Sociophonetics

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Abstract
Investigators have recently made impressive progress in multiple areas of sociophonetics. One area is the use of increasingly sophisticated phonetic analysis, which is demonstrating that very fine phonetic detail is used for the construction of social identity. A second area is the use of ethnographic approaches, which enable researchers to break free from using traditional social categories that may not be relevant for a particular group of speakers, and to investigate in depth the social meaning of particular phonetic variants. A third area is the application of experimental techniques to probe listeners’ uses of sociophonetic detail in speech perception. These research directions are currently pursued by largely disjoint research communities, and the innovations are seldom combined within the scope of a single study. We argue that it is the combination of all these approaches that holds the key to an integrated understanding of how phonetic variation is produced, performed, and perceived in its social context.
Sociophonetics: the study of socially conditioned phonetic variation in speech
Variable: "a set of alternative ways of saying the same thing, although the alternatives will have social significance" (Fasold 1990, pp. 223–24)

INTRODUCTION
Language varies. This observation is the cornerstone of sociolinguistic research. Variation exists at every level of linguistic representation, but the study of socially conditioned variation has concentrated more on phonetics than on any other language domain. As a result, it is now well documented that the phonetic realization of any particular word can vary according to the speaker, the linguistic and social context, the topic, the addressee, the intentional stance taken by the speaker, and a myriad of other factors. Social identities are transmitted and constructed simultaneously with linguistic content.

In fact, the phonetic realizations produced across different speakers and contexts are so layered with social meaning that it is amazing that listeners are even able to identify different tokens as having the same referent, especially given the subtlety of the variation. A recent and rapid increase in the use of instrumental phonetic techniques for the analysis of phonetic variation is beginning to reveal that even extremely fine phonetic details are learned and transmitted for social means. Many of these studies have revealed variation that appears to be highly systematic, despite being so subtle that it is difficult to analyze auditorily. This finding raises the question of how such subtle phonetic detail can possibly be learned and stored.

Researchers have increasingly begun to consider social variation and speech production/perception together. This sociophonetic approach has led to advances in both fields and the emergence of a range of new research questions. Phoneticians are increasingly turning to social variation as something that may hold the key to breakthroughs in the understanding of speech production and perception. Sociolinguists, in turn, stand to benefit from an increasingly sophisticated view of how individuals and groups are able to imbue their speech with social meaning.

In parallel with these developments, some sociolinguists are starting to take more seriously the “social” side of their endeavor by adopting ethnographic approaches. Their ethnographic work is revealing that social meaning is much more nuanced and layered than traditional social categorization would suggest and that a more sophisticated understanding of individuals’ social worlds can greatly enhance our understanding of the ways in which speech is used to express social meaning. However, this line of research is not yet commonly combined with sophisticated acoustic analysis, nor have the findings been adequately considered by researchers concerned with enhancing models of speech production and speech perception to accommodate sociolinguistic variation.

Great progress has been made recently both on the “socio” and the “phonetic” side of sociophonetics, but there is a dearth of work that takes these recent breakthroughs and unites them within the scope of a single study. Although this article is a review and outlines relevant recent work, one main goal of the review is to emphasize the work that has not yet been done. We argue that the field would benefit from research combining an ethnographic approach with both fine-grained phonetic analysis and experimental methodologies. The results of such research should be used to inform work pursuing unified models of the perception and production of linguistic and social meaning. Furthermore, we argue that researchers should develop research agendas that are pattern-driven, rather than variable-driven, investigating the multidimensional patterns of factors woven together by speakers to construct social identities.

FOUNDATIONS OF SOCIOPHONETICS
Different individuals pronounce sounds differently from one another, and some of this phonetic variation depends on the social characteristics of the speaker. Work demonstrating such links is founded largely on the early
work of Labov in New York City (1966, 1972) and Martha’s Vineyard (1963). In these studies, Labov elegantly demonstrated that the frequency of use of phonetic variants systematically varies with age, social class, speaker style, and integration into the local community. Many studies inspired by this line of research have further documented the remarkable systematicity of socially conditioned phonetic variation (see, e.g., Wolfram 1969, Cedergren 1973, Trudgill 1974, Macaulay 1977, Modaressi 1978, Romaine 1978, Guy 1981, Horvath 1985, Milroy 1987, to name but a few). In this sociolinguistic tradition, data are usually collected through a series of interviews with participants, often stratified by age, gender, and social class. Most of this work consists of auditory analysis of variables into (often binary) phonetic categories.

This methodology has made impressive inroads into the study of language change by invoking the so-called apparent time hypothesis. According to the apparent time hypothesis, individuals’ phonological systems and accents remain stable throughout their adulthood. For this reason, any observed differences between younger and older speakers recorded at the same time are generally considered to be indicative of changes in progress (see discussion in Bailey 2001).

Some recent work has challenged the apparent time hypothesis by studying the speech of individuals throughout their lifetimes. Probably the most notable study in this respect analyzed Queen Elizabeth’s vowels during her annual Christmas message broadcast. The realization of the Queen’s vowels has shifted considerably over time (Harrington et al. 2000, 2005). Although such results challenge the spirit of the apparent time hypothesis, they do not negate its legitimacy as a methodological tool. If individuals shift in the direction of changes-in-progress throughout their lifetimes, then apparent time studies will simply tend to underestimate the speed of change.

In addition to the socially indexical, interindividual differences in pronunciation, it is also clear that individuals vary their speech from moment to moment in the performance of linguistic style, and this has been another focus of sociophonetic research. A large amount of the research conducted on stylistic variation has investigated how speakers alter their speech in response to changes in the setting or context. Much work has investigated changes in formality of setting (following Labov 1972) and also the importance of changes in the composition of the audience (following Bell 1984). Bell’s audience design theory holds that “style derives its meaning from the association of linguistic features with particular social groups” (2001, p. 142) and that speakers design their style primarily for their audiences, generally resulting in a shift toward the speech style of their audience. Quantitative work has shown a remarkable degree of fine control by individuals as they vary their speech across different contexts. Examples of this work include studies by Rickford & McNair-Knox (1994), who demonstrate the shifting of an African American teenager across different interviewers and different topics, and Coupland (1984), who studied a Cardiff travel agent and demonstrated the remarkable capacity she had to approximate rates of nonstandard variables used by her clients. Hay et al. (1999) found that phonetic variants in the speech of the television presenter Oprah Winfrey could be predicted by the ethnicity of the referee. Topic-based style shifting is also predicted by Bell’s account, but this is claimed to derive from the association of topics with typical audience members.

PUSHING THE PHONETIC AGENDA FORWARD

Much of the sociophonetic methodology uses solely auditory analysis and typically treats variables as binary. Part of the reason for this is no doubt historical: To conduct an auditory analysis, all that one needs is a good tape recorder. Acoustic analysis, at least until recently, required specialized equipment. One additional reason why sociolinguists continue...
Categorical variable: categorical variables consist of several discrete categories (e.g., variation between the presence or absence of /r/ following vowels)

Formant: a resonant frequency of a speech sound. The two lowest formants of vowels can be related to their place of articulation to analyze variants into categories is likely to be methodological—the predominant statistical analysis technique in which sociolinguists are trained takes categorical variable data as input (variable rule analysis; see, e.g., Tagliamonte 2006).

In actuality, phonetic variants are often arbitrary points along an often multidimensional continuum, and auditory analysis fails to capture the full extent of the continuum. This is most obviously true for vowels. For this reason, we also find a relatively strong tradition of investigating acoustic vowel quality as part of sociolinguistic studies. In such studies, which are increasingly more common, analysts measure the first and second formants of vowels to position them in a two-dimensional vowel space (see e.g., Labov et al. 1972, Maclagan 1982, Veatch 1991, McClure 1995, Roberts 1997, Ito 1999, Thomas 2001, among many others). This enables us to capture relatively fine-grained differences in vowel quality across different speakers and contexts. However, it is not just vowel quality that can benefit from detailed acoustic analysis. Work in phonetics reveals that contrasts between vowels can be maintained with subtle differences in trajectory (Thomas 2002, Maclagan & Hay 2007), duration (Wassink 2001), and voice quality (Di Paolo & Faber 1990). These almost certainly vary in sociolinguistically interesting ways across speakers and contexts, but inclusion of such types of analysis is not yet routine in most sociophonetic studies.

Acoustic analysis of sociolinguistic variation has been restricted almost entirely to vowels, leading to a recent chorus of calls for extending the domain of attention. Thomas (2002) pleads for more attention to consonants, prosody, and voice quality. Foulkes (2002) and Docherty & Foulkes (1999) make a similar case.

Podesva (2006) argues that much of sociolinguistics has focused on phonological variation, ignoring phonetic detail. He claims, and we would certainly agree, that “an approach taking into account the phonetic details of variation can bring to the surface a rich palate of meanings that can not be accessed by categorical investigations alone” (p. iv). He conducts a detailed study of the speech of three gay men across multiple contexts, showing how phonetic detail is used to construct social meaning. He does this with a careful analysis of the duration and intensity of /t/ release, phonetic properties of intonational variation, and the phonetic properties of falsetto voice quality. This work provides a clear illustration of how speakers make use of relatively subtle phonetic variation for social means.

Docherty & Foulkes’s (1999, 2005) detailed acoustic analysis of /t/ uncovering variation that is highly systematic and yet so subtle that it is extremely difficult to perceive auditorily. Despite a small auditory difference between the investigated variants, Docherty & Foulkes (2005) found that intervocalic and prepausal /t/ in Newcastle and Derby English varies depending on a speaker’s social group. Furthermore, Foulkes et al. (1999, 2001, 2005) show evidence of children between 2 and 4 acquiring the range of variants known to be sociophonetically salient within their community, some of which involve a highly complex degree of coordination between oral and laryngeal gestures.

Although /t/ has probably received the most widespread sociophonetic attention, the acoustic analysis of other consonants has also been revealing. For example, Stuart-Smith (2004) showed that speakers in Glasgow manipulate the spectral energy of /s/ to signal speaker gender. Investigating intrusive /r/ in New Zealand English, Hay & Maclagan (2006; J. Hay & M. Maclagan, submitted manuscript) found a correlation between the social class of the speaker and the degree of constriction they used when producing an /r/.

Recent work is also progressing our understanding of how the phonetic detail of intonation, rhythm, pitch, and voice quality can differ across different speakers, speaker groups, and contexts. For example, the formalization of measurements of speaker rhythm (e.g., the Pairwise Variability Index; Grabe & Low 2002) enables quantification of degrees
of syllable-timing in individuals’ speech. Rhythm differs considerably across dialects of English (Grabe & Low 2002) and has surfaced as a marker of ethnicity within some communities, indexing, for example, Latino identity in the United States (Carter 2005) and Maori ethnicity in New Zealand (Szakay 2006). Pitch also seems to function as a marker of Maori identity in New Zealand (Szakay 2006). Researchers are starting to focus some attention on the social meanings associated with different voice qualities (see, e.g., Mendoza-Denton & Jannedy 1998, Podesva 2006, Starr & Greene 2006) and on the phonetic properties of intonation contours across speakers [see, e.g., Warren’s observation that “New Zealand men rise early” (Warren 2005, p. 228)]. Jannedy & Mendoza-Denton (2005) also investigate the relationship between patterns of intonation and nonverbal gestures.

The combined evidence from acoustic work on vowels, consonants, and suprasegmental patterns demonstrates that fine phonetic detail is certainly available, and is used, for the construction of social meaning. Yet sociolinguists have really only begun to explore the extent to which nuanced phonetic variation is socially patterned, and we do not yet understand what the limits are on such patterning. Certainly there is a strong case for abandoning the assumption that social meaning is best analyzed in terms of frequency of use of particular segmental variants and instead for systematically investigating the phonetic detail underpinning these variants.

PUSHING THE SOCIAL AGENDA FORWARD

Traditionally, sociolinguists have focused on predetermined social categories such as age, ethnicity, gender, and social class. This focus is also present in the majority of recent work described above, much of which is attempting more sophisticated acoustic analysis of how phonetic detail is associated with such categories. Although these studies certainly add valuable insight into how language works, they fall short of capturing the wide range of social factors that could influence the patterning of phonetic variation.

An ethnographic approach could provide a sociophonetician with information regarding the social makeup of a given speech community—information that would not otherwise be found. Employing an ethnographic approach to determine locally relevant social categories enables researchers to break free from the mold of using predetermined categories that may or may not be relevant for a particular group of speakers.

Sociolinguistic work seeking to adopt ethnographic methodologies from anthropology can also provide important insights into the broad correlations that have long been observed by the sociolinguistic survey tradition. Ethnographic work can reveal the indirect nature of these correlations. Phonetic variables can index stances (for example, toughness), and these stances may broadly correlate with different social groupings (see, e.g., Ochs 1992). An ethnographic focus provides the potential to identify how phonetic variables are used as a resource to construct social meaning—a question Eckert identifies as shaping the “third wave” of variation studies (Eckert 2005).

Recent research that utilizes an ethnographic approach has revealed how locally relevant social categories covary with phonetic variants (e.g., Bucholtz 1996; Mendoza-Denton 1997; Eckert 1989, 2000; Lawson 2005; Zhang 2005; Rose 2006; Drager 2006b). For example, by conducting an ethnography at a U.S. high school, Eckert (2000) was able to identify the social categories jock and burnout that were relevant for students at the school, and she demonstrated how variation in a particular student’s speech was closely linked to whether that student was classified by the other students as either a jock or a burnout.

Mendoza-Denton (1997) employed an ethnographic approach when studying the speech of girls in Chicana/Mexicana gangs in California. She found that realizations of the vowel /u/ could be predicted by centrality...
of membership to a particular gang. Bucholtz (1996, 1999) examines the linguistic practices of a group of girl nerds at a U.S. high school. Lawson (2005) showed how realizations of /θ/ and /ð/ pattern with different communities of practice at a Glasgow High School. And through conducting fieldwork at an all girls’ high school in Christchurch, Drager (2006b) found that monophthongization of the vowel in quotative like was significantly predicted by whether a particular girl at the school was in a group that eats lunch in the common room or not.

Speakers exploit a range of phonetic variables alongside other linguistic and nonlinguistic stylistic variables to actively construct identities and social meaning (Calif. Style Collect. 1993, Eckert 2000). Eckert (2000) found that clothing of schoolgirls was closely related to phonetic variants in the girls’ speech. Mendoza-Denton (1997) found that the gang girls with whom she was working wore varying amounts of eye-liner, and the realizations of /i/ covaried with the length of the eyeliner worn by the girls. Eckert (1996) argues that phonetic variants serve as a resource to display both individual identity and group membership. She describes how variants are manipulated alongside other, nonlinguistic resources, such as nail polish and ways of walking, to construct one’s position in the heterosexual marketplace. This evidence of covarying linguistic and nonlinguistic factors makes it necessary to break down boundaries between studies of language, gesture, clothing, and other forms of social symbolism.

The work on speaker style is also progressing beyond reports of correlations between stylistic contexts and phonetic variants. Recent work on this topic shows a shift away from reactive accounts and a focus on active and creative speaker agency (see, e.g., Eckert 2000, Mendoza-Denton 2000, Coupland 2001, Mendoza-Denton et al. 2003, Johnstone 2007). Speaking style can be seen as “individual speakers’ creative and proactive deployment of various elements in their repertoires” (Hay et al. 1999). Social practice and speaker agency are key (Schilling-Estes 2001). Stylistic resources are used not only to reflect but also to construct social structures. In performing style, the speakers position themselves with respect to these structures and also with respect to the talk itself—i.e., style plays a “stance-taking” role (Johnstone 2007). There is a shift away from broad-scale quantitative assessments of the correlation between certain linguistic variables and certain addressees or topics toward qualitative, ethnographically based investigations of the performance of style as individual speakers constantly reposition themselves relative to the unfolding conversation (Calif. Style Collect. 1993, Schilling-Estes 1998, Coupland 2001, Johnstone 2007). Another emerging focus is on how linguistic and nonlinguistic factors work together in the performance of speaker style (Mendoza-Denton 1997, Eckert 2000).

The recent focus on ethnographic methods as a tool for examining the construction of social meaning is a very welcome development. However, very few studies have combined an ethnographic approach with a detailed acoustic analysis of fine phonetic detail, despite the clear benefits of each. Work to watch along these lines are the studies of high schools by Wagner in South Philadelphia (see, e.g., Wagner 2006) and Drager in New Zealand (e.g., Drager 2006b), both of which combine ethnographic work with acoustic phonetic analysis. Rose (2006) has also completed an ethnography of a senior citizens center in eastern Wisconsin, and her analysis includes some acoustic analysis of vowels.

Sociophonetics is extending in two exciting directions: one that complicates the social, and one that complicates the phonetic. These directions stand to benefit the field most if they are jointly pursued. Future work in the field should investigate the extent to which continuous social factors correlate with continuous acoustic factors and the extent to which both correlate.
with a combination of different nonlinguistic cues.

**PHONETIC VARIATION IN ITS DISCOURSE CONTEXT**

Speakers use phonetic detail to simultaneously convey a linguistic message and perform aspects of personal identity and group allegiance. However, the phonetic work does not stop there. Recent work has shown that fine details of phonetic implementation are highly instrumental in the organization of discourse structure.

Voiceless stops in English (/p/, /t/, and /k/) are generally characterized as displaying free variation word-finally—they may or may not be aspirated. However, Local (2003) demonstrates how aspiration can be used as a discourse-marker, indicating turn-finality. The presence or absence of variation, then, is interactionally informative. Subtle phonetic indicators can be employed by speakers (and attended to by listeners) in the negotiation of turn-taking roles.

Similarly, words and phrases are realized differently to reflect the different locally contextual and interactional roles they are intended to play. The production of “I think,” for example, is different when this phrase plays a lexical role from when it functions as a discourse marker (Local & Kelly 1986, Local 2003). In the latter context, it often surfaces with glottal friction rather than the interdental fricative at the beginning of “think.” Similar variability is observed for other phrases that can act as discourse markers. Hawkins (2003) argues that the phrase “I don’t know” can undergo extreme reduction (e.g., “nnn”) if accompanied by the correct context, intonation, and appropriate shoulder movements. Turn-taking and discourse structure are also negotiated through the use of length (see, e.g., Fox Tree & Clark 1997, Local & Walker 2004), rhythm, pitch, and loudness (Local & Walker 2004).

Current methodologies for the study of sociophonetic variation tend to extract the relevant tokens from the speech stream and study them in isolation from the context in which they were produced. Researchers may record the degree to which the word containing the token was stressed, and perhaps the phoneme that preceded and followed it, but are unlikely to attend to the full discourse environment in which it occurred. Future work that combines careful discourse analysis with detailed phonetic analysis promises to reveal much about the ways in which phonetic variability is harnessed for the communication of interactional information.

**PROGRESSING SOCIOPHONETICS: LAB-BASED ANTHROPOLOGY?**

There are limits, even, to what a phonetically rich, ethnographically informed analysis can provide. The results from the sociophonetic studies outlined above raise a host of questions relating to the acquisition, transmission, production, and perception of socially conditioned phonetic variation.

To what degree are perceivers sensitive to subtle phonetic differences? To what degree can social information about the speaker and perceiver predict patterns in speech perception? Who recognizes the social meanings of particular variants? Is this social meaning the same for all speakers and listeners? How is it possible that speakers can learn to produce systematic variation that they do not seem able to perceive? How can models of speech perception and production account for the apparently tight links between social and phonetic information?

These questions grow naturally from sociophonetic work on production, and yet answers to them are difficult to achieve without incorporating experimental work. Some researchers have therefore incorporated an experimental element in their work in an attempt to further our understanding of sociophonetic variation.

One way in which experimental work can complement the ethnographic approach is...
Perceptual boundary: the point between two adjacent sounds where a listener will stop hearing sound A and start hearing sound B.

through the use of techniques aiming to gauge degree of self-identification with various attributes. For example, Johnson (2006) investigates the fronting of /æ/ in southeastern Michigan—usually shown to be more advanced in female speakers—and finds that the more individuals self-identify on scales of cheerfulness, warmth, and friendliness, the more their /æ/ is fronted. These scales are considerably better indicators than are scales of femininity/masculinity. Conn (2005) combines production data with subjective reaction tests to argue that front realizations of /ay/ are associated with toughness in Philadelphia. In combination with ethnographic work, this type of approach seems likely to be an effective means of hypothesis testing in the pursuit of identifying stances associated with the use of different phonetic variants.

If different social meanings are attached to particular variants, it would seem likely that individuals would use phonetic information to make social judgments about the speaker. Indeed, ample evidence shows that this is the case. Listeners assign different personality traits, such as friendliness or reliability, to speakers of different dialects (Bayard et al. 2001). Campbell-Kibler (2006) found that manipulating the (ŋ) variable in recordings of spontaneous speech altered listeners’ perceptions about the intelligence of the speaker and the formality of the situation. Speakers of a dialect can use information about the distribution of variants within that dialect to make social judgements (Gordon 1997, Bayard et al. 2001, Docherty et al. 2004, Campbell-Kibler 2006).

Although it may be predictable that phonetic information should affect social judgements, a remarkable set of recent findings indicates that the converse is also true: Our processing of phonetic information seems to be heavily influenced by social facts about the speaker. Recent experimental results reveal that listener expectations regarding a speaker’s gender, age, and social class can influence how speech is perceived (Strand & Johnson 1996, Johnson et al. 1999, Drager 2006a, Hay et al. 2006b). These results are highly parallel to the long-established effects of style-shifting and speech accommodation in production. In production, these results are central to the sociophonetic canon. If parallel effects exist in speech perception, then the influence of social factors on production and perception should be understood within a single framework.

For example, Strand & Johnson (1996) found that participants shifted in their perception of a /s/-/ʃ/ continuum depending on the perceived gender of the speaker. Participants were more likely to perceive a sibilant as /ʃ/ when shown a photograph of a person who in an independent study was rated as more stereotypically female. This finding is consistent with differences in production between males and females because females have a higher acoustic boundary between /s/ and /ʃ/ in production. In a related study, Johnson et al. (1999) found that the perceptual boundary between /ʌ/ and /ʌ/ shifted depending on the perceived gender of the speaker.

Perceived age also affects speech perception. Drager (2006a) found a link between the perceived age of a voice and the perceptual boundary between the short front vowels /æ/ and /ɛ/, which are involved in an ongoing chain shift in New Zealand English. Hay et al. (2006b) found an effect of perceived age on speech perception and also an effect of perceived social class. They examined perception of the centering diphthongs /æ/ and /ɛ/, which are undergoing a merger in New Zealand English. The merger has been led by speakers from lower socioeconomic classes, resulting in a current difference in production of the variants based on age and social class. Consequently, Hay et al. found that listeners were better able to discriminate between /æ/ and /ɛ/ tokens if they thought they were listening to an older or upper-class speaker than if they thought they were listening to a younger or working-class speaker.

Expectations regarding a speaker's dialect can also influence perception. Niedzielski (1999) found that Detroiter shifted in their perception of the /au/ diphthong when the
word “Canadian” or “Detroiter” appeared at the top of their answer sheet. Hay et al. (2006a) report on a similar effect in New Zealand, where New Zealanders shifted in their perception of /i/ depending on the presence of the word “Australian” or “New Zealander.” In fact, they observed the difference in perception despite the fact that all but one of the participants in the “Australian” condition indicated that they were aware that the speaker was from New Zealand. In a follow-up study, the authors showed that a similar change in speech perception can be achieved simply by placing a stuffed kangaroo or a stuffed kiwi in the experiment room (Drager & Hay 2006). It seems that individuals need not actually believe that social characteristics belong to a speaker for those characteristics to affect perception but that exposure to the mere concept of a particular social characteristic is enough to cause a shift in the perception of at least some variants.

Social information and phonetic information are linked, and yet the cognitive nature of this relationship is still not well understood. One promising avenue of investigation is exemplar theory. In an exemplar model of speech production and perception, utterances are stored in the mind as separate exemplars, complete with acoustic/phonetic detail (see e.g., Goldinger 1997; Johnson 1997; Pierrehumbert 2001, 2002; Foulkes & Docherty 2006). Social information about the speaker is also stored during perception and is indexed to the exemplar (Foulkes & Docherty 2006, Hay et al. 2006b). In exemplar theory, then, the cognitive representation of an utterance is not an abstract underlying form, but rather a distribution of remembered exemplars. Speech perception involves mapping the acoustic signal to the stored distribution on the basis of its similarity to both the acoustic and social information indexed to the exemplar. Speech production also exploits these stored memories and involves sampling from the socially and contextually desired part of the stored distribution and averaging over the exemplars in the immediate vicinity. In addition to accounting for the above results demonstrating that social factors can affect speech perception in addition to speech production, this theoretical development has motivated much of the recent sociophonetic work on the relationship between social and linguistic information in speech perception and can provide a relatively compelling account of some classic sociolinguistic findings, such as the relationship between the social stratification of phonetic variables and their use in style-shifting (as observed in, e.g., Labov 1972 and many other studies).

Exemplar theory as it currently stands also makes a number of intriguing hypotheses that point to interesting research directions for sociophonetticians. Yet these hypotheses are currently neither explicitly articulated nor tested. One of these hypotheses is that contextual information such as place could cause a shift in the phonetic variants both produced and perceived. If the presence of a stuffed toy in a room can shift people's speech perception behavior (Drager & Hay 2006), then it would seem surprising if a shift in the entire location or context of an interaction did not. To our knowledge, no linguistic work has examined the influence of place on style-shifting in either speech production or speech perception. However, good evidence demonstrates that conceptual space and language are inextricably linked, so much so that children have already formed language-specific conceptions of space by the time that they first begin to speak (Choi & Bowerman 1991 as described by Levinson 1996). Recent work in psychology demonstrates how background information can influence visual perception (Hong et al. 2000, Peng & Knowles 2003, Nisbett & Miyamoto 2005). Some evidence suggests that Westerners and Asians differ in their perception of visual stimuli, such that Asians are more likely to perceive a scene holistically and Westerners are more likely to perceive a scene analytically (Norenzayan et al. 2002). Work by Hong et al. (2000) and Peng & Knowles (2003) suggests that bicultural individuals may shift in whether they perceive a scene
holistically or analytically when they are primed with visual stimuli associated with one of the two cultures in question. Nisbett & Miyamoto (2005) argue that these differences in patterns of attention are a result of exposure to cultural differences in the perceptual environment. If exemplar models are correct, language would also have a strong association with place, suggesting that changes in environment should cause a shift in which phonetic variants are produced and perceived. Although an ethnographic setting would be best for studying the effect of place on production, prior experimental work would be useful as an initial, more efficient means of determining which aspects of speech and place appear to have a relationship with one another. And studies on how this works in perception would be very challenging indeed without incorporating an experimental component into the overall research program.

Anthropologists are often highly critical of experimental work, claiming that individuals' behavior in the lab need not reflect their behavior in day-to-day life. Although experimental results will always be just that, researchers can take steps to ensure that the experimental context resembles to some degree the tasks that individuals might reasonably conduct on a daily basis. In this respect, there is clear scope for a more organic approach to experimental work: for example, conducting experiments in contexts that are familiar to the participants, using voices with which they are familiar, using real, naturalistic recordings as stimuli, etc. If participants in our experiments are also participants in our ethnographies, we will be able to conduct experiments that specifically probe individuals' encoding of the particular linguistic and social universes in which they participate on a daily basis.

Experimental methods are necessary to examine how subtle differences in perception of phonetic variables can be influenced by social information and how shifts in the perception of social information can be affected by phonetic cues. Future investigations along these lines would help to shed light on how social categories are formed and how these social categories are associated with different variants in speech. Although some work is currently in progress, no one has yet completed a study combining a thorough ethnographic approach with experimental methods when investigating socially conditioned variation in speech. We predict that work combining the best of both worlds is likely to make the biggest breakthroughs in advancing our understanding of the nature of sociophonetic variation over the next decade.

PUTTING IT ALL TOGETHER

Just as the meaning of words is dependent on the words with which they co-occur, so the meaning of particular phonetic detail may be influenced by other phonetic and nonphonetic cues. A high-amplitude final released /t/ may mean different things for different groups, it may mean something different at a university than at a barbeque, and it may have a special function turn-finally. But we should not overlook the possibility that the meaning of the released /t/ is also highly interdependent on the realization of other phonetic variants in the context: How are the surrounding consonants realized? What was the realization of the surrounding vowels? What was the intonation contour? Is the speaker producing creaky voice? Phonic meaning may also be codependent on other gestural movements. Thus, although variation studies are currently striving to investigate the social meaning of a variety of phonetic variables, we should hope to move beyond the focus on the variable and move toward studying the semantics of patterns of phonetic realization (Calif. Style Collect. 1993, Docherty 2006).

Impressive progress has been made in extending an ethnographic approach to the study of the social meaning of phonetic resources, in moving toward studies of the use of fine phonetic detail and constructing experimental techniques to probe listener's use of sociophonetic detail. The combination of all
these approaches offers the potential for an integrated understanding of how phonetic variation is produced, performed, and perceived in its social context.

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