1 Sociophonetics = Sociolinguistics + Phonetics

The tension between the system of language and the way we actually speak it has long intrigued philosophers and language scholars. As far back as classical Indian philosophy, the Sanskrit grammarian Patañjali (ca. second century BCE) argued for the separation between "true sounds" and those which are uttered (Deshpande 2016). Before him, Pāṇini's foundational Sanskrit grammar (fourth to sixth century BCE) described spoken Sanskrit and included both regional variants and notes on sociolinguistic usage. In more recent times, Ferdinand de Saussure, a founding father of twentieth century linguistics, coined the terms "LANGUE" and "PAROLE" to characterize the gulf between the way we conceptualize and the way we speak (Saussure 1916).

Not surprisingly, PHONOLOGY, the study of how human language organizes meaningful sound units, and PHONETICS, the study of speech sounds themselves, have become de rigor subjects of study for any student of linguistics. While we, users of language, conceptualize the sounds of language in the abstract categories referred to as PHONEMES, we speak in variant versions of these categories. That is, speech itself abounds with variation. Every time we produce a /b/, for instance, we produce it a little differently, and the physical, acoustical characteristics of the [b]s produced by different speakers are also distinct. Yet, a hallmark of speech is that we hear different productions of the same sounds as the same, despite great acoustical variability. In this book, we will often refer to an individual speech sound as a PHONE. This is separate from the abstract, phonemic category (a phoneme) and makes no claim as to the phonological status of the sound.

Phonetics, and laboratory-based phonetics in particular, has generally been interested in the range this variation can take, the physiological impetus for and constraints on the possible variation, as well as the articulatory and acoustic correlates of different sound categories. Phonology, in its stead, has explored the structural representation of speech sounds, how the sounds come together to make a system of meaningful contrastive units. Psycholinguistics, another

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allied discipline, is often interested in the cognitive organization and processing of speech sounds and in modeling processes of speech production and perception. The great puzzle in fully understanding the science of speech remains what connects these bottom up and top down processes in the tasks of speaking and listening in interaction by real-world language users. Fundamental to the interests in this book, that is to sociophonetics, is the emphasis on people as the instruments, and agents, through which phonetic and phonological processes operate. The distinctiveness of a speech sound provides more information than what a listener needs for phonemic disambiguation, and not all of this variation arises from articulatory/motor mechanics. Though often discarded in the pursuit of phonetic, phonological and cognitive theorizing, exploring this non-linguistically meaningful variation, particularly in speakers' "everyday speech," has been taken up as the mainstay of work under the broad framework of SOCIOLINGUISTICS.

A Brief History of the IPA

As mentioned in the preface, we adopt the conventions of the International Phonetic Alphabet, or IPA, in this book. The IPA was first published in 1888 by a then recently formed association, *l'Association phonétique international*, made up, at least initially, primarily of French language teachers. This group eventually gave rise to the modern International Phonetic Association, one of the major international associations for phonetics related matters (as the name suggests). Otto Jesperson, who would later write the foundational linguistics text *Language: its Nature, Development and Origin* (1922), suggested the idea of a transcription system that was divorced from any particular language in a letter to Paul Passey, first president of the Association. Membership in this association boasted many early linguistic scholars such as Henry Sweet, John Ellis and Daniel Jones, along with Otto Jesperson, among its ranks. At that time, the goal of these affiliated scholars of language "was to further the cause of reforming the state of modern teaching by introducing phonetic script into school class-rooms" (MacMahon 1986, p. 31). The IPA uses single alphabetic letters and diacritic marks to represent each distinctive speech sound found across languages, sounds that are often spelled in a variety of ways using conventional orthography. Though other such transcription systems had previously existed (and have since been introduced), no other system has become as established as the IPA.

Sociolinguistics, in contrast to these more abstract theoretical and psycholinguistic approaches, has been driven by an interest in understanding how INDEXICAL (socially meaningful) factors and linguistic forms correlate, and in looking at how social factors play a key role in language change. And it is here, within this space between the structure of language, the cognitive and the social, that sociophonetics has come to flourish and to play a vital role.

It is not just across the centuries that we see the divide played out between considering language as a biological product and language as

a social product. Much work in both historical linguistics and in phonetics/phonology has looked at language as an internal, cognitively and physiologically shaped product, rather than as a dynamic and socially embedded one. For example, phoneticians have long searched for the elusive "invariance" in the signal that might allow for signal decoding, or looked for articulatory aspects of production responsible for creating phonetic variants. Variation that could not be explained as arising from such aspects was traditionally discarded as interference or "noise" simply outside of researchers' interest. More recent work in phonetics, speech science and psycholinguistics has begun to appreciate acoustic variability as potentially having advantages for linguistic systems, recognizing variation as a crucial part and product of human speech interaction.

Sociophonetics offers the perspective that speakers and listeners are *always* doing more than just conveying "linguistic content." The types of changes that take place at one time and in one group, but not in others sharing the same language, or that take distinct forms across social groups, suggest that variation is not "noise" extraneous to, but instead an integral part of, the meaning conveyed through speech. Speakers, in such cases, are mobilizing phonetic variation as a part of their linguistic performance. Whenever you speak to someone else about some proposition, you do not just convey information about the proposition itself, but *always* simultaneously convey information about how you feel about the proposition, yourself and your addressee. This linguistic fluidity, in co-occurrence with other types of identity markers, allows speakers and listeners to negotiate who they are and who they believe each other to be. Thus, speech is variable and language changes, because a fundamental purpose of speech is to convey social content.

The field of sociolinguistics has increasingly revealed how socially driven variation is both systematic and pervasive within communities, a situation referred to as ORDERLY HETEROGENEITY (Weinreich, Labov and Herzog 1968). Sociophonetics carries on this tradition of exploring how sounds, as a fundamental part of the human language system, are meaningfully organized by speakers not just linguistically but socially as well, and how this variation can be best understood from a perspective melding experimental phonetics and sociolinguistic theory. Though both fields offer insight and have contributed greatly to linguistic theory on their own, it is our belief that, by bringing together work in these fields, we can produce an even stronger, more comprehensive and more realistic theory of language and cognition. Sociophonetic methods have also opened up new ways of studying one of the longest running interests in human language,

the fact that language changes over time, by increasing our ability to view change in living language used by real speakers. Historical linguistics had long investigated how languages changed over time, but until recently this interest in DIACHRONY was kept distinct and separate from a focus on language in current use, SYNCHRONY. Through the close attention to how changes propagate through communities, sociophonetics and related fields have been able to shed new light on the puzzles of sound change. In this book, we hope both to provide an overview of the contemporary practices utilized in the field, as well as to organize and synthesize the contributory work that can be brought to bear on the nature of linguistic variation, speech processing and theories of sound change. To begin, we consider more generally how sociophonetics can be defined and how it fits into the larger linguistic framework.

1.1 SO WHAT IS SOCIOPHONETICS?

Sociophonetics is a rapidly growing and rapidly developing research area, with interest by sociolinguists, experimental psycholinguists, speech scientists, phoneticians, and phonologists. In many ways, and as introduced in the previous section, sociophonetics represents the meeting ground between these often disparate traditions and unites sociolinguistic work with cognitive research. As overlapping work in each discipline has matured, the cross-pollination of approaches and research foci has led naturally to the emergence of a separate field of sociophonetics, a merger of interest in the acoustic and articulatory variation found in naturally occurring socially situated speech.

Phonetics and Sociophonetics: A Difference in Focus

The initial research techniques of sociophonetics were drawn (and further developed) from those in acoustic phonetics, with the key differences arising from the emphases on social factors, like speakers' genders, ages, and ethnicities, their group orientations, the dynamics of interpersonal interactions, and the like. Despite a similar analytic approach, differences between phonetics and sociophonetics exist, in large degree, in terms of the research questions and data of interest, with sociophonetics taking interest in a broader range of speech types and foci than traditional phonetics research. While phonetics has generally eschewed the messy speech of everyday life in preference for methods involving more controlled, laboratory-based elicitation and the high fidelity recordings only possible in laboratory environments, very much sociophonetic research, like many other areas in sociolinguistics, takes as its foundation everyday speech and/or speech embedded in social contexts. This is not to say that laboratory-based sociophonetic work is rare, but more simply that sociophonetics embraces a wide-range of speech data types, even when this comes at a cost in terms of audio fidelity or control over the speech samples examined.

So, again, what is sociophonetics? On the one hand the term "socio-phonetics" represents a disciplinary narrowing, a specification of a certain kind of sociolinguistic research emphasizing the connection between socially indexical information (the "socio") and the sounds of speech (the "phonetic"). On the other hand, sociophonetics also represents an area of sociolinguistic work that appears to hold appeal to researchers from other allied disciplines like (lab-based) phonetics and phonology, speech sciences or psycholinguistics who, for one reason or another, see sociolinguistics as too broad to relate to their own work, but who nonetheless are interested in what we can describe as the "everyday speech" of "everyday people." In particular, as researchers have increasingly opened the door to theories that allow for, or even require, some representational status of indexical information in concert with linguistic information, sociophonetics has offered a path through that door for the development of more realistic theories of language processing and for better understanding the complex nature of linguistic variation found even in laboratory settings.

As Paul Foulkes, a leading scholar in sociophonetics and laboratory phonetics, comments:

> One of the defining themes of linguistic research over the last few years has been the revival of a healthy Kuhnian view of the interdependence of data and theory, and a reawakening of interest in "performance" data. A consensus has emerged to the effect that a cognitively-realistic, integrated theory of phonological knowledge, speech production, and speech perception must include more than an account of those properties pertaining to lexical contrast (e.g. Docherty 2007). It is clear that what speaker-listeners know about language involves not only abstract symbolic representations of "purely linguistic" structures, but also an extensive repository of social-indexical information. (Foulkes 2010, p. 6)

Thus, as a disciplinary corner of sociolinguistics with an almost esoterically specific label, sociophonetics nonetheless represents a site of great interdisciplinarity and wide-open opportunity.

Related to this great interdisciplinarity, sociophonetics can also be seen as a modern nexus of so many areas that have driven linguistic interest for centuries. Sociophonetics is necessarily empirical and engaged with the sounds of language, but its research questions are immensely broad and cover the great scope of the core questions driving the field of linguistics. What is the relationship between language and speech? How and why do languages change? How do speakers and listeners make use of speech variability (a squarely sociolinguistic question) and (its psycholinguistic analog) how do

speakers and listeners cope with the great extent of speech variabil-ity? Thus, the questions we ask in modern sociophonetics are not just those driven by contemporary interests but are rooted in those that have consumed early grammarians, philologists and historical lin-guists, speaking to the very questions that have fascinated humans about language throughout history.

Phonetics and Sociophonetics: A Question of Questions

A key difference in phonetic approaches and sociophonetic approaches lies in the types of questions that a researcher might be interested in investigating. For example, a phonetician might want to understand the difference in VOICE ONSET TIMING (VOT) in French vs. English in an effort to better understand how languages utilize phonetic features or how co-articulatory pressures affect how sounds are produced. A sociophonetician may instead be interested in how VOT differs across speakers in the same community depending on gender, age or ethnicity, or whether substrate effects from a heritage language with different VOT patterns are maintained in the dominant language of the community. So, rather than viewing the approaches as contrastive, traditional phonetics and sociophonetic aims can usefully be thought of as complementary.

1.2 FROM SOCIOLINGUISTICS TO SOCIOPHONETICS

One cannot talk about sociophonetics without looking to its early development, as its inception came not as an independent field, but as a methodology, an offshoot of the pioneering work in sociolinguis-tics of William Labov and the insights of his mentor Uriel Weinreich (see Weinreich et al. 1968). Labov and his early colleagues argued for a linguistics that recognized the fundamental social nature of lan-guage production and comprehension. This work responded to the dominant view of language at the time as something exclusively examined through abstraction and as the domain only of the individ-ual speaker rather than the community, a reflection of the sway at the time of generativist linguistics born of Chomsky's earlier field changing work (Chomsky 1957, 1966). Working as a graduate student under Weinreich at Columbia University, Labov recognized the neces-sity to move from the disembodied treatment of linguistic units (such as phonemes and MORPHEMES) to the examination of how such units were variable, not just across time, but across social space at any given time. We take up details of Labov's work more throughout this book, and in particular in Chapter 7 when we discuss its foundational import to theories of sound change. Fundamental to his work was the notion of the LINGUISTIC VARIABLE, or the idea that a single linguistic unit could be realized in multiple different ways, and that the realization of

this unit was crucially determined not only by linguistic but by social factors. It is this notion of variable features that planted the seeds for sociophonetic study.

Sociophonetics and Variationist Sociolinguistics

The linguistic variable is the centerpiece of the approach to sociolinguistics known as the field of VARIATIONIST SOCIOLINGUISTICS. There is a lot of overlap between variationist sociolinguistics and sociophonetics and readers are urged to look to publications in journals like *Language Variation and Change* for sociophonetic inspiration. In fact, the annual conference New Ways of Analyzing Variation (NWAV) started as the major meeting for variationists but has increasingly become a hot-bed of sociophonetic research as well. At some level, trying to come up with categorical differences between the two research areas is a futile endeavor, but a few distinguishing differences between sociophonetic work and variationist work are:

1. Variables (in the variationist tradition) are typically categorical – e.g. was a sound present or absent? Sociophonetic work typically addresses features as continuous measures – e.g. how much was present or absent (in terms of duration or some other measurable dimension).
2. Variables (in the variationist tradition) run the gamut of linguistic features. While phonological variables are quite common, so are morphosyntactic and lexical variables. Syntactic and discourse variables are somewhat less common, but only because determining clear alternate forms for variables is less straightforward for phenomena that are less bounded to specific and isolatable forms. Sociophonetic features, of course, are focused on sound-related variables by definition.
3. The variationist tradition has largely emphasized the use of conversational interview recordings in community contexts. While sociophonetic studies often use these same data, sociophonetic studies also commonly occur in laboratory or university environments and often will rely on elicited materials.
4. The variationist tradition has been devoted to understanding the role of social factors when it comes to account for language change. Sociophonetic approaches, more typically, take greater interest in human cognition and perceptual processing and place these factors, along with social concerns, more centrally in their theoretical perspectives (embracing this aspect of laboratory phonetics). In particular, the growth of listener-based theories of sound change (Chapter 7) has proven a rich testing ground for the convergence of phonetic and sociophonetic interests.

Labov's groundbreaking Masters' project, on the island of Martha's Vineyard, which culminated in the 1963 article, *The Social Motivation of a Sound Change*, was prescient of the rise of a socially-embedded linguistics. In this work, Labov examined variation in the pronunciation of the /aɪ/ and /aʊ/ diphthongs by long-time Vineyarders whose livelihood and lifestyle were under threat from an increasingly tourist-based economy. Crucially, Labov approached this work through a novel research paradigm, one which placed social facts as central to the study of language variation. As social changes spread through the Martha's Vineyard community with population and economic shifts, aspects of the local dialect gave way to more mainstream variants. Labov noticed that the variation in the diphthongs patterned in ways that made sense only when considering the social life of the islanders. In particular, he

noticed a range of realizations for the vowels in words like *tide* and *about*, varying from an older form, a centralized [əɪ] and [əʊ] pronunciation, to a newer less centralized [aɪ] and [aʊ] pronunciation. Islanders who had the strongest connections to the traditional life-ways of the Vineyard, fishermen especially in the rural town of Chilmark, resisted the shift and maintained more centralized variants of the /aɪ/ and /aʊ/ diphthongs. Importantly, this wasn't simply Labov noticing locally fine-grained regional dialect patterns, but rather that the individual identities and orientations of the islanders were a key to understanding the patterning of dialect and its ongoing changes. As a result, phonetic differences emerged that could not be explained by appealing to linguistic motivations. Instead, phonetic variation was driven by social dynamics in the local community and enmeshed with identity practices, revealing a pattern that would have been invisible using only traditional linguistic approaches to explaining variation.

Labov's project marked a first in many areas. First, through it, Labov laid the groundwork for the methods and approach that would come to define the field of sociolinguistics. Second, the attention to phonetic gradience, and the focus on diachronic change occurring in the community viewed via a synchronic lens, really established sociolinguistic interrogation from a sociophonetic perspective and turned attention to the role of phonetic gradience in local identity practices and in presaging sound change. In fact, a quote from this work succinctly sums up much of this motivation for examining fine phonetic detail through a sociolinguistic lens:

> By studying the frequency and distribution of phonetic variants of /ai/ and /au/ in the several regions, age levels, occupational and ethnic groups within the island, it will be possible to reconstruct the recent history of this sound change; by correlating the complex linguistic pattern with parallel differences in social structure, it will be possible to isolate the social factors which bear directly upon the linguistic process. It is hoped that the results of this procedure will contribute to our general understanding of the mechanism of linguistic change. (Labov 1963, p 273)

It is from the seeds of this work and much that soon followed (e.g. Labov 1966, 1972a, Weinreich et al. 1968, Wolfram 1969, Trudgill 1974) that grew the mode of inquiry that also underpins the nascent field of sociophonetics, as sociophonetic work has taken up this quest to carefully and rigorously examine complex linguistic patterns and phonetic detail in light of its social correlates within communities and speakers. Though sociophonetics has since extended its reach beyond that of its progenitors, much of this early sociolinguistic influence still

flows through the application of sociophonetics to novel perspectives and to related fields.

1.3 THE SOCIOPHONETIC FRONTIER

Just as early sociolinguistic work, such as Labov's (1963) Martha's Vineyard study, transfigured the study of sound change, so, too, has sociophonetic research contributed to phonetics and to phonological theory. Sociophonetics, as with sociolinguistics, conceives of variation as something stemming not just from structural mechanisms but also as crucially embedded within the social organization of the community and related to the agentive goals of individual speakers. The proliferation of realizations for any given speech sound, realizations which are highly variable across linguistic and social contexts, suggests that psycholinguistic theories about signal invariance or single representational status require a more nuanced approach, particularly one which recognizes that speakers with the same general sound system may not utilize the same phonetic undergirding of that system. By examining how measurable phonetic features (such as duration, voice onset time (VOT), center of gravity (COG) or formant measures; see Chapters 2 and 3) are distributed within speakers that share the same system (as opposed to cross-linguistic comparisons), we can see the range of variation that is socially malleable, bringing new insight to long-standing research questions about a range of topics, including trading cues, discourse cues and instrinsic vs. extrinsic motivations for sound change. We will discuss both methodological contributions and contributions to theories of representation and sound change more in later chapters, but, for now, we note that Labov's (1963) and Weinreich et al.'s (1968) papers were foundational both in terms of articulating what would become a linchpin sociolinguistic methodological approach that prioritizes phonetic detail and in terms of recognizing that phonetic variation is often impelled by external (social) factors.

In describing the emerging field of sociophonetics, Foulkes, Scobbie and Watt (2010) see its role as continuing and expanding beyond the framework of its contributory fields, namely phonetics and sociolinguistics:

> The goals of sociophonetics include accounting for how socially structured variation in the sound system is learned, stored cognitively, subjectively evaluated, and processed in speaking and listening. Such work contributes to the development of theoretical models in phonetics and sociolinguistics, spanning speech production and perception, with a clear focus on the origin and spread of change. (p. 704)

Foulkes et al. suggest that the phonetic arbitrariness of much variation that surrounds speakers makes little sense viewed exclusively through a phonological or phonetic perspective, as only so much of this variability can be ascribed to internal factors. It is only when that variation is observed within a socially oriented perspective that we can understand both the structure that underlies the variability and its relationship to language change. With phonetic gradience, in particular, it is especially complex to disentangle the role of biology, phonology and society, and to understand how such variability is produced, perceived and processed as part of a linguistic and social system. Thus, it is here, in this space between phonetics and sociolinguistics, that sociophonetics has come not only to reside, but has emerged as its own research area that is more than the sum of its parts.

While the questions of sociophonetics are based on timeless questions, the methods and empirical detail of sociophonetics are cutting-edge and immensely modern, pushing the limits of current computational techniques and natural language processing technologies. Sociophonetic work typically entails a close attention to phonetic analysis (for production studies) and/or to experimental rigor (perception studies). Throughout this book we focus on different approaches and explore papers that use different methods. In Chapter 8, we return at some length to the role of technology in sociophonetics, and the future of the field as it relates to the growth of computational approaches to linguistics and the explosion of "big data" for speech research.

1.4 PRODUCTION AND PERCEPTION: THE TWO HALVES OF SOCIOPHONETICS

In addition to the contribution that sociophonetics has made to varied fields that work on the side of speech production, one of its strongest contributions has come by way of its utility in studies of speech perception. Long the neglected stepchild in sociolinguistics, recent work has awakened a keen interest in better understanding how human speech perception is mediated by social, as well as cognitive, factors. As a result of this work, there is growing evidence to suggest that social variation is centrally involved in the processing and decoding of the speech signal (Strand and Johnson 1996, Niedzielski 1999, Strand 1999, Evans and Iverson 2004, 2007, Foulkes and Docherty 2006, Hay, Nolan and Drager 2006, Hay, Warren and Drager 2006, Jannedy and Hay 2006, Hay and Drager 2007, 2010, Fridland and Kendall 2018, Vaughn