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# Prosodic skewing of input and the initiation of cross-generational sound change*

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This paper addresses a proposal about how the seeds of sound change are planted during cross-generational transmission in the particular case of persevering vocalic chain shifts, that is, changes that appear to span many generations. Specifically, we explore the idea that the realization of vowels during child-directed speech may set up young learners to construct their own vowel space in slightly but consistently different ways from those of their caretakers, a process we call 'prosodic skewing'. If this view is correct, it reveals a particular way that social and structural factors interact in sound change, where cultural norms (how caretakers talk to children) systematically bias the structural input to learners. We draw evidence from a cross-generational study of three American dialects where vocalic chain shifts are believed to be underway.

## 1.  Introduction

This paper focuses on the relationship between structural and social factors in transmitting and incrementing sound change, specifically in the initiation of sound change, which was repeatedly noted as the clear focus of the original Barcelona workshop and of the present volume.

How and why successive generations continue along the same path of change in sound change is not well understood. Consider vocalic chain shifts, which have been going on in the Germanic languages since around the time of their earliest attestation and which are still taking place across the family today. Many

of these unfold over multiple generations or even centuries, including the Great Vowel Shift. Despite that diversity across time and space, these shifts show great unity, a conundrum which has been known as the perseverance problem since Stockwell 1978. A related, and even more general problem in sound change, extensively discussed at the Workshop, was how it can move from an individual to the community.

In recent work (notably Jacewicz et al. 2006, 2009, 2011c), we have examined patterns of vowel change during cross-generational transmission. In some of those works (2006, 2009), we have examined the warping of the vowel space under more emphatic pronunciations and further outlined a mechanism for how this could shape sound change: Evidence suggests that in some social contexts child-directed speech (CDS) involves realizations of vowels that partially parallel those found in prosodically prominent utterances. If so, the early input to a new generation is systematically skewed in the same directions as in prosodically prominent realizations, which in turn could drive vowel changes over multiple generations, even centuries. In this paper, we explore this research in its social context and in terms of how it fits into perceptually-oriented accounts of sound change. If the social practice of such CDS is widespread in the community, that means that the broad group of children are getting input biased in the same direction. Thus, on this scenario, this type of sound change is not the result of an isolated child innovating but rather a whole set of children, presumably many or most of the community's children. It is not the result of imperfect acquisition or misperception but rather reflects extremely fine-grained learning of the initial input the children received, which has survived, presumably with adaptations and adjustments over the course of the child's development, into adult speech.

This paper synthesizes some new results from a five-year study examining vowels and vocalic changes across three distinct dialects of American English which are thought to be undergoing distinct patterns of vowel change, southeastern Wisconsin, central Ohio and westernmost North Carolina (see also Jacewicz et al. 2006, 2011a, 2011b). Results to date support the prediction that the emphatic vowels of each successive generation led and determined the direction of shift for younger generations. The aim of this paper then is to begin to establish how our results bear on current theories of sound change, particularly the initiation of sound change, the topic of this volume.

The paper is organized as follows: §2 lays out the problem of transmission and incrementation with regard to perseverance in sound change and then contextualizes that within some current work on sound change. §3 outlines our notion of 'prosodic skewing' and how that fits into sound change, while §4 reviews one set of recent results that test the notion against American dialect data. §5 concludes by placing these results again in the context of current discussions of sound change.

Namely, our evidence points toward a larger and different kind of role for structural factors in vocalic changes underway in the US today than other sources have treated.

## 2. The perseverance problem, transmission and incrementation in sound change

Since Labov (1994), scholarship on sound change has been increasingly organized around the distinction between cross-generational transmission and incrementation. The full body of work on transmission and incrementation is cogently surveyed by D'Arcy in her forthcoming contribution to the *Handbook of Historical Phonology*, where she defines the terms this way (following Labov 1994, 2007):

(1)   Two elements in sound change
      **transmission**: the unbroken sequence of native-language acquisition.
      **incrementation**: the unidirectional progression of a change over time.

D'Arcy (forthcoming) also describes the problem that is the focus of this paper as follows: "Changes continue in the same direction over several generations. If, however, the adult system is faithfully transmitted to children, we must explain the continuous transitions in the frequencies and modal values of forms involved in change." In fact, changes apparently often take many generations. The English chain shift widely known as the Great Vowel Shift (shown below), for instance, is believed to have taken well over two centuries to reach completion.

The chronology of changes from over half a millennium ago is of course less than certain and there has been chronological controversy about the unfolding of this particular change. Clearer is the case of back vowel fronting, discussed at some length at the Workshop (see Harrington and Dimov et al., this volume). Consider this data from Alabama (Feagin 2003), drawn from real-time data from adult speakers and balanced by gender:
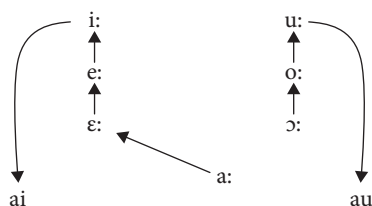


**Figure 1.** The English vowel shift

| Birth years | F2 | |
| --- | --- | --- |
| **/u/** | | |
| 1880s | ca. 1400–1600 Hz | some fronting |
| 1950s- | ca. 2250–2350 Hz | very front |
| | | |
| **/o/** | | |
| 1880s | ca. 1100 Hz | little fronting |
| 1950s- | ca. 1600 Hz | clear fronting |

**Figure 2.** Back-vowel fronting in Alabama English (Feagin 2003)

Here, we have a directly attested pattern of change across generations, one that appears to be a steady, gradual change when seen in the context of individual, gender, and social class differences laid out by Feagin (2003: 132–135). Like many systematic vowel changes, back vowel fronting is amply attested across other varieties of English and across other Germanic languages, both west and north.[1]

Such patterns led Stockwell to propose this (1978: 337, emphasis added):

> The vowel shift occurred no more at the usually cited dates than at any other date in the documented history of English. That is, it did occur then, and also (equally, I believe) over the past 200 years, or over the 200 years between the birth of Alfred and the death of Aelfric, or any other period of that length. **This kind of vowel shifting is a pervasive and persevering characteristic of vowel systems of a certain type.**

Stockwell's suggestion that certain types of vowel systems are prone to such shifting points toward a structural correlate, but others look to social factors. Labov presents his solution to this 'perseverance problem' in this passage (2007: 346, emphasis added):

> Such internal changes are generated by the process of *incrementation*, in which successive cohorts and generations of children advance the change beyond the level of their caretakers and role models, and in the same direction over many generations (Labov 1994: Ch. 14). Incrementation begins *with the faithful transmission of the adult system*, including variable elements with their linguistic and social constraints (Labov 1989, Roberts 1993).

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**1.**   It differs however in ways that go beyond our immediate concern, e.g. in being a 'solidarity' chain rather than one with directly linked movements, and we have not investigated the role of prosody in back-vowel fronting.

That is, children would reach pre-adolescence with a system that very closely mirrors that of their caretakers. From there, Labov has argued (2001: 447) at length that learners, especially girls as the leaders in sound change ...

> increase their use of the linguistic change in progress by re-organizing the vernacular they first acquired. The simplest assumption is that this increment is a continuous one from the period when children first emerge from the linguistic domination of their parents (4–5) to the time when their linguistic system stabilizes (17–20).

As D'Arcy (forthcoming) summarizes the evidence to date on this, children up to about four pattern very closely to the speech of their caretakers. By about eight, they show strong influence from the speech of the community and especially peers. As she concludes, "it seems then that re-organization begins at some point after age four and is well underway by age eight." This community and peer influence is captured in Labov's Nonconformity Principle (2001: 516):

> Ongoing linguistic changes are emblematic of nonconformity to established social norms of appropriate behavior, and are generated in the social milieu that most consistently defies those norms.

In addition to the social side of vernacular reorganization, to account for the unity of changes over many generations, Labov also hypothesizes that these changes are best grounded in a "functional explanation" of sound change (1994: 117–121, 218–221), involving maximization of contrast. This view has been sharply criticized by Kiparsky (1995: 335–336), who favors a 'top down' approach, where the abstract phonological specifications and then phonetic specifications of the relevant sounds drive shifting.[2] Even this brief survey of the topic then includes heavily socially oriented efforts to explain chain shifting versus phonetically and phonologically driven ones.

Given the complex and multifaceted nature of sound change, these and related aspects are all plausible elements in the overall process. Often, the various elements are not mutually exclusive. Historical linguists and specialists in language variation and change have increasingly accepted the close interconnection of internal and external factors generally (most recently King et al. 2011 in the arena of morphosyntactic change), and the push is now for highly specific connections between the two. Here we pursue such a case: Empirical evidence for vernacular reorganization is considerable, for instance, and the structural characteristics of vowel systems may well help account for why most language families lack the

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2.    Specifically, Kiparsky argues that some level of specification for both tenseness and laxness in the vowel system are prerequisites for chain shifting. This argument helps to clarify Stockwell's observation that chain shifting "is a pervasive and persevering characteristic of vowel systems of a certain type."

chronic chain shifts that characterize Germanic. In short, we *expect* both social and structural factors to be at work here.

None of the current accounts, though, provides a satisfying resolution of the perseverance problem: Intense and ongoing discussion has not yet uncovered a reliable fundamental trait that would drive vowels in the same directions over so many generations in so many distinct social and cultural settings so consistently. That is, accepting a powerful role for the combined social and structural elements just noted above, we may still seek a compelling reason for the continuation of just the same trends in nonconformity over two and a half centuries in the history of the Great Vowel Shift and perhaps over a century in back vowel fronting. The occurrence of closely parallel changes across distinct dialect areas and languages across West and North Germanic magnify the issue many times over.[3] We turn now to a candidate for such a characteristic.

### 3.   Prosodic skewing

As already noted, we have argued that prosodic prominence correlates with directions and extent of vowel change during cross-generational transmission. That is, the ways that speakers realize vowels under prominence, such as contrastive stress, appear to parallel the direction of change found in apparent time, across generations. If child-directed speech (CDS) involves realizations of speech that parallel those found in prosodically prominent utterances, the early input to a new generation is systematically skewed in the same directions as in prosodically prominent realizations. If this hypothesis is correct, a younger generation's non-emphatic vowels should generally correspond to the position in the acoustic space of emphatic realizations of the same vowels in an earlier generation. If the ways of realizing prosodic prominence remain stable, then the direction of change, at least change from below, should likewise continue in the same direction. This provides speakers with a grammar that initially differs from that of earlier generations.[4]

This scenario is shown here, adapted from Jacewicz et al. (2009: 100), for the downward movement of lax or short vowels over two successive generations. The circles represent a hypothetical range of realization of a vowel in three different levels of emphatic or non-emphatic pronunciation:

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3.    A review of the vast body of work on chain shifting is far beyond our scope, but note that shifts of varying types occur across the English-speaking world (e.g. Watson et al. 2000), North Germanic (Küspert 1988) and German (Wiesinger 1983).

4.    In principle, speakers may well adjust toward the system of earlier generations, which would retard change.
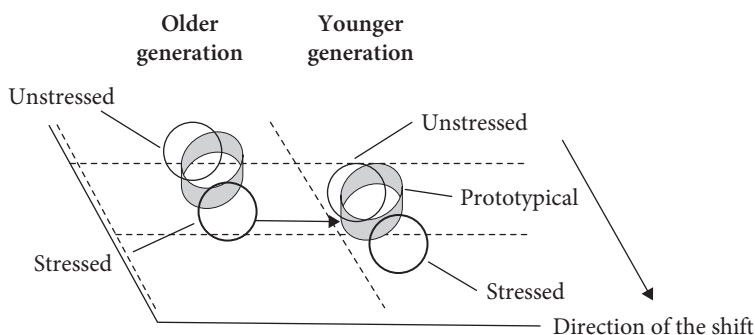
**Figure 3.** Skewing and cross-generational transmission

In such a situation, the system built by the younger generation differs from that of the earlier generation because the younger generation has received systematically different input. Indeed, that input provided to young children differs from the older generation's own, more typical, output in other contexts, like ordinary adult-to-adult conversation.

Our focus is clearly on the discontinuity in cross-generational transmission, not on acquisition, but work on CDS and caretaker speech is suggestive: Foulkes & Docherty describe the characteristics they observed in CDS as including slower speaking rate, extended pitch range, and possible exaggeration of phonological contrasts. Crucially, as they conclude (2006: 422), "Subtle differences in input may yield subtle differences in children's own productions."

Consider how this scenario fits into Hale's (2003: 348–349, 2007) model of sound change, shown below. This figure emphasizes first the discontinuity of cross-generational transmission, and describes potential sources of 'noise' in what constitutes the Primary Linguistic Data (PLD) for the new generation. The noise comes in if an acquirer mistakes "the effects of the speaker's production system (A), of ambient effects on the acoustic stream (B), or of his or her own perceptual system (C)" (2003: 349).

Hale concludes (2003: 349) that change only results from acquirers being exposed to PLD that differs somehow from that presented to earlier generations.
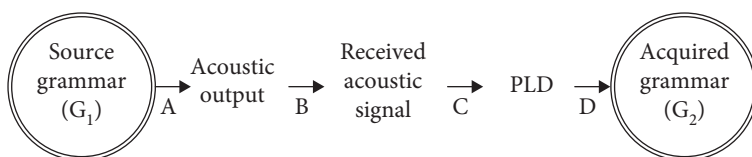


**Figure 4.** Hale's model of 'noise' in primary linguistic data

Prosodic skewing, not noise per se, accounts for a particular type of different input in shaping a particular kind of acoustic output from the earlier generation.

Specifically, the acoustic output of Child-Directed Speech is widely argued to differ systematically from other speech. Caretakers tend to produce vowels emphatically in speaking to infants and young children as has been argued by de Boer & Kuhl (2003), among others. This opens the possibility that cross-generational vowel change might correspond to patterns of prosodic emphasis. While the precise nature of CDS characteristics are not yet fully understood (cf. especially Foulkes et al. 2005), they are clearly associated with patterns often like those found in 'clear speech,' for example. CDS is known to be a culturally variable phenomenon (Lieven 1994) and in some societies, according to Ochs & Schieffelin (2005: 77), "infants are not engaged as addressees until they evidence that they can produce recognizable words." They further note that "in some upper middle class households of the United States and Europe, ... small children may pass the day primarily in the presence of a single adult (e.g., mother)" (2005: 78), so that they are much less frequently the overhearers of "nonsimplified conversations."

Where CDS and related patterns exist, we suggest, they help create a bias in the PLD from which the early learner begins to create their grammar, as the learner establishes an initial vowel system, with vowels slightly skewed in the acoustic space from those of earlier generations.[5]

Goldberg & Casenhiser (2008) have independently developed a notion of input-skewing, aimed at understanding how children develop argument structure in syntactic acquisition. As summarized by Robinson & Ellis (2008: 505):

> Goldberg & Casenhiser show that parental language naturally *skews* the input to children to provide systematic patterns of consistency and variation, and that such skewed input leads them to learn and generalize argument structure constructions.

This would provide independent parallel evidence for skewing from a very different area of grammar. Bias produces a change in the PLD which, in turn, produces a change in the grammar of the child, so that the change in the grammar is a result of the antecedent change in the PLD. The research of Goldberg and colleagues suggests that its role is likely a 'facilitatory effect' on what is learned (Boyd & Goldberg 2009), and work on 'vernacular reorganization' would provide a mechanism for reducing or perhaps eliminating these effects.

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5.   Where there is no CDS of this sort, we do not expect to find persistent shifting of the sort discussed here. For instance, the absence of CDS extends to working class African-American families in the American South (Heath 1983), consistent with the non-participation of such communities in enduring chain shifting. Cultural changes in such communities would then open them to skewing.

Overall, then, prosodic skewing would provide a systematic account for one type of 'noise' from Hale's model. Specifically, it would begin with a pattern of social behavior (CDS) which maps to grammar, namely in how prosodic prominence is realized. This is surely an indirect relationship, one that parallels 'clear speech' or 'hyperarticulation' in some but not all ways.

More importantly, it would provide a systematic source of bias in cross-generational transmission that would move vowels consistently in a given direction based on the realization of those vowels in the input to children. That is, as long as emphasis changes vowels in particular ways and those kinds of emphasis are used frequently enough with early learners, we could see vowels shifting in the same directions. The notion of skewing has nothing to say about the direction of change except that diachronic change should parallel the prosodic warping of child-directed speech. Cultures that do not address young children in this way or languages which do not change the realizations of vowels systematically in such settings would be predicted not to show skewing effects.

With that background, let us turn now to vowel changes underway in American English.

## 4.  Evidence from cross-generational transmission

The results discussed here come from a five-year study, involving data collected from well over 400 speakers spread across three very distinct dialects of American English:

(2)   Dialect areas under study

–   Inland South, represented by western North Carolina,
–   Midland, represented by the area around Columbus in central Ohio,
–   Inland North, represented by Madison, Wisconsin, and areas stretching eastward.

All three are regarded as undergoing distinct patterns of vocalic changes, though the status of changes in each dialect are proving more complex than earlier research would have suggested. Following Labov et al. 2006 and other work, we began from the assumption that the Inland South was actively participating in the Southern Shift, that the Midland was involved in no systematic shift and that the Inland North was subject to the Northern Cities Shift. As detailed in Jacewicz et al. (2011a), the Southern Shift appears to be in retreat in the North Carolina communities under study, the Columbus area shows Canadian-shift-like effects (see Durian et al. 2010), while southern Wisconsin has only partial and inactive effects of the Northern Cities Shift.

The subjects included a total of four age groups roughly corresponding to generations, from children (8–12 years old), to young adults (23–31), a parent generation (35–51) and a grandparent generation (66 and older).[6] Our youngest subjects, then, should be already old enough to reflect the effects of vernacular reorganization as discussed above. That is, their vowel systems should not reflect skewing directly but filtered through social effects.

In order to test the possible role of prosodic skewing in cross-generational transmission, a sentence reading task elicited three different prosodic contexts. These were built into pairs of sentences including contrasting elements, as shown here:

(3)  Reading task examples for the target word "beds"

HIGH EMPHASIS

Rob said the tall CHAIRS are warm. No! Rob said the tall BEDS are warm.

INTERMEDIATE EMPHASIS

Rob said the SHORT beds are warm. No! Rob said the TALL beds are warm.

LOW EMPHASIS

Rob said the tall beds are COLD. No! Rob said the tall beds are WARM.

These pairs were presented to subjects in random order, yielding 120 sentence pairs per speaker. Subjects were asked to produce the words in capital letters with greater emphasis. The recorded material included 5 vowels /ɪ, ɛ, æ, e, aɪ/, 2 consonantal contexts, (/bVdz/ and /bVts/) and 5 levels of emphasis (two of which are not shown here). In addition to this sentence material, we also obtained more samples from each subject including elicitations of single words in the h_d frame and a free conversation, material that will be analyzed elsewhere.

The first set of results of interest come from 123 female speakers using the target words in sentences (in /bVdz/ and /bVts/ contexts) with varying prosodic prominence, as detailed above. Figure 5 shows emphatic (black circles) and non-emphatic realizations (open circles) for one vowel, high front lax /ɪ/ for North Carolina speakers. The plots show productions across three generations, A2 being the oldest (35–51 years old), A1 the intermediate (23–31 years old) and A0 the children's generation (8–12 years old). The measure used here, the spectral centroid, does not reflect the traditional socio-phonetic reliance on a single measurement, such as mid-point. Rather, it takes into account formant movement over the course of vowel's duration while calculating the average F1 and F2 values to establish the position of a given vowel in the acoustic vowel space (see Jacewicz

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6.   Generations here are roughly 15 years apart. This is inevitably somewhat arbitrary, and Labov (2001) sets the number somewhat higher.

et al. 2011c for further details). Of interest here is the fact that the non-emphatic production of each younger generation occurs in a position where the emphatic variant was a generation ago, which gives an impression of a chain-like vowel rotation as illustrated in Figure 5.

A more detailed pattern including formant trajectories sampled at five equidistant points in time is illustrated in Figure 6, which compares the realization of /ɪ/ over these three generations for all three dialect areas. The emphatic (black symbols) and non-emphatic realizations (open symbols) are plotted for each generation. The same basic pattern obtains across each of the three dialects and across all three generations: The vowel is moving downward and forward in each generation and in each dialect in increment-like steps determined by the positional difference between the emphatic and non-emphatic variants. The top row of figures shows vowel dynamics across the generations. While we will not pursue it here for reasons of space, we hypothesize that formant dynamics, in addition to the positional vowel change, also play some role in the patterns of cross-generational vowel change as suggested in Jacewicz (2011a).

The plots show considerable differences, however. Ohio speakers show a smaller incremental change than Wisconsin or North Carolina speakers, especially between A2 and A1 generations. That is, the non-emphatic realizations of the younger generation do not seem to have advanced as far as the emphatic realizations of the older generation would have suggested and as found in the North Carolina example in Figure 5. Still, in our data, the direction determined by the highest level of emphasis parallels the direction of cross-generational change, even if the degree does not.

We call attention to two further points about this figure. First, it shows how the dynamic 5-point measurement used in most of our work compares to the centroid.
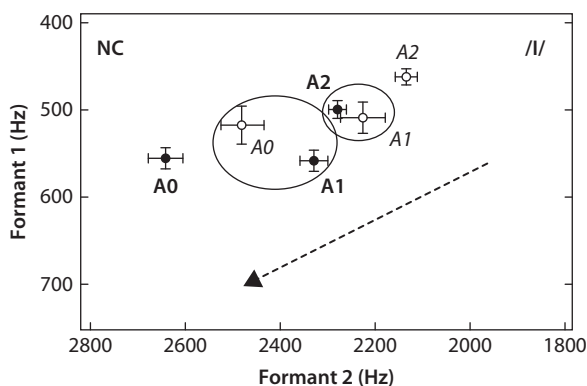


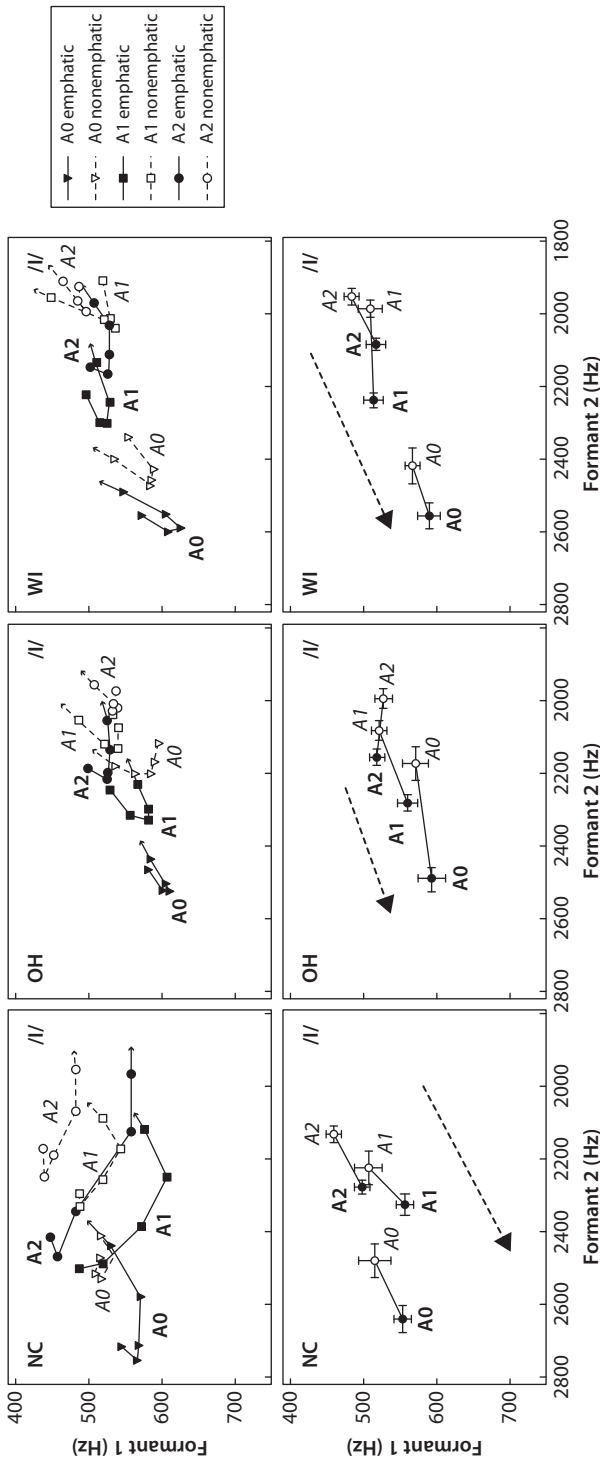**Figure 5.** /ɪ/ across three generations in North Carolina

**Figure 6.** /ɪ/ across three generations in three dialects

Second, our youngest generation, 8–12 year-old girls, is still growing and some of the differences may reflect vocal tract length differences. However, as pointed out in Jacewicz et al. (2011b) we do not expect those effects to be substantial here and therefore we did not normalize the formant values in the present display.

Some researchers recommend that the formant values be normalized for each individual speaker, prior to comparing the acoustic displays (e.g., using a method like Lobanov 1971) – basically an approach to reducing variability. However, the design of the study which examined cross-generational changes in selected vowels did not include vowel tokens most appropriate for normalization purposes, i.e., those having the lowest and highest F1 and F2 values for an individual speaker produced in both emphatic and non-emphatic forms in the phonetic context used here.

Apart from technical reasons (i.e., to avoid any possible side effects resulting from imperfect normalization procedures), there was also another consideration in our decision not to normalize the formant values. One of the important aspects of sound change over time is the perception of the vowels produced by the older generation (e.g., parents) by children learning the language. However, it is not clear that "normalization" per se is a necessary part of the speech perception process (or the acquisition process) and there is continuing debate in the literature concerning this matter. For instance, Johnson (1995) proposes an exemplar model of speech perception which has no overt process of speaker normalization.

While there is a tremendous amount of research on vowel changes in American English, shifts, the most notable contributions, are geographically broad, without large numbers of speakers from a single area. This is most notably so with the *Atlas of North American English*, Labov et al. 2006. Other studies describe single communities or small areas in great depth. One of the aims of this project was to create a larger set of closely comparable data from a set of communities in different dialect areas.

In the end, there are consistent parallels and commonalities between the effects of prosodic prominence and the differences between one generation of speakers and the next in a given dialect area. In many instances, like with the example of North Carolina /ɪ/ discussed in detail above, the match between the two is striking: The younger generation's non-emphatic production is very close to the older generation's emphatic production. We lack, at this point, direct data for the continuity of these realizations from the early stage at which children are exposed heavily to emphatic realizations of vowels, but that scenario seems intuitively implausible: Current evidence, like that reviewed and presented in Foulkes et al. 2005, suggests that caretaker speech ends around 2;0, long before vernacular reorganization, so that prosodic skewing would seed change in the early period. Again, the bias from prosodic skewing may manifest itself in the formation of categories in the vowel system.

As they grow older and move toward the period of vernacular reorganization, children are increasingly exposed to non-emphatic forms of vowels and are presumably capable of adjusting their vowels in that direction. This warrants investigation, we would argue, particularly the likelihood of an interaction between these structural tendencies and the social forces described in detail by Labov and others. Prosodic skewing, at the least, bends the path of vowel change in one direction, whether or not it comes to be adopted and transmitted socially.

## 5.   Conclusion and implications

Labov (2001: 463) has famously said that language change is a process where children come to talk different from their mothers, and specifically on the incrementation of change over generations, he concludes that "there must be a social force that activates ... the shift and drives the increment." But even before vernacular reorganization begins during pre-adolescence, our findings suggest that directly structural factors also play a central role in initiating sound change over the course of cross-generational transmission. In fact, the particular phenomenon under discussion – prosodic skewing of input presented to learners – reflects a particularly close and perhaps inextricable interaction between the structural and the social, namely how vowels are pronounced under prosodic prominence and how caretakers talk to children. Skewing as outlined here, in other words, is both a structural pattern and a social pattern: Again, the interactions between how vowels change under emphasis and how caretakers speak to small children. The social setting of language acquisition can help shape the input that children receive, and input skewed there can help the learners to build slightly but consistently different grammars from those of their caretakers.

This changes the position of vernacular reorganization in sound change. Sound change begins with the input to children, and in this view children already initially learn to talk differently from their mothers. That is, shifted variants are supplied in the input to young children. Vernacular reorganization, on this view, offers young speakers the opportunity to undo changes within the limits of the plasticity of the vowel system and other factors, to adjust the grammar they have recently created from the cross-generationally skewed input back toward that of older speakers.

Recall again Labov's description of early learning as the 'faithful transmission of the adult system'. This wording suggests that 'imperfect learning' and 'vernacular reorganization' are being treated as opposing views of sound change. In line with Purnell, Raimy & Salmons (forthcoming) we would prefer to start from the position that both may well play a role in sound change, and argue that a more

productive focus would be on the roles each play, along with relevant phonological and phonetic structures, lexical frequency effects, and so on. At any rate, prosodic skewing is neither imperfect learning nor vernacular reorganization in the usual senses and so broadens the set of considerations needed for a full understanding of sound change. On the one hand, it relies on the social setting of language acquisition in particular communities to set the table for change. On the other, if the proposed prosodic skewing is right, children are misperceiving not the acoustics of vowels but rather interpreting emphatic forms as normal or non-emphatic forms.

Given how seldom even the most 'natural' sound change reaches completion, we expect that chronic change, like chain shifts in Germanic vowels, must have some relatively direct bias in cross-generational transmission that primes the system toward the pattern in question. Skewing is a candidate for such a bias. Skewing is a pattern of change that has a particular kind of spread: Contrast with variants already in the pool where speakers control old and new forms, like rhotacism or glottalling, where speakers have wide exposure to both patterns (rhotic and non-rhotic, glottal and alveolar consonants), and learn and use both. In fact, the argument developed above suggests that such types of change should not be chronic and may behave differently in vernacular reorganization. That is, we suggest thinking about the typology of sound change in terms of how it gets into the grammar and gets transmitted. Skewing would represent a new type: persistent and gradual, characteristics due to how it originated.

More importantly, many or most types of sound changes are predicted not to be chronic, namely if they lack the distinct input patterns described here. And the chronic patterns of change induced by prosodic skewing should not be found in communities that do not participate in the relevant kinds of child-directed speech.

We close by underscoring two possible contributions that skewing may make to this landscape:

The first is in helping to account for perseverance: As long as patterns of emphatic pronunciation and patterns of child-directed speech remain constant, skewing creates the context for enduring, chronic directions of vocalic change. But we're really at the beginning of this enterprise. We have not yet, for example, begun to consider how skewing might help produce gender effects, especially given evidence from Foulkes and others on gender-based differences on input.

Second, these patterns of emphatic pronunciation and patterns of child-directed speech appear to be widespread, at least in many English-speaking communities. This means skewing seeds change across broad communities. If this is right, vocalic chain shifts are not spreading gradually from one individual to

another in the sense discussed at the Workshop, but rather the bias in direction of change is being passed along to many members of the community.

Also important for the field of language variation and change, vernacular reorganization can presumably reverse direction as well: What is widely known as 'change from above' could be a reaction, in part, to skewing. That is, as speakers become aware of skewing-induced change, we may find a social reaction against it.

To conclude, in some cases children may in certain cases simply be getting distinct input which leads to sound change, a type of sound change that advances incrementally over multiple generations and even millennia. Such change would be initiated via skewing, and subject to later adjustment during vernacular reorganization, even reversal, so that this proposal is not deterministic. Ultimately, directly structural factors in how vowels are pronounced and the input presented to learners should be accorded a position in change across cross-generational transmission of language alongside social factors. Putting our recent findings in the context of Labovian and other views on sound change strongly suggests a new kind of tight and complex interactions between the social and the structural.

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