps clarify this.

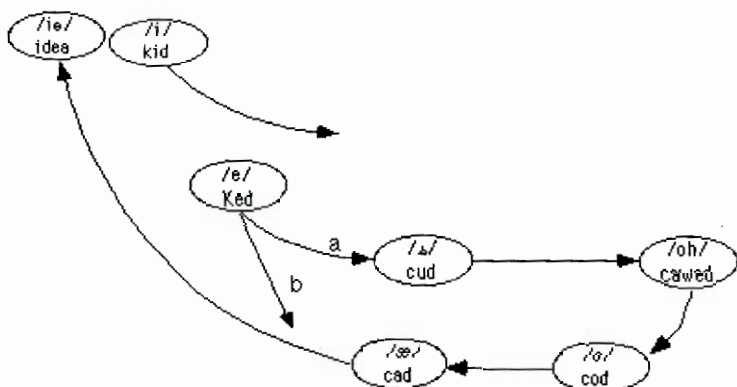


Figure 6: The Northern Cities Shift (adapted Figure 1, Labov 1996)

For example, imagine a case of short e backing (along 'a' in Figure 6). Short e moves into a position occupied by wedge Λ in the pre-shift system, but since wedge Λ has backed into a position closer to the pre-shift position of open oh, the moved short e is now perhaps closer to fronted short o in the post-shift system than anything else in the emerging system. Table 3 shows, however, that misunderstandings are indeed based on pre-shift positions.

In Figure 7 a Bark plot of the Peterson and Barney (shaded) and Experimental (white) vowels in question also shows this pre-shift effect to be at work except for the misunderstandings of wedge Λ as open oh rather than as short o, as Figure 7 would suggest.

What about the individual vowels? Table 4 repeats the GoldVarb results for this factor group.

	Weight	Percentage
short æ	.70	.85
short o	.67	.83
wedge Λ	.64	.80
short e	.49	.69
open oh	.24	.42
short i	.24	.42

Table 4. GoldVarb results for vowels

What are some phonetic facts about these vowels that might account for this order? Here is a list of assumptions:

1. Recency: The oldest changes in the NCS should be best understood.
2. Phonetic clue: Vowels which give some distinctive clue to their identity other than formant positions should be better understood.
3. Phoneme class: Vowels not involved in complex, historical phoneme word-class changes should be better understood.
4. Distinctness: Vowels at a greater distance from those with which they might be confused should be better understood. This distinctness will be considered in terms of pre-shift positions only due to the findings shown above in Table 3 and Figure 7.
5. Chromaticity: Vowels which, as a result of F2 changes, bring about some chromatic change (e.g., +round \rightarrow -round) may be more poorly understood.
6. Formant perceptual strategy: Vowels which, as a result of F2 changes, bring about a change in formant perceptual strategy may be more poorly understood.

Two other features which might have been considered were not. First, the identity of the words and the words that they might have been misunderstood as seem to have more or less equal familiarity as lexical items. Second, no consonant environments (as determined by Stevens and House 1963, for example) had any effect on the realization of these samples so that they

might have been reordered in comprehension.

These assumptions are assigned scores in Table 5. The higher the score, the less likely the vowel will be understood.

The numbers assigned to the order of the shift are taken from previous studies (e.g., Labov 1994:195). No points were assigned short *i* and *e* on the historical dimension, reflecting the relatively uncomplicated history those vowels have had from Old English to Modern English; there has been very little historical category change for words with these vowels. Only short *æ* had no point assigned to it for phonetic distinctiveness on the basis of its acquiring an inglide; no other vowel gains a specific phonetic character that would distinguish it from surrounding items. Shifted vowels that overlapped or came very close to the preshifted form that they might be confused with (short *e*, open *oh*, and short *i*) were given a point. Wedge Λ was given a point for the confusion that additional roundness might cause (with open *oh*), and open *oh* was given one for its loss of roundness (which might contribute to its confusion with short *o*). Finally, short *e* was given a point due to the fact that its change from a front to central vowel results in a change in perceptual strategy, i.e., central and back vowels are perceived on the basis of a central weighting between F1 and F2; front vowels are perceived on the basis of a distinct weighting of F1 and a central weighting between F2 and F3 (Strange 1999:154–55).

Item (in order)	NCS	Historical class	Phonetic clue	Distinct	Round	P S	Total
1 short <i>æ</i>	1	1	0	0	0	0	2
2 short <i>o</i>	2	1	1	0	0	0	4
3 wedge Λ	5	1	1	0	1	0	8
4 short <i>e</i>	4	0	1	1	0	1	7
5 open <i>oh</i>	3	1	1	1	1	0	7
6 short <i>i</i>	6	0	1	1	0	0	8

Table 5. Ranking of phonetic facts influencing comprehension of NCS vowels (higher scores = worse comprehension; 'PS' indicates a change in perceptual strategy)

These scores reflect the comprehension rates fairly well and suggest that NCS order and other phonetic factors enter into the ability of local speakers

to comprehend radically shifted vowels even in single word presentations.

Wedge Λ is, however, a bit of a puzzle. Why is its comprehension rate (GoldVarb .64) nearly as good as the rates for short \ae (.70) and o (.67), the earliest moved elements of the shift? It is not only late moved but also scored for lack of phonetic distinctiveness and development of a potentially confusing roundness feature. I can offer only two suggestions. First, open oh moved so much earlier (and lost its roundness characteristic) that any confusion with it is simply ruled out. That, however, would deny the pre-shift effect that seems clearly to be in operation here. Second, perhaps wedge Λ has moved so slightly back along the F2 trajectory, as seen in Figure 7, that misunderstanding is less likely than for the other more dramatic shifts.

In conclusion, how do these results compare with previous studies of local comprehension of shifted tokens (Labov and Ash 1997, Rakerd and Plichtha 2003)? Labov and Ash say "[t]here is a consistent local advantage in the recognition of advanced forms of the local vernacular" (566). The young, European American, southeastern Michigan group was indeed best here, although Rakerd and Plichtha suggest this advantage is related to the use of carrier phrases. That is not the case here.

Labov and Ash also note that "[w]ords heard in isolation are most consistently identified with less advanced forms ..." (566). That is also true here, in almost every case.

Labov and Ash further note that "the ability to recognize advanced forms... is greater among high school students than college students and greater among African-American subjects than white subjects" (567). This study also shows that local subjects who are more advanced in the shift themselves are better at comprehension.

Finally, various historical and phonetic elements play a role in the comprehension of vowels involved in dramatic change, some features of which modify the effect of the order of change of elements in a direction that better matches comprehension rates.

By now the title should be clear: I heard "Belle's body just caught the fit gnat," but the Michigander said "Bill's bawdy jest cut the fat knot." OK; so my pragmatic organizer is shot to hell. (And I didn't really hear anybody say that anyway.)

References

- Ash, Sharon. 1988. Contextless vowel identification. Paper presented to the 17th annual meeting of NWAVE (New Ways of Analyzing Variation in English). Montreal, October 29.

- Evans, Betsy. 2001. Dialect contact and the Northern Cities Shift in Ypsilanti, Michigan. Doctoral Dissertation, Michigan State University.
- Evans, Betsy, Rika Ito, Jamila Jones, and Dennis R. Preston. 2000. Change on top of change: Social and regional accommodation to the Northern Cities Shift. In *Da toekomst van de variatielinguïstiek: Bundel artikelen aangeboden aan Jo Daan bij gelegenheid van haar negentigste verjaardag (Taal en Tongval 52 (1))*, ed. Hans Bennis, Hugo Ryckeboer, and Jan Stroop, 61–86.
- Hillenbrand, James, Laura A. Getty, Michael J. Clark, and Kimberlee Wheeler. 1995. Acoustic characteristics of American English vowels. *Journal of the Acoustical Society of America* 97 (5), Pt. 1:3099–3111.
- Labov, William. 1994. *Principles of Linguistic Change. Vol. I: Internal Factors*. Oxford: Blackwell.
- Labov, William. 1996. The organization of dialect diversity in North America. Paper presented to the 4th International Conference on Spoken Language Processing, Philadelphia, October 6. (available at <http://www.ling.upenn.edu/phonoatlas/>)
- Labov, William and Sharon Ash. 1997. Understanding Birmingham. In *Language Variety in the South Revisited*, ed. Cynthia Bernstein, Thomas Nunnally, and Robin Sabino, 508–73. Tuscaloosa/London: The University of Alabama Press.
- Peterson, Gordon E. and Harold L. Barney. 1950. Control methods used in a study of the vowels. *The Journal of the Acoustical Society of America* 24 (2):175–84.
- Rakerd, Brad and Bartolomiej Plichta. 2003. More on perceptions of /a/ fronting. Paper presented to the 32nd annual meeting of NWAVE (New Ways of Analyzing Variation in English). Philadelphia, October 11.
- Stevens, Kenneth N. and Arthur S. House. 1963. Perturbation of vowel articulations by consonantal context: An acoustical study. *Journal of Speech and Hearing Research* 6(2), 111–28.
- Strange, Winifred. 1999. Perception of vowels: Dynamic consistency. In *The Acoustics of Speech Communication*, ed. J. M. Pickett, 153–65. Boston: Allyn and Bacon.

Department of Linguistics and Germanic, Slavic, Asian and African Languages
Michigan State University
East Lansing, MI 48824
preston@msu.edu