High Rising Terminals in Australian English: Form and Function

by
Kelly Webb
314813

Under the supervision of Associate Professor Janet Fletcher and Dr. Deborah Loakes
Declaration

This thesis is submitted in partial fulfilment of the requirements for the Degree of Bachelor of Arts (Honours) in the Department of Linguistics and Applied Linguistics of the University of Melbourne. Work presented herein is the original work of the author, unless otherwise acknowledged.

Kelly Webb
November 24th, 2008
Abstract

This study examined various aspects of both the form and function of high rising terminals in Australian English. Using both narrative and collaborative speech data, relevant intonational phrases were labeled on several levels and an objective method to classify question and declarative utterances was also developed. In particular it aimed to examine the relationship between speech act and location of the rise onset, as past studies have shown a significant result in New Zealand English. The findings were that HRTs have a ‘continuing’ function in dialog, that previous findings of a phonological distinction between speech acts are unsupported, and that there appears to be no significant relationship between the location of the rise onset and speech act type.
Acknowledgements

I would first and foremost like to express my gratitude to both Janet Fletcher and Debbie Loakes for all of their advice and encouragement over this past year, and for their confidence when my self-doubt was at its worst. Without their help this thesis would be a much lesser piece of work – in fact, almost certainly non-existent.

I’d like to thank the department for this opportunity and for making my move from UWA as smooth and painless as possible.

I’d also like to mention all my classmates and friends, new and old, who have given me some wonderful memories of Melbourne and whose sympathy and especially patience was much appreciated.

Lastly, and most of all, I’d like to give special thanks to my parents, without whose generous support and belief in me I would never have been able to take even the first steps on this journey, let alone reach this point. I appreciate it more than is conceivable.
# Table of Contents

Index of Figures .................. 6  
Index of Tables .................. 6  
1. Introduction .................. 7  
2. Literature Review ............. 9  
   2.1 Theoretical Background of Intonational Phonology ....... 9  
   2.2 High Rising Terminals ....... 10  
      2.2.1 Function ............... 12  
      2.2.2 Form ................ 15  
      2.2.3 Systemic Differences Amongst Varieties .......... 17  
   2.3 Motivation and Aims of this Study ................. 17  
      2.3.1 Aims ................ 18  
3. Methodology .................. 19  
   3.1 Participants ............... 19  
   3.2 Data Collection .......... 19  
   3.3 Data ..................... 21  
      3.3.1 Labeling ............. 21  
      3.3.2 Speech Act Classification ......... 25  
   3.4 Data Analysis ............. 27  
4. Results ....................... 29  
   4.1 Rise Distribution .......... 29  
   4.2 Rise Function ............. 30  
   4.3 Rise Phonology: Distribution of H* and L* ........ 32  
   4.4 Rise Alignment ........... 33  
5. Discussion .................... 35  
   5.1 Distribution of High Rising Terminals ......... 35  
   5.2 Rise Function in Dialog ...... 36  
      5.2.1 Nuclear Accent and Dialog Act .......... 36  
   5.3 Distribution of Nuclear Accent .......... 37  
   5.4 Rise Alignment ........... 38  
   5.5. Further Considerations .... 39  
6. Conclusion ..................... 42  
References ...................... 46
Index of Figures

Figure 1. Examples of a speaker saying the word ‘Anna’, using both a falling and rising tune. 10
Figure 2. An example of the different levels of annotation performed on a IP with a HRT. 21
Figure 3. Examples of the F0 levels and timing aspects of a HRT. 23
Figure 4. Example of a HRT with the rise onset located in a post-nuclear syllable, labeled with the metrical strength of the syllables. 24
Figure 5. A metrical representation of the phrase in Figure 4. 24
Figure 6. Distribution of HRTs according to speaker, task and speech act. 30
Figure 7. Distribution of nuclear accent type according to speech act. 32
Figure 8. Location of rise onset in polysyllabic boundary tunes according to syllable. 34

Index of Tables

Table 1. The major SWBD/DAMSL codes used for dialog acts. 25
Table 2. Distribution of HRTs according to speech act and dialog act. 31
Table 3. Distribution of nuclear accent types between speakers, according to speech act. 33
1. Introduction

The high rising terminal (HRT) has been a major focus of intonation research in Australian English for over two decades. It has been of such interest due to its divergence from the commonly viewed ‘standard’ usage of HRTs in English, which is to signal a distinction between interrogative and declarative utterances. In addition to this usage, speakers of Australian English also use HRTs on utterances that retain their declarative modality. It is these declarative1 HRTs, and the ways in which they may or may not systematically differ from question HRTs, that are the main subject of interest.

The theoretical development that enabled some of the most recent research on HRTs is the ToBI intonation annotation system (Beckman & Ayers Elam 1997), which is based on the autosegmental-metrical (AM) (Goldsmith 1976, Ladd 1996) intonation framework and Pierrehumbert’s (1980) intonational phonology for English. Because this transcription system allows for separate categories of pitch events, it allows an examination of the distribution of separate phonological features of the contour. It was these tonal categories that were used in a study of Australian English HRTs that found that speakers systematically use the final accented syllable to distinguish between declarative and question HRTs (Fletcher & Harrington 2001).

Further research into the function that HRTs perform in discourse showed that they are used in conjunction with dialog acts that serve to continue conversation, either by asking for a response from an interlocutor with a question HRT, or by indicating that the speaker intends to continue speaking. This similarity between both types of HRTs indicated that rising terminals are indicative of ‘open ended’ speech (Fletcher & Loakes 2006).

Of particular interest in this study is previous research on HRTs in New Zealand English - a close neighbour that is very similar to Australian English. Various studies have found a relationship between the location of the rise onset and the type of speech act; on declarative HRTs the rise begins later than it does on question HRTs (Warren & Daly 2005; Warren 2005). A con-  

---

1 In this study the terms declarative and statement are used in a specific manner so as to avoid ambiguity. Declarative will always refer to the modality of a sentence, and statement the syntactic structure.
trolled experiment examining the perception of HRTs and the location of rise onsets supports this view (Zwartz & Warren 2003).

In this study, multiple factors will be analyzed in order to examine the behaviour and form of HRTs in Australian English. Both narrative and collaborative speech will be elicited from the participants, and the resulting data will be annotated on several different levels, including: speech act, dialog act, syllabic, phonological intonational features, and phonetic features relating to the F₀ level and timing of the rise onset. The associations between these features will then be examined and the results discussed in comparison to previous research on both Australian and New Zealand English. It is hoped that this study will add to the literature on HRTs in Australian English, and help to further explain the role they play and forms in which they are realized which is a difficult area to study.
2. Literature Review

This section will discuss the theoretical background of intonation research and previous research in regards to HRTs in Australian and New Zealand English. Both question and declarative HRTs will be described, and research into the function of both types will be presented, as will research into both the phonological and phonetic forms of HRTs. Finally, the motivations and aims of this study will be presented.

2.1 Theoretical Background of Intonational Phonology

Arguably the most influential theoretical framework for tone and intonation is the autosegmental-metrical model. First developed as autosegmental phonology by John Goldsmith (1976), and later termed autosegmental-metrical (AM) by Ladd (1996), the AM model represents phonetic features on separate, and parallel (as opposed to earlier linear models), hierarchical tiers. As a result, each individual feature (such as segments, syllables, stress and intonation), can be studied individually, as can the relationships between the levels.

The AM framework, and contemporaneous work by Gosta Bruce (1977) in his analysis of the intonation of Stockholm Swedish, influenced Janet Pierrehumbert’s (1980) development of a phonological model to account for the intonational system of English. As opposed to earlier contour-based models (such as Halliday 1967), which considered the shape of the entire pitch contour of the intonational phrase (IP), Pierrehumbert’s account treated the contour as a sequence of pitch targets and boundary tones. These targets are categorized into three pitch events: pitch accents are peaks or troughs in the contour that align with metrically prominent syllables; the boundary tone is the endpoint of the pitch contour; and the phrase accent, which is the section of contour between the final (known as the nuclear) pitch accent and the boundary tone. A labeling system was later developed based on this model, called the Tones and Break Indices (ToBI) (Beckman & Ayers Elam 1997). In the ToBI system, the pitch targets are labeled as high (H) or low (L), and each different type of pitch event is associated with a different symbol; ‘*’ for pitch accents, ‘-’ for phrase accents, and ‘%’ for the boundary tone.
Figure 1. Examples of a speaker saying the word ‘Anna’, using both a falling and rising tune.

For example, Figure 1. shows a spectrogram of a speaker saying the word ‘Anna’ using different tunes. The pitch accent is located on the first syllable, hence where it is marked high ($H^*$) or low ($L^*$) depending on the speakers range. The phrase accent is then marked as high ($H^-$) or low ($L^-$) depending on whether the pitch trace is decending or ascending after the pitch accent, and the endpoint of the contour is then marked as high ($H^\%$) or ($L^\%$), according to the level at which it is located. The falling tunes would therefore be annotated as $H^*L^\%-L^\%$, and the rising tune as $L^*H^\%-H^\%$.

2.2 High Rising Terminals

In English intonation systems, speakers generally perceive an utterance-final falling intonational tune as indicative of a declarative, and a final rising intonational tune as indicative of a yes/no question or some other information request. It is this latter rising boundary tune that is the subject of the present study.
Commonly called a ‘high rising terminal’ (HRT), it has been defined phonetically as having a sharply rising pitch contour that, beginning on the nuclear syllable and finishing at the end of the intonational phrase (IP), rises to a level at least 40 percent above the $F_0$ of nuclear syllable (Guy et al. 1986). Its phonological form as labeled using the ToBI system is as a rising phrase accent (H-) and a high boundary tone (H%): H-H%. It is so strongly representative of a question that it is known commonly as ‘questioning intonation’, and some in academic literature as ‘Australian Questioning Intonation’ or AQI (Guy et al. 1986), and when used on utterances that are syntactically statements (i.e. do not feature the subject/verb inversion of a question), it will give them an interrogative rather than declarative meaning. For example, in the following exchange, the response of the second speaker can be constructed as either a declarative (1a) or a question (1b), simply by using a different boundary tune:

(1.)

a) Speaker 1: I met up with John the other day, did you know he’s studying economics now?
   Speaker 2: He’s that crazy.

b) Speaker 1: I met up with John the other day, did you know he’s studying economics now?
   Speaker 2: He’s that crazy?

In some varieties of English however, the function of HRTs differs slightly from this popularly perceived standard usage. In these varieties, which include English spoken in Australia, New Zealand, Ireland, and Northern England (c.f. Fletcher, Grabe, & Warren 2005; Grabe, Kochanski, & Coleman 2005; Guy et al. 1986; Jarman & Cruttenden 1976; Warren 2005), to name a few, it is possible to produce a statement with a HRT which retains the declarative meaning (Guy et al.1986). This usage functions in conjunction with the above system - in other words speakers can still use HRTs to indicate an interrogative. McGregor (2006, p.169) best described this difference thus: the original usage is the speaker questioning “the propositional content of the utterance,” whilst the second usage seems to “question the listener’s understanding of the proposition” (also see Horvath 1985).
2.2.1 Function

It is the declarative usage of HRTs that has been the biggest area of interest and research in Aus-
tralian and New Zealand English intonation over the last two decades. Guy et al. (1986) sug-
gested that declarative HRTs are associated with younger and female speakers, and evidence
from their analysis of both contemporary speech data and data from the 1960s, point to this us-
age being a relatively recent innovation. Though this seems to be changing, as more recent stud-
ies have shown male speakers having a slightly more frequent rate of usage (Fletcher & Harring-
ton 2001; Fletcher, Grabe & Warren 2005).

Incidentally, some other varieties of English also use declarative HRTs, such as those spoken in
Northern England and Belfast. However, they differ to Australian and New Zealand English
HRTs both phonetically and in their function; the rise starts earlier in the IP, has more of a pla-
teatu-shaped pitch contour, and the HRTs function simply as an unmarked declarative (Jarman &
Cruttenden 1976; Fletcher, Grabe & Warren 2005).

Declarative HRTs in Australian English on the other hand appear to have specific communica-
tive functions. Much of the previous research attempts to address why such an innovation would
be present, when it in fact has the potential to cause ambiguity and confusion. Anecdotal ac-
counts tell of people not familiar with Australian English initially having trouble with declarative
HRTs (Guy et al. 1986). The fact that Australian and New Zealand English speakers have
adopted such a potentially ambiguous feature indicates that it is not simply due to free phonetic
variation of utterance-final tunes, but that it indicates some sort of distinction that is useful in
interactive discourse.

Guy et al. (1986) speculated that the declarative HRT originated from the questioning intonation
tune; the phonetic form of the rise simply shifted over to the declarative and its function
changed. Rising intonation is so strongly associated by speakers with an interrogative sentence
modality, that when it was used with declaratives, it retained an interrogative function of a sort,
as Ladd explains, “the intonation is a kind of shorthand for ‘Do you follow me?’” (1996, p. 121).
Therefore the function of the HRT shifted from questioning the propositional content of the ut-

terance to questioning the listener’s understanding instead, and acts as a kind of checking mechanism to ensure that the listener is following and understands (Guy et al. 1986), or simply that they are engaged in the conversation (Horvath 1985).

If it is the case that declarative HRTs are functioning as a kind of checking device, it is likely that they are being used in structuring conversation management. Meyerhoff (1991) suggested that HRTs are being used by interlocutors in such a way to ensure mutual understanding in conversation. This view is supportive of the collaborative theory of communication, in which conversation is viewed as an interactive, two way activity in which both parties must collaborate each step along the way to ensure mutual understanding is reached before moving along, a process which has been called ‘grounding’ (Clark & Schaefer 1987). This suggests that speakers are using declarative HRTs to check the understanding of the listener is a way of ensuring that grounding is being successfully performed.

Another distinction between question and declarative HRTs is in their location in turn construction. Question HRTs are usually located turn-finally, because a response is generally expected immediately from the listener. Declarative HRTs on the other hand do not expect a response, and multiple studies have shown that they usually occur turn-internally (c.f. Fletcher et al. 2002; Fletcher & Loakes 2006). Fletcher et al. (2002) came to the conclusion that declarative high rises use ‘continuation’ intonation, rather than questioning, and Fletcher and Loakes’ (2006) found that almost all of the non-question HRTs in their study were turn-internal. As a result of these types of observations, many have suggested that declarative HRTs have come to perform a further interactional function as a floor-holding device (Guy et al. 1986; Guy & Vonwiller 1989; Fletcher et al. 2002; Fletcher & Loakes 2006).

Further evidence for the role of HRTs in conversation construction comes from the apparent relationship between HRTs and particular dialog acts. Various studies have examined the categories of dialog acts on which HRTs were used, and how these dialog acts functioned in the conversation (Fletcher et al. 2002; Fletcher & Loakes 2006; McGregor 2006). They broadly classified dialog acts into one of two groups - backward-looking communication acts, which referred to previous discourse, and forward-looking communication acts, which affected subsequent dis-
course. Their findings that almost all HRTs were used with forward-looking communication acts supported the theory that “rising (and non-falling) tunes are associated with more ‘open’ meanings, signaling ‘discourse incompleteness’, whereas falling tunes have a more ‘closed’ meaning, signaling discourse completion or finality” (Fletcher & Loakes 2006, p. 43). In other words, a function that question and declarative HRTs have in common is that they occur on dialog acts whose intention is to continue the flow of conversation, either by expecting a response from the listener (question HRTs), or by indicating that the speaker intends to continue speaking (declarative HRTs).

These uses for HRTs, to elicit information, check understanding, and construct turns, explain why they have been found to be particularly prevalent in narrative and collaborative dialog; so-called ‘semantically complex’ speaking tasks (Guy & Vonwiller 1989). Narratives are semantically complex because they require the listener to understand each part before the speaker can continue on with the story. Considering the use of declarative HRTs as checking the understanding and involvement of the listener, it is not surprising that they are common in this context (Fletcher, Grabe & Warren 2005). Collaborative speaking tasks require the interlocutors to work together to share information and check understanding in order to reach a common goal. For this reason many studies examining the declarative HRT in Australian and New Zealand English have used speech from a map task (Anderson et al. 1991) that requires participants to describe a path to each other in order to reach a certain location (c.f. Fletcher et al. 2002; Fletcher and Harrington 2005; McGregor 2006). The need for ‘grounding’ is obvious here, where both participants need to ensure that they understand each other before moving on to the next step.

In conclusion, it seems that in Australian and New Zealand English the HRT has two functions. Guy et al. (1986) suggests that there is on one hand the question HRT that has a propositional meaning - it distinguishes questions from statements, occurs turn-finally, and questions the propositional content of the utterance - and on the other hand the declarative HRT which has an interactional function - it serves an interactional function as a checking mechanism, ensuring that the listener is following and understanding, and occurs turn-internally.
2.2.2 Form

This section will discuss research examining both the phonological form and phonetic realization of HRTs in Australian and New Zealand English.

2.2.2.1 Phonological Form

If, as much research appears to suggest, HRTs in Australian English perform two semantically distinct functions, there is a fundamental question about the production of the two types: is there evidence for a categorical difference in the way that speakers produce and listeners perceive these HRTs?

Some of the earliest suggestions were that declarative and question HRTs were phonetically identical; simply the intonation contour of question HRTs being used with declaratives (Guy and Vonwiller 1989; Cruttenden 1995; Ladd 1996). However, these initial theories were either based on impressionistic views, or on instrumental research based on the contour-based models of intonation (Guy et al. 1986).

However, as Fletcher et al. (2002) point out, the contour-based approach only takes into account the overall shape of the contour, and in doing so misses out on information such as the relative level of the nuclear pitch accent. Fletcher and Harrington’s (2001) study found that there was a significant difference between types of nuclear accents in question and declarative HRTs; the majority of question HRTs had a high ($H^*$) nuclear accent, and declarative HRTs had a low ($L^*$) nuclear accent. The results indicated that speakers were signaling a difference between question and declarative HRTs by using the nuclear accent tone, and from this Fletcher and Harrington concluded that contrary to previous thought, declarative high rises are not simply the result of redeploying questioning intonation onto declarative utterances - the two types are phonologically distinguishable. Despite the different onset levels, the contour shape of both types remains the same, which is why the Halliday (1967) contour-based system is inadequate to account for the distinction.
Further evidence for this distinction came from Fletcher et al.’s (2002) study which showed that HRTs with H* onsets are more likely to be found in a turn-final position, which, as discussed above, is the location where questions are most commonly located.

However, the relationship between nuclear accents and HRTs may not be so clear cut. A study by McGregor (2006) looked at the issue from a different perspective, and found a significant relationship between the nuclear accent and the response that the speaker expects. A H* pitch accent was used when a confirmation response was expected, and a L* pitch accent when they expected requested information or were not sure what response to expect. It therefore appears that the functions of HRTs may be a more complicated system than initially thought.

2.2.2.2 Phonetic Realization

Researchers have found other aspects of the form of HRTs that do not match Ladd’s (1996) initial description that the rise begins on the nuclear syllable. Recent work on New Zealand English, found that in utterances with a polysyllabic boundary tune unit (i.e. utterances in which the nuclear accent does not fall on the final syllable and therefore the boundary tune is extended over multiple syllables), the majority of rise onsets were actually located on a syllable after the the nuclear accent (Warren & Daly 2005; Warren 2005). Warren and Daly (2005) calculated the location of the rise onset syllable as a fraction of the total number of post-nuclear syllables, and found that declarative HRT rise onsets occurred significantly later than question HRTs.

Based on a discussion by Grice, Ladd, and Arvaniti (2000) about the association between phrase accents and certain stressed syllables, Warren’s (2005) subsequent study measured the location of the rise according to the metrical strength (strong or weak, depending on the prominence of the syllable relative to those surrounding) of post-nuclear syllables (PNS). He listed three options for where a rise could begin - on the nuclear syllable, on a metrically strong PNS, or a metrically weak PNS. The results showed that question HRTs were distributed relatively equally across all three locations, but in declarative HRTs the majority of the onsets were located on the strong PNS, with the second most common position being the weak PNS. This also confirmed that the rise onset of declarative HRTs occurs later than question HRTs, refuting Ladd’s (1996) earlier description. Warren (2005) suggests that the distribution across weak or strong PNSs might sim-
ply be a result of the phonetic structure of the underlying form, and that the explanation for the location of the rise onset is the alignment of the phrase accent. In conclusion he suggests that in declarative HRTs the anchor point for the phrase accent is both the nuclear accent and a metrically strong PNS, or the final weak PNS if there is no strong PNS present.

Further evidence for the use of the alignment of the rise onset as a distinguishing feature between declarative and question HRTs in NZE comes from a perception experiment performed by Zwartz and Warren (2003). By controlling the pitch contour of a IP with a very early nuclear syllable, Zwartz and Warren could test listener’s judgements of which type of contour represented a question or declarative. They found that participants judged sentences with late and steep rises as declaratives, and the earlier rises with a lot of high pitch as questions.

2.2.3 Systemic Differences Amongst Varieties

Overall, the results of past studies have shown that speakers of Australian and New Zealand English differ from most other English varieties in the use HRTs both for indicating a propositional meaning (question HRTs) and for interactional functions (declarative HRTs). Using Ladd’s (1996) typology, this difference has been classified as semantic, systemic (Fletcher, Grabe & Warren 2005, Warren 2005) as well as realizational (Fletcher, Grabe & Warren 2005). What is unclear however, is if the two varieties differ from each other in their use of this feature. It would be useful to analyze and compare the systems of both varieties in order to examine whether the Australian and New Zealand English HRT systems perform in the same manner. Results from such analyses would also provide more information on the functioning of each system individually.

2.3 Motivation and Aims of this Study

Firstly, something must be said for the justification of research on HRTs. Despite only making up a small percentage of overall speech (Fletcher & Loakes 2006; Horvath 1985; McGregor 2006;), declarative HRTs are of interest not only to linguistic researchers, but also outside of academia, because while they are viewed as a characteristic of Australian English, they are also a
regularly stigmatized feature (Fletcher, Grabe, & Warren 2005; Ladd 1996; McGregor 2006), being reported as sounding “wheedling or insistent” (Ladd 1996, p.121) or uncertain and hesitant (Warren 2005; Zwartz & Warren 2003). However despite this negative perception they have been shown to be increasing in usage over the last 50 years (Guy et al. 1986).

The motivation of this study is to build on the current literature of HRT research in Australian English. It will attempt this by replicating some previous studies addressing both the form and the function of declarative HRTs. Narrative and collaborative type speech data collected from Australian English speakers will be analyzed in order to assess the rate of usage and distribution of HRTs overall, and also their function in regards to dialog acts. The phonological distinction of nuclear accents between question and declarative HRTs will also be examined in order to see if past results are supported.

The main goal is to examine the phonetic features of timing of the rise onset in order to compare Australian English HRT system to previous results found in New Zealand English. The results of this study should provide evidence for or against the systems functioning in the same way.

2.3.1 Aims

- Examine the use and distribution of HRTs in Australian English.
- Examine the function and phonological form of HRTs in comparison to previous findings on Australian English.
- Examine phonetic aspects of timing in comparison to results found for New Zealand English.
3. Methodology

Most recent quantitative research regarding intonation has been performed using acoustic phonetic analysis of digitized recordings of speech of speakers. These experimental phonetic techniques allow for a much more precise measurement of tunes and \( F_o \) than would be possible using auditory analysis alone. For this reason, this study follows in the footsteps of past studies in using specialized computer software to aid in analyzing the gathered speech data.

3.1 Participants

Four participants were involved; three females and one male, all were between the ages of 22 and 30. All were native Australian English speakers. By chance they were from different regions of Australia; the male was from New South Wales, two of the females were from Western Australia, and the remaining female from Victoria. The participants were known to the researcher as friends or through other personal friends. Apart from two of the female participants that were personal friends, the participants had not met previously. Two of the female participants were enrolled as students in a Master of Speech Pathology at La Trobe University, and other female and male participant were postgraduate linguistics students at the University of Melbourne. Ethics approval was obtained from the Human Research Ethics Committee.

3.2 Data Collection

There were two components of data collection. In order to ensure that enough samples of declarative HRTs were gathered, the first component involved the researcher asking the participants topical questions in order to elicit casual narrative speech. The questions asked pertained to general past experiences such as ‘Tell me about South Korea/Argentina/Esperance’, ‘What did you do last Christmas holidays?’, ‘How are your assignments going?’, ‘Why did you decide to do linguistics/speech pathology?’. The participants were allowed to speak for a few minutes, with the only interruption being another question from the researcher when the speaker had reached the natural conclusion of their narrative. The type of questions asked elicited narrative

\[^2\] This study was approved under the minimal risk scheme by the University of Melbourne Human Research Ethics Committee (HREC no. 0830243).
speech from the participants, a type that has been shown to contain a high percentage of HRTs (Guy & Vonwiller 1989). This section also served to encourage the participants to relax in the unfamiliar studio setting before performing the next task.

The second part involved the participants being put into pairs to perform a matching task (adapted from Clark & Wilkes-Gibbs 1986) which required them to match geometric tangram figures by describing them verbally. Each participant was given one of two roles: matcher or director. The director was given a sheet of eight consecutively labeled (1-8) tangram figures, which they had to describe to the participant in the matcher role, who was given a sheet of twelve consecutively labeled (A-L) tangram figures (see Appendix A). Eight of the figures on the matchers page were identical to the figures on the directors page - the matchers sheet has a larger amount of figures to prevent the participants from using a process of elimination. Also, in order to avoid the participants using spatial communication (such as gestures) and in turn to encourage more detailed verbal description in describing the figures, they were positioned back to back, facing away from each other, out of each others’ line of sight. The director then described the figures one by one consecutively to the matcher, who said ‘got it’ and wrote down the answer when they believed they had found the corresponding figure. The participants were informed that they could use any method to describe the figures that they wished, as long as it was verbal, and the matcher could ask any questions. Generally they tended chose from one of two of methods; either describing the figures geometrically (“it’s got a square on the top that’s tilted”), or pictorially (“they’re sitting down, with one leg in the air”). This task elicited descriptive and collaborative type speech, both of which have been shown to contain a high proportion of declarative HRTs (Guy & Vonwiller 1989), and the collaborative nature also served to elicit yes/no questions which are traditionally signaled with a HRT.

The data collection was performed in a sound recording studio (Horwood Language Centre at The University of Melbourne) where the participants spoke into individual microphones and the tracks were recorded separately for each person. They were recorded digitally at 22kHz.
3.3 Data

The resulting data was analyzed using the phonetics program *Praat v. 5.0.22* (Boersma & Weenink 1992-2008).

3.3.1 Labeling

Intonational phrases (IPs) featuring HRTs (H-H% boundary tune) were identified both through auditory analysis and acoustically; by firstly listening the audio tracks and identifying those IPs with a rising boundary tune, and then, having singled all examples out, examining the pitch trace on the spectrogram to ensure that it was in fact a high rise.

Figure 2. An example of the different levels of annotation performed on a IP with a HRT.

Figure 2 presents the different levels of annotation performed on IPs featuring HRTs. Firstly phonological labeling of intonation was performed using the ToBI framework adapted to Australian English (Fletcher & Harrington 2001). Once an IP with a HRT was identified, the rising phrase accent and high boundary tone were labeled as H-H%. The nuclear accent was identified as the final metrically prominent (in terms of loudness and intensity) syllable of the IP, and was labelled as either low (L*) or high (H*) depending on its location in the range of the speaker and the position of the accent in relation to other stressed syllables in the phrase. The duration of the
nuclear accent was marked as beginning on the rhyme and finishing at the end of the syllable in question.

Secondly, those phrases with HRTs were annotated for phonetic information. The $F_o$ of all accented syllables was extracted and marked in the centre of the nucleus of the syllable, and the $F_o$ of the endpoint (highest point) of the rise was also marked.

Features of rise timing were marked on a separate tier at three locations - at the onset of the rhyme of the final accented (nuclear) syllable, the onset of the rise (phrase accent), and the location of the endpoint of the rise (the same location as the boundary tone and final measurable $F_o$ value of the rise). The onset of the rise was easily identifiable as the elbow in the pitch trace where the $F_o$ begins a noticeably steep increase. In some instances, words had a period of voicelessness between the nuclear syllable and the phrase accent, resulting in a pitch trace that looked more like a step up rather than an incline. As the timing of the rise onset cannot be accurately pinpointed in these instances they were discounted from the analyses regarding rise timing and alignment.

The height of the rise and the location of the onset were then recorded as percentages. For example, the HRT in Figure 3. has a nuclear accent with a $F_o$ of 195 Hz and the endpoint of the rise is 381 Hz. This means that the endpoint rises to a level 95% above the nuclear accent. In regards to timing, the entire tune, measured from the beginning of the nuclear accent to the endpoint of the rise, is 0.53 seconds. The rise itself, measured from the point where it begins to ascend, is 0.15 seconds, making it 28% of the total tune time.
Figure 3. Examples of the F0 levels and timing aspects of a HRT.

There were also some instances where phrase final creaky voice quality affected the output of the signal on Praat, resulting in halving of the pitch trace; i.e. the pitch-tracking algorithms were unable to estimate the proper F₀ because “the fundamental frequency is physically not well-defined” (Beckman & Ayers Elam 1997, p. 14) in non-modal voice quality. As an accurate F₀ level cannot be obtained for accented syllables or rise peak level, these instances were discounted for analyses concerning pitch level, but they were included in analyses regarding timing.

Some IPs have a boundary configuration that extends over multiple syllables due to the nuclear accent not occurring on the final syllable of the phrase. In these polysyllabic boundary tone groups, the post-nuclear syllables were annotated according to their metrical strength - strong or weak, as is displayed in Figure 4 and explained Figure 5.
The function of dialog acts was labelled for all IPs in the data, using the adapted DAMSL scheme used in Fletcher et al. (2002) and Fletcher & Loakes (2006) after Stirling et al. (2001). Each phrase was classified according to its action, either as having a forward-looking communicative function (affecting subsequent discourse) or backward-looking communicative function (reflecting previous discourse) (Stirling et al. 2001). Table 1. shows the different labels used.
Table 1. The major SWBD/DAMSL codes used for dialog acts.

<table>
<thead>
<tr>
<th>Forward-looking communicative functions</th>
<th>Backward-looking communicative functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>sd</td>
<td>a</td>
</tr>
<tr>
<td>statement</td>
<td>agreement</td>
</tr>
<tr>
<td>qy</td>
<td>b</td>
</tr>
<tr>
<td>question</td>
<td>acknowledge</td>
</tr>
<tr>
<td>ad</td>
<td>bk</td>
</tr>
<tr>
<td>action-directive</td>
<td>acknowledge answer</td>
</tr>
<tr>
<td></td>
<td>br</td>
</tr>
<tr>
<td></td>
<td>signal non-understanding</td>
</tr>
<tr>
<td></td>
<td>ny</td>
</tr>
<tr>
<td></td>
<td>yes answers</td>
</tr>
<tr>
<td></td>
<td>nn</td>
</tr>
<tr>
<td></td>
<td>no answers</td>
</tr>
</tbody>
</table>

3.3.2 Speech Act Classification

The phrases employing HRTs were categorized into two groups. Previously, studies have divided the HRTs broadly into questions and statements, yet have not discussed in great detail how this distinction was made. Such a distinction cannot be performed on purely syntactic grounds because, as discussed in section 2.2, an utterance that is syntactically a statement can be made to function as an information request if it is performed with a rising boundary tune. So how is the speaker’s intention judged in such examples? McGregor includes interrogatives that are “in the form of declarative questions” (2006, p. 185) in her classification of question HRTs, yet in the data collected here it was found that it is not always a simple distinction between a statement made into a question using a HRT and a statement HRT that performs as a declarative.

For example, in the following exchange, the sentence ‘they’re facing the left’ would be difficult to classify as a declarative or question:

(2.)³
N: I think (0.6) I’ve got it just wait so just to clarify (0.3) **they’re facing the left** (0.6) ‘n their [head]
J: [yeah]
N: (0.1) their head’s up and down and they’ve got like a look like they’re reading a book or something and then on the end of their toes there’s like a separate triangle or something that’s pointing down

---

³ Labeling conventions used here are as follows: Numbers in parentheses, such as (0.6) is a pause in speech, referring to seconds; *italicized* refers to speech which has a rising tune; and [square brackets] indicate overlapping speech.
The sentence ‘they’re facing the left’ is constructed like a question in statement form (a syntactic statement with a HRT to form a question), yet is the first in a list of declaratives describing a figure, so could just as easily be a declarative HRT.

As discussed above (§ 2.2.1), Guy et al. (1986) suggest that Australian English uses HRTs in two different ways. Firstly, the function which has a *propositional* meaning, signaling a propositional distinction between questions and declaratives with the use of a HRT. This is also the usage that signals a syntactic statement is functioning as an information request when coupled with a HRT. Secondly, the function which has an *interactional* function, using the HRT on statements that retain a declarative function which is used in conversation management - as a checking mechanism and for floor-holding. This distinction, propositional and interactional, is to be employed in this analysis, because intuitively classifying speech acts as ‘question’ or ‘statement’ is viewed as not being adequately precise. Henceforth, the terms ‘propositional’ and ‘interactional’ as used in this study correspond to ‘question’ and ‘declarative’ respectively and will be used interchangeably.

However the question still remains - how does one deduce the function of a declarative HRT when it can function both as an information request and as a declarative? What is required is to take Guy et al.’s distinction further, and propose a method to classify data. In order to keep the analysis as objective as possible, a method employing aspects of Conversation Analysis (CA) was used in this study. CA was developed in the late 1960s and is used in analyzing speech in terms of conversation construction, especially turn-taking (c.f. Sacks, Schlegoff and Jefferson 1974). As the two different types of HRTs function differently in terms of how they act in turn-construction, it is suggested that they can be defined in the way that interlocutors use and treat them. The propositional HRTs are almost always an information request and as such expect an immediate response from a listener and occur at the end of a turn. In effect, a listener will treat it as a transition-relevance place (TRP), i.e. they will perceive it as a place to begin their turn to speak. On the other hand HRTs with an interactional meaning are used turn-externally as a floor-holding device (Guy et al. 1986; Guy & Vonwiller 1989; Fletcher et al. 2002; Fletcher & Loakes 2006), and would therefore not be treated as a TRP by interlocutors. HRT phrases can therefore
be defined by the actions of the interlocutors, and reliance on the native speaker intuition of the researcher can be avoided. Therefore the function of HRTs is identified according to following criteria:

**Propositional**
- Designed and treated as a TRP by participants; and/or
- Syntactically marked as a question - subject/verb inversion

**Interactional**
- Not designed or treated as a TRP

Therefore, when applying these criteria to the data, example (2) above can be classified by relying on evidence that both participants are treating it as a TRP - speaker N leaves a 0.6 second pause as if expecting a response, and speaker J answers as if perceiving a TRP.

It is suggested that in using this method, speech acts that would otherwise be intuitively labeled as declarative or question will overall correspond to the interactional and propositional classification used here. However, by keeping the judgement as objective as possible, this method makes the classification of some ambiguous instances. Where the phrase could be intuitively judged one way or the other, the distinction is based on the behaviour of the participants, and therefore more reliable.

**3.4 Data Analysis**

The data was firstly analyzed to examine the proportion of HRTs as compared to total speech, as well as in each task separately and for each speaker.

The rest of the analyses involved the examination of the issue of whether different features are used to signify a categorical difference between question and declarative HRTs. Chi square analyses were performed to compare the expected distribution of HRTs amongst several different criteria; the two speech acts according to nuclear accent type (H* or L*), nuclear accent F₀, posi-
tion of the onset as a percentage of the entire boundary tone unit, and onset location in IPs with polysyllabic boundary tone units (nuclear syllable, metrically strong syllable, or metrically weak syllable).

An additional analysis involved correlating the height of the rise and the lateness of the rise onset to examine any potential relationship.
4. Results

This section will report the results of the analyses performed on the data in three main areas. It will firstly report on the proportion of HRTs used by speakers, and how they function in speech. It will then address the relationship between speech act and multiple variables to determine whether there is a phonetic or phonological distinction between question and declarative HRTs and how that distinction is realized - in the location of the onset of the rise, the alignment of the phrase accent, the tone of the nuclear accent.

4.1 Rise Distribution

All four participants used both question and declarative HRTs, and the percentage of HRTs in all the data was 16%.

When examined separately, both tasks used similar amounts of HRTs; HRTs made up 17% of the total speech acts in the interview component, and 15% in the matching task. Further breaking down the tasks into question versus declarative HRTs shows that significantly fewer question HRTs were used in the interview component, with only one question out of 38 HRTs.

Examining each speaker separately by each task shows that they used HRTs to differing degrees. Speaker D used the most HRTs in the interview, and Speaker J used the least - even when expressed as a percentage of the total speech acts the speaker produced in the task - 56% and 3% - the difference is pronounced. The other two speakers percentages were located between these two at 21% (K) and 8% (N).
When examining the matching task, Figure 6. shows that speakers J and N used more HRTs overall, which is to be expected as they took almost twice as long as speakers D and K to complete the task, and therefore used more total speech acts. When calculated as a percentage, the results are more equal, with the three female speakers using 19%, 19%, and 18% and the male speaker using 11% HRTs. The participants in the matching role (D and N) tended to use more question HRTs than their partner in the director role, for whom the opposite is true.

Overall in the matching task, there were more declarative HRTs (35) used than question HRTs (21).

### 4.2 Rise Function

When labeled according to SWBD-DAMSL system, it was found that almost all HRTs (95%) were used in forward-looking communication functions.
Table 2. Distribution of HRTs according to speech act and dialog act.

<table>
<thead>
<tr>
<th></th>
<th>Forward-looking</th>
<th>Backward-looking</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>sd</td>
<td>qy</td>
<td>b/bk/br</td>
</tr>
<tr>
<td>Question HRT</td>
<td>4</td>
<td>29</td>
<td>3</td>
</tr>
<tr>
<td>Declarative HRT</td>
<td>56</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 2. shows that interactional HRTs mostly consisted of statement (sd) dialog acts (97%) and the remainder were acknowledgements (3%). The make up of the propositional speech acts showed a little more variation, with the majority being question (qy) (81%), and the remainder made up of statements (sd) (11%) and acknowledgements (8%).

The few dialog acts with backward-looking communicative functions in the data were acknowledgements and answers to previous questions, for example:

(3.)
K: Which do you think you’ve doubled up on?
D: Uh, number three.
K: Okay.

Or, they were backchannels using ‘okay’ with a HRT to acknowledge the first speakers previous description, but also seemingly to signal them to continue their description (i.e. as an information request), for example:

(4.)
J: Um (0.9) and it’s uh then got (1.9) I don’t know maybe it’s just like a person sitting (0.8)
with no arms
(0.3)
N: Oka:y
(0.3)
J: And, um...
4.3 Rise Phonology: Distribution of H* and L*

A chi-square analysis showed no significant relationship between type of dialog act (sd, qy, b, bk, br) and nuclear accent (H* or L*) \((X^2 = 3.34, df = 4, p = .502)\), though four of the five backward-looking dialog acts had a H* nuclear accent.

As a percentage, the distribution of nuclear accents between question and declarative HRTs is displayed in Figure 7. 61% of the question HRTs had a H* nuclear accent, and 56% of declarative HRTs also had H* nuclear accents.

![Figure 7. Distribution of nuclear accent type according to speech act.](image)

The analysis also failed to show a significant relationship between nuclear accent and speech act \((X^2 = .057, df = 1, p = .811)\). There was a slight tendency for more H* accents than expected for questions (20 for an expected 19) and less than expected for declaratives (30 for an expected 31), but the tendency was negligible. Separating the data from both tasks and performing the analysis on the matching task (due to the lack of question HRT examples in the interview component) also showed no significant relationship \((X^2 = .141, df = 1, p = .707)\).
Analyzing the nuclear accent distribution by each individual speaker showed that the three of the speakers tended to use more H* than L*, as can be seen in Table 3, however none of the speakers individually showed a significant relationship between nuclear accent and speech act.

Table 3. Distribution of nuclear accent types between speakers, according to speech act.

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Question HRT</th>
<th>Statement HRT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H*</td>
<td>L*</td>
</tr>
<tr>
<td>D</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>J</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>K</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>N</td>
<td>10</td>
<td>9</td>
</tr>
</tbody>
</table>

The F0 of the nuclear accent also failed to show a significant distribution between speech acts ($t = .57, df = 80, p = .57$).

### 4.4 Rise Alignment

The results suggest that there is no relationship between the location of the rise onset (location of the rise onset as a percentage of the total time of the boundary tone configuration) and the nuclear accent type ($t = -.19, df = 63, p = .85$). In addition, the location of the rise onset and the height of the rise (as compared to the F0 level of the nuclear accent) - showed close to no correlation ($r = -.01$).

In IPs with a polysyllabic boundary tone group, there was no association between the rise onset occurring on the nuclear syllable, or a subsequent strong or weak PNS, and the nuclear accent - H* or L*. The overall distribution of rise onsets of HRTs that were realized across more than one syllable is as follows: 43% occurred on the nuclear syllable, 22% on a following metrically strong PNS, and the remaining 35% on a weak PNS. The last two figures combined reveals that 57% of rise onsets in this context did not start on the nuclear syllable.

A chi square test shows no significant relationship between syllable type and speech act type; question or declarative ($X^2 = 1.09, df = 2, p = .58$). Figure 8. shows the distribution of rise onset between question and declarative HRTs.
In terms of percentage, 35% of question HRT rise onsets were located on the nuclear accent, whilst 29% were on a strong PNS, and 35% on a weak PNS. The distribution of declarative HRT rise onsets was 47% on the nuclear accent, 18% on a strong PNS, and 35% on a weak PNS.

Figure 8. Location of rise onset in polysyllabic boundary tunes according to syllable.

There are at least four instances in which the rises start on a weak post-nuclear syllable even when there is a strong PNS present, and 29% of those weak PNS onsets were not located on the final syllable of the IP.
5. Discussion

5.1 Distribution of High Rising Terminals

The study showed that the overall rate of occurrence of HRTs is similar to other studies of Australian English. In the past, roughly similar rates have been shown; McGregor’s (2006) study showed that 16% of all IPs were HRTs, while Fletcher and Loakes (2006) showed a slightly higher rate at 19%. The results from this study also support Fletcher and Loakes (2006) observation that speakers use more HRTs than Horvath’s (1985) 1.6% and Guy et al.’s (1986) 2.29% for teenagers and .23% for adults. But this is where the similarities with past studies end in regards to rate of HRT use.

When examined separately, both tasks used a similar overall amount of HRTs, 17% in the solo task and 15% in the matching task. But in order to examine the rate of question versus declarative HRTs, it is necessary to separate the two tasks used in this study because the interview format of the first task does not encourage the use of questions, hence the very low rate of question HRTs. The matching task shows the use of question and declarative HRTs much more reliably. Therefore, judging by the matching task alone, the rate of declarative HRT usage differed a little from past studies - Fletcher and Loakes showed that and average of 12% of HRTs were ‘non-questioning’ (2006, p. 45) whereas in this study 37.5% percent of HRTs in the matching task were declaratives. It is possible that this is related to the different data collection methods, as Fletcher and Loakes used conversational speech, whilst this study used collaborative speech, however Fletcher and Harrington (2001) and McGregor (2006) also used a collaborative task to elicit speech and found that their participants used more declarative than question HRTs. The lower rates of question HRTs are however probably related to the lower number of questions in the data compared to declaratives.

Differences were also found when the results were examined for each participant individually. In the interview component the participants varied widely in the amount of HRTs they used, ranging from 3% at the least, to 56% at the most. This wide difference disappeared in the matching task where all participants used similar amounts of HRTs in their speech. The difference in indi-
vidual usage between the two tasks perhaps suggests that speakers use HRTs differently depending on the conversational context.

Fletcher et al. (2002) found that participants in the “information giver” role spoke more overall and therefore used more H-H% endings than did their partner. In this study, the role equivalent to information giver, the director, did not use more HRTs. The three female participants, one of whom was a director, all used similar amounts of HRTs at 19%, 19% and 18%, and the male participant, who was in the director role, used 11% HRTs.

Overall, these results do not show considerable differences of usage when compared to recent studies of Australian English. This study showed a much higher proportion of declarative HRTs when compared to Fletcher and Loakes’ (2006) study, however considering the different methods of data collection of the two studies, and the fact that within this study there are widely varying rates of HRT usage between the two different tasks, it is possible that it is the speaking tasks which explain this disparity.

5.2 Rise Function in Dialog

The results relating to the examination of the communicative function of HRTs supported Fletcher and Loakes’ (2006) finding of a significant relationship between utterances with a forward-looking function and non-falling boundary intonation. Almost all of the HRTs in this study were used in forward-looking speech acts (95%), with the remaining 5% being acknowledgements.

5.2.1 Nuclear Accent and Dialog Act

In regards to phonological categorization and dialog acts, Fletcher et al. (2002) found that in the map task, dialog acts with a backward-looking communicative function almost never featured a high (H*) nuclear accent. However in this study almost all of the backward-looking HRT dialog acts (all occurring in the matching task) featured a H* nuclear accent, with the only outlier being one that could not be categorized due to creaky voice quality affecting the pitch trace.
There was also no significant relationship between the nuclear accent and dialog act, unlike in Fletcher et al. (2002), who found that information requests (qy) were mostly associated with H* nuclear accents and statements and action directives (sd, ad) were associated with L* nuclear accents. It should be noted however that in the Fletcher et al. study, the dialog act (whether qy or sd) would correspond to the traditional question/statement distinction, but in this study, because of the interactional/propositional method of distinguishing speech acts, the propositional category was made up of 11% sd dialog acts, which may have affected the outcome of the analysis.

5.3 Distribution of Nuclear Accent

Although the data here showed a similar trend to Fletcher & Harrington’s (2001) study of question HRTs having more H* nuclear accents, the result was much more pronounced in Fletcher and Harrington’s data, where they found 91% of question HRTs featuring a H* compared to 61% in this study. In line with Fletcher and Harrington, the declarative HRTs were found to have a larger amount of variation, but this time in the opposite direction - whilst 84% of declarative HRTs had a L* nuclear accent in their study, here is was found that 44% did. As a result, unlike Fletcher and Harrington’s study, this study found no significant relationship between nuclear accent and speech act, even when calculated for the matching task alone in an attempt to account for the declarative-heavy interview component, or when calculated for each speaker individually.

Furthermore, Fletcher and Harrington also found that a phonetic analysis of the nuclear accents’ $F_o$ level showed a significant distinction between question and declarative HRTs, yet in this data the difference between $F_o$ of the nuclear accent was not significant.

Overall, the results fail to show any indication that speakers are using the nuclear accent tone (H* or L*) to signal a systematic difference between question or declarative HRTs. This may also suggest that the H*/L* distinction is not as robust as previously thought. It must be kept in mind however, that there are differences between the data collection in the studies which could be responsible for some of these differences. Fletcher and Harrington (2001) for instance, also
used a set of older speakers from the Sydney area, whereas in the current experiment all speakers were between the ages of 22 and 30, and came from a variety of locations around Australia.

5.4 Rise Alignment

The results in this study support Warren and Daly’s (2005) results showing that when a IP has one or more syllables following the nuclear accent (a polysyllabic boundary tune), the onset of the rise can begin some time later than the nuclear accent. This shows that HRTs in both Australian and New Zealand can differ from Ladd’s (1996) description of HRTs as beginning on the nuclear accent. However, this study showed that the proportion between the two varieties differed; in New Zealand English 76% of rise onsets in polysyllabic boundary tone units started later than the nuclear syllable, whilst a lower percentage (57%) was found later than the nuclear syllable in Australian English.

Other aspects of the results did not reflect previous research examining the location of the rise onset in New Zealand English. Using the same data as Warren and Daly (2005), which examined speech from young (16-19 years of age) male and female speakers, Warren (2005) categorized the post-nuclear syllables into metrically strong or weak and found that (in addition to the 24% started on the nuclear accent) 38% started on a metrically strong PNS, and 38% on a weak PNS. The Australian English speakers on the other hand started 22% on a strong PNS, and 35% on weak PNS. Therefore, not only did more rises start on the nuclear accent in Australian English, less started on a strong PNS.

The differences can be examined in more detail when the distribution is split into questions and declaratives. Warren found a significantly stronger tendency for declarative HRTs to be located post-nuclear - the majority of the declarative high rises in his data occurred on the weak PNS, with the next most common position being the strong PNS (2005, p. 215, figure 3). The distribution of declarative HRTs in this study was quite different - the largest percentage (47%) of rise onsets was located on the nuclear syllable, with the next most common position being a weak PNS (35%) and the remaining (18%) on the strong PNS. So although there are still more rises starting post-nuclear in declarative HRTs in this study, the difference is very slight, and conse-
quently the distribution is very different to Warren’s (2005) study. Therefore, despite the distribution of the rise onsets of question HRTs being similar to Warren’s results (in both the distribution is roughly equal over all three locations), this study failed to show a significant relationship between location of the rise onset and speech act.

According to these results, the phonetic realization and phonological anchoring of HRTs in Australian English appear to be different from New Zealand English. Further evidence of this is found in the fact that whilst Warren (2005) states that “For NZE rises, it seems that the anchor points for a phrase accent are the nuclear syllable and a post nuclear syllable, which is a metrically strong post-nuclear syllable if one is present, but is otherwise the final unstressed (peripheral) syllable”. (p. 225), the data in the current study shows that there are at least four instances in which the rise is located on a weak post-nuclear syllable when a strong PNS is present, and 29% of rise onsets located on weak PNS were not located on the final syllable. So whilst Warren suggests that the distribution of post-nuclear rise onsets may simply be a result of the underlying phonetic structure of the utterance (i.e. the presence of metrically strong PNS, or lack thereof), it appears that in Australian English the metrical strength of the PNS is not relevant. It seems thus far that the alignment of the phrase accent in Australian English is not used as a phonological device to distinguish between questions and declaratives, and, pending further investigation, is simply phonetic variation.

5.5. Further Considerations

The results found here, when compared to previous studies on Australian English, show a larger amount of phonetic variation, which calls into question previous findings of a systematic functional difference between L*H-H% and H*H-H% tunes. Although it is beyond the scope of this study to make a firm conclusion concerning the status of these two contours in the intonational inventory of Australian English, it is possible that the distinction is not as robust as previously thought, or that methods of data collection eliciting types of speech have affected the outcomes. However this requires further investigation.
Multiple different speech corpora have been used as data in the study of HRTs. The majority of previous studies have used collaborative speech data from participants completing the map task (c.f. Warren and Daly 2005, Warren 2005, Fletcher & Harrington 2001, McGregor 2006). Other studies have examined conversational speech data (Fletcher & Loakes 2006). This study on the other hand, whilst still using collaborative speech from the tangram matching task, also incorporated narrative speech from the interview component. It is possible that the HRTs function differently in these different contexts. The widely differing rates of usage for the individual speakers in the two tasks (some using far less or far more HRTs in the interview as opposed the the more even rates among speakers in the matching task) certainly suggests that they utilize HRTs differently in the two contexts, and this may have had an affect on the results.

Another potential issue is the uneveness of gender of the participants. McGregor (2006) found that females used mostly L* onset for declaratives (56%) and mostly H* onsets for questions (67%), whereas males used mostly H* onsets for both speech acts (63% and 71% respectively) indicating that gender plays a role in how HRTs are realized. The use of three females and one male in this study may therefore have an effect on the resulting data. However, despite 3/4 being female, all speakers used a greater amount of H* nuclear accents for both speech acts, which according to McGregor’s study would be more indicative of male, rather than female speakers.

The declarative HRT is a feature that has been present for at least the last 50 years, and, as shown by Guy et al. (1986), that has increased in usage over this period. Research into its prevalence in Australian speech has been performed on speakers from Sydney and Melbourne, and this study differs because it includes speakers from Western Australia. Western Australia is geographically isolated by a vast distance from the eastern states, and it is perhaps possible that the system of HRT usage is developing differently there, as this study suggests it is from New Zealand English. However, there is already a documented difference between the phonological systems of Australian and New Zealand English, and a difference between intonational systems would not be inconceivable, whilst on the other hand no such definitive difference has been found between Australian English speakers from the western and eastern areas of the country. Empirical tests would need to be carried out in order to examine the issue further.
An additional issue in this type of study is that the analysis rests on the assumption that question and declarative HRTs function in two distinct ways - i.e. that the propositional and interactional meanings suggested by Guy et al. (1986) do not overlap in their respective environments of turn-final and turn-internal. This may not be entirely accurate, as Horvath (1985) has pointed out that declarative HRTs are sometimes used turn-finally to indicate non-assertiveness (the ‘oka: y’ in example (4.) would fit this example. With rising intonation it seems to indicate that the speaker has not quite understood, but with a falling intonation it would be perceived as more assertive, signaling comprehension).
6. Conclusion

This study used narrative and collaborative speech data from Australian English speakers in order to examine a number of different issues in relation to HRTs. It compared the results of this data to previous studies on Australian English intonation, and also to results from studies on New Zealand English. Previous notions about the function of HRTs were supported, but those regarding a phonological or rise onset alignment distinction between speech acts were not.

It is possible that the use of two different tasks in gathering speech data from the participants may have affected the results. However this aspect of the study of intonation, or even prosodic features in general, will always be problematic. Intonation is an especially difficult feature of speech to study because it performs many functions simultaneously. In addition to signaling lexical, propositional and interactional meanings, it can serve to indicate the emotional state and attitude of the speaker, and it therefore seems that the intended and perceived meaning of HRTs relies heavily on the context of the speech and the shared knowledge of the participants. This leads to a conflict in how to best study intonation. On one hand, it appears that HRTs need to be studied in a detailed qualitative manner, as McGregor and Palethorpe (2006) explain: “it is crucial to investigate intonational meaning within the context of the unfolding discourse.” (p. 21). The downside of taking this approach is the difficulty in accounting for all variables. The way to control and account for these variables is to elicit and examine speech data in a very controlled environment, such as the perception test by Zwart and Warren (2003). The limitation of this method is that the speech data obtained is produced in an artificial environment, and may not be accurately representative of the natural use of language. It seems that any study of intonation will always have its limitations, and researchers must take care to be aware of these and account for them as best as possible in a final analysis.

Studies such as this one are useful not just in adding to theoretical literature and the understanding of intonation in general, they are also helpful in leading to an understanding of a feature that has been, and still is, stigmatized in Australian English (Fletcher, Grabe, & Warren 2005; Ladd 1996; McGregor 2006). Fully understanding the usefulness of of such a feature may serve to undermine negative popular perceptions, and to assert that the use of declarative HRTs is in fact a
useful communicative device. A better understanding of their usage will also be helpful in informing those who speak other varieties of English, or even other languages; i.e. in foreign language teaching.

When viewed in comparison to past studies, the results here suggest greater phonetic variation than previously thought, and also that HRTs in Australian English differ to those in New Zealand English in terms of their phonetic realization. Whilst the latter variety shows a meaningful relationship between the alignment of the phrase accent and the semantic intent of the utterance, no such distinction was found in the data analyzed here. This means that although the usage of HRTs in Australia and New Zealand English seem to function the same semantically, there seems to be a systematic difference in relation to the anchoring of the phrase accent.
Appendix A: Matching Task Sheets

Director:
Matcher:
References


GOLDSMITH, J. A. (1976) Autosegmental Phonology; Ph.D. dissertation. MIT.


