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ARTICLE

Australian English over Time: Using Sociolinguistic Analysis to Inform Dialect Coaching

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ABSTRACT

Depictions of Australian English in theater and film by non-Australian performers are often met with negative public reactions by Australian audiences. This partially stems from misconceptions about Australian vowel pronunciations (e.g., that *mate* and *might* are homophones); however, there is also a general lack of awareness about how Australian English has changed over time. Research in dialect coaching has long argued that dialect practitioners and learners must have sociolinguistic awareness of the phonetic reality of the dialect being represented. This paper is a resource to assist in the development of such awareness. Research methods from sociolinguistics and phonetics are applied to provide a detailed description of Australian English vowels as evidenced in a large, longitudinal corpus of spontaneous speech data. The corpus captures the speech of 95 Anglo-Celtic Australians in Australia's largest city, Sydney, and includes recordings made at two points in time (1970s and 2010s) with speakers born between 1914 and 1999. The empirical description of vowel productions over time presented here provides a guide for dialect coaches and performers alike for application in their work with Australian English.

KEYWORDS

Dialect coaching; dialect performance; Australian English; sociolinguistics; phonetics; vowels; language change

Introduction: Portrayals of Australian English

As Australian narratives become increasingly visible in the international performance industry, there are numerous instances of non-Australian actors portraying Australian characters. Notable examples in film include Kate Winslet in *The Dressmaker* and *Holy Smoke*, Liev Schreiber in *Mental*, and Benedict Cumberbatch as Julian Assange in *The Fifth Estate*. These actors' performances have garnered wide praise (e.g., Bizzaca 2017), in particular for their portrayal of Australian English. But alongside these applauded performances exists the commonly held belief within Australia that Australian English is often produced in an unsuccessful or overly dramatized way by non-Australian performers.

> What Americans—and to a lesser extent, the British—fail to recognize is that as much as they mock us, they are almost constitutionally incapable of imitating the Australian accent, no matter how often they repeat "G'day, mate!" Even the great Meryl Streep failed to capture

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Supplementary materials for this article can be accessed here.

> it when she portrayed Lindy Chamberlain in the 1988 movie "Evil Angels," about a woman whose baby is killed in the Australian outback. The line remains famous for its melodrama —"The dingo's got my bay-bee!"—but in Australia, it's also famous as a reminder that even Hollywood's greatest stars cannot master our way of speaking. (Baird 2018)

Such reactions may stem from the persistence of misperceptions of Australian English which abound in the cultural mindset. Well known are erroneous characterizations treating *mate* and *might* or *day* and *die* as near homophones, or performances that render *bye* and *bee* similar to *boy*. Even linguists sometimes present simplistic descriptions, for example, Crystal and Crystal's (2014, 163) observations that words like *yes* and *get* are realized more like "'yis' and 'git'," and that *mat* may be misheard as *met*. Such descriptions can undermine the work of dialect coaches seeking to create authentic Australian characters.

Credible portrayals of Australian English are desirable for several reasons, not least among them that the performance industry plays a key role in the production and reproduction of images, symbols, and narratives that frame social realities (Brooks and Hébert 2006). Indeed, for those who portray a dialect, some degree of authenticity is not only necessary to "pass" as a native speaker (Derwing and Munro 2005, 388), but also to elicit favorable reactions (Adank et al. 2013), so that Australian and non-Australian audiences alike positively connect with the material. Authentic portrayals of any variety must be based on appropriately contextualized knowledge of that variety's phonetic patterns. Full phonetic descriptions are therefore indispensable resources for practitioners, as an informed understanding of the relevant variety can counterbalance "the natural tendency to conform the sounds we hear toward our own phonemic categories" (Thompson 2007, 355). And yet, few such descriptions are available.

The goal of this paper, then, is to present a description of the vowels of Australian English as a guide for dialect coaches and performers alike, allowing them to better understand patterns of use and incorporate them into their work. Vowels are particularly worthy of attention because they represent the central loci of variation across English dialects (Labov 2001, 123). We include here the full set of stressed vowels in Australian English to establish a comprehensive profile of the entire vowel space.[1] We highlight average vowel positions to provide coaches with clear points of reference, but also consider the range of variability of each vowel, reflecting the fact that vowels are not fixed points, and that there is a window of acceptability for any vowel's pronunciation. We also consider the phonological context in which the vowel occurs, in particular the type of sound that follows, as this can have a substantial impact on vowel realization.

The phonetic descriptions presented are based on acoustic measurements of the vowels as they occur in some 50 hours of spontaneous speech data from 95 Anglo-Celtic Australians. The recordings were made in Sydney, Australia, in two time periods (1970s and 2010s), and include two age groups at each time period, allowing us to examine Australian English at different time points, and describe changes that have taken place over time. The juxtaposition of historical and contemporary data is particularly useful to practitioners who wish both to understand current Australian vowel pronunciations, and to reconstruct Australian dialects for historical productions (e.g., the Australian Broadcasting Commission's *Les Norton*, which is set in 1980s Sydney). The inclusion of younger and older speakers also provides benchmarks for age-appropriate vowel production in each period. To facilitate contextualization, we draw comparisons

with other varieties of English as described in prior acoustic studies, and with descriptions of Received Pronunciation (RP) prevalent in the performance industry.

The paper is organized as follows. We first present a brief background of dialect coaching in the context of audience expectations of dialect representations. We then provide a general description of some of the sociolinguistic work on Australian English, outline the specific variety that forms the focus of this work, and introduce the data on which the study is based. Prior to presenting the results, we describe the methods used for the acoustic analyses and visualizations of the data, which should assist dialect coaches and performers in understanding the quality of individual vowels and their relation to surrounding vowels. We use this background to contextualize the acoustic phonetic descriptions that follow, first for monophthongs, then for diphthongs. Throughout, we draw attention to the relevance of the observed patterns for practitioners and make recommendations for coaching strategies. As far as we are aware, this is the first resource of its kind that draws on detailed phonetic analyses from large sociolinguistic corpora to offer a guide and practical tool specifically tailored for dialect work in the performance industry. We hope that by demonstrating the value of such a resource, we will see greater links established between research in sociolinguistics, acoustic phonetics, and dialect coaching.

Background

Dialect Coaching, Phonetic Training, and Audience Expectations

In an objective sense, actors and theater performers aim not for full dialect acquisition, but temporary use of the dialect, specialized for the required performance (Wikström 2013, 39; Siegel 2010, 65). Nevertheless, a solid understanding of the phonological structure of a dialect underpins successful performance, and dialect coaching is grounded in this kind of phonological awareness. From the perspective of performers, the mastery required for the role in question relies on an understanding of the target variety's phonology and how this differs from that of their own variety (Derwing and Munro 2005, 385). This kind of approach is captured in existing dialect coaching frameworks, for example, Paul Meier's method (Meier 2009) and the Knight–Thompson Speechwork methodology (Knight 2012). The latter advocates for performers and coaches to gain a detailed understanding of phonetics and the sounds that make up all languages, as differences in these sounds, however small, can impact the performance of regional and foreign accents (Knight 2012, 116). Similarly, dialect coach Sam Chwat highlights the importance of the actor's ability to perceive and understand precisely what constitutes acceptable speech in the target variety (Chwat 2006, 22).

From the Knight–Thompson framework, two key principles governing dialect for performance that are of particular relevance here are flexibility and intelligibility (Thompson, Caban, and Singer 2017). These principles highlight that the performance of a dialect must be flexible enough to prove acceptable to native-speaker audiences while remaining intelligible to non-native audiences. What audiences perceive to be acceptable must be congruent both with their own expectations, and with the character and setting portrayed on stage or on screen. Indeed, "native listeners are extremely sensitive to non-native productions" (Derwing

and Munro 2005, 388), and audiences' expectations of a performance may therefore constrain dialect authenticity.

Baird's (2018) observation above that most Australian audiences reacted negatively to Meryl Streep's portrayal of Australian English serves as an example of the apparent disjunct between accuracy and the constraints of performance on dialect coaching. Mielewska (2012) observes that Streep in fact successfully reproduced Lindy Chamberlain's style of speaking, which contained features of New Zealand English due to Lindy having spent her childhood in that country. However, Lindy's background was not widely known, and thus audiences did not expect New Zealand-like features in the speech of this Australian character. Consequently, the faithful reproduction of this more mixed variety led many to view Streep's performance as poorly portrayed Australian English. In this case, adhering to linguistic accuracy in favor of acceptability compromised performance; however, in dialect coaching, sociolinguistic evidence can nevertheless be effectively balanced with performance requirements and audience expectations. Instead of a mixed New Zealand-Australian dialect, for example, a dialect coach could aim for an Australian English variety appropriate to the time period, namely 1980s Australia. This choice would still be guided by sociolinguistic descriptions to ensure that the dialect is acceptable for a native Australian audience, and congruent with the temporal setting of the performance.

Congruence between the performance and perception of Australian English—what might be deemed "acceptable" speech—exists on a spectrum. In work addressing second dialect acquisition, it is noted that learners do not typically acquire a distinct linguistic system in full, but rather make subtle changes to their native variety, adjusting the range of variability in their speech according to input from the second dialect (Nycz 2015, 470, 473–475). Indeed, from a performance perspective, Knight (2012, 283) claims that too much variability can cloud intelligibility, and he argues that performers should aim for vowel realizations that best maintain the phonemic distinctions of the target dialect.

Central to both performance and second dialect acquisition are the consequences of failing to represent distinctions in the target variety. A learner or performer who fails to perceive a particular contrast may employ a "nearest equivalent" from their own dialect instead (Siegel 2010, 139–141). Relying solely on auditory perceptions in dialect learning is therefore problematic, as perception operates largely below the level of consciousness and does not always translate to production, and learners may map phonological contrasts in ways that do not concord with the behavior of the native speakers they are representing (Thompson 2007, 354). Australian dialect coach Leith McPherson echoes this observation, pointing out that actors may over-generalize features from their own dialect in renditions of Australian English if they have not gained sufficient sociolinguistic awareness of the relevant sounds (as quoted in Madden and Chan 2018).

Phonetic evidence is a powerful tool to address the difficulties that present themselves in the appropriate characterization of a dialect. Used as a reference for dialect coaches and performers alike, acoustic phonetic data can help ensure that the characterization of a variety is grounded in linguistic reality. In this way, dialect coaching and sociolinguistic inquiry have much in common: both fields take a descriptivist approach, with an understanding that languages are not monolithic entities and that there is considerable variation both between speakers (even of the one variety), and within a single speaker. Decades of sociolinguistic work have shown that such variability is not haphazard, but rather, is systematic and structured (Weinreich, Labov, and Herzog 1968, 100–101), and

that this systematicity can best be observed at the level of the speech community, defined via the linguistic patterning and sociolinguistic norms that are shared by its members (Labov 2007, 347). Dialect coaches' and performers' awareness of such variation is crucial, but it must be appropriately balanced with constraints of the performance (Thompson, Caban, and Singer 2017, 332). Thus, here we draw on sociolinguistic methods to examine vowel realizations across a community of speakers, focusing on change in the range of realizations, or scope of variability, that is exhibited over time. These phonetic descriptions can greatly help dialect coaches and performers to gain an understanding of the range of vowel realizations representative of the speech of this community, and how this has changed across generations of Australian English speakers.

Australian English

The variety we focus on is what has been called "Standard (Mainstream) Australian English," or "AusE" (Cox and Fletcher 2017, 12), which is the term we will use here. This represents Australian English as spoken by the majority Anglo-Celtic group in major urban centers, about whom the bulk of research on Australian English has been carried out.

AusE is relatively homogenous when compared with the marked regional variation that is widely acknowledged for British and North American English varieties (e.g., Cox and Palethorpe 2007, 341). Across states, lexical variation has been observed (e.g., Bryant 1997), some phonological differences have also been reported (e.g., Bradley 2004; Cox and Palethorpe 2019; Loakes et al. 2014), and a distinction between urban and rural varieties has also been described (e.g., Bradley 2004; Horvath 2004). The last two decades have seen extensive acoustic phonetic research, and in particular, the work of Felicity Cox and colleagues has documented variation and change in AusE over time (e.g., Butcher 2012; Cox 1999, 2012; Cox and Palethorpe 2008, 2012; Cox and Fletcher 2017; Cox, Palethorpe, and Bentink 2014; Harrington, Cox, and Evans 1997). The findings presented here are largely consistent with observations in this prior work.

Social factors such as class, gender, and ethnicity are relevant for the portrayal of Australian English. As dialect coach John Nelles observes, a character's entire profile can inform the development of that character's voice within the relevant dialect (Wicks 2015). Considering first class and gender, phonetic variation in AusE vowels has traditionally been described as existing along a continuum, from "cultivated" speech, most approximating RP or Standard Southern British English, to "broad" speech, occupying the opposite end of the continuum, with a middle-ground variety labeled "general" Australian English (Mitchell and Delbridge 1965, 35). Broad speech was found to be more characteristic of rural areas and males, and cultivated speech associated with urban centers (1965, 39). This variability was subsequently found to correlate strongly with both socio-economic class and gender in Sydney (Horvath 1985, 81–83). Despite this social differentiation, Horvath proposed that speakers in the late 1970s were moving away from the extremes of this so-called "broadness continuum" toward a more "general" middle (1985, 91). This change has been interpreted as a shift away from an exonormative model, oriented toward British standards, toward an endonormative Australian English model (Cox and Palethorpe 2012, 313). Exploration of AusE diphthongs in the same corpus as that studied in the present paper (*Sydney Speaks*) has confirmed such a change, which results in a reduction in class differences over time, as both men and women have moved

away from broad realizations (Grama, Travis, and Gonzalez To Appear). As for ethnicity, in addition to AusE as spoken by the majority Anglo-Celtic group, the literature makes reference to "ethnocultural varieties" and "Australian Aboriginal English" (Cox and Fletcher 2017, 12). Although the body of research into minority varieties of AusE is growing, further work is needed for the full range of variation in AusE to be appropriately described and represented.

Exploration of social factors is beyond the scope of this paper, which seeks to chart change over time. We, therefore, focus on generational patterns in the dominant Anglo-Celtic model of AusE, as a benchmark against which further analyses, and dialect models, can be compared.

Sydney Speaks: A Sociolinguistic Corpus

The data presented here come from the *Sydney Speaks* corpus (Travis, Grama, and Gonzalez In Progress), a collection of recordings of native Australian English speakers from the *Sydney Social Dialect Survey* made in the 1970s (Horvath 1985), and a contemporary set of recordings made in the 2010s. While the corpus includes speech from Greek-, Italian- and Chinese-Australians, here we use a subsample of Anglo-Celtic Australians. This subsample comprises recordings of 95 men and women from a range of socio-economic backgrounds, born and raised in Sydney, whose parents are also Australian.

Four age groups are represented in the data: 1970s Adults (mostly born in the 1930s), 1970s Teens (born in the 1960s), 2010s Adults (born in the 1960s, the same period as the 1970s Teens) and 2010s Young Adults (born in the 1990s). These time points allow us to describe three generations of AusE speakers: the *Builders*, represented by the 1970s Adults;[2] *Generation X*, represented by both the 1970s Teens and the 2010s Adults (though some also qualify as Baby Boomers); and *Millennials*, represented by the 2010s Young Adults (McCrindle 2014, 6–7). A summary of the distribution of the speakers by age and gender is given in Table S1 (online supplementary materials).

Recordings of speech were obtained using sociolinguistic interviews, a standard methodology in sociolinguistic research involving an informal interview that does not strictly adhere to a pre-determined set of questions, but rather draws on a set of topics assumed to be of interest to the participant, with the aim of eliciting unmonitored speech (Labov 1984). Some 30 minutes of speech were transcribed per participant, providing a total of approximately 50 hours, or 450,000 words, of speech for the descriptions presented here.

Recordings of natural speech are a crucial resource for performers and coaches learning a dialect (Henry 2010). Existing dialect databases, such as the International Dialects of English Archive (IDEA 2019) and the Speech Accent Archive (Weinberger 2015) provide speech samples of native speakers covering a breadth of English varieties. However, such databases primarily consist of scripted speech, which can differ substantially from the spontaneous spoken language that arises naturally in interaction. As the goal in performance is generally to portray the latter, data reflecting that speech style are more appropriate for dialect learning. In linguistics, there have been many large-scale corpus compilation endeavors focusing on spontaneous speech (see a summary in Clopper and Pisoni 2006, 636), but these have not to date been widely employed in the performance literature. In this paper, we demonstrate that such collections have wider

practical application beyond the typical domain of linguistics, in particular as a guide to assist in the creation of socially and temporally appropriate representations of speech.

Interpreting Acoustic Analysis: Formants and Vowel Spaces

As is customary in linguistic research, quantifying vowel quality relies on acoustic measurements, specifically "formants," or resonances in the vocal tract. Vowels are characterized by many formants, the first two of which are interpreted as a general indication of the position of the tongue in the mouth. The first formant (F1) is inversely correlated with the height of the tongue, where a lower F1 indicates that the tongue is oriented higher in the mouth (i.e., closer to the hard palate), and a higher F1, that the tongue is oriented lower in the mouth. The second formant (F2) is correlated with how far forward the tongue is, where a higher F2 indicates that the tongue's position is further front in the oral tract (i.e., closer to the alveolar ridge), and a lower F2, that the tongue is further back (i.e., closer to the velum).

Plotting acoustic measurements of the formant frequencies allows us to visually assess where vowels are situated, mirroring the vowel quadrilateral many dialect practitioners are familiar with. In the vowel figures shown in this paper and in the supplementary material, F1 is presented on the vertical axis, and F2 on the horizontal axis; the higher the vowel (that is, the higher the tongue is in the mouth as evidenced in F1), the higher it appears on the chart. Likewise, the further front the vowel is (the closer the tongue is to the alveolar ridge, as evidenced in F2), the more to the left it appears. In order to facilitate comparison between speakers, formant measurements were normalized (Lobanov 1971) on the basis of the entire vowel space. Normalization allows for comparisons to be made across different speakers, by accounting for speaker-specific physiological differences, such as vocal tract length.[3]

We use the Wells (1982) lexical set system to represent vowels (following Honorof 2003), whereby a vowel class is referred to by a word that contains that vowel, e.g., KIT represents the vowel /ɪ/ that occurs in the word *kit*; TRAP represents /æ/, and so on. Vowels are divided into two major categories: monophthongs (where the vowel is comprised of a single vowel target, such as /ɪ/, as in KIT) and diphthongs (where the vowel is comprised of two vowel targets, the nucleus and the offglide, such as /ɔɪ/, as in CHOICE). We present here an analysis of the 19 vowels of the AusE phonological system that occur in stressed positions, covering monophthongs (KIT, DRESS, TRAP, BATH/START,[4] GOOSE, FOOT, LOT,[5] THOUGHT/FORCE,[6] STRUT, NURSE) and diphthongs (FLEECE,[7] FACE, GOAT, MOUTH, PRICE, CHOICE, NEAR, SQUARE, CURE) (see Table S2, online supplementary materials). Comprising 72,700 vowel tokens across 95 speakers, the size of the corpus provides robust token numbers across age groups for all vowels except CURE, which is rare in spontaneous speech. We include it in our description to assist dialect coaches and performers when approaching specific lexical items containing CURE as they arise in the script.

For each monophthong, F1 and F2 measurements were taken at the midpoint of the duration of the vowel. For each diphthong, F1 and F2 measurements were taken at 11 points throughout the vowel's duration in order to capture the trajectory of the vowel, that is, the position of the tongue as the vowel moves from its first target to its second target. While traditional vowel charts provide a single point for vowel realizations, taking acoustic

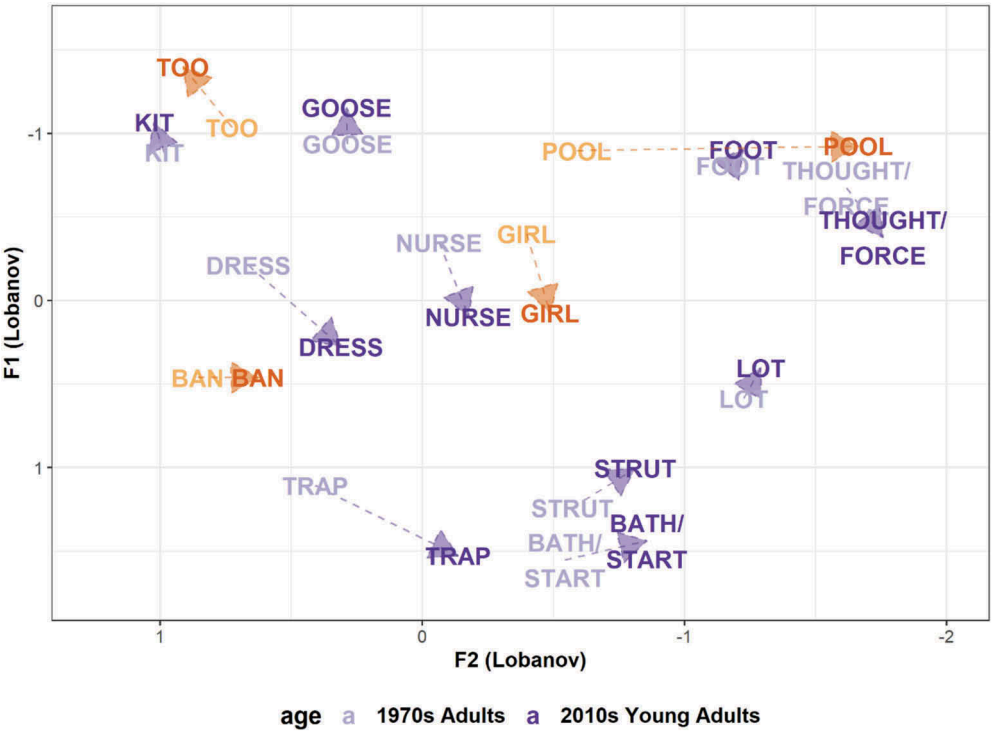

Figure 1. Monophthongs for 1970s Adults (oldest, light) and 2010s Young Adults (youngest, dark); labels placed at the midpoint of each vowel for each age group; arrows indicate the direction of changes over time.

measurements of multiple vowel tokens allows us to capture the range of variability exhibited either by a single speaker (as in Figure S1), or by the speech community (as in subsequent figures). Figure S1 in the online supplement shows that, when we consider the acoustic measurements for each vowel token, there is overlap between some vowel classes, but the means within each vowel category are clearly distinct from one another.

To better serve the dialect coach, in the figures we represent the vowels with mean acoustic values for each generation. We provide different kinds of visualizations, which we hope will facilitate interpretation and consequent successful coaching of AusE. This includes both vowel plots with points which represent mean values across speakers (for the midpoint of the monophthongs in Figure 1, and for the trajectory of the diphthongs in Figures 2, 4 and 5, and Figure S6 in the online supplementary materials), and plots capturing mean values for each speaker (Figures S2 to S5 in the online supplementary materials). Finally, the data capture three generations (Builders, Generation X, Millennials) measured over two time points (1970s, 2010s) and four age groups (1970s Adults and Teens, 2010s Adults and Young Adults); these groups will be presented in the figures, reflecting the age breakdown of the speakers. This should also allow practitioners to tailor their instruction to different age groups in the different time periods.

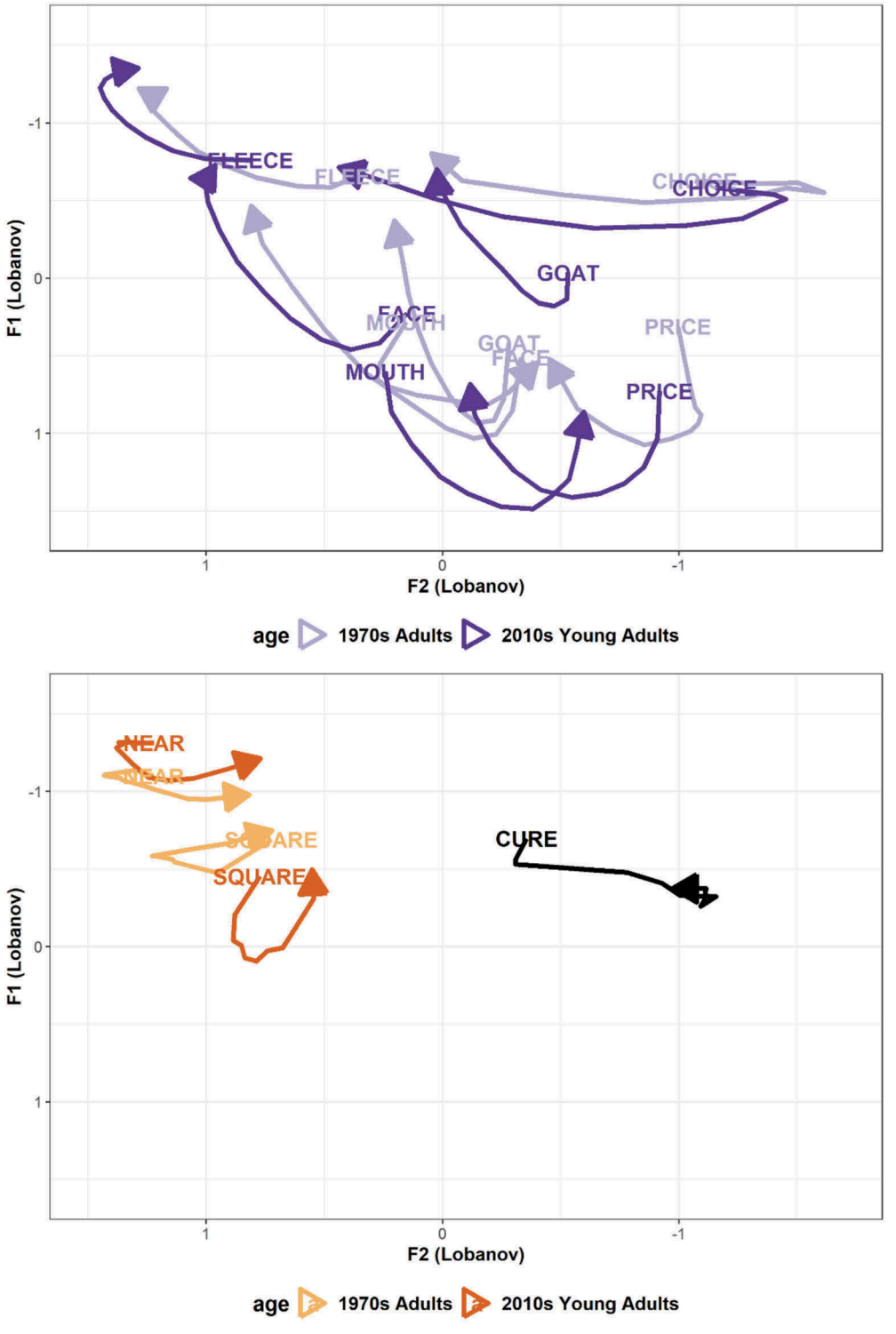

Figure 2. Trajectory of diphthongs for 1970s Adults (oldest, light) and 2010s Young Adults (youngest, dark); labels placed at first measurement point; lines indicate diphthong trajectory.

The Vowels of Australian English

We first present an overall representation of the vowel space of AusE and how it has changed over time, focusing on the monophthongs in Figure 1 and the diphthongs in Figure 2. In order to capture the broad changes over time, the oldest speakers across the time span (1970s Adults) are compared with youngest (2010s Young Adults). Here, we describe the general positions of the vowels; change over time will be outlined in the following sections, where the discussion is broken down by vowel group.

We first consider the monophthongs. As shown in Figure 1, the short-front vowels, KIT, DRESS, and TRAP occupy relatively tensed positions in the front of the vowel space; KIT, in particular, occupies a fronter, higher position than the nucleus of FLEECE (seen in Figure 2). This contrasts with New Zealand English, where KIT is central (i.e., [ə]), and DRESS and TRAP are raised (i.e., [ɪ] and [ɛ], respectively) (Gordon et al. 2004). GOOSE exhibits a very forward position, almost as far forward as KIT, indicating a realization in line with [ʉ̟] or [ʏ̄], paralleling fronted GOOSE found in many varieties (Labov 2001, 475–479). By contrast, FOOT exhibits a back position (e.g., [ʊ]), showing no evidence of the fronting or centralizing that typifies some US and UK varieties (Fabricius 2007; Fridland 2008). NURSE occupies a position slightly front of center (e.g., [ɜ̟]), but not as front as that found in New Zealand (Gordon et al. 2004). Similar to many non-rhotic Commonwealth varieties, FORCE and THOUGHT constitute a single category, and occupy a high back position, quite separate from LOT, which is far lower (e.g., [ɔ]), but not in a low central position as is typical of California, for example (Kennedy and Grama 2012). STRUT is quite low and central (e.g., [ɐ]), and is of a similar quality to BATH or START, which form a single category in AusE. We include in Figure 1 some vowels where the realization in certain phonological contexts is sufficiently distinct to warrant independent discussion below, namely GOOSE following coronal consonants (TOO) and pre-laterally (POOL); pre-lateral NURSE (GIRL); and pre-nasal TRAP (BAN).

Figure 2 shows the diphthongs of AusE, with FLEECE, FACE, GOAT, MOUTH, PRICE, and CHOICE in the top panel, and centering diphthongs NEAR, SQUARE, and CURE in the bottom panel. Note that CURE is shown in black to represent the average across all speakers, as there are not enough tokens in the dataset to assess change over time. In the aggregate, the diphthongs occupy similar positions to those of (especially older) working-class London speakers (Kerswill and Torgersen 2008). In the front of the vowel space, FLEECE is associated with a short onglide (e.g., [ᵊi]), and FACE is characterized by a low nucleus in the vicinity of TRAP, with an offglide near DRESS or SQUARE (e.g., [æɛ̯]). The nucleus of MOUTH is located in the front of the vowel space, and the nucleus of PRICE in the back, reflecting the PRICE-MOUTH crossover that is typical of many Commonwealth varieties (Wells 1982, 310). For MOUTH, this yields a nucleus that is located around TRAP before terminating in a relatively central position (e.g., [æɜ̈]), while for PRICE, the nucleus is lower than LOT and the vowel moves to a similarly central position over its duration (e.g., [ɒə̯]). GOAT exhibits a central nucleus with an offglide in the direction of GOOSE (e.g., [əʉ̯]), and the nucleus of CHOICE occupies a back position and a very fronted offglide (e.g., [oɪ̯]). Both NEAR and SQUARE, as seen in the bottom panel, have offglides toward the center of the vowel space, and SQUARE, in particular, is monophthongal relative to the other diphthongs. Finally, CURE occupies a position in the vicinity of GOOSE with a backing offglide toward the space between FOOT and NURSE (e.g., [ʉə̯]).

With a general overview of the vowels of AusE in hand, we now zoom in to focus on changes over time, also taking into account the impact of phonological context where relevant.[8] We first describe the monophthongs, then the diphthongs, breaking the discussion into regions in the vowel space, to consider together sets of related vowels.

Monophthongs

While Figure 1 presents mean acoustic values, in this section we visualize the range of variability for each monophthong, which allows us to better track the changes undergone.

Short-Front Vowels KIT, DRESS, and TRAP

The short-front vowels KIT, DRESS, and TRAP have lowered and retracted in many English varieties (Bekker and Eley 2007; Torgersen and Kerswill 2004), particularly those of Canada and the US (Clarke, Elms, and Youssef 1995; Fridland et al. 2016). In Australia, these vowels have undergone significant change over time, most notably in the separation of pre-obstruent and pre-nasal TRAP (henceforth BAN), seen in Figure 1 above, and, across the generations, in Figure S2 (online supplementary materials).

Focusing first on TRAP, it is clear from these figures that while the vowel was realized as relatively tensed [æ̝] in the 1970s, it has lowered and retracted over time, such that young speakers today realize the vowel low in the vowel space, as [æ̞] or [a]. This change renders TRAP very similar to its pronunciation throughout the US West Coast and Canada. BAN has not retracted alongside TRAP, and today, it is realized in a front, tense position in the vowel space, something akin to [æ̝ː]. This is evident when comparing older and younger speakers of AusE in Figure S2 (online supplementary material). While older speakers produce substantial overlap between TRAP and BAN, approximating a system more like that of canonical RP, younger speakers show striking differences between the two categories. Today, then, the TRAP lexical set more broadly can be described as having a split-nasal system, whereby instances of the vowel in pre-nasal position have a front, tense, monophthongal realization (Grama, Travis, and Gonzalez 2019, 1771).[9]

DRESS has also shifted to a lower and backer position over time; older speakers produce relatively tense DRESS realizations (e.g., [e]), and younger speakers, laxer realizations (e.g., [ɛ]). The lowering and retracting undergone by DRESS over time contravenes claims that contemporary AusE speakers produce DRESS as high as KIT in words like *yes* (e.g., Crystal and Crystal 2014, 163), a characterization that would be more appropriate for New Zealand English (Gordon et al. 2004, 24–25). While work examining vowel realizations in more constrained elicitation contexts has observed some movement of KIT alongside TRAP and DRESS (Cox and Palethorpe 2008), the data studied here do not provide evidence that KIT has participated in the same lowering and retracting as DRESS and TRAP. Rather, KIT remains in a relatively high, tense position over the four age groups.

From a coaching standpoint, the lowering and retraction of the short-front vowels appears to be a relatively recent phenomenon, taking place sometime in the 1980s and 1990s. Thus, more fronted productions of TRAP and DRESS, and more overlapped realizations of TRAP and BAN, would befit depictions of a historical Australian accent (e.g., in the style of *Puberty Blues*), and contemporary depictions of AusE (e.g., of Millennial speakers) should opt for lower, more centralized TRAP and DRESS,[10] and a greater distinction between TRAP and BAN.

While TRAP and BATH are functionally identical for many US speakers, they are distinct in AusE; instead, BATH and START function as a single vowel category in AusE, as BATH includes words that "belong phonetically with TRAP in [US varieties], but with PALM and START in RP" (Wells 1982, 134). As can be seen in Figures 1 and S2, BATH/START has undergone significant backing over time, potentially motivating the TRAP retraction identified above (Grama, Travis, and Gonzalez 2019). Older speakers produce BATH/START as a long, low central vowel (e.g., [ɐː], Cox and Fletcher 2017, 65), whereas younger speakers produce something closer to [ɐ̟ː]. Neither of these realizations, however, approximates the low back [ɑː] that typifies RP (Hawkins and Midgley 2005, 186). As such, we consider BATH/START further in the following section alongside other central vowels.

Central Vowels: STRUT, BATH/START and NURSE

We now turn to the central monophthongs STRUT, BATH/START, and NURSE. STRUT is largely differentiated from BATH/START by duration, where STRUT is [ɐ] and BATH/START is long [ɐː]. As seen in Figure 1, both STRUT and BATH/START occupy low and central positions in the vowel space, though STRUT is slightly higher. Figure S3, in the online supplementary materials, gives the breakdown across the generations. Like BATH/START, STRUT also retracts over time, exhibiting little change between the 1970s Adults and Teens, but backing noticeably for the 2010s Adults and Young Adults. The similar positions occupied by STRUT and BATH/START suggest that the length difference is a useful way to train these two vowel sets, both for historical and modern varieties. A learner can focus on short/long pairs (e.g., *hut* [hɐt] vs. *heart* [hɐːt]), with differences in height likely falling out of the durational differences. Importantly, both STRUT and BATH/START should be realized further forward in historical as compared with modern representations.

The BATH set is additionally an important focal point for North American and British learners alike, given that it circumscribes different words in AusE, particularly with respect to those in pre-nasal contexts. Figure 3 plots tokens of pre-nasal BATH words (here, referred to using the set label DANCE), with their realizations shaded as either BATH/START-like (darker) or BAN-like (lighter). Certain words are invariably BATH/START-like (i.e., [ɐː]) in AusE across all age groups, including *calm, palm, drama*, and *aunt*. Thus, unlike many North American dialects, *aunt* and *ant* are not homophonous; rather, *aunt* is homophonous with *aren't* in AusE.[11] Other words were once realized as BATH/START, but have largely been re-assigned to BAN over time. 1970s Adults have a more RP-like system, wherein words like *demand, answer*, and *command* pattern with BATH/START. Some words like *example* exhibit variability, occurring with both BAN-like and BATH/START-like realizations for 1970s Adults and Teens, potentially representative of the initiation of this change. Overall, however, the 1970s Teens shift away from the 1970s Adult system, and words like *chance* and *answer* migrate clearly to the BAN distribution. Forty years on, words like *dance, advantage*, and *example* are nearly categorically realized as BAN by 2010s speakers. Similarly, while no tokens of *France, chance, sample, branch*, or *glance* occur in the 1970s data, when these do occur in the 2010s, they are all BAN-like. This information can be employed when dealing with specific lexical items in scripts, bearing in mind that the production of DANCE lexical items as BATH/START or BAN may convey information about a character's age or the time period in which a piece is set. This is one feature that also differs regionally in AusE, as South Australia has been found to conserve a more RP-like

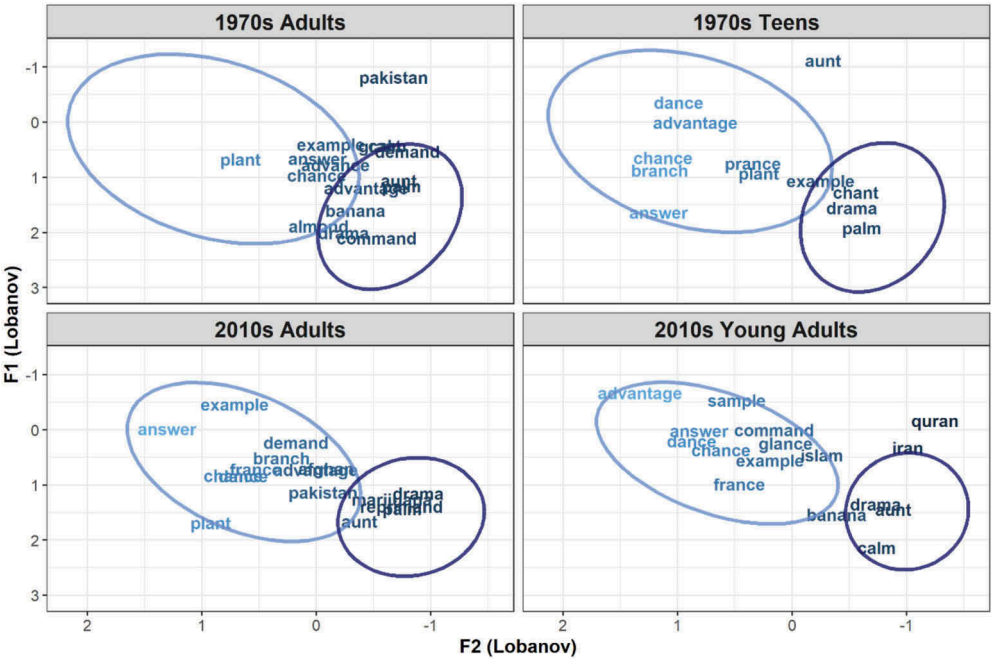

Figure 3. DANCE (pre-nasal BATH) average values of lemma across age group; light ellipse/words indicates the domain of BAN distribution; dark ellipse/words indicates START distribution.

system for DANCE lexical items, wherein BATH/START-like variants are more common (Bradley 2008, 112–113; Horvath and Horvath 2001a, 350).

Turning to NURSE, Figure 1 shows that it occupies a position in the vowel space slightly front of center; importantly, this vowel is not "/r/-ful" in AusE, as it is in rhotic varieties. A following /l/ has an impact on the realization of NURSE, and thus Figure 1 and Figure S3 (online supplementary materials) also show a separate realization of NURSE in pre-lateral contexts, referred to as GIRL. Note that GIRL tends to occupy a position further back in the vowel space than NURSE, such that vowels in words like *girl, world*, and*early* would be pronounced [ɵ, ɵʊ]. Post-vocalic /l/ is commonly vocalized in AusE, whereby /l/ becomes more vowel-like at the end of a syllable (*world* as [wɵʊd], *feel* as [fiʊ]) (e.g., Horvath and Horvath 2001b, 54). This phenomenon is typical of the speakers in this sample (though note that it does not generalize to pre-vocalic /l/; compare, e.g., *girlfriend* [gɵʷ.fɪ̃ẽnd] with *girly* [gɜ̟.li]). Both NURSE and GIRL show some lowering over time, in particular for the 2010s Young Adults. Due to this being a relatively recent change, coaches may benefit from focusing on the non-rhoticity associated with NURSE, as in other non-rhotic dialects, as well as the more retracted pronunciations of GIRL.

Back Vowels: LOT and THOUGHT/FORCE

Unlike several North American varieties where LOT and THOUGHT are merged, such that *cot* and *caught* are homophonous (see, e.g., Labov, Ash, and Boberg 2006), AusE maintains a robust distinction between the two vowels, similar to that found in RP (Wikström 2013) and New Zealand English (Gordon et al. 2004, 25). In addition, THOUGHT and FORCE are generally circumscribed under a single class (see, e.g., Cox 1999), as *court* and *caught* are

homophones. As shown in Figure S4 (online supplementary materials), changes to both vowels have taken place over time. LOT has raised and backed, and THOUGHT/FORCE has lowered. Though this has brought the two vowel classes closer together, they remain very much distinct for all age groups.

Teaching the LOT-THOUGHT distinction will be familiar to any dialect coach, and the same principles that apply in RP apply in AusE. However, due to the changes over time observed here, historical representations of AusE THOUGHT/FORCE may be somewhat closer to RP, while more contemporary depictions may require lower (and less-RP-like) realizations (compare Wikström 2013, 44).

High Vowels: GOOSE and FOOT

GOOSE in AusE (usually transcribed [ʉː]) is largely monophthongal, high, and front, as depicted in Figure 1. While more diphthongization of GOOSE is evident in word-final positions, there is some variability. By contrast, FOOT is considerably backer than in many other varieties. We observe several changes over time, all of which are mediated by phonological context, particularly GOOSE before /l/ (here, POOL) and following coronal consonants /t, d, n, θ, ð, s, z, ʃ, ʒ, tʃ, dʒ, r, l/ (here, TOO), as depicted in Figure S5 (online supplementary materials).[12]

First, it is notable that FOOT is stable over time as a high, back vowel. This contrasts with some US varieties, where it has a centralized realization (Fridland 2008). GOOSE is relatively stable, shifting only slightly fronter in the mouth over time, and Young Adult productions are almost as far forward as KIT. Most striking, however, is the behavior of POOL and TOO. Even for the 1970s speakers, POOL is backer than GOOSE, mirroring the effect of /l/ observed for GIRL. However, POOL's position has continued to back incrementally over time, such that today the vowel is backer than FOOT. By contrast, TOO is produced consistently fronter in the vowel space over time, always fronter than GOOSE.

Dialect coaches and actors may train a fronter POOL vowel (i.e., [pʉ̟ɫ] *pool*, [skʉ̟ɫ] *school*) in performances capturing the Builders' generation, and a backer vowel for speakers of Generation X or Millennials (e.g., [puɫ] and [skuɫ]). For both modern and historical varieties, FOOT should be consistently high and back, avoiding centralized realizations. For all age groups, GOOSE may be found by adopting a rounded KIT vowel and shifting the tongue slightly back.

Diphthongs

We now consider the diphthongs. As described above, acoustic measurements were taken at 11 points along the vowel's duration. For readability purposes, we do not capture the range of variability across speakers in these visualizations, but rather give speaker averages of the measurements taken. We focus our discussion on the two targets of the diphthong, the nucleus and the offglide.

FLEECE, FACE, GOAT, MOUTH, PRICE and CHOICE

This set of diphthongs has changed substantially over time. As with other vowels we have seen, these diphthongs are heavily impacted by a following lateral (e.g. in *feel, old*), and thus we first consider their occurrence in phonological contexts other than pre-lateral position. Figure 4 shows the changes across the four age groups. As can be seen, both

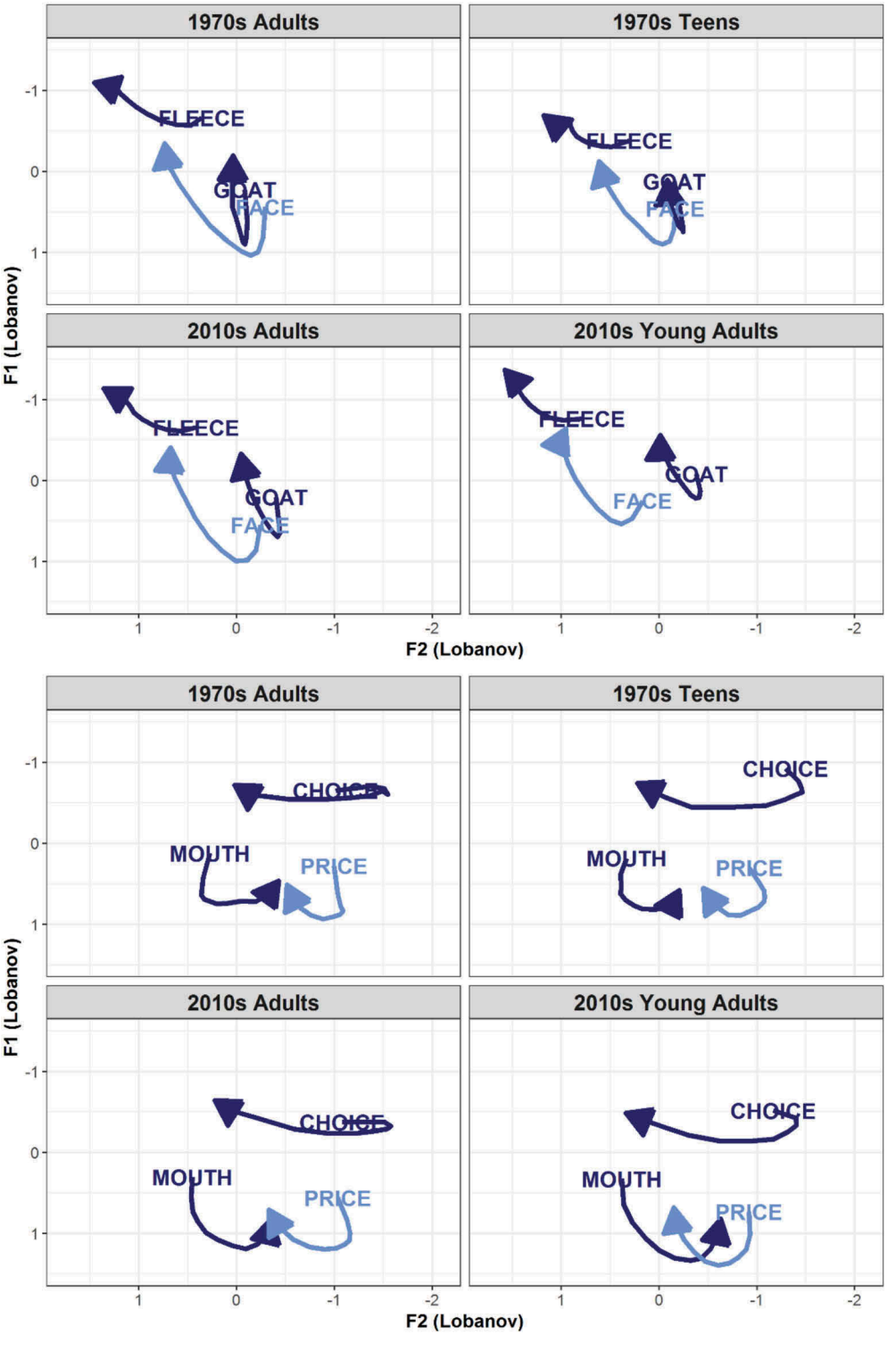

Figure 4. FLEECE, FACE, GOAT, MOUTH, PRICE, and CHOICE across age group (pre-lateral contexts excluded).

FLEECE and FACE raise and front over time. For FLEECE, this means that the change has been away from a variant with a central onglide (e.g., [ᵊi]) toward realizations with a laxer onglide (e.g., [ᶦi]). The central onglide for FLEECE is famously parodied in the Australian TV series *Kath and Kim* from the early 2000s (e.g., "look at moiye" [mə̟ːɪ̯i]], Riley and Turner 2002), by Kath, who would be of a similar age group as the 2010s Adults in the sample studied here. For FLEECE, there is incremental raising and fronting from the 1970s Teens, while for FACE, raising and fronting is more recent, only being evident among the Millennials, for whom the nucleus of FACE has moved from [æ] to [ɐ̝].

GOAT raises and backs incrementally over time, coming to exhibit a more centralized nucleus today. PRICE (in the bottom panel) lowers and fronts over time, such that older speakers produce backer realizations with less overall movement (e.g., [ɒɐ̯]), while younger speakers have centralized the nucleus of this vowel, and tend to produce longer trajectories (e.g., [ɑə̯]). MOUTH lowers and backs over time; 1970s speakers produce a very front nucleus and offglide (e.g., [ɛ̟a̟]), while 2010s Young Adults have lowered and backed the nucleus of the vowel and lengthened the trajectory (e.g., [æɐ̯]). Finally, CHOICE exhibits very little change over time, with all age groups producing [oɪ̯].

In coaching these diphthongs, it could be helpful to focus on differences in the nucleus targets. For older AusE varieties, consider a more central onglide for FLEECE and lower nucleus positions for both FACE and GOAT. Conversely, raising the nucleus of PRICE and MOUTH can help establish an older Australian sound, especially with a shortened trajectory for PRICE and maintaining a higher overall trajectory for MOUTH. However, these realizations may not be entirely appropriate for characters of higher social classes, due to the class distinctions that existed at that time noted earlier (Grama, Travis, and Gonzalez To Appear). A more modern AusE variety should aim to reduce and raise the onglide of FLEECE, and also raise the nucleus of both FACE and GOAT; the former should also be fronted, and the latter slightly backed. Both PRICE and MOUTH should have lowered nuclei, and longer trajectories reflecting greater overall movement. Finally, CHOICE can be consistent across time periods.

These diphthongs are realized quite differently in pre-lateral position. To demonstrate this, we focus on the general pattern across the speakers, without giving a break down per age group. Figure 5 shows the trajectories of FLEECE, FACE, GOAT, MOUTH, PRICE, and CHOICE in non-pre-lateral contexts (on the left) vs. in pre-lateral contexts (on the right). The direction of the offglides for many of these vowels is consistent with /l/–vocalization, which is quite common in the data as noted above. Non-pre-lateral FLEECE raises and fronts during its pronunciation, while pre-laterally, it moves toward the center of the vowel space (compare, e.g., *speak* [spᵊik] with *feel* [fɪʊ̯]). By contrast, FACE and PRICE show very little movement before /l/ compared with other environments (e.g., *place* [plæɪ̯s] and *New South Wales* [wæ̝ʊz][13]; *like* [lɒə̯k] and *child* [tʃɒə̯d]). CHOICE moves in the same direction, but shortens its trajectory pre-laterally, and does not travel as far forward in the mouth (compare, e.g., *boys* [boɪ̯z] and *toilet* [toə̯lɨt]). GOAT exhibits a backing upglide and the nucleus of the vowel backs (compare, e.g., *road* [ɹəʉ̯d] and *old* [ʌo̞ld]). Finally, while pre-lateral MOUTH has a long backing offglide, there are only five instances in the data, all of which are spoken as two syllables (e.g., *owl* [æʷɐ̯l], and *howl* [hæʷɐ̯l]).

Coaching of vowels in pre-lateral contexts may benefit from illustration via frequent words in which this occurs (e.g., *feel, deal; Australia; old, whole; toilet; child, style*),

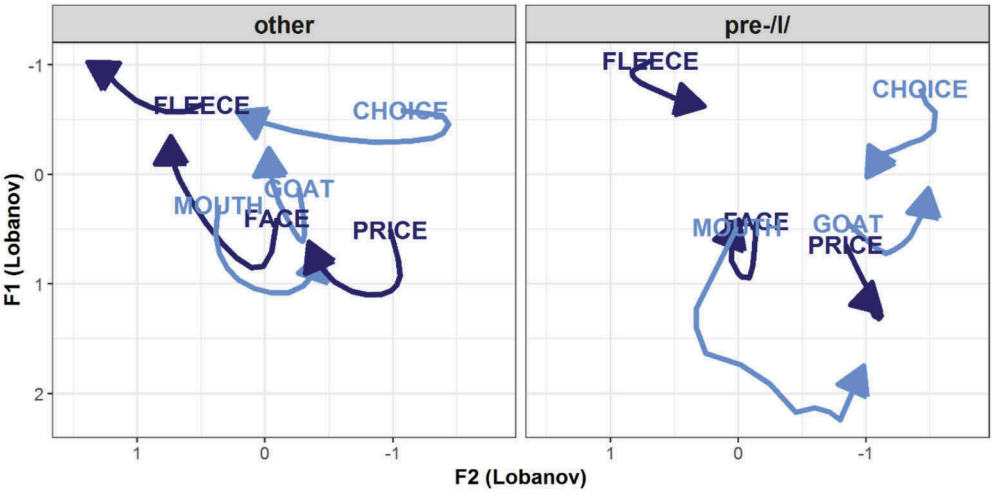

Figure 5. FLEECE, FACE, GOAT, MOUTH, PRICE, and CHOICE comparing pre-lateral phonological contexts with all other contexts.

More generally, these trajectories may be more easily learned by first adopting /l/–vocalization at all times, to practice the different direction of the diphthongs, and then re-introducing consonantal /l/, while maintaining the new trajectories. Of course, /l/-vocalization can be maintained as a character choice. For MOUTH specifically, inserting a /w/ to avoid hiatus and to divide the diphthong into syllables could prove a useful coaching strategy.

Centering Diphthongs: NEAR, SQUARE and CURE

NEAR, SQUARE and CURE are described as "centering" diphthongs, as their offglides move toward the center of the vowel space. As we noted in relation to NURSE, START, and FORCE, AusE is non-rhotic, meaning that post-vocalic /r/ is generally unrealized.

NEAR is clearly influenced by whether it occurs before a consonant or word-finally, as can be observed in Figure S6 (online supplementary materials).[14] When it occurs before a consonant, it may be realized as a monophthong (e.g., *years* [ji:z]), as a diphthong with a short centralizing offglide (e.g., [ji:ᵊz]), or a longer centralizing offglide (e.g., [jiəz]). In final position, each of these realizations is possible as well, particularly if the following word begins with a consonant; however, a lower central offglide is also more likely (e.g., *here* [hiɐ]). Changes have also taken place in NEAR over time; the vowel has fronted in both pre-consonantal and word-final positions. Moreover, the trajectory of word-final NEAR has lengthened over time, consistent with the increased likelihood of a low, centralizing offglide in younger generations. Given this, dialect coaches and actors can examine scripts for word-final NEAR (e.g., *here, year*), and aim to extend the trajectory of these vowels as a stylistic choice.

Conversely, SQUARE lowers and retracts over time in both pre-consonantal and word-final position, more so in the latter context. This parallels a similar change in DRESS and indicates that older speakers are more likely to produce tenser realizations of SQUARE (e.g., *there* [ðe:]), while younger speakers are more likely to produce somewhat laxer variants

(e.g., [ðɛ:]). Therefore, the practitioner must be careful not to overgeneralize canonical RP patterns, where SQUARE can be realized with a central offglide (Cruttenden 2014, 97).

CURE comprises a very limited set of words in AusE (Cox and Fletcher 2017, 107). In the data studied here, items that canonically belong to CURE are predominantly produced with two syllables comprised of the GOOSE vowel plus a central offglide (i.e., [ʉ.ə] as in all instances of *manicure, mature*, and *pure*), while some items may be variably mapped to FORCE (i.e., [o:] as in *tour, sure*).

Conclusion: Applying Sociolinguistic Analyses to Dialect Coaching

This overview of historical and contemporary patterns of AusE vowels, based on empirical sociolinguistic and phonetic research, provides a unique resource for dialect coaches and performers. The care that is required to appropriately understand the changes outlined here, including their progression over time and the impact of phonological context, underlines the need for up-to-date linguistic evidence to inform the practice of dialects in performance. The phonetic findings and vowel plots presented in this paper and in the online supplementary materials provide a visual reference that can be used in practice. In these materials, coaches can observe the scale of the similarities and differences between vowel categories and their changes over time. This information can then be paired with auditory and kinesthetic explorations by following the described shifts in tongue position, thereby producing shapes that aid familiarity with the variety (e.g., the proximity of GOOSE and KIT can be used to learn one vowel with reference to the other).

To support the visual guides of historical and contemporary AusE vowels, in Table S3 (online supplementary materials) we provide IPA representations that summarize the main features discussed over the three generations. We further provide access to representative speech samples from the *Sydney Speaks* corpus, that may be of use to practitioners in training and instruction, available via this link [http://www.dynamicsoflanguage.edu.au/sydney-speaks/sydney-speakers/].[15]

Reliance on a large sociolinguistic corpus of spontaneous speech data guarantees that the results presented reflect patterns of the speech community. Detailed acoustic analyses allow for fine-grained tracking of changes over time and across phonological contexts. Such an approach is, however, not without its limitations. The level of rigor required for data collection, analysis and visualization means that it is not possible in one study to cover the full phonemic inventory. Here, our focus has been on vowels, but also worthy of careful consideration are consonantal realizations (e.g., /l/-vocalization, mentioned briefly above), and prosody (e.g., high rising terminal). We have also focused on one social group, from one city—Anglo-Celtic Australians from Sydney. A full description of Australian English would need to include a breakdown for a range of social characteristics, but in particular other communities (including Indigenous Australians and migrant groups) and other regions (especially rural Australia). Nevertheless, we hope to have demonstrated not only that is it possible for empirical sociolinguistic research to be harnessed for use in dialect coaching, but also that there is enormous benefit in doing so. Beyond being a guide, evidence-based depictions of speech in the performance industry have social implications, as the representation of ways of speaking can have a powerful impact on shaping concomitant perceptions, attitudes and thus also social realities. As far as we are aware, the approach taken here is novel in the dialect coaching literature, and we put this forward as a potential avenue for future

work, for application across other language varieties relevant to the wider field of dialect coaching.

Notes

1. Patterns of variation in unstressed vowels have received less attention than those of stressed vowels, due in part to the likelihood that such vowels are reduced.
2. The name *Builders* comes from this generation's role in re-building the nation after events such as the World Wars and the Great Depression. In the United States, this generation is often called the *Silent Generation*.
3. Lobanov normalization converts Hertz values into z-scores, roughly anchored between 2 and −2 in both formant dimensions; these are the values presented in the figures given here.
4. We treat BATH, PALM, and START as a single vowel category in AusE, noting that PALM typically refers to foreign loans (with the exception of a few native English words, like *father* (see Wells 1982, 143–144)). Throughout the paper, we refer to this class as BATH/START, with START denoting tokens that occur before /r/ and may be rhotic in other varieties.
5. In AusE, LOT includes words in the CLOTH lexical set, as in many UK varieties (Wells 1982, 136), and unlike US varieties, which typically equate CLOTH with THOUGHT. This includes words like *dog, cloth, log, long, chocolate, off, golf, wash, squash*, and *slosh*.
6. FORCE, NORTH, and THOUGHT comprise a single vowel category in AusE. We, therefore, use THOUGHT/FORCE to refer to this vowel category, with FORCE denoting tokens that occur before /r/ and may be rhotic in other varieties.
7. FLEECE has been described as both a monophthong (Cox 2012, 56) and a diphthong (Horvath 1985) in AusE. We include it as a diphthong here in accordance with our observations in the data.
8. We exclude from analysis (and the token numbers in Table S2) vowel tokens occurring in contexts that are both relatively infrequent in the data, and heavily influence formant trajectories, such as when followed by other vowels (e.g., CHOICE in *annoying*), glides [w, j] (e.g., FORCE in *forward*), and before /r/ (e.g., LOT in *foreign*).
9. Note that this differs from US split-nasal systems that realize BAN as diphthongal, e.g., [ɛæ] (see Labov, Ash, and Boberg 2006, 172–173).
10. A pre-lateral merger for DRESS and TRAP has been reported in parts of Victoria, such that *celery* and *salary* are homophonous for some speakers (Loakes et al. 2014).
11. Although absent in this dataset, *can't* and *shan't* are also always BATH/START-like.
12. Tokens that are both post-coronal and pre-lateral (e.g., *rule*) pattern more like POOL than TOO.
13. Though we note that over one half of the instances of pre-lateral FACE in the data occur in the word *Australia*, and its occurrence in this multi-syllabic word no doubt contributes to the limited movement observed.
14. Word-final position is particularly relevant to these vowels, as it accounts for 51% of the tokens of NEAR and 70% of the tokens of SQUARE, compared with between 0% and 37% for all other vowel categories. Only 20 tokens of CURE were present in the data.
15. Requests for access to further materials may also be considered. Please contact Catherine.Travis@anu.edu.au if you wish to make such a request.

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No potential conflict of interest was reported by the authors.

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