

(æ) in San Francisco English

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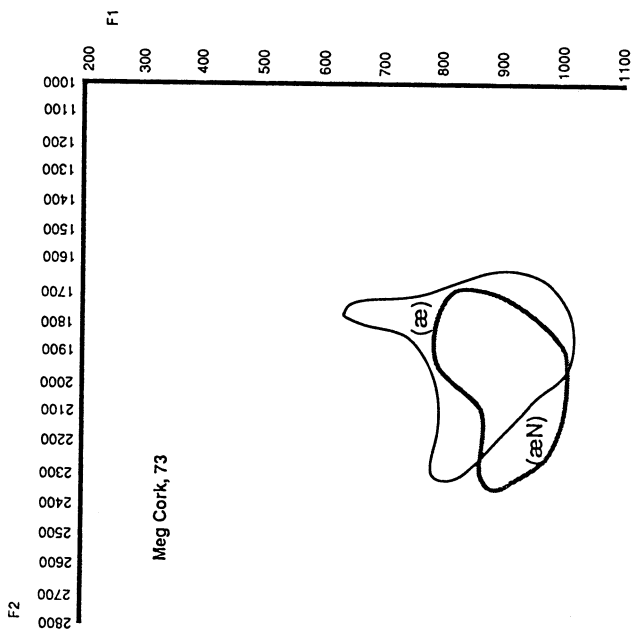
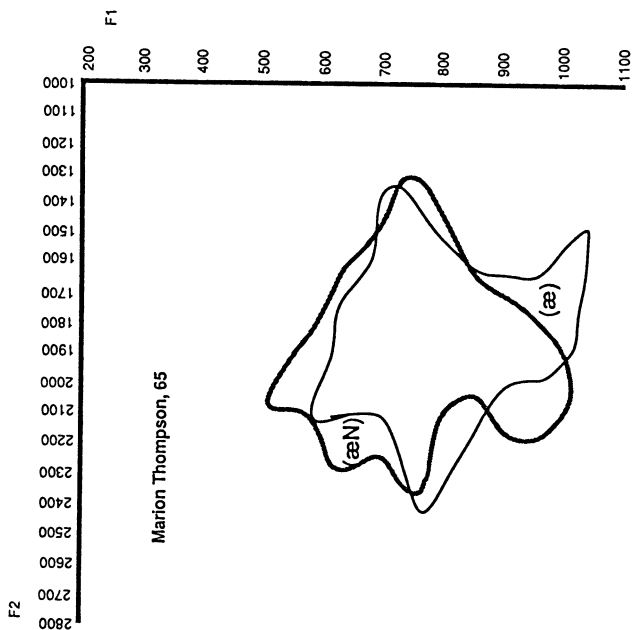
In the change in progress in San Francisco White English the front vowel /æ/ is distributing in two areas of vowel space, a lower, more centralized area and a higher, fronter one. The area of the low, less front phones realize one of the two allophones of /æ/ in the current phonology, that is, the alternant not in the nasal environment. The area of fronter and higher vowels realize the other alternant, /æ/ before nasals, hereafter /æN/. Through apparent time low /æ/ before obstruents interacts less and less with /æN/. This is because /æN/ has tensed.

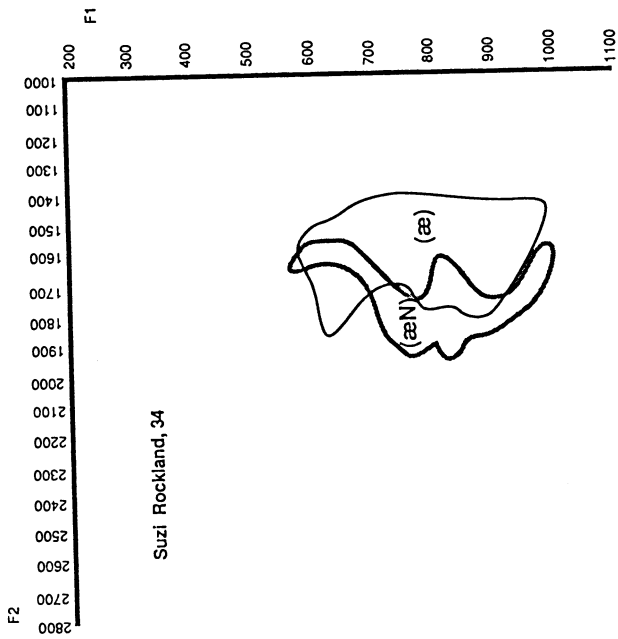
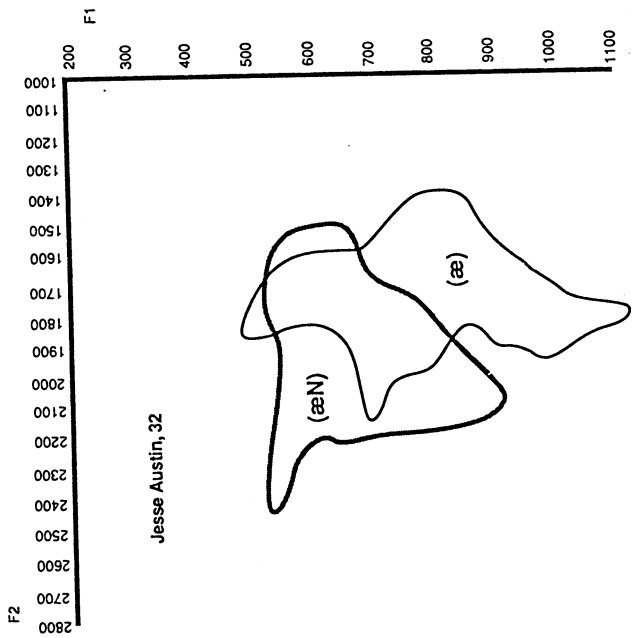
This paper reports on /æN/ in the informal speech obtained from interviews with 14 white women, native speakers of English who grew up in San Francisco. Eight of these are grouped into four pairs, each of which has a working class and middle class member; the youngest two are in their twenties, the next in their thirties, the next in their forties, and the oldest two are over sixty. These eight informants are the main group speakers. The remaining six speakers, all in their early thirties, are the supplementary group speakers. The findings presented here rely on plotted F1 and F2 measurements obtained for more than 70 vowels per speaker for the eight main group speakers and between 30 and 40 tokens from the speech of each of the supplementary group speakers.

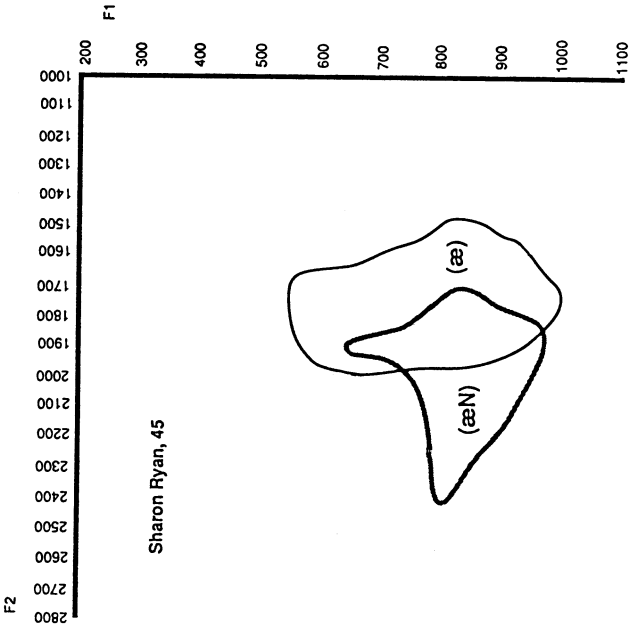
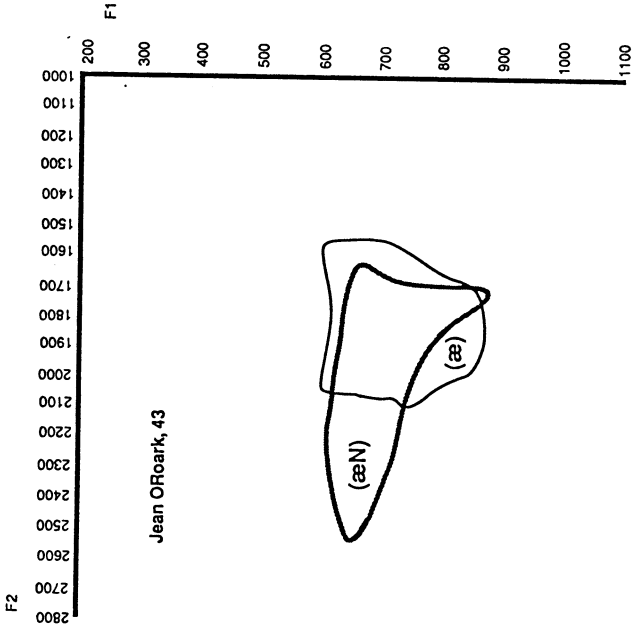
When followed by a nasal consonant /æ/ fronts and raises. Fronting is more consistent than raising. An increase in both kinds of movement is observable through apparent time. The variation observable across speakers of different ages and between informants of approximately the same age is subject to linguistic and social constraints. It is possible to trace the phonetic course of a subphonemic change that has been producing the allophone /æN/, /æ/ before nasals. The speech of younger informants shows that adults in San Francisco already have, or almost have, a complete allophonic distinction between /æ/ and /æN/.

The variable (æN), then, represents the distribution and movement of part of a phonologically low front vowel phoneme. The variation that defines (æN) involves tensing of /æ/___N, which, by bringing some of the front low vowel forward, brings the lower front edge of vowel space forward for San Francisco White English. Vowel tenseness is a phonological phenomenon. It is not a matter of the presence or absence of one phonetically defined feature, nor a difference in degree of any one acoustic cue or articulatory gesture on some scale. Several cues are involved. The one with apparent priority is peripherality. The importance of peripherality is obvious in English phonology. Tense vowels are fronter than lax front vowel counterparts and backer than lax back vowel counterparts.

An examination of the vowel charts for main and supplementary group speakers shows the course of the development of complementarity, in so far as plotted F1 and F2 measurements reveal degree of frontness and height for vowel tokens. Charts for the eight main group speakers, given in Figure 1 on the next four pages, show total distributions for (æN) and for (æ) elsewhere. In the speech of the two oldest informants in the main group of speakers there is some fronting of (æN); (æN) overlaps greatly with all of the rest of /æ/. For the middle-aged speakers (æN) fronts more, overlapping less with (æ). For speakers in their early thirties (æN) is clearly in the process of separating from (æ), but there is still overlap between the areas. This is also the situation for 25 year old Beth







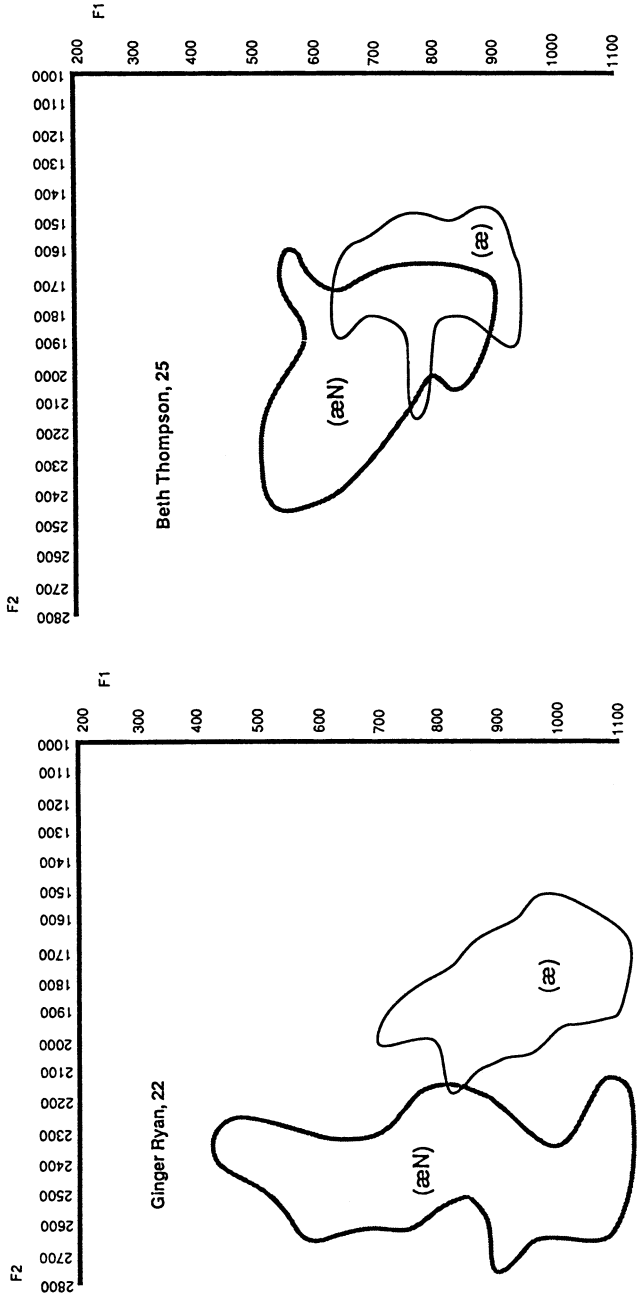


Figure 1. Charts for the eight main group speakers showing distributions for (æ) and (æN) for working class and middle class older speakers, middle-aged speakers, speakers in their early thirties, and speakers in their twenties.

Thompson as well. For twenty-two year old Ginger Ryan (æN) has completely separated from (æ). All six of the supplementary speakers, in their early thirties, whose charts are not reproduced here, show separation of (æN) from (æ). The (æN) distributions suggest that /æN/ behaves more and more over time as a member of the subsystem of front vowels and participates little in low vowel activity; /æN/ has nothing to do, for instance, with the interaction of /æ/ before obstruents, as in *cat*, with the nearly merged low back /a/ and /ɔ/ , as in *cot* and *caught*. There are low front variants of (æN), but these are within a distribution that ranges front and up from low vowel space. Through apparent time variation involving (æN) can be seen to assume direction, carrying the nasalized vowels more and more forward and further and further up within front vowel space. Two movement rules are involved; the fronting rule has priority.

Examination of the data for evidence of lexical diffusion does not reveal any very good candidates for items that have conditioned tensing of the vowel more than others. But within the distribution of (æN) across age of speaker finer phonetic conditioning is found. The most extreme tensing—that is, fronting and raising together—is favored overall by a following alveolar environment. There are different fronting and raising orders, however, for variants in several environments, as shown in Table 1.

	WC		MC	
oldest	fronting	raising	fronting	raising
	nT n#	n# nT	ŋ nT n# m	n# nT m ŋ
	n# nT m	n# nT m	nT n#	nT n#
	nT m n#	nT n# m	nT n#	nT n#
youngest	nT/n# m	n# nT m	ŋ nT	nT ŋ

Table 1. Fronting and raising orders for (æN) in several environments for the eight main group speakers, oldest to youngest by class. (n# = (æn\#); nT = (ænt/d); m = (æm); ŋ = (æŋ))

Not every speaker produced enough tokens of the nasalized vowel in each environment for environmental centers to be calculated. Given the orders of the centers, it can be seen that (æ) before /n/ word finally varies with (æ) before /n/ plus /t/ or /d/ for highest position across age of speaker. (æ) before /m/ is least favored for fronting. The four speakers for whom (æ) before /m/ centers can be found keep the vowels relatively unfronted. It may be that the velar nasal encourages fronting the most, while keeping the vowel relatively low. The velar plosive also conditions fronting for (æ), so two constraints, place of articulation and nasality, are probably at work. Environmental constraints for fronting and raising have not reordered over time. The following ordering generalization can be suggested:

fronting	raising
æŋ æn æm	æn æm æŋ

(æm) is favored for neither fronting nor raising. (æŋ) tends to be front, but it is also kept low. (æn) is both fronted and raised; this makes it the most favored for tensing in general.

There is social embedding for the sound change. Correlation of phonetic behavior and SES index score of speaker is apparent only for the pronunciation of the nasalized vowels. Two features are involved: vowel height; and diphthongization. In San Francisco White English the tensing of /æ/ before nasals has been effected in such a way that it has been unnecessary for either class (to

dichotomize unrealistically) to change the realization of the nasalized vowels exactly in the direction of realization in the speech of the other class. An original higher position for (æN) for middle class speakers along with prioritizing of fronting over raising makes this so. The spread of SES index scores, determined by employing an index similar to the one used in Labov (1966), is given in Table 2. Given these SES scores, there is a break in the continuum on the class spread between Tracy Sawyer and Jean ORoark. Heuristically, the women with scores 8–11 are regarded as working class, and those with scores from 13.5–18 as middle class.

Ginger Ryan	8	Jean ORoark	13.5
Suzi Rockland	8	Beth Thompson	14
Meg Cork	10	Rachel Stone	14.5
Sharon Ryan	10	Maureen Donovan	14.5
Carol Winter	10	Jesse Austin	15
Tracy Sawyer	11	Barb Walsh	15
		Marion Thompson	16
		Nan Levine	18

Table 2. SES index scores for the 14 speakers.

Charts for the dyads of elderly and middle-aged speakers show that class has determined a height difference for (æN) centers and distributional spreads for many decades. The height difference illustrated in Figure 1 was certainly established well before extreme fronting of (æN) began. The two middle class speakers center the (æN) distribution above but not in front of the obstruent environment distributions. For the working class speakers (æN) centers lower than some of the obstruent centers, as well as slightly in front; the center of (æN) has about a mid height position within the total low front vowel distribution. For the lower SES speakers the forward extension of (æN) is quite low, while for the higher SES women it is relatively high. Since tensing is primarily a fronting movement the older middle class informants Marion Thompson and Jean ORoark do not extend (æN) down and front, the older working class informants Meg Cork and Sharon Ryan do not extend (æN) up and front. Speech within one class is not adjusting to a position for (æN) determined by the speech of another class. Rather, the tensing rule, primarily a rule for peripheralizing (æN), applies in the phonology of all speakers.

From decade to decade fronting proceeds, accompanied by some raising. The raising appears to be processually secondary. Younger speakers all show (æN) centers to the front of the obstruent environment centers. Raising is found across class, but for middle class speakers this results in a further height separation of nasalized and nonnasalized vowel distribution centers, while for working class speakers a center for (æN) higher than for areas within (æ) is quite recent. Extension of the distribution of (æN) up from a center increases over time. The two speakers in their twenties, Jennifer Ryan and Beth Thompson, show the highest extension of (æN) relative to the whole (æN) and (æ) areas. For working class Suzi Rockland and Jennifer Ryan, both in their thirties, however, there remain quite low areas of (æN). Across class (æN) has moved forward and up, while keeping some of its distribution relatively low. The low area is lower for young working class speakers; at the same time, the high area for (æN) is higher for young working class speakers. There is a greater height range for (æN) for young lower SES speakers.

Middle class individuals are more likely than working class ones to diphthongize phones of the low front phoneme. In the sampled speech of the six working class women there are only three instances of diphthongization. The vowels in *hand* and *understand* glide back and slightly up for main group speaker Suzi Rockland and supplementary group speaker Carol Winter. Main group speaker Jennifer Ryan has a lowering inglide on the vowel in a particularly front instance of *Tam*. Seven of the eight middle class women diphthongize some of the vowels before nasals. For instance, main group speakers Jean O'Rourke and Jesse Austin have lowering inglides on vowels in *can*, *and*, supplementary speakers Rachel Stone, Barb Walsh and Nan Levine on *panic*, *and*, *Jan*; Levine has a raising inglide on the vowel in *hand*. Barb Walsh's chart is given in 4 on the handout. All of the glides used by middle class women are of some length, lowering F2 by 500-1000 Hz; and the vowels are quite long, in no case shorter than 300 msec. Across speakers of both classes, diphthongization is favored in the alveolar environment.

The process of increased tensing of (æN) through apparent time is the progress of a subphonemic sound change and therefore a process that results in the change of status for a rule (or rules). (æN) fronts and raises variably. Finally complementarity is established. A variable rule (or variable rules) accounting for the fronting and raising movements is either replaced by or exists along side of a categorical rule stating that before a nasal consonant / æ / becomes tense. Description of the process, as seen in the drift of tokens through time, addresses the embedding, transition, and actuation problems. The embedding problem, as discussed in Weinreich, Labov, and Herzog (1968:100), is to locate change 'within the linguistic and social matrix governing its development', the transition problem to discover 'the route from one state of language to another' (p.101), and the actuation riddle to find 'how rule changes pass from an active to dormant state' (p.187). It is possible to place the tensing of (æN) within a linguistic context and, in a less detailed way, within a social context. The route in vowel space from untensed to tensed for (æN) is clear. It is not clear that the tensing process is finished phonetically; that is, it is not clear that a variable tensing rule is 'dormant'—(æN) can be further tensed. Tensing itself, however, is predictable. 'Actuation' of rule change, in the sense of the addition to the grammar of a statement describing a complementary distribution, has taken place or is in the final stage of coming about. The mechanism for the rule addition may or may not be a change in the status of the long-lived variable tensing rule or rules from variable to categorical; or, to put it another way, the addition of the allophonic rule may or may not be the result of variable rule loss. The same statement or set of statements accounting for tensing may have dual status: as categorical, describing complementarity; as variable, describing increasing tensing in all or some environments. The rule for allophony simply tenses / æ / before nasals. The variable rule (or rules) front and raise the variable (æN) under several, differently weighted, constraints.

In formulating responsible sociolinguistic phonological statements about most synchronic or diachronic processes—that is, about processes more complicated than those involving phonemic distinction or complementarity due only to phonetic conditioning alone—it is necessary to inquire about at least four different kinds of possibilities. First, it is possible for a rule to be categorical or variable. Second, it is possible for conditioning to be phonetic, lexical, or both; or to be grammatical. Third, it is possible for variability to be socially or linguistically conditioned, or both. Social variability will have reference to speaker identity and to the level of formality of a speech situation. Phonetic and lexical linguistic

variability have been given more consideration than other kinds. If the variability is phonetic it is a matter of more frequent rule application in one environment than another, that is, of weighted phonetic constraints. Fourth, it is possible for a rule to change status in more than one way. Lexical conditioning may be lost, resulting in a rule that is entirely phonetically conditioned. Or, a rule may change from variable to categorical. At the end of a sound change a rule changes phonological status. A rule for changing an inventory or creating allophony—a rule describing shift, merger, split, or complementarity—is of a different phonological order than one describing, e.g., variable, conditioned vowel movement in which no change in the state of the phonology has been effected.

The movement of (æN) is embedded in the subsystem of front vowels, but it is also true that (æN) exists only in relation to (æ). The tensing of (æN), resulting in allophony, manifests a separation of (æN) and (æ). For younger speakers /æN/ is now maximally separated, phonetically, from /æ/. (æN) may continue to tense but, as far as securing the allophony goes, further fronting and raising would be inefficient. There is more room for expansion in front vowel space than in back, and (æN) has made use of it. Martinet's (1955) margin of security or safety margin, is a concept that has had reference to the maintenance or collapse of *phonemic* distinctions. But here a principle that it is functional to maintain a safety margin of empty vowel space may be operating subphonemically, for the development of allophony.

It may be that this reveals something about the mechanism of phonemic split. In White English in Philadelphia a tense collection of vowel phones has split from a lax collection for /æ/, resulting in tense /æh/ versus /æ/; the separation is phonemic and not simply allophonic because it is not simply phonetically conditioned. In San Francisco White English a collection of phones has been separating from a lax collection for /æ/, but the result is complementarity rather than contrast at this time because the phonetic conditioning is clear. Labov (n.d.) has referred to the tensed vowel /æh/ in Philadelphia as a 'marginal phoneme', by which he means that its status depends on only slight disturbance of a pattern of complementarity. The tensing of San Francisco /æ/ before nasals, the most favored environment for raising, exemplifies a stage in a process that logically leads to split, either by partial merger with a higher nasal allophone of a front vowel if tensing does not extend to other environments, or by the establishment of a new distinction if tensed /æ/ gains lexicon in some way other than through phonetic conditioning. I am not suggesting that split is predictable but that two preconditions for it have already been met: phonetic conditioning for allophony has developed; complementarity, reflected in separation between the distributions of (æN) and (æ) in phonetic vowel space, has been effected. What remains to happen is some disturbance to the complementarity, or partial merger of /æ/ with a higher vowel. The high, front phones of /æ/ have reduced the phoneme's margin of security in relation to nonlow front vowels drastically. There is also no margin of security between /æ/ (*cat*) and /a/ (*cot*), and overlap is tolerated. The situation at present is one of maximal overlap of areas of confusability, to use Nunberg's (1980) term, between /æ/ and higher front vowels and between /æ/ and /a/; and of minimal overlap of what I will call also areas of confusability between the two alternants of /æ/. I am suggesting that the separation in vowel space between the two allophones of /æ/ be regarded as the same sort of thing, phonologically, as separation of phoneme distributions, but relevant to a different *level* of the phonology.

The development of allophony for /æ/ is embedded socially within a continuum of class differences. Phonologically, the route from lack of allophony to

clear complementarity is one of fronting primarily and raising secondarily. Allophony is actuated by rule addition. The rule has been variable. Now tensing of /æN/ is categorical, although further tensing may continue, variably. Both categorical and variable versions of a tensing rule may be said to exist, the first describing that fact of complementarity. The achievement of categorical status for the tensing rule marks that a *phonological* change has already taken place. To say this, however, is simply to reify an observation that a process, tensing, now seems to consistently occur to a degree that maintains phonetic separation of the phones distributing as (æ) and those distributing as (æN). The reality of allophony can be said to have been effected at some point prior to consistent separation of (æ) and (æN) distributions across individuals, in the sense that 'free variation' can manifest stage complementarity. A linguistic perspective tying the phonetic detail of specific stages of sound change to phonological feats such as the accomplishment of allophony, split, or merger is the most obvious bottom-up approach to the problem of how one rule changes into another. This problem is 'the generative aspect of the transition problem' (Labov 1973:101).

Conditioning for the development of allophony is purely phonetic. Even fine phonetic conditioning by place of articulation of the nasal is discernible. The word class involved remains intact; no items are subtracted, no items are added. Differences in rule application for speakers under 35 suggests that the change has been a lexically intact wave. Within the tensing rule, in both its categorical and variable forms, there are differently weighted constraints determined by place of the nasal following the vowel. This phonetic variability interacts with socially governed variability. Class of speaker controls the height of the nasalized vowels before tensing and the use of glides. Further, level of formality, although not discussed in this paper, affects vowel realizations. The four different types of possibilities that should be considered—categorical or variable status of a rule, level of linguistic conditioning, type of variability, and kind of rule change—have been inquired about. The development of the allophone /æN/, a simply conditioned, categorical matter by one kind of account, can be seen as a process describable by a list of selections from several sets. There are categorical and variable rules tensing /æ/, involving linguistic conditioning that is purely phonetic, with linguistic and social variability.

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