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Belfast Intonation and Speaker Gender

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Abstract

Literature on the Belfast dialect of English typically describes it as one that is characterized by a rise-plateau nuclear pattern in declaratives. Informal listening suggests, however, that a falling nuclear pattern is employed in several instances, and its use appears to be gender related, in that it is found more frequently in female speech. A production study is carried out to discover the frequency of production of falling nuclear patterns in male and female speakers, and a perception test on Belfast speakers provides evidence that the use of falling nuclear pattern creates impressions of expressivity, emotional engagement, enthusiasm, and commitment to establishing effective interaction with the participant in the speech event.

Keywords

sociolinguistics, phonetics, intonation, methodological approaches

Since Lakoff's (1972, 1973, 1975) work in the 1970s on how the language of female speakers differs from that of males ignited a series of studies on language and gender, relatively few have focused on the relationship between intonation and speaker gender. The present study discusses how intonation patterns may be related to speaker gender in Belfast English and incorporates both the production and perception of nuclear pitch shape. Belfast English is described in the literature (Jarman & Cruttenden 1976; Wells & Peppé 1996; Rahilly 1997; Ladd 2008) as one of the few varieties of English that typically has a rise on the final accented syllable (the *nucleus*) of a declarative, followed by a pitch plateau, if sufficient segmental material follows the final accent. Most varieties of English, particularly the standard varieties often described in pedagogic texts, such as Southern British, General American, and Standard Australian

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English, normally have a falling nucleus in declaratives, also followed by a plateau if unaccented segmental material follows. The pitch pattern from the beginning of the nucleus to the end of the *intonation phrase* (the domain of the nucleus, also known as the *tone unit*), which may correlate with a syntactic unit such as a phrase or sentence (Cruttenden 1997:72), is in the present study referred to as the *nuclear pattern* (after Gussenhoven 1986:78).

Informal listening, however, finds that in several instances, instead of the "characteristic" rise-plateau pattern, a falling pattern is produced. It also appears that female speakers of Belfast English use the falling pattern more often than male speakers. This investigation presents details of the frequency of production of nuclear pattern types in a corpus of spoken Belfast English; it also presents evidence to suggest that Belfast speakers who use falling nuclear patterns in declaratives are perceived by Belfast listeners to be more expressive, emotionally engaged, assertive, and enthusiastic than those who do not.

Contribution to the Field and Previous Work

Sociolinguistics

This study contributes to research in the fields of sociolinguistics, phonetics and phonology, sociophonetics, and intonational phonology.

The study may add to knowledge in the field of sociolinguistic research, both in terms of the possibility that intonational variables may be interpreted, in a Labovian sense, as reflecting membership of a particular social category, and in terms of the more modern *Third Wave* approach (Eckert 2005, 2008) to variation research, which focuses on constructing social meanings and speaker personae from linguistic variation. This recent body of research builds on what Eckert terms the *First Wave* and the *Second Wave*, both of which consider linguistic variables to be dialect features associated with the demographic groups that use them most frequently. The Third Wave moves in a different direction, taking "social meaning" as its point of departure, a concept defined by Campbell-Kibler (2009:136) as "social content tied in the mind of a given speaker/hearer to a particular piece of linguistic behavior." The approach argues that social meaning is not a rigid structure reflected in linguistic variation but rather a constantly evolving and flexible entity, subject to reinterpretation and identification. This notion of flexibility is linked to Eckert's (2008:453) postulation of an "indexical field," described as "a constellation of ideologically related meanings, any one of which can be activated in the situated use of the variable." The meaning of the variable, then, is considered to be context dependent and associated with the characteristics that make up demographic categories, rather than with the categories (such as gender or socioeconomic class) themselves. The new wave thus shifts the focus from variable–demographic correlations to a consideration of how linguistic variation may be instrumental in the construction of social meaning and speaker personae. To date, studies on intonational function have

focused on how patterns may provide or add to discoursal and pragmatic meanings; few address the possibility that intonation patterns can provide information about speaker characteristics.

From the perspective of language and gender, the present study adds to current knowledge of linguistic practices and ideologies associated with speaker gender. Previous literature has found that female speakers may play an important role in sound change, and Labov (2001:321) describes females as "innovators of most linguistic changes," claiming both that they produce standard forms for stable variables more consistently and that they tend to lead males in the use of innovative forms for variables that are undergoing a change:

> In adopting new prestige features more rapidly than men, and in reacting more sharply against the use of stigmatised forms, women are again the chief agents of differentiation, responding more rapidly than men to changes in the social status of linguistic variables. Men follow behind with a lesser degree of investment in the social values of linguistic variation. (Labov 2001:321)

Holmes (1997:121) makes a related point in stating that "women are more status conscious than men and more sensitive than men to the significance of language as a reflection of social status." The implication here is that women use standard forms more often than men, particularly in formal contexts, and that they also introduce new forms from "external prestigious reference groups" (Holmes 1997:121). Holmes presents evidence to suggest that females lead in making phonetic changes in New Zealand English; changes include the decreasing use of /h/-dropping, increasing use of glottal stops (which have switched from being a stigmatized vernacular variable to one with more prestige), increasing use of syllable-timed, rather than stress-timed, rhythms, and increasing instances of final /z/-devoicing. In relation to intonation patterns, Guy et al. (1986) demonstrate that female speakers lead in intonational change in Australian English, with their increased use of the *high rising terminal* (a high rising nuclear pattern, discussed below), and Britain (1992) observes the same trend in Paheka women in Porirua, New Zealand. Moonwomon (1995) notes that females are more adept than males at style-switching, showing that African American females use a wide range of linguistic variants, depending on context. Middle-class teachers, for example, use standard forms for professional purposes, but for other purposes revert to the African American vernacular. This style-switching to the vernacular, it is claimed, enables women to communicate affect in ways that are not available in the standard variety, and allows them to maintain social relationships by creating solidarity.

Since the present study hypothesizes that female speakers of Belfast English use a particular linguistic variable (the falling nuclear pattern) more often than males, and are thus perceived as being more expressive and emotional than males, the question naturally arises as to whether or not emotional and expressive qualities are in turn related to the notion of femininity. Lutz (1988, 1990) explores relationships between

emotion and gender and considers that the expression of affect is gendered, claiming that "any discourse on emotion is also, at least implicitly, a discourse on gender" (Lutz 1990:69). Lutz argues that emotion is a social, rather than an individual, phenomenon, which is not innate in the person but rather is structured by, defined by, and learned from society. Emotional experience, she says, is "not precultural but pre*eminently* cultural" (Lutz 1988:5). This notion of social, rather than natural, conditioning of emotion and how it is displayed is supported by studies of the Kaluli people, a group of rain forest dwellers in the Southern Highlands of Papua New Guinea (Feld 1990; Schieffelin 1990), who find that it is the males who are stereotypically emotional, and manifestations of affect by them are highly valued and encouraged within their culture.

Similarly, Kulick (1998) shows how specific linguistic practices linked to emotion and gender create particular stereotypes, with the result that in another Papua New Guinean village, Gapun, a linguistic shift occurred from the village vernacular, Taiap, to Papua New Guinea's official and most widely spoken creole language of Tok Pisin, to the extent that by the 1990s, no child under fourteen was using Taiap, and male speakers and many females speakers were increasingly exclusively using Tok Pisin. The author attributes this shift to an attempt, primarily by males, to distance themselves from the linguistic practices used in frequent, intense episodes of anger carried out in Taiap, displayed by many females, which lead to their stereotypical perception of being "childish, destructive and irresponsible" (Kulick 1998:99). Males who wish to disassociate themselves from this group use Tok Pisin rather than Taiap, leading to the reported language shift from the latter to the former. It seems likely, then, that particular communities have preconceived ideas about relationships among language, gender, and emotion and that the three are inextricably bound and interwoven in complex ways.

Phonetics and Phonology

Foulkes (2006:625-626) makes the point that, in the field of phonology, much more is known about speech production than speech perception and that research on phonological variation usually focuses on segmental, as opposed to suprasegmental, aspects of speech. This investigation goes some way toward redressing these imbalances in phonological knowledge, by dealing with perception as well as production and by focusing on a suprasegmental aspect (intonation), rather than on segmental features. Familiarity with phonetic variation within and between speakers and dialects is necessary from a theoretical point of view in order to lay empirical foundations for constructing adequate models of phonological knowledge: the more that is known about variation, the more that existing phonological models may need to be rethought and, possibly, reconstructed. More specifically, and pertaining to the present investigation, awareness of inter- and intraspeaker intonational variation is necessary for the formation of comprehensive intonational typologies (Grabe 2002), which since the advent of the autosegmental-metrical framework of analysis (for an overview, see Ladd 2008) has increasingly occupied intonational phonologists.

In practical terms, knowledge of phonetic and phonological variation is essential for interpersonal communication; this may be of particular relevance in the field of intonation, as listeners may generally be less familiar with this type of variation than with segmental. Differences in vowel production between speakers of different varieties of English, for example, do not normally lead to errors in comprehension: speakers of Belfast English, for instance, have little difficulty in understanding speakers of Southern British English, and vice versa, despite some significant differences in the vowel sounds produced. Listeners do, however, appear to be more likely to misinterpret unexpected or unfamiliar intonation patterns; to the uninitiated, perhaps, the Belfast English rise-plateau may be always interrogative rather than often declarative.

In relation to second language learning, it has been found that knowledge of intonational variation can play an important part in both producing and understanding language. Chun (2002:75) claims that intonational, and not solely segmental, errors need to be corrected for significant improvement to be attained in nonnative speaker comprehensibility, arguing that "prosodic deviance by language learners contributes significantly to the perception of foreign accent, affects comprehensibility and may affect intelligibility as well." Grabe et al. (2005) make a similar point, demonstrating that learners of English should be prepared for a wide range of intonation patterns from native speakers and that an awareness of variation is necessary to optimize their comprehension.

Research on variation in phonology can also effect technological advancement: in the area of speech technology, there is a strong emphasis on making speech synthesis systems sound more natural, and on training automatic speech recognition systems to respond to naturalistic speech (Douglas-Cowie et al. 2007). Knowledge of intonational variation may again be of relevance in such cases, as it is often a factor in indicating attitude and adding emotional coloring to speech, thus making synthetic speech more "human" and further removed from the monotonous, robotic speech formerly involved in speech technology. Increased knowledge of how expressive speech can vary according to social categories or speech style may assist in the development of complex speech systems. Theune et al. (2006), for example, describe how an expressive storytelling speaking style is achieved by changing the intonation of utterances produced by a text-to-speech system.

Forensic phonetics would also appear to be an area in which knowledge of phonological variation is of practical importance—for example, in profiling speakers in a criminal investigation or in organizing voice parades for the purposes of identification. Nolan (1991) emphasizes the need to approach speaker identification with caution, precisely because of the variable nature of speech. However, to attempt to provide any evidence as to the likelihood, say, that two speech samples were produced by the same person, some knowledge of variation and its causes—accentual, stylistic, physiological—is essential.

Sociophonetics

The idea of constructing a social meaning or speaker persona, on which the Third Wave approach (discussed above) is based, can be linked to the notion that gender can be "performed"—that is, that a variable can be used intentionally, so that the speaker, for whatever reason, may sound more or less typically masculine or feminine. Johnson (2005, 2006) addresses the idea of the performance of gender in his cross-linguistic investigations of formant values in vowel sounds, in which he demonstrates that male–female differences in the values are not purely dependent on vocal tract size. Since the differences cannot always be attributed to anatomical variation, he suggests that they are cognitive and linked to the performance of gender. The author adds to his findings by carrying out a word recognition test, in which listeners' responses were slower when speakers' formant values caused them to sound less typically male or female, indicating that listeners have preconceived gender expectations and cannot process nonstereotypical speech with the same efficiency as they do stereotypical speech. It seems that listeners, possibly subconsciously, connect particular linguistic behaviors and social structures.

Munson (2007) also shows how phonetic variation between males and females can be constrained and monitored. Words that are easily perceived generally have a high frequency of use and are of low phonological neighborhood density, meaning that relatively few words differ from them by the addition, deletion, or substitution of one phoneme (Luce & Pisoni 1998). It was found that male speakers pronounce such words using a disproportionately reduced vowel space in comparison to female speakers—that is, female speakers' vowel production in these words is more distinct than that of male speakers. The suggestion here is that male and female speakers control their use of phonetic variables depending on whether or not the word's intelligibility is likely to be affected; male speakers, for example, tend to convey their masculinity by reducing the vowel space in high-frequency, low-density words, subconsciously knowing that the comprehensibility of the word is unlikely to be negatively affected.

Intonational Phonology and Speaker Gender

As mentioned earlier, relatively few studies exist that focus exclusively on intonation and its relationship with speaker gender. Perhaps the most widely discussed phenomenon in this regard is that of the *high rising terminal*, or *HRT*. Phonetically, this pattern begins to rise during the accented syllable and continues to rise until it reaches a level high in the speaker's range at the end of the intonation phrase. The pattern is produced in declaratives, most often by young, female speakers of some varieties of American, Australian, and New Zealand English, and perceptions of its functions have varied over the years. Lakoff (1973), for example, argues that the pattern denotes states such as uncertainty, unwillingness to commit, lack of confidence, and tentativeness. McLemore (1992) claims that it signals that the speaker still holds the floor in a conversation and that her turn is not yet ended. Cheshire (2003) describes the pattern

as having a positive politeness function, indicative of a cooperative speaking style. McConnell-Ginet (1983) presents results from an investigation carried out on Cornell University campus, during which researchers approached people outside a particular campus building and asked them to name the building. It was found that more female than male respondents answered with a HRT, but it was deemed unlikely that this signaled uncertainty or unwillingness to commit. Instead, it is suggested that the function in this case was to question whether the respondent had answered the researcher's question appropriately, whether the answer was intelligible to the researcher, and/or why that particular respondent, rather than someone else in the vicinity, had been asked the question.

Guy and Vonwiller (1989:25) report yet another use for the HRT in Australian English, claiming that the "HRT correlates with the semantic complexity of the text and therefore the need for checking to see if the audience is understanding what is being said." Eckert and McConnell-Ginet (2003:195) point out that the HRT has been heard much more often in recent years than when Lakoff first described it; perhaps its semantic and pragmatic connotations have changed, possibly reflecting women's shifting position in society. It is, after all, unlikely that the HRT associated with speakers whom the popular press often refers to as "Valley Girls" (stereotypically socially ambitious, appearance-obsessed young women from the San Fernando Valley area of California) reflects the relative subjugation of females, conveyed by Lakoff's suggested meanings of the 1970s use of the pattern. These findings show the difficulty in attempting to postulate a particular function for the HRT, which may, of course, be dialect specific, in that the Australian English usage may differ from the American English usage. However, Ladd's (1980) claim that fundamentally it signals some sense of nonfinality or incompleteness appears plausible in many cases.

As far as the present author is aware, studies of the HRT are the only ones to find a relationship between speaker gender and nuclear pitch shape (as opposed to pitch range, average pitch, or pitch dynamism). Its form and function, however, differ from the stylistically unmarked rise-plateau, which is reported to characterize declaratives in Belfast English. Stylized representations of the rise-plateau nuclear pattern, the HRT, and the falling nuclear pattern (common in declaratives in Southern British and American English) are presented in Figure 1.

In Figure 1, (a) shows how the Belfast English rise-plateau differs from the HRT in (b). The shaded area represents the accented syllable, the unshaded area represents any subsequent unaccented material, and the line represents the pitch contour. In (a), the pitch contour rises during the course of the accented syllable and levels off (the "plateau") during the unaccented syllable(s), whereas in (b), the pitch contour rises during the accented syllables and continues to rise during any unaccented material that follows. Diagram (c) represents the typical declarative falling pattern of Southern British and General American English. In this case, pitch falls from the mid to high part of the speaker's range to a low point before leveling.

Most of the recent studies that attempt to relate intonation and gender focus on such aspects of intonation as pitch range (difference between highest and lowest pitch) and

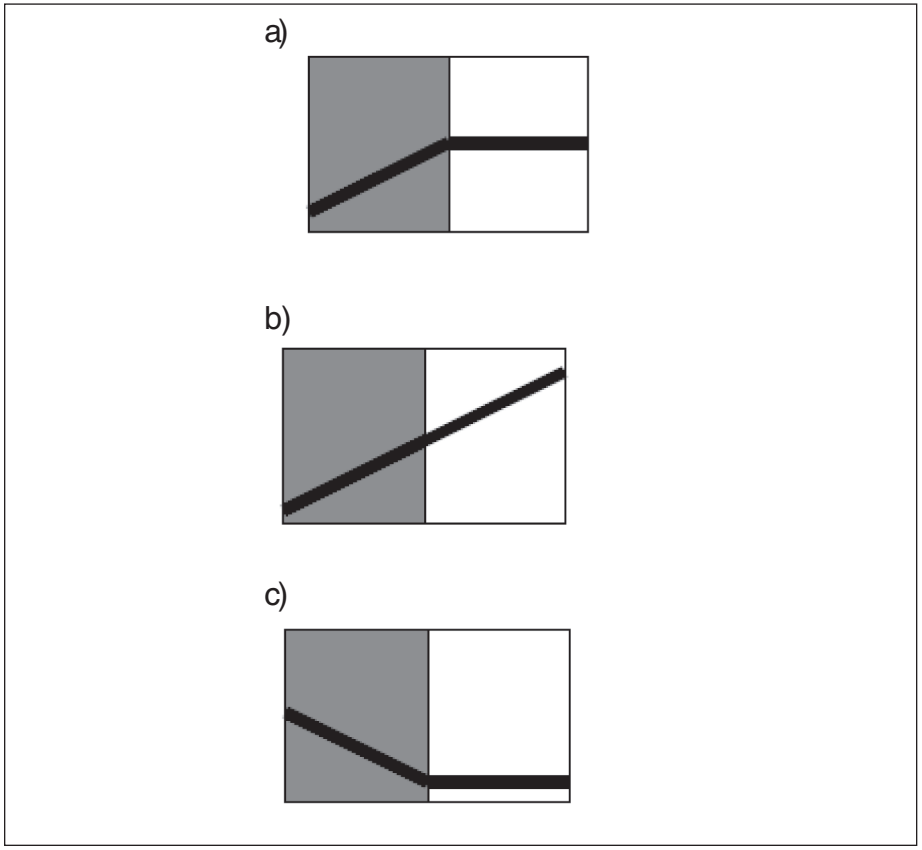

Figure 1. Stylized representations of nuclear patterns
a. Belfast English rise-plateau
b. High rising terminal
c. Southern British/General American English fall

dynamism (rate of change of pitch and frequency of change of direction), and how this may be associated with perceptions of qualities such as emotionality, expressiveness, and enthusiasm in female speakers. Daly and Warren (2001) report a greater use of both pitch range and pitch dynamism in female speakers of New Zealand English. These patterns, they claim, have the effect of attracting and holding the listener's interest and thus create impressions of enthusiasm, emotional engagement, friendliness, and an awareness of the communicative needs of the listener. Haan and van Heuven (1999) focus on pitch range in Dutch speakers, and they also find that female speakers use increased pitch range with greater frequency than male speakers. Like Daly and Warren, the authors claim that the female speakers' use of increased pitch range leads to a perception of greater willingness to establish a strong interaction with their partners in conversation and also of greater liveliness than the male speakers in the study.

Findings from recent studies on intonation, then, are that certain intonational aspects of females' speech may indicate that they are more sensitive to the communicative needs of their interlocutors, and thus make a greater effort to establish effective interaction. They are also often perceived as being more emotional, expressive, and lively than male speakers. It is hypothesized below that similar perceptions will be made of Belfast speakers because of their more frequent use of the nuclear fall. This would suggest that a categorical or phonological variation (fall instead of rise) in Belfast English carries the same type of meaning difference as a gradient, or phonetic, variation (e.g., high fall instead of low fall) in New Zealand English or Dutch. Podesva (2006) discusses categorical and phonetic properties of linguistic forms in relation to intonational variation in General American English. He claims that for linguistic variables to carry social meaning—that is, to assist in the construction of speaker identities and personae—they must have sufficient salience: the degree of categorical salience is inversely related to the frequency with which the variable is used, and the degree of phonetic salience is directly related to values along an acoustic scale that characterizes a variable. According to this definition, it could be argued that the high falls that indicate increased expressivity in American English (they are associated with higher and lower acoustic values along the Hertz scale) have phonetic salience and that the nuclear falls that are hypothesized to have a similar meaning in Belfast English (they are less frequent than nuclear rise-plateau and are structurally different from them) have categorical salience. Podesva (2006:201) argues that using a categorically salient intonation pattern is sufficient to index social meaning but that indicating social meaning with a nonsalient variant requires phonetic creativity. Using this reasoning, it could be suggested that since the rise-plateau (as the most frequently used pattern) is the nonsalient variable in declaratives in Belfast English, the fall is, unusually for most varieties of English, available as salient, and therefore employable to indicate social meaning. In American English, on the other hand, the falling pattern is the nonsalient variant for declaratives, and the rise may have other functions (e.g., questioning, uncertainty, nonfinality), so speakers are forced to be more phonetically creative with the fall, using varying degrees of higher and lower falls to express social meaning. More research would, however, need to be carried out on intonational variation and social meaning to make the point anything more than suggestive.

As the above discussion indicates, then, the present study may contribute to the fields of sociolinguistics, phonetics, and phonology and, more specifically, to the fields of sociophonetics and intonational phonology and its links to speaker gender. It also makes a novel methodological contribution by analyzing the perception, as well as the production, of a particular intonational variable.

Hypotheses

The hypotheses were formulated to reflect findings from the phonological and sociolinguistic studies reviewed above, and, to a certain extent, the intuitions of the author, who is a native speaker of the dialect of the Belfast English dialect. As mentioned above, and as is widely reported, Belfast English typically has a rise-plateau nuclear

pattern in declaratives, but it is hypothesized here that female speakers employ a falling pattern more often than the literature would seem to suggest is the case, and do so with greater frequency than male speakers. Following from Guy et al.'s (1986) observation that females lead in intonational change, Holmes's (1997) claim that females have a greater tendency to use prestige forms, and Moonwomon's (1995) assertion that females have a greater aptitude for style-switching, the use of the falling pattern by Belfast speakers may convey a desire to sound more educated or formal by using a variable that is perceived to be more prestigious, or may be an example of female speakers' style-switching ability, depending on whether or not contextual factors play a part. It is also hypothesized that listeners may judge speakers as having qualities such as expressiveness, emotional engagement, and enthusiasm on the basis of their intonation patterns. The particular patterns may vary according to language or dialect—for example, increased pitch range in Dutch speakers appears to lead to such judgments—and it is suggested here that a falling nuclear pattern in Belfast English leads to similar perceptions. Specifically, the hypotheses are as follows:

1. Female speakers of Belfast English employ more falling nuclear patterns than males in declaratives.
2. Belfast English listeners perceive speakers who use a predominantly falling nuclear pattern to be more expressive, enthusiastic, and emotionally engaged and to sound more formal than those who use the rise-plateau pattern.

Production Study

Method

The data employed in the present study are taken from the Intonational Variety in English, or IViE, corpus (Grabe 2004), which contains recordings of nine varieties of English spoken in the British Isles. Recordings of six male and six female speakers from Belfast are included in the corpus, and the investigation controls for native dialect and education level. All speakers were aged seventeen at the time of recording and were A level (U.K. final year school exams that can lead to university entry) students from a boys and a girls grammar school, both situated near the center of Belfast. The principal reason for selecting young speakers was that it was deemed more probable that they had lived all their lives in Belfast than older speakers, and they were therefore less likely to have been exposed long term to any other language or variety of English that could have influenced or affected their native Belfast dialect. All twelve speakers had been born in and had lived all their lives in Belfast; all lived with their parents, who, in all cases, had been born in and had lived all their lives in Northern Ireland. A further reason for choosing young speakers was that they are less likely than older speakers to be intimidated or inhibited by the presence of recording equipment, since technological appliances are likely to be a constant presence in their

recreational and educational pursuits, meaning that the risk of overly careful, unnatural-sounding "laboratory speech" may be less than for a speaker less accustomed to such equipment. As an additional attempt to elicit as naturalistic a speaking style as possible, the researcher engaged the speakers in light-hearted conversation prior to the beginning of the tasks in an attempt to habituate them to the recording equipment and to the situation. Recordings took place in a small room in each of the schools, and speakers entered the room in pairs, meaning that one of their peers, as well as the researcher, was present during each task. They were told that they were participating in a "language study" carried out by university researchers.

Utterances from three speech tasks contained in the corpus are used in the present study: read isolated declarative sentences, declaratives selected from a version of the story *Cinderella*, and utterances contained in a goal-directed interaction between pairs of speakers. Speakers were instructed to read the *Cinderella* story as they would read it to a young child; no particular instruction was given in the isolated sentence reading ask, other than to read the sentences aloud. The fact that the corpus contains scripted speech is useful for comparative purposes since the phonetic structure, both segmental and intonational, is controlled: speakers read the same material, and in the utterances selected, the nucleus occurred in all speakers on the same syllable. Eight isolated sentences and twelve sentences from the story were selected (see Appendix A). Although the two tasks just described were performed by the speakers individually, it was anticipated that the story-reading task would—since it contains direct speech—be closer to a dialogue or talk in interaction than the isolated read sentences. The goal-directed interactive task was carried out by pairs of speakers and is a version of the Map Task (Anderson et al. 1991). The speakers sat opposite each other, each with a map of a small town that the other could not see. One speaker had a route marked on his or her map, and the goal was to reproduce this route on the other speaker's map. The maps, however, contained small differences, which led to disagreement and debate. Although material in this case is not directly comparable since pairs of speakers cannot produce identical spontaneous conversations, the interactions often proceeded in a similar manner, contained similar issues of agreement and disagreement, and often used the same vocabulary, in terms of landmarks named and directions given.

The nuclear pattern for each intonation phrase was isolated and labeled. In the case of the isolated read sentence task and the *Cinderella* story task, each sentence constituted one intonation phrase and thus contained one nuclear pattern. There were, of course, longer sentences in the story task, but only short ones that all speakers produced as containing one and the same nucleus were selected for the purpose of comparison. In the case of the interactive task, all nonquestion sentences were included, several of which contained more than one intonation phrase, and were divided accordingly. In all cases, the pattern was either a rise-plateau or a fall.[1] The analysis was primarily auditory and was verified by visual inspection of the pitch contour, generated by the Praat (Boersma & Weenink 2004) phonetics analysis software, which aligned the speech waveform, spectrogram, and pitch track. The total number of rise-plateau patterns and falling patterns was counted for each of the three tasks, and the

Table 1. Frequency of Nuclear Patterns in Each Task Expressed as Percentage of Total Nuclear Patterns

	Read sentence (%)	Read sentence (%)	Story (%)	Story (%)	Interactive task (%)	Interactive task (%)
	Fall	Rise-plateau	Fall	Rise-plateau	Fall	Rise-plateau
Male	0.0	100.0	15.28	84.72	1.8	98.2
Female	18.75	81.25	69.45	30.55	43.6	56.4

percentage of falling patterns for the male speakers and for the female speakers was calculated for each task. A statistical test was then carried out to investigate whether or not any differences found were significant.

Results and Discussion

The results of the frequency of the nuclear patterns in each task are as follows. In the isolated sentence reading task, all eight sentences were produced with a rise-plateau pattern by all six of the male speakers. The female speakers produced 9 falling nuclear patterns and 39 rise-plateau patterns. In the case of the read story, the male speakers produced 11 falling and 61 rise-plateau patterns, while the females produced 50 falling and 22 rise-plateau patterns. In the interactive task, male speakers produced 5 falling and 270 rise-plateau patterns, while females produced 103 falling and 233 rise-plateau patterns. These figures are expressed as percentages of the total utterances in Table 1.

The results show the first hypothesis to be correct, and a Mann–Whitney *U* test was carried out to test whether or not the male–female difference is significant in each of the speaking tasks. The null hypothesis in the tests is that there is no significant difference, and this cannot be rejected in the case of the isolated read sentence task ($U = 12$, $Na = Nb = 6$). In the story-reading task, however, the null hypothesis is rejected at the level of .05 ($U = 2.5$, $Na = Nb + 6$) and is rejected at the level of .01 in the interactive task ($U = 0$, $Na = Nb = 6$). The test concludes that the difference between the nuclear fall usage by male and female speakers is significant in the story-reading task and in the interactive task but not significant in the reading of isolated sentences.

These findings appear to support some of the claims made in the literature and described in the introduction. The fact that the female speakers in the study produced few falling nuclei in the sentences task in comparison to the storytelling task provides evidence to support Moonwomon's (1995) claim that females are more adept at style-switching than males, using different linguistic variables for different communicative purposes. Labov's (2001) and others' assertion that female speakers lead in using standard linguistic forms appears to be supported by the results, as speakers of Belfast English may judge Southern British English to be the standard form of the language and may thus use the falling nuclear pattern, typical of that variety of English, especially,

perhaps, when reading aloud, or in other noncasual contexts. The results indicate that in Belfast English, female speakers use this form more often and that males are indeed following behind "with a lesser degree of investment in the social values of linguistic variation" (Labov 2001:321).

Perception Study

Method

Since a difference in the frequency of production of the falling nuclear pattern was found between male and female speakers, it was decided that a perception test should be carried out to investigate whether this particular variable leads listeners to judge the speakers who use it differently from those who use the rise-plateau and, if so, how the falling pattern may be employed for social purposes. Data from the two tasks in which the male–female difference was found to be significant, the read story and the interactive task, were used in the test. Ten subjects, all of whom were born and brought up in Belfast (further details on the subjects are given in Appendix B), were presented with recordings of each speaker's story-reading data and each pair of speakers' interactive task data and instructed to rate their impressions, by selecting from a list of eight descriptors which items they considered appropriate. Each subject performed the test individually, in a room with the researcher, and listened to the story and the interactive task played on a computer via headphones from the IViE corpus website (http://www.phon.ox.ac.uk/IViE/). Each subject was given a grid, with the eight descriptors listed vertically and the speakers, named as M1, M2, F1 (abbreviations for male 1, male 2, female 1), and so on, horizontally. Subjects were asked to tick any descriptors they considered to characterize the speaker's speaking style. There was no limit to the number of descriptors to be chosen, and no time limit for making judgments was imposed. The subjects had the option of pausing and replaying the recordings as often as necessary.

The list of descriptors below derives largely from perceptions of male and female speakers described in other studies on intonation and gender, such as those mentioned above. Contributions to the list were also made as a result of class discussions with Northern Irish students of linguistics, who were asked to make judgments of various recordings of Belfast English speakers, taken from IViE and from other sources. The list comprises the following: neutral (Neu), enthusiastic (Enth), emotionally engaged (E-e), bored (Bor), friendly (Frien), formal (For), expressive (Exp), and assertive (Ass).

Results and Discussion

Results of the perception test are presented in Figures 2 (story-reading task) and 3 (interactive task). These take the form of scatterplot charts, where each speaker's percentage of nuclear falls along the x-axis and the number of times the descriptor was identified by the ten subjects falls along the y-axis. A best-fit line and R^2 values are

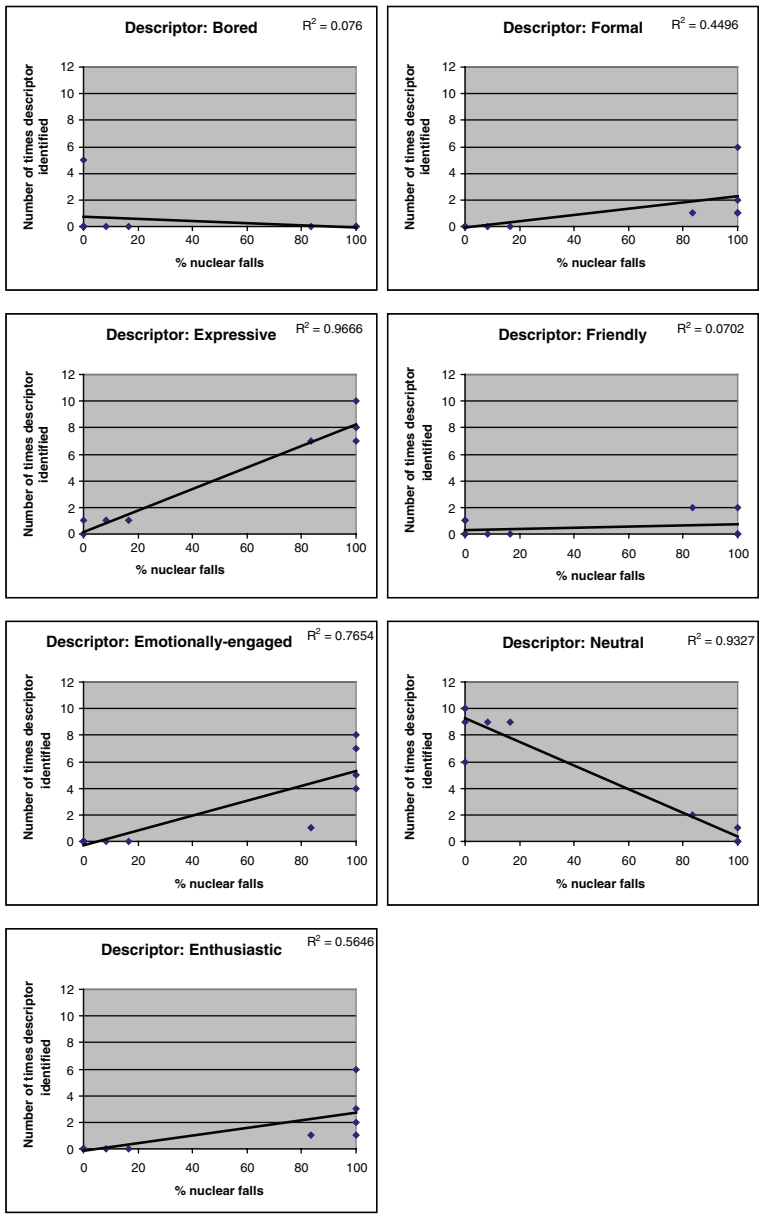

Figure 2. Scatterplot charts showing the relationship between the percentage of nuclear falls and the number of times the descriptor was identified in the story-reading task

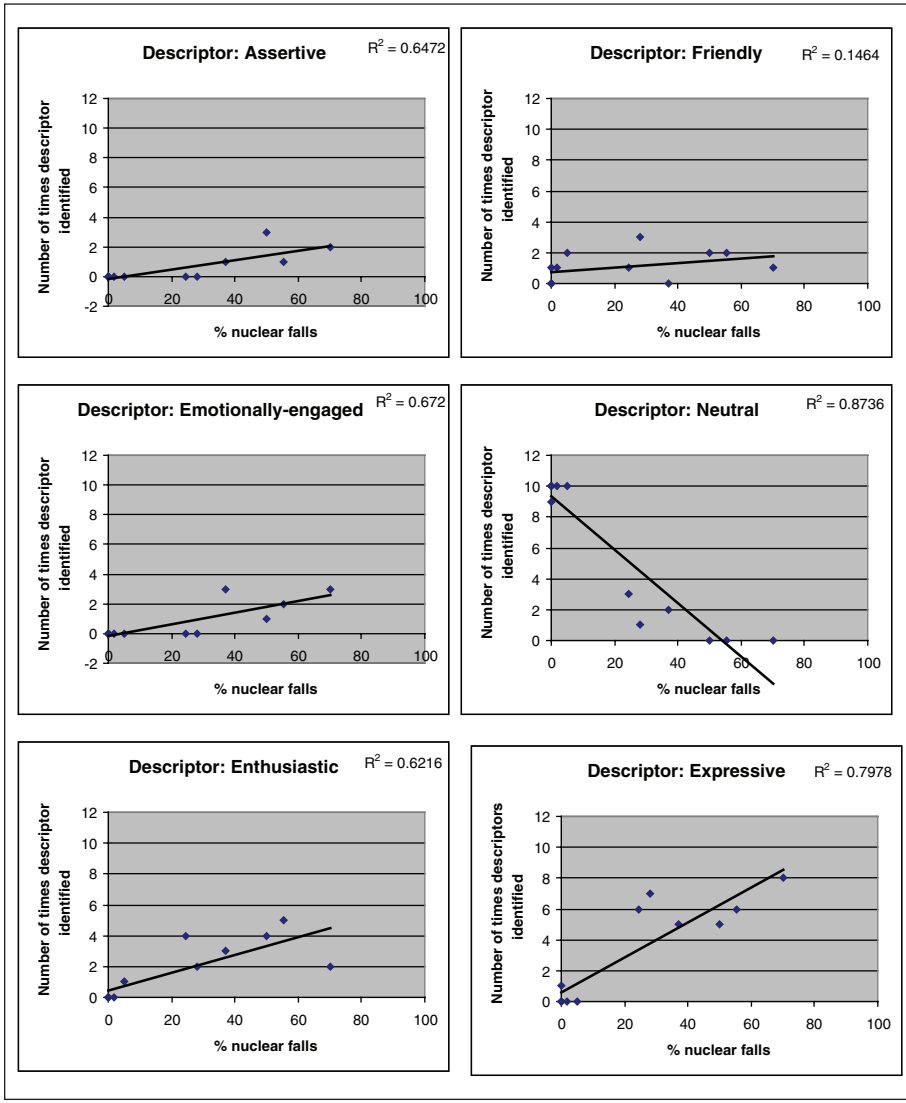

Figure 3. Scatterplot charts showing the relationship between the percentage of nuclear falls and the number of times the descriptor was identified in the interactive task

added. Tables containing the actual number of judgments of descriptors for each speaker by each subject are included in Appendix C.

The charts show the correlations between the percentages of nuclear falls and subjects' judgments of the speech in the story-reading task. Lines of best fit show

Table 2. *R*-squared Values for Each Descriptor and Type of Correlation between Identification of Nuclear Fall and Frequency of Occurrence of Descriptor

Descriptor	Story-reading R^2 value	Correlation with nuclear fall	Interactive R^2 value	Correlation with nuclear fall
Neutral	.932	Negative	.873	Negative
Enthusiastic	.564	Positive	.621	Positive
Emotionally engaged	.765	Positive	.672	Positive
Bored	.076	Negative	Descriptor not selected	
Friendly	.070	Positive	.146	Positive
Formal	.448	Positive	Descriptor not selected	
Expressive	.966	Positive	.797	Positive
Assertive	Descriptor not selected		.647	Positive

negative correlations between the percentage of nuclear falls and perceptions of boredom and neutrality: the more nuclear falls that are produced, the less likely it is that listeners perceive the speech as "bored" or "neutral." There are positive correlations between the falling nucleus and impressions of expressiveness, emotional engagement, enthusiasm, formality, and friendliness. In this task, only one of the male speakers employs a preponderance of falling nuclei, and this is the only male whose speech is not consistently described as "neutral" and never as "boring." Four of the female speakers use 100 percent falling nuclear patterns, and in no instance is their speech perceived as "boring," and in only one instance is it described as "neutral."

In the interactive task, as in the storytelling task, there is a negative correlation between the occurrence of the nuclear fall and the perception of neutrality. The "bored" descriptor is not selected by any subject for this task. Positive correlations are found for the "assertive," "emotionally engaged," "enthusiastic," "expressive," and "friendly" descriptors. The findings, for both tasks, are in agreement with the second hypothesis.

The closer the R^2 values are to 1.0, the greater the probability that there may be a relationship between the percentage of nuclear falls and the judgments of the listener. The R^2 values for each descriptor and the type of correlation between the nuclear fall and number of descriptor identifications (i.e., whether positive or negative) are summarized in Table 2.

Values show that the strongest positive correlations are between the frequency of nuclear falls and the descriptors "enthusiastic" and "emotionally engaged" and that there is a strong negative correlation between the nuclear fall and "neutral."

These findings support the second hypothesis, since it appears that native speakers perceive the speech of female speakers of Belfast English as signaling increased

emotional involvement, expressiveness, and commitment to establishing effective interaction. It seems likely that this may be achieved (at least in part) by the use of the falling nuclear pattern rather than the perhaps more characteristic rise-plateau pattern.

Discussion

Native speakers' perceptions of speakers of Belfast English appear to be in agreement with the findings of studies such as those by Daly and Warren (2001) and Haan and van Heuven (1999), in that female speakers are judged to speak more expressively, with emotional engagement, and with commitment to achieving successful interaction. It is, of course, impossible to claim definitively that it is the use of the falling nuclear pattern in Belfast English which is responsible for these perceptions, although the fact that the segmental structure, age, and background are controlled for in the story-reading task makes for compelling evidence that the intonation patterns are likely to play at least a part. Further investigations could be carried out to find out whether or not increased pitch excursion in the nuclear patterns operates in a gradient manner to indicate increased degrees in the perception of expressivity, as is the case in the studies cited above.

In the case of the story-reading data, the nature of the task and age of the speakers, that is, seventeen-year-olds reading the story of *Cinderella*, could influence findings. The main goal of storytelling is to capture and engage the child's attention, and achieving this necessarily entails a high degree of expressivity; it may be the case that young female speakers are more willing than their male counterparts to "perform" to make their communication more effective, and thus to show more emotion and enthusiasm, and perhaps sound more formal in particular situations. Further investigation using older speakers could be carried out to discover whether similar results are found, or whether males become more willing to show more emotion as they grow older. This concept of willingness and effort to achieve effective communication could also go some way toward explaining the results of the isolated sentence task (females produced a small number of falling nuclei and males produced none, and the difference was found to be statistically nonsignificant). It is possible, in this case, that the speakers did not consider themselves to be truly engaged in the act of communicating; as far as they were aware, they were simply reading out sentences for the purposes of "a language study," and there was no interaction with other speakers or listeners. They may have therefore deemed it unnecessary to make the effort they normally might have when attempting to bring about successful communication. For the story-reading task, in contrast, the speakers were instructed to read as they would to a young child; their speech thus carried out a particular communicative function, and more effort may have been made to ensure that the putative child understood, and that his/her attention was held. In addition to interacting with the child, the fact that the story contained direct speech necessitated another type of interaction—that between the characters in the story—which was lacking in the isolated sentence reading task.

The argument that females appear more expressive and aware of the communicative needs of their interlocutor appears also to be borne out in the results for the interactive

task, in which the females demonstrated a significantly increased use of falling nuclear patterns than males. However, as mentioned above, the segmental material in this task is not directly comparable, meaning that it can be merely suggested, rather than claimed, that it is the nuclear patterns that contribute to how the speakers are perceived. Interestingly, the "assertive" descriptor was not selected for the story-reading task, and the "bored" and "formal" descriptors are not selected for the interactive task. This lends support to Eckert's (2008) notion of the indexical field, in which the linguistic variable is linked to a field of related concepts and the perception of any of these concepts may be influenced by contextual factors. Campbell-Kibler (2009:149) makes a similar point in her study of the English variable (ING) and its alternations *–in* and *–ing* occurring at the end of multisyllabic English words: "The notion of an indexical field is tremendously helpful in understanding how (ING) operates within the social world because (ING) can mean a wide variety of things. Just as a given word's referential meaning depends on the context in which it is used, social meaning too is highly flexible."

The results suggest, then, that female speakers are more likely than males to display by their intonation patterns qualities such as enthusiasm, expressiveness, emotionality, and a willingness to establish effective communication. Ochs (1991), however, cautions against directly associating a social category, such as gender, with a particular language behavior, such as the use of increased falling nuclear patterns. Such an association, she claims, is normally indirect, as the primary function of the language behavior is to index one or more of the practices of the social category and not the social category itself. For instance, if the use of increased falling nuclear patterns in Belfast English indicates expressiveness, and if women are more inclined to speak more expressively than men, the direct association is between expressiveness and nuclear falls, and only indirectly between nuclear falls and females. This work foreshadows to an extent aspects of the Third Wave body of research, described above, which moves away from the direct association of a linguistic variable with a social category, and focuses instead on a matrix of variables that can combine to construct social meaning. Male speaker 5 (MS5) in Appendix C illustrates the point. This speaker uses predominantly falling nuclear patterns, and a majority of subjects perceive his speech as being indicative of expressiveness or emotional engagement, with only two "neutral" descriptions, unlike the other male speakers, who are judged for the most part to be "neutral" in their speech. The suggestion is thus that emotionality and expressiveness are likely to be associated with the nuclear falls, rather than directly with speaker gender.

Conclusion

This investigation provides evidence that the use of falling nuclear patterns in Belfast English is of social significance, given the homogeneity of the speakers' age, education, and regional and social background as well as the fact that one of the tasks controls for segmental and intonational structure. The production task and significance test show that it is female speakers who are more inclined to employ the pattern, and the perception test demonstrates that listeners appear to incorporate social cues from the pattern

into particular perceptions of the speakers. Perceptions signaled by the falling nucleus by Belfast English listeners are of such qualities as expressiveness, enthusiasm, and emotional engagement, and it is suggested, drawing from the Third Wave body of variation research, that these form part of a network of concepts, which relate to the notion of femaleness, and not that the variable itself directly indexes female speech.

Appendix A

Sentences Selected from Isolated Reading Sentence Task

1. We live in Ealing.
2. You remembered the lilies.
3. We arrived in a limo.
4. They are on the railings.
5. We were in yellow.
6. He is on the lilo.
7. You are feeling mellow.
8. We were lying.

Sentences Selected from Story of Cinderella

1. But everyone called her Cinders.
2. They were lazy girls.
3. And she had to do all the cleaning.
4. They dreamed of wedding bells.
5. They were in a bad mood.
6. It was her fairy godmother.
7. Then the girl looked at her old rags.
8. And there were some elegant glass slippers.
9. Cinders ran from the ballroom.
10. But the slipper was always too small.
11. And her face was dirty.
12. It fitted perfectly.

Appendix B

Descriptions of Subjects in Perception Test

1. Male, aged 27, teacher
2. Female, aged 34, lawyer
3. Male, aged 48, business employee

(continued)

Appendix B (continued)

4. Female, aged 20, university student
5. Female, aged 63, retired teacher
6. Male, aged 30, computer technician
7. Male, aged 35, lawyer
8. Female, aged 42, doctor
9. Female, aged 32, marketing manager
10. Male, aged 18, student

Appendix C

Tables Showing the Speaker Gender and Subject Gender as well as the Percentage of Nuclear Falls and Each Subject's Perception(s) of Each Speaker

Story-Reading Task

Subject	Speaker / % Nuclear fall	M1 0.0	M2 0.0	M3 0.0	M4 0.0	M5 83.3	M6 8.3	F1 100.0	F2 0.0	F3 100.0	F4 100.0	F5 100.0	F6 16.6
M1		Bor	Neu	Neu Frien	Neu	Frien Exp	Neu	Exp E-e	Neu	For Exp	Exp E-e	Exp E-e Frien	Neu
F2		Bor	Neu	Neu	Neu	Exp	Neu	Exp E-e	Neu	Exp E-e	Exp E-e	Exp Enth	Neu
M3		Neu Bor	Neu	Neu	Neu	Enth Frien	Exp	E-e For	Neu Frien	E-e For	Exp E-e	Exp Frien	Neu
F4		Bor	Neu	Neu	Neu	Neu	Neu	Exp	Neu	Exp	Exp	Neu	Neu
F5		Bor	Neu	Neu	Neu	Neu	Neu	Exp	Neu	Exp For E-e	Exp E-e	Exp E-e Enth	Exp
M6		Neu	Neu	Neu	Neu	Exp	Neu	Exp E-e Enth	Neu	Exp E-e Enth For	Exp E-e For	Exp Enth	Neu
M7		Neu	Neu	Neu	Neu	Exp	Neu	Exp	Neu	E-e For	Exp E-e	E-e Enth	Neu
F8		Neu	Neu	Neu	Neu	Exp E-e	Neu	E-e Enth	Exp	Exp E-e Enth	Exp Enth	Exp E-e Enth	Neu
F9		Neu	Neu	Neu	Neu	Exp	Neu	Exp	Neu	E-e Enth	Exp Enth	Exp Enth	Neu
M10		Neu	Neu	Neu	Neu	Exp For	Neu	Exp	Neu	Exp E-e For	Exp E-e For	Exp For	Neu

(continued)

Appendix C (continued)

Interactive Task

Subject	Speaker / % Nuclear fall	M1 1.7	M2 0.0	M3 0.0	M4 0.0	M5 5.0	M6 0.0	F1 70.2	F2 50.0	F3 37.1	F4 28.0	F5 24.3	F6 55.5
M1		Neu	Neu	Neu Exp	Neu	Neu Enth	Neu	Exp Ass	Ass Exp	Neu	Neu	Neu	Exp E-e
F2		Neu	Neu	Neu	Neu	Neu	Neu	Exp E-e	Exp Ass	Exp	Exp	Exp	Enth E-e
M3		Neu Frien	Neu	Neu	Neu	Neu	Frien	E-e Ass	Frien Enth	E-e Enth	Exp Frien	Exp Frien	Exp
F4		Neu	Neu	Neu	Neu	Neu	Neu	Exp	Ass	Exp	Frien	Neu	Exp Ass
F5		Neu	Neu	Neu	Neu	Neu	Neu	Exp	Exp	Exp	Exp Enth	Exp Enth	Exp
M6		Neu	Neu	Neu	Neu	Neu	Neu	Exp Frien Enth	E-e Enth	Enth E-e Enth	Exp	Neu	Enth
M7		Neu	Neu	Neu	Neu	Neu	Neu	E-e Enth	Exp Frien	Ass	Exp	Enth	Exp Enth
F8		Neu	Neu	Neu	Neu	Frien Neu	Neu	Exp	Exp	Exp E-e Enth	Enth	Exp Enth	Enth
F9		Neu	Neu	Neu	Neu	Neu	Neu	Exp	Enth	Neu	Exp Frien	Exp Enth	Exp Frien
M10		Neu	Neu	Neu	Neu	Neu Frien	Neu	Exp	Exp Enth	Exp	Exp	Exp	Frien Enth

M1 = male speaker or subject 1, F1 = female speaker or subject 1, and so on; Neu = neutral; Enth = enthusiastic; E-e = emotionally engaged; Bor = bored; Frien = friendly; For = formal; Exp = expressive; and Ass = assertive.

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Note

1. This is the case for this investigation's data and not for the Intonational Variety in English Belfast data overall. See Grabe and Post (2002) for overall figures.

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Bio

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