Adults’ Attitudes towards Children with Unintelligible Speech Related to Cleft Palate

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Abstract

A person’s speech and voice have a big impact on how the person is perceived by others. Individuals with unintelligible speech and/or an atypical voice are often judged in more negative terms regarding personal, physical, physiological and social traits compared to peers with typical speech. Only few studies have considered public attitudes towards children and adults with cleft lip and/or palate (CLP).

Also, numerous studies have investigated whether it is possible to modify a listener’s judgements of a speaker with atypical speech or voice. Some studies have shown that the intervention group that somehow receives information/education about the impairment actually rates the speakers in more positive terms than the control group. However, other studies have shown that receiving information does not change the listener’s perception of the speaker.

This study aims at investigating adults’ attitudes towards cleft palate child speakers to see if there is (1) a correlation between the ratings made by the adult listeners and the level of the child’s speech intelligibility, and (2) if receiving information about cleft palate – as well as the speech difficulties associated with it – has an effect on ratings made by adult listeners. Adult listeners (N=30, control group n=15, experimental group n=15) listened to 30 speech samples; three speech samples from ten different children, with more or less unintelligible speech due to a repaired cleft palate. The adults graded how they perceived the children using a seven point differential scale with eight different adjective pairs describing different personal, physical, psychological and social attributes.

The overall findings in this study indicate that children with unintelligible speech due to CLP are perceived in more negative terms than their peers with typical speech in terms of personal, social, psychological and physical traits. Although, it seems unintelligibility itself is not the main issue as to how a listener perceives children, with or without cleft palate (even though it might be an influence). Receiving information about cleft palate could not be concluded to improve the listeners’ perception of children with unintelligible speech. The group that received information about cleft lip and palate actually perceived the children in more negative terms for the personal trait “Nice/Mean” compared to the group that did not receive such information. However, this study is based upon a limited number of participants (n=30) which should be considered when evaluating the results.
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# Table of Contents

1 Introduction .................................................................................................................. 1  
2 Background .................................................................................................................. 2  
   2.1 Cleft Lip and/or Palate .......................................................................................... 2  
   2.2 Characteristics of Cleft Palate Speech ................................................................. 5  
   2.3 Measuring Judgements towards Individuals with Voice Disorders ...................... 7  
   2.4 Judgements towards Individuals with Voice and Speech Disorders ..................... 8  
      2.4.1 Changing Listeners’ Attitudes toward Voice and Speech Disorders .............. 10  
      2.4.2 Judgements towards Individuals with Unintelligible Speech Related to Cleft Lip and/or Palate .......................................................... 11  
3 Purpose ....................................................................................................................... 11  
   3.1 Questions at issue .................................................................................................. 12  
4 Method ......................................................................................................................... 12  
   4.1 Participants .......................................................................................................... 12  
   4.2 Speech samples ..................................................................................................... 12  
   4.3 Test procedure ...................................................................................................... 14  
   4.4 Ethical considerations ........................................................................................... 16  
   4.5 Statistical analysis ............................................................................................... 16  
5 Results ......................................................................................................................... 17  
   5.1 Correlation between Speaker Intelligibility and Listeners’ Perception .................. 17  
   5.2 Differences in Judgements between the Children with Typical Speech and the Children with Cleft Palate ................................................................. 26  
   5.3 Comparisons between the Experimental Group and the Control Group ............... 27  
6 Discussion .................................................................................................................... 29  
   6.1 Results .................................................................................................................. 29  
   6.2 Limitations of the Present Study .......................................................................... 32  
   6.4 Conclusions ......................................................................................................... 34  
   6.5 Future research ..................................................................................................... 35  
References ....................................................................................................................... 37  
Appendix A ..................................................................................................................... 44  
Appendix B ..................................................................................................................... 52  
Appendix C ..................................................................................................................... 53  
Appendix D ..................................................................................................................... 54  
Appendix E ..................................................................................................................... 55  
Appendix F ..................................................................................................................... 56
1 Introduction

Attitudes towards individuals with speech and voice problems are pre-eminently relevant to the speech and language therapist’s work, since these attitudes clearly will affect both the patient and the patient’s family and surroundings. Therefore, this will also affect the intervention and the therapeutic process. Different people tend to make similar judgements towards a speaker’s psychological, physical and social attributes, even though these judgements rarely are based on empirical facts (Aronovitch, 1989). Previous studies have shown that people with speech and voice disorders are often judged in more negative terms than people with normal voice and speech (Lallh & Rochet, 2000; Lass, Ruscello, Harkins & Blankenship, 1993; Ma & Yu, 2013).

A number of studies have investigated whether it is possible to modify such negative judgements. Some studies have suggested that informing listeners about speech or voice disorders results in a more accepting attitude towards the speaker. Some studies have found that listeners’ attitudes towards individuals with communication disorders because of other disabilities are improved by information given and discussion about the disability (Ibrahim and Herr, 1982). Similar results were found in a study by Gilmore (1974), where esophageal speakers were significantly more accepted by listeners who received information about the disorder compared to listeners who did not receive information. However, other studies indicate that the receiving of information does not change a listener’s perception of a speaker with a speech or voice disorder (Lallh, 1997; Lallh and Rochet, 2000).

Studies have mainly focused on disorders such as stuttering, dysphonia and dysarthria. Some studies have also investigated listener’s attitudes toward hypernasal speech. The correlation between listeners’ attitudes and unintelligible speech related to cleft palate has not been studied very much. However, recently a study was conducted by Lee, Spivey and Gibbon (2014) about children and their attitudes towards peers with unintelligible speech related to cleft palate. The results of this study show that unintelligible children are more likely to be perceived and judged in more negative terms compared to children with typical speech. The study presented in this paper aims at a similar investigation, based upon the same speech recordings as those used by Lee et al, but now with adult listeners. The results of the study will show whether children with cleft palate (CP) encounter negative attitudes among adults as well or if such attitudes mainly arise among their peers.

In addition, the study here presented aims at investigating the possibility of modifying a listener’s judgement by giving information about the speech impairment. No previous
investigations have been found to include speakers with cleft lip and/or palate, how they are perceived, and if possible bias can be prevented. If information about cleft palate can be shown to change judgements to a more positive attitude, this can be a way to prevent children with cleft palate from being judged in more negative terms compared to peers with typical speech. This research is also important from an educational point of view, to teach students and professionals about how children with cleft palate are being perceived by peers and others (i.e., the public). To give the reader an insight into what cleft lip and palate is, and its common consequences, characteristics of cleft lip and palate and research related to the present study are presented below.

2 Background

2.1 Cleft Lip and/or Palate

Cleft lip and palate (CLP) is a deformity caused by lack of closing of the palatal plates (both the hard palate and the velum) and is ranked as one of the most prevalent birth defects (Kummer, 2008). The incidence of cleft lip, cleft palate and cleft lip and palate among infants in Europe is approximately 1-2 per 1000 new-borns (Vanderas, 1987). Normally, the palate merges in the second month of prenatal life but different factors interfere in the merging process. If so, a cleft will emerge (Kummer, 2008; Mitchell and Risch, 1992).

Clefts can occur in conjunction with other congenital anomalies in addition to the cleft, and this is termed syndromic CLP. For individuals with cleft together with other anomalies, 30% have a CLP (Vallino-Napoli, Riley & Halliday, 2006). When occurring with other abnormalities an isolated cleft palate is more common than CLP (Mossey & Little, 2002). A number of congenital anomalies are reported to be related to CLP. These include for instance congenital heart diseases such as Tetralogy of Fallot (Wyse, Mars, al-Mahdawi, Russel-Eggitt & Blake, 1990) and ectodermal dysplasia (Suzuki et al., 2000), van der Woude syndrome (Kondo et al., 2002) and chromosomal defects such as 22q11 deletion syndrome (Ben-Shachar et al., 2008), SUMO1 syndrome (Pauws & Stanier, 2007) and Wolf-Hirschhorn syndrome (Battagliak Filippi & Carey, 2008).

CLP can also occur as an isolated defect, which is commonly known as non-syndromic CLP. Examples of causes for non-syndromic CLP are alcohol consumption during pregnancy, genetic factors (Bezerra et al., 2014) and lack of folic acid which can cause damage to DNA (Bezerra et al., 2014; Brooklyn, Aravinthan, Adhisivam & Chand, 2014). The fissure may occur to the
soft palate only, or towards and through the hard palate. If so, the nasal cavity is open to the mouth, and the septum may be absent. (Kummer, 2008).

Individuals with CLP are at risk for eating problems, conductive hearing loss, speech problems and dental anomalies (Estrem & Broen, 1989; Kummer, 2008; Mackay, Mazahari, Graham, Jeffords, Leber, Gorman, & Sagers, 1999). Depending on the hearing status of the child with CP, language development might also be affected (Kummer, 2008). It may also be associated with social and psychological issues (Mackay et al., 1999). CLP often requires multidisciplinary treatment and craniofacial surgery, dental treatment and speech and hearing intervention (Marazita & Mooney, 2004).

2.1.1 Classifications of Cleft Lip and Palate

Depending on embryology, physiology and anatomy, CLP may be classified into four general categories: (1) Cleft involving the lip and alveolus, (2) Cleft involving the lip and palate, (3) Cleft where the palate alone is affected and (4) Congenital insufficiency of the palate (Berkowitz, 2006). A complete cleft lip (CL) extends from the vermilion border to the floor of the nose. Minimal clefts, where only the vermilion border is included, require less surgery and will most likely not have as large consequences as those of a greater cleft. There are unilateral and bilateral clefts. The unilateral clefts occur at one side only while the bilateral cleft occurs at both sides. In a bilateral CL a median portion of the lip is isolated in the midline of the upper lip that remains attached to the premaxilla and the columella (Berkowitz, 2006). There is a strong correlation between the completeness of the cleft and the effects at the alveolar process. The dental defects can be assessed by the number of teeth and the shape, structure, shape and the position of the teeth in the dental arch (Berkowitz, 2006).

When a unilateral CLP is complete there is a direct connection between the oral and nasal cavities on the cleft side of the palate. At the opposite side the nasal septum is attached to the palatal process and separates the oral cavity from the nasal chamber. If the CLP is incomplete it may be symmetrical or asymmetrical depending on whether both sides mirror each other or not. If complete CLP, both nasal chambers are in direct communication with the oral cavity. The turbinate are clearly visible within both nasal cavities and the nasal septum forms a midline structure that is firmly attached to the base of the skull. Here, the premaxilla’s size and shape can differ and depending on this the dental status may differ (Berkowitz, 2006). The most common type of CLP is unilateral clefts (80-85%) (Hagberg, Larson & Milerad, 1998). Fifty percent of all patients with cleft lip also have a cleft palate (Stanier & Moore, 2004). Clefts that
include the lips are more common in males, while an isolated cleft palate is more common among females. Also, males with CLP tend to have more severe clefts than do females (Fogh-Andersen, 1942).

In an isolated cleft palate (CP) neither the lip nor the alveolar process is affected. The fusion of the palates proceeds from front to back, which means that the CP may occur in the soft palate or the hard and the soft palate, but never the hard palate alone. The cleft may extend from the uvula towards the soft and the hard palate. If a midline notching is present that may reveal a submucous cleft. In other more extreme forms the CP may extend to the nasopalatine foramen and in such cases the nasal chambers will be in direct communication with the oral cavity (Berkowitz, 2006).

2.1.2 Hearing Loss associated to Cleft Palate

Hearing is often affected by CP. When swallowing, the eustachian tubes do not open properly because of the anatomic dysfunctions caused by CP and the fluid produced by the middle ear cannot drain through the eustachian tubes properly. Because of this, many children with CP develop middle ear effusion (Kummer, 2008). This, in turn, leads to a chronic conductive hearing loss if pressure equalization tubes are not placed in the middle ear (Valtonen, Dietz & Qvarnberg, 2005). Pressure equalization tubes are therefore placed earlier and more often in children with CP compared to typically developing children. Despite this, children with CP are more likely to fail hearing screenings (Broen, Moller, Carlstrom, Doyle, Devers & Keenan, 1996).

Middle ear effusion that causes mild to moderate hearing loss seems to be associated with delays in cognitive and linguistic development. Because of this, meticulous treatment and monitoring of middle ear otitis is recommended to counteract hearing loss and thereby speech and language delays (Broen et al., 1996). In addition, research in the area of hearing impairment has shown that individuals with hearing impairment or deafness are at higher risk of being socially isolated and/or unemployed (Schein, 1979). Since hearing loss is common among individuals with CLP, this is a most relevant aspect for individuals with CLP and the development of their social life.

Because of the anatomic dysfunctions in CLP, and also because of the often fluctuating hearing loss, the CLP may cause atypical speech. The timing for the surgery and the closure of the palate seems to have an impact on speech development (Berkowitz, 2006). At what age the cleft is repaired by surgical closure depends on the width of the cleft. Also, such surgery is performed
at different stages and in different ways depending upon cultural preferences and also it varies with geographic location. There is no evidence that any particular surgery preference is more successful than any other. Clefts including the hard palate are frequently and simultaneously closed with the soft palate cleft. Very wide clefts might need a greater palatal growth and therefore the surgical closure may need to be conducted when the child is between 5 and 6 years of age. Until the palate is closed a pharyngeal extension can be worn to decrease the problems related to the CP (Berkowitz, 2006). However, children with CP will be behind their non CP peers in the acquisition of certain early developed phonemes, due to the CP. The delay will persist until the palate is closed and also for some postoperatively (Kummer, 2008).

2.2 Characteristics of Cleft Palate Speech

Deviant speech characteristics for cleft palate speech include hypernasality, hyponasality, audible nasal air emission and/or nasal turbulence, constant production errors and voice disorder. These, individually or combined, might affect the intelligibility of the speech (Karling, Larson, Leanderson & Henningsson, 1993).

Infants with CP have an inadequate sound production mechanism, and frequently also impaired hearing, which puts them at risk for delays in phonological development (O’Gara & Logemann, 2008). The speech abnormalities arise most likely even when the baby develops babbling. For example, babies with cleft palate often use less or no anterior sounds, and these sounds are among the first to appear in typical speech (Estrem & Broen, 1989). The speech sounds that are developed by infants with CLP are depending on the infant’s response to the atypical anatomy during phonological development (Harding & Grunwell, 1996). The infant may use atypical or compensatory articulation to produce meaningful speech (O’Gara & Logemann, 1988). Overall, babies with cleft palate tend to produce more nasals, glides and the glottal fricative [h] and fewer multisyllabic constructions and high pressure consonants (e.g. /k/, /s/, and /h/) than do babies with typical speech. However, despite the constraint on their sound producing abilities, babies with cleft palate reduplicate and vary their use of consonants within the same utterance as typically developing babies (Chapman, 1991).

Before the cleft has been repaired the oral and nasal opening makes it impossible for the child to produce high pressure consonants. To be able to produce speech similar to the perceptual speech models, the child can either have a sound producing system lacking high pressure consonants, thereby getting a limited number of speech sounds, or it might develop
compensatory strategies making pressure changes in the mouth to be able to produce an increased number of speech sounds (Trost-Cardamone, 1990).

Once the cleft has been repaired, usually around 10-12 months of age, most children will have an adequate structure for speech and sound production. However, even when the cleft is repaired some articulatory difficulties may remain. The developmental stage where stop plosives are usually produced and practiced through normal babbling occurs when the child is around 6 months of age, and therefore children with CLP will have missed out on this developmental stage (Kummer, 2008). Also, some children continue to use the same compensatory strategies as before the surgery even if no longer necessary. If so, the child will need help from a speech and language therapist to change these patterns and instead develop new ones. Early and intense intervention for speech and language disorders in children with CLP has been shown to be important. Therapy for children with repaired CLP should mainly focus upon reaching a level corresponding to typical speech and language use by the time they start school, however it is likely that many children will have some remaining speech difficulties (Kuehn & Moller, 2000).

When beginning to use words, children with cleft palate tend to target more words with word-initial nasals, approximants and vowels but use fewer words with word-initial stops, fricatives and affricatives. Children with typical speech, in turn, tend to target more words with initial consonants articulated in the centre of the oral tract, while children with cleft palate target more words with initial phonemes articulated at the periphery of the oral tract. Though, this applies to children with cleft palate as a group, not to all specific individuals (Estrem & Broen, 1989). Also, articulation in children with CLP is more glottal before the cleft palate has been repaired (O’Gara & Logemann, 1998). The cleft causes lack of bone structures in the palate and because of this there will be a lack of areas for proper articulation training, thus learning how to produce consonants with the tongue against the hard palate might be different from typical learning (Trost-Cardamone, 1990).

Another reason for remaining speech difficulties can be that the closing of the cleft is still not complete, which will be the case if the soft palate and the throat wall are unable to complete a closure between the mouth and the nasal cavity. This condition is known as velopharyngeal inadequacy (Peterson-Falzone, Hardin-Jones & Karnell, 2000). When velopharyngeal inadequacy occurs, the voice will be hypernasal and there will also be audible nasal airflows which might affect speech intelligibility. Velopharyngeal inadequacy is, for most children with CLP, the single most important factor for how intelligible and acceptable the child’s speech
will become (Peterson-Falzone et al., 2000). If velopharyngeal inadequacy occurs, the child may use a passive or an active strategy to produce speech. A passive strategy means that the child does not make an effort to reduce the unavoidable consequences of oral-nasal coupling, with the consequence of voicing of consonants and nasalization of vowels, as well as nasal turbulence. If the child uses an active strategy it tries to prevent the effects of oral-nasal coupling, which is usually done by changing the place or the manner of articulation using compensatory articulation (Hutters & Bronsted, 1987). Reduced velopharyngeal function is treated by the use of speech improving surgery, most common is pharyngeal flap surgery (Sloan, 2000).

Individuals with CLP often show more shyness than do their peers. Also experience of bullying and teasing due to the CLP has been shown to be common (Noar, 1991). In turn, several studies suggest that people with speech and voice disorders often are perceived by listeners in more negative terms than people with typical speech and voice (Doody, Kalinowski, Armson & Stuart, 1993; Dorsey & Guenther, 2000; Franck, Jackson, Pimentel & Greenwood, 2003; Hall, 1991; Lass et al., 1993; McDonald & Frick, 1954; Williams & Dietrich, 1999). Children with speech-, language- or voice difficulties have been reported to not be readily accepted by their peers and classmates (Davis, Howell & Cooke, 2002; Marge, 1966; Perrin, 1954) and to have a lower social status among peers (Woods & Carrow, 1959). It is important that teachers and health professionals are provided with tools making them able to handle conflicts and problems that arise.

2.3 Measuring Judgements towards Individuals with Voice Disorders
To investigate how people with different voice disorders are perceived by others, a tool for measuring attitudes is needed. Osgood, Suci and Tannenbaum (1957) developed such a method; a semantic differential scale where the listener is provided with contrasting adjective pairs, i.e. “Nice/Mean”, “Strong/Weak”. The adjectives are assigned with an ordinal rating scale, and the participant is asked to evaluate the object using a series of bipolar rating scales. In this way, the direction and the intensity of listeners’ attitudes can be measured and characterized.

The efficiency of the semantic differential scale depends upon the adjectives included. According to Osgood et al. (1957) the adjectives being used should be limited and contrasted to make sure that a broad representation is provided, thus avoiding making the test sessions too long and exhausting for the participants. This kind of judgement assessment is the most
commonly used method when measuring listeners’ attitudes towards atypical speech and voice, and is therefore also used in the paper presented here.

2.4 Judgements towards Individuals with Voice and Speech Disorders

A person’s speech and voice have a big impact on how the person is perceived by others (Evitts, Dine & Holler, 2009; Gilmore, 1974). Many studies have been presented on how listeners judge, from different perspectives, people with different speech and voice disorders such as stuttering and dysphonia. The results from previous research almost unanimously show that people with a speech or voice disorder are judged in more negative terms than speakers with typical speech (Doody, Kalinowski, Armson & Stuart, 1993; Dorsey & Guenther, 2000; Franck, Jackson, Pimentel & Greenwood, 2003; Hall, 1991; Lass et al., 1993; McDonald & Frick, 1954; Williams & Dietrich, 1999).

Amir and Yundof (2013) conducted a study on Israeli native listeners’ attitudes towards people with dysphonia. The results from the investigation, when using a 12 bipolar adjectives semantic differential scale for assessment, showed statistically significant negative attitudes towards dysphonic speakers on all 12 scales. Also, dysphonic women were shown to be rated in more negative terms than dysphonic males. The attitudes towards the dysphonic speakers did not seem to differ between the male and female listeners. The more gender typical a voice is (high pitch voice among women and low pitch voice among men), the more attractive the listeners perceived the voice to be and also tended to judge the speaker as more attractive (Zuckerman & Driver, 1989). Women with dysphonia tend to be seen as less attractive and are judged in more negative terms than women with a typical voice (Blood, Wallace Mahan & Hyman, 1979). Similar results have been reported among children and teenagers respectively with and without dysphonia (Lass, Ruscello, Harkins Bradshaw & Blankenship, 1991). Also, it has been shown that the severity of the dysphonia has an impact on the listener’s attitude, since individuals with severe dysphonia have been shown to be judged more negatively than do individuals with mild dysphonia (Altenberg & Ferrand, 2006).

A study by Lass, Ruscello and Lakawicz (1988) showed that speakers with dysphonic voice may be judged in more unfavourable terms compared to typical speakers. The study is based upon 16 children with cerebral palsy and with dysphonia and 8 typically developing children, all between 6 to 11 years of age. The children were recorded and the speech samples were presented to 25 college students. Results showed that children with typical speech were judged in more favourable terms for all but two adjective pairs of a scale with 24 different adjective
pairs. These two pairs were “Loud-Quiet” and “Youthful-Mature”. This is also supported by Ma and Yu (2013), who investigated the attitudes towards children with dysphonia among primary-school teachers, speech-language therapy students and university students in general. The judgements were based upon 12 voice samples (whereof 6 were from children with typical voices and 6 were from children with dysphonia) using a semantic differential scale with 22 bipolar adjective pairs. The study shows that the mean attitude ratings were significantly more negative for the children with dysphonic voices. It is also concluded that the ratings made by the three different student groups did not significantly differ from one another.

Attitudes and judgements towards stuttering have also been investigated in several studies. Woods and Williams (1976) made a study of attitudes towards stutterers and found that there is an existing generally unfavourable personality stereotype of stutterers. This stereotype was not affected by the listener’s exposure level to stutterers. Franck et al. (2003) conducted a study on children’s attitudes towards a stuttering adult and which produced similar findings to Woods and Williams (1976). The study showed that school aged children judged an adult man in more negative terms when he was stuttering compared to when he had fluid speech. Silverman (1976) investigated the attitudes among two groups of students towards lateral lisping. One group listened to a female speaker with typical speech, and the other group to the same speaker who simulated a lateral lisp. The results showed that the reading with a lateral lisp was rated in more negative terms than the reading with typical speech. Even when it comes to minor speech problems listeners’ perception of a person tend to be more negative (Burroughs & Small, 1991). More negative judgements were observed when a speaker misarticulated 1 out of 98 words.

These studies all show that atypical voice or speech is most likely to influence negatively the perception of individuals’ physical, psychological and social appearance. Also, these negative attitudes toward people with voice disorders seem to exist in most parts of the world according to several studies (Amir & Levine-Yundof, 2013; Lass, Ruscello & Lakawicz, 1988; Ma & Yu, 2013). However, there might be cultural differences in the preconceptions of people with untypical speech or voice. For example, Bebout and Arthur (1992) showed that Asian listeners are more likely than a North-American listener to believe that a person stuttering can stutter less if they try harder. The study also shows that listeners with Chinese as their native language were more likely to believe that speakers with cleft palate and hearing impairment were emotionally disturbed, than were listeners from other language groups. However, there seems to be no research indicating negative preconceptions about people with untypical speech or
voice are lacking in any culture. The fact such negative attitudes are common also shows the importance of early identification and intervention of different voice disorders.

It is most important to make teachers and health professionals aware of the existence of these attitudes and the problems connected to them, including making them aware of their own attitudes towards children and adults with unintelligible speech and with voice disorders. Many studies investigating attitudes toward people with communication disorders have shown that the attitudes can be changed (Gilmore, 1974; Ibrahim & Herr, 1982). If so, it is highly relevant to investigate how this can be performed in order to be able to reduce the negative attitudes a speaker with a speech or voice disorder may face.

2.4.1 Changing Listeners’ Attitudes toward Voice and Speech Disorders

Ibrahim and Herr (1982) made a study based upon attitudes toward people with communication disorders among undergraduate speech pathology students and audiology students. One control group and two intervention groups were being used in the study: a) an experimental group that role-played a specific communication disorder, and b) an informational group that received information and engaged in discussion about people with communication disorders. The result showed a significant difference between the attitudes in the control group compared to the two intervention groups, where the intervention groups had more positive attitudes toward people with communication disorders. Similar results were found in a study by Gilmore (1974) investigating listeners’ attitudes towards speakers with esophageal voice, where esophageal speakers were significantly more accepted by the listeners that received information about the disorder compared to the listeners who did not receive such information.

However, other studies have found that increased information about speech or voice disorders does not change a listener’s perception of the speaker. In a study by Lallh (1997) university students got to listen to speech samples of women with normal voice, dysphonia due to vocal nodules and hypernasal voice due to velopharyngeal incompetence derived from focal injury. The listeners were assigned into one out of two listener groups, one group that received two pages of information about the speech disability and one group that received two pages of neutral information. The judgements from the two listener groups did not differ from each other. Lallh and Rochet (2000) studied attitudes among university students toward women with resonance disorders (hoarseness/breathiness or moderate hypernasality) were measured. The students were divided into two groups (one control group and one intervention group). The intervention group received two pages of information about the disorder before they were to do
the judgements using a semantic differential scale. The results showed no significant difference in the judgements between the two groups, which supports the findings made by Lallh (1997).

2.4.2 Judgements towards Individuals with Unintelligible Speech Related to Cleft Lip and/or Palate

Since the speech and voice abnormalities associated with CLP often cause more or less unintelligible speech it is likely that CLP, just as for example dysphonia, stuttering and other voice disorders, may have an impact on how listeners perceive a speaker with CLP. However, research on attitudes towards individuals with unintelligible speech related to cleft palate is not as widespread as the research on the attitudes toward other speech and voice difficulties. A recent study was conducted by Lee, Gibbon and Spivey (2014) about children’s attitudes towards peers with unintelligible speech related to cleft lip and/or palate. The study investigated whether children were judging peers in more negative terms because of unintelligible speech. Ninety children listened to 10 speech samples from 10 different children, each including 3 recorded sentences, and rated 8 different personal traits (adjective pairs) that they thought described the speakers, on a three point scale ("Mean", “Do not know” or “Nice”). The children in the study by Lee et al. (2014) were divided into three different age groups: age 7-8, 9-10 and 11-12. The judgements made by the children aged 7-8 years showed a significant correlation for pairs “Mean/Kind” and “Shy/Outgoing”. For the children aged 9-10 years old there was a significant correlation for the adjective pair “No Friends/Friends”. The children aged 11-12 years made ratings with a strong correlation for pairs “Ugly/Good Looking” and “No Friends/Friends”. The study concluded that children show less accepting attitudes towards peers with reduced speech intelligibility compared to peers with typical speech.

3 Purpose

The purpose of the study presented here is to investigate if adults perceive children with unintelligible speech related to CP in other terms than they perceive children with typical speech. The study also aims at investigating if there is a difference between judgements made by adults having received information about cleft palate and its possible effects on speech, compared to adults having received no such information.
3.1 Questions at issue

- Is there a correlation between the ratings made by the adult listeners and the level of the child’s speech intelligibility?
- Does receiving information about cleft palate and speech difficulties associated with it, have significant effect on ratings made by the adult listeners?

4 Method

4.1 Participants

The listener group consisted of 30 adults above 18 years of age (n=30) of which 18 were women and 12 men. They were all recruited in county Cork (southern Ireland) but were of different nationalities. Most participants were Irish, the majority from the Republic of Ireland but some also from Northern Ireland. Also, some participants were from the United Kingdom and some from the United States of America. The recruitment was made via e-mail, sent to students and staff at University College Cork. The e-mail included information about the study and asked the respondents to take part in the study. Respondents were chosen among people over 18 years of age with English as their native language, no background with working or studying in the sectors of health or child welfare and no history of hearing impairment.

4.1.1 The participant groups

The listeners were randomly divided into two groups. Group 1, the experimental group, read two information brochures: (1) “What is Cleft Lip & Palate?” and (2) “Cleft Lip & Palate – Speech & Hearing Concerns” (Appendix A), both developed by The Cleft Lip & Palate Association of Ireland (2004). Group 2 served as a control group and did not receive the brochures. The judgements made by listeners within the two groups were analysed to find possible differences between them.

4.2 Speech samples

Each listener listened to 10 speech samples consisting of 3 sentences each. These speech samples were recordings from 8 children with repaired cleft palate and 2 typically developing children, 7 boys and 3 girls between 6-14 years of age. The samples with typical speech were included in order to form a set of speech samples that varied from typical speech to very unintelligible speech. These recordings were pre-existing samples collected from children from
different parts of the United Kingdom for a previous research project, the CLEFTNET UK Project (Lee, Gibbon, Crampin, Yuen & McLennon, 2007). As one part of the CLEFTNET UK Project, spoken sentences were elicited from 4 typically developing children and from 11 children with unintelligible speech due to cleft palate. The sentences were taken from GOS.SP.ASS (Sell, 1998), which is a speech assessment protocol for speech disorders associated with CLP and/or velopharyngeal dysfunction. The recordings included in the present study are the same ones used in the previous study by Lee et al. (2014). Each child read 13 sentences which are listed in Appendix B. From each child’s recordings, 3 sentences that were considered by the authors to represent the child’s speech were chosen to be included in the study. The judgement of which sentences best represented the speech was perceptual, meaning that for a child that the authors considered very unintelligible the chosen sentences were also considered very unintelligible.

4.2.1 Intelligibility measurements

In the previous study by Lee et al. (2014) the levels of speech intelligibility for the children in the CLEFTNET UK Project (Lee et al., 2007) were measured. Twenty adults without experience of speech measurements were asked to listen to each speech sample once and orthographically transcribe what they heard. To prevent the listeners from hearing the same sentence twice, 4 sets of speech samples were chosen, in which 6-9 different sentences were included, spoken by 2-3 different speakers. Each set was presented to 5 listeners. By dividing the number of correctly transcribed words by the total number of words in the sentence, a percentage of speech intelligibility was obtained. An average percentage of the 3 sentences per speaker was then calculated. All child speakers and their intelligibility scores are presented in Table 1. The speakers with 99% intelligible speech are the speakers with typical speech. The speakers were presented to the listeners in the order listed below.
Table 1.

*Speech Intelligibility Level per Speaker (Lee et al., 2014)*

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Speech Intelligibility Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 (Typical)</td>
<td>99 %</td>
</tr>
<tr>
<td>S2 (Typical)</td>
<td>99 %</td>
</tr>
<tr>
<td>S5</td>
<td>73 %</td>
</tr>
<tr>
<td>S4</td>
<td>81 %</td>
</tr>
<tr>
<td>S3</td>
<td>85 %</td>
</tr>
<tr>
<td>S6</td>
<td>63 %</td>
</tr>
<tr>
<td>S8</td>
<td>36 %</td>
</tr>
<tr>
<td>S10</td>
<td>32 %</td>
</tr>
<tr>
<td>S9</td>
<td>35 %</td>
</tr>
<tr>
<td>S7</td>
<td>40 %</td>
</tr>
</tbody>
</table>

*Speakers are presented in the same order as presented to listeners.*

4.3 Test procedure

In the present study, the adult listeners attended one individual session each. They were asked to listen to the speech samples one by one, with a total of 10 samples (each sample included three sentences through headphones, spoken by one of the 10 children). The instructions given to the listeners are attached in Appendix C. After each speech sample the listener filled in a semantic differential scale with seven bipolar adjectives that describe different personality and social qualities (e.g. whether the child is clever or not clever, healthy or sick, etc.). The listener was asked to judge the speech using a seven-point scale depending on what he or she believed described the child, based on the recording. The semantic differential scale used for the study is attached in Appendix D and the bipolar adjectives for the judgement are listed in Table 2.
The adjective pairs were adopted from a study by Ruscello, Lass and Brown (1988) and also from Turnbaugh, Guitar and Hoffman (1979) and were adapted for the previous study about children’s attitudes conducted by Lee et al. (2014). For that study, some changes were made in the adjective pairs; “Cruel/Kind” was changed to “Mean/Kind”, “Shy/Bold” to “Shy/Outgoing”, “Unfriendly/Friendly” to “No friends/Friends” and “Dull/Intelligent” to “Not clever/Clever”. These changes were made to ensure the child raters understood all of the adjective pairs, and to make the adjectives more appropriate for describing a child. For example, it was considered to be more common to describe a child as naughty or mean rather than bad or cruel.

A laptop computer (HP Pavilion 13 x360 PC) and headphones (HeadMax PX40) were used to present the speech samples to the participants. All speech samples were adjusted to a level of 70 dB and when the speech samples were presented to the participants, the participant was allowed to adjust the volume before the session started. Also, the participants could repeat the speech samples if they wished to.

<table>
<thead>
<tr>
<th>Traits</th>
<th>Bipolar adjective pair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personality</td>
<td>Naughty</td>
</tr>
<tr>
<td></td>
<td>Happy</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Appearance</td>
<td>Good looking</td>
</tr>
<tr>
<td>Intelligence</td>
<td>Not Clever</td>
</tr>
<tr>
<td>Other</td>
<td>No friends</td>
</tr>
<tr>
<td></td>
<td>Healthy</td>
</tr>
<tr>
<td></td>
<td>Shy</td>
</tr>
</tbody>
</table>

The adjective pairs were adopted from a study by Ruscello, Lass and Brown (1988) and also from Turnbaugh, Guitar and Hoffman (1979) and were adapted for the previous study about children’s attitudes conducted by Lee et al. (2014). For that study, some changes were made in the adjective pairs; “Cruel/Kind” was changed to “Mean/Kind”, “Shy/Bold” to “Shy/Outgoing”, “Unfriendly/Friendly” to “No friends/Friends” and “Dull/Intelligent” to “Not clever/Clever”. These changes were made to ensure the child raters understood all of the adjective pairs, and to make the adjectives more appropriate for describing a child. For example, it was considered to be more common to describe a child as naughty or mean rather than bad or cruel.

A laptop computer (HP Pavilion 13 x360 PC) and headphones (HeadMax PX40) were used to present the speech samples to the participants. All speech samples were adjusted to a level of 70 dB and when the speech samples were presented to the participants, the participant was allowed to adjust the volume before the session started. Also, the participants could repeat the speech samples if they wished to.
4.4 Ethical considerations

All participants filled out a consent form to approve their participation in the study. All participation was voluntarily and the participant could at any time choose to cancel his or her participation. All data was anonymised and a participant’s individual responses cannot be traced. The collected data will be saved at the Speech and Hearing Department at University College Cork for at least five years.

Ethical approval was given by the Clinical Research Ethics Committee of the Cork Teaching Hospitals prior to participant recruitment in March 2015.

4.5 Statistical analysis

In order to avoid any bias in assigning the listeners to the experimental group and the control group, a randomized distribution was made (using Microsoft Excel 2010). For the randomized distribution each participant was assigned a random number (=rand) and thereafter the participants were numerically sorted after their random number. The participants from the first half of the list were assigned to Group 1 (the experimental group) and those from the second half to Group 2 (the control group). This randomisation was made for groups of 10 to make sure that both groups had equal amounts of participants even if the study failed to recruit as many participants as it originally intended to (i.e. 70 participants).

A Spearman rank order correlation test was undertaken in SPSS 2.0 to determine the relationship between the level of speech intelligibility and the judgements made by the listeners. The Spearman rank order correlation test investigates the strength of correlation between two ordinal variables. In order to prevent overall Type I error rate, Bonferroni Correction was used to determine the significance level that should be used to determine statistical significance. A customary probability level of 0.05 was selected and divided by 8 (the number of adjective pairs) and the significance level was therefore set to \( p = 0.05 / 8 = 0.00625 \). Regarding the correlation coefficient there are different levels of strength of relationships. A correlation coefficient between 0.1-0.29 is considered as weak, 0.3-0.49 as medium and 0.5-1 as strong (Cohen, 1999).

A Mann Whitney U-test was performed to determine differences in ratings between the children with CP compared to the children with typical speech. A customary probability level of 0.05 was selected. The Mann Whitney U-test was also used to see if there was any difference in the judgements made by the two groups of listeners. For this a Bonferroni Correction was used, and the significance level was set to 0.00625 (see above).
In total there were 2400 social acceptance ratings available for quantitative analysis (30 participants x 10 speech samples x 8 adjective pairs).

5 Results

5.1 Correlation between Speaker Intelligibility and Listeners’ Perception

The mean ratings for each speaker are presented in Table 3. All the negative adjectives (the less positive ones) are for reasons of clarity listed on the left hand side and all the positive adjectives are listed to the right. A lower score equals a more negative judgement and a higher score equals a more positive judgement. The scale is graded from 1 to 7 where 1 is the most negative and 7 the most positive judgement. To examine whether there is a difference between the ratings related to the speakers’ speech intelligibility level, the speakers are presented in intelligibility order.

Table 3.

Mean Rating Scores for Each Speaker per Adjective Pair

<table>
<thead>
<tr>
<th>Speaker:</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>S8</th>
<th>S9</th>
<th>S10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naughty/Good</td>
<td>6.00</td>
<td>5.27</td>
<td>4.63</td>
<td>5.47</td>
<td>5.37</td>
<td>5.37</td>
<td>5.00</td>
<td>4.97</td>
<td>5.20</td>
<td>5.43</td>
</tr>
<tr>
<td>Sad/Happy</td>
<td>5.23</td>
<td>3.47</td>
<td>5.43</td>
<td>3.87</td>
<td>3.53</td>
<td>3.53</td>
<td>2.90</td>
<td>3.03</td>
<td>3.87</td>
<td>4.57</td>
</tr>
<tr>
<td>Mean/Kind</td>
<td>6.00</td>
<td>5.40</td>
<td>5.20</td>
<td>5.23</td>
<td>5.53</td>
<td>5.17</td>
<td>5.03</td>
<td>4.87</td>
<td>5.40</td>
<td>5.33</td>
</tr>
<tr>
<td>Ugly/Good Looking</td>
<td>4.97</td>
<td>4.47</td>
<td>4.40</td>
<td>4.43</td>
<td>4.17</td>
<td>4.20</td>
<td>3.63</td>
<td>3.97</td>
<td>4.23</td>
<td>4.53</td>
</tr>
<tr>
<td>Not Clever/Clever</td>
<td>5.60</td>
<td>4.40</td>
<td>4.40</td>
<td>4.53</td>
<td>3.80</td>
<td>3.97</td>
<td>3.37</td>
<td>3.87</td>
<td>4.53</td>
<td>4.93</td>
</tr>
<tr>
<td>No Friends/Friends</td>
<td>5.33</td>
<td>4.07</td>
<td>4.63</td>
<td>4.37</td>
<td>3.70</td>
<td>3.70</td>
<td>2.97</td>
<td>3.40</td>
<td>3.83</td>
<td>4.80</td>
</tr>
<tr>
<td>Sick/Healthy</td>
<td>4.97</td>
<td>4.57</td>
<td>4.20</td>
<td>4.43</td>
<td>3.37</td>
<td>3.70</td>
<td>3.33</td>
<td>3.37</td>
<td>4.57</td>
<td>4.57</td>
</tr>
<tr>
<td>Shy/Outgoing</td>
<td>4.70</td>
<td>2.87</td>
<td>5.30</td>
<td>3.50</td>
<td>3.13</td>
<td>3.00</td>
<td>2.62</td>
<td>2.57</td>
<td>3.40</td>
<td>4.20</td>
</tr>
</tbody>
</table>

Speaker S1, showing typical speech, had the highest (most positive) ratings for all adjective pairs except for “Sad/Happy” and “Shy/Outgoing”. Speaker S3, showing a speech intelligibility level of 85 %, was perceived as happiest and most outgoing. Speaker S7, showing an intelligibility level of 40 %, had the lowest ratings for all pairs except for “Naughty/Good”, where speaker S3 was perceived as the naughtiest, and regarding “Mean/Kind” where speaker S8, with a speech intelligibility level of 36 %, was perceived as the meanest speaker.
Whether the social acceptance judgements correlate with the speaker’s level of speech intelligibility was determined with a Spearman rank order correlation test. The results from this are presented in Table 4 below.

Table 4.

Results from Spearman’s Rank Order Correlation Test between Measures of Intelligibility and the Social Acceptance Ratings

<table>
<thead>
<tr>
<th>Adjective Pair</th>
<th>Correlation Coefficient (rho)</th>
<th>Significance Level (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naughty/Good</td>
<td>0.490</td>
<td>0.147</td>
</tr>
<tr>
<td>Sad/Happy</td>
<td>0.080</td>
<td>0.827</td>
</tr>
<tr>
<td>Mean/Kind</td>
<td>0.857*</td>
<td>0.002</td>
</tr>
<tr>
<td>Ugly/Good Looking</td>
<td>0.492</td>
<td>0.148</td>
</tr>
<tr>
<td>Not Clever/Clever</td>
<td>0.382</td>
<td>0.276</td>
</tr>
<tr>
<td>No Friends/Friends</td>
<td>0.354</td>
<td>0.316</td>
</tr>
<tr>
<td>Sick/Healthy</td>
<td>0.568</td>
<td>0.087</td>
</tr>
<tr>
<td>Shy/Outgoing</td>
<td>0.128</td>
<td>0.725</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.00625 level - p<0.00625 (2-tailed)

For most adjective pairs there is a positive correlation between a high speech intelligibility level and high social acceptance ratings. However, the correlation is regarded as statistically significant only in the pair “Mean/Kind”. Adjective pairs “Sad/Happy” and “Shy/Outgoing” are the only pairs with a weak correlation. To investigate the differences in how the speakers were being perceived, and possible correlations between intelligibility and ratings, a bar chart was made for each adjective pair. The mean rating per speaker is listed at the Y-axis and the speakers are listed at the X-axis in intelligibility order. The mean ratings per speaker for the adjective pair “Naughty/Good” are presented in Figure 1.
All speakers were rated in relatively positive terms (high scores) for the adjective pair “Naughty/Good”. Speaker S3 had the lowest rating (mean 4.63) and as stated above, speaker S1 (typical speech) had the highest rating (mean 6.00). There is no clear relationship between the speech intelligibility and the ratings to be seen in the diagram. For this pair the Spearman rank order correlation test shows a correlation coefficient of 0.49 which is considered a medium strong correlation. There is though no significant result (p=0.147>0.00625) to be found.

The ratings for adjective pair “Sad/Happy” are presented in Figure 2.
As seen, the spread in the judgements are wider for this adjective pair, “Sad/Happy”, compared to the previously presented pair “Naughty/Good”. Speaker S7 (intelligibility level of 40 %) had the lowest ratings, with a mean score of 2.90, and seems to be commonly perceived as sadder than the other speakers. Speaker S3 was perceived as the happiest with a mean score of 5.43. Also in this test speaker S1 (typical speech) had among the most positive ratings with a mean score of 5.23. It is notable that speaker S2, also showing typical speech, was perceived as one of the saddest speaker with a mean score of 3.47. The Spearman rank order correlation test showed a correlation coefficient of 0.08 which is considered as a weak correlation. Also, no statistical significance can be proven (p=0.827>0.00625).

The ratings made on the next adjective pair, “Mean/Kind”, are presented in Figure 3.
Just as with the former adjective pair “Naughty/Good” the ratings for this adjective pair, “Mean/Kind”, tend to be quite high (rated in positive terms). The mean scores for all speakers except for speaker S8, who has an intelligibility level of 36 %, are above 5. Just as for the previous adjective pairs, speaker S1 is judged in more positive terms than the other speakers with a mean score of 6. There is no clear relationship detected between speech intelligibility and the listeners’ ratings. Speaker S10, who is the most unintelligible speaker, has a mean score almost as high as speaker S2, who is a typical speaker. The correlation between the ratings made by the listeners and the speaker’s speech intelligibility levels for adjective pair “Mean/Kind” is 0.857, according to the Spearman rank order correlation test. This means there is a strong correlation between high intelligibility and high rating scores (positive judgements). Also, the correlation is statistically significant (p=0.002<0.00625) which indicates that children with unintelligible speech are perceived as meaner than children with typical speech.

In figure 4, the ratings on adjective pair “Ugly/Good Looking” for each child are presented.
As for all the previous adjective pairs, speaker S1 (typical speech) is rated most positively, in this case more good looking, than the other speakers. Speaker S2 (typical speech) had a mean score of 4.47 and was perceived as uglier than the most unintelligible speaker (S10). Therefore, no strong relationship can be detected between speech intelligibility and how a listener perceives a speaker’s physical appearance. Speaker S7 is perceived most negatively with a mean score of 3.63. For this adjective pair the Spearman rank order correlation test shows a correlation coefficient of 0.492 which is considered a medium strong correlation between high intelligibility and high rating scores. There is though no statistical significance for this result (p=0.148>0.00625).

The results for adjective pair “Not Clever/Clever” for each speaker are presented in Figure 5.
Speaker S1 (typical speech) is clearly perceived as the cleverest speaker with a mean score of 5.60. Speaker S10 (most unintelligible) was perceived as the second cleverest speaker with a mean score of 4.93. Speaker S7 (40% intelligible speech) was, as for pairs “Ugly/Good Looking” and “Sad/Happy”, perceived most negatively with a mean rating of 3.37. No clear relationship can be detected between the level of speech intelligibility and how clever a speaker is perceived by a listener. The Spearman rank order correlation test gave a correlation coefficient of 0.382. This shows a medium strong correlation between high intelligibility and being perceived as cleverer than unintelligible peers. No statistical significance could be proven (p=0.276>0.00625).

Whether the children are perceived of as having friends or not is shown in Figure 6, where results for the adjective pair “No Friends/Friends” are presented.
Here also speaker S7 (40 % intelligible speech) is judged most negatively (no friends), with a mean score of 2.97. Speaker S1 (typical speech) was again judged in more positive terms (friends), with a mean score of 5.33. Again there is no clear relationship to be noted in the diagram. Speaker S10 who is the most unintelligible speaker was perceived in second most positive terms (friends) with a mean score of 4.80. The correlation coefficient between the speech intelligibility score and the rated attitudes, according to the Spearman rank order correlation test, is 0.354. Consequently, the correlation between the positive rating “Friends” is medium strong to a high intelligibility score. This cannot be proven as statistically significant (p=0.316>0.00625).

The next adjective pair is about whether the child is perceived as sick or healthy. The results for this pair, “Sick/Healthy”, are presented in Figure 7.
Speakers S5 (73 % intelligible speech), S7 (40 % intelligible speech) and S8 (36 % intelligible speech) are the children that are perceived as the sickest with mean scores of 3.37, 3.33 and 3.37. The speakers with the highest level of speech intelligibility (S1, S2, S3 and S4) are among the speakers that are perceived as the healthiest. But, speakers S2, S9 and S10 all have a high mean score of 4.57, even though speaker S2 has an intelligibility level of 99 % while speakers S9 and S10 are the most unintelligible speakers. According to the Spearman rank order correlation test there is a strong correlation, 0.568, between the more positive judgement “Healthy” and a high speech intelligibility, and vice versa. This cannot be proven to be statistically significant (p=0.087>0.00625).

The last adjective pair is “Shy/Outgoing” and the results from this pair are presented in figure 8.
The rating scores for this pair are quite widespread. The speakers judged as the shyest ones are speaker S8 (36 % intelligible speech) with a mean score of 2.62 and speaker S7 (40 % intelligible speech) with a mean score of 2.57. These two speakers are among the most unintelligible ones. It is notable that speaker S2 (typical speech) also had a quite low mean score, 2.87. This is the only pair where speaker S1 (typical speech) was not perceived in most positive terms. Speaker S3 was perceived as most outgoing with a mean score of 5.30. No clear correlation between intelligibility and the ratings was found. According to the Spearman rank order correlation test the correlation between intelligibility and the positive rating “Outgoing” (and vice versa) is weak, with a coefficient of 0.128. This result could not be proven to be statistically significant (p=0.725>0.00625).

5.2 Differences in Judgements between the Children with Typical Speech and the Children with Cleft Palate

To investigate possible differences between how the listeners perceived the speakers with CP compared to how they perceived those with typical speech, a Mann Whitney U-test was performed. The results shows a statistically significant difference between the ratings for the
children with CP and the typical speakers (p=0.000<0.05). It seems based upon this that children with CP are perceived in more negative terms than children with typical speech.

5.3 Comparisons between the Experimental Group and the Control Group

The judgements made by the two listener groups are presented in Table 6.

Table 6.

Mean Ratings per Listener Group for each Adjective Pair

<table>
<thead>
<tr>
<th>Adjective Pair</th>
<th>Experimental Group Mean Ratings</th>
<th>Control Group Mean Ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naughty/Good</td>
<td>5.07</td>
<td>5.47</td>
</tr>
<tr>
<td>Sad/Happy</td>
<td>3.95</td>
<td>3.94</td>
</tr>
<tr>
<td>Mean/Kind</td>
<td>4.95</td>
<td>5.68</td>
</tr>
<tr>
<td>Ugly/Good Looking</td>
<td>4.42</td>
<td>4.18</td>
</tr>
<tr>
<td>Not Clever/Clever</td>
<td>4.27</td>
<td>4.41</td>
</tr>
<tr>
<td>No Friends/Friends</td>
<td>4.30</td>
<td>3.86</td>
</tr>
<tr>
<td>Sick/Healthy</td>
<td>3.91</td>
<td>4.30</td>
</tr>
<tr>
<td>Shy/Outgoing</td>
<td>3.51</td>
<td>3.55</td>
</tr>
</tbody>
</table>

To investigate whether there is a difference between the two groups, the mean ratings per group and adjective pair are presented in a bar chart in Figure 9. The mean ratings are presented on the Y-axis and the adjective pairs on the X-axis. The white bars represent the ratings made by the experimental group (group 1) and the black bars represent the ratings made by the control group (group 2).
The largest differences in judgements between the groups was found with the adjective pair “Mean/Kind”, where the control group rated the children in more positive terms than group 1. The mean rating for the experimental group is 4.95 while the mean rating for the control group is 5.68. For the remaining adjective pairs there are small or no differences between the groups. Overall there is no clear correlation to be observed between group affiliation and social acceptance ratings and the differences between the groups are relatively small for all adjective pairs.

To determine differences between the two groups a Mann Whitney U-test was performed. The significance level for the Mann Whitney test was set to p=0.00625. The results from the Mann-Whitney U-test for all adjective pairs are presented in Table 7.
Table 7.

*Mann-Whitney U-test: Differences Between Group Judgements for each Adjective Pair*

<table>
<thead>
<tr>
<th>Adjective Pair</th>
<th>Asymp. Significance (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naughty/Good</td>
<td>0.009</td>
</tr>
<tr>
<td>Sad/Happy</td>
<td>0.960</td>
</tr>
<tr>
<td>Mean/Kind</td>
<td>0.001</td>
</tr>
<tr>
<td>Ugly/Good Looking</td>
<td>0.119</td>
</tr>
<tr>
<td>Not Clever/Clever</td>
<td>0.393</td>
</tr>
<tr>
<td>No Friends/Friends</td>
<td>0.022</td>
</tr>
<tr>
<td>Sick/Healthy</td>
<td>0.040</td>
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<tr>
<td>Shy/Outgoing</td>
<td>0.857</td>
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</table>

The results show that there were significant differences between the groups for one adjective pair only: “Mean/Kind” (p=0.001<0.00625). For all the other adjective pairs there are no significant judgement differences between the two groups.

In other words the listeners belonging to the control group rated the speakers as more kind to a greater extent as compared to the experimental group.

6 Discussion

6.1 Results

For most adjective pairs high social acceptance judgements had a correlation with highly intelligible speech and vice versa. The correlation was statistically significant for one adjective pair only: “Mean/Kind” (correlation coefficient 0.857, p=0.002<0.00625). This indicates that the more unintelligible a child’s speech is because of the CP, the meaner he or she is perceived by adult listeners. A strong correlation was also found for adjective pair “Sick/Healthy” (correlation coefficient 0.568). For all remaining pairs except for “Sad/Happy” and “Shy/Outgoing” there was a medium strong correlation between a high level of speech intelligibility and high social judgement ratings. There was no clear correlation for adjective pairs “Sad/Happy” and “Shy/Outgoing” (0.080 and 0.128).
Compared to the previous study by Lee et al. (2014), where children’s attitudes towards the same speech recordings as used in this investigation were being studied, there are some differences and similarities to be noted. The social acceptance judgements made by the children aged 7-8 years showed a significant correlation for pairs “Mean/Kind” and “Shy/Outgoing”. For the children aged 9-10 years old there was a significant correlation for adjective pair “No Friends/Friends”. The children aged 11-12 years made ratings with a strong correlation for pairs “Ugly/Good Looking” and “No Friends/Friends”.

For the present study adjective pair “Shy/Outgoing” is one of the two pairs showing weak or no correlation between intelligibility and judgements. These results do not correspond to the findings of Lee et al. (2014) where children aged 7-8 years judged the speaker with more unintelligible speech as more shy than their typical speaking peers. It seems therefore likely that an adult listener pays attention to other attributes in speakers’ speech and voice when making such judgements.

Both adult and child listeners (referring to the previous study by Lee et al., 2014) seem to have perceived some of the speakers differently compared to the other speakers with similar speech intelligibility level. For example the most unintelligible speaker, S10 who has a speech intelligibility level of 32 %, was in most cases perceived in more positive terms than many of the more intelligible speakers. In the previous study with the child listeners it was hypothesized that the speaker’s prosody may be a parameter that affects the listener’s perception of a speaker. This might also be an explanation why speaker S2, who is one of the two speakers with typical speech, in several cases was rated in more negative terms than the other typical speaker S1 and other speakers with more unintelligible speech. For example, speaker S2 was perceived as very shy.

A strong statistically significant difference was found looking at how children with CP were perceived compared to children with typical speech. This also indicates that listeners take other things than unintelligibility into consideration when making a judgement of a speaker. Other aspects of the speech and voice can be presumed to have an impact on how the speaker is perceived by the listener. For example, it has been shown that latency and intonation affect the listener’s perception judging how likely it is that the speaker knows the answer to a certain question (Brennan & Williams, 1995) and might therefore also have an effect in other ways. Also, the dialect of the speaker might have an impact on how they are perceived by listeners (Tucker & Lambert, 1969). Atypical speech and voice attributes, such as atypical articulation,
phonation and resonance, might also have an impact on how a listener perceives a speaker (Lass et al., 1988). The correlation between judgements and speech intelligibility is stronger among child listeners. One reason might be that the child listeners had a 3-point scale while the adult listeners had a 7-point scale. The number of points used has been suggested to have an impact on the results (Dawes, 2008). Since the adult listeners had two options respectively between the neutral response (grade 4) and the extremes (grade 1 and 7) it is likely that they used the extremes to a smaller extent than do child listeners using the 3-point scale, which might affect the results. Also, research has shown that whether the scale is labelled or not has an impact on the results (Weijters, Cabooter & Schillewaert, 2010). Since the child listeners had a three point labelled scale (e.g. “Nice”, “Don’t know” and “Mean”) it is likely that this is a reason for the differences in the judgements between the adult and the child listeners. Another explanation for the differences between the child and the adult listeners could be that the adult listeners adjust their ratings depending on how they think that they are expected to judge children, while children often express their direct feeling. The adult listeners were asked not to adjust their opinions but to go with their first instinct, but nevertheless some adjustments might have been made.

Overall, it seems that adult listeners tend to give more positive judgements than do child listeners. This indicates that adults consider other factors when making judgements. They might also have a greater insight about unintelligible speech; that it does not necessarily have anything to do with the speaker’s personal attributes, which are no different from those of a typical speaker. It is also likely that the adult listeners have a greater insight about speech difficulties and that they do not necessarily mirror other social, psychological or physiological attributes. Regardless, it seems adult listeners show a more positive attitude (i.e. give higher ratings) towards children with unintelligible speech related to CP than do child listeners. Previous research has shown that judgements toward dysphonic speakers do not differ between younger (18-40 years old) and older adult listeners (above 40 years of age) (Amir & Levine-Yundof, 2013). Since the results presented in this report indicate that there might be differences in how child and adult listeners perceive a speaker, this is suggested to be an area for further research.

The ratings made by the adult listeners for the trait “Ugly/Good Looking” are all at a mean score somewhere in the middle of the scale, which indicates that the adults either could not, or did not want to make a judgement of a child’s physical appearance just from hearing the child’s voice. Many adults expressed being more or less uncomfortable with making this judgement. Many of the listeners gave comments about this adjective pair and said that it was very hard, or
that they felt bad, making that judgement about a child based on the child’s voice. This is supported by the fact that most ratings for this adjective pair were somewhere in the middle, between 3 and 5. This might indicate that listeners did not feel that they were able to (or did not want to) make a judgement of a child’s physical appearance without actually being able to see the child. For this pair, some listeners made comments. For example, one speaker said “It feels mean to rate whether a child is good looking or not only by listening to its speech” while another said “I don’t think there are any ugly children”.

The differences between the experimental listener group and the control group in this study, do not completely correspond to previous findings. In the earlier studies the results indicated that the intervention group (the group that receives information with the main purpose to affect social acceptance judgements) made more positive judgements (Gilmore, 1974; Ibrahim & Herr, 1982), or that the judgements did not differ between the intervention group and the control group (Lallh, 1997; Lallh & Rochet, 2000). The present study indicates that receiving (reading) information about CLP does not change listeners’ perception of a speaker in a more positive direction. For adjective pair “Mean/Kind” the experimental group (the group that received information) made significantly more negative judgements compared to the control group. This might be caused by the limited listener groups (N=30, n=15). No other studies have been found showing that listeners receiving information would cause a downgraded perception of the speaker’s social appearance, and an explanation of such an effect cannot easily be found. With the exception of the adjective pair “Mean/Kind” no difference has been detected between the listener groups’ judgements. This supports the result from Lallh and Rochet’s (2000) study with similar listener groups, including one group that received written information about the reason for the atypical voice. No differences between the groups were found.

6.2 Limitations of the Present Study

Overall the results might have been more applicable for larger populations if the study had included larger listener groups. It is also possible that the results would have shown more statistically significant results if a bigger listener group had been recruited. It had been intended to include 70 participants but because of time limitations and difficulties in finding volunteer participants, the final participant group consisted of 30 adult listeners.

When presenting data for participants all speech samples were played in the same order. It is possible that this might have affected the listeners’ judgements, since the two most intelligible speakers were presented at the beginning of the research sessions. It might have been better to
make sure that there were some unintelligible speakers before, between and after the intelligible ones, to avoid the typical speakers setting some kind of ‘standard’ for a typical child voice. Another option is to present speech samples of one of the children again, to be able to measure intrarater reliability. Because of the difficulties finding participants and the fact that the sessions already took around half an hour in the experimental group, adding more speech samples (and therefore more time) might have resulted in test sessions being too long. Also, since some of the sentences occurred more than one time in the different speech samples, it is possible that this might have had an impact on how unintelligible the speakers perceived the children, and this might have been taken into consideration. The sentences in the present study were chosen by a perceptual judgement made by Lee et al. (2014). A more reliable method to decide which sentences best represented the children’s speech could for example have been to have more than one person listen to the entire set of samples and thereafter chose the sentences that most listeners considered most representative for each child. However, since the intelligibility measurements are made for the chosen sentences only and not for the entire set of sentences, this likely did not affect the results for the present study.

Also, methods of measuring speech intelligibility and how valid the methods are should be considered. Speech evaluations made by listeners are subjective and are therefore influenced by setting and experience. Thus speech assessments tend to vary and the validity of results can be questioned (Lohmander & Olsson, 2004). To make the intelligibility measurements less subjective, an automatic speech recognition system can be used together with listener judgements of intelligibility. Automatic speech recognition systems have been evaluated for patients with CLP by Schuster et al. (2006) and Schuster et al. (2011), and have been shown to be useful for speech intelligibility measurement for the CLP population. However, the method to measure speech intelligibility in the present study was used so that listeners without education in the area could be compared to how listeners with similar attributes perceived the speech intelligibility. This kind of measurement is also used in other studies (Osberger & Kent, 1992; Osberger, Maso & Sam, 1993). Nevertheless it is possible that another way of measuring the intelligibility would show a different result for the present study.

Regarding the assessment measure, a 7-point differential scale (as used in the present study) is recommended for research, but a further improvement might be to have a labelled scale since this has been shown to give more reliable results (Weijters, Cabooter & Schillewaert, 2010). However, some studies indicates that a 10-point scale is more reliable than a 7-point scale, since this gives more options and also since a 10-point scale lacks a middle point which forces the
respondent to give a slightly positive or negative answer (Cummins & Gullone, 2000). It is also possible that using a visual analogue scale might have given a different result, partly since this has also lacks a clear middle score. However, these two types of scales have been shown to give similar results (Harland, Dawkin & Martin, 2014).

Another thing that might have affected the results is that the trait “mean” might carry different meanings. Some of the listeners may be of the opinion that “mean” is similar to greedy or stingy, while others may think it means that a person is bad. Whether another trait is to be preferred when making these kinds of measurements might be taken into consideration for future studies. Overall, the adjective pairs used for the study were initially meant for child listeners. It is possible that other adjective pairs would have been more useful for a study with adult listeners, but in order to be able to eventually conduct further research on possible differences between the child and adult listeners it was considered suitable to use the same adjective pairs.

The listener group mostly included university staff or students, which might have had an impact on the results. Ma and Yu (2011) investigated if there were any differences in how primary school teachers, speech-language therapists and general university students judged children with dysphonia, but found no differences. No studies that the author is aware of have focused on cleft palate speakers, and it might be interesting to investigate if there are any differences in how different groups of listeners judge this group of speakers, to see if there is a difference from other speaker groups. Also, most participants were Irish but some were from the United Kingdom or the United States of America. Studies have shown that listeners with different nationalities perceive speakers in different ways. Bebout and Arthur (1992) showed that Chinese listeners are more likely than other language groups to believe that a speaker with CP and hearing impairment is emotionally disturbed. Since the present study does not consider different English speaking nationalities, this might be an interesting area for further research.

6.4 Conclusions

The overall findings of this study indicate that children with unintelligible speech related to CLP are judged in more negative terms than their peers with typical speech. These findings are also supported by earlier research. Although, it seems that unintelligibility is not the main factor for how a child with or without cleft palate is perceived even though it might have some impact.

Statistical significance was proven for the personal trait “Mean/Kind”, where a strong correlation between unintelligible speech and more negative judgements was found. A strong, but not statistically significant, correlation was also found for the personal traits “Sick/Healthy”.
A medium strong correlation was found for the traits “Naughty/Good”, “Ugly/Good Looking”, “Not Clever/Clever” and “No Friends/Friends”. The traits “Sad/Happy” and “Shy/Outgoing” had a weak correlation therefore it seems that unintelligibility does not have an impact on how adults perceive children judging these traits.

The second question at issue was, “Does receiving information about cleft palate, and the speech difficulties associated with it, have an effect on the ratings made by the adult listeners?”. It can be concluded that the intervention group having received information about CLP made more negative ratings than the control group for adjective pair “Mean/Kind”. Since this discovery has not been found in earlier research, it might be that the size of the groups (n=15) has affected the results. Anyhow, according to the findings, receiving written information about cleft lip and palate does not change a listener’s rating of an unintelligible speaker’s personal traits.

The results from this study gives health care professional an insight into how patients with CLP are treated and perceived by people around them. This is important to take into consideration when planning treatment and intervention, and when discussing matters with patients and their relatives. By having an insight into what might be an issue for the patient, it is also easier to plan intervention and education people around them to prevent these negative responses.

### 6.5 Future research

Since the results from this study indicate that children with cleft palate are being judged in more negative terms, without necessarily being dependent upon the child’s level of speech intelligibility, a suggested area for future research is to investigate what are the speech and voice attributes that really affect a listeners’ perception of a speaker. One idea could be to compare the judgements made by listeners with the severity of the speaker’s speech disorder, and/or the type of atypical attributes (i.e. articulation, level of nasality etc).

Further research is also needed about the possibilities of modifying a listener’s judgement towards a speaker with unintelligible speech (in this case CLP). Earlier research has found a variety of results and it seems that just receiving written information about the speech disorder does not change the listeners’ perception of an unintelligible speaker. Finding other ways to change listeners’ judgements would be useful for professionals as well as for people with unintelligible speech and their families and friends.
Another area for further research is to study different groups of listeners and their attitudes towards children with unintelligible speech related to CLP. The study presented here investigates adults’ attitudes in general, but it would be highly interesting also to investigate attitudes among, for example, teachers and health professionals. This would also make professionals involved with CLP speakers and the CLP speakers’ relatives and peers aware of the difficulties and problems CLP speakers face, which in turn might help prevent possible negative judgements and treatment. It would also be interesting to make a deeper investigation about possible differences between how children and adults respectively perceive speakers with speech or voice disorders.
References


39


Appendix A

Information Brochure given to Participants in Group 1 (Experimental Group)
**What is Cleft Lip and Palate?**

A cleft lip (CL) is a separation in the upper lip. A cleft palate (CP) is an opening in the roof of the mouth. Clefts result from incomplete development of the lip and/or palate in the early weeks of pregnancy. During this time, the face is being formed— the top and the two sides develop at the same time and grow towards each other, finally fusing in the middle. The lip and primary palate develop at 4 to 6 weeks of gestation, while the secondary palate develops at approximately nine weeks.

Clefts affect approximately 1 in every 700 babies in Ireland.

In the instance of a cleft forming, the final closing does not fuse properly and an opening remains. The cause or causes for this failure to close are as yet not clearly understood, although research has been and continues to be undertaken. Genetics and environmental factors are both considered instrumental in causing clefts.

**Types of Clefts**

A cleft lip or cleft palate can be either **unilateral** (one-side only) (Fig.2) or **bilateral** (both sides) (Fig.3). A cleft can be either complete or incomplete. A complete palatal cleft involves both the primary and secondary palate, while an incomplete cleft involves the secondary palate only.

A child may be born with either a cleft lip or cleft palate or both.

Combined cleft lip and palate (CLP) represents approximately 50% of the incidence of cleft lip and palate, cleft palate alone c.30%, and cleft lip alone c.20%.

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**Fig. 1  Normal Lip and Mouth**

- Upper Lip
- Hard Palate
- Soft Palate
- Uvula
- Primary Palate
- Secondary Palate
- Avusus (Gum)

**Fig. 2  Unilateral Cleft Lip and Palate**

- Upper Lip
- Uvula
- Avusus (Gum)
Submucous Cleft

A submucous cleft palate is where, although the surface layers of the soft palate (mucous membrane) are complete, the underlying muscle is incomplete. A submucous cleft of the hard palate is where the bony element is incomplete. In its most minor form only the uvula is cleft, but even this leads to an abnormality in the muscles in the palate and, if the speech is affected, a repair will be required.

Normal speech production is the primary goal of any surgical repair of a submucous cleft.

A submucous cleft palate can prove difficult to identify; the palate appearing normal in some children. It is often not discovered before leaving the maternity hospital. Special tests may be necessary to properly identify it.

What can be done?

Cleft lip and cleft palate are correctable birth defects. Treatment of cleft begins within months of birth with corrective surgery, and continues in one form or another until the person reaches their late teens/early twenties.

Primary surgery begins for lip repair at about 3 or 4 months and for palate repair between 6 and 12 months. Cosmetic surgery on the nose may occur before the child attends school. A corrective rhinoplasty may be performed on the nose in the teenage years. Orthodontic surgery begins with maxillary expansion at around 9 to 10 years followed by bone grafting. Further corrective surgery (an osteotomy) may be carried out at about 18 years.

Speech difficulties arising because of a cleft palate may necessitate the need for speech and language therapy. Likewise the hearing of a child with a cleft palate needs to be constantly monitored, and treatment if required may involve the use of aminopterin.

Cleft lip and palate treatment involves a multi-disciplinary team including a plastic surgeon, ENT surgeon, maxillofacial surgeon, orthodontist, and speech and language therapist. Other specialists sometimes involved include the social worker, psychologist, paediatric dentist and geneticist. A Cleft Co-ordinator brings together all of these specialists in the larger centres, acting as a contact point for patients, parents and clinicians.
Some Basic Points About Cleft Lip and Palate

- Cleft Lip and Cleft Palate are correctable birth defects.
- The condition affects approximately 1 in every 700 babies in Ireland.
- It is the most common birth defect of the head and neck region.
- It occurs in the early weeks of pregnancy. During this time the face is being formed - the top and the two sides develop at the same time and grow towards each other, finally fusing in the centre. For some reason in a child with a cleft lip and/or palate this final closing does not fuse properly and a cleft remains open.
- The cause or causes for this failure to close are as yet not clearly understood although much research has been and is being undertaken.
- In some cases there is a hereditary factor but cleft lip and/or palate can suddenly appear in a family with no known history of the defect. When this happens it may not appear again for several generations.

- Teeth. The greatest care should be taken of all children's teeth, but this is especially important in the case of a child with a cleft lip and palate. The first teeth and later the permanent teeth are very important for the success of the Dental Specialist's work - neglected teeth make the task of the Orthodontist more difficult.
- Hearing. The child with a cleft palate may experience some hearing impairment, and particular attention needs to be paid in the first 2-3 years of life. Treatment if required may involve the use of grommets. Reduced or impaired hearing can hinder the early development of good speech.
- Speech and Language. Speech difficulties are associated with cleft palate, and close attention needs to be paid to a child's speech development. Most problems can, however, be resolved with speech and language therapy.
- While supplementary advice and information is useful, the experts forming part of the multi-disciplinary cleft team responsible for your child's care are the people best placed to inform and advise on your child's future treatment.
ACKNOWLEDGEMENT:

The Association would like to thank the members of the cleft treatment teams and other health professionals for their valuable contributions. See www.cleft.ie for the full acknowledgement and list of contributors.

CONTACT DETAILS:

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Tel: 085 145 2088/01 2848227  
E-mail: info@cleft.ie  
Web: www.cleft.ie

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Speech Development

While speech difficulties are associated with cleft palate, it is important to realise that not every child with a cleft palate will experience such difficulties. However, because of the nature of the problem, your child is more at risk of having a speech and/or language problem, and both you and the professionals will need to keep a close eye on your child’s speech development. Most problems can, however, be resolved with speech and language therapy.

While approximately 50% of children will have some problems with speech and language development, children with cleft lip only rarely have any speech difficulty associated with the cleft.

The Nature of Speech Difficulties

During the first four years of life, language development may be delayed in a child with a cleft palate. Speech and/or language problems are usually associated with deficits in hearing, wrong patterns of tongue movement, problems of palate function, or a combination of these factors. The resulting problems are ones of language development, articulation and nasality.

The Speech & Language Therapist

First contact with a speech and language therapist should be as early as 6 months of age if your child is experiencing feeding difficulties. You may even find that contact with the therapist begins earlier than this, as this seems the practice favoured by cleft teams in their overall care approach.

The therapist can learn much at the early stages from listening to your child’s babbling pattern and observing his/her interaction with you. The therapist can also advise you on important aspects of speech and language development, and once in the system regular reviews can occur to ensure everything is developing along normal lines.

Corrective Action

Your child should have his/her first full speech assessment at approximately 3 years of age. If your child is experiencing difficulties with their speech, a detailed assessment will determine a course of action, which may consist of a course of speech and language therapy, a course of speech and language therapy with an appliance in the mouth, corrective surgery followed by speech therapy, or a combination of the above.

If a child has speech and/or language problems, they should attend regular speech and language therapy in the local community care clinic. The reality of waiting lists means that it may be advisable to put your child’s name forward for assessment at an early stage.

Therapists generally work on a block basis with breaks from therapy to allow generalisation of the work covered. Therapy might mean direct work with your child or with you the parents. In working closely with parents, the speech and language therapist will provide exercises and drills, which should be carried out at home.
Hearing Issues

Your child may experience some hearing impairment as a result of being born with a cleft palate. Although the hearing impairment is temporary, it can have an affect on speech and language if it is not addressed. This does not always happen, but the possibility exists and your child's hearing should be checked at approximately 12 months of age. Poor hearing can adversely affect the development of your child's speech. This is because children learn to speak by imitating what they hear. Consequently you must be aware of this possibility so that your child is not deprived of full learning ability in his/her early years.

When a child has a cleft lip only, associated hearing problems do not arise.

WHAT CAN GO WRONG?

The part of the ear that is usually affected in a child with a cleft palate is the middle ear. The middle ear is a small space behind your ear drum that contains three small bones and is normally filled with air. A tube, called the Eustachian tube, connects the middle ear to the soft palate at the back of the mouth. The Eustachian tube allows any fluid formed in the middle ear to drain away and allows air into the middle ear space.

In children with cleft palate some of the muscles that open the Eustachian tube do not work as well and the tube does not open as often. Consequently, air will not get into the middle ear as readily as it should and its place is taken by fluid. This fluid interferes with the conduction of sound through the middle ear and your child may experience reduced hearing. This is sometimes called "glue ear." The problem most commonly arises in your child's earlier years when the Eustachian tube has a more horizontal position. The tube becomes more sloped by the age of 6 or 7 years as the shape of your child's face changes with the result that the problem tends to decrease.
Approximately 15-20% of children, however, will continue to have ongoing problems with their middle ears in the long term. This may require major ear surgery involving the mastoid bone (located at the back of the ear) in order to eradicate any significant ear disease which may accrue from poor Eustachian tube function. It is difficult to predict which child might run into such problems and therefore monitoring of the middle ear and hearing levels is important.

**The Signs of Hearing Loss**

Hearing loss can be difficult to detect in the very young child. Unresponsiveness, frustration or withdrawal can all be symptomatic of glue ear resulting in poor hearing. Turning up the sound of the television or having to repeat yourself can be other clues as to the existence of a problem.

Particular attention should be paid to your child's hearing in the first 2-3 years of life. Hearing tests will be carried out as part of the work of the combined cleft team, and you should not hesitate to contact the team and relay any concerns you may have with regards to your child's hearing.

**Treatment for hearing loss**

Treatment involves day case surgery, the administration of a general anaesthetic, and the draining of fluid with the insertion of a grommet. An Ear, Nose and Throat (ENT) surgeon performs this surgery. The grommet may last 6-9 months after which point they usually expel naturally. Grommets may need insertion on more than one occasion until such time as your child's Eustachian tubes start to work properly.

You should generally notice an improvement in your child's hearing within a few days. Swimming is now generally allowed for children with grommets in place if certain precautions are taken. Your ENT surgeon will advise you accordingly.

An alternative to grommets is to have hearing aids fitted temporarily. The hearing aids will improve the child's hearing and can be returned once the child is finished with them. Hearing aids have proven a successful treatment for many children with cleft palate.
Appendix B

Recorded Sentences (Lee et al., 2007) from GOS.SP.ASS (Sell, 1998)

1. My Daddy mended a door
2. Funny Sean is washing a dirty dish
3. Cheeky Charlie’s watching a football match
4. The phone fell off the shelf
5. Tiny Tim is putting a hat on
6. I saw Sam sitting on a bus
7. Jolly John’s got a magic badge
8. Baby Gary’s got a bag of lego
9. Happy Karen is making a cake
10. The hamster scrambled up Stewart’s sleeve
11. The nasty boy tossed the basket into the box
12. Bouncy Bob is a baby boy
13. The puppy is playing with a rope
Appendix C

Protocol

The participants were given the following instructions.

Initial instructions to Group 1 and 2:

“You are going to hear some speech samples. The samples are short sentences read by children, whereof most of the children have more or less unintelligible speech because of a repaired cleft palate. Your task is to listen to the speech samples and after each sample you will be asked to fill in this scale [show Semantic Differential Scale to the participant] depending on which attributes you think applies best on the child you just heard. It is very important that you go with your first instinct, do not modify your answers depending on how you think others would like you to answer.”

Following instructions to Group 1:

”Also, I would like you to read these information brochures before we start listening to the speech samples. You do not need to rush and please ask if you find anything in the text unclear. I will leave you and come back in about 5 minutes and see if you are done with the reading, there is no rush though and I will give you more time if you need it. [Give information paper and leave the room for about 5 minutes.] Are you done reading? […] Okay, now you will hear three sentences read by the first child, listen to the speech samples and thereafter you will fill in the semantic differential scale.”

Following instructions to Group 2:

“You will now hear three sentences read by the first child, listen to the speech samples and thereafter you will fill in the semantic differential scale.”
# Appendix D

## Semantic Differential Scale

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Appendix E

Information sheet

A study about adults’ attitudes towards children with unintelligible speech

My name is Kajsa Skytt and I am a Speech and Language Student at Linköping University, Sweden. As a part of my degree course I am undertaking a research project at University College Cork. The title of my project is: “Adults' attitudes towards children with unintelligible speech”.

This study will investigate how adults’ perceive children with unintelligible speech.

I am looking for adult volunteer listeners to participate in the study. Participation in the study means you will come to Department of Speech and Hearing Sciences in Brookfield Health Sciences Complex UCC for about 30 minutes, at a time in March 2015 that suits you. During the study you will listen to some speech samples and you will be asked to give your opinions regarding the personality and social characteristics of each speakers. I do not anticipate any risks associated with participation in the study.

I am looking for volunteers who fulfil the following criteria:

- Are over 18 years old
- Have English as your native language
- Do not work or study in the health care sector
- Do not work or study in the children care sector
- Have no history of hearing, speech or language impairment

Participation in the study are voluntarily and you are, at any point, allowed to discontinue participation. All results are anonymised. Your name will be replaced with a participant number and it will not be possible for you to be identified in the reports of the data gathered.

The results will be reported as a master thesis, which will be published online.

If you are interested in participating in this research, please reply to kajsk095@student.liu.se and we will set up a date that suits you. While participating you will be asked to fill in the consent form below. Thank you very much in advance for your participation!

If you would like to contact another person who knows about this project, you are welcome to contact Dr Alice Lee Contact details are given below.

Kind regards,

Kajsa Skytt
Appendix F

Adults’ Attitudes towards Children With Unintelligible Speech

Consent Form

I have read and understood the information sheet and this consent form. I have had an opportunity to ask questions about my participation.

I understand that I am under no obligation to participate in this study.

I understand that I have the right to withdraw from this study at any point without giving any reason.

I understand that the results obtained will be reported as a master thesis, which will be published online; however, all information and results will be anonymised and no identifying information will be included in any reports of the study.

I am above 18 years old, English is my native language, I do not work or study in the area of health care or children welfare and I have no history of hearing impairment.

I agree to participate in this study.

________________________

Name

________________________

Signature of participant

________________________

Signature of researcher

________________________

Location and date

Thank you for participating!