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A Transatlantic Cross-Dialectal Comparison of Non-Prevocalic /r/

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Abstract
The presence or absence of non-prevocalic /r/, also known as rhoticity, has been frequently examined in studies of language variation and change with some varieties gaining rhoticity e.g., New England (Nagy and Irwin 2010), New York (Becker 2009) and the Southern United States (e.g., Feagin 1990) and others losing it e.g., southwest England. However, there have been few attempts to look at the linguistic constraints on non-prevocalic /r/ use cross-dialectally. This paper attempts to do this, introducing new data from the southwest of England, to see to what extent the linguistic constraints on /r/ use can be said to be universal and to see whether they are the same in varieties gaining and losing rhoticity. Do those dialects losing rhoticity follow the same linguistic path as those gaining it? If so, are the linguistic constraints which most strongly favour /r/-loss in southwest England the same ones that promote the acquisition of /r/ in the US? Taking Nagy and Irwin (2010), as a point of comparison this paper examines the paths of change and finds that there are commonalities in the environments most promoting of /r/ regardless of whether the variety is losing or gaining rhoticity. This paper also shows the steep decline in non-prevocalic /r/ use in both real and apparent time and provides a multivariate analysis of the linguistics constraints of this change.

A Transatlantic Cross-Dialectal Comparison of Non-Prevocalic /r/

Caroline Piercy*

1 Introduction

Non-prevocalic /r/ use "is generally considered one of the major features distinguishing varieties of the English speaking world" (Schneider 2004:1126); it refers to the presence or absence of /r/ in non-prevocalic environments, for example, *Star Wars* as either (1) where non-prevocalic /r/ is present or (2) where non-prevocalic /r/ is absent. The terms rhotic and non-rhotic are used to refer to (1) and (2) respectively.

(1) [stɑɹ wɔɹz]
(2) [stɑ: wɔ:z]

General descriptions of national accents vary according to whether non-prevocalic /r/ is present or absent. For example, non-prevocalic /r/ is present in Standard American Pronunciation (Kretzschmar 2004), Scottish English (Stuart-Smith 2004), Irish English (Hickey 2004), and Canadian English (Boberg 2004), but absent in Australian English (Horvath 2004), New Zealand English (Bauer and Warren 2004), and in England in the reference accent Received Pronunciation (Upton 2004). Indeed, except for a small area of Lancashire and the southwest of England, all accents of English in England are described as non-rhotic (Hughes and Trudgill 1996:59). The manner in which non-prevocalic /r/ came to be distributed as it is across different varieties of English is beyond the scope of this paper (for an overview see Gordon et al. 2004:171–176), however of importance are those dialects where change in the use of non-prevocalic /r/ is still ongoing. For example, despite assertions such as that of Wells (1982:340) that rhoticity is "the best known phonetic characteristic of the West of England," all recent reports from studies conducted there (e.g., Sullivan 1992, Williams 1991) suggest that rhoticity is in decline. In other regions, such as New England and New York the opposite process is occurring and former non-rhotic accents are becoming rhotic.

Since the earliest days of sociolinguistics it has been shown that variation in the presence or absence of non-prevocalic /r/ can index social meanings related to, for example, age, socioeconomic class, and attention paid to speech (Labov 1966, Levine and Crockett 1966). However, despite this interest in rhoticity, few studies have looked in detail at the linguistic constraints of /r/ use. Recent exceptions are the work of Nagy and Irwin (2010) and Becker (2009) who examined both the social and linguistic constraints on /r/ use in Boston, New Hampshire, and New York. In southwest England there have not been, to my knowledge, any multivariate analyses examining the linguistic constraints of /r/ loss. Therefore, the first aim of this paper is to provide an account of /r/ loss in a representative dialect of southwest England and for the first time to conduct a multivariate analysis to examine the linguistic constraints on this change. With this completed it is possible to ask an intriguing question; using Nagy and Irwin (2010) as a point of comparison it is possible to examine whether dialects losing rhoticity, such as those in southwest England, follow the same linguistic path as those gaining it, such as those in New England. Are the linguistic constraints which most strongly favor /r/-loss in southwest England the same ones that promote the acquisition of /r/ in the US?

2 Methodology

2.1 Data Collection

The data comes from Dorset, a county physically and dialectologically (Trudgill 1999:66, Wells

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1982:335) in the southwest of England—a region known colloquially as the West Country. For the present study speakers were not drawn from one specific location but come broadly from mid-southern Dorset, including the market towns of Dorchester and Wareham and their hinterlands. This region avoids the more urban areas to the east of the county where the towns of Bournemouth and Poole are located. It also avoids the far west, less populated areas of the county bordered by the more westerly counties of Devon and Somerset. Aside from geographical location, participants were only included in the study if they were born in Dorset, or moved there very young, and had not lived elsewhere during their lifetimes.

All the data come from typical sociolinguistic interviews where informal casual speech was favored over providing answers to batteries of questions. However, topics that featured in most interviews were life stories including growing up in Dorset and how it might have changed over time. The interviews lasted on average 45 minutes and were recorded to a solid-state digital recorder using lavaliere microphones. The data was collected from 2007–2008.

2.2 Sample

In total 24 speakers were analyzed: 12 male and 12 female with an age range of 14–83 years. Within this range speakers can be assigned to three broad age groups, *young* aged 14–29, *middle* aged 30–64, and *retired* aged 65 and above. In each group there are four speakers in each cell for both sexes. The distribution of the ages by speaker sex is shown in Table 1.

	Male	Female
N	12	12
Average age	49.25	46.25
Youngest	14	14
Oldest	80	83
Young 14-29	4	4
Middle 30-64	4	4
Retired 65+	4	4

Table 1: Stratification of the sample by speaker sex and speaker age.

2.3 Data Analysis

The first ten minutes of each recording were omitted to allow speakers to settle into conversational speech before analysis began. For each speaker the next 200 tokens of potential non-prevocalic /r/ were analyzed. This includes all environments where a non-prevocalic /r/ occurs historically including word medially (e.g., *cart*) and word finally (e.g., *car*). This was not possible for two younger speakers who provided a total of 167 and 144 tokens respectively. This gave a total of 4711 tokens of potential non-prevocalic /r/ from the 24-speaker sample. Tokens were omitted when a potential word final /r/ was followed by an initial /r/ in the following word, as in (3), as in these environments it may be impossible to tell whether any /r/ that is produced is word final, word initial or both. Tokens were also omitted if they were not amenable to analysis due to being inaudible or obscured by noises or by two or more people speaking simultaneously. Environments where a potential word final token of /r/ was followed by a vowel word initially, as in (4) were at first excluded from the analysis since this is the environment in which so-called linking /r/ can occur.

(3) car radio
(4) car alarm

Linking /r/ is a sandhi phenomenon in which word final /r/ can occur in otherwise non-rhotic speech. It is therefore important to distinguish this linking realization of /r/ from /r/ in non-prevocalic environments which might be termed true rhoticity. However, since this prevocalic environment has been included in recent studies of varieties gaining rhoticity such as Nagy and Irwin (2010) and Becker (2009) and /r/ presence has been shown to be variable in this environ-

ment, a second analysis was conducted of /r/ in this linking environment. The first 50 tokens were extracted and coded for each speaker where possible; 7 of the 24 speakers had less than 50 tokens in this linking environment. In total there were 1070 tokens of linking /r/, an average of 45 per speaker.

For each token, the presence or absence of /r/ was determined by auditory analysis, a method common to most previous studies of this variable (e.g., Nagy and Irwin 2010, Becker 2009, Hay and Sudbury 2005, Labov, Ash, and Boberg 2005, Feagin 1990). To assess the consistency of this approach a second examination of the tokens was undertaken. A random sample of ten tokens for each speaker was coded a second time after an interval of twelve months. In total, 240 tokens, representing around 5% of the corpus were sampled, recoded and compared with the original analysis. It was found that 222/240 tokens were coded consistently on both occasions indicating a very good reliability (K = .82). The 7% disagreement is presented as a confidence interval in Figure 1.

3 Results

3.1 The Loss of Non-Prevocalic /r/ in Dorset

As expected, the overall results show a decline in the use of rhoticity over time. The average rhoticity of the 24-speaker sample was 29%; the range was 0–91%. There were no categorically rhotic speakers though there were however, eleven categorically non-rhotic speakers. The striking change from rhoticity to non-rhoticity can be observed in Figure 1, which shows the results for the three age groups of the present study alongside a real time point of comparison from the Survey of English Dialects (SED hereafter). The SED (Orton and Wakelin 1967) shows almost categorical rhoticity for the five locations surveyed in Dorset. The realizations of all answers given across the nine books of questions show that just 48/1642 tokens were non-rhotic giving an overall level of rhoticity of 97% (Piercy 2006:11). The drop from 97% rhoticity in the SED to 29% rhoticity in the present study shows real time change in the use of non-prevocalic /r/. In apparent time there is a strong and significant correlation of age and rhoticity ($r^2 = .71$, $p < .0001$): as age decreases the use of non-prevocalic /r/ decreases. Figure 1 also shows that this change from rhotic to non-rhotic can be said to be complete for the youngest generation of speakers. This suggests that our understanding of the distribution of rhoticity in southwest England, for the youngest speakers at least, needs to be reconsidered.

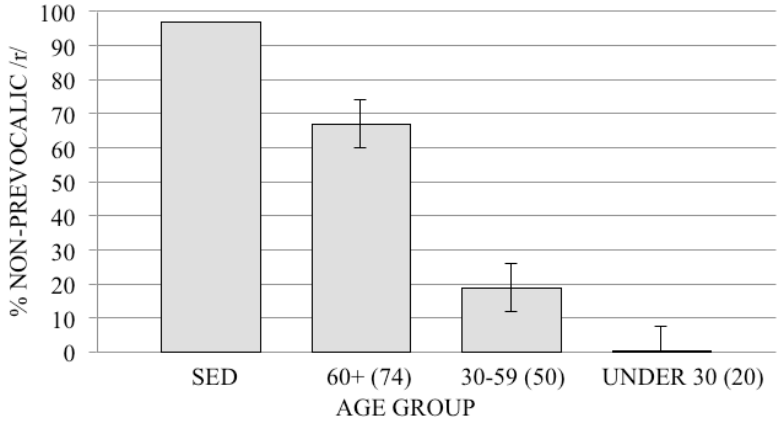

Figure 1: Showing the decline in rhoticity in real and apparent time. The figure in brackets indicates the mean age of each age group. N from left to right = 1642, 1600, 1600, 1381.

However, for linking /r/ the trend is very different. Figure 2 shows that all speakers, regardless of age, use linking /r/ and use it variably. The average percentage use of linking /r/ for the 24-speaker sample was 71%; the range was 40–90%. For linking /r/ a much weaker correlation exists with age ($r^2 = .21$, $p = .02$) though in the same direction. This demonstrates that on average all

speakers use more linking /r/ than non-prevocalic /r/ but that /r/ presence is still variable in this environment. Even speakers who use very low levels of rhoticity, for example, Callum, Christopher and Carl use high levels of linking /r/. This strongly suggests that linking /r/ may be a different phenomenon than rhoticity. Therefore, those speakers that used only linking /r/ have been removed from subsequent statistical analyses. This leaves a total of twelve speakers who are variably rhotic with Bridget, a 20 year old speaker who had only 2/200 tokens of non-prevocalic /r/ (1% rhotic), also excluded at this stage. The data from these variably rhotic speakers provides the perfect opportunity to examine the change from rhotic to non-rhotic and any significant constraints on that change.

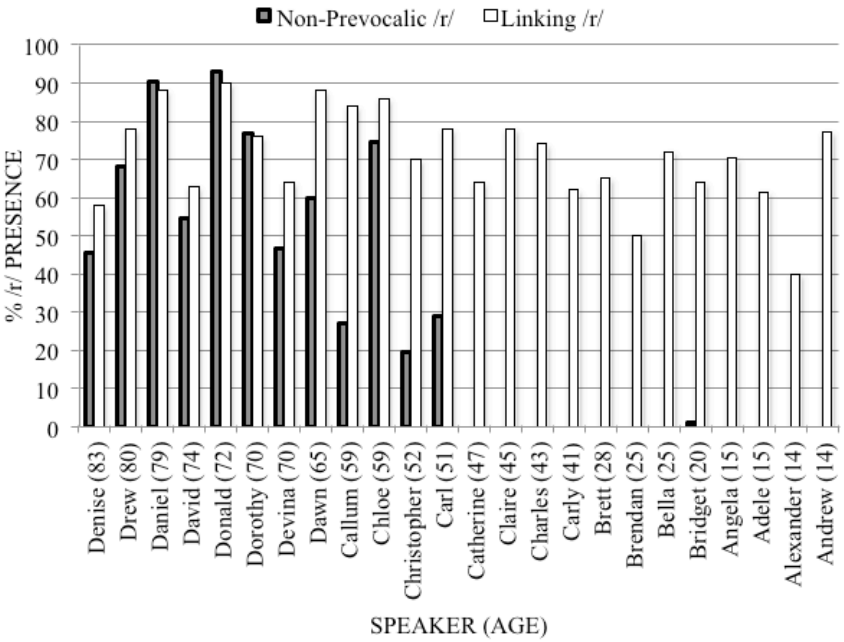

Figure 2: Percentage /r/ presence in non-prevocalic and linking environments by individual speaker. Age decreases along the x-axis. Non-prevocalic /r/: N=4711, correlated with age: $r^2 = .71$, $p < .0001$. Linking /r/: N=1070, correlated with age $r^2 = .21$, $p = .02$.

3.2 Linguistic Constraints on /r/ Loss

Alongside the presence or absence of rhoticity, each token was coded for speaker sex and age, as well as the following linguistic constraints, which are summarized with examples in Table 2:

Preceding vowel: The quality of the preceding vowel was coded using the citation form from Wells' lexical sets (Wells 1982). This approach was taken, rather than a fine-grained analysis of actual realization, in line with many previous studies and to ensure comparability across the different speakers. The word *our* was coded as START [aː(r)]. Tokens realized as unstressed for example, *your* [jəˠ] and *were* [wəˠ], were coded under the full form of the vowel that is, CURE and NURSE but coded as unstressed under a separate linguistic constraint. Vowels that are always realized as unstressed for example, *backward* were coded as schwa. There were a total of 40 tokens with a preceding /aɪ/ or /aʊ/, for example *fire* and *hour.* An auditory analysis of these tokens revealed that all but one were realized with a bisyllabic pronunciation, without any smoothing of the triphthong. Due to the small number of these tokens they were therefore coded as LETTER. The quality of a preceding NEAR vowel was variable. It was most commonly realized with a bisyllabic or diphthongal pronunciation [ɪə] even when an /r/ was present though sometimes the off-glide was very slight. Barras (2010:175), studying Lancashire in Northern England, also found that a diphthongal pronunciation of NEAR was possible with a following rhotic. There were however stressed monophthongal realizations [ɪː] or [ɜː] as well as unstressed monophthongal [ə] in

fast connected speech.

Word context: The position of the /r/ within the word was coded following Nagy and Irwin (2010) to allow direct comparison with their study. Tokens were coded as morpheme final, word final, or morpheme internal and by their following environment, consonant, vowel, or pause. This allows the difference between plurals (e.g., *walkers*) and truly word internal environments (e.g., *church*) to be explored.

Lexical frequency: Each token was coded for lexical frequency based on its number of occurrences in a larger corpus of Dorset English. This corpus encompasses transcriptions of the speech of 46 speakers from Dorset from sociolinguistic interviews and totals 276,721 words. Raw word frequencies have been transformed before being used in the regression since they were shown to have a non-normal distribution with a positive skew by a Kolmogorov-Smirnov test of normality due to many different low frequency items. It was found that a square root transformation worked well to distribute these less frequent tokens.

Word stress: Tokens were coded as being realized as either stressed or unstressed. This was based on the actual realization of each token not the citation form, therefore a word like *for* could be realized as stressed [fɔ:(r)] or unstressed [fə(r)].

Word class: Tokens were coded as being content words or function words. Content words included verbs, nouns, adverbs and adjectives, and function words included all other parts of speech.

Factor Group	Factors	Example
Preceding Vowel	CURE	*cure, poor*
	NORTH, FORCE	*fourteen, lord*
	NEAR	*near, year*
	NURSE	*nurse, bird*
	LETTER	*letter, forward*
	SQUARE	*square, where*
	START	*start, arm*
Word Context	Word final_V	*door opener*
	Word final _C	*door stop*
	Word final_pause	*door*
	Morpheme final_heterosyllable C	*nearly*
	Morpheme final_tautosyllabic C	*doors*
	Morpheme internal_C in same or next syllable	*world*
Lexical Frequency	Continuous variable: square root lexical frequency/per million words	low frequency: *uproar* 4
		median frequency: *born* 470
		mean frequency: *they're* 1991
		high frequency: *there* 10,906
Stress	Stressed	*heard*
	Unstressed	*letter, for*
Word Class	Content	*card*
	Function	*for*
Speaker age	Continuous variable in years old	*14–83*
Speaker sex	Male	-
	Female	-

Table 2: Summary of linguistic and social constraints.

After each token had been coded these data were analyzed by mixed model logistic regression in R using Rbrul (Johnson 2009, 2011). In the present study, individual speaker variation is included as a random effect. The dependent variable was chosen to be the presence of rhoticity de-

spite the fact that non-rhoticity is the incoming feature. Presenting the variable in this way allows direct comparison with varieties gaining rhoticity in the US. The results of the logistic regression are shown in Table 3.

Dependent variable = *presence of /r/* N = 2978 Grand mean = 61%		Deviance: 2954 Degrees of freedom: 15			
Factor Groups	Factors	Log Odds	Factor Weight	N	% *Rhotic*
Preceding Vowel	NURSE	1.13	.76	409	81
	NEAR	0.32	.58	251	70
	START	0.28	.57	291	76
	LETTER	-0.01	.50	816	63
	CURE	-0.36	.41	92	45
	SQUARE	-0.57	.36	513	47
	NORTH, FORCE	-0.78	.31	606	47
Word Context	Word final_V	1.36	.80	579	77
	Word final_pause	0.64	.66	330	68
	Morpheme final_tautosyllabic C	0.25	.56	257	63
	Morpheme internal_C in same or next syllable	-0.25	.44	831	67
	Word final _C	-0.71	.33	949	44
	Morpheme final_heterosyllable C	-1.29	.22	32	38
Stress	Stressed	0.29	.57	1571	65
	Unstressed	-0.29	.43	1407	57
Lexical Frequency	Decreasing	-0.01		2978	

Table 3: Showing the results of the mixed model logistic regression. Factors are significant at $p \leq .01$. Non-significant factor groups were speaker sex, speaker age and word class.

Beginning with the social factors the analysis shows that neither speaker sex nor age were significant predictors of /r/ use. Since this analysis removed all the younger, non-rhotic speakers this was expected. However, Table 3 shows that almost all the linguistic constraints were found to be significant; preceding vowel, syllabic stress, lexical frequency and word context therefore all affect the presence or absence of /r/. Word class was not found to be significant.

The analysis shows that a preceding NURSE vowel is by far the most promoting of /r/. This is followed by NEAR and START. The back vowel in NORTH/FORCE is shown to disfavor rhoticity. Overall, stressed environments were more favoring of /r/ than unstressed environments. Frequent words had a disfavoring effect on rhoticity; as lexical frequency increases /r/ use decreases. This is a weak but significant effect.

For word context a more complicated picture emerges. The environment most favoring of rhoticity is the linking /r/ environment. This is expected since /r/ occurs here frequently even in non-rhotic speech and an /r/ in this environment can be accounted for as a method to resolve hiatus. The next most favoring environment is word final /r/ followed by a pause. Finally, clustering together are environments with following consonants. Of these, morpheme internal /r/s, for example, in words such as *church, born,* and *part*, are shown as favoring /r/. Next, are morpheme final and word final /r/ followed by either a tautosyllabic consonant (e.g., *walkers*), or a consonant in the next word (e.g., *walker said*). These two types intuitively seem to belong together and have patterned as such. The most disfavoring environment is morpheme final /r/ followed by a heterosyllabic consonant, words such as *wonderful* and *nearly.*

3.3 Comparisons with Nagy and Irwin (2010)

3.3.1 Lexical Frequency

In Dorset it was found that the more frequent a word is, the more likely it was to be non-rhotic; more frequent words were leading the sound change. Contrary to this, Nagy and Irwin (2010) found that rare words were leading the sound change and were therefore more likely to favor /r/. In both studies, therefore, the same effect is seen: more frequent words have lower levels of /r/ presence. A comparison of the results is shown in Table 4.

Dorset	New England (Nagy and Irwin 2010)	Factor Weight
Log Odds: -0.01	Rare	.52
as lexical frequency increases	Intermediate	.51
/r/ use decreases.	Frequent	.47

Table 4: Comparison of the effects of lexical frequency on /r/ presence in the present study and Nagy and Irwin (2010).

Schuchardt (1885/1972:58) is often credited as the first to espouse the view, as a critique of the neogrammarians' exceptionless view of sound change, that the frequency of a word plays a role in phonological change: "rarely used words drag behind; very frequently used ones hurry ahead." This theory was refined by Hooper (1976, cited in Bybee 2002:263) who "identified a lexical diffusion paradox. Reductive sound change tends to affect high frequency words before low-frequency words, but analogical leveling or regularization tends to affect low-frequency words before high frequency words." For example she found that schwa deletion occurred more often in frequent words like *nursery* than less frequent words like *cursory.*

It seems clear then that the data from Dorset fit with previous assertions made about the effect of word frequency. The loss of rhoticity is a reductive change and affects frequent words before less frequent ones. What then can be made of the fact that the opposite process is occurring in the varieties gaining rhoticity? At this juncture it might be worth considering how these two types of sound change differ. Gaining and losing rhoticity are actually rather different processes. A variety gaining rhoticity is adding an additional segment and this has to happen in a set of environments that is rather unpredictable. For example, an acquirer of rhoticity would have to learn to add /r/ in *dear* but not *idea,* in *lore* but not *law*. In a variety losing rhoticity the process is somewhat simpler, lose /r/ except before a vowel. Therefore, what is observed might actually be rather expected. In the high frequency items the same reductive processes are applying in the varieties gaining rhoticity, halting or slowing down the addition of an /r/ in these environments. In the lower frequency items, less subject to elision in fast connected speech, the /r/ is more common. For both the present study and Nagy and Irwin (2010) however, the effect of word frequency, whilst significant, is a smaller effect than other factors, which are now examined.

3.3.2 Stress

The present study agrees with Nagy and Irwin (2010) in showing that regardless of whether the variety is losing or gaining rhoticity, stressed environments are more promoting of /r/ presence than unstressed environments. Indeed, it appears that the effect of stress might have a universal effect on the presence of rhoticity. This was the conclusion of Nagy and Irwin (2010:267) following their survey of 11 variationist analyses of US accents. They write, "the clear effect of stressed syllables favoring (r-1) may be readily explained by the greater articulatory effort and duration in stressed syllables."

3.3.3 Preceding Vowel

Table 5 shows the comparison of Dorset English and Nagy and Irwin (2010). It can be seen that a preceding stressed schwa or NURSE vowel is the most favoring of /r/ regardless of whether the

variety was gaining or losing rhoticity. The back vowels NORTH/FORCE are also disfavoring of rhoticity across the two varieties with the remainder of preceding vowels having a more mixed effect.

Dorset	Factor Weight	New England (Nagy and Irwin 2010)	Factor Weight
NURSE	.76	NURSE	.68
NEAR	.60	START	.58
START	.57	SQUARE	.52
LETTER	.50	CURE	.51
CURE	.40	NEAR	.48
SQUARE	.36	FORCE, NORTH	.45
FORCE, NORTH	.31	LETTER	.39

Table 5: Comparison of the effect of preceding vowel on /r/ presence in the present study and Nagy and Irwin (2010).

3.3.4 Word Context

Finally, examining the effect of word context also shows similarities across the varieties gaining and losing rhoticity. Table 6 shows that the differing word contexts are ordered very similarly across the dialects. As expected both Nagy and Irwin (2010) and the present study found that the linking /r/ environment was most promoting of rhoticity. All the other /r/ contexts are also very similarly ordered. Indeed they are the same apart from two shown in grey on Table 5, morpheme internal and morpheme final followed by a tautosyllabic consonant, which are switched. In both studies, a following pause is promoting of rhoticity. Britain (2011) has conducted a survey of the effect of a following pause across variationist studies looking at variables in both English and other languages. In this study he finds that a following pause promoted marked or released forms which suggest that they are used in such contexts in order to mark turn finality, and that consequently there is a conversational management function to phonological variation in these positions. This could promote the use of /r/ in these pre-pausal contexts in varieties both gaining and losing rhoticity.

Word context	**e.g.**	**Dorset**	**New England (Nagy and Irwin 2010)**
Word final_V	*car alarm*	.79	.75
Word final_PAUSE	*car*	.65	.55
Morpheme final_tautosyllabic C	*cars*	.55	.47
Morpheme internal	*card*	.43	.49
Word final_C	*car park*	.32	.44
Morpheme final_heterosyllabic C	*nearly*	.25	.42

Table 6: Comparison of the effect of word context on /r/ presence in the present study and Nagy and Irwin (2010).

4 Summary and Future Research

This paper has provided the first multivariate analysis of the linguistic constraints of /r/ loss in southwest England and has shown that the loss of non-prevocalic /r/ is complete for the youngest generation of speakers in Dorset. It has also demonstrated the differing use of /r/ in linking and non-prevocalic /r/ environments showing that all speakers use high levels of linking /r/ regardless

of their use of non-prevocalic /r/. An analysis of linguistic constraints show that stressed syllables favor the retention of /r/ over unstressed syllables and that a preceding NURSE vowel is the most favoring environment for /r/ presence. As expected, a following vowel is highly favoring of /r/ use. Lexical frequency also appears to correlate with /r/ presence with more frequent words more likely to be non-rhotic.

The comparison of a variety losing rhoticity, Dorset English, with a variety gaining rhoticity, Nagy and Irwin (2010), has shown some interesting commonalities. This paper set out to answer the question as to whether those linguistic constraints, which most strongly favor the loss of rhoticity in southwest England are the same ones that least favor the acquisition of it in the US and this does indeed appear to be shown in the present study. In both studies stressed environments and preceding NURSE vowels most strongly favor /r/, along with environments with following vowels and pauses. Finally, frequent lexical items appear to be the least promoting of /r/ use in both studies. This suggests that linguistic factors, which may apply across all varieties of English could have universal effects in the use of /r/. This paper has been narrowly focused to describe the loss of non-prevocalic /r/ in Dorset and a comparison with one variety gaining rhoticity in the United States. Future research, reported in Piercy and Britain (in prep.) extends these observations by conducting an extensive survey of the literature of other varieties gaining and losing rhoticity and crucially posits linguistic explanations for the patterns observed.

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