Tension and intrusive-R in English accents¹

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Abstract

Inspired by the work of Plénat (1987), Durand (1990) and Giegerich (1992) on the motivation for the feature Tense in French and English, a precise definition of vowel tension is offered:

Tense vowels are either ATR, advanced tongue-root, or RTR, retracted-tongue root.

Within a feature geometry derived from that of Goad (1991), Tension is a single node, which as a bare node means ATR, but is also the docking point for the feature RTR. The geometry embodies the dual definition of tension and facilitates a process: tension switching, which is used to account for characteristics of Tyneside and Bolton accents. Applying this richer notion of tension to RP allows the generalization:

The vowels giving linking and intrusive-R are those with RTR tension.

i.e. including not only schwa-like vowels but also PALM and THOUGHT, which Giegerich (1997) achieves by regarding them as underlying diphthongs ending in a default vowel. Analyses are also offered of Tyneside and Shorrocks’ (1998) Bolton accents.

Tyneside differs from RP mainly in having tension on the first mora rather than the last. Tension switching, from ATR to RTR, may account for the rising variants of the high vowels which are mandatory in morpheme final position.

¹ much of this paper has been aired in a talk to the Falmer Language Group in 1995 and a poster at the 1998 Manchester Phonology Workshop. A version was presented at English Phonology, Toulouse 2002.
The tying of intrusive-R to RTR tension may force the analysis of the Bolton data into an unexpected mould. But the variations [e:] ~ [æ:] in TOWN can then be seen as a further example of tension switching.

1 Introduction

The categories tense and lax have been applied to vowels in historical and synchronic phonology but often abhorred because they seem difficult to define in acoustic or articulatory terms. If phonology is abstract this should not matter too much but I suggest that what is lacking is requisite variety, sufficient richness to explain the data. I want to propose a structure to vowel tension which may make the notion more acceptable and which has some interesting consequences.

After considering two recent applications of the categories tense and lax, I take an excursion into feature geometry to find a way of making the phonology specific, and then use the restricted framework derived to analyse the tense vowel systems of three accents of English with particular reference to the occurrence of intrusive-R and the possibility of vowel shifts.

2 Motivation for [± tense]

2.1 Introduction

Plénat and Giegerich have found it useful to classify vowels as either tense or lax, without being specific about the meaning of these terms. My first task is to rehearse their motivation for this distinction and then to spell out some of the problems it raises,
which have led many, like Wells, to abstain from the notion in spite of its venerable tradition.

A brief look at tongue-root features, which have been used mainly for vowel harmony systems in non-European languages, leads in to my proposal of a precise definition of the tense/lax distinction in terms of these features. This not only addresses the problems enumerated but also allows a simple characterization of the context for intrusive-R in English.

2.2 Motivation

First the French because it was Durand’s (1990:84-5) account of Plénat’s ideas which inspired this part of the theory:

Plénat regards as tense the high vowels of cri, tube, tout
and the non-high vowels of thé, feu, base, gros
and as lax the non-high vowels of gel, fleur, patte, vol,
where each lax vowel has a tense partner.

Then 1 learned backing affects lax vowels eg clair ~ clarté, fleur ~ floral
2 some speakers tense the vowel before -tion eg admiratif ~ admiration
3 vowels before final /z/ are tense eg gueuse, Berlioz, gaz
4 non-high vowels before final /r/ are lax.

Giegerich (1992:95f) has for English:
lax vowels kit dress trap lot strut foot
corresponding tense fleece face palm thought goat goose
2.3 Problems

1. In French the tense counterparts of the vowels of *gel, fleur, vol* are higher while the tense counterpart of the vowel of *patte* is not higher but very back.

2. In English the tense counterparts are higher except for *palm* which is very back.

3. *goat* is round as well as higher than *strut*.

4. In non-rhotic accents the vowels of *near, square, nurse, cure* may be stressed at the end of a word, but have never been regarded as tense.

2.4 Tongue-root features

Advanced tongue-root (ATR) makes vowels a bit higher and, mostly, fronter. It is used in some African languages which have pairs of vowels like *fleece ~ kit, goose ~ foot, thé ~ gel, gros ~ vol, strut ~ palm,* to distinguish the higher member of the pair. There are harmony systems in which all the vowels of a word must agree in being ATR or non-ATR.

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2 Scobie et al. (1999) have a more restricted set of candidates for the Scottish Vowel length Rule: FLEECE, GOOSE and PRICE, which weakens this part of Giegerich’s case. An accommodation could be made if it were possible to regard FACE and GOAT as RTR-tense. Then the input set to a Scottish Vowel Fortition Rule could be the ATR-tense vowels which were strengthened by lengthening unless already long like PRICE, which strengthened by tension-switching to RTR-tense. [high, RTR] may also be credible features for some Northern Ireland FACE and GOAT.
Wood’s (1988) articulatory study shows a correlation of ‘tense’ with ATR for a Southern British English subject except that tense [ɑ] has low pharyngeal constriction, “contradicting the normal meaning of ATR” (:287).

Retracted tongue-root (RTR), mainly makes vowels a bit lower and backer. Held by some to be a purely consonantal feature as in Arabic emphatic or pharyngealized consonants. Others think it can be vocalic as well, responsible for blocking ATR harmony and also for RTR harmony, which can be blocked by ATR vowels.

Strong support for the feature RTR and for its association with ‘tense’ comes from articulatory work of Carlson & Esling (2003) on Nootka and Salish: “we believe that the operation of the laryngeal sphincter is the source of the auditory quality that has often been referred to as RTR” (:190). They further claim that the sphincter contributes “to an impression of ‘tense’ quality”, referring to the lowered and/or backed ‘tense’ vowels of languages of North China treated in Esling & Edmondson (2002).

2.5 Proposed definition

Tense means specified for ATR or RTR. Lax means lacking a tongue-root specification.

2.6 Solutions

1 & 2  *gaz* and *palm* are RTR-tense. This also resolves Wood’s contradiction.

3  *lot* has two tense counterparts: ATR *goat* and RTR *thought*

       *strut* has two unrounded tense counterparts: ATR *trap* and RTR *palm*

4  *near, square, cure* are also RTR tense
2.7 Intrusive-R

Liaison [r] after NEAR, SQUARE, NURSE, PALM, CURE, THOUGHT, letter/commA (to use Wells’ convenient notation) is called ‘linking-R’ where it is historical and ‘intrusive-R’ where it is not, as in

*the idea* R of it

*Laura* R is

*shah* R of Persia

*law* R and order.

The vowels which take liaison [r] are RTR-tense. They all owe at least part of their historical origin to vowels before /r/, an RTR consonant from which they have acquired RTR. In accents which have intrusive-R, all liaison [r] may be attributed to the spreading of RTR into the hiatus position, perhaps as a frictionless ʕayin which is enhanced with rhoticity if that is not a legal segment.

Support for this view of vowels before /r/ may be found in Lodge’s (2003) analysis of the effect of rhymal /r/ on preceding vowels in German. He claims a back resonance for such vowels (:934), attributed (:944) to “pharyngeal constriction”. In some examples the /r/ is heard only as this back resonance, in a manner similar to that of non-rhotic accents of English: [l̩ɛ̈ːn̩t̩] *lernt* ‘learns’, [v̩iː] *wirr* ‘confused’.

3 Goad’s geometry of height features

A very brief account is offered of Goad’s impressively adequate and constrained (1991, 1993) thesis, with some motivation for the changes proposed.
Vowel height is handled by the **Voc** node. Three primary heights are represented as:

\[
\begin{array}{ccc}
\text{Voc} &=& \text{Voc} = \text{Voc} \\
&|&| \\
\text{[open]} &=& \text{[open]} \\
&|&| \\
\text{[low]} \\
\end{array}
\]

ATR is shown to be a constituent of this node, adding two secondary heights:

\[
\begin{array}{ccc}
\text{Voc} &=& \text{Voc} \\
&|&| \\
\text{[open]} \\
&|&| \\
\text{[atr]} &=& \text{[atr]} \\
\end{array}
\]

The feature [atr] is anomalous in two ways in Goad’s theory: it can attach in two places, either to [open] or direct to the Voc node; and it cannot co-occur with [low].

Goad also argues that [rtr] is a Place feature that can co-occur with any Voc feature, including [atr]. The implication is that [low] and [rtr] are different features, though this seems to me to be weakened by the suggestion (1993:186) that [low] might “link directly to Voc under marked circumstances”, acting effectively as [-atr].

The influence of Goad’s (1991: 202-4) treatment of Lund Swedish diphthongization as ATR on the second half of the diphthongs may be seen in sections 5 and 7 below on RP and Tyneside English.
4 Proposed geometry

1 to equate Goad’s [low] and [rtr] as [RTR]
2 to attach [atr] only to the Voc node as sister to [open]
3 to attach [RTR] only to [atr], negating it as [open] negates Voc:

\[
\text{Voc} \quad \text{renamed as} \quad \text{Height} \\
/ \quad \backslash \\
\text{[open]} \quad \text{[atr]} \quad \text{open} \quad \text{Tension} \\
/ \\
\text{[RTR]} \quad \text{RTR}
\]

4 a notion of tension switching, where adding or subtracting a single feature can switch between ATR and RTR tension:

\[
\text{Height} \quad \text{fortition} \quad \Rightarrow \quad \text{Height} \\
\backslash \\
\text{Tension} \quad \text{Tension} \\
/ \\
\text{<- lenition} \quad \text{RTR}
\]

5 Application to RP

The richer notion of tension allows me to break with tradition and say that the falling diphthongs of NEAR, NURSE, TOUR, SQUARE in non-rhotic accents are [RTR] Tense and thus, with Ladefoged (1982:80) but contra Giegerich, that all vowels and
diphthongs that can appear stressed at the end of a word are Tense. Each Lax vowel may then be associated with two Tense vowels, one [ATR] and one [RTR]. Using broad symbols and monovalent features for the lax vowels of RP:

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<tr>
<th>front</th>
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<tr>
<td>KIT</td>
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<td>DRESS</td>
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<td>STRUT</td>
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<td>LOT</td>
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I would like to represent the corresponding tense vowels as:

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<th>front</th>
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<tbody>
<tr>
<td>ATR</td>
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<tr>
<td>FLEECE</td>
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<td>GOOSE</td>
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<tr>
<th>RTR³</th>
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<th>lettER/commA</th>
<th>ə̂</th>
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<tbody>
<tr>
<td>NEAR</td>
<td>i̯</td>
<td>NURSE</td>
<td>ə̂:</td>
<td>TOUR</td>
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<tr>
<th>open</th>
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<tbody>
<tr>
<td>ATR</td>
<td></td>
<td>TRAP</td>
<td>a</td>
</tr>
<tr>
<td>FACE</td>
<td>eɁ</td>
<td>BAD</td>
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<thead>
<tr>
<th>RTR</th>
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<tbody>
<tr>
<td>SQUARE</td>
<td>e̯</td>
<td>START</td>
<td>a̯:</td>
</tr>
<tr>
<td>NORTH</td>
<td>o̯:</td>
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³ The pharyngealization diacritic is used for RTR to make it more distinct from the ATR diacritic.
with tension on the second half only except for the nurse, bad, start, north monophthongs which derive historically in part from short vowels.

I am using tour rather than wells’ cure because I would like to represent that as a diphthong $iu'$, with an atr partner: cue $iu$.\(^4\)

The trap vowel is shown as atr tense because it can be long in some words, as admitted by wells (4.1.5). I have recently encountered two surprising pronunciations of the name of the ford Ka, in southern british English: $[kʰæ]$, $[kʰɑ]$, both with short vowels. It is surprising to hear a stressed short vowel at the end of a word, but the first is confirmation of the tension in trap.

A cogent objection to this analysis is that north is higher than lot on the IPA vowel chart. But the effect of a retracted tongue-root on vowel acoustics is not as simple as down a bit, back a bit, particularly in the cases of back rounded vowels. lodge presents formant data for German (2003: Fig 1, 2) which show raising and fronting in this area as well as lowering and backing, all attributed to RTR.

An atr tense partner of letter/commA may be the new unrounding of foot noted by gimson (:112). As a tense vowel it would then have the possibility of becoming long.

6 [RTR] and /r/

In non-rhotic accents like RP historical /r/ is only pronounced when a vowel follows. The $r$ that is pronounced in <star of Bethlehem> alternating with $\emptyset$ in <star> is known as linking-R. Classical RP has this alternation only where historically justified but there are many near-RP accents which have it also in eg <law r and order> where there is no historical /r/. This is known as intrusive-R. wells (1982:225) claims linking-R for his own speech but reports word-final intrusive-R as

\(^4\) Similarly price $ae$ ~ prior $ae'$, mouth $ao$ ~ hour $ao'$
widespread in RP. Broadbent (1991:282) claims RP has intrusive-R modified by social suppression. Be that as it may, it is the phonology of intrusive-R that I wish to discuss.

Giegerich (1997) uses an underlying default vowel to characterize the segments giving linking- and intrusive-R. I propose instead the feature [RTR]. The phonemes that may be followed by intrusive-R are the [RTR] Tense vowels and schwa, the letter/commA vowel, which all owe at least part of their historical origin to the pre-R context. I suggest that /r/ is a [RTR] consonant and that the feature [RTR] has spread from the /r/, tensing short vowels in NURSE, START, NORTH and switching the tension from [ATR] in NEAR, SQUARE, TOUR. Around 1800 a change from level-tensing to final-tensing accounts for the narrow FACE, GOAT diphthongs at the same time as the centering NEAR, SQUARE, TOUR diphthongs.

Intrusive-R is then a [RTR] glide plus rhoticity, filling an empty onset following a [RTR] vowel.

Word-final schwa behaves exactly like the [RTR] vowels in the matter of intrusive-R and so must be regarded as [RTR] and thus Tense, a short unstressed version of the NURSE vowel. This paradoxical conclusion seems to me to be supported by Gimson’s description (1962:119) of the schwa of RP as much more open when word-final. Further, in an accent which also has what Wells (257) calls happy-tensing, in which the final vowel of <happy> is classed with FLEECE rather than KIT as tense and possibly long in some accents, we could say that all word-final vowels, stressed or unstressed, are tense. It would be interesting to know how far the distribution of happy-tensing coincides with that of intrusive-R after schwa in English accents.
7 Application to Tyneside

Some Tyneside accents seem to me to have mirror images of the RP diphthongs which I can represent by tension on the first half only, except for the START vowel which seems monophthongal:

\[
\begin{array}{ccc}
\text{front} & | & \text{round} \\
\hline
\text{ATR} & | & \text{FLEECE} \ ji & \text{MOUTH} \ uu \\
\hline
\text{RTR} & | & \text{NEAR} \ ii & \text{NURSE} \ oo & \text{TOUR} \ uu \\
\hline
\text{ATR} & | & \text{FACE} \ ee & \text{GOAT} \ oo \\
\hline
\text{RTR} & | & \text{SQUARE} \ ee & \text{START} \ a^\prime: & \text{NORTH} \ o^\prime o
\end{array}
\]

Intrusive-R is rare in this initial-tensed sort of Tyneside. I have only heard it after schwa in <hosanna r in the highest> and [ʃəɹɪz] <she is>, implying that schwa may be [RTR] Tense word-finally in Tyneside as in RP. My representation of the START vowel with level tensing and thus with [RTR] adjacent to any following empty onset suggests that intrusive-R is possible after this as well, but I have not noticed any occurrence. Watt & Milroy (1999: 31) find intrusive-R “at a rate of around 20%” in working class speech. Their data for older working class males is closest to the sort of accent I depict here.
Wells (375) reports diphthongal variants of the FLEECE and MOUTH vowels in morpheme-final position eg \( [\text{fæiz}] \) frees \( \neq [\text{faiːz}] \) freeze. Watt & Milroy (1999: 28) give examples (for GOOSE) \( [\text{breʊz}] \) brews and \( [\text{bruːz}] \) bruise. I suggest Tension-switching here with [ATR] being replaced by [RTR]. Maybe [RTR] has more phonological weight than [ATR] Tension leading to preferences for one or the other in various contexts.

The citation form for near is disyllabic, but a monosyllabic pronunciation with a rising diphthong occurs in connected speech and that is what is shown in the chart above. The restricted possibilities for height and tension mean that this clashes with the RTR morpheme-final variant of FLEECE, leading to the question: can knee and near be homophones in Tyneside?

Similar diphthongisations of high tense vowels “in hiatus” appear in Swiss German and Frisian. Is it coincidence that these dialects also display falling diphthongs?

Is there any evidence that Late Middle English was initial-tensed at the time of the PRICE, MOUTH diphthongisation?

8 Bolton

**The Bolton lax vowels**, using Shorrocks' symbols:

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</table>
Because the schwa /ə/ may be followed by intrusive-R, I have to regard it as RTR-tense even when short. Tension seems to be a necessary but not sufficient condition for length in English.

/ɔː:/ may be RTR-tense because it has no occasion for intrusive-R.

/æː:/ must be RTR-tense because it gives intrusive-R.

All other long vowels can only be ATR-tense, which means that /ɔː:/ must be [ATR, open], forcing /ɔː:/ to be phonologically high, unless /ɔː:/ has no occasion for intrusive-R. The following solution has an interesting consequence.

**The Bolton tense vowels:**

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<th>front</th>
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<td>RTR</td>
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<td>SQUARE</td>
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<tr>
<th>ATR</th>
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<td>open</td>
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<tr>
<td>RTR</td>
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<td>CARD</td>
<td>æ:</td>
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</table>

The variation between /ɛː:/ and /æː:/ in TOWN words can then be seen as an example of **tension-switching**.
Wells (4.4.4), commenting on the short NURSE vowel of some Northern accents (like Bolton WORK), suggests that it may be used for STRUT to implement a FOOT - STRUT split. My analysis here suggests that this vowel must be tense and thus open to lengthening.

A short NURSE vowel has also been noted by Trudgill (1999: 125-128) as an older feature of the Norwich dialect. Its replacement by a long vowel could be lengthening under tension rather than, as Trudgill suggests, the influence of other accents.

9 Conclusions

The richer concept of tense vowels proposed not only improve the adequacy of the category, but also allows a simple characterization of the context for intrusive-R and suggests mechanisms for vowel shift.

Having two sorts of tension, ATR and RTR, enables the definition of tense vowels as those which can appear stressed at the end of a word in English to be applied to all such vowels and diphthongs including the centering diphthongs of RP.

The [RTR] tense vowels are then the set which gives rise to intrusive-R, an [RTR] glide.

The restricted number of vowel heights allowed by the feature geometry proposed, severely constrains analyses. In the Tyneside case this forces the morpheme-final variants of the high ATR vowels to share a slot with the high RTR vowels of monosyllabic variants of eg NEAR. The Bolton TOWN vowel cannot be the RTR counterpart of ATR ACE because it does not give intrusive-R. Being forced, therefore, to be the ATR counterpart of CARD, it is in a position to have its variation with CARD explained as tension switching.
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See also http:/web.uvic.ca/ling/research/phonetics/festschrift


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