

Is there any Evidence of Rhoticity in Historical Australian English?

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Abstract

Australian English is traditionally regarded as having been non-rhotic throughout its history, but a recent study by Trudgill and Gordon (2006) has found rhoticity levels of 1% to 20% in audio recordings of six Australian men born near the end of the 19th century, suggesting that Australian English was once a rhotic dialect. The present study re-examines the three most rhotic speakers in the Trudgill and Gordon dataset, as well as archival recordings from an additional seven speakers, to further investigate the presence of rhoticity in Australian English around the turn of the 20th century. Approximately 30 minutes of audio interview data from each speaker was examined impressionistically for the presence of non-prevocalic /r/. Other postvocalic instances of /r/ were also identified in order to explore the relationship between non-prevocalic /r/, linking /r/ and intrusive /r/. On re-examination, the three subjects from Trudgill and Gordon (2006) were found to exhibit little or no rhoticity according to our criteria. Analysis of the additional seven speakers further weakens the argument for rhoticity in Australia at the end of the nineteenth century. Some speakers do, however, have traces of rhoticity, and only one shows consistent use of linking /r/. In this paper, we will explore the phonetic conditioning environments for the vestigial rhoticity in historical Australian English and will discuss some implications for phonological theory.

1. Introduction

1.1. Background

In the dialects of English spoken in Ireland, Scotland and much of North America, speakers produce /r/ in coda positions in a phenomenon known as ‘rhoticity’. In the non-rhotic dialects of English spoken in much of England, Wales, Australia and New Zealand, this coda /r/ is typically only present before a vowel. The /r/ produced by non-rhotic speakers frequently links words, for example ‘near’ is pronounced without /r/ in ‘near the’ /nɪəðə/ but with /r/ in ‘near a’ /nɪərə/. This phenomenon is known as ‘linking /r/’ whether it occurs word internally or finally. In most non-rhotic dialects /r/ can also occur in the absence of orthographic ‘r’, in what is known as ‘intrusive /r/’ (or r-epenthesis), for example ‘law'r n order’ /ləʊrənɔːdər/. Intrusion is the ‘presence of a non-historical consonant between two heterosyllabic vowels’ (Gick 1999:20). In non-rhotic dialects, non-prevocalic /r/ is typically replaced by phonetic realisations such as vowel lengthening or offglide. For example, Mitchell and Delbridge (1965:38-39) describe Australian English (AusE) as a non-rhotic dialect containing the four centring diphthongs /ɪə, eə, ʊə, ɔə/. They comment that ‘in the pronunciation of some Australians the glide ... is very slight, with the result that the final [ə] sound is hardly heard. The effect is more of a pure vowel lengthened. The pronunciation often more closely resembles [ɪː, eː, ʊː] than [ɪə, eə, ɔə], as in *here* [hɪː], *clear* [klɪː], *fair* [fɛː], *chair* [tʃɛː], *four* [fɔː], *store* [stɔː]’. More recent work on AusE has reduced the inventory of centring diphthongs in AusE to just /ɪə, eə/ which have been

transcribed by Harrington et al. (1997) as /ɪə, eɪ/. However, the vowels /oɪ, ɛɪ, ɜɪ/ as well as /ɪə, eɪ/ may still be present before /r/ in linking environments.

There is some debate in the literature about the chronology of r-loss in English dialects. English colonisation of North America began with the Jamestown and Pilgrim's Plymouth colonies in 1607 and 1620 respectively. Australian colonisation began in 1788 and Great Britain took over the Cape of Good Hope colony in 1795. European settlement of New Zealand began in earnest after the country received dominion status in 1840 (Gordon et al. 2004). Given that much of the United States and Canada are today rhotic, while Australia, New Zealand and South Africa are today totally non-rhotic, the traditional view is that England, as the source of colonists, must have lost its rhoticity between the early 17th and late 18th centuries. McMahon (2000), however, argues that the loss of rhoticity began earlier, pointing out that the areas first settled in the United States (the south-east) are among those that are largely non-rhotic. On the other hand, there is substantial evidence that much of England was rhotic well into the mid-nineteenth century (Gordon et al. 2004; MacMahon 1999; Trudgill 2004).

If much of the UK was partially rhotic when Australia and New Zealand were colonised, then it follows that a substantial number of the colonists may have been rhotic. Evidence for this is provided by recent research on recordings of 59 New Zealanders born between 1850 and 1890 in which 95% of speakers were found to show some level of rhoticity (Trudgill 1999). Rhoticity levels as high as 56% within an individual were reported, although half showed less than 5% rhoticity and the older speakers were the most rhotic (Gordon et al. 2004), indicating that rhoticity was in steep decline. Gordon et al. (2004) also conducted a detailed examination of the phonetic and semantic environments in which rhoticity was most likely. The following five environments were found to support rhoticity:

Following segment: Following voiceless sounds were linked to increased rhoticity and following obstruents were somewhat associated with increased rhoticity, while following coronal sounds were linked to decreased rhoticity.

Preceding vowel: Preceding diphthongs were associated with increased rhoticity. /æɔ/ and /œe/ were noted as facilitating non-prevocalic /r/ and the long vowel, /ɜɪ/, is noted as preserving /r/ the longest.

Lexical stress: Lexical stress is reported to affect /r/, however they argue that the true pattern is concealed because other predictive factors of /r/ do not occur equally in stressed and unstressed syllables. This represents an area where further work is needed.

Prosodic boundaries: Non-prevocalic /r/ was most likely to appear at a word boundary and least likely to occur at a syllable boundary.

Semantic domain: Speakers showed increased rhoticity in words associated with farming and mining, and it is argued that these represent traditional activities that therefore condition a more 'old fashioned' pronunciation. It must, however be acknowledged that the differences are small

and at low levels of rhoticity, with the lowest rhoticity level being associated with the army (approximately 0.03%) and the highest with mining (approximately 0.8% rhoticity).

Trudgill and Gordon (2006) suggested that if New Zealand was partially rhotic during this period, then Australia could be expected to exhibit the same phenomenon. In order to test this hypothesis, they looked for direct evidence of rhoticity in historical AusE by examining recordings made in 1988 as part of the New South Wales Bicentennial Oral History Project. Interview data from six men and six women, who were all born between 1889 and 1899, was examined. They found that all the men exhibited some degree of rhoticity, while the women were all non-rhotic. Trudgill and Gordon (2006) interpret this as being a possible sign that women led the way in the process of rhoticity loss. This is a view that corresponds well with evidence that women generally lead language change at the conscious level (Labov 2001). The following table gives the biographical and rhoticity information that Trudgill and Gordon (2006) supply for their subjects. Mr. Golby's birth year was found to be incorrect in Trudgill and Gordon (2006) and has been corrected here.

Table 1. Rhoticity levels reported in historical AusE (adapted from Trudgill and Gordon 2006). Numbers in brackets are instances of rhoticity observed compared to potentially rhotic utterances.

Speaker	Birth year	Birth place	Rhoticity
G. Golby	1899	Dalgety	20% (49/240)
R. Green	1897	Guyra	8% (29/357)
A. Debenham	1897	Pampoolah	8% (34/395)
A. Richardson	1889	Sydney	4% (25/580)
A. Emblem	1897	Tamworth	4% (19/454)
D. Taylor	1891	Avalon	1% (8/557)

One curious pattern in this data is that the highest rates of rhoticity are seen in those born latest. If this data represents a period where the remaining rhoticity in AusE is being lost then one would expect rhoticity levels to be highest in the speakers born earliest. Trudgill and Gordon (2006) report that rhoticity occurred most often in the Australian data after /oɪ/ and /ə/. Rhoticity is also noted after /ɛɪ/ (as in 'start'), /ɪə/ (as in 'near'), /eɪ/ (as in 'square') and /ɜɪ/ (as in 'first'). They also found that several mining and farming terms were pronounced rhotically, but do not perform any detailed analysis of the frequency of rhoticity in 'old fashioned' words. No examination of linking or intrusive /r/ in historical AusE is carried out.

1.2. Rule-based and exemplar theories of rhoticity

The traditional phonological account of the loss of rhoticity and emergence of intrusive /r/ suggests that a ‘deletion rule’ developed, which caused speakers to weaken or remove /r/ except when it came before a vowel (Wells 1982). This weakening is referred to as r-vocalisation. In rule-based accounts, speakers would presumably store the word ‘sore’ underlyingly as /so:r/, but produce the surface realisation /so:z/ as a result of the deletion process which involves vocalisation and merger (Gick 1999). Future generations who do not have this underlying /r/ in their phonology, rather than employing a deletion rule, develop an ‘insertion rule’, storing ‘sore’ as /so:z/, with a rule that requires an /r/ to be inserted if the following segment is a vowel. Because these speakers now store ‘sore’ and ‘saw’ as /so:z/ the insertion rule is applied to both by analogy, leading to ‘sore elbow’ /so:zrelbəʊ/ and ‘saw Emily’ /so:zreməli:z/. A rule inversion is said to have occurred. Intrusive /r/ is described as ‘non-categorical’ as it does not occur perfectly consistently, varying according to speech rate, social situations, as well as exhibiting random fluctuation (Wells 1982).

Gick (1999) offers an alternative explanation for /r/ intrusion using an Articulatory Phonology framework. He argues that /r/ does remain underlyingly (lexically) present and that intrusion and linking are the same phenomena, resulting from final reduction and gestural timing processes. Hay and Sudbury (2005), also present evidence against rule inversion based on their analysis of the ONZE corpus and the finding that intrusive /r/ appears before rhoticity loss had been completed in New Zealand English (NZE). They suggest that speakers are unlikely to develop a rule requiring the insertion of /r/ if they still have an active rule for deleting it, and they argue that the transition to an r-less dialect is a long and complicated process, not simply a re-analysis. Instead, they propose that morphologically complex words occupy several ‘exemplar clouds’, for instance, one for ‘fear’ (without an /r/) and another for ‘fearing’ (with an /r/). These proposed exemplar clouds are marked for phonetic and contextual detail, and this explains the fact that in the New Zealand data words relating to ‘old time’ activities are more likely to show rhoticity (Gordon et al. 2004). Hay and Sudbury (2005) also found that linking /r/ levels declined alongside rhoticity levels, although at a far slower rate, before stabilising at a relatively high level and rising again after rhoticity loss was completed. Linking /r/ levels declined only in word-final position, remaining categorical word-internally.

Intrusive /r/ is used frequently in modern AusE (Cox & Palethorpe 2007), and is present in most modern non-rhotic English dialects (McMahon 2000), but its occurrence in late 19th century AusE is not discussed in Trudgill and Gordon's (2006) examination of historical data. They accept the rule inversion model, and use it to argue that even the 1% rhoticity observed in one of their speakers (Mr. Taylor) is highly significant. In this model Mr. Taylor is using a deletion rule to remove non-prevocalic /r/, marking a fundamental difference between his speech and that of modern, non-rhotic Australians who use an insertion rule to restore linking /r/ and add intrusive /r/. In this view rhoticity becomes something of a binary state, and one who is partially rhotic is still fundamentally rhotic. According to Trudgill and Gordon (2006) only a speaker who shows no rhoticity at all can be considered non-rhotic.

It is certainly statistically convenient to describe rhoticity as simply either present or absent, but this imposes a binary distinction on a continuum. Hay and Maclagan's (2006) analysis of intrusive /r/ in modern New Zealand English highlights the non-categorical nature of /r/ production. Their study found that New Zealanders from lower social groups were more likely to produce intrusive /r/, but also found that those people who were most likely to produce intrusive /r/ also produced it with greater levels of constriction (and a lower F3). If /r/ production is demonstrably variable in both the frequency and degree to which it is produced, then it cannot be considered a categorical phenomenon; asserting that there is a fundamental difference between a non-rhotic and minimally rhotic speaker appears to be an over simplification.

1.3. Aims

This paper is an attempt to replicate the findings of Trudgill and Gordon (2006) with a larger number of speakers covering a longer period of time, to establish whether it can be ascertained that AusE was once a rhotic dialect. Trudgill and Gordon's argument for the importance of even very low-level rhoticity rests on the rule inversion theory, in which partially rhotic speakers suppress non-prevocalic /r/ production with a deletion rule while non-rhotic speakers have 'inverted' this rule, inserting /r/ before a vowel. This theory will be tested by analysing the data to determine whether intrusive /r/ arose in AusE before rhoticity had disappeared. If this is found to be the case it would seem to undermine the rule inversion model by requiring the simultaneous use of apparently contradictory rules. If the rule inversion is rejected then Trudgill and Gordon's argument about the importance of very low-level rhoticity is substantially weakened, and it becomes an open question whether a 1% rhotic speaker could reasonably be described as non-rhotic.

2. Method

2.1. Data Collection

Data collection was guided by two goals:

1. To verify the levels of rhoticity observed by Trudgill and Gordon (2006). To this end the most rhotic of their speakers were obtained for re-analysis. They were reported as having rhoticity levels of 20%, 8% and 8%. All three were part of the New South Wales Bicentennial Oral History Project, held by the Mitchell Library in Sydney.
2. To expand the number of speakers and the time period examined. All six of Trudgill and Gordon's speakers would, together, cover a period of 10 years; from 1889 to 1899. Data from an additional seven speakers was selected from various sources, concentrating mainly on people born earlier, extending the range to 26 years, from 1873 to 1899. The speakers, their birth places, birth years and source of the recordings are listed in Table 2.

Table 2: List of speakers examined.

Designation	Born	Recorded	Place of birth	Collection
Speaker 1	1873	1953	Queensland	National Library of Australia, John Meredith
Speaker 2	1873	1962	Tasmania	National Library of Australia, Barry McDonald
Speaker 3	1875	1960	Melbourne	National Library of Australia, Norm O'Connor
Speaker 4	1878	1974	Cooee, Tasmania	National Library of Australia
Speaker 5	1880	1978	Gulgong, NSW	Private donation
Speaker 6	1884	1964	Wagga Wagga NSW	Alex Hood
Speaker 7	1885	1964	Tasmania	Alex Hood
Speaker 8	1897	1987	Pampoolah, NSW	NSW Bicentennial
Speaker 9	1897	1988	Guyra, NSW	NSW Bicentennial
Speaker 10	1899	1988	Dalgety, NSW	NSW Bicentennial

The use of older speakers to provide a picture of a changing language was pioneered by William Labov's (1963, 1966) work in Martha's Vineyard and New York City in the United States. The comparison of older and younger speakers to examine sound change is a methodology based on the apparent time hypothesis (Labov 2001). Research suggests that speakers' vernaculars do not stabilise until their late teens or early adulthood (Cukor-Avila 2000; Labov 2001). This means that the speakers analysed here probably represent the language norms predominant when they reached adulthood. There is evidence, however, that individuals' speech does not remain entirely stable through their adult lives. Harrington et al. (2000) compared the annual speeches of the Queen Elizabeth II in the 1950s with her speeches from the 1980s as well as the speech of female news presenters from the 1980s. Almost all the Queen's vowels showed movement in the same direction as changes documented in Standard British English. This research does not, however, present evidence of adults moving to closely match the accents of younger speakers. Apparent time analysis therefore appears to still present a valuable means of analysing vernaculars that are very close to those in use near the beginning of the twentieth century. Even if a person's accent changes throughout their lifetime, it will do so more slowly than changes occurring in the community through innovations in the younger generations, meaning that apparent time work will, at worst, underestimate the pace of language change.

2.2. Data processing

Orthographic transcripts for each speaker were created. The first 400 instances of orthographic ‘r’ were numbered in each transcript. This equated to roughly 30 minutes of recorded audio data for most of the speakers. Each word containing an ‘r’ was then listed as a potential instance of /r/. The recordings were played using Express Scribe (NCH Swift Sound) and the preceding and following vowels or consonants were noted for each potential ‘r’ using the Harrington et al. (1997) phonemic transcription system. When a potential /r/ was followed by a pause of 500 milliseconds or greater, these were noted as prepausal. Instances where the ‘r’ containing syllable was entirely elided were removed from the analysis, for example the pronunciation of ‘kangaroo’ as ‘kangoo’. The presence or absence of vowels either before or after the potential /r/ was noted as an aid to later manipulation of the data. Each instance was also marked as occurring word initially, word internally or word finally.

2.3. Isolation of potential rhoticity and linking /r/

An utterance is described as non-rhotic when ‘r’ is orthographically present but not pronounced in isolated, or citation, form. We isolated rhoticity using the following method. All instances of word-initial /r/ (as in ‘red’ and ‘ripe’), and /r/ in onset clusters (as in ‘string’ and ‘trap’) were removed. All words where the ‘r’ was both prevocalic and word-internal were also removed (for example ‘Sharon’) as these instances of /r/ are obligatory in both rhotic and non-rhotic dialects. These deletions reduced the total number of utterances examined by about 25% for each speaker. This left the environments where orthographic ‘r’ was non-prevocalic and either word-internal (as in ‘arm’) or word-final (as in ‘are’). The reduced data set also included environments where orthographic ‘r’ was both word-final and prevocalic, as in ‘sore elbow’ (i.e. prevocalic coda position). In a modern, non-rhotic speaker of AusE we would expect to find /r/ in this environment, demonstrating linking /r/. We would also expect /r/ to be consistently absent word internally before consonants (as in ‘ark’) and word finally before both pauses and consonants (as in ‘four’ and ‘our time’). If Trudgill and Gordon’s (2006) findings are corroborated, we would still expect the speakers to observe this pattern, but with a significant number of instances of /r/ word-internally before a consonant (‘form’) or word finally before a pause or consonant (‘four’ and ‘four months’).

2.4. Analysis of rhoticity and /r/ sandhi

An initial impressionistic analysis was made of every word in the reduced data set, noting for each whether consonantal /r/ was actually produced. Allophones of /r/ were not distinguished and recorded in this analysis (alveolar approximants were overwhelmingly dominant, although some speakers did produce alveolar taps). Based on this impressionistic survey, instances of potential /r/ were divided into two groups. The first group was made up of all those utterances where the speaker displayed either non-rhoticity or linking /r/, as would be expected of a modern Australian speaker, given the phonetic environment. The second group was made up of any instances where the subject departed from this behaviour, producing /r/ before a consonant or pause, or failing to produce linking /r/ word-finally before a vowel. All utterances in this second category were examined acoustically using wideband spectrograms in the Emu speech

annotation tools (Cassidy & Harrington 2001, <http://emu.sourceforge.net/>) to verify the presence of the characteristic low third formant (F3) for /r/ sounds (Ladefoged & Maddieson 1996). Each absent linking /r/ or instance of rhoticity before a consonant or pause was referred to the second author for impressionistic and acoustic verification. Disagreements were discussed and agreement reached on all occurrences. Unfortunately the age of the material had, in some cases reduced the quality of the recordings and made some acoustic judgements difficult. In approximately 16% of instances impressionistic analysis alone was used. After the presence of rhoticity was confirmed, all instances of potential /r/ in the same phonetic environment were examined acoustically to reduce the risk of failing to detect rhoticity.

For each speaker the number of instances of orthographic 'r' in non-prevocalic, word-internal or word-final position was totalled and taken to be the number of possible environments for rhoticity. The number of occasions where that speaker produced rhoticity was then used to calculate their percentage of rhoticity. Trudgill and Gordon (2006) do not detail the process by which they calculated rhoticity levels, so it is unclear whether they used a similar approach. The number of instances of orthographic 'r' in word-final prevocalic position was also totalled for each speaker and taken to be the number of possible environments for linking /r/. Linking /r/ usage rates were then calculated in a similar manner to rhoticity. On a few occasions, instances of rhoticity or absent linking /r/ were excluded from the statistics due to the occurrence of 'anticipatory' rhoticity or absent linking /r/. Speakers who repeated a word in error occasionally applied or did not apply linking /r/ identically for both instances of the word. This resulted in rhoticity in the first word of 'before before ever' /bəfo:rbəfo:revə/ and absent linking /r/ in the first word of 'ever ever Jimmy' /evəevədʒɪmi:z/. The speakers were using linking /r/ (or not) based on the beginning of the next 'intended' word. This behaviour provides an interesting glimpse of the motor planning process, in which the necessary articulatory gestures are anticipated and prepared for. This phenomenon did not occur often, but has the potential to warp the results if not removed from the data.

It will be noted that this process does not provide a systematic search for instances of intrusive /r/. Each speaker's audio was carefully and repeatedly listened to. Intrusive /r/ was noted and its environment analysed, but no attempt was made to chart the number of potential environments for it, and findings on intrusive /r/ will consequently be less detailed and conclusive.

3. Results

3.1. Rhoticity

The expanded data set did uncover some relatively isolated evidence of rhoticity. Of the ten speakers born between 1875 and 1899, only three display any rhoticity (see Figure 1). Speaker 1 exhibits a rhoticity level of 16.45%. Two other speakers showed rhoticity levels of 2.27% (Speaker 5) and 1.02% (Speaker 8, who produces only two rhotic utterances) of the potential rhotic environments. The first speaker's level of rhoticity is far greater than any other speaker, and it occurs after a far greater range of vowels than the other two slightly rhotic speakers (see

Table 5). This makes it difficult to draw large conclusions from the data, especially when it is noted that Speaker 2 was born in the same year as Speaker 1 and was totally non-rhotic.

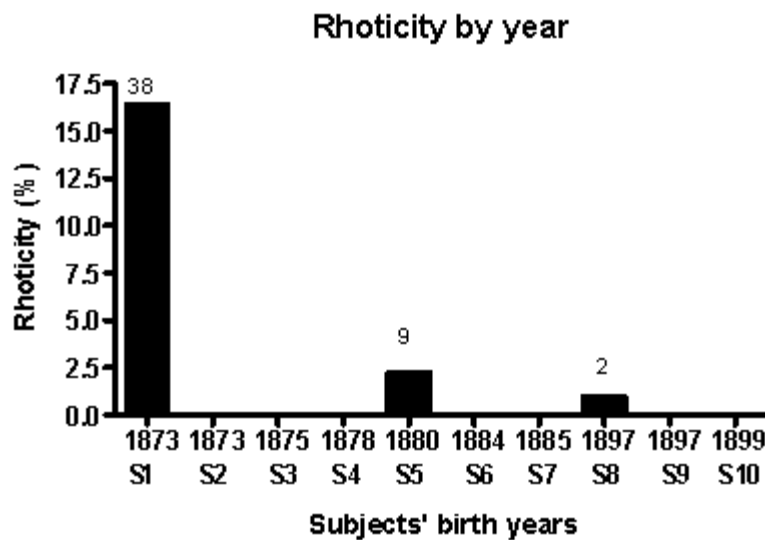


Figure 1: Percentage of rhoticity that occurs in potentially rhotic environments in expanded data sets. Numbers above bars indicate the number of rhotic utterances discovered for each speaker.

3.2. Preceding vowel effects

As detailed above, Trudgill and Gordon (2006) found that rhoticity was more likely in historical AusE after /o:/ and /ə/. In historical New Zealand English both the preceding vowel and following segment were found to have significant effects on the frequency of rhoticity. Preceding vowels and following segments were therefore analysed to examine similar effects, and rhoticity was indeed found to be more common (for some speakers) after particular vowels, as shown in Figure 2 below.

For Speaker 1, preceding long monophthongs clearly favour rhoticity, as is suggested by Trudgill and Gordon (2006). Speaker 5 also appears to show a trend in this direction, but in Speaker 8 there are too few instances of rhoticity to draw conclusions. Trudgill and Gordon's (2006) finding that preceding /ə/ favours rhoticity is not supported. The results obtained also fail to mirror Gordon et al's (2004) finding in New Zealand data that preceding diphthongs favour the production of non-prevocalic /r/. There was no phonetic environment in which rhoticity was produced consistently by any speaker, although in potentially rhotic environments after /ɜ:/ Speaker 1 produces rhoticity 45.45% of the time. Trudgill and Gordon (2006) found rhoticity after /Iə/ in their Australian data, but this diphthong precedes non-prevocalic /r/ only once in the data analysed here, in the most rhotic subject (Speaker 1). Table 3 below summarises the environments preceding non-prevocalic /r/ for Speaker 1.

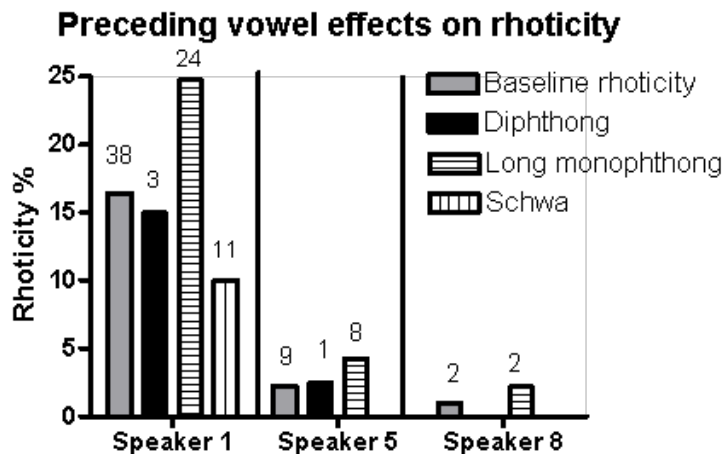


Figure 2: Vestigially rhotic speakers' overall rhoticity levels compared to the percentage of rhoticity after certain vowels. Numbers above the bars indicate the total rhotic utterances discovered for each speaker after each kind of vowel. The first bar gives the speakers' overall rhoticity levels.

Table 3: Frequency with which Speaker 1 produced rhoticity after various vowels.

Preceding vowel	Rhoticity	%
/ɜɪ/	15/33	45.45
/eɪ/	7/25	8
/ə/	11/110	10
/oɪ/	2/23	8.7
/ɪə/	1/16	6.25

3.3. Following context effects

For most of the partially rhotic speakers, following voiceless sounds and obstruents are associated with higher levels of rhoticity. This means, for example, that while Speaker 1 produces non-prevocalic /r/ 16.45% of the time overall, before a voiceless sound he produces non-prevocalic /r/ 22% of the time. Increased rhoticity before voiceless sounds and obstruents is seen very clearly for Speaker 1 (see Figure 3), with a trend in the same direction in Speaker 8. Speaker 5's data is less clear, with a slight reduction in rhoticity levels for obstruents that may be a result of random variation. These results mirror findings from Gordon et al. (2004) for New Zealand.

Gordon et al (2004) also found that following coronal consonants decreased the likelihood of rhoticity being produced, a finding which is not mirrored in this data. Speaker 1, 5 and 8 all

produce above-baseline levels of rhoticity before coronal sounds (See Figure 5). This reversal is most profound for Speaker 5, but may be a consequence of a lexical effect, as all three occurrences are forms of the word ‘horse’, the most frequently rhotic word in Trudgill and Gordon’s (2006) data. This evidence of semantic influence on rhoticity is very isolated in the data however, with no other evidence found of an association between ‘old-fashioned’ terms and increased rhoticity. Speakers were, in fact, found to alternate between /r/-less and /r/-full realisations of the same word, as illustrated by Table 4:

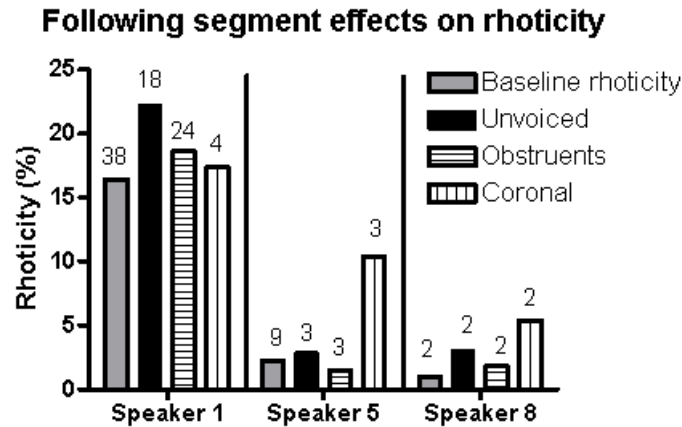


Figure 3: Vestigially rhotic speakers’ overall rhoticity levels (baseline rhoticity) compared to the % of rhoticity before certain segments. Numbers above the bars indicate the total number of rhotic utterances before each kind of segment. The first bar gives speakers’ overall rhoticity levels. Please note that these categories are not mutually exclusive. /s/, for example, is both coronal and unvoiced.

Table 4: Potentially rhotic environments after /ɜ:/ in Speaker 1.

Environment	Rhotic	Non-rhotic
ɜ:d	heard	heard
		word (x3)
ɜ:n	McInnerny	burn (x2)
ɜ:nd	turned (x3)	turned
ɜ:st	first (x5)	first(x3)
ɜ:t	thirty (x3)	thirty (x2)
		your (followed by /t/ and pronounced /jɜ:t/)

3.4. Linking /r/

Linking /r/ is used 100% of the time only by Speaker 2, but generally remains at high levels, with little evidence that any preceding vowels are strongly associated with absent linking /r/. The most notable exception to both these statements is Speaker 4, who produces linking /r/ only 61.11% of the time, but who never fails to produce linking /r/ after any vowel other than /ə/ (see Table 5).

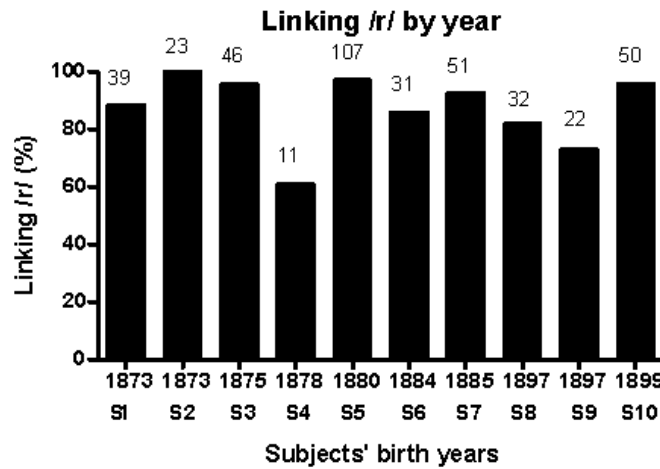


Figure 4: Percentage of linking /r/ levels by birth year. Numbers above the bars show the number of instances of linking /r/ for each speaker.

Table 5: Summary of findings.

Speaker	Rhoticity rates & environments		Linking /r/ rates & absent environments		Intrusive /r/ instances & environments	
		oɪ Iə eɪ æɔ ɒeə ʒɪ				
S1	16.45%		88.64%	ə aɪ oɪ	0	
S2	0.00%		100.00%		0	
S3	0.00%		95.83%	ə eɪ	0	
S4	0.00%		61.11%	ə	0	
S5	2.27%	oɪ ɒe ʒɪ	97.27%	ə	6	ə oɪ
S6	0.00%		86.11%	ə eɪ	1	ə
S7	0.00%		92.73%	ə eɪ Iə	0	
S8	1.02%	oɪ	82.05%	ə eɪ Iə	0	
S9	0.00%		73.33%	ə eɪ ɔ	0	
S10	0.00%		96.15%	ə eɪ	1	iə

3.5. Intrusive /r/

Intrusive /r/ appeared extremely infrequently in the early Australian data, appearing eight times in the entire data set analysed. Six of these occurrences are produced by Speaker 5 who was

found to be 2.27% rhotic, while one each are produced by Speakers 6 and 10 who both display no rhoticity. Speaker 5 is therefore both vestigially rhotic and by far the heaviest user of intrusive /r/, supporting Hay and Sudbury's argument that intrusive /r/ appeared before the process of rhoticity loss was completed. There is a possibility of lexical influence with the intrusive /r/ that does exist. Five of Speaker 5's instances of intrusive /r/ come at the end of 'saw'. His other instance is in a placename: 'Calcutta Harbour' /kælkʌtəɹɪbə/. The only use of intrusive /r/ made by Speaker 6 occurs in the placename, 'Wagga here' /wɔgəɹɪə/ and Speaker 10 used it in 'idea of' /ædɪəɹəv/. The extreme scarcity of intrusive /r/ precludes any conclusions in this regard, however.

4. Discussion

Re-analysis of the three most rhotic speakers listed in Trudgill and Gordon (2006) uncovered very little rhoticity. The rhoticity level of Mr. Golby (Speaker 10) was revised from 20% to 0% (0/229 potential environments) and Mr. Green (Speaker 9) was lowered from 8% to 0% rhoticity (0/201 potential environments). Only Mr. Debenham (Speaker 8) showed some (low-level) rhoticity, but dropped from 8% to 1.02% (2/196 potential environments). Trudgill and Gordon (2006:240) note that the rhoticity of non-prevocalic /r/ they observed tended to be phonetically weaker than prevocalic /r/ in the data, and also weaker than non-prevocalic /r/ in fully rhotic speakers. These results are predicted by Gick's (1999) Articulatory Phonology model which proposes that surface nonprevocalic /r/ is reduced in these contexts. Given that /r/ production is a continuum from extremely weak to strong, it is entirely possible that in this paper we set the threshold for the acceptance of /r/ presence at a different level, noting as non-rhotic some utterances that might possibly have been judged to be rhotic by Trudgill and Gordon (2006). We did find that offglides to schwa were frequently encountered in potentially rhotic environments, which is presumably a consequence of /r/ vocalisation. This phenomenon lacks the characteristic F3 drop of /r/, but may have been treated as an allophone of /r/ by Trudgill and Gordon (2006). It is also possible that the anticipatory linking /r/ discussed above may have been included in their tally of rhoticity. Recent studies have shown that trained listeners vary considerably on judgements of rhoticity (Plus & Ogden 2003) which are influenced by both listener's expectations and acoustic characteristics (Yaeger-Dror, Kendall, Foulkes, Watt, Oddie, Harrison, & Kavanaugh 2008). Further studies of historical rhoticity must therefore employ objective acoustic techniques in order to avoid the problems associated with impressionist analyses alone.

The small number of speakers showing low levels of rhoticity made it impossible to examine many of the patterns of rhoticity observed by Gordon et al. (2004), although rhoticity was found to occur more often after long monophthongs, particularly /ɔ:/, and there was some indication that rhoticity was also more likely before unvoiced consonants, supporting their findings. Trudgill and Gordon's (2006) analysis of AusE found that the most common environments for rhoticity were a preceding /ɔ:/ or /ə/, and they state that this is contrary to other vestigially rhotic dialects of New Zealand and England where /ɜ:/ is the most common conditioning environment. We have found that while the highest levels of rhoticity occur are after /ɜ:/ in our data, the only vowel to precede rhoticity in all three vestigially rhotic speakers is /ɔ:/. This may suggest that preceding /ɔ:/ was the last environment in which rhoticity was found in AusE although this

occurred often in the word ‘horse’, as previously mentioned. While Speaker 1 is far more likely to display rhoticity after /ɜ:/ than in any other environment, he still does so on a minority of occasions. One would expect that if this speaker had developed a rule ‘delete /r/, except after /ɜ:/ or before a vowel’, then he would apply this rule in a majority of instances, if not consistently. His failure to do so weakens the rule inversion model.

If AusE was once (somewhat) rhotic, then the speakers analysed here grew up after the shift to non-rhoticity was almost complete. If it is assumed that in AusE, as in NZE (Hay & Sudbury 2005), rhoticity loss was associated with temporarily reduced levels of linking /r/ usage, then the lower levels of linking /r/ observed for some speakers here may be indirect evidence of recently lost rhoticity. However, the isolated and low-level rhoticity found in the Australian data means that no correlation could be found between rhoticity and linking /r/ levels and there is no direct evidence to support this conclusion. Indeed, if linking /r/ was recovering after rhoticity was lost then one would expect the lowest linking /r/ levels in the earliest speakers and the highest levels in the latest speakers, but instead we see apparently random variation, as illustrated by Figure 2. Furthermore, there is no evidence that this kind of non-categorical linking /r/ production is not perfectly typical in AusE, then and now.

There was little evidence that ‘old-fashioned terms’ are associated with increased rhoticity, undermining the exemplar model, although Speaker 5 did pronounce ‘horse’ rhotically several times. This is noted by Trudgill and Gordon (2006) as being the most frequently rhotic word in their data. It should also be noted that speakers sometimes alternated between rhotic and non-rhotic pronunciations of the same word.

5. Conclusion

Speakers previously reported to have rhoticity levels as high as 20%, were found to be totally non-rhotic according to our criteria and only one speaker, born significantly earlier than those examined by Trudgill and Gordon (2006), was found to possess anything approaching 20% rhoticity (16.45%). Unfortunately, a birth certificate could not be obtained for this speaker to verify his place of birth, although he refers to his early childhood in Australia and describes the non-native born disparagingly as ‘new chums’. This confirms that at least his linguistically impressionable years were spent in this country, however, caution is warranted. The total lack of rhoticity in most of this speaker's peers makes it very difficult to draw any valid conclusions based on his (partial) rhoticity, but it is entirely possible that he simply had an atypically conservative dialect. Some (extremely low-level) rhoticity does occur in other speakers, however, and it is therefore indisputable that some Australian-born men displayed some rhoticity during the period covered in this paper. Whether this suggests that AusE was once rhotic is highly speculative and we reserve judgement on this issue pending further investigation.

This paper argues that Trudgill and Gordon's (2006) contention that ‘1% rhoticity is still most definitely rhotic’ is not supported by any strong evidence. The argument for the significance of low-level rhoticity is rooted in the rule inversion model, which creates a fundamental linguistic division between a generation of (vestigially) rhotic speakers (who have an active deletion rule)

and a following generation of non-rhotic speakers (who have an insertion rule). If this model is rejected, then there is no need to conclude that a totally non-rhotic speaker has a fundamentally different phonotactic system to one who says 'horse' rhotically half the time. They simply occupy different points on a continuum, supporting Gick's (1999) notion that gestural reduction and timing processes could be responsible for variable realisation. The question of whether AusE was ever rhotic therefore depends on where one arbitrarily sets the boundary for a significant level of rhoticity. It does appear that the process of rhoticity loss was not entirely completed when the country was colonised, but there is no evidence that Australia was ever 'rhotic' in any real, substantial sense. In order to make that claim, one would need to verify higher levels of rhoticity, or at least more widespread low-level rhoticity in older recordings. Unfortunately the scarcity of the available material severely limits further research.

Another technique for indirectly confirming substantial levels of rhoticity in early AusE is to further investigate levels of linking /r/ production. If it were found that speakers who grew up in the early 20th century used linking /r/ far more consistently than those who grew up at the end of the 19th century, then this might provide evidence that linking /r/ was rising after the loss of rhoticity was completed. If, on the other hand, speakers born later (including modern speakers) continue to produce inconsistent linking /r/ then this would suggest that linking /r/ is simply a feature of this non-rhotic dialect and has no verifiable relationship with the loss of rhoticity.

While this paper offers some objections to the rule inversion theory we have not been able to evaluate many of the predictions of exemplar theory, chiefly because the small number of rhotic utterances made statistical analysis impossible. This problem cannot be addressed without older, more rhotic recordings, which are not currently known to exist.

¹ The phonemic symbols used throughout this paper are those suggested by Harrington, Cox and Evans (1997) for Australian English.

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