

Variations in the Acoustic Properties of Children and Adults Villains' Deceptive Speech in some Selected Hollywood Movies

Fatima Radhwan Qasim

Prof. Dr. Balqis Issa Gatta

Dept. of English, College of Education for Human Sciences, University of Basra

Abstract:

This study investigates the variations in the acoustic properties in the deceptive speech patterns of child and adult Hollywood villains. Through a comprehensive analysis of audio data from movie dialogues, it identifies distinct acoustic features associated with deceptive communication in both child and adult villains. By examining the fundamental frequency (pitch), intensity, voice quality, and speech rate, the study elucidates how age influences the acoustic characteristics of deception in villainous portrayals. The findings provide valuable insights into the portrayal of deception in cinematic contexts and contribute to a deeper understanding of age-related differences in deceptive communication strategies within the realm of popular culture.

Key words: (Acoustic properties, Deceptive speech, Adults, Children, Villains, Movies).

1. Introduction

The portrayal of villains in Hollywood movies often involves complex and multifaceted characters whose deceptive speech plays a crucial role in shaping their identities. While previous research has explored the acoustic properties of deceptive speech in various contexts, little attention has been given to the specific differences between child and adult villains. This paper aims to fill this gap by conducting a detailed analysis of the acoustic properties associated with villains' deceptive speech in Hollywood across different age groups. By examining pitch, intensity, voice quality, and speech rate, this study seeks to uncover how age influences the acoustic characteristics of deception in cinematic portrayals of villainous characters. Through this investigation, we aim to provide valuable insights into the nuanced ways in which deceptive communication is portrayed across different age groups in popular media, contributing to a deeper understanding of the role of acoustic cues in character portrayal and audience perception.

2. Deception

Deception in human behavior can be broadly defined as the deliberate act of misleading others through distortion, omission, or falsification of information to create beliefs divergent from reality (Ekman & O'Sullivan, 1991, p. 45; Bok, 1999, p. 23; Gino & Pierce, 2009, p. 112). This multifaceted phenomenon encompasses various practices such as lying, omission, and manipulation, utilized for personal gain, social cohesion, or self-protection (Knapp & Comadena, 1993, p. 67; Sagarin & Skowronski, 2009, p. 89). It permeates social interactions, impacting relationships, group dynamics, and societal structures, serving purposes of impression management, self-presentation, and conflict resolution (Knapp & Comadena, 1993, p. 67; Sagarin & Skowronski, 2009, p. 89). Both deceivers and those deceived are affected psychologically, as cognitive dissonance theory suggests, leading to emotional and psychological repercussions (Ekman & O'Sullivan, 1991, p. 45; Bok, 1999, p. 23; Gino & Pierce, 2009, p. 112). Speech, influenced by the psychological outcomes of deception, serves as a crucial aspect of its manifestation. By delving into its conceptual foundations, cognitive processes, and effects, a deeper understanding of deception emerges, facilitating informed decision-making, ethical reflection, and healthier interpersonal relationships in an intricate societal landscape (Bok, 1999, p.23).

3. The Acoustic Characteristics of Speech

The acoustic characteristics of speech encompass various measurable features that define how sounds are produced and perceived. These include fundamental elements such as fundamental frequency, intensity, voice quality, and speech rate. Together, these acoustic properties play a crucial role in conveying linguistic information, emotional nuances, and social cues in communication.

3.1 Fundamenal Frequency (Pitch)

Fundamental frequency, also referred to as pitch, which is an auditory term, denotes the lowest frequency component of a periodic waveform, representing how high or low a sound is perceived by the human auditory system (Johnson, 2005, p. 24). It determines the perceived pitch of a sound, with higher frequencies corresponding to higher perceived pitches and lower frequencies resulting in lower perceived pitches

(Plack & Oxenham, 2005, p. 56). Pitch perception, influenced by factors such as frequency, amplitude, and harmonic structure, is subjective (Moore, 2012, p. 78). In speech, the fundamental frequency reflects the rate of vocal fold vibration, influencing the perceived pitch of the voice and measured in hertz (Hz). It contributes to the sound's harmonic structure and defines its timbre. While pitch and fundamental frequency are closely related, they are not perfectly synonymous; pitch denotes the subjective sensation of sound frequency, while fundamental frequency represents its physical attribute. To align with the terminology used by the Praat software, fundamental frequency will be referred to as pitch for the remainder of this paper. Pitch variations in speech convey linguistic information and emotional states, shaping communication and expression (Ladd, 2008, p. 112). For instance, rising pitch indicates questions or uncertainty, while falling contours signify assertiveness or the end of a statement (Crystal, 1969, p. 45). Pitch, thus plays a crucial role in auditory perception, influencing our understanding and interaction with the auditory world in everyday communication and expression.

3.2 Intensity

Intensity of voice, alternately referred to as loudness, which is also an auditory sensation, represents the energy per unit area carried by a sound wave. Loudness, however, refers to the subjective perception of a sound's intensity by the human auditory system, indicating how we interpret its strength or volume. It is influenced by factors like the sound wave's intensity, frequency content, and individual hearing sensitivity differences. Unlike intensity, a physical quantity, loudness is a psychological sensation that varies among individuals. For instance, a sound perceived as loud by one person may not be perceived as such by another with different hearing abilities (Hillenbrand & Houde, 1996, p. 78). Voice intensity reflects the acoustic signal's amplitude or power produced by the vocal folds during speech, typically measured in decibels (dB) and varying across speech sounds, utterances, and speaking styles (Pickett, 1999, p. 45). Intensity variations contribute to speech prosody, conveying linguistic and emotional information (Fujisaki & Kawashima, 1969, p. 112). In speech production, intensity functions to emphasize, denote speaker confidence, and express emotions. Changes in intensity highlight key information, emphasizing words or phrases to convey significance or urgency (Crystal, 1969, p. 56). Intensity variations

also influence stress patterns, intonation, and rhythm in speech prosody (Ladd, 2008, p. 89). In emotional speech, an increased volume reflects a heightened arousal or intensity in the speaker (Banse & Scherer, 1996, p. 23).

3.3 Voice Quality

Voice quality refers to the distinctive characteristics and properties of an individual's voice, including its timbre, resonance, clarity, and expressiveness. It encompasses the overall auditory perception of a person's voice, influenced by factors such as vocal fold vibration patterns, airflow dynamics, resonance frequencies, and articulatory precision. Voice quality is subjective and can vary widely among individuals, reflecting physiological differences in vocal anatomy, as well as behavioral and environmental factors. Additionally, voice quality plays a crucial role in conveying emotion, intention, and personality in spoken communication, contributing to the richness and variability of human vocal expression. Voice quality is a fundamental aspect of human communication, contributing to the richness and expressiveness of spoken language. Variations in voice quality can convey subtle nuances of meaning, emotion, and intention in speech. This study aims to explore the differences between four distinct voice qualities: modal, breathy, creaky, and harsh, elucidating their acoustic characteristics and perceptual implications. The modal voice quality, also known as normal or neutral voice, is the most common and natural voice quality used in everyday speech (Titze, 2000, p. 32). It is characterized by a clear and resonant sound produced with regular vocal fold vibration and a balanced airflow. It is associated with optimal vocal fold adduction and sub-glottal pressure, resulting in a smooth and effortless phonation (Hartmann & Hassel, 2015, p. 45). Speakers typically employ the modal voice quality in formal communication settings and when conveying neutral or assertive messages. The breathy voice quality is characterized by the simultaneous production of voice and a substantial amount of unvoiced airflow, resulting in a soft and airy sound (Titze, 2000, p. 55). It is achieved when the vocal folds are slightly separated, allowing air to pass through the glottis during phonation. The breathy voice quality is often perceived as gentle, soothing, or sensual and is commonly used in intimate or emotional communication contexts (Laver, 1980, p. 112). However, excessive breathiness may also indicate vocal dysfunction or pathologies such as vocal nodules or polyps (Verdolini & Ramig, 2001, p. 78). The

creaky voice quality, also known as vocal fry or glottal fry, is characterised by irregular and low-frequency vibrations of the vocal folds, resulting in a crackling or popping sound (Ladefoged & Johnson, 2010, p. 94). It is produced when the vocal folds are tightly adducted and vibrate with a decreased rate and increased tension. It is often associated with informal speech styles, particularly among young adults and in casual or conversational settings (Yuasa, 2010, p. 123). While the creaky voice quality can convey a sense of informality or nonchalance, excessive use may strain the vocal folds and lead to vocal fatigue or discomfort (Heman-Ackah et al., 2002, p. 56). The harsh voice quality, also known as rough or hoarse voice, is characterized by a raspy, grating, or gravelly sound produced by an irregular and a turbulent airflow through the glottis (Heman-Ackah et al., 2002, p. 56). It is often associated with vocal fatigue, vocal abuse, or underlying vocal pathology such as laryngitis or vocal fold lesions (Verdolini & Ramig, 2001, p. 89). It can convey emotions such as anger, frustration, or pain and is commonly observed in situations of heightened arousal or stress (Baken & Orlikoff, 2000, p. 78). However, the chronic use of the harsh voice quality may lead to long-term vocal damage and impairments in voice production. To sum up, voice quality encompasses a spectrum of acoustic characteristics that contribute to the richness and variability of spoken communication. The modal voice quality represents the normative and balanced phonation pattern, while the breathy, creaky, and harsh voice qualities introduce variations in airflow, vocal fold vibration, and resonance, leading to distinct perceptual impressions and communicative functions.

3.4 Speech Rate

Speech rate, the pace at which an individual speaks, is a crucial element of verbal communication impacting comprehension, intelligibility, and social interactions (Crystal, 1969, p. 112). Variations in speech rate convey subtle nuances of meaning, emotion, and cognitive processing (Fujisaki & Kawashima, 1969, p. 45). It quantifies the number of syllables or words produced within a given time frame, typically measured in syllables per second (sps) or words per minute (wpm), encompassing both articulation speed and overall speaking rate (Pickett, 1999, p. 78). Speech rate can range from slow to fast, influenced by individual traits, context, and communicative objectives. Physiological conditions like neurological disorders or speech motor impairments may contribute to slow speech, affecting articulatory

coordination and precision (Hillenbrand & Houde, 1996, p. 231). Cognitive load or attentional deficits can also influence speech rate, with slower speech observed during cognitive overload or processing difficulties. Developmental disorders like autism spectrum disorder may result in slower speech due to cognitive processing differences. Linguistic complexity, language proficiency, and syntactic structure also impact speech rate, with inexperienced or multilingual speakers often exhibiting slower rates for clarity and accuracy (Hillenbrand & Houde, 1996, p. 231). Conversely, individuals with rapid speech may possess enhanced motor skills or cognitive processing abilities, often influenced by arousal levels or cultural norms. Social context plays a significant role, with speech rate adjusting to conversational dynamics or cultural communication styles. Overall, speech rate reflects a complex interplay of physiological, cognitive, linguistic, and social factors, where slower or faster rates may arise from various individual and situational influences (Pickett, 1999, p.78).

4. Methodology and Data Description

This study relies on Hollywood movies as its source of data for several reasons. Firstly, Hollywood villains are skilled at deception and often engage in deceptive speech, providing examples of successful deception. Secondly, Hollywood has a diverse group of villains, which serves the purpose of this study and helps to ensure that the findings of this study are generalizable to a wider population. In other words, the kind of variety that Hollywood provides allows for the age variable of this study to be applicable. Lastly, unravelling the ways as to how Hollywood, as the largest movie industry in the world, portrays deception so accurately and realistically through its villains would be of interest to many viewers, psychologists, and filmmaking specialists.

The sample of this study consists of 10 audio recordings for each of 12 different Hollywood villains from 12 different movies of varying genres. Five of these recordings contain deceptive utterances and the other five contain truthful utterances, to ensure that any abnormality in the behaviour of the acoustic properties in deceptive speech can actually be attributed to deception and not individual differences. The selected villains represent a diverse group of males and females of different ages. To ensure reliable findings and consistent comparisons, the number of villains is divided into six

adult villains and six child villains, each age group containing three male villains and three female ones. The selected audio recordings are then analysed using the Praat software to discover the acoustic aspects of the speech they contain, such as pitch, intensity, voice quality, and speech rate. The twelve characters are divided into six pairs in which there is a child villain and an adult villain. Initially, the acoustic characteristics displayed by the members of a given pair are compared. Then, the observed differences between children and adults are stated.

4.1 Procedures

The research methodology of this study includes a number of processes by which the data was selected, collected, and analysed. This section explains all the procedures in which the researcher was engaged in the order that they occurred.

- Selecting 12 Hollywood movies which contain a villainous character or more and which are popular, award-winning, and belong to different decades.
- Selecting 12 villains who engage in deceptive speech throughout the movie, six of which are males and six are females. Within each gender group, three villains must be underage and three must be adults.
- Examining the speech of the selected villains and distinguishing between truthful speech and deceptive speech based on the context, their interlocutors, and the plot of the movie.
- Collecting five audio recordings in which the selected villains engage in deceptive speech and five in which they engage in truthful speech
- Analysing the audio recordings using the Praat software to discover the acoustic characteristics of deceptive speech. The acoustic characteristics to be examined are pitch, intensity, speech rate, voice quality, and speech rate.
- Comparing the acoustic characteristics of the deceptive speech of the child villains with those of the adult villains.
- Reporting findings.

4.2 Data Description

This section of the paper introduces the titles of the selected movies, the names of the selected characters, and their ages. It aims to familiarise the reader with the information that will be mentioned in the findings later on.

1. Movie: Fatal Attraction (1987)
Villain: Alex Forrest
Age: 36 years old
2. Movie: The Craft (1996)
Villain: Nancy Downs
Age: 16 years old
3. Movie: Misery (1991)
Villain: Annie Wilkes
Age: 39 years old
4. Movie: The Exorcist (1973)
Villain: Regan MacNeil
Age: 12 years old
5. Movie: Gone Girl (2014)
Villain: Amy Dunne
Age: early 30's
6. Movie: Orphan (2009)
Villain: Esther Coleman
Age: 9 years old
7. Movie: Star Wars: Episode VI – Return of the Jedi (1983)
Villain: The Emperor
Age: 88 years old
8. Movie: Joshua (2007)
Villain: Joshua Cairn
Age: 9 years old
9. Movie: The Silence of the Lambs (1991)
Villain: Dr. Hannibal Lecter
Age: 46 years old
10. Movie: The Good Son (1993)
Villain: Henry Evans
Age: 10 years old
11. Movie: No Country for Old Men
Villain: Anton Chigurh

Age: In his 30's

12. Movie: Brightburn (2019)

Villain: Brandon Beyer

Age: 12 years old

5. Findings

Table.1 The Acoustic Characteristics of the Deceptive and Truthful Speech of Adult Alex Forrest and Child Nancy Downs

Deceptive	No. of utterance	Adult villain				Child villain			
		1. Alex Forrest				1. Nancy Downs			
		Pitch	Intensity	Speech rate	Voice quality	Pitch	Intensity	Speech rate	Voice quality
	1.	179.5 7 Hz	57.47 dB	3.31 sps	Breathy	201.2 7 Hz	63.56 dB	2.20 sps	Creaky
	2.	219.8 8 Hz	66.22 dB	4.83 sps	Modal	294.5 1 Hz	66.60 dB	3.10 sps	Harsh
	3.	314.0 6 Hz	70.37 dB	5.23 sps	Modal	152.5 3 Hz	54.78 dB	3.44 sps	Breathy
	4.	173.8 7 Hz	59.19 dB	4.16 sps	Breathy	120.8 7 Hz	50.58 dB	5.82 sps	Breathy
	5.	185.3 2 Hz	63.65 dB	2.80 sps	Breathy	94.49 Hz	61.59 dB	2.43 sps	Breathy
Truthful	1.	146.2 2 Hz	57.78 dB	4.37 sps	Breathy	250.3 1 Hz	62.99 dB	4.21 sps	Creaky
	2.	159.2 9 Hz	53.48 dB	3.43 sps	Breathy	139.5 7 Hz	73.45 dB	4.02 sps	Creaky
	3.	238.2 8 Hz	70.04 dB	4.74 sps	Modal	210.2 6 Hz	51.78 dB	3.05 sps	Breathy
	4.	178.5 3 Hz	58.29 dB	6.54 sps	Modal	178.5 6 Hz	54.90 dB	3.75 sps	Breathy
	5.	196.3 9 Hz	50.84 dB	5.74 sps	Breathy	236.7 8 Hz	61.75 dB	3.75 sps	Modal

Examining the two characters' acoustic characteristics in order, we begin by looking at their pitch levels. Adult Forrest has a higher average pitch of 214.54 Hz in deceptive

speech than child Downs's 172.73 Hz. However, Forrest's average pitch in truthful speech is lower than both her own average pitch in deceptive speech and that of Downs's truthful utterances. The adult's average pitch in truthful speech is at 183.74 Hz, whereas the child character's is 203.09. This means that Forrest's overall pitch level increased in the case of deception, while it decreased in the speech of Downs.

The average intensity of Forrest's truthful utterances is 58.08 dB, and that of her deceptive utterances is 63.38 dB, which illustrates that her overall intensity level rose in the case of deception. Downs's average intensity in truthful speech is 60.97 dB, a little higher than Forrest's, while her deceptive utterances display an average intensity of 59.42 dB, slightly and barely lower in comparison with the character's truthful speech. Therefore, the adult's intensity level increases in the case of deception, while the child's drops by a small amount.

As for speech rate, it is faster in the case of deceptive speech for both characters. It goes from 4.96 sps in Forrest's truthful utterances to 4.06 spa in her deceptive ones, and from 3.75 sps in Down's truthful utterances to 3.39 sps in her deceptive ones.

Both characters exhibit a change in their voice qualities, with Forrest using a majorly breathy voice quality in three of her truthful utterances and three of her deceptive ones. Downs also uses a breathy voice quality in her deceptive speech, but her truthful utterances are dominated equally by breathy and creaky voice qualities.

Table.3 The Acoustic Characteristics of the Deceptive and Truthful Speech of Adult Annie Wilkes and Child Regan MacNeil

Deceptive	No. of utterance	Adult villain				Child villain			
		2. Annie Wilkes				2. Regan MacNeil			
		Pitch	Intensity	Speech rate	Voice quality	Pitch	Intensity	Speech rate	Voice quality
1.	181.6 2 Hz	62.91 dB	5.09 sps	Modal	187.2 7 Hz	62.89 dB	2.83 sps	Breathy	
2.	204.0 3 Hz	68.11 dB	2.77 sps	Modal	208.4 6 Hz	59.87 dB	2.83 sps	Modal	
3.	301.7 0 Hz	72.50 dB	3.68 sps	Modal	335.3 6 Hz	57.84 dB	1.58 sps	Creaky	

	4.	197.8 8 Hz	66.23 dB	5.17 sps	Moda l	237.8 5 Hz	49.27 dB	1.87 sps	Creaky
	5.	146.5 6 Hz	63.97 dB	3.92 sps	Moda l	342.8 0 Hz	56.36 dB	1.81 sps	Creaky
Truthful	1.	212.6 2 Hz	70.38 dB	3.14 sps	Moda l	312.5 8 Hz	62.23 dB	5.55 sps	Creaky
	2.	167.7 6 Hz	62.29 dB	3.31 sps	Moda l	268.8 9 Hz	60.91 dB	3.68 sps	Creaky
	3.	165.6 5 Hz	67.49 dB	6.66 sps	Moda l	309.4 3 Hz	56.09 dB	1.44 sps	Creaky
	4.	171.8 1 Hz	67.08 dB	3.22 sps	Moda l	260.7 8 Hz	54.42 dB	1.99 sps	Creaky
	5.	166.4 2 Hz	62.41 dB	5.82 sps	Moda l	251.7 3 Hz	55.11 dB	2.47 sps	Creaky

The second pair of characters, consisting of adult Wilkes and child MacNeil, displays the same behaviour of pitch observed in the first pair, that of an increased average level of pitch in the deceptive speech of the adult character, and a decreased average level in the deceptive speech of the child character. Adult Wilkes' average pitch rises from 176.85 Hz in her truthful utterances to 206.35 Hz in her deceptive ones. MacNeil's average pitch, on the other hand, drops from 280.68 Hz in her truthful utterances to 262.34 Hz in the case of deception.

The behaviour of intensity for these two characters also resembles that of the previous two; higher in the deceptive speech of the adult villain and lower in the deceptive speech of the child villain. However, the difference is so minute that it may be justifiable to neglect it. Adult villain Wilkes' average intensity is 65.93 dB in her truthful speech and 66.74 Hz in her deceptive speech. MacNeil's average intensity goes from 57.75 dB in her truthful speech to a barely lower 57.24 dB in her deceptive speech.

Once again, the rate of speech is faster in the truthful speech of both characters. Wilkes speaks at an average rate of 4.43 sps in her truthful utterances and at 4.12 in her deceptive utterances. MacNeil, on the other hand, speaks at an average rate of 3.02 sps in her truthful speech and 2.18 sps in her deceptive speech, her general rate of speech being noticeably lower than that of her adult counterpart. Therefore, in both pairs thus

far examined, the adult character has a higher speech rate than that of the child character in both truthful and deceptive contexts.

Wilkes's utterances undergo no change of voice quality, maintaining a stable modal voice quality in the entirety of her truthful and deceptive speech. MacNeil's voice quality, however, goes from being creaky in all of her truthful utterances to being creaky in three of her deceptive utterances.

Table.3 The Acoustic Characteristics of the Deceptive and Truthful Speech of Adult Amy Dunne and Child Esther Coleman

Deceptive	No. of utterance	Adult villain				Child villain			
		3. Amy Dunne				3. Esther Coleman			
		Pitch	Intensity	Speech rate	Voice quality	Pitch	Intensity	Speech rate	Voice quality
Deceptive	1.	247.9 5 Hz	64.33 dB	4.22 sps	Modal	281.4 6 Hz	65.31 dB	2.94 sps	Modal
	2.	197.2 2 Hz	60.92 dB	2.83 sps	Modal	258.5 5 Hz	59.79 dB	2.97 sps	Modal
	3.	153.4 0 Hz	53.82 dB	3.26 sps	Breathy	245.5 0 Hz	61.93 dB	3.92 sps	Creaky
	4.	186.0 2 Hz	55.85 dB	3.23 sps	Modal	229.3 6 Hz	56.07 dB	3.01 sps	Breathy
	5.	143.2 3 Hz	53.84 dB	4.41 sps	Breathy	250.1 1 Hz	58.00 dB	3.96 sps	Breathy
Truthful	1.	145.5 4 Hz	65.87 dB	3.53 sps	Creaky	210.9 1 Hz	60.45 dB	3.57 sps	Creaky
	2.	136.9 3 Hz	65.38 dB	2.87 sps	Creaky	215.3 2 Hz	61.47 dB	4.85 sps	Creaky
	3.	202.9 8 Hz	61.74 dB	2.38 sps	Modal	237.0 0 Hz	61.10 dB	3.05 sps	Modal
	4.	217.3 3 Hz	67.08 dB	3.81 sps	Modal	164.7 5 Hz	54.56 dB	4.06 sps	Creaky
	5.	188.4 6 Hz	64.78 dB	3.68 sps	Modal	246.9 5 Hz	62.72 dB	4.12 sps	Modal

We observe some changes in the behaviour of some of the acoustic characters of this pair. While the average pitch of adult Amy Dunne is still predictably higher in the case of deceptive speech, the difference lies in the unprecedentedly higher average pitch in the deceptive speech of the child character, which contradicts the lower pitch associated with deception observed in the previous child characters. Adult Amy Dunne's average pitch is 178.24 Hz in her truthful utterances and rises slightly higher to 185.56 Hz in her deceptive utterances. Child Esther Coleman's average pitch, however, exhibits a major increase from 214.98 Hz in her truthful speech to 252.99 Hz in her deceptive speech.

Intensity, too, behaves uniquely in the speech of both characters. Unlike the previous two adult characters, Dunne's average intensity spikes in the case of her truthful speech from 57.75 dB to 64.97 dB. Instead of slightly lower in deceptive speech like the previous two child villains, Coleman's average intensity is slightly higher, going from 60.06 dB to 60.22 dB in her deceptive speech.

Speech rate, which has been observed to be higher in truthful speech for both child and adult villains, is lower in the truthful speech of adult Amy Dunne, changing from 3.25 sps to a slightly higher 3.59 sps in deceptive speech. However, it remains characteristically higher in the truthful speech of child Esther Coleman. Moreover, the small difference between the speech rates of the child and adult characters present another difference, as Coleman's speech rate is a higher 3.93 sps in truthful speech and a slightly lower 3.36 sps in depletive speech.

Adult Dunne's voice quality is modal in the majority of both her truthful and deceptive utterances, whereas child Coleman's is majorly creaky in truthful speech and equally modal and breathy in deceptive speech.

Table.4 The Acoustic Characteristics of the Deceptive and Truthful Speech of Adult The Emperor and Child Joshua Cairn

Deceptive	No. of utterance	Adult villain				Child villain			
		4. The Emperor				4. Joshua Cairn			
		Pitch	Intensity	Speech rate	Voice quality	Pitch	Intensity	Speech rate	Voice quality
1.	199.1	60.15	3.10	Creak	222.6	70.40	4.23	Modal	

		1 Hz	dB	sps	y	8 Hz	dB	sps	
	2.	158.9 5 Hz	54.75 dB	1.20 sps	Creak y	170.4 9 Hz	66.76 dB	3.77 sps	Breath y
	3.	99.64 Hz	57.74 dB	3.86 sps	Moda l	285.0 1 Hz	71.86 dB	2.97 sps	Modal
	4.	90.04 Hz	59.05 dB	2.09 sps	Creak y	228.1 9 Hz	71.16 dB	5.33 sps	Modal
	5.	104.6 5 Hz	59.69 dB	3.12 sps	Creak y	145.1 6 Hz	70.13 dB	3.57 sps	Breath y
Truthful	1.	103.5 1 Hz	58.08 dB	3 sps	Creak y	214.4 4 Hz	72.48 dB	5.97 sps	Modal
	2.	406.5 5 Hz	59.26 dB	1.57 sps	Harsh	265.2 3 Hz	72.56 dB	5.55 sps	Modal
	3.	190.4 8 Hz	59.35 dB	3.11 sps	Harsh	208.8 5 Hz	69.72 dB	3.22 sps	Modal
	4.	354.6 9 Hz	61.53 dB	1.83 sps	Harsh	242.4 9 Hz	74.06 dB	4.49 sps	Modal
	5.	159.4 3 Hz	60.43 dB	3.09 sps	Harsh	224.1 4 Hz	73.34 dB	4.76 sps	Modal

In the previous three pairs, we compared female adult villains to female child villains. In the next three pairs, we examine the differences in acoustic properties between adult and child males. In the deceptive speech of adult male The Emperor, the average level of pitch is significantly lower than that of his truthful speech, with his truthful utterances averaging 242.93 Hz and his deceptive utterances averaging 130.47 Hz. This makes The Emperor the first adult character whose pitch level drops in the case of deception. On the other hand, child male Cairn;s average pitch in deceptive speech is characteristically lower than it is in his truthful speech, dropping faintly from 231.03 Hz to 210.30 Hz. This indicates a similar behaviour of pitch for both members of this pair.

The average intensity of The Emperor's voice is 59.73 dB in his truthful speech and is slightly higher than the 58.27 dB of his deceptive speech. Because of the smallness and insignificance of the difference, the two values will be considered equal. The intensity of the child villain is once again slightly higher in the case of truthfulness, with the average being 72.43 dB, a small difference from the 70.06 dB of his deceptive utterances.

The Emperor's rate of speech increases insubstantially in his deceptive speech, creating a minute difference between its 2.67 sps and the 2.52 sps of his truthful utterances, which renders the rate of his speech almost equal in both cases. Cairn's speech, however, is characteristically higher in the context of truth and uncharacteristically higher than that of his adult counterpart in both truthful and deceptive speech. Cairn's average rate of speech is 4.79 sps in his truthful speech and 3.97 sps in his deceptive speech.

As for voice quality, The Emperor displays a harsh voice quality in four of his truthful utterances and a creaky voice quality in four of his deceptive utterances, while Cairn's utterances shift from an entirely modal voice quality to a mix of modal and breathy voice qualities in the case of deception.

Table.5 The Acoustic Characteristics of the Deceptive and Truthful Speech of Adult Dr. Hannibal Lecter and Child Henry Evans

Deceptive	No. of utterance	Adult villain				Child villain			
		5. Dr. Hannibal Lecter				5. Henry Evans			
		Pitch	Intensity	Speech rate	Voice quality	Pitch	Intensity	Speech rate	Voice quality
Deceptive	1.	78.79 Hz	73.88 dB	3 sps	Creaky	187.8 Hz	71.13 dB	4.45 sps	Modal
	2.	103.7 Hz	75.33 dB	4.09 sps	Creaky	351.7 Hz	67.85 dB	3.40 sps	Modal
	3.	134.9 Hz	74.43 dB	4.52 sps	Creaky	265.5 Hz	67.86 dB	4.22 sps	Modal
	4.	129.3 Hz	79.76 dB	2.84 sps	Creaky	208.8 Hz	67.88 dB	4.63 sps	Modal
	5.	149.9 Hz	75.67 dB	3.07 sps	Modal	212.3 Hz	65.06 dB	6.03 sps	Modal
Truthful	1.	114.1 Hz	78.13 dB	3.51 sps	Creaky	270.0 Hz	69.21 dB	4.83 sps	Modal
	2.	275.1 Hz	75.48 dB	3.18 sps	Modal	260.6 Hz	71.69 dB	3.09 sps	Modal
	3.	126.9 Hz	79.69 dB	2.86 sps	Creaky	188.4 Hz	68.13 dB	5.43 sps	Modal
	4.	91.75 Hz	78.89 dB	3.61 sps	Creaky	281.1 Hz	69.14 dB	4.76 sps	Modal

	5.	104.3 2 Hz	77.09 dB	5.34 sps	Creak y	254.1 9 Hz	72.10 dB	4.54 sps	Modal
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For the second time, we witness an adult character whose average pitch is lower in deceptive speech than it is in truthful speech, dropping from 142.45 Hz to 119.36 Hz. The child character, however, maintains the same behaviour of pitch we have been observing and resembles that of the adult in its lower level in the case of deception, although the drop is a minor one from 250.90 Hz to 245.26 Hz.

Adult Lecter's average intensity level is higher in truthful speech (77.85 dB) than it is in deceptive speech (75.81 dB). Similarly, child Evans's average intensity is also higher in truthful speech (70.05 dB) than it is in deceptive speech (67.45 dB).

Adult Lecter's rate of speech decreases by a small amount from 3.70 sps to 3.50 sps in his deceptive speech, while Evans's remains fairly level, being 4.53 spa in his truthful utterances and 4.54 sps in his deceptive ones.

Lecter maintains a creaky voice quality in four out of both his five truthful utterances and five deceptive ones, whereas Evans exhibits an unchanging modal voice quality in the entirety of his speech.

Table.6 The Acoustic Characteristics of the Deceptive and Truthful Speech of Adult Anton Chigurh and Child Brandon Beyer

Deceptive	No. of utterance	Adult villain				Child villain			
		6. Anton Chigurh				6. Brandon Beyer			
		Pitch	Intensity	Speech rate	Voice quality	Pitch	Intensity	Speech rate	Voice quality
	1.	112.1 7 Hz	59.12 dB	4.49 sps	Creaky	233.9 1 Hz	63.36 dB	9.37 sps	Modal
	2.	122.6 1 Hz	66.54 dB	3.57 sps	Creaky	321.7 8 Hz	62.15 dB	7.59 sps	Modal
	3.	122.3 8 Hz	63.63 dB	4.30 sps	Creaky	223.7 8 Hz	58.28 dB	1.70 sps	Modal
	4.	123.9 8 Hz	70.55 dB	2.82 sps	Creaky	211.2 6 Hz	67.08 dB	6.50 sps	Modal

	5.	234.1 5 Hz	69.29 dB	3.68 sps	Harsh	244.4 8 Hz	63.95 dB	3.26 sps	Breath y
Truthful	1.	100.3 6 Hz	71.00 dB	4.12 sps	Creaky	247.4 3 Hz	63.23 dB	3.26 sps	Harsh
	2.	90.50 Hz	65.62 dB	2.64 sps	Creaky	283.7 6 Hz	77.08 dB	2.79 sps	Harsh
	3.	99.95 Hz	62.85 dB	4.90 sps	Creaky	238.9 3 Hz	64.04 dB	2.22 sps	Breath y
	4.	76.25 Hz	67.56 dB	3.87 sps	Breath y	246.2 9 Hz	61.16 dB	5.08 sps	Breath y
	5.	124.7 9 Hz	68.63 dB	3.68 sps	Creaky	237.5 2 Hz	55.54 dB	4.44 sps	Breath y

Finally, in the sixth pair of villainous characters, the average pitch of the adult member is once again higher in the case of deception, resembling the behaviour of pitch observed in adult female characters. It goes from 98.37 Hz in the truthful speech of Chigurh to 143.05 Hz in his deceptive utterances. In the deceptive speech of the child character, however, the average of pitch is so slightly lower than that of truthful utterances that the difference may well be neglected, as it is 250.78 Hz in Beyer's truthful utterances and 247.04 Hz in his deceptive ones.

The average intensity level is higher in the truthful utterances of both adult Chigurh and child Beyer, making it the third time that such a behaviour has been witnessed for both groups. It goes from 67.13 dB to 65.82 dB in Chigurh's deceptive utterances and from 64.21 dB to 62.96 dB in Beyer's deceptive utterances.

Chigurh's speech rate is fairly level in both of his truthful and deceptive utterances, changing only slightly from 3.87 sps in his truthful speech to 3.77 sps in his deceptive speech. Beyer, however, exhibits a greater difference in speech rate, being the first to show a higher rate of speech in the case of deception, as it goes from 3.55 sps in his truthful speech to 5.68 sps in his deceptive speech.

Chigurh's voice quality remains creaky in four of both his five truthful utterances and five deceptive ones, while Beyer's shifts from majorly breathy to majorly modal in deceptive speech, which may be attributed to an attempt to appear confident, sincere, and indifferent.

6. Conclusion

All in all, four of the six adult characters displayed a higher average pitch in their deceptive utterances, while four of the child characters' average pitch was lower in the case of deception. The average level of intensity was higher in the truthful speech of three adult characters and child characters. Two of the remaining adults displayed almost equal intensities, and one of them had a higher intensity in deceptive speech. All of the remaining three child characters, however, displayed almost equal intensity levels in their truthful and deceptive utterances. Speech rate, too, was higher in the truthful speech of three adult and three child characters. The rest of the adult villains and two of the remaining child characters showed a somewhat unchanging rate of speech, and the last child character had a higher speech rate in deception. Both groups had an almost equal tendency to change their voice quality in the case of deception, with 14 of the adult villains' total 30 deceptive utterances exhibiting a shift in voice quality, and exactly half of the child characters' deceptive utterances behaving the same way. Therefore, it can be said that the prominent difference between the two age groups can be observed in the behaviour of pitch, with adult villains tending towards higher pitch levels in deception, and child villains tending towards lower pitch levels in deception. The rest of the examined acoustic properties, however, show little-to-no age-related distinctions.

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