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# Introduction to sound change in endangered or small speech communities

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**Abstract:** How sound change is initiated and propagates in smaller speech communities is not well understood. This paper provides an overview of the main themes, including theoretical and methodological issues, of the special collection on sound change in endangered and small speech communities.

**Keywords:** endangered languages; phonetics and phonology; small speech communities; sound change

While it is estimated that there are around 7,000 languages spoken in the world today, the number of speakers distributed across languages is vastly skewed: most of the world's languages have fewer than 100,000 speakers. In fact, over 94% of people in the world speak only 6% of the living languages (Eberhard et al. 2020). All languages evolve over time in their fine-grained phonological patterns and the sound/sign-to-meaning mapping of words. The study of sound change is important for understanding the mental representations and cognitive mechanisms underlying speech communication. Yet, not all speech communities are equal. The consequences for differences in the makeup and size of a community could impact how sound change occurs in a language. To this end, this special collection focuses on sound change in endangered and small speech communities. How sound change might originate and diffuse in communities like these is poorly understood.

In addition to providing insight into the mechanisms of language change, language documentation of small speech communities is important as many of these languages are endangered. Almost half of extant languages, about 3,400 languages, are classified as endangered (Thomason 2018). Situations such as climate change (Dunn 2018) and lack of support for minority languages in educational, political, and technology arenas (Romaine 2007) further threaten linguistic diversity in the world. The dynamics of language endangerment and interaction between small groups of speakers may provide unique opportunities for sound change to take place, especially since groups of different sizes are known to have different community dynamics (Stanford 2009).

The call for this special collection was inspired by discussions at the fifth Workshop on Sound Change (WSC 5), which focused on sound change in small and endangered speech communities and was held at the University of California, Davis, in June 2019. The 20 papers in this special collection provide empirical and theoretical explorations of variation and change in indigenous minority languages and small speech communities which can inform our understanding of sound change. A summary of the languages featured in this special collection, together with their genetic affiliation, number of speakers, and vitality status, is provided in Table 1, with Figure 1 displaying the primary geographic locations where these languages are spoken.

The field of sound change centers around understanding how and why sound systems vary across (geographic and social) space and time. The field has grown over the past several decades and it has drawn upon research in phonology, phonetics, sociolinguistics, psycholinguistics, computational linguistics, language acquisition, and other fields, to make substantive contributions in addressing the problems of the actuation and propagation of sound change. The majority of this research has focused on languages with large

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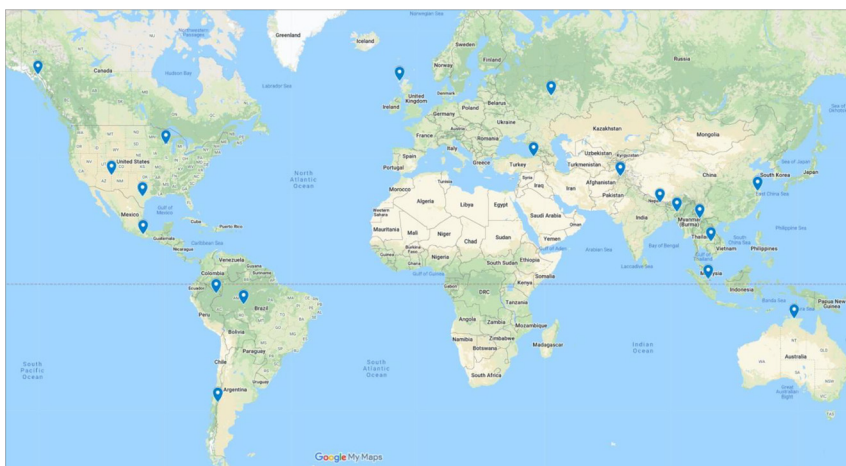
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**Table 1:** List of languages, along with language family, primary location spoken, number of speakers, and status, represented in the papers in this special collection.

Author(s)	Language (family); location	Number of speakers (status)
Bowern	Australian languages (Pama-Nyungan language family and non-Pama-Nyungan languages); Australia	34,000+ for 141 language varieties (status varies) (AIATSIS 2020)
Miceli and Round	Tlingit (Na-Dené); Alaska, USA, and British Columbia, Canada	1,300 (critically endangered)
Cardoso, Crippen, and Mellesmoen		
Demir	Laz Turkish (Turkic), speakers of Laz (Kartvelian); Turkey	20,000 Laz speakers in Turkey (endangered)
DiCanio	Itunyoso Triqui (Mixtecan, Otomanguean); Mexico	2,500 (endangered)
Fafulas, Henriksen, and O'Rourke	Spanish (Romance, Indo-European), speakers of Bora (Witotoan); Peru	3,000 Bora speakers in Peru (endangered)
Faytak	Suzhou Chinese (dialect of Wu Chinese, Sino-Tibetan); China	3 million (vulnerable)
Gao and Mazaudon	Risiangku Tamang (Tibeto-Burman); Nepal	1.3 million (vulnerable)
Hussain and Mielke	Kalasha and Dameli (both Dardic, Indo-European); Kamviri and Eastern Kataviri (both Nuristani, Indo-European); Chitral, north Pakistan	5,000 Kalasha speakers (endangered)
Lau	Kuy (Katuic, Austroasiatic); Thailand	450,000 (endangered)
Lee	Baba Malay (creole of Malay [Austronesian] and Hokkien [Sino-Tibetan]); Singapore and Malaysia	2,000 (critically endangered)
Marley	Bininj Kunwok (Gunwinyguan); West Arnhem Land, Australia	2,000 (endangered, gaining speakers)
Molineaux	Mapudungun (Mapuche, Araucanian); Chile and Argentina	260,000 (endangered)
Nance	Scottish Gaelic (Celtic, Indo-European); Scotland, UK	58,000 (definitely endangered)
Palakurthy	Diné Bizaad (Navajo, Na-Dené); Arizona and New Mexico, USA	170,000 (endangered)
Panick and Hall	Hoocąk (Siouan); Wisconsin and Nebraska, USA	< 200 (moribund)
Raychoudhury and Mahanta	Sylheti (Bengali-Assamese, Indo-Aryan); Bangladesh	10 million (vulnerable)
Sadlier-Brown, Salles, and Salomon	Pirahã (Mura); Brazil	1,000 speakers (small, but stable)
Warmuth	New Braunfels German (Germanic, Indo-European); Texas, USA	5,000 (moribund)
Yang, Stanford, Zhang, and Luo	Black Lahu (Loloish/Ngwi, Tibeto-Burman); China	600,000 (vulnerable)

**Figure 1:** Primary geographic locations where the languages in Table 1 are spoken (map from Google Maps).

numbers of speakers and on highly studied languages. In order to have a complete understanding of the principles and factors under which variation leads to sound change, all types of linguistic contexts need to be examined, especially since there is mounting evidence that cultural variation makes a difference in children's

language acquisition (for detailed discussion, see, e.g., Brown and Gaskins 2014). The papers in this collection reveal how the study of sound change in small and endangered speech communities can address long-standing theoretical issues in the field. In the following paragraphs, we highlight various theoretical and methodological points that are raised by the papers in the special collection.

Sound change research, as with most work in phonetics and phonology, has focused on languages that have historically been dominant or where speakers are easily accessible. Yet, basing theoretical claims and making predictions about the nature and directions of linguistic change by examining only languages that happen to be easily accessible can potentially skew the generalizations made in linguistic theory. For example, Chomsky and Halle (1968: 4) warn that “accidental linguistic universals” can arise when making generalizations about the widespread use of certain properties only because, for instance, they occur in languages with large numbers of speakers or commonly studied languages. Such accidental universals, they argue, are not useful for linguistic theory, which aims to characterize the range of potential structures and patterns found in human languages. The importance of looking at sound change in endangered languages in order to shed light on typological sound patterns is discussed by Cardoso, Crippen, and Mellesmoen (this collection). They examine sound change in Tlingit and point out that sound systems in small or endangered languages often contain typologically rarer sounds, but our notion of what sounds are common – and whether certain sounds are more common due to articulatory or perceptual biases – is based on the languages that are most commonly surveyed, that is, Indo-European languages and/or those with large numbers of speakers. For this reason, our understanding of how these rare sounds originate and evolve is likely to be incomplete. Cardoso et al. further argue that exploring diachronic and synchronic variation of small and understudied languages can inform claims about phonetic biases in learning and linguistic change (Blevins 2004; Ohala 1993). This might be especially the case since differences in linguistic input across small and large communities can affect performance by influencing people’s knowledge base by modulating their processing manner, and shaping expectations (e.g., Lev-Ari 2016). Hussain and Mielke (this collection) also examine the issue of sound change of typologically rare sounds in endangered languages by exploring how language-internal and language-external factors can explain the development of rhotic vowels in two Dardic languages. They provide articulatory and typological evidence supporting the proposal that rhotic vowels developed in Kalasha and Dameli due to both the coarticulatory influence of retroflex consonants and the presence of retroflex consonants in neighboring Nuristani languages.

Miceli and Round (this collection) discuss potential explanations for the vast majority of correspondence patterns in Australian languages involving identical segments and why the sound changes that are found often display irregularity. Using arguments from the synchronic phonologies of Australian languages, they argue that regular sound changes are unlikely to be due to unique phonological and morphological profiles of these languages. Bovern (this collection) examines the very broad question of phonological stability in Australian languages. These languages are surprisingly uniform phonologically considering their extensive diversity. Previous work has argued that perhaps there is less phonetic or socially conditioned variation among speakers in Australia and that tighter social networks might impede regular sound change. Bovern argues that none of these explanations are proven or satisfactory, but several functional and phonological factors remain unexplored. Together, these papers point out that the classic models of sound change do not strictly explain the exceptional uniformity observed in the languages of Australia and, furthermore, leave open many questions about additional factors influencing sound change that may be examined in future research.

In general, the study of small and endangered speech communities provides additional empirical examples that can enrich our understanding of the mechanisms and dynamics of sound change. For example, DiCano (this collection) investigates the origin of tonal allomorphy in enclitic pronouns in Itunyoso Triqui, arguing that the reduced variants of these pronouns are conditioned by the tonal specification of the form to which they attach and the recoverability of the tonal feature of the pronouns when reduced. He found evidence for this functional explanation via an investigation of a spontaneous speech corpus, showing that the reduced allomorph is more frequently observed when the preceding tone is raised, but not when the preceding tone is not affected or lowered. This is notable because the sources triggering the evolution of tonal morphology are frequently difficult to determine in tonally complex languages. Demir (this collection) examines vowel

harmony in Laz Turkish, a variety of Turkish that emerged due to contact with Laz, a Kartvelian language of northeastern Turkey. By analyzing a corpus of fieldwork data, Demir shows that, unlike in standard Turkish, vowel harmony in Laz Turkish is only partly productive, and that the smaller vowel system has led to cases of opacity. These findings show that synchronic vowel harmony patterns may have multiple sources, including not only phonologization of phonetic patterns, but also language contact. Raychoudhury and Mahanta (this collection) examine the loss of a four-way laryngeal contrast in Sylheti and find that, instead of producing a two-way tonal contrast, a three-way tonal contrast has emerged. Historically word-initial aspirated stops conditioned low tones on roots, whereas aspiration in codas (in monosyllabic roots) or in the second syllable onset (in disyllabic roots) conditioned high tones on roots. Roots with no aspiration have a mid-tone. This work provides further empirical support for the classic example of VOT-f<sub>0</sub> covariation which leads to tonogenesis (e.g., Hyman 1976) and suggests that word position is an important factor in its evolution.

Small speech communities have different social structures than large communities, leading the phonetic and cognitive influences on sound change to interact and diffuse in different ways when there are fewer agents. Yet, how sound change might originate and diffuse in speech communities of different sizes and different ecologies is poorly understood. Sadlier-Brown, Salles, and Salomon (this collection) examine gender-differentiated /s/ variation in Pirahã, a language isolate spoken by about 1,000 people. They find that women are more likely to use an [h] variant, while men are more likely to use [s] variants. These patterns mirror “female-lead” sound change trajectories observed in Western speech communities, despite the fact the social and cultural factors in the Pirahã speech community are very different. Nance (this collection) also highlights how the ecological context of a speech community is important for understanding sound change. She examines the realization of a three-way lateral contrast in Scottish Gaelic. By comparing older adults, younger adults, teenagers, and children, she finds that the phonetic contrast between the laterals reduces through time. However, the language learning context of Gaelic is vastly different across generations, potentially explaining the different realizations of this phonemic contrast from older to younger speakers. Nance also raises questions about how to tease apart differences in sound realization across generations as either due to sound change or due to acquisition of the language as an L2.

Relatedly, endangered, vulnerable, or less commonly spoken languages are often heavily influenced by other languages and cultures, making sound change through contact more likely. In order to make useful models and predictions about when and how sound change will occur, we need to explore these patterns in diverse speech communities. A unique aspect of many papers in this volume is a focus on the linguistic ecology of the locales where the languages are spoken, as a smaller or less culturally dominant speech community might be exposed to higher pressure to be multilingual, increasing the opportunity for contact-induced change. Such a scenario is the focus of the study by Faytak (this collection), who examines the realization of an unusual contrast between high front “fricative” vowels and apical vowels in Suzhou Chinese across younger and older adult speakers. He finds that the younger cohort lacks some of the structured acoustic variation observed in the older cohort, possibly due to influence from Standard Chinese in the younger speakers. In another paper, Warmuth (this collection) examines the realization of three features in New Braunfels German, a variety of Texas German, comparing data collected from the 1950s to 1970s to those collected recently as part of the Texas German Dialect Project (TDGP). He finds that speakers of Texas German recorded as part of TDGP have a more centralized (fronted) and shorter /u/, diphthongized /e:/ and /o:/, and are more likely to pronounce rhotics as retroflexed rather than other variants more traditionally observed in Standard German and the variety of German originally spoken in Texas, due to influence from American English.

Many of the papers in this collection examine linguistic changes seen in small and endangered languages that are due to contact with colonial, or larger and more widely spoken, languages. For instance, Palakurthy (this collection) examines the production of voiceless alveolar and velar stops among three different age groups of speakers who are bilingual in English and Diné Bizaad (Navajo). The so-called aspirated stop series in Diné Bizaad is characterized by fricated releases (transcribed as [tx], [kx]) which, according to data published in previous studies, are relatively long. However, Palakurthy shows that contemporary speakers produce significantly shorter releases, and the shortening effect is strongest among the youngest group of speakers. This change may be due to extended contact with American English, which exhibits relatively short,

aspirated releases (transcribed as [t<sup>h</sup>], [k<sup>h</sup>]). If that is the case, these data present a particularly interesting example of phonetic convergence, whereby sounds that are phonetically dissimilar nevertheless influence one another. In another paper, Fafulas, O'Rourke, and Henriksen (this collection) examine the production of Spanish intervocalic stops by bilingual speakers of Bora. They focus on lenition, a highly productive process in most varieties of L1 Spanish, whereby voiced stops shorten and take on properties of glides or fricatives. Their results show that lenition, as measured by shortening of duration and weakening of intensity, is more prevalent among male speakers than among female speakers. This difference, the authors suggest, may be due to different patterns of contact outside the community: while males travel regularly to conduct trade with neighboring towns, females do not.

It is frequently difficult to examine the influence of sound change on cue perception in endangered language communities, though two papers in this collection are notable for examining how emerging tonogenetic processes are perceived by listeners. Gao and Mazaudon (this collection) conducted an apparent-time study of the relative cue weighting of the tonal contrasts with native listeners of Risiangku Tamang (Tibeto-Burman). The language has a four-way tonal contrast where f0 is the primary perceptual cue, but voice quality and plosive prevoicing remain as subordinate cues to the tonal contrasts. These subordinate cues remain important in the perception of low tones and, while these cues are less important to younger listeners, the prevoicing persists as a relatively strong cue for low tone perception among all speakers. The authors speculate that this may relate to the greater bilingualism with Nepali among younger Tamang speakers/listeners, since Nepali has prevoicing of voiced stops. Meanwhile, Lau (this collection) looks at how the relative weighting of f0 as a cue to the modal-breathy voice quality contrast has increased among younger speakers of Kuy (Austroasiatic) as the population becomes more integrated into Thai society and more multilingual in Thai. Thai does not substantially rely on voice quality cues to distinguish tonal contrasts. Interestingly, Lau finds that the speakers who have a strong Kuy identity and who speak Kuy fluently are more likely to lead a sound change where a voice quality contrast is becoming a tonal contrast than speakers who are more integrated into Thai society and who are less fluent in Kuy. Both papers emphasize the rather distinct roles that contact with majority languages may have on sound change in endangered languages. In the Tamang community, contact with Nepali may permit the retention of a historical segmental contrast which has led to tonal split, but in the Kuy community, contact with Thai has facilitated tonogenesis.

Many papers highlight the importance of looking at variation within and across speakers in small and endangered speech communities. For example, Lee (this collection) examines the use of formal and casual stylistic variants among older versus younger speakers of Baba Malay. Her results show that older speakers employ formal variants more often than younger speakers do. Nevertheless, younger speakers do employ formal variants in careful speech, a finding which highlights the importance that different speech styles might potentially play, even in small and endangered language communities, in diachronic change. Yang, Stanford, Zhang, and Luo (this collection) examine a pattern of tonal change in Black Lahu; and demonstrate how collaboration with local linguists along with detailed phonetic analysis can uncover subtle tonal changes across generations. They provide a variationist approach to an under-documented language and suggest a link between patterns of tonal coarticulation and the raising of lower tones among younger speakers.

Working with a small speech community also poses practical challenges in the study of sound change. Many papers in this collection explicitly highlight the problems, challenges, and progress they have seen in the empirical study of sound change in endangered and small communities. Given the small numbers of speakers of the languages, many papers use historical documentation to supplement fieldwork done with contemporary native speakers. Such work is particularly relevant to the theme of the special collection since researchers who work with languages with small speech communities recognize the utility of historical work in their investigations. Panick and Hall (this collection) illustrate this issue in Hoocak by combining documentation by fieldworkers over time, and use phonological descriptions of a sound change from a dozen fieldworker notes over a 135-year period to reveal the diachronic evolution of a sound change. Marley (this collection) also illustrates that careful quantitative analysis can provide information about sound changes that might be misunderstood in cases where their prior description is done impressionistically by fieldworkers without precise or quantitative approaches. Both of these papers demonstrate phonological change over time in these



speech communities, and a similar approach is taken in Molineaux (this collection). Based on examination of writings from the colonial era, Molineaux examined the dental-alveolar contrast in Mapudungun during the past 400 years, arguing that this typologically rare contrast has not only remained stable over time, but might have even enhanced long-term in contexts of linguistic vitality.

Also of note is that many of the papers in this special collection use documentation corpora to investigate sound change in small and endangered speech communities (e.g., Demir; DiCanio; Molineaux; Panick and Hall; Warmuth). This is not only a methodological strength as it reflects unscripted speech, but it also has an impact since it demonstrates how funding for language documentation produces materials that are useful for looking at important scientific questions in linguistics.

In summary, as the 20 papers published in this special collection demonstrate, looking at linguistic variation and change in small and endangered speech communities enriches and illuminates long-standing issues in the field of sound change. For one, they are a step toward providing a more representative cross-linguistic survey of sound changes across languages (cf. Whalen and McDonough 2019). Moreover, many of the papers provide data and discussions which enrich theories of perceptual/acoustic/production biases that lead to sound change by including languages that might include rare or underrepresented sounds (e.g., Bowerm; Cardoso et al.; Hussain and Mielke; Miceli and Round). Furthermore, several of these papers demonstrate that a richer perspective on what type of cross-generational, synchronic, stylistic, and individual variation exists in small and endangered languages can inform variationist approaches to sound change (e.g., Gao and Mazaudon; Lau; Lee; Nance; Yang et al.).

The papers in this collection also demonstrate that there are many future avenues for exploring sound change in small and endangered speech communities. For example, paying attention to the ecological, social, and political structures in which the language is spoken (and how those change over time), and how that might influence sound patterns, can offer insights into how synchronic variation leads to diachronic change (as highlighted by, e.g., Faytak; Nance; Sadlier-Brown et al.). Ultimately, exploring how models and theoretical predictions about speech processing and articulatory/phonetic biases are borne out in empirical sound change patterns across all types of languages can inform linguistic theory.

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