

# THE INFLUENCE OF CHARACTER'S GENDER AND THE BASIC EMOTIONS OF "HAPPINESS" AND "SADNESS" ON VOICE PITCH IN THE READING OF FICTION

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## Abstract

This paper examines the way in which two basic emotions and the character's gender are rendered in the reading aloud of prose in terms of the fundamental frequency and the variability of the fundamental frequency. When female characters express happiness or male characters express sadness, the effects of the two variables reinforce each other. However, when female characters express sadness or male characters express happiness, the two characteristics, theoretically, cancel each other. The results of this study indicate that the happy-sad dichotomy has priority over the character's gender. These findings could potentially be extended to the more general claim that the broad category of emotion has a greater influence than the character's sex on the reader's voice.

## Key words

*Affective speech; affect vocalisation; emotional expression; pitch; fundamental frequency*

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## 1. Background

### 1.1. Definitions of the term "emotion"

Griffiths (1990) has suggested that even in our everyday discourse the term "emotion" is interpreted in two different ways. According to the first, the notion is contrasted with rational thinking and it is assumed to be "passive" and "involuntary". In this interpretation, emotions interfere with rational action and are naturally linked to various physiological events, such as flinching or sweating. Alternatively, emotions may be treated as intentional states which involve conscious judgements. This strand of thought is found in philosophical cognitivism which assumes that propositional attitudes are necessary for the occurrence of emotions (Kenny, 1963; Lyons, 1980; Solomon, 1976; Stocker, 1987). For instance, in order to react to something with fear, one needs to believe that it is dangerous.

In scholarly discussions the term is even more confounding. It has been observed that since the twentieth century more than 90 definitions of emotion have been proposed (Klainginna and Kleinginna, 1981; Plutchik, 2001a, 2001b); however, it is possible that the number of different interpretations of the term is probably much higher. In some publications the definition is rather vague.

For instance, Gobl and Ní Chasaide (2003) use the term alongside such related notions as “speaker mood” and “attitude” in a way that suggests a continuum of human affects, among which emotions were treated as the strongest, moods as weaker and attitudes as the weakest. Mozziconacci (1998), on the other hand, uses the term to refer both to emotions and attitudes. Many other authors have suggested narrower interpretations. For example, Griffiths (1989, 1990) makes a clear distinction between emotions and moods, and states that the former are typically brief and their onset may be regarded as near instantaneous. Plutchik (2001a, 2001b) also provides a clear definition, one directly connected to his psychoevolutionary approach in which an emotion is treated as “a complex chain of loosely connected events” (2001b: 345–346). Such a chain involves a stimulus event, inferred cognition, a feeling state, an impulse to action, overt behaviour displays and final effects. For instance, the complex chain of events defining “fear” includes the threat of a predator, the realisation of danger, feeling the state of fear, the impulse to run, the action of running and the effect of being protected from the attack.

In the present paper the word “emotion” will be used synonymously with the word “feeling” and the meaning of both will be interpreted as a “feeling state” understood in the sense defined by Plutchik (2001a, 2001b). Both “happiness” and “sadness” will be interpreted as subjective, reportable states which constitute only a small part of the complex chain of events mentioned in the previous paragraph.

## 1.2. Taxonomy of emotions

The categorisation of emotions is a subject broadly discussed in scholarly publications. It has been noted that there is no consensus on one preferred taxonomy (cf. Gobl and Ní Chasaide, 2003; Mason and Capitano, 2012; Scherer, 1986). Some researchers have even suggested that such a clear categorisation may not really exist (Nesse and Ellsworth, 2009). Nevertheless, various emotion labels have been proposed in numerous publications and any taxonomy of this kind automatically relies on a given theory.

One generalisation which may be drawn about the theories of emotion is that they follow either the idea that the expression of emotions is mostly genetically determined (Eibl-Eibesfeldt, 1973; Ekman, 1980; Ekman and Friesen, 1971; Frijda and Parrott, 2011; Fulcher, 1942; Plutchik, 1980, 2001a, 2001b; Thompson, 1941; Tooby and Cosmides, 1990) or that emotions are mainly conditioned by culture (Averill, 2009; Birdwhistell, 1963; Ekman, 1999; Harré, 1986; Labarre, 1947). An intermediate approach which recognises that both of these factors have a direct influence on emotional behaviour is also encountered (Ekman, 1999; Griffiths, 1990; Izard, 2007; Mason and Capitano, 2012; Panksepp, 2007). For methodological reasons, the first position is most crucial to the current paper. It can be traced back to Darwin’s pioneering work *The expression of the emotions in man and animals*, in which he concentrated on the facial expression of emotions. Among other things, he used the term “chief movements of expression” (1998: 345), which in numerous later publications have frequently been referred to as “basic emotions” (Clark, 2010; Costa et al., 2014; Farinelli et al., 2015; Fernández-Sán-

chez, Giménez-Dasí, and Quintanilla, 2014; Frijda and Parrott, 2011; Glass, Lingg, and Heuberger, 2014; Griffiths, 1990; Kennedy, 2012; Lewinski, Tim and Butler, 2014; Mason and Capitanio, 2012; Saarimäki et al., 2015; Scheff, 2015; Takagi, Hiramatsu, Tabei and Tanaka, 2015) and which are usually assumed to “provide the biological foundations for all emotions, to be genetically determined, and to have acquired their adaptive functions in response to recurrent challenges to the individual and the species over generations of evolutionary history” (Mason and Capitanio, 2012: 238). Some empirical studies support the universal nature of human emotions. For instance, in the experiment performed by Ekman and Friesen (1971) on the Fore language group in New Guinea, the subjects were capable of adequately recognizing various emotions from photographs showing prototypical facial expressions, although the informants had no contact with the western culture which would influence their responses. Another example which corroborates this approach is the study examining facial expression of emotions in deaf and blind children by Eibl-Eibesfeldt (1973). He established that the patterns of muscular activity for selected emotions were similar to those of sighted and hearing children.

The concept of basic emotions has also drawn criticism (Barret, 2006; Frijda and Parrott, 2011; Ortony and Turner, 1990; Reisenzein, 2000; Russell, 2003; Russell and Barrett, 1999); hence, uncritical relying on it in the form proposed in initial studies would be objectionable. One needs to accept that the degree to which emotional behaviour is predestined by genetic makeup is limited. Nevertheless, the theory offers useful analytical tools, which has even been noted by some critics of the idea of basic emotions (Ortony and Turner, 1990). The fact that the exact set of such basic categories is different in almost each publication dealing with the topic is another problem. A possible solution would be just to choose one specific proposal. An example of a theory which could potentially serve the purpose of a reliable methodological framework for projects similar to the current one is the psychoevolutionary approach developed by Plutchik (1980, 1997, 2000, 2001a, 2001b). The approach assumes that the process of adaptation of organisms to environment results in 8 basic emotions (joy, trust, fear, surprise, sadness, disgust, anger and anticipation), which in turn are treated as building blocks of other, more complex emotions, referred to as “primary”, “secondary” and “tertiary dyads”. It is interesting to note that some basic categories used in Plutchik’s theory are also present in many other taxonomies of emotions reported in the literature. Nesse (1990) has observed that most such lists contain the notions of fear, anger, happiness, sadness and love. Indeed, this opinion may be easily substantiated by the summary of such classifications provided in Ortony and Turner (1990) and the methodology described in Section 3 is based the notion, that some emotion categories seem to be widely accepted.

### **1.3. Vocal expression of emotions**

The way in which emotions are expressed in language has been discussed in a broad body of literature. Comprehensive surveys of such studies are provided in Frick (1985), Kappas, Hess and Scherer (1991) and Scherer (1986).

They include investigations of various acoustic aspects of speech by means of which emotions may be conveyed. Among the frequently discussed aspects one should mention the intensity of sound waves, which corresponds closely to our perception of loudness (Bezooijen, 1984; Costanzo, Markel and Costanzo, 1969; Davitz, 1964; Eldred and Price, 1958; Hargreaves, Starkweather and Blacker, 1965; Huttar, 1968; Kaiser, 1962; Kotlyar and Morozov, 1976; Moses, 1954; Ostwald, 1963; Skinner, 1935; Tolkmitt, Helfrich, Standke and Scherer, 1982; Whitman and Flicker, 1966; Williams and Stevens, 1969). It has been established that an increase in intensity tends to be associated with such emotions as anger or joy, and a decrease with those of sadness or boredom. An alternative interpretation would be to assume that an increase in loudness is dependent more on the intensity of a given emotion than on its kind. While most authors agree that this is generally lowered in sad utterances, it is actually the opposite in expressions of rage. According to the model of emotions proposed by Plutchik (1980, 1997, 2000, 2001a, 2001b), rage is actually the same emotion as sadness, but it is simply more intense. Another good example is the relationship between serenity and joy, which, again, are treated as one kind of emotion. The sound level typically associated with serenity is lower than the one ascribed to joy.

Another frequently examined acoustic feature in the literature on the vocal expression of emotions is the rate of speech (Bergmann, Goldbeck and Scherer, 1988; Breitenstein, Van Lancker and Daum, 2001; Carlson, Granström and Karlsson, 1991; Coleman and Williams, 1979; Davitz, 1964; Eldred and Price, 1958; Ellgring and Scherer, 1996; Fairbanks and Pronovost, 1939; Johnson, Emde, Scherer and Klinnert, 1986; Kotlyar and Morozov, 1976; Markel, Bein and Phillis, 1973; Mozziconacci, 1995, 1998; Murray and Arnott, 1995; Scherer, 1981, 1986, 1989; Scherer and Oshinsky, 1977; Stibbard, 2000; Williams and Stevens, 1972). In general, it has been noted that slower tempo tends to correlate with sadness, while a faster rate is typical for emotions such as fear or anger. As in the case of intensity, such associations may also be explained by referring to the relative level of emotional arousal (cf. Breitenstein et al., 2001; Ellgring and Scherer, 1996). The speech rate in expressions involving emotions with high sympathetic arousal tends to be generally higher than in other cases.

Further acoustic properties analysed in connection with emotions include voice quality (Alter et al., 1999; Bezooijen, 1984; Boves, 1984; Cummings and Clements, 1995; Gobl and Ní Chasaide, 2003; Johnstone and Scherer, 1999; Ladd, Silverman, Tolkmitt, Bergmann and Scherer, 1985; Murray and Arnott, 1995), extralinguistic interjections (Scherer, 1994; Schröder, 2003), pausing structure (Cahn, 1989, 1990), and intonation contours (Höffe, 1960; Kaiser, 1962; Ladd et al., 1985; Rodero, 2011). Nevertheless, the most frequently described acoustic feature of speech in related discussions is the fundamental frequency. It is significantly more common for at least two reasons. Firstly, as suggested by Scherer (1986), F<sub>0</sub> is one of the acoustic variables which is relatively easy to measure. Secondly, it has been reported to be among the attributes exerting the greatest effect (Banse and Scherer, 1996; Frick, 1985; Murray and Arnott, 1993, 1995; Pell, 1999; Scherer, 1982, 1995; Scherer and Oshinsky, 1977; Vroomen, Collier and Mozziconacci, 1993). It is important to stress that this feature may be considered from

at least two different points of view. On the one hand, one may be interested in its mean value for a given utterance. On the other hand, the focus of attention could be the variability of F0. Both of these aspects are central to the current paper and the way they may be measured is explained in Section 3.

Possible associations between F0 and emotions have been discussed in a great number of publications and reviewing them in detail is beyond the scope of this paper. However, it is necessary to point out the results concerning the behaviour of F0 in expressions involving happiness and sadness because the two emotions are analysed in Section 4. It has been confirmed that the mean value of the fundamental frequency tends to be relatively lower in sad utterances (Coleman and Williams, 1979; Collier and Hubbard, 1998; Davitz, 1964; Fairbanks and Pronovost, 1939; Fonagy, 1978; Huron, 2008; Huron, Yim and Chordia, 2010; Kaiser, 1962; Leinonen, Hiltunen, Linnankoski and Laakso, 1997; Razak, Abidin and Komiya, 2003; Sobin and Alpert, 1999; Wallbott and Scherer, 1986; Wu, Zheng, Xu and Bao, 2006) and higher in expressions involving the emotion of happiness (Bezooijen, 1984; Coleman and Williams, 1979; Collier and Hubbard, 1998, 2001; Davitz, 1964; Fonagy, 1978; Havrdová and Morávek, 1979; Razak et al., 2003; Skinner, 1935; Sobin and Alpert, 1999; Wu et al., 2006). Similarly, the variability of pitch is lowered in utterances expressing the former (Breitenstein et al., 2001; Havrdová and Morávek, 1979; Ladd et al., 1985; Skinner, 1935; Wu et al., 2006) and raised in the latter (Breitenstein et al., 2001; Fairbanks and Pronovost, 1939; Kaiser, 1962; Ladd et al., 1985; Wu et al., 2006). These observations are in accordance with the aforementioned association between sympathetic arousal and an increase in speech rate and volume. Again, more intensive emotions evoke higher values of the acoustic features under consideration.

#### ***1.4. Acoustic differences between male and female voices***

One of the variables used in the experiment described in Section 4 is the gender of the characters whose dialogues are analysed. Consequently, the topic of acoustic differences between male and female voices should also be addressed.

Although the early work on acoustic phonetics focused primarily on male speakers, possible differences between acoustic characteristics of male and female speech have since been widely discussed. For instance, the classical study by Peterson and Barney (1952) reported data on acoustic differences of vowels produced by men, women and children. Since then various other aspects have been analysed, including abruptness of flow termination, symmetricalness and duration of vocal pulses, sound pressure level, the amount of noise fill in interformant regions, the size of formant bandwidths, etc. (cf. the summary in Kent and Read, 1992). A number of studies also examined the assumption that a woman's voice involves more breathiness than a man's (Henton and Bladon, 1985; Holmberg, Hillman and Perkell, 1988; Klatt, 1987; Klatt and Klatt, 1990) and the notion of "timbre", broadly defined as a "multidimensional waste-basket category for everything that cannot be labelled pitch or loudness" (McAdams and Bregman, 1979, p. 34), has also received some attention in the discussion (cf. Pernet and Belin, 2012). Nevertheless, the major acoustic feature which has repeatedly been

reported to differentiate women's voices from men's is the fundamental frequency (Childers and Wu, 1991; Fitzsimons, Sheahan, and Staunton, 2001; Gelfer and Mikos, 2005; Kent and Read, 1992; Latinus and Taylor, 2012; Machado, Duarte, Teles, Reis, and Rebelo, 2012; Ohara, 2003; Yuasa, 2008). Even though F0 may be not sufficient by itself to discriminate male and female voices and additional acoustic information may be required (Childers and Wu, 1991; Klatt and Klatt, 1990), it has been used as a primary cue for gender identification in a number of voice recognition systems (Abdulla and Kasabov, 2001; Hu, Wu, and Nucci, 2012; Jung, Schwarzbacher, Humphreys and Lawlor, 2002; Parris and Carey, 1996).

The height of the fundamental frequency largely depends on the membranous length of the vocal folds (Kent and Read, 1992; Titze, 1989). Therefore, F0 is directly connected with the biological differences between men and women. The average male larynx is 1.7 times larger than the average female larynx, resulting in the average female voice being 1.7 times higher than the average male voice (Childers and Wu, 1991; Jung et al., 2002). There is, obviously, much individual variability and the actual acoustic values of F0 vary from 100 Hz to 200 Hz for men, and from 120 Hz to 350 Hz for women (Titze, 1989).

Possible differences in the variability of the fundamental frequency of male and female voice have also been debated. The discussion is somewhat confusing because the phenomenon may be measured in different ways. One of these is by calculating the range of pitch, understood as the difference between the maximum and minimum value of the fundamental frequency of voice measured in Hertz among a group of participants. This method has been frequently applied, most likely because the pitch range is easy to determine. It has been concluded that the voice pitch range of women is higher than the voice pitch range of men (Childers and Wu, 1991; Fitzsimons et al., 2001; Kent and Read, 1992; McConnell-Ginet, 1983; Waksler, 2001). A detailed survey of studies including such data has been provided by Henton (1989) and the claim of the larger pitch range in the female voice as measured on the linear Hertz scale is valid. Nevertheless, Henton has argued that such a method for comparing male and female voices is misleading because "the ear is known to judge pitch range not by measuring hertz, but by using a logarithmic, on non-linear scale, such as semitones" (1989: 301). Consequently, she has converted the values of the range measured in Hertz into semitones using the formula applied earlier by Graddol (1982). The new values on the logarithmic scale do not support the former conclusion that the male voice involves less variability than the female voice. In fact, Henton's results indicate that it is the male voice which involves greater pitch range.

Another way of measuring variability is to calculate standard deviation. In Henton (1995) this method was associated with the term "pitch variability" and contrasted with the notion of "speaker's pitch range", which had been the focal point in her previous publication described above. The major advantage of using standard deviation rather than range is that the former summarises the exact average distance from the mean, while the latter takes into account only two marginal values in a dataset, which tend not to be representative of the data. A partial solution to this problem is to calculate the range from less than the total range, e.g. from the data within four standard deviations (Jassem, 1971). This would

help to eliminate extreme outliers, but the obtained marginal values could still be unrepresentative of the whole dataset.

Even though range has been regarded as a statistic of severely limited use (Rumsey, 2011), choosing between the two methods depends on a study's aims. If one just wants to investigate the actual range of pitch for a given group of subjects, then the very range is, obviously, the right choice. However, if the aim is to evaluate the level of variability of pitch in the speech of such a group, then range is not the right statistical measurement and the standard deviation of pitch should be chosen instead. For this reason, the results reported in Henton (1989) should be treated with caution. One of the major aims of her study was to disprove the derogatory terms "over-emotional" and "swoopy" which had been used to describe female speech in the past. By choosing range of pitch as the major acoustic cue, it was difficult to objectively disprove the variability of voice implied in those pejorative terms. Apart from that, from the phonetic point of view there is nothing negative in having more pitch variability in one's speech; thus, any derogatory descriptions of such tendencies are not encountered in modern linguistics.

Studies which provide data on the standard deviation of pitch indicate that, in general, it is actually larger in female speech than in male speech (Schötz, 2006, 2007; Xue and Deliyski, 2001), although further investigation into this topic could help to provide more in-depth answers.

Finally, it must be emphasized at this point that the category of gender used in this study refers to the "character's sex", and not to "the reader's sex". Consequently, it affects the acoustic measurements discussed in Section 4 only indirectly. It is not concerned with the actual differences between the male voice and the female voice resulting from dissimilar characteristics of vocal track anatomy. Instead, this explanatory variable is associated with the reader's idea of what men and women sound like and how these differences should be conveyed when reading dialogues (see also Section 3.1).

## 2. Aims

This paper continues the investigation of the ways in which the emotions of happiness and sadness are expressed in the reading of prose as begun in Stolarski (2015). It was established that they are conveyed according to the predicted tendencies. The average value and standard deviation of readers' F0 tends to be raised in expressions involving the former category, and both acoustic variables are lowered in fragments involving the latter emotion. Nevertheless, these acoustic cues are utilised to varying degrees. Although signalling happiness includes an increase in both the mean F0 and the standard deviation of F0, sadness is primarily marked by a lower variability of F0; decrease in F0 level is less influential.

The present publication extends the scope of Stolarski (2015) by including a crucial new variable. Each of the extracts analysed in the previous experiment was a part of a dialogue in which a given character in a novel took part.

In addition to the clearly specified emotion of happiness or sadness relevant to the excerpt, the readers were also aware of the gender of the character. In the previous study the potential influence of this important additional factor was partially mitigated by choosing exactly the same number of male and female characters in each sample. Nonetheless, the impact of a person's gender on the way his/her speech is rendered when reading aloud should be closely investigated.

The initial predictions are that parts of dialogues in which male characters express sadness will be read with a lower mean F0 and a lower variability of F0. Conversely, the parts in which female characters express happiness should result with an increase in the two acoustic features. The predictions are based on the data discussed in Sections 1.3 and 1.4. The mutual influence of the two factors is, however, difficult to guess in the other two contexts. Namely, it is unclear what the resulting readers' mean F0 and standard deviation of F0 will be in cases of male characters expressing happiness and female characters expressing sadness. In these contexts, the two variables act in opposition to one another; thus, it is by examining such cases that the relative degree of influence of these two socio-linguistic aspects on the above mentioned acoustic features may be estimated.

It is worth emphasizing that the "happy/sad" dichotomy may be treated as a prototypical emotion continuum (see the discussion in Section 3.1 below). Consequently, the results obtained in this paper could also be interpreted in a more general sociolinguistic context. The potential of "happy/sad" to be dominant over "gender" (or vice versa) could be extended to a more general claim replacing "happy/sad" with the broad category of "emotion". Such a conclusion would have to be verified in future research, but it would be highly probable.

### 3. Methods

#### 3.1. Variables included in the study

The response variables in the experiment described in Section 4 are the average fundamental frequency and the variability of the fundamental frequency (measured as the standard deviation of the fundamental frequency) of the readers' voices. In the current study, the former is usually referred to as "F0", and the latter as "SD of F0". As discussed earlier (see Section 1.3), both are basic acoustic cues used in studies on the vocal expression of emotion and both have been shown to exert the greatest effect. Additionally, F0 is also frequently included in literature on acoustic differences between male and female speech (see Section 1.4). Both of the response variables are numerical and are measured in Hertz.

There are also two categorical explanatory variables. The first is the gender of the characters (male or female). As mentioned at the end of Section 1.4, this variable is assumed to affect acoustic measurements indirectly. It refers only to the way in which the reader perceives the differences between the male and the female voice and also the manner in which he or she wants to convey these differences. The actual acoustic characteristics typical for men and women should be treated only as a theoretical point of reference for what the readers may be



attempting to reproduce. As a consequence, the statistical analysis performed in this study is based on the relative differences between the mean values measured in the whole chapters and the mean values obtained in the extracts (see Section 4.1). This normalization of the data is necessary to observe the changes for a given reader, regardless of his or her natural voice characteristics.

The second explanatory variable is the contrast between the opposing emotions of happiness and sadness. These two emotion categories appear in almost any taxonomy of emotions (see the discussion in Section 1.2) and their existence is rarely questioned.

It must be emphasised that all of these variables have been chosen not only to investigate the interaction between the literary character's sex and the way happiness and sadness are expressed. As mentioned in Section 2, the intention of this study is also to explore the more universal relationship between the category of emotion and the character's gender in the reading aloud of novels. By choosing "prototypical" emotions as well as the most quintessential acoustic characteristics of the human voice, one may, to a certain degree, make more general estimates regarding the effects of emotions and the literary character's sex on the fiction reader's voice.

Data on the readers' gender and dialect was also collected, but the influence of these variables on the resulting pitch values, discussed in Section 4.2, is not the primary focus of this article. They were analysed only to exclude possible confounding effects.

### 3.2. Materials

The materials analysed in the present study comprise fragments of audiobooks selected according to criteria which allowed testing the influence of the two explanatory variables on the two response variables specified in Section 3.1. The process of their selection was essentially the same as that applied in Stolarski (2015). Below is a summary of the procedures followed in the previous research.

1. A reasonably large corpus of novels had to be created. Initially, only books written by Charles Dickens were taken into account. He wrote over 40 works, most of which are large novels. They were downloaded in electronic format from "www.gutenberg.org".
2. The corresponding audiobooks were sought at "www.librevox.com". 28 titles were found, and some of the novels were recorded in several versions by different readers.
3. Appropriate lexical cues associated with the semantic categories of happiness and sadness had to be established. Phrases containing adjectives, such as "cried a cheerful voice" (Charles Dickens, *A Christmas Carol*, Stave 1), or nouns, as in "cried Biddy, in a burst of happiness" (Charles Dickens, *Great Expectations*, Chapter 58), could have been used, but it was found that the most suitable were expressions including adverbs. The list of the adverbs included close synonyms of "happily" (joyfully, joyously, amusingly, cheerily, cheerfully, gleefully, gaily, merrily, buoyantly, ebulliently, avidly, jovially,

blithely, radiantly) and “sadly” (unhappily, gloomily, cheerlessly, sorrowfully, despondently, dejectedly, dismally, dolefully, joylessly, morosely).

4. A search was conducted with the use of *AntConc* (Anthony, 2014). Due to restrictions resulting from the applied statistical methods (see below) only 20 examples were found for each of the two emotion categories. Most of the examples followed the pattern “first part of a character’s utterance + expression involving one of the emotional adverbs + second part of the same character’s utterance”. The acoustic analysis was performed solely on the part following the adverb specifying the emotion with which the fragment was meant to be read. Additionally, only those examples were chosen which indicated one of the emotions in a clear and unambiguous way. Cases in which a given emotion was expressed only up to a point (e.g. “he added more cheerfully” – Charles Dickens, *The Life and Adventures of Nicholas Nickleby*, Chapter 55) or was mixed with another emotion (e.g. “said Mr. Lorry, joyfully relieved after reading this note aloud” – Charles Dickens, *A Tale of Two Cities*, Book 3, Chapter 3) were excluded. Similarly, examples chosen for the analysis included reporting verbs that were either neutral, e.g. “said” or “answered”, or implied a feeling consistent with the emotion signalled by the character. All this guaranteed that the reader was left with no doubt about the character’s emotional intentions.
5. The statistical methods applied in the study included the sign test for the mean difference with matched-pairs data and the Wilcoxon signed rank test for paired data. This choice was dictated by the need to cope with the problem of speaker normalization, but it introduced an important restriction. On the one hand, the same example could actually be analysed several times if it was read by different readers (cf. Appendix C for the extract from *A Christmas Carol* by Charles Dickens which was scrutinised 5 times). On the other, for each of the emotion categories the samples could not contain recordings by the same reader. This restriction limited the number of available examples to 20 for each emotion label and this was not enough to obtain statistically relevant results. As a consequence, other novels written by other twentieth century authors were included in the search and, finally, 30 appropriate extracts for each emotion category were found and analysed.

The aims of the current study demand twice as many examples as in the previous case. There are four groups to be examined: 1) male characters expressing happiness, 2) female characters expressing happiness, 3) male characters expressing sadness and 4) female characters expressing sadness. Assuming that 30 is the minimum number of elements in a single sample in order for the results to be statistically reliable, the total number of examples should be 120. Among the excerpts used in Stolarski (2015) the first group was represented by 27 expressions, the second by 3, the third by 27 and the fourth by 3. Therefore, the examples that needed to be added included: 3 for male characters expressing happiness, 27 for female characters expressing happiness, 3 for male characters expressing sadness and 27 for female characters expressing sadness. The search for these additional

extracts followed the same procedures as before and only a few new aspects were introduced. One of them was, obviously, gender of the characters. Other aspects were characters' names and age. The latter variable was quite important because it also has a direct influence on the speaker's voice (Linville, 1996; Reubold, Harrington and Kleber, 2010; Schötz, 2006, 2007; Xue and Deliyski, 2001) and it could also alter the resulting quality of the readers' voice. In order to control for this variable, all of the examples selected for the current paper involved characters who were neither children nor elderly, at least not at the time in the novel when the dialogues analysed took place. The final set of 120 excerpts gathered for the analysis discussed in Section 4 is presented in the Appendices.

All of the recordings used in this study were downloaded as mp3 files with a bit rate of 64 or 128 kbit/s.

### **3.3. Acoustic measurements**

The acoustic measurements were performed using *Praat* (Boersma and Weenink, 2014). As mentioned in Section 3.2, the analysis of the extracts concerns only those fragments that follow an adverb suggesting emotional content. They are underlined in the Appendices. In each of these expressions, the mean F0 was measured and the pitch contour was extracted in order to obtain the standard deviation of F0. Additionally, the values of F0 and SD of F0 were calculated for the whole chapter in which a given extract was found. This allowed a comparison between the values in the extracts with emotional content and the values typical for a given speaker.

All of the measurements collected for the present study are summarised in Appendices A, B, C and D.

### **3.4. Statistical techniques**

The discussion of the results is divided into two major parts. In the first (Section 4.1), cases are analysed in which the two major explanatory variables function simultaneously and have a potential influence on the response variables. The statistical methods used in this analysis involve paired t-tests for samples that follow a normal distribution, and both the sing test and the Wilcoxon signed rank test for samples which do not fit a normal distribution. The normality of the samples was established by a visual inspection of the corresponding normal probability plots as well as the results of the Anderson-Darling test for normality.

In the second part of the discussion (Section 4.2) the readers' gender and dialect are analysed. They are treated as additional variables and are not the focus of the present study; however, their potential confounding effects need to be examined. The statistical methods used in this part of the paper, which are the Kruskal-Wallis test and a four-way analysis of variance, also make it possible to examine potential interaction between all explanatory variables under investigation.

The statistical tests in Section 4.1 were performed using Minitab 16.2.3 (2012) and the analysis summarised in Section 4.2 was conducted in R 3.0.3 (2013).

## 4. Results

### 4.1. Effects of characters' gender and expressed emotion

Appendices A and B present the data such that the two explanatory variables act concurrently and, theoretically, should reinforce each other. The combination of a female character and the emotion of happiness (Appendix A) should result in an increase in the two response variables, whereas in the examples in which male characters express sadness (Appendix B) both F0 and SD of F0 should decrease. Appendices C and D, on the other hand, include examples in which the two explanatory variables cancel each other and the resulting values of the response variables are difficult to predict. As mentioned in Section 2, the answer to this problem constitutes the major aim of the current paper.

Each appendix contains samples of mean F0 and SD of F0 from the chosen fragments as well as the corresponding values from the whole chapters. Consequently, there are four samples in each appendix, 16 samples in total. It must be emphasised that the tests discussed in Sections 4.1 and 4.2 were conducted on the differences between the mean F0 in the whole chapters and the mean F0 in the extracts (the penultimate column in each appendix) and the differences between SD of F0 in the whole chapters and SD of F0 in the extracts (the last column in each appendix).

#### Examples in which the explanatory variables reinforce each other

The 30 examples in Appendix A involve female characters who express the emotion of happiness. 17 of these were read by females and 13 by males. Among the females, 12 are native speakers of American English and 5 are native speakers of British English. The male readers include 5 native speakers of American English, 7 native speakers of British English and 1 speaker of Irish English. Appendix B includes 30 examples of male characters vocalizing the emotion of sadness. The excerpts were read by 17 male readers (8 speakers of American English, 8 speakers of British English and 1 speaker of Irish English) and 13 female readers (10 speakers of American English and 3 speakers of British English).

The upper left graph in Figure 1 depicts the normal probability plot for the differences between mean readers' F0 and the F0 measured in the extracts involving female characters expressing happiness (the penultimate column in Appendix A). Some of the data points do not closely follow a normal distribution as represented by the straight diagonal line in the middle of the picture. The corresponding statistic of the Anderson-Darling test, included in the quantitative summary to the right of the graphs, is large (0.866), and the p-value is below the  $\alpha$  level of 0.05 (0.023). Because of this, the sign test as well as the Wilcoxon signed rank test were used to examine whether the median of the dataset is different from 0.

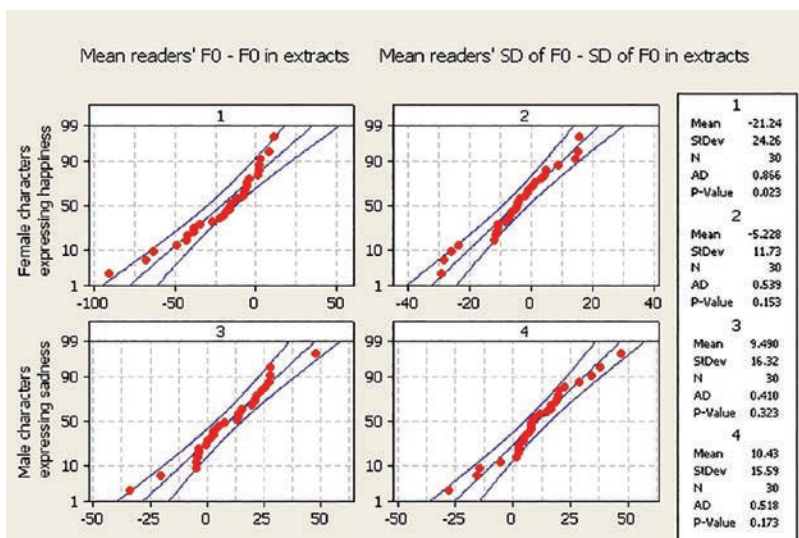
In the end, the results fully support the assumption that the readers' F0 tends to increase in extracts involving female characters expressing happiness. The median for the difference between the mean readers' F0 measured for whole

chapters and the corresponding values measured for the excerpts is -15.83 Hz. Moreover, the results of the sing test indicate that this difference is statistically significant ( $p = 0.0014$ ). This is also substantiated by the Wilcoxon signed rank test ( $W = 33, p < 0.0001$ ).

The normality tests for the other three samples analysed in the present section indicate that parametric methods may be applied (see the upper right and both bottom graphs in Figure 1). The data follow a normal distribution rather closely, which is also indicated in the results of the Anderson-Darling test summarised in the box to the right of the graphs.

Paired t-test for cases in which mean readers' SD of F0 is compared to the SD of F0 in the extracts in which female characters express the emotion of happiness indicates a difference of -5.23 Hz (95% CI: -9.61 Hz, -0.85 Hz) and p-value of 0.021. Thus, the predicted tendency in which the two explanatory variables reinforce each other has been confirmed once again. On average, SD of F0 tends to be higher in the extracts than in the corresponding chapters. Likewise, the results concerning the data on male characters expressing sadness follow the assumptions mentioned in Section 4.1. F0 tends to be lower by 9.49 Hz (95% CI: 3.40 Hz, 15.58 Hz) in such extracts and this difference is statistically significant ( $p = 0.003$ ). The SD of F0 is also relatively lower. The results suggest an average difference of 10.43 Hz (95% CI: 4.61 Hz, 16.25 Hz) at a high level of significance ( $p = 0.001$ ).

**Figure 1:** Normal probability plots for samples involving female characters expressing happiness and male characters expressing sadness on which the statistical tests were performed



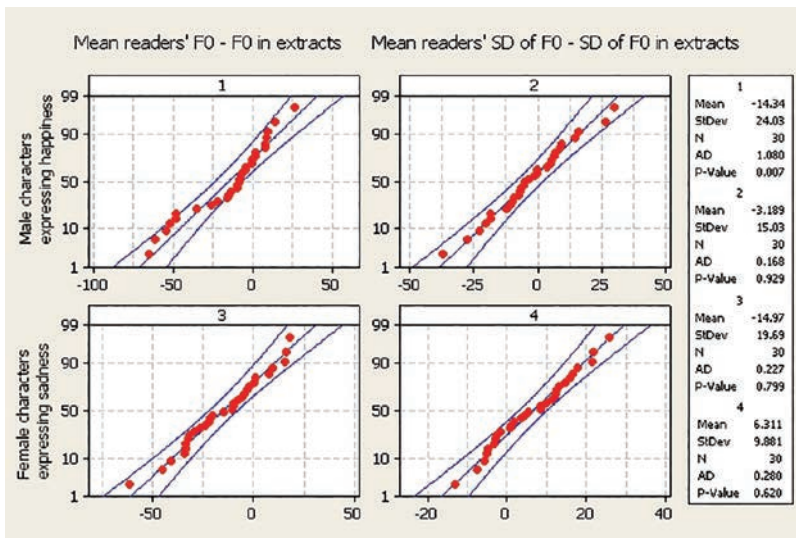
Examples in which the explanatory variables cancel each other.

Appendix C contains fragments exemplifying the way in which the expression of happiness in male characters is rendered in the reading aloud of prose. 20 of the

excerpts were read by male readers (11 speakers of American English, 8 speakers of British English and 1 speaker of Irish English) and 10 by female readers (7 speakers of American English and 3 speakers of British English). Finally, Appendix D includes cases in which female characters vocalise the emotion of sadness. The fragments were read by 10 men and 20 women. The male readers included 6 speakers of American English, 3 speakers of British English and 1 speaker of Irish English. In the group of female participants there were 13 speakers of American English and 7 speakers of British English.

As in the case of the data analysed in the section above, the Anderson-Darling test of normality indicates that most of the samples follow a normal distribution (see Figure 2). The only case in which nonparametric methods are preferable is the data set containing the differences between the mean F0 in fragments with male characters expressing happiness and corresponding values of F0 in whole chapters (see the penultimate column in Appendix C and the graph in the upper left-hand corner in Figure 2). The Anderson-Darling test statistic for this group amounts to 1.08 and the p-value to 0.007, which is strong evidence against normality. In all other cases, however, parametric tests may be applied.

**Figure 2:** Normal probability plots for samples involving male characters expressing happiness and female characters expressing sadness on which the statistical tests were performed



The average F0 tends to increase in extracts in which male characters are expressing happiness. On the basis of the sample analysed in Appendix C, the median for this difference is -15.83 Hz and the sign test suggests that it is statistically relevant ( $p = 0.0014$ ). The Wilcoxon signed rank test also confirms the significance of this result ( $W = 100$ ,  $p = 0.007$ ). The conclusion to be drawn from this is that the changes in F0 tend to be more dependent on the variable of emotion than gender. Such an observation is additionally supported by the changes in SD of F0. The paired t-test for the sample listed in the last column in Appendix A shows

an average difference of -3.19 Hz. In this case, the result may not be treated as statistically relevant ( $p = 0.255$ ), but it indicates a similar tendency. The variable that plays the leading role is the emotion of happiness. The fact that the characters whose utterances are read are male seems to have a relatively weaker influence on the characteristics of the readers' voice pitch.

The situation in the fragments in which female characters express sadness is more complex. First, the behaviour of F0 tends to be primarily influenced by the gender of the characters (see the penultimate column in Appendix D). The average difference of -14.97 Hz (95% CI: -22.32 Hz, -7.61 Hz) is highly statistically significant ( $p < 0.0001$ ). The readers tend to raise the pitch of their voice in order to imitate the relatively higher pitch of a given female character, whereas the reverse influence of the emotion of sadness is clearly weaker. Second, the changes in SD of F0 indicate an opposite pattern. The values of this variable are, on average, lower by 6.31 Hz (95% CI: 2.62 Hz, 10.00 Hz) in extracts in comparison to the corresponding whole chapters and the difference should be treated as highly statistically significant ( $p = 0.002$ ). This suggests that it is the emotion of sadness which plays here a more dominant role. The readers lower the variability of their pitch, which most probably results from the patterns found in the vocal expression of sadness. A possible raising of the variability in order to mark female voice is of secondary importance.

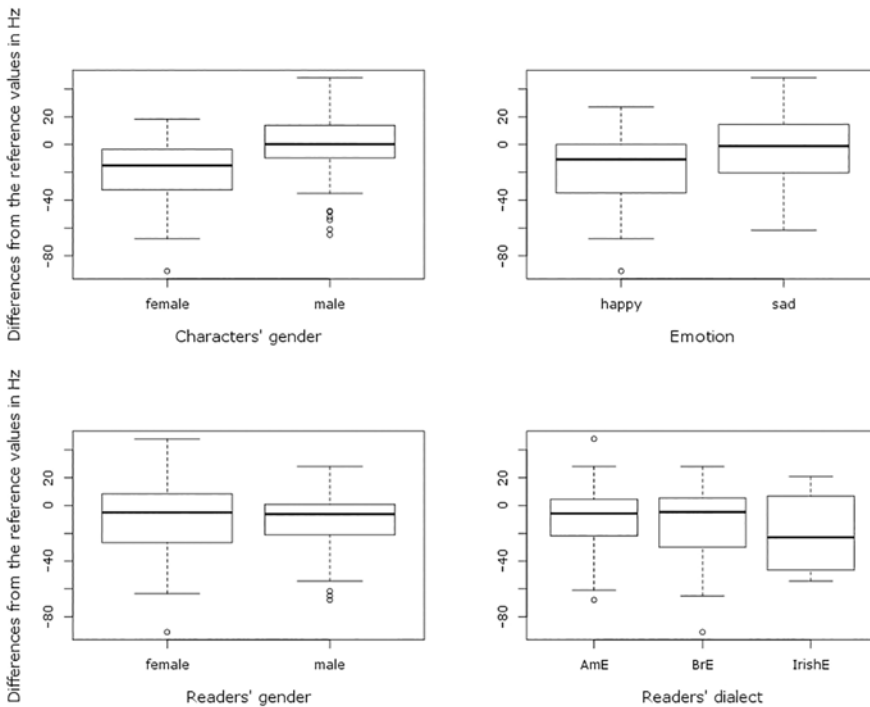
#### **4.2. Analysis including all explanatory variables**

Data on readers' gender and dialect which are included in the Appendices are not the primary focus of the present paper. Nonetheless, it is important to investigate possible confounding effects of these variables. What is more, it is crucial to consider the interaction between all explanatory variables used in the present study. To do this, a 4-way analysis of variance (ANOVA) could be conducted for both the differences between the mean F0 in the whole chapters and the mean F0 in the extracts (the penultimate column in each appendix), and the differences between the variability of F0 in the whole chapters and the variability of F0 in the extracts (the last column in each appendix). There are, however, certain problems with applying this method to the data under analysis. Many of the sets involving F0 that would be compared in ANOVA do not follow a normal distribution. This was already indicated in Figures 1 and 2, which suggest nonparametric methods for the samples of female characters expressing happiness and male characters expressing happiness. A closer inspection of other datasets that would be involved in ANOVA reveals numerous other instances which do not exhibit a normal distribution pattern. This problem relates to, for example, the sample of the F0 differences for all male characters ( $n = 30$ ,  $AD = 1.3751$ ,  $p\text{-value} = 0.001328$ ), all cases involving the emotion of happiness ( $n = 30$ ,  $AD = 1.6071$ ,  $p\text{-value} = 0.0003519$ ), or even the whole set of F0 differences ( $n = 60$ ,  $AD = 1.2581$ ,  $p\text{-value} = 0.002726$ ). An attempt to overcome this obstacle by applying "log transformation" was unsuccessful. The choice of nonparametric methods was the next logical step, but such a decision creates another problem. There is no direct, nonparametric counterpart for an n-way ANOVA. Instead, one may

apply the Kruskal-Wallis rank sum test, but the effects of the four explanatory variables may only be analysed separately in four different tests. Therefore, the possible interaction between the four factors cannot be estimated. In conclusion, the analysis conducted in the first part of Section 4.2 involves, first and foremost, the Kruskal-Wallis test. The results of ANOVA are discussed later very briefly and suggest some interaction between the two variables.

The second part of Section 4.2 presents the results of a 4-way analysis of variance for the effects of the four explanatory variables on SD of F0. The samples compared in ANOVA do not reveal in this case any significant deviations from a normal distribution. Four of them were already summarised in Figures 1 and 2, and the Anderson-Darling tests for the others yielded p-values above 0.05.

**Figure 3:** Boxplots comparing the F<sub>0</sub> shifts according to the four explanatory variables



### The effects of all four explanatory variables on F<sub>0</sub> analysed with the Kruskal-Wallis rank sum test

Figure 3 shows boxplots comparing the differences between the values of F<sub>0</sub> in whole chapters and in extracts in terms of the four explanatory variables. It is readily visible that data divided according to readers' gender (see the boxplot in the lower left-hand corner in Figure 3) do not differ in any significant way. This is confirmed by the high p-value of 0.5271 obtained in the Kruskal-Wallis test summarised in Table 1. All this suggests that any concerns regarding confound-



ing effects of readers' gender on F0 differences under analysis may be rejected.

A similar conclusion should be drawn for readers' dialect. Both the boxplot in the lower right-hand corner in Figure 3 and the results of the Kruskal-Wallis test presented in Table 1 ( $p = 0.7508$ ) indicate that this variable neither affects the behaviour of F0. These findings make the conclusions reached in Section 4.1 more reliable. What is more, the results presented in Section 4.1 are further corroborated by the clear differences in the samples divided according to the characters' gender. The boxplot in the upper left-hand side of Figure 3 indicates that extracts with female characters are associated with a much higher F0 in comparison to the values measured in the corresponding whole chapters than is the case with extracts including male characters. This is confirmed by the result of the Kruskal-Wallis test presented in Table 1 ( $p < 0.0001$ ). Finally, the influence of the variable of emotion on F0 is also consistent with the tendency established in Section 4.1. The values of F0 in excerpts involving happiness are clearly higher than the corresponding values in whole chapters, while in fragments in which the emotion of sadness is expressed such a shift is not readily observable (see the graph in the upper right-hand corner in Figure 3). What is more important, the difference in the way the two levels of the explanatory variable affect F0 is statistically relevant. The Kruskal-Wallis test results summarised in Table 1 indicate that the p-value is only 0.0006.

Despite the problems with the normality of the samples analysed in this section, it is worth mentioning that the results of ANOVA also indicate that both characters' gender and the emotion expressed have primary effects ( $p = 0.000126$  and  $0.000224$ , respectively). More importantly, interaction between the two factors is statistically relevant ( $p = 0.026093$ ). The corresponding interaction plot reveals the behaviour of these two factors, which was, to a certain extent, predicted before conducting the experiment (see the discussion in Section 2). Fragments with female characters expressing happiness represent the largest upward shift of F0 and male characters' expression of sadness has the opposite effect on F0. On the other hand, there is not much difference between the results for female characters expressing sadness and male characters expressing happiness. The discussion in the second part of Section 4.1 suggested that it is the variable of emotion which dominates over the variable of gender. However, this does not exclude the fact that the two factors mutually influence each other. Such a conclusion seems perfectly natural, although the exact results of ANOVA cited above should be interpreted with caution because of the problems with the normality of samples.

	Characters' gender	Emotion	Readers' gender	Readers' dialect
Kruskal-Wallis chi-squared	15.912	11.6571	0.4	0.5733
df	1	1	1	2
p-value	< 0.0001	0.0006	0.5271	0.7508

**Table 1.** The Kruskal-Wallis rank sum test results for the effects of the four explanatory variables on the differences between the values of F0 measured in whole chapters and the values of F0 measured in extracts

The effects of all explanatory variables on SD of F0 examined in a four-way analysis of variance (ANOVA)

Table 2 summarises the results of ANOVA for the effects of all four explanatory variables on pitch variability. It is plainly visible that neither readers' gender ( $p = 0.4018$ ) nor their dialect ( $p = 0.5124$ ) has any effect on the sample of differences between the variability of their voices in whole chapters and in the extracts cited in the appendices. In other words, these two additional explanatory variables do not influence the response variable of pitch variability. This reinforces the interpretation of the results reported in Section 4.1: because any confounding effects of speakers' gender and dialect on SD of F0 may safely be rejected.

Another interesting observation is that characters' gender does not affect SD of F0 either ( $p = 0.2138$ ). This is in agreement with the results discussed in Section 4.1, where it was observed that pitch variability always depends on the emotion expressed and is never really controlled by the characters' gender.

The results summarised in Table 2 do not indicate any interactions between explanatory variables. The only significant result concerns the category of emotion ( $p < 0.0001$ ). All this suggests that as far as the behaviour of pitch variability is concerned, the explanatory variable of emotion is dominant in relation to other explanatory variables such as characters' gender (see also the discussion in Section 5).

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Characters' gender	1	284.4	284.4	1.5651	0.2138
Emotion	1	4746.9	4746.9	26.1221	1.54E-006 ***
Readers' gender	1	128.8	128.8	0.7088	0.4018
Readers' dialect	2	244.6	122.3	0.6731	0.5124
Characters' gender : Emotion	1	28.3	28.3	0.1555	0.6941
Characters' gender : Readers' gender	1	8	8	0.044	0.8343
Emotion : Readers' gender	1	0.9	0.9	0.0049	0.9445
Characters' gender : Readers' dialect	2	291.2	145.6	0.8012	0.4516
Emotion : Readers' dialect	2	605.4	302.7	1.6658	0.1942
Readers' gender : Readers' dialect	1	292.6	292.6	1.61	0.2074
Characters' gender : Emotion : Readers' gender	1	319.8	319.8	1.7601	0.1876
Characters' gender : Emotion : Readers' dialect	2	142	71	0.3907	0.6776
Characters' gender : Readers' gender : Readers' dialect	1	138.1	138.1	0.7598	0.3855
Emotion : Readers' gender : Readers' dialect	1	3.5	3.5	0.019	0.8906
Characters' gender : Emotion : Readers' gender : Readers' dialect	1	79.7	79.7	0.4387	0.5093
Residuals	100	18172.1	181.7		
Significance codes:		0 '****'	0.001 '***'	0.01 '**'	0.05 '.'

**Table 2.** ANOVA results for the effects of all four explanatory variables on shifts of pitch variability

## 5. Discussion

The results discussed in the second part of Section 4.1 revealed that in the fragments in which male characters express the emotion of happiness the mean values of both F0 and SD of F0 tend to increase. This suggests that in these contexts

the “emotion” variable is the only influence on the response variables. It is worth adding that these results corroborate the findings on the vocal expression of happiness and sadness in the reading of prose reported in Stolarski (2015). One of the major conclusions reached in that paper was that the emotion of happiness is signalled by a distinct increase of both F0 and SD of F0. The results of the experiment described in the present study additionally suggest that this tendency seems considerably stronger than the opposite one which is, presumably, associated with the “gender” variable. The fact that the extracts are uttered by male characters does not result in the decrease of any of the response variables.

The analysis presented in the second part of Section 4.1 on female characters expressing the emotion of sadness yielded mixed results. On the one hand, the behaviour of F0 seems to be influenced mostly by the gender of the characters. The mean value of this variable tends to increase in comparison to the corresponding average values for entire chapters. On the other hand, SD of F0 is, again, dependent on the “emotion” variable and it tends to be lower. At first sight, such an outcome may appear somewhat confusing, but a closer examination of the results reported in Stolarski (2015) suggests a possible explanation. Namely, it was observed that sadness is signalled primarily by lowering SD of F0. Any decrease in the value of F0 is of secondary importance in expressing this emotion. The fact that in the present study SD of F0 is influenced by “sadness” rather than “female gender” and that both of the response variables are influenced by “happiness” rather than “male gender” could be explained by assuming that, in general, the variable of emotion is more influential than the other explanatory variable. In the cases involving “happiness” an increase in the values of F0 and SD of F0 may be observed because, typically, this emotion is associated with such phonetic changes. The opposite tendency for the “male gender” to lower the values of the two response variables is weaker and fully dominated by the emotion. In contrast, in examples which include “sadness” only changes in SD of F0 are caused by the emotion, because sadness is typically conveyed by a lower SD of F0. Any changes of F0 are secondary and the opposite tendency triggered by the “female gender” is in a position to take over the behaviour of this response variable. As a consequence, F0 tends to increase.

This interpretation of the evidence gathered in Section 4.1 is further supported by the results obtained in Section 4.2. The potential for the emotions of happiness and sadness to control the behaviour of SD of F0 has been proven statistically, while the corresponding potential of the “gender” category does not seem to affect the resulting values of SD of F0. Furthermore, it is worth recalling that the findings discussed in Section 4.2 exclude any possible confounding effects of additional factors such as readers’ gender or dialect, which make the claims put forward in this study even stronger.

As indicated in Section 2, the results obtained in this paper may be interpreted in a more general sense. Even though further research is needed to conclusively prove such a suggestion, it is very likely that the broad category of emotion affects the reader’s voice characteristics to a greater degree than the character’s gender. To put it another way, other emotions, beyond happiness and sadness, may also play a dominant role in influencing the reader’s voice. The particular emotion

categories chosen in the present study are considered “prototypical” (see the discussion in Section 1.2) and it is highly probable that examining the interaction of the character’s gender and other emotions would yield similar results.

In order to further corroborate the claims made above, future research needs to be conducted on audiobooks with the aim of exploring possible associations between the acoustic characteristics analysed in this study and other basic emotions. Moreover, the examination should be extended to include acoustic features other than the pitch. For example, not only is it important to take into consideration global statistics on the fundamental frequency in a given utterance, but also to observe intonation contours. Previous research has revealed that some patterns of this kind may be appropriate to express almost any emotion, but other contours are more suitable to signal only some affective states (Mozziconacci and Hermes, 1997). It has also been observed that intonation patterns may have independent effects on the way the emotional content of utterances are judged from other suprasegmental features (Ladd et al., 1985). Moreover, Rodero (2011) has proposed that contour type may be more representative of a given emotion than pitch level. The results reported in Bänziger and Scherer (2005) do not support such a claim, but the fact that intonation contours may play a crucial part in the vocal expression of emotions, especially in connection with other prosodic features, is clear.

An interesting example of an investigation which involves a large number of possible acoustic correlates of emotions is the study by Schuller, Wöllmer, Eyben and Rigoll (2009). They analysed expression of the “big six” emotions, as named by Ekman (1972), in terms of 1406 different features grouped into the three categories of prosodic, spectral and voice quality. Such a large number of response variables could be juxtaposed with a group of explanatory variables and a multiple regression analysis, similar to the one found in Banse and Scherer (1996), could be conducted.

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## Appendix A. Female characters expressing happiness

Source	Emotional Word	Context (the part which has been analysed is underlined)	Character's name or function	Reader's Initials	Reader's Gender	Reader's Dialect	Reader's mean Fo in Hz	Reader's SD of Fo in Hz	Mean Fo in the extract in Hz	SD of Fo in the extract in Hz	Difference between reader's mean Fo and Fo in the extract in Hz	Difference between reader's SD of Fo and SD of Fo in the extract in Hz
Charles Dickens. The Chimes, Chapter 1	cheerfully	Context (the part which has been analysed is underlined) "He'd eat his dinner with an appetite, whoever he was, if it smelt like this," said Meg, cheerfully. "Make haste, for there's a hot potato besides, and half a pint of fresh-drawn beer in a bottle. Where will you dine, father? On the Post, or on the Steps? Dear, dear, how grand we are. Two places to choose from!"	Margaret Veck	R.G.	female	BrE	185,09	74,31	248,35	81,02	-63,26	-6,71
Louisa May Alcott. Work: A story of experience, Chapter 12	merrily	She glanced at the title of the new gift, read "Heroes and Hero-worship," and answered merrily: "No, sir, but I'm looking hard."	Christy Devon	L.P.	female	AmE	188,01	44,34	179,92	45,65	8,09	-1,31
Charles Dickens. A Tale of Two Cities, Third Book, Chapter 7	cheerfully	"Heigh-ho-hum!" said Miss Pross, cheerfully, repressing a sigh as she glanced at her darling's golden hair in the light of the fire, "then we must have patience and wait: that's all. We must hold up our heads and fight low, as my brother Solomon used to say. Now, Mr. Cruncher!-Don't you move, Ladybird!"	Miss Pross	P.A.	male	BrE	139,75	49,46	137,38	45,24	2,37	4,22
Charles Dickens. A Tale of Two Cities, Third Book, Chapter 7	cheerfully	"Heigh-ho-hum!" said Miss Pross, cheerfully, repressing a sigh as she glanced at her darling's golden hair in the light of the fire, "then we must have patience and wait: that's all. We must hold up our heads and fight low, as my brother Solomon used to say. Now, Mr. Cruncher!-Don't you move, Ladybird!"	Miss Pross	B.F.	male	BrE	156,3	38,64	172,52	47,36	-16,22	-8,72
Charles Dickens. A Tale of Two Cities, Third Book, Chapter 7	cheerfully	"Heigh-ho-hum!" said Miss Pross, cheerfully, repressing a sigh as she glanced at her darling's golden hair in the light of the fire, "then we must have patience and wait: that's all. We must hold up our heads and fight low, as my brother Solomon used to say. Now, Mr. Cruncher!-Don't you move, Ladybird!"	Miss Pross	T.	female	AmE	214,85	59,21	213,56	70,66	1,29	-11,45
Charles Dickens. David Copperfield, Chapter 9	gaily	"We shall be ready by the trying-on time," she replied gaily, without looking up. "Don't you be afraid, father."	Minnie Omer	T.I.	male	IrishE	131,34	35,31	170,02	59,42	-38,68	-24,11
Charles Dickens. David Copperfield, Chapter 9	gaily	"We shall be ready by the trying-on time," she replied gaily, without looking up. "Don't you be afraid, father."	Minnie Omer	V.J.	male	AmE	132,34	29,28	138,4	28,24	-6,06	1,04
Charles Dickens. Life and Adventures of Martin Chuzzlewit, Chapter 28	cheerfully	"How late it is!" she said cheerfully, opening the shutter after an interval of silence. "Broad day, Jonas!"	Merry Pecksniff	P.K.	male	BrE	136,47	33,08	144,44	35,41	-7,97	-2,33

Charles Dickens. Life and Adventures of Martin Chuzzlewit. Chapter 28	cheerfully	"How late it is!" she said cheerfully, opening the shutter after an interval of silence. "Broad day, Jonas!"	Merry Pecksniff	D.L.1	female	AmE	190,55	47,18	210,5	51,54	-19,95	-4,36
Charles Dickens. Little Dorrit. Book 1, Chapter 14	cheerly	"Come, Maegy," said Little Dorrit cheerly, "we shall do very well; we know the way by this time, Maggy?"	Amy Dorrit	E.C.	male	BrE	158,13	43,28	173,57	26,85	-15,44	15,43
Charles Dickens. The Battle of Life. Part 2	cheerly	"Never far from her sister," said Marion, cheerly, "however little, Grace was everything to me, even when she was a young child herself;"	Marion Jeddler	M.F.S.	male	AmE	148,66	67,37	216,56	52,83	-67,9	14,54
Mary Elizabeth Braddon. Henry Dunbar. Chapter 31	cheerfully	"I do believe it, my dear," answered the widow, cheerfully; "when did you ever do anything that wasn't wise and good?"	Mrs Austin	N.W.	male	BrE	139,55	42,56	178,35	72,35	-38,8	-29,79
George Eliot. Middlemarch. Book 2, Chapter 22	cheerfully	"And I am quite interested to see what you will do," Dorothea went on cheerfully. "I believe devoutly in a natural difference of vocation. If it were not for that belief, I suppose I should be very narrow—there are so many things, besides painting, that I am quite ignorant of. You would hardly believe how little I have taken in of music and literature, which you know so much of. I wonder what your vocation will turn out to be: perhaps you will be a poet!"	Dorothea Brooke	M.E.	female	AmE	156,25	32,51	161,65	44,4	-5,4	-11,89
Elizabeth Cleghorn Gaskell. Wives and Daughters. An Every-Day Story. Chapter 7	merrily	"Please speak for yourself, Mrs. Hamley," said Molly, merrily. "I ate — oh, such a great basketful yesterday, and the squire went himself to the dairy and brought out a great bowl of cream, when he found me at my busy work. And I'm as well as ever I was, to-day, and never had a touch of indigestion near me."	Molly Gibson	C.K.	female	AmE	249,76	65,94	299,05	71,43	-49,29	-5,49
Elizabeth Cleghorn Gaskell. Wives and Daughters. An Every-Day Story. Chapter 7	merrily	"Please speak for yourself, Mrs. Hamley," said Molly, merrily. "I ate — oh, such a great basketful yesterday, and the squire went himself to the dairy and brought out a great bowl of cream, when he found me at my busy work. And I'm as well as ever I was, to-day, and never had a touch of indigestion near me."	Molly Gibson	E.K.	female	AmE	221	50,26	237,23	61,34	-16,23	-11,08
Thomas Hardy. The Mayor of Casterbridge. Chapter 24	gaily	Lucetta, discerning that he was much mixed that day, partly in his mercantile mood and partly in his romantic one, said gaily to him: "Well, don't forsake the machine for us," and went indoors with her Companion."	Lucetta Templeman	B.P.	male	AmE	111,16	28,67	133,48	19,93	-22,32	8,74
Thomas Hardy. The Mayor of Casterbridge. Chapter 24	gaily	Lucetta, discerning that he was much mixed that day, partly in his mercantile mood and partly in his romantic one, said gaily to him: "Well, don't forsake the machine for us," and went indoors with her Companion."	Lucetta Templeman	N.	female	BrE	190,74	48,98	281,78	52,91	-91,04	-3,93
Edward George Bulwer-Lytton. The Last Days of Pompeii. Book 4, Chapter 2	joyfully	"This is kind, Apaeicides," said Ione, joyfully; "and how eagerly have I wished to see thee: what thanks do I not owe thee! How childish hast thou been to answer none of my letters — to abstain from coming hither to receive the expressions of my gratitude! Oh! thou hast assisted to preserve thy sister from dishonour! What, what can she say to thank thee, now thou art come at last?"	Ione	C.B.	female	BrE	205,17	32,52	218,35	44,95	-13,18	-12,43

Source	Emotional Word	Context (the part which has been analysed is underlined)	Char-acter's name or function	Reader's Initials	Reader's Gender	Reader's Dialect	Reader's mean Fo in Hz	Reader's SD of Fo in Hz	Mean Fo in the extract in Hz	SD of Fo in the extract in Hz	Difference between reader's mean Fo and Fo in the extract in Hz	Difference between reader's SD of Fo and SD of Fo in the extract in Hz
Anthony Trollope. The Three Clerks. Chapter 43	cheerfully	"Yes," said she, cheerfully, "these are the little men, that in the good times coming will be managing vast kingdoms, and giving orders to this worn-out old island of yours. Alley, my boy, sing your new song about the good and happy land."	Gertrude Woodward	B.	male	AmE	145,26	49,63	150,55	46,5	-5,29	3,13
Anthony Trollope. The Three Clerks. Chapter 43	cheerfully	"Yes," said she, cheerfully, "these are the little men, that in the good times coming will be managing vast kingdoms, and giving orders to this worn-out old island of yours. Alley, my boy, sing your new song about the good and happy land."	Gertrude Woodward	A.O.	male	BrE	141,04	46,96	145,03	31,57	-3,99	15,39
William Makepeace Thackeray. Vanity Fair. Chapter 44	gaily	"A poor man's wife," Rebecca replied gaily, "must make herself useful, you know."	Becky Sharp	C.P.	male	BrE	191	44,59	233,16	73,29	-42,16	-28,7
Edith Van Dyne. Aunt Jane's Nieces in the Red Cross. Chapter 16	cheerfully	Maud, seeing that they recoiled from the doctor's appearance, took his place and said cheerfully: "Mr. Denton is asleep, just now, but by the time you have bathed and had a cup of tea I am quite sure he will be ready to receive you."	Maud Stanton	L.T.	female	BrE	215,13	61,63	212,49	66,7	2,64	-5,07
Max Brand. Alcatraz. Chapter 22	cheerfully	And dropping one hand on her hip, she said cheerfully to McGuire. "You look queer as a prison-guard, Mr. McGuire."	Marianne Jordan	R.K.	male	AmE	103,17	22,23	114,82	48,64	-11,65	-26,41
Roy Justin Snell. The Blue Envelope. Chapter 8	cheerfully	"Oh, we'll make it still," encouraged Lucile, cheerfully. "Probably the Straits are not fully frozen over yet anyway."	Lucile Tucker	D.L.2	female	AmE	203,79	41,1	210,88	47,93	-7,09	-6,83
Jane Austen. Emma. Volume 2, Chapter 17	gaily	"And I am quite serious too, I assure you," replied Mrs. Elton gaily, "in resolving to be always on the watch, and employing my friends to watch also, that nothing really unexceptionable may pass us."	Augusta Elton	L.A.W.	female	AmE	192,71	52,87	190,61	48,25	2,1	4,62
Jane Austen. Emma. Volume 2, Chapter 17	gaily	"And I am quite serious too, I assure you," replied Mrs. Elton gaily, "in resolving to be always on the watch, and employing my friends to watch also, that nothing really unexceptionable may pass us."	Augusta Elton	S.C.	female	AmE	223,46	59,48	242,15	64,07	-18,69	-4,59
Jane Austen. Emma. Volume 2, Chapter 17	gaily	"And I am quite serious too, I assure you," replied Mrs. Elton gaily, "in resolving to be always on the watch, and employing my friends to watch also, that nothing really unexceptionable may pass us."	Augusta Elton	M.F.	female	AmE	214,78	59,92	249,1	67,15	-34,32	-7,23
Jane Austen. Emma. Volume 2, Chapter 17	gaily	"And I am quite serious too, I assure you," replied Mrs. Elton gaily, "in resolving to be always on the watch, and employing my friends to watch also, that nothing really unexceptionable may pass us."	Augusta Elton	S.D.	female	AmE	209,26	53,12	236,6	52,88	-27,34	0,24
Jane Austen. Emma. Volume 2, Chapter 17	gaily	"And I am quite serious too, I assure you," replied Mrs. Elton gaily, "in resolving to be always on the watch, and employing my friends to watch also, that nothing really unexceptionable may pass us."	Augusta Elton	M.T.	female	AmE	201,05	43,85	243,71	54,71	-42,66	-10,86
Edith Wharton. The Age of Innocence. Chapter 22	gaily	"Of course," she added gaily, "I shouldn't have minded half as much if I'd known you were coming."	Miss Blenker	B.D.	female	BrE	154,51	30,35	143,4	31,25	11,11	-0,9

Appendix B. Male characters expressing sadness

Source	Emotional Word	Context (the part which has been analysed is underlined)	Character's name or function	Reader's Initials	Reader's Gender	Reader's Dialect	Reader's mean Fo in Hz	Reader's SD of Fo in Hz	Mean Fo in the extract in Hz	SD of Fo in the extract in Hz	Difference between reader's mean Fo and Fo in the extract in Hz	Difference between reader's SD of Fo and SD of Fo in the extract in Hz
Charles Dickens. <i>Our Mutual Friend</i> . Chapter 7	despondently	Having so held and waved the candle as that all these heterogeneous objects seemed to come forward obediently when they were named, and then retire again, Mr Venus despondently repeats, "Oh dear me, dear me!"	Mr Venus	D.J.	male	AmE	142,76	38,92	146,43	36,67	-3,67	2,25
Charles Dickens. <i>Our Mutual Friend</i> . Chapter 7	despondently	Having so held and waved the candle as that all these heterogeneous objects seemed to come forward obediently when they were named, and then retire again, Mr Venus despondently repeats, "Oh dear me, dear me!"	Mr Venus	D.B.	male	BrE	108,64	40,39	113,08	32,49	-4,44	7,9
Charles Dickens. <i>A Tale of Two Cities</i> . Second Book, Chapter 9	gloomily	"We have so asserted our station, both in the old time and in the modern time also," said the nephew, gloomily, "that I believe our name to be more detested than any name in France."	Charles Darnay	P.A.	male	BrE	158,17	59,19	163,04	21,14	-4,87	38,05
Charles Dickens. <i>A Tale of Two Cities</i> . Second Book, Chapter 9	gloomily	"We have so asserted our station, both in the old time and in the modern time also," said the nephew, gloomily, "that I believe our name to be more detested than any name in France."	Charles Darnay	B.F.	male	BrE	151,06	41,29	171,48	38,94	-20,42	2,35
Charles Dickens. <i>A Tale of Two Cities</i> . Second Book, Chapter 9	gloomily	"We have so asserted our station, both in the old time and in the modern time also," said the nephew, gloomily, "that I believe our name to be more detested than any name in France."	Charles Darnay	N.	female	AmE	196,4	45,94	193,3	43,31	3,1	2,63
Charles Dickens. <i>Bleak House</i> . Chapter 51	gloomily	He took a few turns up and down and sunk upon the sofa. "I get," he repeated gloomily, "so tired. It is such weary, weary work!"	Richard Carstone	M.N.	female	BrE	184,8	49,72	157,56	55,1	27,24	-5,38
Charles Dickens. <i>Bleak House</i> . Chapter 51	gloomily	He took a few turns up and down and sunk upon the sofa. "I get," he repeated gloomily, "so tired. It is such weary, weary work!"	Richard Carstone	C.L.	female	AmE	200,58	55,94	185,56	33,44	15,02	22,5
Charles Dickens. <i>Little Dorrit</i> . Book 2, Chapter 28	gloomily	"Without giving an unqualified assent to what you say," returned Arthur, gloomily, "I am much obliged to you for your interest in me."	Arthur Clemm	E.C.	male	BrE	143,79	42,71	143,44	41,32	0,35	1,39
Charles Dickens. <i>The Haunted Man and the Ghost's Bargain</i> . Chapter 2	gloomily	"it is only since last night," he muttered gloomily, "that I have remained shut up, and yet all things are strange to me. I am strange to myself. I am here, as in a dream. What interest have I in this place, or in any place that I can bring to my remembrance? My mind is going blind!"	Professor Redlaw	R.G.	female	BrE	179,4	56,43	165,65	22,37	13,75	34,06
Charles Dickens. <i>The Haunted Man and the Ghost's Bargain</i> . Chapter 2	gloomily	"it is only since last night," he muttered gloomily, "that I have remained shut up, and yet all things are strange to me. I am strange to myself. I am here, as in a dream. What interest have I in this place, or in any place that I can bring to my remembrance? My mind is going blind!"	Professor Redlaw	R.F.	male	AmE	165,64	40,2	152,31	34,66	13,33	5,54

Source	Emotional Word	Context (the part which has been analysed is underlined)	Character's name or function	Reader's Initials	Reader's Gender	Reader's Dialect	Reader's mean Fo in Hz	Reader's SD of Fo in Hz	Mean Fo in the extract in Hz	SD of Fo in the extract in Hz	Difference between reader's mean Fo and the extract in Hz	Difference between reader's SD of Fo and SD of Fo in the extract in Hz
Charles Dickens. <i>The Pickwick Papers</i> . Chapter 48	gloomily	"I remember," said Mr. Allen gloomily. "Upon which we ate <u>it ourselves</u> , in alternate bites."	Benjamin Allen	S.E.	male	BrE	149,65	69,2	146,93	62,14	2,72	7,06
Charles Dickens. <i>The Pickwick Papers</i> . Chapter 48	gloomily	"I remember," said Mr. Allen gloomily. "Upon which we ate <u>it ourselves</u> , in alternate bites."	Benjamin Allen	D.L.	female	AmE	188,34	52,73	183,27	32,89	5,07	19,84
Charles Dickens. <i>Oliver Twist</i> . Chapter 46	sadly	"No, my love," replied Mr. Brownlow, looking sadly back. " <u>She has not moved, and will not till we are gone.</u> "	Mr. Brownlow	T.H.	male	IrishE	133,41	38,56	112,5	22,07	20,91	16,49
Charles Dickens. <i>Oliver Twist</i> . Chapter 46	sadly	"No, my love," replied Mr. Brownlow, looking sadly back. " <u>She has not moved, and will not till we are gone.</u> "	Mr. Brownlow	R.D.	male	BrE	144,67	48,14	116,65	29,02	28,02	19,12
Charles Dickens. <i>Oliver Twist</i> . Chapter 46	sadly	"No, my love," replied Mr. Brownlow, looking sadly back. " <u>She has not moved, and will not till we are gone.</u> "	Mr. Brownlow	A.P.	male	AmE	174,31	68,27	152,34	53,66	21,97	14,61
Charles Dickens. <i>David Copperfield</i> . Chapter 49	sorrowfully	"She is but so-so. And this," said Mr. Micawber, nodding his head sorrowfully, "is the Bench Where, for the first time in many revolving years, the overwhelming pressure of pecuniary liabilities was not proclaimed, from day to day, by importunate voices declining to vacate the passage, where there was no knocker on the door for any creditor to appeal to, where personal service of process was not required, and detainees were merely lodged at the gate!"	Wilkins Micawber	V.B.	female	AmE	214,47	48,31	210,28	40,7	4,19	7,61
Charles Dickens. <i>The Old Adventures of Martin Chuzzlewit</i> . Chapter 43	sorrowfully	"A short interview after such an absence!" said Martin, sorrowfully. "But we are well out of the house. We might have placed ourselves in a false position by remaining there, even so long. Mark."	Martin Chuzzlewit	P.K.	male	BrE	148,5	42,89	124,34	31,11	24,16	11,78
Charles Dickens. <i>The Life and Adventures of Nicholas Nickleby</i> . Chapter 22	sorrowfully	"I don't know," said Smike, shaking his head sorrowfully. "I think I had once, but it's all gone now - all gone."	Smike	C.C.	male	BrE	101,22	27,23	135,33	55,53	-34,11	-28,3
Charles Dickens. <i>The Old Curiosity Shop</i> . Chapter 25	sorrowfully	"No," rejoined the schoolmaster shaking his head sorrowfully, "no better. They even say he is worse."	Mr. Marston	E.1	female	BrE	149,68	41,59	135,78	13,04	13,9	28,55
Anthony Trollope. <i>He Knew He Was Right</i> . Chapter 29	gloomily	"It is very sad for me," said Trevelyan, gloomily. "Very sad, indeed. My home is destroyed; my life is made solitary. I do not even see my own child. She has her boy with her, and her sister. I have nobody."	Louis Trevelyan	A.L.	female	AmE	230,82	49,09	223,12	44,5	7,7	4,59



Henry Rider Haggard. Colonel Quaritch, V.C.: A Tale of Country Life. Chapter 13	sadly	"The cant of the impressionist school," he said sadly; "ont the contrary, the business of the artist is to paint what he knows to be there."	Colonel Quaritch	E.2	female	AmE	172,76	38,4	152,97	22,09	19,79	16,31
Thomas Hardy. The Trumpet Major. Chapter 9	sadly	Loveday imagined her tone that she must have an interest in Derriman, and said sadly, "You blame me for going across to the window, and leading you to follow me."	John Loveday	J.F.	male	AmE	132,63	89,84	104,59	42,53	28,04	47,31
William Makepeace Thackeray. Vanity Fair. Chapter 54	sadly	"It may be so," Rawdon answered sadly, "but this don't look very innocent."	Rawdon Crawley	A.	female	AmE	177,54	43,29	162,45	34,96	15,09	8,33
Jules Verne & Michael Verne. In the Year 2889.	sadly	"You decline! All is over then!" murmured the British agent sadly. "The United Kingdom falls to the share of the Americans; the Indies to that of..."	John Last	J.K.	male	AmE	119,33	26,13	119,78	6,5	-0,45	19,63
Jules Verne The Field of Ice. Part II of the Adventures of Captain Hatteras. Chapter 2	sadly	That would be little use, said Hatteras, sadly, "my opinion might appear interested; let me hear all yours first."	John Hatteras	J.C.	male	AmE	95,35	38,69	99	53,42	-3,65	-14,73
Louisa May Alcott. Work: A Story of Experience. Chapter 15	sadly	David stood beside her silent, till tie first impressive paroxysm was over; then, while she sat weeping softly, quite bowed down by emotion, he said, sadly now, not sternly: "You could not know, because we hid the truth so carefully. I have no right to resent that belief of yours, for I did wrong my poor Letty, almost as much as that lover of hers, who, being dead, I do not curse. Let me tell you every thing, Christie, before I ask your respect and confidence again. I never deserved them, but I tried to; for they were very precious to me."	David Sterling	L.P.	female	AmE	18,11	41,33	179,38	57,42	1,72	-16,09
Mary Elizabeth Braddon. Lady Audley's Secret. Chapter 2	sadly	"I would give ten years of my own life if I could see him alive," answered Robert, sadly, "I am sorry for you, Mr. Maldon - I am sorry for all of us."	Robert Audley	E.K.	female	AmE	207,04	44,32	181,5	36,76	25,54	7,56
Max Brand. Black Jack. Chapter 27	gloomily	"I suppose," he admitted gloomily, "that I've been raised to do pretty much as I please - and the money I've spent has been given to me."	Terry Hollis	R.K.	male	AmE	105,54	39,01	110,14	20,85	-4,6	9,16
Henry Rider Haggard. The Brethren. Chapter 23	sadly	"Then we must dare the great sin and take her," answered Balian sadly, "having first slain the knight Wulf, who will not let her go while he is alive."	Balian of Ibelin	A.R.	female	AmE	242,36	34,85	194,39	30,39	47,97	4,46
Lew Wallace. Ben-Hur: A Tale of the Christ. Book 5, Chapter 8	gloomily	"Rome!" he answered, gloomily "Rome, and her legions. I have dwelt with them in their camps. I know them."	Judah Ben-Hur	M.F.S.	male	AmE	118,88	34,19	97,56	15,87	21,32	18,32

## Appendix C. Male characters expressing happiness

Source	Emotional Word	Context (the part which has been analysed is underlined)	Character's name or function	Reader's Initials	Reader's Gender	Reader's Dialect	Reader's mean Fo in Hz	Reader's SD of Fo in Hz	Mean Fo in the extract in Hz	SD of Fo in the extract in Hz	Difference between reader's mean Fo and Fo in the extract in Hz	Difference between reader's SD of Fo and SD of Fo in the extract in Hz
Charles Dickens. <i>David Copperfield</i> . Chapter 35	joyfully	"Agnes!" I joyfully exclaimed. "Oh, my dear Agnes, of all people in the world, what a pleasure to see you!"	David Copperfield	T.I.	male	IrishE	133,3	44,24	187,58	62,75	-54,28	-18,51
Charles Dickens. <i>David Copperfield</i> . Chapter 35	joyfully	"Agnes!" I joyfully exclaimed. "Oh, my dear Agnes, of all people in the world, what a pleasure to see you!"	David Copperfield	D.L.	female	AmE	190,47	54,21	251,4	39,8	-60,93	14,41
Charles Dickens. <i>Our Mutual Friend</i> . Book 3, Chapter 16	joyfully	"Mr Wifer," said John Rokesmith, excitedly and joyfully. "Bella takes me, though I have no fortune, even no present occupation; nothing but what I can get in the life before us. Bella takes me!"	John Rokesmith	M.N.	female	BrE	184,426	64,945	157,48	35,02	26,9456	29,925
Charles Dickens. <i>Our Mutual Friend</i> . Book 3, Chapter 16	joyfully	"Mr Wifer," said John Rokesmith, excitedly and joyfully. "Bella takes me, though I have no fortune, even no present occupation; nothing but what I can get in the life before us. Bella takes me!"	John Rokesmith	A.C.	male	BrE	147,11	53,69	138,15	27,1	8,96	26,59
Charles Dickens. <i>Our Mutual Friend</i> . Book 3, Chapter 16	joyfully	"Mr Wifer," said John Rokesmith, excitedly and joyfully. "Bella takes me, though I have no fortune, even no present occupation; nothing but what I can get in the life before us. Bella takes me!"	John Rokesmith	D.J.	male	AmE	150,09	36,88	150,13	29,91	-0,04	6,97
Charles Dickens. <i>Great Expectations</i> . Chapter 53	cheerfully	"When it turns at nine o'clock," said Herbert, cheerfully. "look out for us, and stand ready, you over there at Mill Pond Bank!"	Herbert Pocket	M.F.S.	male	AmE	110,68	54,91	136,01	65,78	-25,33	-10,87
Charles Dickens. <i>The Life and Adventures of Martin Chuzzlewit</i> . Chapter 5	cheerfully	"When I say nothing," observed Mr Pinch, cheerfully. "I am wrong, and don't say what I mean, because I get a great deal of pleasure from it, and the means of passing some of the happiest hours I know. It led to something else the other day; but you will not care to hear about that I dare say?"	Thomas Pinch	P.K.	male	BrE	136,09	35,14	140,15	35,33	-4,06	-0,19
Charles Dickens. <i>Little Dorrit</i> . Book 2, Chapter 28	cheerfully	"I still look round, from time to time, sir," said Mr Ruggs, cheerfully. "To see whether any lingering Detainers are accumulating at the gate. They have fallen in pretty thick, sir, as thick as we could have expected."	Mr Ruggs	E.C.	male	BrE	146,15	49,23	152,34	54,9	-6,19	-5,67
Charles Dickens. <i>The Life and Adventures of Nicholas Nickleby</i> . Chapter 35	cheerfully	"You are a foolish, silly creature," said Nicholas cheerfully. "If that is what you mean, I grant you that. Why, here's a dismal face for ladies' company! - my pretty sister too, whom you have so often asked me about. Is this your Yorkshire gallantry? For shame! for shame!"	Nicholas Nickleby	A.S.	female	AmE	205,71	49,51	213,94	54,9	-8,23	-5,39
Charles Dickens. <i>The Old Curiosity Shop</i> . Chapter 54	cheerfully	"Nell here?" he said cheerfully, as he closed his book. "It does me good to see you in the air and light. I feared you were again in the church, where you so often are."	Mr Marton	E.1	female	BrE	152,84	46,48	152,73	47,95	0,11	-1,47

Charles Dickens. The Uncom- mercial Traveller. Chapter 8	cheer- fully	"He is a careful fellow this, you must know," said the Doctor, cheerfully; "it was raining hard when they put him in the open cart to bring him here, and he had the presence of mind to ask to have a sovereign taken out of his pocket that he had there, and a cab engaged. Probably it saved his life."	doctor	W.T.	male	AmE	140,78	49,56	150,4	70,15	-9,62	-20,59
Charles Dickens. A Christmas Carol. Stave 1	gaily	"Come, then," returned the nephew gaily, "What right have you to be dismal? What reason have you to be morose? You're rich enough."	Fred	C.O.	male	AmE	117,01	32,83	124,2	27,55	-7,19	5,28
Charles Dickens. A Christmas Carol. Stave 1	gaily	"Come, then," returned the nephew gaily, "What right have you to be dismal? What reason have you to be morose? You're rich enough."	Fred	L.B.	female	AmE	177,51	60,68	229,71	68,23	-52,2	-7,55
Charles Dickens. A Christmas Carol. Stave 1	gaily	"Come, then," returned the nephew gaily, "What right have you to be dismal? What reason have you to be morose? You're rich enough."	Fred	B.F.	male	BrE	146,8	46,11	195,2	64,71	-48,4	-18,6
Charles Dickens. A Christmas Carol. Stave 1	gaily	"Come, then," returned the nephew gaily, "What right have you to be dismal? What reason have you to be morose? You're rich enough."	Fred	G.H.	male	BrE	134,75	81,02	182,48	81,44	-47,73	-0,42
Charles Dickens. A Christmas Carol. Stave 1	gaily	"Come, then," returned the nephew gaily, "What right have you to be dismal? What reason have you to be morose? You're rich enough."	Fred	K.M.1	male	BrE	117,33	41,05	182,26	51,03	-64,93	-9,98
Charles Dickens. A Christmas Carol. Stave 1	gaily	"Come, then," returned the nephew gaily, "What right have you to be dismal? What reason have you to be morose? You're rich enough."	Fred	M.B.	male	AmE	131,86	59,5	153,76	82,19	-21,9	-22,69
Jules Verne. Around the World in 80 Days. Chapter 2	joyfully	Having scrutinised the house from top to bottom, he rubbed his hands, a broad smile overspread his features, and he said joyfully, "This is just what I wanted! Ah, we shall get on together, Mr. Fogg and I! What a domestic and regular gentleman! A real machine; well, I don't mind serving a machine."	Jean Passepat- tout	A.F.	male	BrE	107,86	45,44	105,77	29,69	2,09	15,75
Jules Verne. Around the World in 80 Days. Chapter 2	joyfully	Having scrutinised the house from top to bottom, he rubbed his hands, a broad smile overspread his features, and he said joyfully, "This is just what I wanted! Ah, we shall get on together, Mr. Fogg and I! What a domestic and regular gentleman! A real machine; well, I don't mind serving a machine."	Jean Passepat- tout	D.H.	male	AmE	157,1	52,37	155,04	59,69	2,06	-7,32
Jules Verne. Around the World in 80 Days. Chapter 2	joyfully	Having scrutinised the house from top to bottom, he rubbed his hands, a broad smile overspread his features, and he said joyfully, "This is just what I wanted! Ah, we shall get on together, Mr. Fogg and I! What a domestic and regular gentleman! A real machine; well, I don't mind serving a machine."	Jean Passepat- tout	R.S.	male	AmE	109,1	24,59	124,46	37,2	-15,36	-19,61
Jules Verne. Around the World in 80 Days. Chapter 2	joyfully	Having scrutinised the house from top to bottom, he rubbed his hands, a broad smile overspread his features, and he said joyfully, "This is just what I wanted! Ah, we shall get on together, Mr. Fogg and I! What a domestic and regular gentleman! A real machine; well, I don't mind serving a machine."	Jean Passepat- tout	E.2	female	AmE	178,36	30,16	213,52	58,05	-35,16	-27,89

Source	Emotional Word	Context (the part which has been analysed is underlined)	Char-acter's name or function	Reader's Initials	Reader's Gender	Reader's Dialect	Reader's mean Fo in Hz	Reader's SD of Fo in Hz	Mean Fo in the extract in Hz	SD of Fo in the extract in Hz	Difference between reader's mean Fo and Fo in the extract in Hz	Difference between reader's SD of Fo and SD of Fo in the extract in Hz
James Fenimore Cooper. <i>The Pioneers, or The Sources of the Susquehanna</i> . Chapter 3	cheerfully	As house, village, and valley burst on his sight, he exclaimed cheerfully to his daughter: "See, Bess, there is thy resting-place for life! And thine too, young man, if thou wilt consent to dwell with us."	Judge Marmaduke Temple	C.S.	male	AmE	144,95	37,11	160,03	74,22	-15,08	-37,11
Dinah Maria Mulock Craik. <i>John Halifax, Gentleman</i> . Chapter 3	cheerily	He pulled a wry face, though comical withal, and said, cheerily, "Every-body must like what brings them their daily bread. It's a grand thing for me not to have been hungry for nearly thirty days."	John Halifax	C.S.	female	BrE	218,79	44,53	231,91	41,08	-13,12	3,45
Jules Verne. <i>A Journey to the Interior of the Earth</i> . Chapter 29	cheerily	"Good morning, Axel," he cried cheerily. "I feel sure you are better."	Professor Otto Lidenbrock	K.M.2	female	AmE	190,65	56,76	198,29	60,53	-7,64	-3,77
Jules Verne. <i>Dick Sands the Boy Captain</i> . Chapter 15	gaily	"It will give me much pleasure," answered Harris, gaily; "I will employ the interval in fetching my horse, who has breakfasted already."	Harris	A.T.	male	AmE	127,79	13,73	131,75	7,47	-3,96	6,26
Levis Carroll. <i>Sylvia and Bruno</i> . Chapter 14	gaily	"Don't wait too long!" I said gaily. "Faint heart never won fair lady!"	The historian – narrator	S.D.	male	BrE	154,34	97,7	144,84	107,28	9,5	-9,58
Arthur Applin. <i>Blackthorn Farm</i> . Chapter 21	cheerily	"I suppose when we meet again you will be millionaires," Crichton said cheerily. "I see a prospectus is being issued next week of The Blackthorn Development Company. I shall apply for a few shares – just for luck."	Reginald Crichton	T.O.	male	AmE	170,19	33,41	179,97	28,77	-9,78	4,64
Joseph Conrad. <i>Almayer's Folly. A Story of an Eastern River</i> . Chapter 10	cheerfully	"But the white men had him thrown into a hole at once. You know he found his death on the river," he added cheerily, "and his ghost may hail the canoes, but would leave the land Alone."	Babalatchi	K.T.	female	AmE	219,33	47,9	210,87	38,73	8,46	9,17
Joseph Conrad. <i>Almayer's Folly. A Story of an Eastern River</i> . Chapter 10	cheerfully	"But the white men had him thrown into a hole at once. You know he found his death on the river," he added cheerily, "and his ghost may hail the canoes, but would leave the land Alone."	Babalatchi	T.W.	male	AmE	137,33	36,96	122,9	28,12	14,43	8,84
Henry Rider Haggard. <i>The Brethren</i> . Chapter 4	cheerfully	"Ah!" replied Wulf cheerfully; "I am glad that Godwin went first, since it saves me words, at which he is better than I am."	Wulf	A.R.	female	AmE	236,37	33,57	227,89	40,33	8,48	-6,76

Appendix D. Female characters expressing sadness

Source	Emotional Word	Context (the part which has been analysed is underlined)	Character's name or function	Reader's Initials	Reader's Gender	Reader's Dialect	Reader's mean Fo in Hz	Reader's SD of Fo in Hz	Mean Fo in the extract in Hz	SD of Fo in the extract in Hz	Difference between reader's mean Fo and Fo in the extract in Hz	Difference between reader's SD of Fo and SD of Fo in the extract in Hz
Charles Dickens. <i>No Thoroughfare</i> . Act 2.	sadly	"O, Mr. Vendale," she said sadly, "it would have been kinder to have kept your secret. <u>Have you forgotten the distance between us? It can never, never be!</u> "	Marguerite	A.C.	male	BrE	121,55	37,21	183,13	40,34	-61,58	-3,13
Charles Dickens. <i>No Thoroughfare</i> . Act 2.	sadly	"O, Mr. Vendale," she said sadly, "it would have been kinder to have kept your secret. <u>Have you forgotten the distance between us? It can never, never be!</u> "	Marguerite	E.C.	male	BrE	139,71	48,52	149,87	36,08	-10,16	12,44
William Wilkie Collins. <i>The Dead Alive</i> . Chapter 8	sadly	I went upstairs, and, knocking softly at her door, made my inquiries from outside. The clear young voice answered me sadly, "I am trying to bear it: I won't distress you when we meet again."	Naomi Colebrook	P.M.	female	AmE	190,96	41,08	193,85	42,76	-3,89	-1,68
Jane Barlow. <i>Strangers at Lisconnel</i> . Chapter 3	sorrowfully	"Deed was I," said Mrs. Killoyle, sorrowfully, "a fine fool. And vexed she'd be, real vexed, if she guessed the way it was gone on us, for the dear knows what dirty ould rapsallions, 'ill get the wearin' of it now. Rael vexed she'd be."	Bessie Killoyle	J.E.C.	male	AmE	113,9	29,87	119,31	33,04	-5,41	-3,17
Charles Dickens. <i>Little Dorrit</i> . Chapter 30	gloomily	"I do not," she said, gloomily. "There is little left to choose now. <u>Flintwinch, it is closing in.</u> "	Mrs Clermman	M.N.	female	BrE	180,11	58,04	220,64	42,06	-40,53	15,98
Charles Dickens. <i>The Battle of Life</i> . Part 3	sorrowfully	"And it was only this very day that I heard it whispered at the old house, that better and plainer news had been half promised of her, soon!" said Clemency, shaking her head sorrowfully, and patting her elbows as if the recollection of old times unconsciously awakened her old habits. "Dear, dear, dear! There'll be heavy hearts. Ben, yonder."	Clemency Newcome	M.F.S.	male	AmE	139,98	56,25	172,17	46,5	-32,19	9,75
George Eliot. <i>Silas Marner</i> . Chapter 18	sadly	"It'll be different coming to us, now she's grown up," said Nancy, shaking her head sadly. "But it's your duty to acknowledge her and provide for her, and I'll do my part by her, and pray to God Almighty to make her love me."	Nancy Lamme-ter	R.	female	AmE	209,13	51,12	232,61	49,64	-23,48	1,48
George Eliot. <i>Silas Marner</i> . Chapter 18	sadly	"It'll be different coming to us, now she's grown up," said Nancy, shaking her head sadly. "But it's your duty to acknowledge her and provide for her, and I'll do my part by her, and pray to God Almighty to make her love me."	Nancy Lamme-ter	T.I.	male	IrishE	119,78	32,55	126,85	24,11	-7,07	8,44
Elizabeth Cleghorn Gaskell. <i>Mary Barton</i> . <i>A Tale of Manches-ter</i> Life. Chapter 17	sadly	"No, he knows that," answered Mary, sadly. "I sometimes think he'll never get work again, and that trade will never mend. It's very hard to keep up one's heart. I wish I were a boy, I'd go to sea with you. It would be getting away from bad news at any rate; and now, there's hardly a creature that crosses the door-step, but has something sad and unhappy to tell one. Father is going as a delegate from his Union, to ask help from the Glasgow folk. He's starting this Evening."	Mary Barton	G.K.	female	AmE	171,33	34,69	175,88	26,39	-4,55	8,3

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Elizabeth Cleghorn Gaskell. <i>Ruth</i> . Chapter 2	sadly	"Yes: I know I am pretty," said Ruth, sadly, "but I am sorry I have no better gown. For this is very shabby. I am ashamed of it myself, and I can see Mrs Mason is twice as much ashamed. I wish I need not go. I did not know we should have to think about our own dress at all, or I should not have wished to go."	Ruth Hilton	C.L.	female	AmE	211,33	60,82	233,23	59,78	-21,9	1,04
Elizabeth Cleghorn Gaskell. <i>Wives and Daughters</i> . An Every-Day Story. Chapter 21	sadly	"Betty has left us," said Molly, sadly. "She's gone to live at a place at Ashcombe."	Molly Gibson	E.K.	female	AmE	215	53,8	246,36	28,16	-31,36	25,64
Elizabeth Cleghorn Gaskell. <i>Wives and Daughters</i> . An Every-Day Story. Chapter 21	sadly	"Betty has left us," said Molly, sadly. "She's gone to live at a place at Ashcombe."	Molly Gibson	T.	female	AmE	219,63	67,49	203,68	49,81	15,95	17,68
Henry Rider Haggard. <i>Colonel Quirich</i> . V.C. A Tale of Country Life. Chapter 24	sadly	"Nothing," she answered sadly. "I do not see what can help us, unless the man died."	Ida de la Molle	E.	female	AmE	180,99	39,12	214,19	35,6	-33,2	3,52
Thomas Hardy. <i>The Mayor of Casterbridge</i> . Chapter 21	sadly	Elizabeth-Jane shook her head. "On consideration I don't fear it," she said sadly. "He has grown quite cold to me."	Elizabeth-Jane Newson	D.L.	female	AmE	178,42	44,14	160,05	29,53	18,37	14,61
Thomas Hardy. <i>The Mayor of Casterbridge</i> . Chapter 21	sadly	Elizabeth-Jane shook her head. "On consideration I don't fear it," she said sadly. "He has grown quite cold to me."	Elizabeth-Jane Newson	B.P.	male	AmE	106,06	25,55	120,78	28,19	-14,72	-2,64
Thomas Hardy. <i>The Mayor of Casterbridge</i> . Chapter 21	sadly	Elizabeth-Jane shook her head. "On consideration I don't fear it," she said sadly. "He has grown quite cold to me."	Elizabeth-Jane Newson	N.	female	BrE	187,35	54,71	213,3	38,13	-25,95	16,58
Thomas Hardy. <i>Tess of the d'Urbervilles</i> . Chapter 45	sadly	"Yes," she replied sadly. "But I cannot believe in your conversion to a new spirit. Such flashes as you feel, Alec, I fear don't last!"	Tess Durbeyfield	A.P.	male	BrE	114,46	39,87	114,11	44,67	0,35	-4,8
Thomas Hardy. <i>Tess of the d'Urbervilles</i> . Chapter 45	sadly	"Yes," she replied sadly. "But I cannot believe in your conversion to a new spirit. Such flashes as you feel, Alec, I fear don't last!"	Tess Durbeyfield	B.N.	male	AmE	160,71	45,29	170,25	34,19	-9,54	11,1

Thomas Hardy, <i>Tess of the d'Urbervilles</i> , Chapter 45	sadly	"Yes," she replied sadly, "But I cannot believe in your conversion to a new spirit. Such flashes as you feel, Alec, I fear don't last!"	Tess Durbeyfield	A.V.	female	BrE	187,38	46,07	197,17	33,15	-9,79	12,92
Edward George Bulwer-Lytton, <i>The Last Days of Pompeii</i> , Book 1, Chapter 5	sadly	"He has other duties," answered lone, sadly; "he is a priest of Isis."	lone	B.C.	female	AmE	185,81	34,33	219,29	22,49	-33,48	11,84
Anthony Trollope, <i>He Knew He Was Right</i> , Chapter 30	sadly	"Of course," said Dorothy, sadly, "if he were to think of such a thing at all, it would only be because the money would be convenient."	Dorothy Stanbury	A.L.	female	AmE	242,25	54,46	263,77	60,3	-21,52	-5,84
William Makepeace Thackeray, <i>Vanity Fair</i> , Chapter 4	sadly	"Why?" answered the other, still more sadly, "That I may be only the more unhappy – unwilling to lose you?"	Becky Sharp	W.G.	female	AmE	201,68	59,24	230,71	37,41	-29,03	21,83
Edith Van Dyne, <i>Aunt Jane's Nieces in the Red Cross</i> , Chapter 14	despondently	"I fussed, Uncle," said Patsy despondently. "I fussed willfully. But – how could I help it when she looked at me that way?"	Patsy Doyle	L.T.	female	BrE	218,65	72,15	208,88	60,04	9,77	12,11
Joseph Conrad, <i>Almayer's Folly</i> , A Story of an Eastern River, Chapter 12	sadly	"You say that because you do not understand the meaning of my words," she said sadly. "Between you and my mother there never was any love. When I returned to Sambir I found the place which I thought would be a peaceful refuge for my heart, filled with weariness and hatred – and mutual contempt. I have listened to your voice and to her voice. Then I saw that you could not understand me; for was I not part of that woman? Of her who was the regret and shame of your life? I had to choose – I hesitated. Why were you so blind? Did you not see me struggling before your eyes? But, when he came, all doubt disappeared, and I saw only the light of the blue and cloudless heaven."	Nina Almayer	K.T.	female	AmE	211,45	50,03	231,64	57,83	-20,19	-7,8
Joseph Conrad, <i>Almayer's Folly</i> , A Story of an Eastern River, Chapter 12	sadly	"You say that because you do not understand the meaning of my words," she said sadly. "Between you and my mother there never was any love. When I returned to Sambir I found the place which I thought would be a peaceful refuge for my heart, filled with weariness and hatred – and mutual contempt. I have listened to your voice and to her voice. Then I saw that you could not understand me; for was I not part of that woman? Of her who was the regret and shame of your life? I had to choose – I hesitated. Why were you so blind? Did you not see me struggling before your eyes? But, when he came, all doubt disappeared, and I saw only the light of the blue and cloudless heaven."	Nina Almayer	T.W.	male	AmE	133,79	33,6	167,93	38,84	-34,14	-5,24
Henry Rider Haggard, <i>The Brethren</i> , Chapter 14	sadly	"Mayhap," she answered sadly, "two ladies – but one love."	Masouda	A.R.	female	AmE	228,09	36,65	211,56	15,24	16,53	21,41
Max Brand, <i>Black Jack</i> , Chapter 10	gloomily	"It may be that you're right," she said gloomily. "Twenty-four years! Yes, and I've filled about half of my time with Terry and his training. Vance, you are right; if he has the elements of a mankiller in him after what I've done for him, then he's a hopeless case. The sheriff shall stay! The sheriff shall stay!"	Elizabeth Cornish	R.K.	male	AmE	105,3	30,94	103,79	25,7	1,51	5,24

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Elizabeth Cleghorn Gaskell. North and South. Chapter 16	sorrowfully	"No, Dixon," said Margaret, sorrowfully, " <u>I will not tell papa. He could not bear it as I can.</u> "	Margaret Hale	C.	female	BrE	247,89	53,23	293,22	66,41	-45,33	-13,18
Elizabeth Cleghorn Gaskell. North and South. Chapter 16	sorrowfully	"No, Dixon," said Margaret, sorrowfully, " <u>I will not tell papa. He could not bear it as I can.</u> "	Margaret Hale	M.A.	female	BrE	192,73	49,35	184,51	39,74	8,22	0,61
E. Burke Collins. Her Dark Inheritance. Chapter 5	sadly	For the last time, she murmured, sadly: " <u>the very last time – poor papa!</u> "	Beatrice Dane	S.K.	female	BrE	197,67	36,89	199,38	32,61	-1,71	4,28



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