

HIATUS RESOLUTION STRATEGIES IN NON-RHOTIC ENGLISH: THE CASE OF /r/-LIAISON

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ABSTRACT

This paper looks at the different hiatus resolution strategies in potential cases of /r/-liaison in non-rhotic English. Potential contexts of /r/-liaison were identified in a corpus of BBC newscasts and analysed auditorily and acoustically for the occurrence of /r/-liaison, glottal stops, creaky voice or hiatus. The results show that /r/-liaison is a common hiatus-breaking strategy although there are significant differences between linking /r/ and intrusive /r/. They also show that glottal hiatus-breaking strategies are common and that creaky voice is more frequent than true glottal stops while hiatus is not very frequent. The discussion focuses on the reason why glottal strategies seem to be gaining ground as opposed to the use of /r/.

Keywords: /r/-liaison, hiatus, glottal stop, creaky voice

1. INTRODUCTION

Hiatus refers to the situation in which two vowel sounds occur in adjacent syllables with no intervening consonant between both.

Many languages disallow or restrict hiatus, the insertion of an epenthetic consonant being one of the most common strategies to avoid it. Most varieties of English, for instance, have at their disposal a wide range of hiatus-breaking strategies. For example, in a standard non-rhotic British English variety like Received Pronunciation – henceforth RP –, three of the most common strategies are the use of /n/ with the indefinite article ‘a(n)’, where a relic [n] is inserted to block hiatus (cf. *a pear* /ə peə/ vs. *an apple* /ən æpl/). Also, in potential hiatus contexts in which the first vowel is [-high], /r/ is often used to prevent hiatus across word boundaries, a phenomenon known as /r/-liaison or /r/-sandhi. When this phenomenon is the consequence of the historical loss of rhoticity but spelling still retains <r(e)> –e.g. *fear of it* /fɪər əv ɪt/, it is typically referred to as ‘linking /r/’. However, /r/ can also be inserted when there are no etymological traces of /r/ <r> –e.g. *idea of it*

/aɪdɪər əv ɪt/, a phenomenon known as ‘intrusive’ /r/. Finally, in potential contexts in which the first vowel is [+high] and unrounded, a palatal glide is often inserted –e.g. *flying* [flaɪ̯ɪŋ]–while if the first vowel is [+high] and rounded –e.g. *going* [ˈgəʊ̯wɪŋ]–, a labial-velar glide is inserted.

2. HIATUS-BREAKING IN POTENTIAL /r/-LIAISON CONTEXTS: A STUDY

Although the hiatus-breaking strategies in varieties of English have long been observed and described, little empirical research has so far been carried out into different aspects of the use of those strategies and their variability. As a case in point, /r/-liaison has long been discussed in the relevant literature e.g. [4] but few empirical studies have focused on its variability, with some remarkable exceptions e.g. [6, 10]. The findings obtained in these studies show, for example that linking /r/ is more frequent than intrusive /r/. However, little is known about the hiatus-breaking strategies used when /r/-liaison does not apply. Evidence of an anecdotal nature suggests that speakers use glottal stops –see [3] for a review–. As mentioned below, however, glottal stops are often realised as creaky voice, typically associated with vocal folds tightly adducted but open along a portion of their length. If hiatus is understood as the occurrence of two modally voiced vowels in adjacent syllables with no change in phonation at the boundary between them, creaky voice can be considered as a further strategy to prevent hiatus.

Given the apparent variability in the use of hiatus resolution strategies in potential /r/-liaison contexts, different questions can be asked regarding those strategies and their frequency of occurrence. This study addresses four of those questions: how common is /r/-liaison?; b) are differences in rate of occurrence between linking /r/ and intrusive /r/ described so far confirmed?; c) are laryngeal strategies (use of glottal stops, creaky voice) a common hiatus-breaking strategy when

/r/-liaison is not used?; d) how common is hiatus in potential /r/-liaison contexts?.

Based on previous studies, it is hypothesized that: a) /r/-liaison will be a common hiatus-breaking strategy; b) linking /r/ will be more common than intrusive /r/; c) laryngeal hiatus resolution strategies will be very common; and d) hiatus will be uncommon as strategies to avoid it will be used instead.

2.1. Method

2.1.1. Data

The study focused on the non-rhotic accent of English known as RP, as exemplified in the speech of BBC newsreaders. RP was chosen as it is relatively easy to find considerable recorded speech that exemplifies it, and because it was considered important to rule out speakers' accent as a source of variation in the results. Following previous studies e.g. [10], use was made of a corpus of newscasts from the BBC World Service, available in the Words in the News link. For the current study, a relatively large-scale sample corresponding to the years 1999-2009 was used. This resource amounted to a total of 1503 newscasts, 1263 eventually included in the analysis and 240 ruled out because the speaker was not a newsreader, the speech was not RP, the text was technically unavailable, or the speaker's identity was unknown. Observing these criteria, 344 speakers were considered and 86 left out due to the absence in the latter's speech of phonological/phonetic features typically of RP e.g. [4]. The relevant texts analysed amount to ca. 250,000 words and 32 hours of audio material.

2.1.2. Procedure

Once the RP newscasts had been identified, the procedure involved three stages: a) identification of potential spelling contexts; b) phonetic 'trimming' of those contexts; and c) auditory and acoustic analysis of the trimmed contexts.

The first stage involved the identification of potential spelling contexts of /r/-liaison, i.e. contexts where the spelling suggests /r/-liaison could apply. To achieve this, automatic searches were made on a database created ad-hoc with the written version of the newscasts. The searches identified typical spellings of /r/-liaison contexts. Representative cases are tokens of <r/re> followed by a space bar and a vowel letter (e.g. <.(ca)r i(s)..>, <.(mo)re o(f)..>, etc.) for potential cases of

linking /r/ as well as tokens of <a/aw> followed by a space bar and a vowel letter (e.g. <.(Asi)a a(nd)..>, <.(s)aw i(t)..>, etc.) for intrusive /r/. This process resulted in the identification of 2721 potential spelling-based of /r/-liaison (linking /r/: 1971; intrusive /r/: 750), produced by a total of 215 speakers (59 females, 156 males).

The second stage involved a phonetic 'trimming' of the potential spelling-based /r/-liaison contexts. This involved analysing all those potential contexts auditorily and acoustically to rule out contexts where the presence of a pause prevented the appearance of hiatus or a hiatus resolution strategy. Bearing in mind future subsequent analysis of the material studied, only speakers with potential intrusive *and* linking /r/ were considered, which ruled 20 females and 33 males so the total number of speakers was 39 females and 123 males. In the end, 140 potential spelling-based cases of linking /r/ were ruled out, and 351 of intrusive /r/. Thus, a final number of 1875 potential 'trimmed' cases of /r/-liaison were identified (linking /r/: 1476; intrusive /r/: 399).

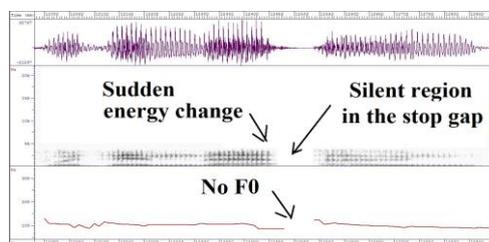
The third and final stage was a further acoustic and auditory analysis of the trimmed cases for speakers with both intrusive and linking /r/ contexts. Two independent researchers looked at the cases. When in disagreement, the opinion of a third judge was sought for. To carry out the spectrographic inspection of the sound files, use was made of SFS/WASP version 1.41, free speech research software developed at UCL. Oscillographic, spectrographic and F0 displays were made of all the trimmed cases. Auditory inspection of the files was often enough to decide whether /r/ was produced but presence of a low F3 was taken as a strong cue to /r/ in dubious cases.

As to the presence of glottal stops, it has been pointed out that a full voiceless glottal stop should have complete obstruction of airflow at the glottis, preventing simultaneous phonation so a glottal stop is unvoiced by definition. In theory, then, a glottal stop should be easy to identify acoustically and it should be perceived when a single glottal pulse occurs. Creaky voice, however, should be perceived when several such pulses occur in a row, giving the impression of a rapid series of taps [5]. In practice, however, it is often hard to discriminate a glottal stop from creaky voice, even for trained phoneticians [2], which may be partly due to the fact that glottal stops and creaky voice are both produced with the same physiological mechanism [7]. In fact, the occurrence of true

glottal stops in English may be unusual e.g. [2] as the so-called glottal stops in English are often realised as creaky voice, not requiring a complete stop closure and immediate cessation of vocal fold pulses. The usual phonetic realization of the RP glottal stop is, it seems, a few pulses of creaky voice at the end of the preceding vowel [12].

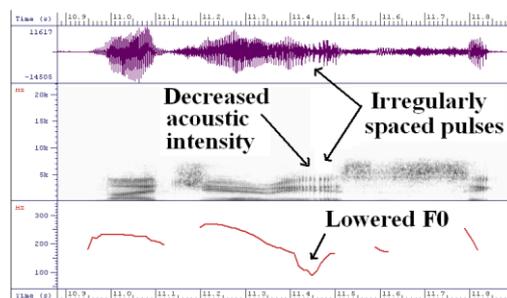
Despite possible perceptual difficulties to distinguish between glottal stops and creaky voice, certain criteria were followed to decide whether these two realisations occurred. For the presence of a glottal stop [ʔ], a stop gap or silent region on a spectrographic plot, absence of F0 and a sudden energy change were important cues (see figure 1).

Figure 1: Cues for the glottal stop in “their[ʔ]own”



In the case of creaky voice, [Ɂ], lowered F0, decreased acoustic intensity and irregularly spaced glottal –or vocal fold– pulses with periods of varying length were determinant (see figure 2). It was considered unnecessary for this study to quantify the degree of creaky voice phonation, which can be made by measuring the spectral tilt.

Figure 2: Example of creaky voice in “Nigeria is the”



2.2. Results and discussion

The analysis of the corpus provides enough empirical evidence to suggest an informed answer to the research questions of the present study. Regarding the first question, i.e. how common /r/-liaison is as a hiatus-breaking strategy, the results confirm that it is a common strategy, although maybe less than it could be expected. The data show that /r/-sandhi was produced in 60.5% of all potential cases (1134 out of 1875).

With regards to the second research question, i.e. whether there are differences in rate of occurrence between linking and intrusive /r/, the data obtained show that there are significant differences, confirming the hypothesis entertained and in line with data from previous studies e.g. [10]. Linking /r/ was used in 66.5% of all potential linking /r/ cases –982 out of 1476 cases–, while intrusive /r/ was used in 38.1% of all intrusive /r/ cases –152 out of 399 cases–. The difference is significant by a chi-square test ($p < 0.05$).

For the third research question, i.e., whether laryngeal hiatus resolution strategies are common when /r/-liaison is not used, the results show that they are very frequent so the initial hypothesis is confirmed. Of the 741 cases of potential /r/-liaison where no /r/ was used to break hiatus, i.e. 39.5% of the whole corpus studied, laryngeal hiatus breaking strategies were used in 78.8% of cases (31.1% of all potential /r/-liaison cases). Moreover, the results reveal an important difference in the rate of use of full glottal stops and the use of creaky voice. Whereas creaky voice is used in 64.5% of the cases in which hiatus resolution strategies are used, glottal stops are only used in 14.3% of the cases.

Although further analyses of the material will have to look into possible aspects of the variability in the use of glottal stop and creaky voice, an inspection of the cases shows that full glottal stops tend to be used when followed by a stressed syllable. More specifically, 81.1% of the glottal stops were followed by a stressed syllable where 18.9% were followed by a non-stressed syllable. This is in line with the observation that glottal stops are used as hiatus breakers before stressed syllables rather than before unstressed ones [13].

Finally, the fourth research question, i.e. how common hiatus is in potential /r/-liaison contexts, the results show that that it is not very common, so the hypothesis entertained is confirmed. In fact, hiatus is used in 21.2% of all cases where /r/-liaison is not used –and 18% of all cases studied in the corpus–. An inspection of the cases where hiatus is not avoided shows that full hiatus is used in 96% of the cases and it seems that in 4% of the cases there is some kind of geminate vowels/vowel lengthening, which deserves further research.

With these data in mind, one might reasonably ask why it is that hiatus resolution based on laryngeal action –glottal stop and creaky voice– is so common, when a more frequent use of /r/-liaison could be expected, particularly in the case of linking /r/ which is not stigmatised as intrusive

/r/ may be [9]. As to glottal stops, some authors e.g. [8] suggest that the former have the least marked place of articulation for a consonant and hence are to be expected as epenthetic hiatus-breaking consonants, with coronal consonants like /r/ being the next best choice. In fact, the glottal stop seems to be the default form in children's English until adult forms are acquired [11] and its use seems to be gaining ground not only in potential /r/-liaison contexts but also in cases where the typical /ð+C, ð̥+V/ allomorphy of the article 'the' and the glides [j w] after high vowels in potential hiatus contexts are expected to apply [3]. In addition, it has been claimed [14] that glottal stops are optimal epenthetic consonants at word edges because they provide a maximally steep sonority rise to the neighbouring sound.

Regarding the use of creaky voice phonation as a hiatus breaker, its wide use may not be surprising as creaky voiced is also exploited in English, if not distinctively, for different communicative, paralinguistic functions like the expression of attitudes and emotions [11]. Prosodically, creaky voice is also used as a boundary signal, alongside other phonetic cues like drop in F0, decreased intensity, final lengthening, or pausing, to mark the end of conversational turns, intonation phrases, including paragraphs and smaller prosodic units e.g. [11]. The use of creaky voice as a hiatus breaking strategy adds then to the different prosodic uses of that kind of phonation in English.

3. CONCLUSION

This paper has looked at the different hiatus resolution strategies in potential cases of /r/-liaison in the speech of BBC newsreaders. Summarising the data obtained, it is clear that speakers did use some kind of hiatus-breaking strategy to prevent hiatus in most cases. /r/-liaison –linking and intrusive /r/– was produced in 60.5% of all potential cases, glottal strategies –creaky voice and glottal stops– in 31.5% of all potential /r/-liaison cases, and hiatus in 18% of the cases. The results also reveal rate differences between intrusive /r/ and linking /r/ and between the two glottal strategies –glottal stop vs. creaky voice.

The findings obtained are a first step to understanding the variability in the use of strategies to avoid hiatus in cases of potential /r/-liaison. However, the present study has certain limitations that suggest directions for future research. For instance, the different phonetic,

linguistic, or sociolinguistic variables that may influence the use of /r/-liaison, glottal stops, creaky voice or hiatus should be looked into in future studies. For example, it would be interesting to see, whether the patterns described also apply to a somewhat more broadly-defined SSBE subject group which could have included the RP speakers. In addition, the sample size per speaker in this study is small, so further data should be collected to look at pattern uses within speakers.

The study adds to the growing evidence showing that glottal stops are used as hiatus breakers in careful formal pronunciation of BBC newsreaders [1] but also in the informal styles of regional accents e.g. [3]. It shows then, as an important conclusion, that RP uses a complex system of hiatus resolution strategies.

4. REFERENCES

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