

# CHAPTER ONE : INTRODUCTION, BACKGROUND AND RESEARCH PROBLEM

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## 1.1 INTRODUCTION

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Deafness is an invisible and complex disability that is seldom understood by the naïve observer. This is especially true of a profound, congenital hearing loss.

It is common for hearing individuals to express the view that blindness is a more devastating handicap. This assumption is, because the impact of blindness can be more easily understood. A normally sighted individual may perceive the exact nature of blindness by simply closing his eyes. This is not so with deafness. It is difficult for the hearing individual to simulate and consequently imagine the true nature of this disability. Even if the person with normal hearing could exclude all sound, he would still possess an a priori knowledge of language and have the capacity to speak normally. It is these obstacles rather than the lack of hearing acuity, per se, that causes the Deaf person problems in a hearing world.

Helen Keller, who was both blind and deaf, gave this comparison of her two disabilities: “The problems of deafness are deeper and more complex than blindness. Deafness is a much worse misfortune for it means the loss of the most vital stimulus - the sound of the voice that sets thoughts astir and keeps us in the intellectual company of man” (Keller, H. In *Better Hearing for All*: 3. Published by the Medical Association of South Africa Incorporated, CTP Book Printers, Cape. No date or author given).

The nature and consequences of deafness are elusive, giving rise to misunderstanding. Hippocrates, the father of medicine, believed that the Deaf could not speak because there was something wrong with their tongues which caused them be “dumb”- unable to speak (Markides,

1985). He did not understand that the tongue is unaffected, but that where hearing acuity is disturbed, speech will not develop normally (Ling, 1976; Calvert, 1978; Davis and Hardwick, 1984; Knauf, 1984 etc).

Teaching the Deaf to talk – the subject of this study - had its origins in the miraculous. The first semi-historical account was recorded by the English scholar Bede in 1653. He described how Bishop John taught a deaf and dumb youth to speak. “The bishop, having ordered the boy to show his tongue, made him say 'yea', which he did immediately. Then pronouncing one by one the names of all the letters, the Bishop directed the lad to say them; thereafter the boy proceeded to repeat syllables and words put to him by the Bishop, who also commanded him to utter sentences” (Mullet, 1971:123). The boy was so pleased with his new-found skill that: “... he did not cease all day and the next night so long as he could keep awake, to relate, to talk something, and to express his thoughts and will to others” (Mullet, 1971:123).

Today, because of advances in technology and new insights into speech and language development, teaching speech to Deaf children occurs. However, the happy picture that Bede paints of the successful teacher and the satisfied student do not exist. The current view of speech teaching to the Deaf is generally one of disappointment, confusion and conflict. The aim of this chapter is to critically analyse firstly, the disappointment, secondly, the confusion and conflict that have become a hallmark of Deaf education today and thirdly, on a more optimistic note, to view the hope that medical and educational advance offer. The research problem will be set against this background.

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## 1.2 DISAPPOINTMENT: CAN SPEECH BE TAUGHT?

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Numerous writers have commented on the low standard of speech proficiency attained by the Deaf. Bunch (1987:146) states unambiguously: “The reality of speech instruction in the past is that it has not been successful with the majority of hearing-impaired individuals with severe to profound losses.”

Looking at the situation more closely, a pessimistic picture emerges. Firstly, it is clear that intelligibility is low - relatively little of the speech of the hearing-impaired can be understood. A comparative table illustrates similar results among different researchers.

**Table 1.1 Intelligibility of speech among hearing-impaired subjects**

<b>Researcher</b>	<b>Percentage of words understood by normally hearing listener</b>
Markides (1970)	19%
Smith (1972 – cited by Ling, 1976)	18,7%
Heidinger (1972 – cited by Ling, 1976)	Less than 20%
Brannon (1974 – cited by Ling, 1976)	20 – 30%

Source : Markides (1983): Ling (1976)

As can be seen from table 1.1, up to 80% of the hearing-impaired speaker's utterance cannot be understood by a hearing person.

The picture becomes even more negative when studies showing that additional schooling does not improve speech are taken into account (Boothroyd; 1985; Osberger et al 1986 - both studies cited by Yoshinaga-Itano et al, 1992). Jensema, Karshmerand Trybus (1978 cited by Yoshinaga – Itano et.al, 1992) reported no improvement in intelligibility beyond age seven.

From the above, it may well be concluded that speech improvement at school is an impossibility. However, careful examination reveals a more complex and positive picture.

### **1.2.1 EXISTENT POTENTIAL**

One of the most significant contributions pointing to the possibility of a more positive picture is the seldom-quoted research of Markides (1970). He investigated the speech of Deaf children in British schools and found that the level of speech proficiency varied considerably across schools, - speech skills were not completely dictated by hearing level, but were significantly influenced by the school, which the child attended. He goes so as far as to state: "... educational environment ...

was one of the most important single factors affecting speech intelligibility. So much so that degree or type of hearing loss becomes of secondary importance.” (Markides - cited by Isseldyk, 1982:62).

Markides formally described the variable of educational placement on speech proficiency of Deaf pupils. He stated clearly that schools could make a difference. Other studies have supported this: Smith (1975 cited by Yoshinaga-Itano et al, 1992) describes significant difference in speech production skills between older and younger pupils in the same school, showing that the speech of children at some schools can improve with time. In South Africa, Derman (1987 – this writer) conducted an investigation comparing speech improvement at two schools over a one-year period. Students from one school made significantly greater gains than the other. Additional studies have shown that intense and systematic speech training can result in significant improvement in speech skills (Osberger, Johnstone, Swarts and Levitt 1978; Calvert, 1981; and Osberger, 1983 studies cited by Yoshinaga-Itano et al, 1992).

These studies underscore the concept that speech improvement is possible.

### **1.2.2 CURRENT EXPLOITATION OF POTENTIAL IN IMPORTANT AREAS OF EDUCATION**

A natural question that arises from the above. If schools have the potential to improve speech, what is the state of the current educational infrastructure? Has all the potential been exploited, or is there room for improvement?

In order to answer these questions with greater clarity, four important areas need to be examined, namely: teacher training, available curricular resources, and frequency of speech teaching and teacher attitude to speech teaching.

The situation abroad will be gauged from a literature survey and that in South Africa from an investigation conducted by the writer in October 2000.

### 1.2.2.1 Teacher training

(1987:149) states: “Concerning the training of teachers for the deaf, it is the wide-spread consideration of knowledgeable professionals that preparation in speech is less than satisfactory.” Teachers graduate from training programmes unprepared and unable to teach speech to the hearing-impaired (Hogan, 1980 - cited by Bunch, 1987).

A cursory perusal of the proposed revision of standards for the certification of American Teachers of the Hearing Impaired (published in the American Annals of the Deaf 1984) shows the lack of preparedness to which Hogan alludes. According to this document, teachers in training must complete a core instructional programme consisting of 30 semester’s hours. Only 10% of that time (i.e. three hours) is allocated to Audiology and Speech Science. The document reads as follows. Aspects relating directly to the study of speech have been underlined.

“Audiology and speech science: Study of the physical characteristics of speech and hearing mechanisms. The physical dimensions of sound, the psycho-acoustic aspects of sound, the relationship among these areas: and special attention given to practical preparation in the use and care of hearing aids and amplification systems, including the application of this information to the educational setting” (Proposed revision of standards for The Certification of Teachers of the Hearing-Impaired; American Annals of the Deaf, February 1984:58).

As can be seen from the above excerpt, speech is given scant attention. The only apparent reference is the study of “the physical characteristics of speech”. The rest of the syllabus has no relevance to speech teaching. How much of the three-hour time allocation is set aside for speech can only be surmised but it seems as though fifteen minutes would not be an overstatement. No instruction is given in essential areas such as speech errors common to the hearing-impaired or their remediation.

A more recent description of teacher training in America, appears in the 1992 report of the Joint Standards Committee which sets out standards for university and college teacher preparation programmes – (“CEC-CED Joint Knowledge and Skills Statement for All Becoming Teachers of Students who are Deaf or Hard of Hearing” American Annals of the Deaf, Volume 141, No 3, 1996:220).

The only mention that speech teaching is accorded in this article is in the single sentence stating that teachers in training should be taught to “infuse speech skills into academic areas”. A pertinent question is: how are teachers expected to “infuse” speech skills into academic areas when no provision is made to train them in the requisite skills? A teacher who has not developed speech training skills will not be able to monitor the speech of her pupils effectively (Ling, D and

Ling, A H, 1978). The choice of the verb “infuse” is questionable. It does not mean “to teach” or “to help directly” – it signifies an empty gesture.

In Britain, teachers assessed the efficiency of the Distance Education Course, and rated speech as a topic not covered in sufficient depth (Bowers and Fraser, 1995).

The recurring message is: **teachers are not given sufficient preparation to teach speech.**

A similar situation exists in South Africa.

Table 1.2 gives an overview of the major institutions in South Africa providing training for teachers of the Deaf and describes the attention that speech instruction is accorded, and the rationale for the level of emphasis.

**Table 1.2 : Speech training for teachers of the Deaf in South Africa**

Name of Institution	Specific attention to speech instruction	Rationale for level of emphasis
University of South Africa (UNISA)	No specific attention	Related activities such as auditory training and lip-reading are used to address speech indirectly
University of Stellenbosch	No specific attention	Speech training is regarded as the task of the communication pathologist
University of the Witwatersrand	No attention	<ol style="list-style-type: none"> <li>1. Congruent with the in philosophy of bilingualism speech is not targeted</li> <li>2. If any speech training is given it is regarded as the task of the communication pathologist.</li> </ol>
University of Pretoria	One chapter (seven pages) in the study guide deals with an orientation to speech describing to problems and a short description of Ling's (1976) system. Guidance in remediation of errors is not given.	The major thrust is to encourage an attitude that speech is a viable goal. Time constraints prohibit attention to specifics.

Source : Telephonic conversations with relevant personnel

Table 1.2 indicates that little attention is given to speech. The only direct attention accorded is at the University of Pretoria where there is an orientation towards speech development, but not in practical teaching. The trainee teacher in South Africa has little assistance in developing speech training expertise. Two institutions indicate that the responsibility for speech development is that of the communication pathologist. Table 1.3 shows that this is not practical because of the high pupil/pathologist ratio.

**Table 1.3 : The ratio of hearing-impaired students and communication pathologists at schools for the Deaf in South Africa**

School	Number children attending	Number of communication pathologists
A	180	1
B	265	0
C	160	2
D	105	1
E	310	3

Source : Telephonic communication with school principals (November 1996)

Table 1.3 clearly demonstrates that it is unrealistic to expect communication pathologists to be solely responsible for speech instruction.

An additional problem is that not all teachers employed at a school for the Deaf hold a qualification in teaching the Deaf (Markides, 1970). A pertinent question is how are these teachers expected to learn to teach speech? In a survey of South African schools (November 1996), four out of the five schools interviewed had no in-service training for speech. The following recorded responses, by principals, demonstrate the situation:

“The teachers are not trained, but they do their best.”

“Nobody tells them - they use their common sense and instinct.”

“Teachers learn internally - they see what is happening.”

#### **1.2.2.2 Available resources**

Since teacher training institutions and schools do not offer satisfactory guidance, the question may be posed whether there is any way for the teacher to learn this skill independently. Davis and Hardwick (1981:276), describing available material, state tellingly: “If the reader is feeling frustrated regarding the lack of specifics regarding teaching speech to the hearing-impaired, it is



not surprising. Available descriptions of the methods in current use are vague and open to many interpretations. This fact has contributed ... probably to the poor speech skills of hearing-impaired children.” A brief review of current resources will give support to this viewpoint.

The relatively few books written on speech training for the Deaf are not a solution to the teachers problems (Davis and Hardwick, 1984). They must however be evaluated to determine their strengths and weaknesses.

Three literature sources were used to compile the list of books selected for this study as representing those most widely used. These are books cited by Markides - eminent researcher in the Education of the Deaf (Markides, 1985); Bunch - widely published author on the education of the hearing-impaired, including a book on curriculum (Bunch, 1987); and Ling - acknowledged leader in the field of speech training for the hearing-impaired (Ling, 1990).

- **Markides** (1985:160) in the following quotation names the texts he considers as the most important:  
“Several books have ... been published, ... most of them originating in USA. The book by Haycock (1933) still remains a classic, but rather outdated. The Ewings book (1954, 1964) and the book by Calvert and Silverman (1975) are relevant and full of practical suggestions. By far the most practical book so far published in this area is the one by Ling (1976). The most recent is by Markides (1983).”
- **Bunch** (1987) In his book *The Curriculum and the Hearing-Impaired Student: Theoretical and Practical Considerations*, Bunch (1987) reviews the four speech books he considers being the most important. These are: *Speech* (no author), a manual devised by the Clarke School for the Deaf (1971); *Speech and Deafness* (Calvert and Silverman, 1975); *Speech and the Hearing-Impaired Child* (Ling, D, 1976) and *Teaching Speech to Deaf Children* (Vorce E, 1974).
- **Ling** in 1990 writes: “Several texts on the teaching of speech have been published since Bell described his methods ... a century ago. Among the most notable of these were books by Calvert and Silverman (1975), Ewing and Ewing (1954), Haycock (1933), Ling (1976,

1989) and Vorce (1974)” (Ling, 1990:15-15).

A tabulated form of the above information is presented in Table 1.4

**Table 1.4 : Books chosen by Ling, Markides and Bunch as representing those most significant for speech teaching**

Title of Book	Author	Date	Authority that chose the book		
			Ling	Markides	Bunch
The Teaching of Speech	Haycock	1933	✓	✓	
Speech and The Deaf Child	Ewing and Ewing	1954	✓		
Speech	Clarke School for The Deaf	1971			✓
Teaching speech to Hearing Impaired children	Vorce	1974	✓		✓
Speech & Deafness	Calvert & Silverman	1975	✓	✓	✓
Speech and The Hearing-Impaired child	Ling	1976	✓	✓	✓
Foundations of Spoken language for Hearing Impaired pupils	Ling	1989	✓		
The Speech of Hearing Impaired children	Markides	1983		✓	

**Sources :** Ling (1976); Markides 91985); Bunch (1987).

From Table 1.4 it can be seen that the two books chosen unanimously (coded in pink) are those written by Calvert and Silverman (1975) and Ling, (1976). They are considered the most widely used books available. The books by Haycock (1933), and Vorce (1974).are mentioned by two of the authorities (coded in yellow). Four books will be reviewed.

It is noteworthy that the most recent book reviewed was published in 1976. This demonstrates

Ling and Stoker's (1992) observation that little has been written in recent years on speech production of hearing-impaired children. A significant number of references in this study bear witness to this deficit as they are not recent.

- **Speech and the Hearing Impaired Child (Ling, 1976)**

In 1987 Bunch described this as the major curricular resource available. More than a decade later, this remains the speech book most frequently mentioned (Danier et. al., 1994).

It is agreed that Ling's pioneering work has made an enormous and invaluable contribution to speech science for the hearing-impaired, which has earned him a well-deserved first place in this field. The numerous strategies he delineates to correct sounds and the step-by-step model he describes, – not available in other systems, are examples of his unique contribution. Yet, despite these stated merits, Ling's work does not completely fulfil the teacher's needs. There are two reasons for this: Ling's style of writing is technical. This makes it difficult for the average teacher to understand. He states at outset that the book is written for two groups: firstly, "teacher/clinician /informed parent" and, secondly, "the student/researcher" (Ling, 1976:1). Possibly the needs of such disparate groups could not be met in one book. The highly structured approach may not appeal to teachers, even where the teacher is able to understand Ling's work. A more detailed critique of Ling, encompassing other aspects, is given in Chapter 3.

- **Speech and Deafness (Calvert, and Silverman, 1975)**

This book provides useful teaching strategies for phoneme correction. However, no sequential teaching model is provided. Consequently, as Bunch (1987) states the book is somewhat unfocused.

- **Teaching Speech to Deaf Children (Vorce, 1974).** The main thrust is Vorce's philosophy of a natural approach to language (Bunch, 1987). There is little for the teacher in terms of practical speech teaching. Bunch (1987) describes a lack of sufficient closure in significant areas. It would seem that the section on speech is one such area.

- **The Teaching of Speech (Haycock, 1933)**

The book is simply and clearly written and the teacher may find many helpful strategies. However, as Markides stated in 1985, it was already outdated then. This criticism is even more pertinent over a decade later. The selection of sentences and drills are no longer appropriate and unlikely to appeal to the modern child. Haycock did a yeoman's job to produce this book in 1933. It cannot however, be expected to reflect modern educational and technological advances.

In conclusion, the teacher has an extremely limited selection of books available. Their appeal to the modern child is questionable as modes of education have changed significantly. The four books reviewed in this section are dated 1933, 1974, 1975 and 1976. For over 20 years no widely accepted new book on teaching speech has been published. Moore's statement in 1978 (cited by Subtelny, 1983:45) still resonates: "the lack of new material in itself would not be cause for alarm if there were evidence that the approaches had met with consistent success, but there is none ...".

### **1.2.2.3 Frequency of speech teaching**

The potential to improve speech performance by formal instruction can only be exploited if the subject is actually taught. The clearest research describing frequency of speech teaching remains the work of Markides (1970), who noted that only one out of the four schools for the Deaf he surveyed, taught speech as a special subject.

In an investigation conducted by the author in South Africa (Jan 1997), only one school of five designated a specific period to be set aside for speech instruction. It is less than surprising that teachers who have no adequate training or accessible resources do not teach speech.

Generally, there has been a decrease in the emphasis of speech training for the hearing-impaired over the last two decades (Otis-Wilborn, 1992). Among the reasons suggested are poorly trained teachers, and the anticipation of limited results, even after years of speech training (Hochberg, Levitt and Osberger (1980).

#### 1.2.2.4 Teacher attitude

Teacher attitude – although a less tangible measure than training, resources or frequency of speech teaching, is nonetheless existent potential, as the discussion below will demonstrate.

White (1990) notes that the literature reveals little of speech development as a function of psycho-social variables. He suggests that consequently the attitude of teachers towards speech instruction has remained a hidden variable and states. “It ... seems reasonable to postulate that the attitudes of teachers both individually and collectively may have a significant influence on the speech development of hearing-impaired children” (1990:131).

The research of Meadows 1981 (cited by McNeil and Jordan, 1990) formalises what is probably empirically known by most teachers of the Deaf: that, in comparison with teachers of non-handicapped children, they experience “higher levels of emotional exhaustion” (McNeil and Jordan, 1990:284) and perceive themselves as more stressed (Bambach, 1987). Meadow notes that one factor that contributes to teacher stress is perceived inadequacy in the performance of work-related activities (Meadows 1981 - cited by McNeil and Jordan, 1990). This factor is also identified by Johnson (1983) and Moores (1991 - cited by McNeil and Jordan, 1990). Feelings of inadequacy produce stress (Meadows, 1981; Johnson, 1983; and Moores, 1991 - cited by McNeil and Jordan, 1990), which has a negative effect on individuals (McNeil and Jordan, 1990).

The inadequacy that teachers experience when required to teach speech has been expressed over a period of decades.

In 1964 in a report published in London by Her Majesty's Stationary Office, speech teaching was found to be the subject that caused teachers of the Deaf to feel the most inadequate (Dale, 1977). This was reiterated by Ling in 1976 (cited by Bunch, 1987) and Dale 1977 (cited by Bunch, 1987).

The statement by Ling and Stoker in an introduction to a special edition of The Volta Review devoted to speech, written in 1992, shows that the situation had not changed : “Many fine educators and therapists have confided to us that expressive speech is the thing they find most difficult and threatening in their work with hearing-impaired children” (Stoker and Ling, 1992:1).

Looking more closely at their statement, the choice of the verb “confided” is telling. It suggests an air of guilty secrecy. Perhaps this is because teachers feel that they are somehow expected to have the skills that no-one is giving them. The hidden agenda implicit in the statement provides primary motivation for much of this study.

A pertinent question is whether it is possible to change this attitude. White (1990) answered this in some measure when he examined differences in teacher expectations across educational systems for the hearing-impaired. Interesting data emerged demonstrating differences in the way teachers feel about teaching speech. Teachers from certain programmes were more confident in their ability than were teachers from other programmes. This demonstrates that attitudes and perceptions of teachers should not be viewed as fixed or similar” (White, 1990). White postulates further: “It may be that significant gains will never be made in speech development until a fuller and richer appreciation of the emotions which underlie both the teaching and learning of speech are better understood and respected” (White, 1990:141). He suggests that there should be more investigation into determining the relationship between attitude and confidence in teaching speech and accentuates the need for research orientated in this direction: “... it seems incumbent upon all those interested in improving the quality of teachers of hearing-impaired individuals to find ways and means of assessing teachers’ attitudes and, where necessary, try to improve their attitude and perceptions related to speech” (White, 1990:140).

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### 1.2.3 CONCLUSIONS

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Reviewing the four areas discussed above a pessimistic picture emerges:

Teachers are not given adequate training.

Teaching materials are scarce and may be difficult for the average teacher to understand.

Speech is rarely taught in schools for the Deaf.

The attitude of teachers towards speech instruction is generally negative.

These factors should not be seen in isolation. They are linked in a self-perpetuating negative

cycle. Teachers who are untrained and are not provided with resources will have a poor attitude to speech and not teach it, and consequently, not gain in experience or expertise. Connor's evaluation in 1974 (cited by Subtelny, 1983:18) that speech teaching was the poorest-taught subject in the education of the Deaf remains true more than two decades later. It may also explain in part, as Ling and Stoker (1992) suggest, why relatively little has been written on the subject, and why over two decades the priority that educators place on competencies in speech-related areas has decreased dramatically (Grissham and Cochran, 1986; Sass Lehrer, 1986, cited by Otis-Wilborn, 1992).

The answer to the question posed at the beginning of this section – i.e., can speech be taught? - seems to be a qualified "yes". Despite all the negative aspects described, there is untapped potential. This view is well expressed by Gatty (1992:59-60), who sees both the negative aspects and the potential for change. Commenting on the negatives, she states: "Unfortunately..... proven methods of instruction cannot be assumed to be available. To make matters worse, there are few professionals with the expertise to implement effective speech programs and even fewer who can do this for children who have very profound hearing losses."

Yet, in a positive light, she notes the potential for change: "...this situation should not ... be seen ... as a cause of despondency. The inherent opportunity for improvement through research, program development and personnel preparation is tremendous. We may hope that a rising generation of informed, motivated, committed professionals will seize the opportunity" (Gatty, 1992:59-60).

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### 1.3 CONFUSION AND CONFLICT - SHOULD SPEECH BE TAUGHT?

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Having dealt with the disappointment that surrounds speech teaching, the next section deals with the confusion and conflict between proponents of different teaching methodologies. A new question is raised over and above whether speech can be taught, namely, **should** speech be taught?

With this question, entry is made into the battlefield of the “war of methods”, the long-standing, controversial and bitter debate of the “200-years war”. (Davis and Hardwick, 1979:311) between oralists - who maintain that Deaf children should learn to understand communication by lip-reading, supported by residual hearing and to express themselves using speech - and manualists, who argue that Deaf children should be taught signing, both to understand the communication of others and as a medium for self-expression. Although the fulcrum of the debate centres on language, there are also important implications for speech as it is the vehicle for verbal language.

Proponents of each method argue their point of view vigorously and often vituperatively. Northern and Downes (1979:309) summarise the argument thus: supporters of the oral method feel the child who uses the manual system will be forced into a Deaf society because of his limited communication skills. Proponents of the manual system feel that Deaf children learn more easily when taught primarily through the visual mode and thus develop a wider base of knowledge.

The rational tone of the extract above is not a true reflection of the passion and conflict that have characterised the ongoing debate. It remains a subject that evokes a seemingly endless flow of conflicting and often purely emotional responses (Wagenfeld, 1996) and, as Davis and Hardwick (1974) note, the passion associated with the controversy is difficult to describe and detrimental to the education of Deaf children. On a psychological level it has caused unhappiness and confusion - bewildered parents, confused administrators, wondering public and vulnerable children caught in the turmoil (Davis and Hardwick, 1979). On an academic level, the polarisation between educators has retarded progress. Davis and Hardwick (1979) ascribe the paucity of research to the lack of co-operation between proponents of opposing views. Over and above the lack of research, the objectivity of existing research needs to be questioned. An example of this is reviewing the choice of publications of two major journals in Deaf education - The Volta Review and the American Annals of the Deaf. Davis and Hardwick (1979) note cogently that articles published in the Volta Review support the oral point of view, whereas articles published in the American Annals of the Deaf support the manual standpoint. There is a clear bias demonstrated by the choice of research selected. As Northern and Downes (1979) note, few experts have the ingredient of objectivity when evaluating the field of Deaf education. They continue to protect their own self-interest and attempt to conceal their particular biases.



The following section describes the methods with special emphasis on the role of speech teaching within each philosophy.

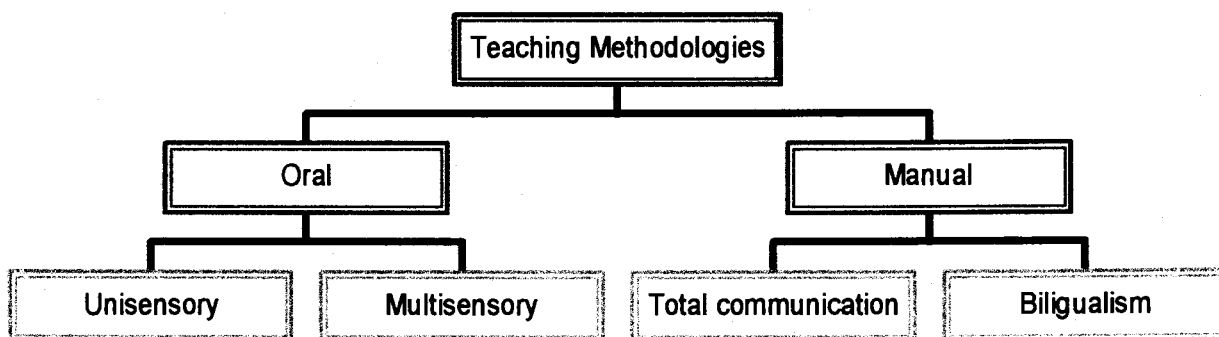
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### 1.3.1 TEACHING METHODOLOGIES REVIEWED

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The main teaching methodologies are summarised in Figure 1.1.

**Figure 1.1: Major teaching methodologies**



Source : Original

Figure 1.1 summarizes the discussion that follows. It shows how the two main methodological branches, oral and manual, can be respectively subdivided into unisensory and multi-sensory and total communication and bilingual. The following discussion is not meant to provide a complete description of the methodologies, but to form a basis for understanding the emphasis and attitude each awards to speech teaching.

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### 1.3.1.1 THE ORAL METHOD

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Subsumed beneath this heading are two methods, which differ so greatly that they should be considered as distinct. These are the unisensory and the multi-sensory methods.

- **The unisensory method**

A confusing array of labelling variations describes this method. These include: auditory approach, acoupedics, auditory oral, acoustic auditory, auditory global and auditory verbal. Further confusion is caused because some writers do not use the terms appropriately. Ling (1993) describes the ill effects of incorrect labelling as the greatest potential impediment to the growth and acceptance of this method, especially when the label is used to describe inferior work.

The basic principle of this approach is that hearing is used as the primary avenue for communication learning. Early diagnosis and intervention are kernel elements. (Northern and Downs, 1979), as is the absence of attention to lip-reading (Northern and Downs, 1979). Pollack (1970:1979), a pioneer of this method, states emphatically. "There can be no compromise because, once emphasis is placed upon 'looking', there will be divided attention and the unimpaired modality, vision, will be victorious."

Parents need to spend many hours a day working with their children (Davis and Hardwick, 1979). In South Africa, the Carel du Toit Centres in Cape Town and Pretoria use this method exclusively.

Where this method is successful, children are mainstreamed (Du Toit, 1981), as are 80% of children from the Carel du Toit Centre in Cape Town (Spencer-Jones, 1996). Speech development is relatively normal (Du Toit, 1981), not characterised by the typical faults demonstrated by Deaf children generally (Pollack, 1970). Extensive speech instruction is

therefore not necessary. Such children are not suitable candidates for the proposed speech programme described in this study, which targets Deaf children who exhibit a specific, predictable error pattern.

- **The multi-sensory method**

A natural approach to language, early intervention and maximal exploitation of residual hearing may also occur where the second oral approach is followed. A major difference, however is that children are taught to formally lip-read by attending to mouth cues.

Many of the children taught in this way have the phonological errors common to the Deaf (Pollack, 1970), which have been described by numerous writers (e.g. Haycock, 1933; Hudgkins and Numbers; 1942; Ling, 1976, etc).

Children educated according to the oral multi-sensory method must rely solely on speech for all communication needs - receptive and expressive. Intelligibility is therefore a priority. It is possible that not all children have the potential for intelligible speech. In such cases, an unrealistic burden may be placed on the curative power of speech training and disappointment may consequently be experienced by teacher and pupil alike.

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### 1.3.1.2 THE MANUAL METHOD

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There are two main branches of this method: total communication and bilingualism.

- **Total communication**

This system involves the use of all modalities, sign language, finger spelling, amplified sound, speech, lip-reading, reading, writing, facial expression, mime and gesture (Lynas et. al., no date). Protagonists argue that total communication improves speech and linguistic performance (Moore, 1991), whereas antagonists argue that total communication impoverishes speech and linguistic performance (Lynas, 1994).

Two investigations, coincidentally appearing in a single issue of the *Journal of the British Teachers of the Deaf* (Volume 12, Number 6, 1988) show the contrast of focus between protagonists of oral and total communication methods. Both articles evaluate progress of Deaf children who changed from an oral to a total communication approach (whether the oral approach was unisensory or multi-sensory is unclear).

In the first article Evans, looking at parent-child communication, concluded that parents understood far more of their children's communication and that there was an even more marked improvement in the amount of communication children understood from parents. In the second article Markides (1988) viewing intelligibility, describes a less favourable result in terms of speech. Intelligibility decreased significantly over a five-year period once signing had been introduced.

- **Bilingualism**

Critics of total communication are not drawn exclusively from the oral camp. There are increasing numbers of people who also favour signing, but not what they see as the contrived sign system of Total Communication (Lynas, 1994). These are the bilingualists who assert that Deaf children have a right to "their own language, the natural sign language used by deaf people within their own community" (Lynas, 1991:145).

Bilingualists do not accept the medical model of deafness as a disability. As Reagan (1996:2) explains, they regard Deaf individuals as belonging to a subculture who are a linguistic minority speaking American Sign Language, "and are no more in need of a cure than are Haitians or Hispanics". Under this system combined oral/manual communication and sign systems based on spoken languages are terminated (Moores, 1991).

The case for bilingualism is essentially a moral one (Lynas, 1994). A major practical problem is that at least 90% of profoundly deaf children are born of two hearing parents who are unlikely to know natural sign language (Lynas, 1994). Bilingualists do not regard speech as an important, or even necessary skill. It is doubtful, therefore whether children educated according to this methodology will be motivated or be given educational opportunities to

develop speech.

The approach of each method with regard to intelligibility speech lessons, and potential for deviant speech production, summarised in table 1.3.

**Table 1.5 : Comparison between the relative importance accorded to intelligibility, speech lessons and potential for deviant speech by different educational methods**

Oral or manual	Method	Intelligibility	Perceived need for Speech lessons	Potential for deviant speech
Oral	Unisensory	Very important	Not important	Low
	Multi sensory	Very important	Very important	High
Manual	Total Communication	Less important varies according to school	Probably less important	Probably high
	Bilingualism	No importance	No importance	Unknown/ Probably high

**Source:** Original

As can be seen from Table 1.5, the need for development of intelligibility and provision of speech lessons varies according to the goals set by educators of each methodology. The potential for deviant speech is probably extremely high among children educated according to bilingualist philosophies. No data are currently available to substantiate this. However, it seems logical to assume this will occur where hearing aids and cochlear implants are not seen as beneficial, but as irrelevant cures for a sickness that does not exist (Aldridge, Timmons and Wood, 1995; Cohen and Walbman, 1996), and speech is not considered necessary for communication. Intelligibility is an important goal for both unisensory and multi-sensory oral methods. However, the need for speech lessons and the potential for deviant speech differ. The goals of educators who follow the Total Communication system will vary from school to school – generally, it may be speculated that intelligibility and the perceived need for speech lessons will be rated as less important than for oral protagonists, because signing offers an alternative communication route. It is apparent that the teaching of speech is dependant to a large degree on the methodology.

### 1.3.2 Conclusions drawn

The aim of education is to maximise the potential of a child – this applies equally to the speech of the Deaf albeit speech potential may be limited.

A school situation provides the infrastructure for basic knowledge to be imparted. For Deaf children, this includes the provision of speech lessons - as basic an educational need for Deaf children as the Three R's. The current lack of teaching is, in Monsen's (1981:845) words, "a bizarre state of affairs", since the lack of speech proficiency is a primary reason why the Deaf child's educational needs are different.

A basic principle of education is that lessons should be psychologically healthy experiences that are interesting, challenging and growthful. Speech lessons for the Deaf should follow these tenets. The emotional well being and self-concept of the child are of paramount importance. As Northern and Davis (1979:308) cogently state: "Intelligible speech in an emotionally disordered mind is a useless function."

The proposed policy on the education for the Deaf in South Africa, 1994, shows acceptance for these principles. Regarding desirability of teaching speech and locating it within the infrastructure of a school for the Deaf, the proposed policy states that a speech therapists should be part of the teaching team, and that speech should be offered as a "supplementary and compulsory" subject from pre-school through to secondary school (Proposed Policy on Education of the Deaf, Oct 1994:11). The identity of the Deaf learner be respected and every child should be provided with the opportunity to learn to speak to his own potential without co-ercion (Proposed Policy on Education of the Deaf, Oct 1994).

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## 1.4 HOPE: CAN MODERN TRENDS INFLUENCE SPEECH

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There are further two avenues that have important implications for speech acquisition. The first is audiological i.e. cochlear implants and the second educational i.e. the policy of inclusion.

### 1.4.1 COCHLEAR IMPLANTS

There is uncertainty regarding the benefits of cochlear implants for congenitally deaf children, as progress has not been widely evaluated (Fryauf - Bertchy, Tyler, Kelsay and Ganz 1992). Staller, Beiter, Brimcombe, Mecklenberg and Arndt (1991) found congenitally deaf children showed less improvement compared with children with acquired deafness. Long-term expectations are as yet undefined and more longitudinal studies are needed (Fryauf-Bertschy, Tyler, Kelsay, Ganz, 1992).

Looking at the overall picture in terms of benefit to speech **perception**, Tellings (1996) notes the following positive generalisations from recent publications: All children can perceive more environmental sounds and a majority can use the implant as a help for speech reading.

The situation for speech **production** is complex. Children may retain speech production characteristics typical of profound deafness even after implantation (Osberger, et.al., 1993). This may be more frequent in children who received cochlear implants when older – length of time prior to implantation has been described as having a negative impact on speech intelligibility (Osberger et.al., 1993 cited by McCaffry 2000) Higgens et.al., (1996 cited by McCaffrey, 2000) suggest continued deviance of speech production, despite improved auditory information is a consequence of alternative feedback strategies established prior to implantation that pre-empt development of auditory based strategies potentiated by the implant.

The above suggests the following: where speech production exhibits characteristics typical of Deaf speakers, a potential speech programme should target such errors. Where speech production does not exhibit these characteristics, such a speech programme is of no value.

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## 1.4.2 INCLUSION

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This issue is currently widely debated (Powers 1996). The United Kingdom, United States and Australia are involved in mainstream education for the Deaf (Powers 1996) and, Lynas, in 1999

states most Deaf children in the United Kingdom are educated in the mainstream. It is a newer, untried concept in South Africa, and the implications for Deaf Education are being debated.

Several educational bodies support inclusive education for the Deaf (telephonic conversation with the Director of Support Services, 7 Feb, 1996), whereas DEAFSA, representing the Deaf of South Africa, oppose to the system. (Education for the Deaf, Proposed Policy, October 1994).

Supporters of inclusion cite several advantages.

- **Language and speech development**

Harrison (1993) describes, speech and language as developing normally and voice quality as pleasant.

- **Social development**

Placing children with disabilities in regular classes enhances social integration (Stinson and Lang, 1994).

- **Economic advantages**

Efficiency and cost-effectiveness of the schools are improved (Powers, 1996).

Conversely, Stinson and Lang (1994), in an article tellingly entitled “Full Inclusion: A Path for Integration or Isolation?”, give four areas in which the needs of the Deaf child are not met.



- **Social development**

Empirical research indicates minimal to non-existent interaction between the Deaf and hearing – true for both for young children and adolescents. They believe that Deaf students placed alone in schools are likely to encounter persistent frustration and negative experiences that lead to poor development of social skills, little participation in activities and much loneliness.

- **Cultural considerations and self-identity**

Special schools for the Deaf provide for everyday interaction with a large number of Deaf peers and offer links to social organisations. Pupils may use a signing system, either as official school policy or informally. The lack of signing and support for interests in Deaf culture at the neighbourhood public school is likely to complicate development of the student's self-identity.

- **Participation in classroom dialogue**

Students may struggle to understand and not participate in class because of communication problems.

- **Unwritten curriculum**

The hearing child learns, for example, social codes and attitudes, health habits and games naturally. In the mainstream setting, the Deaf student has difficulty accessing this unwritten curriculum.

The following deserve consideration with regards to speech development. Firstly, the Deaf child will have a real need to develop intelligible speech if he is to be understood by his hearing peers. Secondly, the class teacher will need to accept responsibility for helping the child with his speech. If a communication pathologist is available, the teacher can assume a supportive role. If no communication pathologist is available, the class teacher will need to directly assist her Deaf pupil in improving speech proficiency.

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## 1.5 RESEARCH QUESTION, ANSWER AND AIMS

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### 1.5.1 RESEARCH QUESTION

In the light of the preceding discussion, speech teaching emerges as a problematic area. Two major components of the problem are lack of resource material and teacher training. The research question addressed by this study is: can a practical solution to these problems be found?

### 1.5.2 RESEARCH ANSWER

A speech programme can, simultaneously, provide both training and resource material. Three research routes are employed to demonstrate this. Firstly, **theoretical research** – this describes documented issues and theories drawn from literature, so that the study is seen to stand on a sound theoretical infrastructure. Secondly, **empirical research** – this investigates attitudes and solutions proposed by educators of children with hearing losses. Thirdly, **developmental research** – this sets out the design and theory of the programme, based on preceding theoretical and empirical research, providing a practical contribution to the current knowledge base of speech science for the Deaf.

### 1.5.3 RESEARCH AIMS

There are three aims:

- **Aim One: To execute theoretical research so that the design of the proposed speech programme is seen to rest on valid theoretical assumptions.**

Subaim One: To describe background issues in order that the proposed speech programme is seen to have taken these into account.

Subaim Two: To describe the pathology of the speech of the Deaf so that the rationale for selection of faults to be addressed by the proposed speech programme can be appreciated.

Subaim Three: To describe theories of speech teaching for the Deaf – historically, currently and potentially – in order to provide a rationale for theories and approaches incorporated in the proposed speech programme.

- **Aim Two: To execute empirical research, which will be used as a basis for the development of the proposed speech programme.**

Subaim One: To investigate and describe attitudes of teachers towards speech training for Deaf learners in order that these are taken into account in the proposed speech programme.

Subaim Two: To enlist the aid of teachers in problem solving for the creation of a new speech programme, thereby widening the repertoire of possible solutions.

Subaim Three: To assess the needs of school principals in relation to a speech programme for Deaf learners.

Subaim Four: To access the knowledge of communication pathologists, particularly in regard to Ling's (1976) speech programme.

- **Aim Three: To concretise developmental research in the form of a classroom-orientated speech programme designed for children with hearing losses.**

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## 1.6 ORGANISATION OF THE THESIS

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In accordance with the research aims, the thesis is divided into four complementary sections:

Section one describes theoretical research - congruent with Aim One (chapters 1-3).

Section two describes empirical research - congruent with Aim Two (chapters 4-5).

Section three describes developmental research congruent with Aim Three (chapter 6).

Section four evaluates the proposed programme (chapter 7).

- **Theoretical research**

**Chapter one** provides an introduction. It describes problems relating to the issues of speech teaching in terms of disappointing results, conflict between protagonists of different philosophies and hopeful developments that may solve some of these problems. Research question, answer and aims were placed against this background. A section dealing with terminology concludes the chapter.

**Chapter two** sets out variables that affect speech proficiency and describes common speech errors of Deaf speakers. Subsequent proposals are based on this theoretical framework.

**Chapter three** delineates major teaching theories and models. The purpose is to access what is currently available and suitable for inclusion in the proposed programme.

- **Empirical research**

**Chapter four** describes the research methodology.

**Chapter five** discusses the results of the investigation.

- **Developmental research**

**Chapter six** sets out the theoretical model of the proposed speech programme.

- **Evaluation and conclusion**

**Chapter seven** evaluates the proposed programme.

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## 1.7 CLARIFICATION OF TERMINOLOGY

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Various terms need to be clarified.

### 1.7.1 Terms describing a loss of hearing acuity

- **Outdated terms**

“Deaf and dumb” and “Deaf mute”. These terms are used in a historical context only. They are regarded as negative and unacceptable by Deaf people (Policy Document on the Education of the Deaf, DEAFSA, October, 1993:7).

- **Currently used terms**

Deaf; hearing-impaired; handicapped in hearing; aurally handicapped. No one term satisfies all authorities in the field (Knauf, 1984).

Ling (1976), currently the leading figure in speech teaching for children with hearing losses, uses the term “hearing-impaired” preferentially to apply to a wide range which includes the hard-of-hearing and the totally deaf child.

Calvert and Silverman (1983), well-known authorities in the field of Deaf education, state that they use the terms “deaf” and “hearing-impaired” interchangeably, because agreement on the precise definition of each is still not universal.

Personnel at the Institute Voor Doven Holland use the term “deaf” preferentially and precisely. They believe use of the broad, inclusive term “hearing-impaired,” causes confusion. This idea is well expressed by van Eindhoven, the then director of the school (1983:65). “You have asked me to speak about ‘Remediation With Hearing-Impaired Children’. With this proposal of the

subject, you have confused me a little. Why? I don't know what you mean by 'hearing-impaired'. Do you mean 'deaf' and 'hard of hearing' children?" van Uden, pioneer of the institute, uses the term "deaf" to describe individuals who have losses of 90 decibels or greater and who are deaf before language develops. He excludes children who have a hearing loss in the high frequencies only, and have relatively intact hearing in the lower frequencies (van Uden, 1982).

Pollock (1970), pioneer of the unisensory method, was not in favour of the term "deaf". She regarded it as having negative and outdated connotations.

The Deaf Federation of South Africa states: "... in South Africa, as elsewhere in the world, the only culturally accepted term is 'Deaf'. The term 'hearing-impaired' is not viewed as culturally acceptable." They distinguish between "Deaf" written with a capital "D" and "deaf" written with a lower case, small letter "d". The difference is explained as follows: "Deaf people view themselves as belonging to a different and separate minority cultural group with its own language, history, values, norms and morals. For that reason, the term 'Deaf' is written with a capital 'D'. Similarly, one will not speak of the 'Zulu people' and use a lower case 'z'. This practice has been internationally accepted" (Proposed Policy Document on Education for the Deaf, Compiled by DEAFSA, October 1994:7).

- **Rationale for chosen terminology**

The terms Deaf, deaf, and hearing-impaired are used according to various criteria: firstly, terminology of quoted authors is not changed. While it is acknowledged that this may lead to inconsistency as well as imprecision – in the way van Eindhoven describes – changing the terms of other authors is considered to have the potential to corrupt their intended message – especially with regard to contentious agendas.

When used to express this writer's view terms are used specifically and purposefully. The term "hearing-impaired" is used to designate a wide range of hearing losses in an imprecise way, to include individuals who are hard of hearing through to those who have profound losses. The term 'Deaf' with a capital 'D' is used to designate subjects addressed by the proposed speech programme – namely learners whose hearing is such that speech is compromised to the extent that they manifest predictable speech production errors congruent with what is known as "Deaf speech". This means that the degree of hearing loss is not the

only qualifying factor. Learners who have received timeous rehabilitation may exhibit normal/near normal speech despite the fact that they have severe /profound hearing losses. The term 'deaf' with a small 'd' refers to aspects of a loss of acuity, such as in the phrase 'profoundly deaf'.

### **1.7.2 Terms relating to personnel who assist pupils with the development of speech competency**

The complex problems of the Deaf require the co-operation of a multi-disciplinary team (Otis-Wilborn, 1992). Concerning the development of speech competency at schools, the main personnel are the school audiologist, the teacher and the communication pathologist (Calvert 1980; Otis-Wilborn, 1992).

A collaborative approach is necessary (Otis-Wilborn, 1992). The audiologist is not directly involved with teaching, but with selection of apparatus to improve speech reception. The communication pathologist has more theoretical knowledge, whereas the class teacher has greater opportunity to incorporate speech skills in natural settings (Otis-Wilborn, 1992). Each team member has a unique complementary role.

Major educationalists concur that speech teaching is a shared responsibility, a significant proportion of which rests on the teacher. This is evidenced by the following references:

- Ling's view is that once the child is at school, the class teacher should be primarily responsible for speech teaching. If any additional lessons are given by another person (for example, a communication pathologist), the teacher should ensure that they are congruent with the goals she has set for the child (Ling, 1976).
- Calvert and Silverman state: "... in a school, we do not depend just on a designated specialist, helpful as such may be, to improve the speech of children, but rather that **every teacher is also a teacher of speech**. We cannot stress this point too strongly" (Calvert and Silverman, 1979:4) (original author emphasis).

- van Uden's view is that although the class teacher should be able to do much of the work, "the refinement of speech demands specialised training and experience" (van Uden, 1971). He considers the specialist speech teacher to be either a teacher of the Deaf, or alternately a communication pathologist who has received additional training in speech teaching for the Deaf (Maas, 1984).

It is clear that, whatever the level of involvement, the teacher plays a significant role in speech development.

In addition to communication pathologist and teacher, parent and teacher assistants are included in the multi-disciplinary team. Learners may be assigned speech homework, either to reinforce sounds learned, or to make parents aware of specific speech targets at which the child is currently aiming. In this way, parents are encouraged to incorporate speech gains out of school. For example, the parent may be instructed to help the child identify and pronounce family names containing a specific phoneme. In less ideal situations where no speech instruction is available, the parent may need to take on a more active role. A teacher assistant who is trained to teach speech can aid the teacher, especially with regard to class organisation during individual speech lessons.

The term "teacher", as used in this study, refers to the person responsible for teaching speech. This may be the teacher, communication pathologist or even the parent. However, since the programme is designed for use in the classroom, the term "teacher" generally refers to the class teacher who is, at that time, is teaching speech. A fundamental principle is that the programme should be co-ordinated between all members of the multi-disciplinary team. The term "communication pathologist" is used consistently, in preference to "speech therapist" – the choice is idiosyncratic.

### **1.7.3 TERMS RELATING TO DEVELOPMENT RESEARCH**

The term 'preliminary programme' refers to an early form of the speech programme before empirical research was conducted. The term 'proposed programme' refers to the speech programme in its developed form, modified by the input of the empirical research.



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## 1.8 CONCLUSION

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This chapter has provided the argument to support the concept that a classroom speech programme for children with hearing losses is needed and is viable. The next chapter moves away from the philosophical nature of this discussion to an area that deals with concrete aspects. It places under the microscope the pathology that the study addresses – the deviant speech patterns of the Deaf.

## CHAPTER TWO : THE SPEECH OF THE DEAF

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### 2.1 INTRODUCTION

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The wide focus of chapter one now narrows to describe concrete observations relating to the problems of the speech of the Deaf, which are generally a predictable sequel to auditory loss (Yoshinaga-Itano, Stredler-Brown and Jancosec, 1992). The difference between the speech of the Deaf and the hearing is so marked as to render it different from normal speech in all aspects (Black 1971, cited by Markides, 1983), so distinctive that it is recognisable in any language (Monsen 1983), so generic that it is already noticeable in early infancy (Yoshinaga-Itano Stredler-Brown and Jancosec, 1992) - by six months Deaf infants can be seen to produce a smaller repertoire of phonemes than hearing infants (Stoel-Gammon and Otomo 1986) – and so ineluctable that even when deafness is suddenly acquired in childhood, changes in speech progress rapidly and predictably. Binne, Daniloff and Buckingham (1982) describe the speech of a five-year-old boy who suffered a profound hearing loss following meningitis. They state that six weeks after the hearing loss, “remarkable changes had occurred” in speech, and by nine months speech intelligibility had decreased by 30% (Binne et. al., 1982:47). The faults they report are congruent with those of Deaf speakers.

The aim of this chapter is to describe the speech of the Deaf, so that the design of the proposed programme (Chapter 6), is seen to rest on valid theoretical principles. This aim will be realised by discussing the variables that affect speech proficiency and the typical speech errors of the Deaf. Both subjects are extensive and thus definitive accounts are beyond the scope of this work. Therefore, only aspects, that have a direct bearing on the proposed speech programme, will be included. Where literature reflects opposing views the theoretical stance adopted in the proposed speech programme is explicitly stated.

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## 2.2 VARIABLES THAT AFFECT SPEECH PROFICIENCY

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Speech proficiency is influenced by a multitude of factors (Davis and Hardwick, 1981) and identification of every conceivable one would be impractical. Therefore only those gauged as the most relevant will be described.

### 2.2.1 DEGREE OF DEAFNESS

The amount of hearing is crucial - the better the child's hearing levels, the better his speech will be and the easier to develop (Calvert, 1982; Deal and Haas, 1996). This is demonstrated in the table below.

**Table 2.1**

**The relationship between degree of hearing loss and speech deviations**

Hearing levels for speech	Speech deviations anticipated
0 to 30 decibel loss	No speech deviations
30 to 55 decibel loss	Some defects in articulation
55 to 70 decibel loss	Abnormalities in articulation and voice
70 to 90 decibel loss or greater	Articulation and voice quality likely to be abnormal - will need to be taught to speak
90 decibels or poorer	Articulation and voice quality abnormal – speech must be developed with careful and extensive training

Source: Extracts from Calvert (1982:638)

It is clear from Table 2.1 that a loss of no more than 30 dB means that the speaker has defects in articulation, but suprasegmental production is relatively normal. Once a loss of 55 dB is sustained, suprasegmental aspects are also involved.

In reality, however, the relationship between speech performance and hearing level is less predictable and more complex than demonstrated in Table 2.1. As Monsen (1978:215) states: “A ‘good’ audiogram is a fairly reliable indicator of intelligible speech, but a ‘bad’ audiogram does not necessarily always predict poor or unintelligible speech.” The audiogram describes **how much** hearing is lost, but does not give information as to the **quality** of residual hearing available (Ling, 1976), or how hearing has been **influenced** by subsequent aural rehabilitation (Ling and Milne, 1981).

An exception to the way degree of deafness affects speech proficiency relates to high-frequency deafness, where there is a relatively mild loss for the low frequencies and a severe to profound loss for high frequencies. Such a child may score the same average decibel loss as a profoundly Deaf subject, but speech performance is generally relatively intact (Steward, 1969). Because of this, van Uden (1982:135) excludes children who have “a so-called ski slope hearing loss” from his criteria of what constitutes a Deaf child.

### 2.2.2 AGE AT ONSET OF DEAFNESS

Age when deafness is sustained is a primary factor in determining the disabling effects of a hearing loss (Davis and Hardwick, 1981). Early onset of deafness generally has a devastating effect upon the development of spoken language skills (Geers and Toby, 1992), and is probably the greatest barrier to spoken language (Ling, 1978, cited by Whitehead and Barefoot, 1992). A child with a pre-lingual hearing loss will have a significantly greater speech problem than the child who acquires a hearing loss post-lingually (Deal and Haas, 1996).

### 2.2.3 TYPE OF DEAFNESS

The type of Deafness impacts on speech development (Deal and Haas, 1996). There are four types of deafness: **conductive, sensorineural, central and mixed**. The problems of a conductive loss can often be overcome by medical means or amplification (Davis and Hardwick 1981). Consequently, speech may not be significantly affected. In contrast a sensorineural loss causes serious speech perception difficulties (Davis and Hardwick 1981) with corresponding speech pathology. In cases of central deafness, sensitivity for sound is unimpaired. Problems arise in the way the brain processes and encodes messages, and this is then reflected in speech production. Any of the types of deafness may occur together constituting a mixed loss, affecting speech according to how the elements of the disability are combined.

## **2.2.4 AGE OF THE CHILD AT DIAGNOSIS AND COMMENCEMENT OF AURAL REHABILITATION**

The sooner the child is diagnosed, fitted with a hearing aid and exposed to a programme of language and speech stimulation, the better his prognosis for speech (Davis and Hardwick, 1981; Ling, 1990). There is a critical period for language learning between birth and three years (Caleffe-Schenk, 1992), which can only be accessed if the hearing loss is detected early and, the child timeously fitted with quality hearing aids and exposed to a programme of speech and language stimulation (Caleff-Schenk, 1992).

## **2.2.5 QUALITY OF AN EARLY AURAL REHABILITATION PROGRAMME**

The quality of aural rehabilitation will influence speech development (McConnell and Horten, 1970; Balow and Brill, 1975 cited by Ling, Ling A H and Pflaster, 1977; Deal and Haas, 1996). This includes the quality of hearing aids, language and speech instruction (Pollack, 1972).

## **2.2.6 QUALITY OF LATER SPEECH TEACHING**

An important variable, considered by some to be the most crucial (Di Carlo, 1964, Markides, 1970) is the quality of speech teaching available. The rationale of this study is based on acceptance of this variable. Systematic speech teaching has been shown to improve speech proficiency. (Yoshinaga-Itano et. al., 1992).

A note of caution must be sounded against misplaced optimism which will lead to disappointment. Markides (1970 cited by Isseldyk, 1982:62) appears to hold unrealistic expectations when he describes speech teaching as so powerful a variable, that it has the potential to render degree of hearing loss of secondary importance. The assumption held for this study, is that speech teaching can make a significant improvement within realistic bounds of expectation.

## **2.2.7 ADDITIONAL DISABILITIES**

Additional disabilities affect speech development adversely (Deal and Haas, 1996). Disabilities such as cerebral palsy or blindness, are obvious barriers to speech proficiency. However, other more subtle problems may be masked by the overarching effects of deafness. van Uden (1981) has described less obvious motor and cognitive problems that may compromise speech.

He notes two motor problems, choreiformity and dyspraxia. Choreiformity is a condition where the child makes small, jerky, involuntary movements. If such movements are present in the fingers, they are almost always present in the lips and tongue (van Uden, 1981). This has obvious negative implications for speech production. Dyspraxia, termed “clumsy speakers” by van Uden (1981:113), manifest problems of control of speech organs. Synergistic movements of the speech organs are vital for accurate articulation (Calvert, 1982).

Cognitive problems labelled by van Uden as “dysymbolia”, describe aspects of central deafness.

He notes that dyspraxia and dysymbolia also occur in hearing children, but have less severe consequences. “In deaf children even a slight degree of these disturbances is already dangerous... the normal hearing child does not show any learning difficulty because they can compensate by hearing” (van Uden, 1981:117).

### **2.2.8 MOTIVATION**

The attitude of both the family (Davis and Hardwick, 1981; Deal and Haas, 1996) and the school (Vorce, 1974) are important determinants. A child’s speech attempts need to be positively reinforced.

Other influences on motivation are mode of communication used (signing or oral) and type of educational environment. A child in a mainstreamed environment may be motivated to speak more intelligibly in order to be understood by hearing peers, as compared with a child who attends school for the Deaf, where intelligible speech has little advantage among peers. In an environment where signing is used, a child may be less motivated to speak intelligibly, since he has recourse to another mode of communication, as compared with a child in an exclusively oral educational environment. However, where limited verbal skills are the only option, and the child struggles to be understood without recourse to signing, it is speculated that vocal strain may result and deviant strategies, such as exaggerated mouth movements, may be employed in an effort to be understood. These may be detrimental to speech performance (2.3.1.6). Paradoxically, increased motivation may impact negatively on speech performance.

### **2.2.9 AMPLIFICATION**

The quality of amplification and the consistency with which it is applied is an important factor in speech development (Deal and Haas, 1996).

### 2.2.10 INTERCONNECTEDNESS OF VARIABLES

The nine variables described do not stand in isolation, but operate within a fluid dynamic. For example child A, with a more severe hearing loss than child B, may develop better speech if child A is diagnosed and rehabilitated more timeously and effectively, and born into a family who value and reinforce intelligible speech more positively.

### 2.3 SPEECH AND VOICE ERRORS COMMON TO THE DEAF

There is a complex interrelationship between errors. In this regard Smith (1980, cited by Markides, 1983:101) comments: "... the deaf child does not have a speech problem. The speech problems exist in bunches or, more accurately, in stacks. A bunch has the possibility of being taken apart, so that one part can be tidied up at a time. A stack has one error built on another in some unknown order."

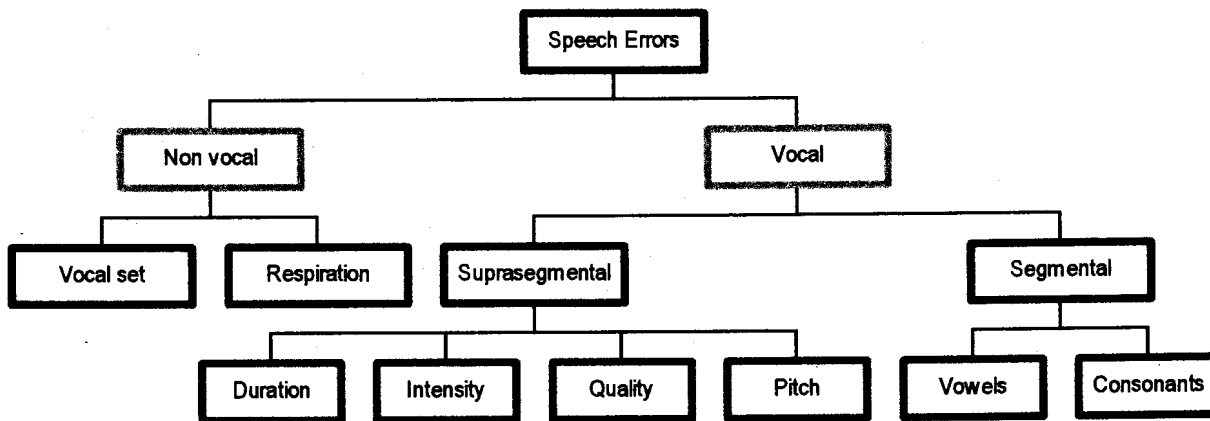
This section attempts to metaphorically "tidy" these stacks, thereby making the subject easier to view and comprehend. Two routes are used, systematic categorisation of errors and viewing speech errors from the vantage point of causes.

Systematic categorisation provides a sense of order by showing that the errors of speech of the Deaf are not random, but follow predictable patterns. This has been asserted by numerous writers over decades – e.g. (Haycock, 1933; Dodd, 1976; Abelhamied, Waldron and Fox, 1990).

Viewing speech errors from the vantage point of causation demonstrates an underlying logic to errors. Ling (1991) states pertinently that, problems can generally be treated more appropriately when causes are accurately identified.

Analysis of speech is divided into two main sections: firstly, non-vocal aspects of speech -vocal set and respiration – and, secondly, vocal aspects of speech - suprasegmental and segmental production. Because of the often inextricable relatedness of problems, a degree of repetition is unavoidable. The organisation of the discussion is shown in figure 2.1.

**Figure 2.1 Organisation of discussion relating to common errors of speech of the Deaf**



Source : Original

Figure 2.1 shows that the discussion starts with non-vocal aspects of speech production, namely vocal set and respiration, and proceeds to vocal aspects – suprasegmental features – namely duration, intensity, quality and pitch - and segmental aspects – namely production of vowels, consonants and connected speech.

### 2.3.1 NON-VOCAL ASPECTS OF SPEECH

This refers to speech functions that are not characterised by vocalisation.

#### 2.3.1.1 Deviant vocal set

The term “vocal set” has been coined for this study because of the absence of a satisfactory alternative to describe the concept. Gatty (1997:57) uses the term “posture,” in the following account to describe certain aspects of vocal set. Her description, however, does not encompass the total scope of the concept.

“Intelligible speech requires the talker to have relaxed control of the speech mechanism and maintain reasonable flexibility of the articulators. A velum which is normally lowered during speech produces nasality. Unnatural posture of the larynx and pharynx affect both pitch and voice quality. The jaw and tongue need to be mobile and flexible to produce patterns at a reasonable rate and the whole mechanism must be supported by adequate breath control.” (Emphasis added)



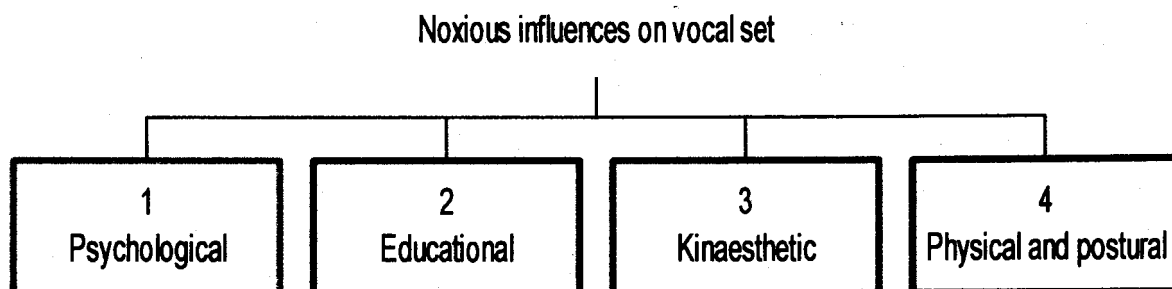
In the extract above, Gatty describes a variety of vocal behaviours necessary for the production of normal speech. However, she does not link these behaviours in a single dynamic.

The term “vocal set”, as used in this study, defines a concept that includes and extends the speech behaviours described by Gatty. It is an all-encompassing term that describes a multitude of simultaneously occurring factors, including the mindset of the speaker, his body posture, posture of the speech organs, and physical, neural and physiological changes to the speech organs, all of which result from his hearing loss. **The vocal set of the Deaf speaker will adversely affect speech even before a single syllable is uttered.**

Normal vocal production requires a complex and subtly orchestrated synchrony of vocalisation and physical movements. A deviant vocal set disturbs this synchrony, - analogous to an orchestra whose instruments, are faulty and whose playing is mistimed. This section analyses the structure and functioning of the vocal instrument that is necessary for normal speech.

Five influences are regarded as adversely affecting the vocal set of the Deaf speaker; psychological, educational, kinaesthetic and changes to physical, neural and postural aspects of the speech mechanism.

**Figure 2.2 : Noxious influences on the vocal set of the Deaf speaker**



Source: Original graphic supported by information from the following sources: Haycock, 1933;Hudgkins, 1937 (cited by Subtelny, 1989); Millard and Erikson, 1964, cited by McClumpha, 1969; Mazaheri, McClumpha, 1969; Stewart, 1969; Helm, 1970, cited by Black, 1971; Ling, 1970 and 1976; Ringel et al, 1972, cited by van Uden, 1987; Vorce, 1974; Wyke, 1974, cited by Binnie, Daniloff and Buckingham, 1982; Wets and Stalbech, 1975, cited by van Uden, 1987; Calvert, 1978; McGarr and Osberger, 1978, cited by McGarr, 1980; American Annals of the Deaf, Nov 1981, Vol 126 (no author: 911); Monsen, 1983; Stevens et al, 1983; van Uden, 1987; Perigoe, 1992

Figure 1 provides a graphic representation of five noxious influences that impact on the speech of the Deaf. Each of these is discussed in the section below.

- **Psychological**

When a hearing person speaks, he takes for granted the fact that he will be understood. Not so for the Deaf person, who soon realises that many of his utterances are not intelligible. Even before speaking, he is under psychological tension. He must try hard.

Heightened emotion leads to involuntary physiological changes caused by reaction of the sympathetic and parasympathetic branches of the autonomic nervous system, which can affect speech behaviour, even against the individual's will (Williams and Stevens, 1981). Changes include control of articulatory movements, respiratory control and the manner in which the vocal cords vibrate (Williams and Stevens 1981). It is speculated that the stress of needing to be understood, coupled with the anticipatory anxiety of not being understood, initiates such changes in the physiology of the Deaf speaker.

Implications of heightened emotion are even more severe for the Deaf speaker because, unlike his hearing counterpart, he cannot perceive the vocal correlates of his emotional state, and has therefore even less chance of monitoring emotion induced changes in vocal behaviour.

- **Educational**

It is ironic that teaching practices designed to improve speech may, in fact, be responsible for speech problems considered typical of "Deaf speech" (Ling, 1991:12). Deterioration of voice quality of pupils at schools for the Deaf, a documented cause of concern for over 60 years.

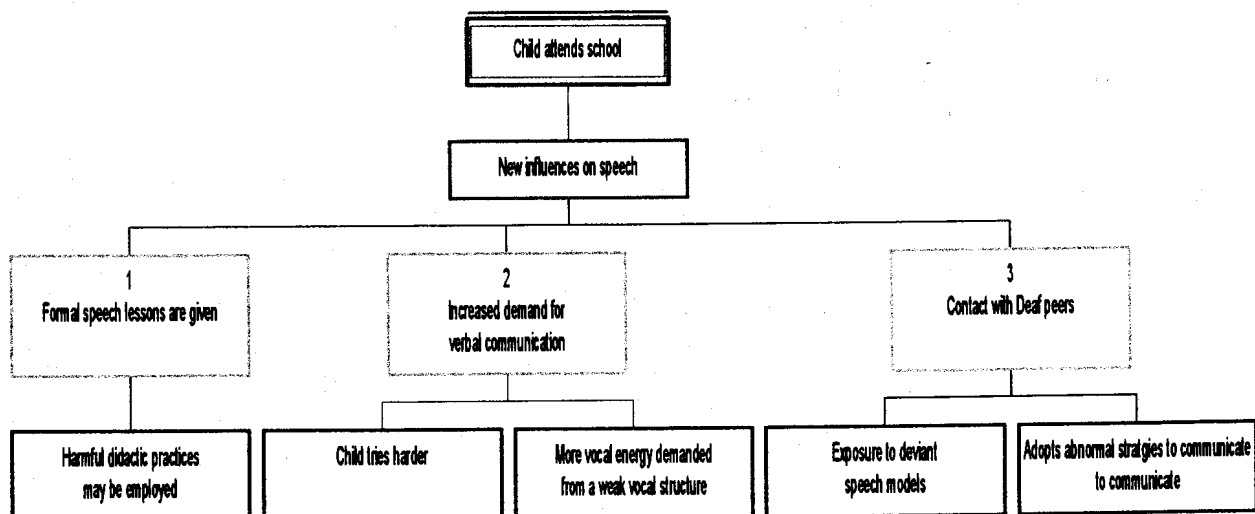
As early as 1933(:270) Haycock commented: "The earliest spontaneous vocal utterance of the young deaf child is, as a general rule, normal in quality and produced in an easy natural manner pleasant and agreeable to the ear and though they may be weak and thin ... are often delightfully free from those blemishes which are characteristic of the voices of the majority of deaf children in the upper classes of our schools."

Forty years later the same observation was made by Vorce (1974:27): “It is generally accepted that the voices of young deaf children are free of major problems. Unfortunately, something happens in the process of acquiring speech...”. She hypothesises that the cause may lie in traditional analytic teaching methods and tense didactic situations.

Ten years later Monsen (1983:12) comments: “Teachers of deaf children often report an intuitive feeling that poor voice quality develops as the children learn to speak. When children are very young and do not yet speak, teachers often feel that the voices are normal-sounding. As they teach children to speak, they often sense the development of abnormal voice quality but are at a loss to correct it or impede its further developments.”

With regard to such deterioration, it is speculated that when the child first enters school a new set of influences is set into motion that will affect speech performance. He may receive formal speech lessons for the first time, demands for verbal communication will increase, he will come into contact and communicate with Deaf peers. Figure 2 demonstrates how each influence impacts on speech.

**Figure 2:3 The influences of school entrance on speech**



Sources: Graphic supported by the following literature sources: Perigoe, 1992; Monsen, 1983; Mazaheri et al, cited by McClumpha, 1969; McClumpha 1969; Hugdkins, 1937, cited by Subtelny 1989; Ling, 1970; 1976; Ringel et al, 1972 (cited by van Uden, 1987); Vorce, 1974; Calvert, 1978; van Uden, 1987;

Stevens et al, 1983; Haycock, 1933; Stewart, 1969; Helm, 1970, cited by Black, 1971; Wyke, 1974, cited by Binnie, Daniloff and Buckingham, 1982; Wets and Stalbech, 1975, cited by van Uden, 1987; McGarr and Osberger, 1978, cited by McGarr, 1980; Photograph from Instructional Programme on Speech Production (no author quoted), American Annals of the Deaf, Nov 1981, Vol 126; Millard and Erikson, 1964, cited by McClumpha, 1969.

Figure 2.3 shows how a new set of influences is initiated on school entry which may affect speech production adversely. Firstly, the child may receive formal speech lessons for the first time. These lessons, aimed at improving speech, may have the opposite effect if harmful teaching strategies are employed – for example, touching the larynx or introducing a tense didactic situation. Tension undermines mastery (Gatty, 1992). Secondly, there may be an increased demand from teachers for speech. The child may perceive the need to try harder, leading to psychological tension reflected in vocal tension. These increased demands are made on a dysfunctional vocal structure. For example, the breath stream, the basic building block of voice, is inadequate and the vocal folds are underdeveloped. Because the vocal equipment is not working normally, more effort may be required to produce voice inducing vocal strain. Thirdly, the young Deaf child will suddenly come into contact with his Deaf peers. The implications of this, as it affects speech development, are twofold. In the first place, the child will be exposed to daily contact with a large number of deviant speech models. In the second place, he may adopt visible strategies, such as exaggerated mouth movements, in an effort to make himself understood. This will affect his speech production adversely.

- **Kinaesthetic**

Deaf speakers may receive more satisfying kinaesthetic feedback when using deviant, rather than normal speech patterns (Calvert, 1978). It is logical to assume that this will favour the use of deviant speech patterns. The strength of maladaptive kinaesthetic feedback is described by McCaffrey et.al., (2000) who note that children who receive a cochlear implant may retain speech patterns typical of profound deafness because the mislearned kinaesthetic pattern is preferred.

- **Physical, neural and postural changes to the speech mechanism**

Long-term deviant use of speech organs may cause changes in their physical structure (McClumpha, 1969; Ling, 1976), neural functioning of the mouth (van Uden, 1987) and habitual posture of the tongue (Ling, 1976). These physiological, neural and postural changes indicate that the vocal infrastructure of the Deaf speaker is different to that of the hearing speaker.

Table 2.2 Summarises the effect of deviant vocal set on speech production. For brevity and convenience the information is tabulated, showing how psychological, educational and kinaesthetic influences, as well as physical, neural and postural changes in the speech mechanism deleteriously affect the speech production of the Deaf child. References are noted in the table and where a concept is based on speculation, this is been indicated.

Table 2.2

## How deviant vocal set affects the speech organs and resultant speech production

Primary mechanism affected	Noxious influences on vocal set				Primary resultant speech pathology
	Psychological causes	Educational causes	Kinaesthetic feedback	Physical, neural or postural changes of the speech mechanism	
Body	Bodily tension - the body is tense, reflective of an attitude of trying (speculation)	A tense didactic situation leads to the child becoming tense through apprehension (Ling, 1976)			Bodily tension may cause tension in the vocal apparatus (Ling, 1976) which may be reflected in voice production (Berry and Eisensohn, 1967)
Muscles controlling articulatory structures	Heightened emotion causes changes in the activation of the muscles controlling articulatory structures (Williams and Stevens, 1981). The stress involved in trying to be understood may activate this				<p>May cause</p> <ul style="list-style-type: none"> <li>• Changes in the <b>timing</b> of movements which modifies rate of articulation (Williams and Stevens, 1981). This may be a causal factor in the abnormally slow rate of the speech of Deaf (speculation). As a consequence of reduced speaking rate, the velum tends to break contact with the posterior pharyngeal wall (Bjork, 1961, Bzoch, 1965, both cited by McClumpha, 1969), resulting in an incompletely closed nasal port which allows vocalisation to escape through the nose causing nasalisation.</li> <li>• Different <b>amplitudes</b> of motion of the structures concerned. This will affect, firstly, the range of vowel qualities produced (Williams and Stevens, 1981). This may be a causal factor in the neutralisation of vowel sounds (speculation), which limits vowel range and, secondly, may affect the range of frequencies of vocal cord vibration (Williams and Stevens, 1981) – deviant pitch may be related to this factor (speculation)</li> </ul>

Primary mechanism affected	Noxious influences on vocal set				Primary resultant speech pathology
	Psychological causes	Educational causes	Kinaesthetic feedback	Physical, neural or postural changes of the speech mechanism	
Respiration	Heightened emotion may cause changes in the depth, rate and pattern of respiration (Williams and Stevens, 1981)	Inappropriate early instruction (Forner and Hixon, 1977 cited by Monsen, 1979)			This can influence the magnitude and time pattern of subglottal pressure and the position of the sternum (to which the larynx is attached through the strap muscles). These changes can modify the contour of fundamental frequency and acoustic characteristics of obstruent consonants which are produced by build-up of pressure behind a constriction (Williams and Stevens 1981)
Jaw	Exaggerated movements may reflect an attitude of trying - an attempt to make speech more visible (speculation)	Exaggerated jaw movements of teachers (Ling, 1976) and peers are imitated (speculation)	More satisfying kinaesthetic sensation results from exaggerated jaw movements (speculation)		Leads to abnormal tongue and lip behaviours (Ling, 1976) and consequent speech production
Lips		Exaggerated lip movements of teachers (Ling, 1976) and peers are imitated (speculation)	Heightened feedback (speculation)		Exaggerated lip movements mean that speech production must take longer (speculation)
Mouth		Poor oral tactile discrimination in children who sign (van Uden, 1987)		Neural sensitivity is compromised (speculation)	Lack of tactile discrimination will compromise speech because speech organs are less sensitive (speculation)
Consistency of saliva and level of moistness of mouth	Heightened emotion may lead to a decreased secretion from the salivary glands, leading to increased viscosity of the saliva and a drying of the mouth (Williams and Stevens, 1981)				This clinically observed phenomenon has not been documented for Deaf speakers. It is speculated that the "gluey" consistency of viscous saliva will impede quick movements of the tongue

Primary mechanism affected	Noxious influences on vocal set				Primary resultant speech pathology
	Psychological causes	Educational causes	Kinaesthetic feedback	Physical, neural or postural changes of the speech mechanism	
Tongue				Tongue carriage is immobile and retracted (Stevens et al, 1983)	Impedes production of vowels and consonants (Stevens et al, 1983; Tye-Murray, 1992). May contribute to the distinctive speech quality of Deaf speakers (Tye-Murray, 1992)
Pharynx	Psychological tension leads to pharyngeal tension (speculation)	Teaching strategies where child's throat or larynx are touched (Ling, 1976) lead to pharyngeal tension	Pharyngeal tension may give the child a positive feeling of voice generation (speculation)		Pharyngeal tension (Ling 1976) contributes to resonance problems as it affects laryngeal function, thereby inhibiting modification of pitch (Ling, 1976) and lowering frequency of the second formant (Monsen, 1983)
Velum			Nasalisation may provide stronger and more satisfying orosensory feedback (Kimbrough-Ollers and Ehlers, 1981). It is speculated that this may account in some measure for nasalisation described suprasegmentally (Deal and Haas, 1996), for vowels (Ling 1976) and for consonants (Di Carlo, 1964)	Velum shorter and thinner (McClumpha, 1969). Due to lack of use it atrophies (Mazaheri, Millard and Erikson, 1964, cited by McClumpha, 1969)	Velar pharyngeal mechanism is compromised. Deaf subjects have some degree of velar pharyngeal opening during vocalisation (McClumpha, 1969). This causes nasalisation (speculation)
Nasopharynx				Shorter (McClumpha, 1969)	Shorter (same dynamic occurs as for velum atrophy)



Primary mechanism affected	Noxious influences on vocal set				Primary resultant speech pathology
	Psychological causes	Educational causes	Kinaesthetic feedback	Physical, neural or postural changes of the speech mechanism	
Larynx	Tense larynx, reflective of an attitude of trying (speculation) - a spillover of generalised bodily tension (Ling, 1976)	The Deaf speaker gains the impression that laryngeal, rather than respiratory, muscles control air flow during speech (Hudgins, 1937, cited by Subtelny, 1989) when the teacher touches the child's larynx to, for example, encourage voicing or remedy pitch (Calvert, 1978; Perigoe, 1990)	Increased feedback from laryngeal tactile baro-joint and spindle receptors occurs with the production of faulty pitch (Wyke, 1974, cited by Binnie, Daniloff and Buckingham, 1982) caused by increased laryngeal tension		The extra effort of vocalisation of the profoundly deaf speaker (Wilbeman and Lee, 1967, cited by Subtelny et al, 1989) may result in an excessively high pitch (Subtelny et al, 1989), low pitch (Stevens et al, 1983) or harsh, throaty voice (speculation)
Vocal cords - (poor development)		Where signing is the chosen mode of communication there will be less need for vocalisation. Consequently the vocal folds will be less used and may atrophy (speculation)	Vocalisation provides little kinaesthetic or auditory feedback. This leads to decreased vocalisation which, in turn, means the vocal folds are little used and consequently do not develop normally (speculation)	Weak, partially atrophied vocal folds accompanied by poorly developed laryngeal valving action (Holm, 1970, cited by Black, 1971)	Poor development causes difficulty in approximating and maintaining tension of the vocal folds. This adversely affects the conversion of breath, causing an overlay of whispered noise along with voice and an inability to sustain vocalisation (Holm, 1970, cited by Black, 1971). This has important implications for speech as an ability to sustain vocalisation and speech intelligibility correlate (McGarr and Osberger, 1976, cited by McGarr, 1988)
Vocal cords (nodules)	An attitude of trying may lead a child to strain his voice and develop vocal nodules (speculation)	1. Teaching strategies that induce strain, such as touching the larynx (speculation) 2. Where signing is not allowed and the child is forced to speak, he may strain his voice (speculation)	Abusive use of voice may provide a more satisfactory kinaesthetic feedback (speculation)	Vocal cords that have nodules are physically different to normal vocal cords	Vocal nodules affect voice production (Berry and Eisenson, 1967)

Primary mechanism affected	Noxious influences on vocal set				Primary resultant speech pathology
	Psychological causes	Educational causes	Kinaesthetic feedback	Physical, neural or postural changes of the speech mechanism	
Vocal cords (moistness or dryness of the vocal folds)	A heightened emotional state may lead to a change in the moistness or dryness of the vocal folds (Williams and Stevens, 1981)				The condition of moistness and dryness of the vocal folds can modify the vibratory patterns and thus change the characteristics of the source of acoustic excitation of the vocal tract at the larynx, leading to a different overall spectrum shape for vowels, and possibly to deviation from regular periodic vocal cord vibration during voiced sounds (Williams and Stevens, 1981). This may play a significant role in the deviant characteristics of vowel production and unique vocal quality of the Deaf speaker (speculation)

Source: Based on the authors speculation and extracts from: Berry and Eisenson, 1967; McClumpha, 1969; Black, 1971; Ling, 1976; Calvert, 1978; McGarr, 1980; Williams and Stevens, 1981; Binni, Daniloff and Buckingham, 1982; Stevens et al, 1983; Monsen, 1983; van Uden, 1987; Subtelny, 1989; Tye Murray, 1992

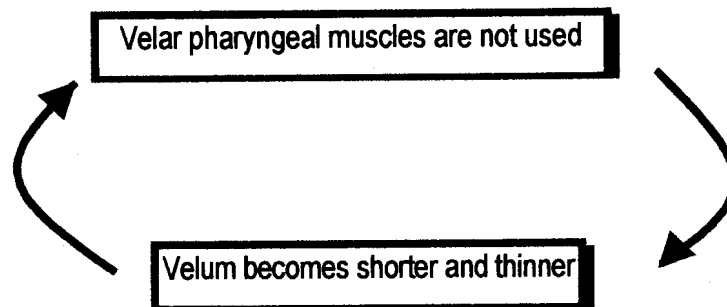
Table 2.2 demonstrates the complex interrelationship between psychological, educational, kinaesthetic, physical, neural and postural aspects of the speech production of the Deaf. It underscores the way the Deaf child's speech is compromised before a single syllable has been uttered.

- **Psychological aspects**, causing anxiety and frustration - have significant consequences for speech production. A negative dynamic is set up. Bodily tension causes laryngeal tension, producing vocal strain which affects the muscles controlling articulatory and vocal cord movement, and levels of moistness in the mouth.
- **Postural** changes, particularly of the tongue, influence speech production. Correct tongue posture is vulnerable to hearing loss, as demonstrated by superior tongue posture of children with high-frequency deafness only. (Stewart, 1969). Considering the importance of the tongue in phoneme production, the implications of impeded functioning are significant. Tye-Murray (1992) has suggested that jaw movement is, in fact, similar to the magnitudes of displacement demonstrated by hearing subjects, but that the difference is in the ratio between tongue and jaw displacement. Deaf subjects move their jaws but keep their tongues relatively immobile, while hearing subjects displace tongue bodies at least twice as much.
- **Physical** changes occur which render Deaf and hearing speakers different. McClumpha (1969) reports that the structure and functioning of the velum and velar pharyngeal mechanism of congenitally Deaf children is inferior to that of hearing children. Deaf subjects had shorter and thinner vellums and shorter nasopharynges. Hearing subjects maintained a velopharyngeal seal during vocalisation, whereas Deaf subjects had some degree of velar pharyngeal opening throughout vocalisation.

The Deaf speaker has no way of knowing whether velar pharyngeal closure has been effected, since nasalisation, a feature of lack of closure, is inaudible to him. He therefore does not develop the ability to sustain velar pharyngeal closure (McClumpha, 1969). McCaffrey et al., (2000) confirm the above by suggesting that Deaf infants produce more nasal than non-nasal consonants in babbling, because they cannot hear that the adult language is characteristically non-nasal. Therefore they are not motivated to close the velarpharyngeal port from the open position manifest in resting and quiet breathing. When the mechanism is not used, it atrophies (Mazaheri, Millard and Erikson, 1964, cited by McCumpha 1969). Nasality is therefore a fault that feeds on itself and leads to organ deterioration,

which in turn means less likelihood of effective use (Ling, 1976).

**Figure 2.4 The self-perpetuating negative cycle that causes the velum to become thinner and shorter**



**Source:** Original graphic based on McClumpha (1969)

The diagrammatic representation above depicts the self-perpetuating negative cycle which continues until the velum has been maximally attenuated.

It is surprising that McClumpha's observations have not been further researched. Currently no further literature is available on the velar pharyngeal structure or functioning of the Deaf population. Not only is his research seldom referred to (of the major workers in the field, only Ling (1976) and Calvert (1978) make brief reference to his finding) but, of even greater concern, many researchers seem unaware of it. Monsen, for example, in 1976 writes incorrectly: "Since the deaf are physiologically normal in all respects save hearing..." (Monsen, 1976:189) and, in so doing, completely ignores McClumpha's findings.

There have been few studies investigating the connection between physiology and speech of the Deaf (McGarr and Osberger, 1982). There are two possible reasons. Certain physical investigations may require invasive procedures researchers are reluctant to perform on children and in addition, this area is traditionally that of medicine, rather than education. Further progress may not occur until interdisciplinary co-operation between the two professions is better established.

A further physical factor is the normal development of the vocal folds which is influenced by frequency of vocalisation. Holm (1970, cited by Black, 1971) estimated the functioning of the vocal folds of a Deaf child of two-and-a-half years as equivalent to a normal child of six months, and that of a Deaf child

of six years as resembling a normal child of two-and-a-half years. Table 2.2 describes how voice quality is affected by poor vocal fold development. Additionally, the ability to sustain vocalisation is compromised and, since there is a correlation between ability to sustain vocalisation and intelligibility (McGarr and Osberger, 1978, cited by McGarr, 1980), this has important implications for speech proficiency.

Neural factors are important. van Uden (1987) has shown that well-developed orostereognosis is not automatic, but develops as a consequence of speech, and varies in Deaf children according to educational method. He cites two studies, one by Ringel et al (1972) showing that children who signed had inferior oral tactile discrimination to hearing children. The second study by Wets and Stalbech (1975, cited by van Uden, 1987) compared a group of what van Uden terms "well orally educated children" (1987:152) between 8 and 10 years of age, with a hearing group. Results showed no inferiority in oral stereognosis of the Deaf compared with the hearing group. In fact, the Deaf group were superior in certain respects. Since oral stereognosis and speech intelligibility correlate (van Uden, 1987), it is possible that this has important implications for speech proficiency.

Turning to **educational** influences, it is ironic that teachers' well-intentioned efforts may cause harm. This may be due to a tense didactic situation which, as Ling (1970) cautions, may cause the child to become tense through apprehension. He advocates that "fun and laughter, during which overall tension is minimal, will lead to a more natural voice than fear of failure" (:213).

Even where the teaching atmosphere is congenial, certain teaching strategies may cause harm. Touching the larynx has been noted in this connection. Another example is where exaggeration, used initially to clarify production, as demonstrated by the photograph below, is not discontinued once the child has mastered the skill (Ling, 1976). This may result in the exaggerated lip movements common to Deaf subjects (Ling, 1976).

**Figure 2.5 A photograph showing a teacher exaggerating her mouth movements during a teaching situation**



Source: Photograph from “Instructional Programme: Speech Production”, American Annals of the Deaf: Nov 1981, Vol 126 No 8:910 (no author noted)

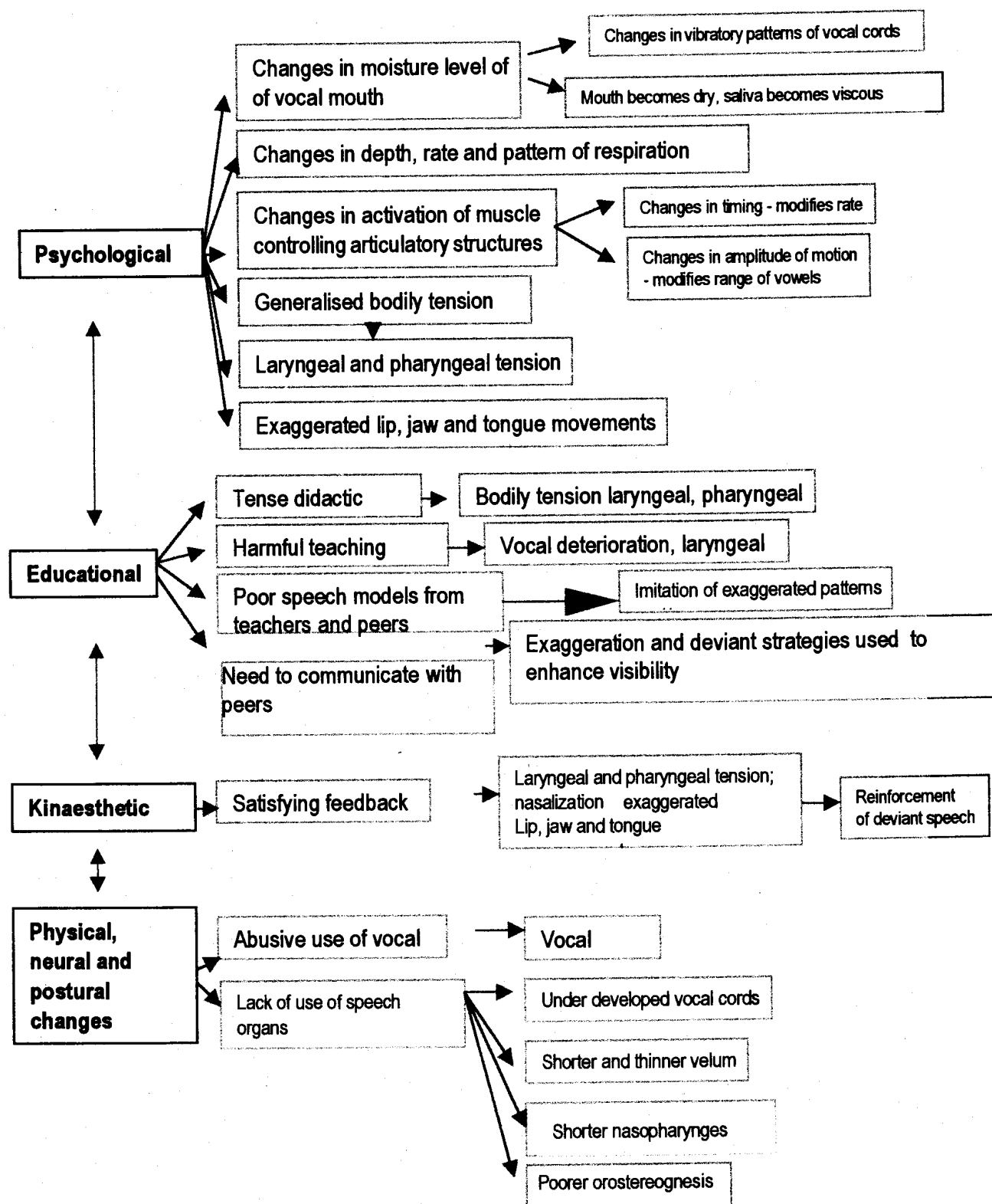
As can be seen, the teacher’s mouth is positioned in an exaggerated posture in an attempt to clarify sound production, probably /S/. The caption that accompanies the photograph reads: “Multi-sensory stimulation was used to improve speech production.”

A complicating factor is that a deviant vocal set may provide the child with a more satisfying **kinaesthetic** sensation. This means that laryngeal and pharyngeal tension, faulty pitch and exaggerated movements of the speech organs are experienced positively, and therefore reinforced.

The information presented in this table serves to highlight both the magnitude and the complexity of the problem of Deaf speech. It is speculated that by understanding the underlying causes, the resultant symptoms, expressed in the unique speech pathology of the Deaf speaker, will be better understood and, consequently, more accessible to remediation.

Figure 2.5 summarises the information from a different perspective.

**Figure 2.6**  
Adverse effects of psychological, educational, kinaesthetic, physical, neural and postural factors on the vocal set of the hearing-impaired child



Source Original graphic based on the same information presented in Table 2.2 based on the same speculations and literature references

Figure 2.5 reiterates how the Deaf child, born with a normal speech mechanism, is rendered different as a speaker in terms of psychological attitude, kinaesthetic appreciation, physical, neural or postural states, - even before a single vocal utterance has taken place. Psychological stress manifests physically, affecting speech in numerous ways. Vocalisation initiated on a mismanaged breath stream passes through a deviantly postured larynx which houses poorly developed vocal cords that cannot adduct with normal strength or sustain vocalisation. This already abnormal voice is misdirected through the nose, because of preferred kinaesthetic feedback, poorly functioning and physically different velarpharyngeal structure, and a slow rate of speaking. The resonance of the voice in the mouth is further affected because the velar arch is different and the tongue is retracted. Finally, superimposed on all these faults, exaggerated articulatory movements further compromise the outgoing vocal utterance. There is an interconnectedness of influences.

### **2.3.1.2 Aberrant use of the breathing mechanism**

Aberrant use of the respiratory mechanism among Deaf speakers has long been known (eg Kinsey, 1833; Bell, 1914, Henderson, 1930; Haycock, 1933 - all cited by Ling, 1976), and suspected by some to be a primary contributor to the speech production problems of hearing-impaired speakers (Hudgins, 1934; Rawlins, 1936; Woldring, 1968; Harris and McGarr, 1980 - all cited by Cavello et al, 1991). Clinically, it is a common observation that profoundly hearing-impaired individuals exhibit abnormal speech breathing patterns (Cavello et. al., 1991).

Investigations suggest that hearing-impaired subjects do not have an abnormal ventilatory function. The biochemical posturing of the chest wall at speech onset, including relative enlargement of the ribcage and compression of the abdomen, are normal (Cavello et. al., 1991). The abnormality lies in the management of the speech air stream (Ling, 1976), particularly the co-ordination and synchrony of the laryngeal and respiratory mechanism of phonation (Ling, 1976; Cavello et al, 1991). This is characterised by tendencies to, firstly, initiate speech from lung volume levels at or below functional residual capacity; secondly, continue speech at lung levels well below functional residual capacity; thirdly, inhale or hold breath at points that are not linguistically appropriate, and, fourthly, expend far greater average lung volumes than hearing speakers (Forner and Hixon, 1977; Whitehead, 1983 - studies cited by Cavello et. al., 1991). Cavello et al, (1991) suggest the last-mentioned factor may explain Forner and Hixon's (1977) finding that hearing-impaired individuals produce only 4,5 syllables



per expiration, compared with normally hearing subjects who produce approximately 13,5 syllables per expiration. Finally, hearing-impaired subjects often expend substantial volumes of air prior to initiation of utterance (Forner and Hixon, 1977, cited by Cavello et. al., 1991).

Improving breathing through instruction does not appear to be a simple solution. Monsen (1979:286) notes: "...it is difficult to describe how to teach systematically the proper control of air pressure and particularly of vocal fold tension to even an adult hearing-impaired individual". He suggests that teachers devote attention to the breathing processes during speech instruction. However, no body of research exists detailing which aspects of such instruction are effective, despite the fact that Hudgins had already, in 1937 (cited by Di Carlo, 1964), demonstrated a high correlation between speech breathing and speech intelligibility.

The complex interrelationship of speech problems of the Deaf is well demonstrated by reference to deviant respiratory functioning. Abnormal breathing patterns cause and exacerbate other problems, including laryngeal tension, straining and poor voice production, Monsen (1979) adds psychological frustration. Wastage of breath leads to lack of available breath, so that the child expends more effort because he must inhale more frequently.

### **2.3.2 VOCAL ASPECTS OF SPEECH PRODUCTION**

This section deals with aspects of speech once vocalisation is initiated.

#### **2.3.2.1 Suprasegmental deviations**

Each of the five areas of suprasegmental voice production can be abnormal in Deaf speakers (Ling, 1976), namely: duration, pitch, intensity, quality, rhythm and intonation.

- **Duration**

With few exceptions, the speech of the severe and profoundly hearing-impaired is perceived as too slow. Osberger and McGarr (1982), Volkner (1938, cited by Ling, (1976) found the average rate of utterance for hearing children was 210 words per minute. In contrast, Deaf children produce only 28-145 words per minute (Ling, 1976). Speech time is lengthened not only because speech segments are prolonged, but also because additional pauses are inserted (John and Howarth, 1965; Boone, 1966; Hood, 1966; Heidinger, 1972; Nickerson and Stevens, 1974; Stevens, Nickerson and Rolling, 1978 - studies cited by Osberger and McGarr, 1982). These may occur at syntactically inappropriate boundaries (Osberger and McGarr, 1982) and could result from poor respiratory control (Osberger

and McGarr, 1982).

Ling (1976) has suggested that prolongation of vowels results from poor teaching methods. Additionally, it is speculated that prolongation provides the hearing-impaired speaker with more satisfying kinaesthetic feedback, as there is more time for sensory appreciation to occur.

- **Pitch**

Among the most noticeable speech disorders of the Deaf are those involving fundamental frequency (Osberger and McGarr, 1982; Angelocci et al, 1964; Boone, 1966; Martony, 1968 - studies cited by Osberger and McGarr, 1982). The more common problem is an inappropriately high voice. A lower than normal pitch, and a pitch that fluctuates abnormally during speech, also occur (Osberger and McGarr, 1982). Pitch may also fluctuate as a function of vowel production (Smith, 1975; Steens et al, 1978; Monsen, 1979; Stuches, cited by Osberger and McGarr, 1982). This will be described in the section on vowels.

Psychological strain, pharyngeal and laryngeal tension which develop as a consequence of inappropriate teaching strategies and preferred kinaesthetic feedback have been noted as causal factors in table 2.2.

- **Intensity**

Speech may be too soft, loud (Markides, 1983) or inappropriate for the social environment (Calvert, 1978).

- **Voice quality**

Voice quality - an ill-defined term which generally appertains to the global impression of the way someone speaks (Monsen, 1979), is commonly deviant in speakers with severe hearing impairment. (Monsen, 1973).

The following are among the descriptors used for the voice quality of the Deaf. Where applicable, causes are suggested:

**Breathy voice** as noted in table 2.2, is caused by excessive and inefficient conversion of breath to voice (Calvert, 1982; McGarr and Osberger, 1982).

**Harsh and throaty** (Calvert, 1982), **strident voice** (Calvert, 1978) results from generalised constriction and tension in both the glottal and supraglottal areas (Calvert, 1978). As noted in table

2.2, the causes may be rooted in the didactic situation or in more satisfying kinaesthetic feedback (Calvert, 1978).

**Nasalised voice** (Deal and Haas, 1992) is function of poor velar pharyngeal closure, slower rate of utterance, preferred kinaesthetic feedback a atrophied velum (Table 2.2).

- **Rhythm (Calvert, 1978), stress (Osberger and McGarr, 1982) and intonation (Ring, 1976) are abnormal**

Early literature describes the speech of congenitally Deaf persons as monotonous and devoid of melody (eg Scripture, 1913; Story, 1917; Russel, 1929; Haycock, 1933; Rawkings, 1935 - studies cited by Osberger and McGarr, 1982). More recent investigations show that Deaf speakers do produce some pitch variations, but that these are substantially less reduced than those of normally hearing speakers (Osberger and McGarr, 1982).

#### **2.3.2.2. Segmental problems: vowels, diphthongs and consonants**

Numerous independent investigations have been remarkably consistent in identifying typical articulatory errors in the speech of hearing-impaired children taught by many different programmes (Osberger and McGarr, 1982). These similarities have been shown by investigations of a descriptive nature, as well as acoustic measurements (McGarr and Osberger, 1982).

#### **2.3.3.2. Comparison of the relative difficulty of vowel and consonant production**

Whether vowels or consonants are more difficult to produce correctly is arguable. Traditionally, it has been accepted that vowels are more likely to be correctly produced (Branne, 1966, cited by Osberger, 1980). Geffner (1980:447) expresses an acceptance of this when she uses the words, "as expected", to state she found more vowels correct than consonants. However, as Osberger (1980) argues, vowel targets are less precise than consonants, and consequently the listener may tolerate greater distortion and therefore report fewer vowel errors. Additionally, there are fewer vowels than consonants in running speech and therefore fewer opportunities for error (Osberger, 1980).

Nober (1967, cited by Ling, 1976) described 70% of vowels as being correct. This optimistic percentage may have been influenced by two confounding variables. Firstly, Nober used judges familiar with the speech of the Deaf (Ling, 1976) and who may consequently have found the speech of Deaf children easier to understand (Markides, 1983). Secondly, it is possible that Nober's subjects had a greater than

average exposure to amplification (Ling, 1976) and therefore made fewer errors.

There are differences between the way vowels and consonants are produced that have implications for the relative difficulty they present to Deaf speakers. Significant differences are summarised in the table that follows.

**Table 2.3 A comparison of relative ease/difficulty of production that vowels and consonants present for Deaf children**

Aspect under consideration	Vowels	Consonants	Judgement as to relative ease of production
1 Audition <ul style="list-style-type: none"> <li>• Intensity</li> <li>• Frequency</li> <li>• Duration</li> </ul>	Louder  Lower pitch  Longer	Softer  Higher pitch  Shorter	Vowels are more audible and therefore easier (Gatty, 1991)  Vowels more audible, therefore easier (Gatty, 1991)  The longer duration of vowels (Gatty, 1991) means there is more opportunity for them to be auditorally perceived. Therefore they are easier (speculation)
2 Range of variation required <ul style="list-style-type: none"> <li>• Mechanisms of adjustment</li> <li>• Length of production</li> <li>• Frequency range</li> <li>• Intensity range</li> </ul>	Less variation  Less variation Less variation Less variation	More variation  More variation More variation More variation	Vowels are easier, as fewer variations need to be learned (Ling, 1976)
3 Precision of articulatory movements required	Less precision required	More precision required (Osberger, 1980)	Vowels are easier (Osberger, 1980)
4 Strength of orosensory feed back	Weaker	Stronger (Ling, 1976)	Consonants are easier (Dagenais, 1992)
5 Accessibility of speech organs to description	Tongue positions for vowels do not provide reference points that can easily be described (Gulian et.al.,	Position of speech organs (including the tongue) are easier to describe, because the tongue is in	Since tongue positions for vowels cannot easily be described, they cannot be monitored for the Deaf (Gulian et.al, 1983). Consonants are easier to describe because the target, point of contact or near contact – is more precise.



Aspect under consideration	Vowels	Consonants	Judgement as to relative ease of production
	1983)	contact or near contact with another speech organ	Consonants are more accessible to description
6 Role of the tongue	All vowels are largely dependent on tongue position (Gulian et.al., 1983), particularly the tongue positioned horizontally. Deaf speakers habitually "bunch" or retract the tongue (Ling, 1976). This means that all vowels are compromised because the tongue posture is abnormal (speculation)	Some consonants do not require correct tongue position for intact production eg /m/ and /f/ Other consonants require a distinctive, virtually uncorruptible tongue position – eg /θ/ Or a tongue position that is not horizontal – eg /l/. This means that the retracted tongue is not a problem for all consonants, whereas it is problematic for all vowels (speculation)	Tongue retraction and immobility will cause more problem for vowels than consonants. As a consequence, consonants are easier (speculation)
7 Suprasegmental involvement	More involvement (speculation). All vowels are produced with the voice, therefore the vowels are compromised if the voice is deviant in terms of quality, pitch or nasalisation	Less involvement (speculation). Not all consonants are voiced. /f/, for example, is not dependent on suprasegmental features	Consonants are easier

Aspect under consideration	Vowels	Consonants	Judgement as to relative ease of production
8 Physical changes of the speech mechanism as a consequence of deafness	Affected more (speculation)	Affected less (speculation)	Consonants are easier
9 Ability of the listener to tolerate distortion	More ability (Osberger, 1980)	Less ability (Osberger, 1980)	Consonants are easier

Source: Compiled and developed from Ling 1976; Osberger, 1890; Gulian et. al., 1983; Gatty, 1991

The above table shows which features of vowels and consonants make for ease or difficulty of production. As can be seen, certain aspects point to the consideration that vowels are easier to produce. They are more audible, as they are produced on a higher intensity and in a lower frequency range that is more accessible to the Deaf (Gatty, 1991), they have less variation in terms of mechanisms of adjustment, length of production, frequency and intensity levels (Ling, 1976), oral/nasal direction and voiced/voiceless contrasts. The higher number of variations for consonants in these areas means that the Deaf child need learn many more vocal strategies and behaviours in order to produce consonants correctly, as compared with vowels.

There are, however, other factors operating which suggest consonants are easier. Most significantly, the orosensory pattern for many consonants is stronger than for vowels (Ling, 1976), as there is an additional tactile component when one speech organ is in contact with another (Ling, 1976). This contrasts to the somewhat "nebulous" (Dagenais, 1992:261) tongue position assumed for vowels, which does not provide strong feedback. Paradoxically, although the tongue position is "nebulous" in terms of feedback, production is complex and precise in terms of the slight variations that markedly affect vowel quality (Monsen and Shaugnesse, 1978 - cited by Guliam et al, 1983). This aspect of vowel production is well expressed by Calvert (1982), who describes in orchestral terminology, the synchrony of vowel production as needing exquisitely fine variations in mouth opening, place and height of arching of the tongue and rounding of the lips. Continuing the metaphor, production of vowels is akin to playing the violin. Positional demarcations and guidelines for the fingers are not clearly defined. Consonant production is comparable with playing the piano - the notes are predictably and clearly marked for easy reference. The demands for execution of a middle C on the violin are more stringent than for the piano, where simply striking the clearly demarcated middle C will produce the correct sound.

It is speculated, that where vowels cannot be learned directly through audition, they are ineffably difficult to teach. The stronger orosensory component of consonants makes teaching them easier.

Although more variations are required for the learning of consonants, the variety of articulatory skills and their contrastive nature may offer an experiential lucidity unlike the amorphous sameness of vowels. In addition, heightened feedback may mean that the finely-tuned articulatory movements of consonants which, at first glance, suggest greater difficulty, actually offer precise more tangible goals than those required for the “nebulous” (Dagenais, 1992:261) tongue positions of vowels, and that, once taught are easier to remember and replicate.

A second judgement of ease on the side of consonant production is that tongue positions, which are largely responsible for vowel quality, do not provide reference points that can be easily described by the teacher (Gulian et al, 1983). It is easier, for example to describe the tongue position for the consonant /n/ (ie “the tongue is up against the palate”) than it is for the vowel /æ/ (ie “the tongue is higher than for /e/ but lower than for /ɜ/”). It is therefore harder to teach vowels by description of tongue position.

A third judgement that works on the side of consonants is the role of the tongue - vowel production relies mainly on the position and shape of the tongue (Monsen and Shaugnessey, 1978 - cited by Gulian et al, 1983). Considering the retracted position and general immobility of the tongue of the Deaf speaker, it is understandable that vowel production is severely compromised. Not all consonants rely on the tongue for correct production; some such as /t/ and the/l/, have an unambiguous movement pattern that overrides habitual tongue immobility and retraction. In contrast, it is probable that the horizontal position needed for correct production of vowels - with the tip resting behind the bottom teeth and the blade subtly lowered or raised - is severely compromised by tongue retraction and immobility.

A fourth judgement viewing consonants as easier, is the speculation that vowels are more dependent on suprasegmental features - than consonants. Pitch, for example, is not a consideration with voiceless consonants. Faults related to duration for vowels seem more noxious than consonants. An /s/, for example, remains an /s/ sound, whether it is short or long, but an /l/ and an /i/ are different phonemes based solely on the element of duration.

A fifth judgement is that physical changes to the speech mechanism, such as the velar arch, may alter vowel resonance, whereas the less subtle movements required for consonant production are more

resistant to these changes. A vowel may be more prone to nasalisation due to lack of velarpharyngeal closure than a consonant because of the clear, orosensory sensation of orality. Two examples illustrate this. A /b/ is virtually propelled orally. An /f/ requires a forceful oral breath stream. Intra-oral pressure will motivate for maximal velarpharyngeal contact. This may compensate for some velarpharyngeal incompetence.

Finally, the superiority that vowels have been accorded on the grounds of more accessible acoustic properties may, in fact, not translate into a relevant basis for improvement of speech production. This is demonstrated in Subtelny, Orlando and Websters (1980) research on consonants and vowels in relation to auditory discrimination and speech production. A pre- post test design was followed. Skills were measured and training was then given in auditory discrimination and speech production. Table 2.4 sets out the results.

**Table 2.4 : Subtelny et.al.,’s 1980 investigation of improvement of vowels and consonants following training in auditory discrimination and speech production**

	Status before training	Improvement following training
<b>Auditory discrimination</b>	Vowels superior	Consonants improve more
<b>Speech production</b>	Consonants superior	Consonants improve more

Source : Based on Subtelny et.al. 1980

Table 2.4 demonstrates that:

- Vowels start as superior in **auditory discrimination**. This is a predictable result as vowels have superior acoustic features.
- Following training in auditory discrimination and speech production, **auditory discrimination** improves more for consonants. Subtelny et.al., (1980) express confusion at this result. According to their expectations the superior auditory features of vowels should have meant they were more accessible to training. This author suggests that speech training activates the speech production – speech perception link (3.1.2.1.). Vestigial auditory traces were potentiated through the haptic avenue when one speech organ is in contact or near contact with another. This is not available to vowels. The production – perception link is not therefore activated.
- Consonants start off superior in speech **production**. Subtelny et. al., (1980) were surprised by this. They expected vowels to be produced better because of their superior acoustic features. The author suggests that consonants are better because the secondary school aged children had received prior



speech training for vowels and consonants. Speech training for vowels did not bring about improvement, whereas speech training for vowels did.

- Consonant **production** improved more following training than vowel production. Subtelny et.al., (1980) were surprised at this result. They expected greater improvement in vowels because of their better acoustic features. The writer suggests this finding supports her belief that, although consonants have inferior auditory features, they are more accessible to training because of superior orosensory gestalts.

The observations that cause confusion to Subtelny et. al., (1980) support the author's view that vowel production is less accessible to training than consonant production. This gives a clear mandate for the emphasis on consonant development in the proposed programme.

The following two sections look at common production errors of vowels (and diphthongs) and consonants among Deaf speakers. Stress is laid on understanding causal factors. In this vein, speech faults are viewed as an entry point to understanding the Deaf child's perception of speech i.e, what he is producing is the result of what he perceives. Speech production is therefore a good guide to speech perception (Montgomery, 1967 - cited by Monsen, 1978). Faulty production of speech is a valuable clue to the nature of the misperception.

#### **2.3.2.2.2 Common vowel and diphthong errors**

Lip spreading and rounding are visible for certain vowels. They are not, however, complete sources of information, since the major player, the tongue, cannot be seen. Additionally, visual clarity is influenced by several variables, including the speaker's characteristic mode of production, whether speech is accompanied by a smile, and what sounds precede or follow the vowel (Ling, 1976). Tongue position can sometimes be seen (Ling, 1976), but is, for the most part, invisible (Wold et.al., 1994). A complication in categorising vowel errors is the lack of absolute delineation between suprasegmental aspects and vowel elements. Consequently pitch, intensity, duration and voice quality, described above for suprasegmental aspects, impact on vowel production.

In addition to suprasegmental considerations, five problems are associated with vowel production – prolongation, neutralisation, substitution, diphthongisation and exaggeration (Ling, 1976; Markides, 1983).

These are represented in table 2.5.

**Table 2.5 : Common faults of vowel production and their causes**

Fault	Causes
Neutralisation	Inability to hear the second formant (Deal and Haas, 1992) Tongue position is generally invisible (Wold, 1994). Weak orosensory feedback from nebulous tongue position (Dagenais, 1992)
Substitution	Tongue position is generally invisible (Wold et.al., 1994). Weak orosensory feedback from nebulous tongue position (Dagenais, 1992)
Prolongation	Harmful teaching practices (Ling, 1976) Provides heightened orosensory feedback (speculation)
Diphthongisation	Vocalisation continues after completion of vowel production while the tongue moves to a new position (speculation)
Nasalisation	Compromised velarpharyngeal function (McClumpha, 1969) Increased kinaesthetic feedback (Kimbrough-Oller and Eilers, 1961) A consequence of slower rate of speech (Bjork, 1961, Bzoch, 1965 - Studies cited by McClumpha, 1969)

Source: Compiled from: Hudgkins 1934, cited by Kimbrough-Oller and Eilers, 1981; Manigan, 1961, cited by McGaffrey and Sussman, 1994; Angelocci, 1964, cited by Ling, 1976; Boone, 1966, cited by McGaffrey and Sussman, 1994; Dickerson and Bolling, 1976, cited by Kimbrough-Oller and Eilers, 1981; Ling, 1976; Monsen, 1978; Wold et.al., 1994; Osberger and McGarr, 1982; Markides, 1983; Deal and Haas, 1992; Perigoe, 1992; McGaffrey and Sussman, 1994

Table 2.5 demonstrates invisible tongue position, heightened orosensory feedback from faulty production, lack of orosensory feedback from nebulous tongue position, and harmful teaching practices combine to cause faulty vowel production. The discussion that follows expands on these premises.

- **Neutralisation**

Vowels approximating the neutralised schwa are often produced in place of those which require a more specific vocal tract configuration (Ling, 1976; Deal and Haas, 1996). Neutralisation of certain unstressed vowels is a normal speech process. However, Deaf speakers neutralise vowels extensively and inappropriately (Ling, 1976). This is the most common vowel production fault (Angelocci, 1964, cited by Ling, 1976; Perigoe, 1992; McGaffrey, Osberger and McGarr, 1982). It has been observed

**perceptually**: one vowel sounds very much like another (Angelocci et al, 1964 - cited by Ling, 1976) as a neutral, indistinct, schwa-like sound (Monsen, 1978); **acoustically** measured formant frequencies show vowels tend to / / (Osberger and McGarr, 1982; Angelocci, Kopp and Holbrook, 1964; Monsen, 1976. Latter two references cited by Dagenais, 1992) and, **physiologically**, the tongue shows relatively minimal movement (Daenais and Critz Crosby, 1992; McGarr and Gelfer, 1983; Tye-Murray, 1991 - all cited by Dagenais, 1992).

It is suggested that lack of hearing of the critical second formant is the cause (Deal and Haas, 1996).

- **Substitution**

Neutralisation is a form of substitution (Ling, 1976; Osberger and McGarr, 1982). The general rule for substitutions is that they are exchanges among near neighbours along the vowel quadrilateral (McGaffrey and Sussman, 1994).

- **Prolongation**

This fault is closely linked to the problem of speaking rate, described earlier. Vowels may be inappropriately lengthened. Calvert (1961 cited by Kimbrough-Oller and Eilers, 1981) found that durations of unstressed vowels were nearly five times as long, and stressed vowels nearly twice as long in deaf subjects compared with hearing speakers (Kimbrough-Oller and Eilers, 1981).

Ling (1976) ascribes harmful teaching practices as an almost exclusive cause of prolongation. The author suggests further additional factors may also contribute. Firstly, the extended length of the phoneme may provide more satisfying kinaesthetic feedback, providing a longer temporal opportunity to experience an orosensory gestalt and, secondly, prolongation may be reflective of an attitude of trying.

- **Diphthongisation**

A vowel sound may be produced in two parts, as if it were a diphthong (Markides, 1983). The authors speculates that the child inadvertently continues vocalising after he has completed vowel production, while the tongue moves towards its next target, thus producing an additional sound.

## **Nasalisation**

A high proportion of vowels of hearing-impaired speakers are nasalised (Hudgkins, 1934, cited by Kimbrough-Oller and Eilers, 1981). This has been physically demonstrated (Nickerson and Bollins, 1976, cited by Kimbrough-Ollers and Eilers, 1981).

Lack of velarpharyngeal closure, functional changes of the velum, increased feedback and slower rate of speaking have been ascribed as causes (Table 2.2).

- **Exaggeration**

Exaggerated movements of lips and jaw occur with considerable frequency among Deaf speakers (Ling, 1976). This fault is exacerbated by prolongation, which allows time for the articulators to assume extreme positions (Ling, 1976).

This fault has been discussed in the section describing vocal set. Causes were ascribed to poor teaching methods and speech models (Ling, 1976), and the authors speculation that exaggerated lip movements provide a stronger orosensory feedback. Additionally, it is possible that exaggeration may be used as a strategy to gain greater visual clarity to promote understanding by peers.

- **Omission of one element of the diphthong and prolongation of the other**

Diphthongs – being made up of two or more vowel sounds – are subject to the same errors as described for vowels. In addition, one component – usually the final – may be dropped, and the remaining one prolonged (Markides, 1983).

### **2.3.2.2.3 Aspects of maximal vowel contrast**

Boundaries of vowel changes are close and definitive descriptions for each vowel and corresponding production faults would be cumbersome and repetitive. For this reason, the productions of vowels in positions of greatest contrast, are described. Rules for intermediate vowels can be extrapolated on a continuum basis.

**Table 2.6 : A comparison of correct production and pitch stability of contrastive vowels**

Vowel contrast	More often correct	Reason
<b>High</b> compared with <b>low</b> vowels	Low vowels (Osberger and McGarr, 1982)	Habitual retracted tongue position favours low vowels (speculation)
<b>Back</b> compared with <b>front</b> vowels	Back vowels (Mangan, 1961; Boone, 1966; Nober, 1967; Smith, 1975; Geffner, 1980 - all cited by McGaffrey and Sussman, 1994)	Habitual retracted tongue position interferes with front vowels (Wold et.al., 1994; Boone, 1966 - cited by Osberger and McGarr, 1982) and favours back vowels
<b>High back</b> vowels compared with <b>high front</b> vowels	High back vowels (Monsen, 1978)	Firstly, habitual tongue retraction interferes with high front vowels and favours high back vowels. Secondly, the highest back vowel, /u/, has a more intense, lower frequency than the highest front vowel, /i/ (Wold, 1994). This may make it more audible. Thirdly, the distinctive rounded lip position for /u/ may "trick" listeners into believing they have heard /u/ correctly (speculation)
The <b>highest vowels</b> (/u/ and /i/) compared with all other vowels in relation to pitch stability	All other vowels	Tongue position for /u/ and /i/ causes laryngeal involvement and consequent pitch change (Honda, 1981, cited by Osberger and McGarr, 1982)

Source: Original graphic based on speculation and the following references: Mangan, 1961; Boone, 1966; Nober, 1967; Smith, 1975; Geffner, 1980, all cited by McGaffrey and Sussman, 1994); Monsen, 1978; Wold, 1994; Honda, 1981, cited by Osberger and McGarr, 1982.

Table 2.6 demonstrates that back vowels and low vowels are more advantaged by habitual retracted tongue posture than their contrastive partners. The highest vowels, both front and back, ie /u/ and /i/, are subject to abnormally high pitch production that does not occur for relatively lower vowels. Deaf subjects who have a relatively normal or characteristically monotonous voice, may produce the vowels /u/ and /i/ on a higher than normal pitch (Honda, 1981, cited by Osberger and McGarr, 1982). This may be caused by movement of the tongue root forward for the production of these two high vowels, which causes the thyroid bone to move upwards thus increasing tension of the vocal folds and raising pitch.

#### 2.3.2.2.4 Common consonant errors

There is an overall pattern of consonant error among the hearing-impaired that has been replicated in numerous studies (Osberger and McGarr, 1982).

The traditional grouping of consonant faults according to omissions substitutions, distortions and additions is used to categorise faults of Deaf speakers. This system has been adopted by numerous researchers, (Hudgkins and Numbers, 1942; Geffner, 1980; Calvert, 1982). Geffner (1980) gives the following figures for vowel and consonant production errors:

**Table 2.7: Proportion of omissions, substitutions, distortions and additions in deviant consonant production**

Omissions	91%
Substitutions	72%
Distortions	1%
Additions	0,19%

Source: Geffner (1980) presented in a tabulated form

The table clearly demonstrates that omissions are the largest category of speech fault, followed by substitutions and, to a far lesser degree, distortions and additions.

The section that follows examines each category of error.

- **Omissions**

Table 2.8 views consonant omissions.

**Table 2.8 : Consonant Omissions**

Consonant type/phonetic environment	Pathology
Single consonants	Back consonants omitted more frequently than front consonants (Geffner, 1980)
Affricates	One element dropped, usually fricative element (Osberger and McGarr, 1982)
Clusters and blends	Elements omitted (Kimbrough-Oller and Eilers, 1981)
Sonorous and fricative consonants	Consonants of sonority and frication omitted more frequently (Geffner, 1980)
Consonants according to position in words	Consonants are omitted in all positions – i.e., initially, medially, and finally - most often finally (Osberger and McGarr, 1982)

Sources: Geffner, 1980; Kimbrough-Oller; Osberger and McGarr, 1982

Table 2.6 demonstrates several important principles. The first is that back consonants are more problematic. It is logical to assume that visibility plays a role, and therefore the invisible back consonants are more disadvantaged. The second principle is the vulnerability of the feature of continuance. The feature of continuance consists of the combination of sonorous and fricative consonants, both of which are more frequently omitted. Underscoring this premise, in affricates the fricative element is more frequently omitted than the plosive.

One further example, not included in table 2.6, provides additional support for this theory.

- /k/ and /ŋ/ present equal difficulty in terms of position - both are back consonants, therefore cannot be easily seen. Yet /ŋ/ is more frequently omitted (Geffen and Freeman, 1980).

These examples support the author's new view that the feature of continuance in consonants is extremely vulnerable. Consonant and vowel production in the Deaf seem to operate in a temporally, diametrically opposed dynamic. **Vowels are prolonged** (Markides, 1983) **and consonants are generally shortened**. It is possible that this abnormal temporal dynamic plays an important role in creating the unique quality of the speech of the Deaf.

- **Substitutions**

Where audition is not available, lip-reading is the primary source of speech production information (Dodd, 1976). Lip-reading is a confusing avenue for speech information. Only /f/v/ and /θ/ð/ have direct visual cues (Ling, 1976) and, even then, the voicing distinction between surd-sonant pairs is invisible. Many sounds which are auditorially different are visually identical (Markides, 1983). Sounds which share the same visual appearance are termed visemes (Owens, 1978). It follows that sounds that cannot be heard to be different, and look identical, will be pronounced identically. The following is a fundamental concept : **substitutions occur frequently within viseme groups, but seldom across them** (Osberger and McGarr, 1982). This is tabulated in table 2.9.



**Table 2.9 : Common substitutions and rationale**

Substitution	Cause
Voiced/Voiceless counterparts may be substituted, (Ling, 1976; Monsen, 1976; Calvert, 1982; Osberger-McGarr, 1982)	Voicing is an invisible feature which cannot be lip-read. Therefore surd/sonant cognates are substituted.
Nasal/Oral substitution occurs (Ling, 1976; Calvert, 1982). Nasal consonants become oral stops (Osberger and McGarr, 1982). This is especially common for visemes (Calvert, 1982)	Nasality and orality are invisible features which cannot be lip-read., Therefore they are confused - The vulnerability of the feature of continuance is demonstrated.
Glottal stops substituted for any phoneme (Osberger and McGarr, 1982)	The neutral /ʔ/ sound made by sudden adduction and abduction of the vocal cords is invisible and relatively amorphous, cannot be lip-read, and is therefore randomly substituted
Plosives substituted for fricatives, not vice versa (Osberger and McGarr, 1982)	A plosive and a fricative within the same viseme group are visually identical. The vulnerability of the feature of continuance is again demonstrated.

Sources: the authors views and Monsen, 1976; Calvert, 1982; Osberger and McGarr, 1982

Table 2.7 demonstrates the limited amount of information lip-reading provides and the confusion it causes. As regards voiced/voiceless confusion, some controversy exists as to whether the voiced or voiceless counterpart is most commonly used. Heider (1941) and Car (1943) (both cited by Osberger and McGarr, 1982) believe the voiceless counterpart to be most commonly substituted. Nober (1967), Markides (1970) (both cited by Osberger and McGarr, 1982) and Monsen (1976) - who used acoustic analysis - hold the view that the voiced counterpart is most often incorrectly substituted. The assumption held by the author is that the voiced counterpart is more frequently incorrectly substituted. This judgement is partly subjective based on clinical experience, and partly an evaluation of the difficulty of quickly changing vocalised voice production into unvoiced production to accommodate a voiceless consonant. The vocal act of maintaining vocalisation would seem to be easier and more natural and thus more frequently used. Additionally, teaching a voiceless consonant is easier than teaching a voiced consonant, because the voiceless counterpart is contrastive to ordinary vocalisation, and offers a clearer experiential gestalt, and is less able to be corrupted because suprasegmental features are not operative. Teaching a voiced consonant is held to be more difficult because of the lack of a clear experiential gestalt.

Table 2.7 demonstrates, the vulnerability of the feature of continuance - plosives are substituted in place of fricatives, not vice versa, and nasal continuants become oral stops. Features of frication and sonority, which combine to form continuance, are shown to be extremely vulnerable.

- **Distortions**

Distortions of the intended phoneme may resemble non-English phonemes or be unidentifiable (Osberger and McGarr, 1982). Stops, /p/t/k/b/ and /g/, may be distorted by the excessive degree of force used in their production (Calvert, 1982).

- **Additions**

Sounds may be incorrectly added, termed epenthesis (Ling, 1990).

- There may be cluster creation - a /t/ becomes /st/ (Kimbrough-Oller).
- The neutral swcha may be erroneously added, firstly within a word, creating two separate syllables where there should be one (van Uden, 1987), secondly, word finally (Deal and Haas, 1996), as in the following example van Uden 1987:8): “We went(e) to town(e)” and, thirdly, in between the elements of a blend - for example, as in “g-lad” (Van Uden, 1987:8).

Harmful teaching methods have been suggested as the cause (Ling, 1976; van Uden, 1987).

#### **2.3.2.2.5 Vowels and consonants in connected speech**

Any description of single vowels and consonants as static entities is simplistic. Phonemes in connected speech influence each other in complex ways, and a definitive description of each phoneme in its myriad phonetic contexts is not within the scope of this study. The examples below to demonstrate some of the complexities.

- Although /f/ and /v/ are classified as fricatives, they are not inevitably characterised by turbulence. In running speech /v/ - as in the word “very” - may have no fricative turbulence, and /f/, as in the word “fat”, very little. They may be pronounced as if they were alveolar or dental stops (Reddy, 1967, cited by Ling, 1976).

- Not all nasals are voiced. Following /s/ as in the word “small”, the /m/ may be partly or wholly unvoiced. The /n/ is unvoiced in the word “snow” (Ling, 1976).
- Acoustic measurement has shown that for normal speakers, the same vowel is shorter when it precedes a voiceless consonant than when it precedes a voiced consonant in stressed syllables (Denis, 1955; House and Fairbanks, 1953; Peterson and Lehiste, 1960; House, 1961, studies cited by Osberger and McGarr, 1982). Additionally, where a vowel precedes a voiceless plosive, the duration of the occlusion of the plosive is longer than when the vowel precedes a voiced plosive (Van Uden, lecture material, 1987 international course). The example below demonstrates both these principles.

In the word “hoppy”            -/p/ is a **voiceless** plosive  
   -/o/ is shortened  
   - the duration of lip occlusion for /p/ is lengthened

In the word “hobby”            - /b/ is a **voiced** plosive  
   - the /o/ is lengthened  
   - the duration of lip occlusion for /b/ is shortened

These examples serve to underscore the precise and complex nature of phonemes as used in connected speech.

#### 2.3.2.2.6 Intelligibility and type of speech error

The relationship between specific error type and intelligibility has not been clearly established. Traditionally, vowels were associated with sonority and consonants with intelligibility (Ling, 1976). This could be because of the analogy with writing (Monsen, 1978), which shows that consonants carry meaning. However, vowels sounds also differentiate between words (Ling, 1976).

Correlational studies at the segmental level show a high degree of association between the frequency of errors and reduction of intelligibility. Of the various error types that have been studied, the highest correlations have been reported for overall amounts of phonemic errors, omissions of phonemes word-initially medially, substitutions involving a change in the manner of articulation, substitutions of non-English phonemes, and unidentifiable or other gross distortions of the intended phoneme. At the suprasegmental level, timing errors and errors involving poor phonatory control have been found to have a negative effect on intelligibility (summarised from Osberger and McGarr, 1982:276).

Over and above the common faults described, there is some instability of fault patterns (Mets et al, 1990).

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## **2.4 CONCLUSION**

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This chapter describes variables and problems relating to speech of the Deaf. The aim is to provide not just a simple catalogue of speech faults, but to go beyond that parameter, and provide an understanding of the underlying dynamics which cause these systematic deviations, and demonstrate that a coding structure is operative (Osberger and McGarr, 1982, cited by Abdelhamied, Waldron and Fox, 1990). This causes speech to be produced consistent with typical Deaf patterns and, as such, creates a Deaf norm (Abdelhamied, Waldron and Fox, 1990). A major clue to understanding the different coding structure, is the appreciation of the concept that speech production errors are a good guide to faulty speech perception (Montgomery, 1976, cited by Monsen, 1978). A major cause of error is related to the incorrect and confusing messages lip-reading provides. The general rule may be simplistically stated: As they perceive it, so shall they pronounce it.

The following chapter moves away from a focus on problems and views potential solutions that have been devised by educators in various geographical and historic contexts. These will be appreciated against the backdrop of the theory set out in this chapter.

## **CHAPTER 3 : THEORIES OF SPEECH TEACHING FOR THE DEAF**

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### **3.1 INTRODUCTION**

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The direction taken now shifts from a focus on problems to one of solutions, what has been done historically is being done contemporarily and can be done potentially. This “menu” of available options provides a theoretical framework for Chapters Four and Five which describe empirical research into educator needs for speech instruction. This chapter details what is available to fill those needs. Similarly, it provides a theoretical framework for Chapter Six which describes the proposed speech programme. The description and evaluation of available options presented in this chapter substantiate, to a large degree, the rationale for design of the proposed programme. The theory presented in this chapter thus forms a basis for the understanding of subsequent chapters.

Where a system or theory is well documented, as is, for example, Ling’s (1976), - or is only important historically, less detail is provided. In contrast, those theories considered significant and which have not been described in depth as they relate to speech teaching for children with hearing losses, are described in greater detail. An exception to this, is the lack of detail accorded to techniques of vocal improvement used in speech and drama. Although these have not been described in relation to speech improvement for children with hearing losses, the vastness of the subject has means that only a brief foray could be made explaining basic precepts.

The chapter begins with a brief account of the historical roots of speech teaching for the Deaf. Some issues are still relevant. These include paradigm shifts in attitude towards the Deaf as a group, which occurred as a result of advances in medicine, science and changes in societal norms. Additionally, theories and strategies that have stood the test of time are briefly reiterated, and the genesis of the oral-manual controversy is viewed within historical context. Following that, an overview is given of the development of speech teaching for the Deaf in modernity, describing and evaluating the work of

important educators in the field, as well as technological advances. A description is given of how newer educational trends can be exploited to improve the speech of Deaf children. These include approaches both in general education and speech pathology. Evaluations of singing and vocal techniques used by actors, are the final items on the menu of available options.

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### 3.2 SPEECH TEACHING FOR THE DEAF HISTORICALLY

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This brief account describes major figures and trends and attempts to demonstrate how speech teaching reflected issues of the time. Awareness of the time link is an important consideration in analysing how current trends are influenced by contemporary issues.

The distinction of **first teacher** is generally accorded to Spanish Benedictine monk, Pedro Ponce de Leon (1510 (?) - 1584) (Lowe, 1991). Deafness was relatively common among upper-class Spanish families as a result of inter-marriage. Wealthy parents were anxious that their Deaf children learn to speak because Spanish law decreed that only those Deaf who were able to speak were entitled to full legal rights (Kapp, 1976). Few records remain, but it is known that De Leon based his teaching on written language. He educated numerous Deaf pupils, drawn exclusively from aristocratic families (Markides, 1983). The wording on Ponce's epitaph supports the then prevailing view that teaching the Deaf to talk was largely regarded as the realm of the miraculous: "Here lies the venerable Father Pedro Ponce who deserves to be eternally remembered for his gift, given to him by G-d, for making the dumb to speak." (Markides, 1983:7).

The **first textbook** on teaching the Deaf is credited to another Spaniard, Juan Pablo Martin Bonet (1579 - 1633) (Kapp, 1976). Bonet was not a teacher but a soldier, man of letters and politician who served an aristocratic Spanish family of a Deaf boy (Markides, 1983). In order to help the child he observed, and subsequently published, the methods of fellow Spaniard, Ramirez de Carrion in a book he entitled "Simplification of the Letters of the Alphabet and Method of Teaching Deaf-Mutes to Speak" (Bonet, 1620 in Markides, 1983). He made no mention of De Leon or De Carrion and was accused of plagiarism and fraud (Markides, 1983).

Bonet described how a leather tongue could be used to clarify tongue position to the Deaf speaker. It is interesting to note that Ling (1976), still advocating this strategy, uses Bonet (1620) as the formal reference. Bonet described a system of using the written form with the spoken form of the alphabet (Markides, 1983) which has much in common with the Association Phoneme Method described much later by Mildred McGinnes (Davis and Hardwick, 1981). Bonet noted the connection of good speech production and a relaxed teaching situation, and advocated that speech teaching be conducted in restful surroundings (Kapp, 1976). The potential of a tense didactic situation to deleteriously influence voice, as described in Chapter 2 (2.2:18) remains a problem. The influence of the Spanish pioneers spread throughout Europe (Markides, 1983).

The 17th century was a turning point in the education of the Deaf, as it was then that the assumption that dumbness was the inescapable and incurable accompaniment to deafness was rejected (Kapp, 1976). In addition, economic prosperity created a favourable climate for the advancement of science and there was an increasing interest in deaf-mutism as a scientific phenomenon among doctors and philosophers (Kapp, 1976). One of the most influential teachers of that time was Joseph Amman (1669 - 1724), a Swiss-born doctor who lived in Holland. His influence was significant because he published an account of his teaching methods. This was in contrast to many of his contemporaries who, for financial gain, jealously guarded their techniques (Kapp, 1976).

Today, while speech-teaching strategies are not withheld for financial gain, a similarity remains in that many remain unknown to the vast majority of educators - what is known scientifically does not necessarily find its way into the classroom (Ling, 1976). This may be in part because speech teaching is so complex a task that it is difficult to set down and describe. Over and above that consideration, lack of and inappropriate literature reflects the paltry and inferior effort that has been extended towards making methods accessible for teachers.

Amman gave a detailed analysis of sounds, dividing them into vowels, semi-vowels and consonants, and demonstrated a wide area of knowledge, such as the structure and function of the soft palate and the modified formation of sounds in combination (Kapp, 1976). The connection between writing and speech was used extensively (Markides, 1983) - a practice advocated in modern times by Van Uden (Van Uden, 1968).

As the education of the Deaf proceeded, motivation changed from religious benevolence, scientific curiosity and financial gain to one of social conscience (Kapp, 1976). This led to the establishment in 1700 of the **first schools for the Deaf**.

This century also saw the beginning of the long controversial “**war of methods**” **between oralists and manualists**. An example of how personalities affect the course of education can be seen in a description of the following event. In England Braidwood established an oral school for the Deaf which acquired a prestigious reputation for speech skills (Markides, 1983). At the same time, in France, Abbé de l'Epee conceived of the idea of education for all Deaf children, including the poor (Markides, 1983), using signs as the medium of communication (Kapp, 1976; Markides, 1983). Thomas Hopkins Gallaudet was sent to England to learn the oral method; however, the secretiveness of the Braidwood's led him to France, where he was given generous help by Abbe de l'Epee in the signing method, which he subsequently established in America. The Gallaudet College of America, which teaches Deaf college students using the medium of signing, has its roots in this event (Markides, 1983). Although the secretiveness displayed by the Braidwood's is no longer a feature of Deaf education, the polarisation that existed even then remains a problem.

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### 3.3 SPEECH TEACHING FOR THE DEAF CONTEMPORARILY

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#### 3.3.1 IMPORTANT EDUCATORS

Because Deaf education originated sporadically in different countries and many pioneers tried to keep their strategies secret, diverse methods arose (Kapp, 1976). Change arose out of technological advances, especially in the improvement of hearing apparatus, and in the sharing of knowledge when educators published techniques.

##### 3.3.1.1 England: Haycock and The Ewings

- **Sibley Haycock**

In England Sibley Haycock published *The Teaching of Speech* in 1933 (Chapter 2). It has become a classic and has been reprinted 19 times, the last printing being in 1979 (Markides, 1983), and is



still referred to frequently. Both Ling (1976) and Markides (1985) include it among their references of notable books for speech teaching.

Haycock's method was systematic (Markides, 1983). He trained both prosodic and articulatory aspects of speech and gave accurate descriptions of phoneme production (Markides, 1983). In addition, he described a variety of strategies for teachers on sound acquisition and correction. The method was primarily visual, dependent on lip-reading and direct imitation assisted by touch and kinaesthetic sensation (Markides, 1983). A critical evaluation has already been presented in Chapter 1.

- **The Ewings**

Also in England, a short time later a married couple, the Ewings, exerted a significant influence. They were particularly interested in the development and teaching of speech (Markides, 1983) and described their methods in a book entitled *Speech and the Deaf Child*, published in 1954. Methods were similar to those put forward by Haycock (Markides, 1983). One difference was their emphasis on the use of residual hearing, as they were able to take advantage of recent hearing aid advances.

In 1964 they described a new speech teaching technique they termed the Simultaneous Listening, Reading and Speaking (LRS) method, which relies heavily on the use of residual hearing and reading. The teacher reads the material aloud, employing natural prosodic patterns and uses a pointer simultaneously to follow the printed line being spoken. The pupil then approximates the teacher's utterance while keeping pace with the movement of the pointer (Markides, 1983). McMahon and Subtelny (1981) re-evaluated the effectiveness of this method and found that intelligibility, both for oral reading and spontaneous speech, improved significantly.

### **3.3.1.2 America: Daniel Ling**

In America several books were published on speech teaching. Examples include those by Calvert and Silverman, first published in 1975, and Vorce, first published in 1974. However, the first book that set out a sequential speech teaching model (Davis and Hardwick, 1981) was that of Daniel Ling (1976), some aspects of which have been discussed in Chapter 1, and will not be reiterated. The "Ling thing" (Davis and Hardwick, 1981:276) grew rapidly in popularity and was soon established as the teaching method most followed (Newton and Dunne, 1985; Bunch, 1987). It is unusual to come across an article dealing with speech that does not refer to Ling's methods (eg Le Blanc, 1985; Perigoe 1991; Cole,

1992; Gatty, 1992; Dagenais, 1994, etc). Davis and Hardwicks' observation in 1981, that Ling's system constitutes the most systematic and best thought-out programme, remains valid 20 years later. Possibly a major reason for his popularity is the planned security offered by the programme. Following his step-by-step approach, the teacher knows where to start and how to proceed.

The approach is largely phonetic, - the underlying assumption being that automaticity on the phonetic level will carry over to the phonological level. Seven sequential stages of speech acquisition are listed: voice on demand; control of suprasegmental patterns; vowels; consonants by manner contrast; consonants by manner and place contrast; consonants by manner, place and voicing contrast; and, lastly, word initial and final blends. Lessons are of short duration, with a heavy emphasis on drills. Little use is made of the mirror (Ling, 1976).

### **3.3.1.2.1 Critique of Ling**

Despite the acknowledged contribution, it is also clear that there are inherent weaknesses in the system. Two of these namely, the level of language used to explain the programme to teachers, and the lack of a child-centred approach, were discussed in Chapter 1. Three additional criticisms are:

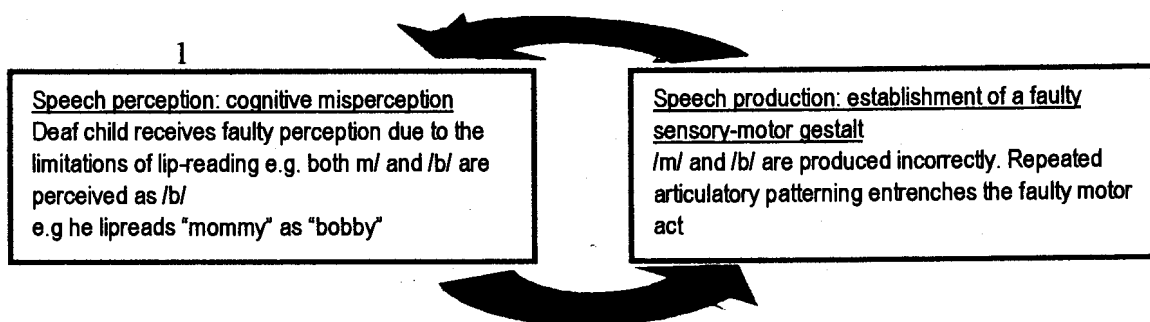
Too little emphasis is placed on the phonological aspect (Newton and Dunn, 1985). Ling believes that skills fully mastered at the phonetic level will require little, if any, instruction at the phonological level and suggests complete mastery at the phonetic level before beginning work at the phonological level (Newton and Dunn, 1985). Criticism has been levelled at the disproportionate amount of time expended on the phonetic level of training, especially with children who have useful residual hearing (Newton and Dunn, 1985). Additionally, it has been postulated that working on nonsense syllables may not facilitate generalisation of motor speech skills to meaningful linguistic units (Osberger, 1983; Abraham and Winer, 1985, both cited by Newton and Dunn, 1985). The direction taken in this author's study is that the amount of phonetic practice Ling lays down is appropriate, but there is a lack of additional provision for practice on the phonological level.

A second source of criticism relates to the fact that Ling deals with a specific sound and then moves on to the next one without a planned structure for revision. It is as though he regards the completed drill sequences as permanently "fixing" or "curing" the incorrect sound. The comments of DiCarlo (1976), who reviewed Ling's book the same year it was published, support the criticism that Ling seems to be

describing a foolproof formula based on a model that looks good on paper, but may not be valid in practice. Di Carlo asks: “The model imposes a lawfulness deductively derived and consistent with logico-mathematical models. But does the model satisfy logical necessity, rather than the processes and operations that fall within the rubric of empiricism?” (DiCarlo, 1976:230)

It is speculated that Ling’s model portrays an unrealistically optimistic outcome that does not reflect how exceedingly resistant incorrect production is to permanent remediation. The Deaf child continuously receives incorrect perception of sound production through the confusion inherent in of lip-reading. An example to clarify this is the Deaf speaker’s tendency to substitute /m/ and /b/ sounds. He does not hear that the phonemes are different, and when lip-read in connected speech, they appear to be identical. Consequently he may pronounce “mommy” as “bobby”. Every time he is presented with the word “mommy”, he will lip-read and cognitively internalise the faulty pattern, ie “bobby”, thus creating a negative cycle whereby the fault becomes entrenched. This is represented diagrammatically in figure 3.1.

**Figure 3.1: The negative cycle of speech perception and production**

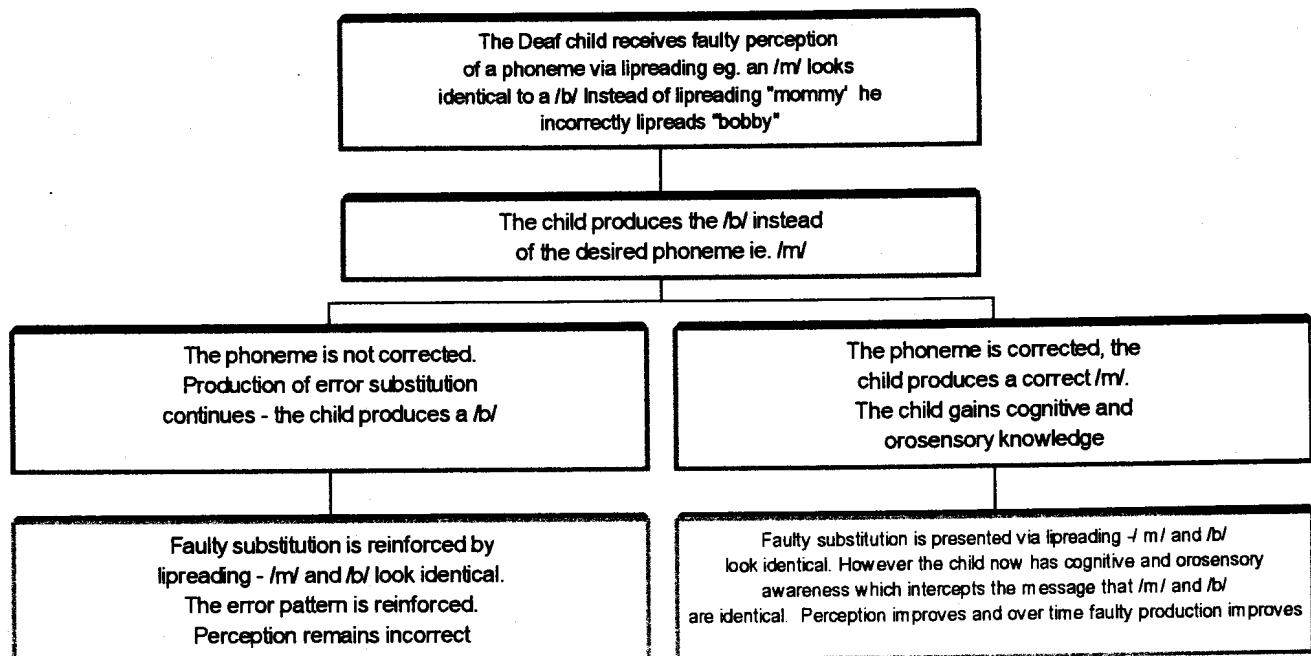


Source: Original graphic based on speculation

Figure 3.1 shows the negative cycle that faulty speech reading may perpetuate and how speech faults become entrenched due to incorrect cognitive patterning.

Figure 3.2 graphically represents a possible contrast between deviant production left uncorrected and deviant production that is corrected.

**Figure 3.2: Contrast between deviant production left uncorrected and deviant production that is corrected**



Source: Original graphic

Figure 3.2 shows the speculated link between production and perception. In this example, the child receives the faulty perception that /m/ and /b/ are identical and incorrectly substitutes /b/as /m/. The faulty perception is entrenched as a cognitive structure and reinforced by repeated motor, articulatory acts (represented by the statements boxed in blue). Where the sound is corrected (represented by the statements boxed in green), the child gains cognitive and sensory-motor awareness that modify the faulty message lip-reading provides. Substantiating the proposed theory that lip-reading not only affects but is affected by speech production, is the research finding of Conklin and Subtelny (Subtelny, 1980), who showed that small but significant gains in lip-reading occurred as a consequent of speech teaching. Remediation of phonemes, in terms of speech production, lead to an improvement in speech perception, ie lip-reading. The important point is that this will take time, repeated cycles of intervention being needed. Ling's model seems to imply that once the correct phoneme has been drilled to automaticity,

the task has been completed and the teacher can move to the next specified target. Where the teacher has conscientiously followed the steps Ling has set out, she consequently expects a sound to be permanently corrected. Once she finds this is not the outcome, she may feel a sense of inadequacy which may lead to a negative attitude to speech teaching.

A third criticism of Ling's approach, is that it is not integrated into other aspects of the educational curriculum, but remains a separate domain unrelated to, for example, reading, writing or spelling. This is in contradiction to modern tenets of education, which are discussed more fully later in this chapter (3.2:21-31).

### 3.3.1.3 Europe: van Uden

In Europe, Guberina (1952) of Yugoslavia became known for his verbotonal method. He asserted that body movements and bodily contact with low frequency vibration assisted in both perception and production of speech (Northern and Downs, 1984). His method is currently seldom mentioned.

A more enduring figure in Holland, Antony van Uden, originator of the well-known oral school, The Instituut Voor Doven, also uses sound perception in his programme. However, he remains best known for his system of language development termed the Conversational (or Maternal Reflective Method) which is based on of natural language learning as it occurs normally in the mother-child dyad. His system of speech teaching is less well known, as it has been little documented. However, the writer studied under van Uden in 1986 at the Instituut Voor Doven, graduating with the Maternal Reflective Diploma (1986), and is therefore au fait with his speech teaching system.

Several important principles are integral to the method:

- **Speech is taught in the context of language.** A typical lesson focuses on correction of a phrase, spontaneously spoken by the child.
- **The mirror is used extensively.** Teacher and pupil sit side by side facing a mirror. Child and teacher both watch the mouth of the speaker, ie the child watches his own lip movements when he speaks, and the teacher's when she speaks. Mirror usage goes beyond the idea of looking at the mouth for information on speech production. It is regarded as a tool for developing proprioceptive awareness. The child's perception of his own mouth movements is regarded as important for building

a motor sensory gestalt (van Uden, 1987), which affects perception and production of speech and development of lip-reading (Maas, 1984; van Uden, 1987).

- **Children are taught technical terminology from a relatively early age** (Van Uden, 1987). Terms such as “vowel”, “consonant”, “accent” and those describing tongue position, are used consistently.

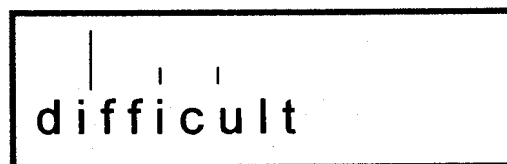
This is demonstrated by the following example: “To a child who, for example, says ‘hurd’ instead of ‘hurt’... one can say: ‘You are changing the last consonant into a voiced one; it should be breathed: hurt!’” (van Uden, 1987:31).

“To a child who is inclined to change all nasal sounds into plosives, say, for example, ‘sigs’ for ‘signs’: ‘You are using a plosive, but it should be a nasal sound.’ (van Uden, 1987:31).

Such an approach demands a serious attitude towards speech from pupils, - as evidenced by the level of concentration required from even young children (observed by the author in 1986).

- **Knowledge of syllable structure is regarded as indispensable.** Children need to know, the number of syllables a word contains and, which syllable has the accent (van Uden, 1987).

**Figure 3.3 : Stress analysis of the word “difficult” according to the system of van Uden**

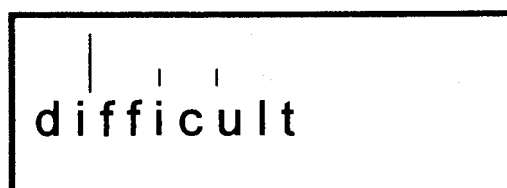


Source: Application of theory observed at the Instituut Voor Doven (1986)

Figure 3.3 shows how vertical lines of different lengths are used to denote number of syllables and stress pattern.

After the major and minor stress patterns have been demarcated, a structure termed the “melody bow” is superimposed to denote the unbroken rhythmic structure of the word, as demonstrated below in figure 3.4.

**Figure 3:4 The melody bow superimposed on the graphically represented stress accents**



Source: Application of theory observed at the Instituut Voor Doven in 1986

Figure 3.4 shows how the melody bows both repeats and emphasises the stress pattern and additionally denotes the unbroken fluidity of word production.

Figures 3.3 and 3.4 demonstrate the link between accent and rhythm. It is significant that during both phases – ie the first phase, scoring the vertical lines denoting stress and syllable structure and the second phase, superimposing the curved melody bow - are done in a manner which replicates the Listening Reading Speaking method described by the Ewings (1964). The pupil does not look at the teacher’s mouth, but attends to the written representation as the teacher simultaneously vocalises and draws.

- **Hand analogies are used.** One of the most frequently observed was the movement of the fingers imitating a motion akin to pulling a piece of string out of the mouth to signify the narrow, continuous breath stream required for correct articulation of the /s/ sound.
- **Writing is used extensively.** Words are taught initially by imitation, the written form being provided directly afterwards. Writing also forms an integral part of language training. Conversations are written down and form the basis of future learning, including rules of grammar. Van Uden terms these written conversations “deposits”. He humorously reasons that in the same way as a deposit of money in the bank will lead to financial growth in the form of accrued monetary interest, so will language “deposits” lead to incremental language growth (lecture material, van

Uden, 1986). Speech correction and development are constructed along similar lines. The correction of phonemes is written down as a “deposit”, which can later be revised and extended.

van Uden asserts that Deaf people need the written form to aid memory for words (van Uden, 1987). He notes that writing, as a support for speech and language, is used naturally by hearing individuals. Underscoring both the normalcy and efficacy of this strategy, he asks rhetorically:

“How often have we heard hearing people ask: ‘How do you write this?’ when they meet a new term? Deaf people can learn to visualise a certain word in writing and pronounce it thus” (van Uden, 1987: 27).

During speech lessons the teacher writes on the mirror, since the child cannot look down to a book and at the teacher’s mouth simultaneously (van Uden, 1987). Later the “deposit” is written in the child’s speech book.

#### 3.3.1.3.1 Critique of van Uden

Despite the acknowledged merits of the system, certain criticisms are pertinent.

- **The serious attitude to speech learning is not child centred.** It is possible that this method may not be appealing or appropriate for young children and could even cause negative attitudes to speech.
- **The lack of published material renders this method inaccessible to the majority of teachers.** Its use is limited to individuals who have observed such teaching.
- **The lack of a chronological model detailing teaching steps is a severe obstacle for inexperienced teachers.** The amount of knowledge needed at outset is enormous. It would seem to be a method best suited to educators experienced in teaching speech.
- **Extensive use of the mirror may cause exaggerated movements the visible speech organs.** Direct attention to the mouth may cause the pupil to exaggerate his lip and mouth movements habitually.



### 3.3.1.4 Comparison between Ling and van Uden

There are several important contrasts between the training methods of van Uden and Ling. These are summarised in the table below.

**Table 3.1: Comparison between the speech teaching methods of Ling and van Uden**

Ling	Van Uden
Phonetic approach	Phonological approach
Extensively published material available	Very little published material available
Prescribed sequential order for teaching sounds	No sequential order. The teacher chooses speech targets from the child's conversation
The teacher has access to a pre-planned basis of incremental knowledge – Ling's (1976) book	The teacher has no access to material and needs a vast amount of existent knowledge
Mirror is seldom used	The mirror is used extensively
Writing is not used	Writing is used extensively
Less integrated into other aspects of education	More integrated into other aspects of education

Source: Original table based on material from Ling (1976), Maas (1984) and van Uden (1987)

The table above delineates seven major points of difference between the two methods.

- Ling's method is almost exclusively phonetic. van Uden, on the other hand, spends very little time at the phonetic level. Brief mention is made of the importance of babbling exercises for developing rhythm and training memory (Maas, 1984), details of which have not been extensively published.

A comparison between this aspect of the two educators reveals different strengths and weaknesses.

It is possible that Ling's stress on phonetic training produces more natural speech patterns, because the repeated motoric act become habitual (termed by Ling as the level of automaticity), and correct production is no longer part of conscious, cognitive awareness. van Uden's method, on the other hand, based on cognitive awareness, may demand that pupils be continuously aware of speech production. This may cause psychological strain. However, as an advantage, van Uden's immediate integration of correct speech into language may make correction more cogent. Possibly the contrastive aspects could be combined to maximise the benefits.

- A second major difference is that Ling lays down a prescribed teaching order, whereas the content of van Uden's lessons arises out of the child's spontaneous conversation. On the one hand, a prescribed teaching order is an aid for the novice teacher, giving a sense of security. On the other hand, repeating the same prescribed order for numerous children may become tedious once she is no longer a novice. Additionally, teaching that arises out of spontaneous conversation, which is relevant to the pupil, is a more integrated approach.
- The fourth difference relates to availability of published material. Ling's method has been documented in his book, "Speech and the Hearing-Impaired Child", whereas little of van Uden's speech method has been published. As a consequence, few teachers have the opportunity of learning van Uden's methods.
- Fifthly, because of Ling's prescribed structure, the teachers can use compartmentalised areas of knowledge. Working according to van Uden's method, the teacher needs to have a ready storehouse of knowledge, since spontaneous conversation is used as a basis for speech teaching. Working within the confines of compartmentalised areas of knowledge, as laid down by Ling, is easier for the inexperienced teacher. A vast amount of available knowledge is needed in order to be able to correct spontaneous speech, without a teaching model.
- A sixth contrast is the role played by writing. Ling suggests that writing is not only unhelpful but, if used too early, may be harmful, causing speech problems such as impaired speech fluency and cognitive processing (Ling, 1976). This is in contrast to van Uden, who regards such usage as a normal process for clarifying phonemes which is particularly suited to Deaf individuals.

The direction taken by the author is that writing is a useful tool, both because it clarifies the confusing message purveyed via lip-reading and because it is a fixed reference point, compared with the fleeting image that occurs for phonemes in connected speech. However, the manner in which writing is integrated into the proposed speech programme differs substantially from Van Uden's system.

The use of writing integrates speech lessons into general education. Ling's system, as stated, has little connection with other areas of education. van Uden's system is relatively more integrated, not only in the use of writing, but also in the teaching of poetry and the writing of phrases and sentences as part of spelling (van Uden, 1987). van Uden regards these familiar educational practices as important for speech improvement of the Deaf. The integration of areas of education is a basic tenet of modern didactic practice.

- A final point of divergence concerns mirror usage. Ling seldom finds the need to use a mirror because, in his view most speech production cues are invisible (Ling, 1976). This is in contrast to van Uden, who regards the mirror as indispensable, not only for correcting speech errors (Maas, 1984), but also as an aid to developing proprioceptive awareness of the speech organs.

As Pflaster (1976) notes, mirrors have held a traditional role in speech teaching for hearing-impaired children. However, there is a diversity of opinion between writers as to their efficacy. van Uden (1987), advocates continuous mirror usage. Others recommend that mirrors be employed to correct specific errors (Bell, 1916; Haycock, 1933; Calvert and Silverman, 1975). Ling (1976) questions its value, and Ewing and Ewing do not even mention its usage (1964, cited by Pflaster, 1979). As recently as 1992, Gatty (:53) somewhat tentatively states: "... the availability of a mirror ... **may** also be helpful" (this writer's emphasis). Gatty's unsure tone reflects Pflaster's (1979) observation of the absence of research to provide evidence to either support or contradict mirror usage. The direction adopted in the proposed speech programme is that, in general, the mirror offers little help. The child's production errors reflect phoneme - vizeme confusion caused by lip-reading – and, as such, the same confusion will simply be repeated by viewing a mirror image of the same viseme. Hand analogies, and tactile cues which seek to replicate orosensory gestalts, are regarded as superior cues for production.

### 3.3.2 TECHNOLOGICAL ADVANCES : COMPUTERS AND BIOFEEDBACK

During the last 20 years, use of technological devices to make speech visible to Deaf people have increased rapidly (Ryals, et.al., 1994). Two main avenues exist (Dagenais, 1992). The first provides a visual display of the acoustic signal (for example, through computers such as the IBM speech viewer), which has had a significant impact on the development of speech training aids for the Deaf (Garry, 1992). The second avenue, which is more recent and less studied, is the use of biofeedback. This includes glossometry and palatometry instrumentation (Dagenais, 1992).

There is little available research demonstrating clinical effectiveness of either (Dagenais, 1992; Ryals et. al., 1994; Ryals et al, 1995). Some research findings show that alternate sensory channels can improve speech (Gulian et.al., 1983). A study described a group of profoundly Deaf children using technological aids who made greater gains in vowel production and had better retention after six months than a group who had the same training without such input (Gulian et. al., 1983). As discussed in Chapter 2 vowel production is particularly problematic for Deaf speakers, therefore any system which points to possible improvement is noteworthy.

#### 3.3.2.1 Advantages and disadvantages

There are several **advantages** to these systems. The major one is that Deaf individuals have, through technology, access to input that neither hearing, lip-reading nor touch can provide (Gatty, 1992). Secondly, most systems use a game-like design (Gatty, 1992) which is interesting and motivating to children (Ryals et al, 1994) and, thirdly, use is supposedly independent of teachers (Gatty, 1992).

Several **disadvantages** have also been noted. Firstly, the system is not wearable and therefore does not provide consistent reinforcement (Gatty, 1992). In a certain sense this criticism is unfair, since the device is for training purposes, analogous to a speech teacher, who also cannot be available to the child throughout the day. Another criticism is that where the design of the feedback is simple, the image of the sound may not be complete and, conversely, where the visual image is complete, it may be too complicated for practical use with children (Ling, 1990). A third noted disadvantage, is the apparent difficulty in using these devices for connected speech, especially in contexts of co-articulation (Gatty,

1992; Dagenais, 1992). The subtleties and complexities of co-articulation are important and difficult to teach. In Ling's (1976) view co-articulation constitutes the final hierarchy in teaching speech. Thus a system that does not provide aid in this area does not contribute to a complex problem that has not been solved by other strategies, and as such, falls somewhat short of the mark. Fourthly, the idea that the pupil is independent of a teacher is not a true representation. The pupil may well be less dependent on the teacher, but effective use still requires considerable skill on the part of the teacher (Gatty, 1992). As Ling (1990) cogently states, technological aids like most other tools, can either be used skilfully or poorly. The machine cannot simply be switched on. Professionals need clear concepts about a range of factors underlying the acquisition and treatment of deviant phonology if they are to use this system effectively (Ling, 1991). Fifthly, the financial expenditure required to purchase such systems may be beyond the scope of some schools.

### **3.3.2 THE WHOLE LANGUAGE APPROACH (WLA): A NEWER DEVELOPMENT IN LANGUAGE TEACHING**

The basic construct of the WLA is that language is an integrated, componentially complex system and, as such, is more than the sum of fragmented parts (Cummins, 1983; Oller, 1979; Shuy, 1981 – studies cited by Norris and Damico, 1990). Thus language cannot be taught as it was during the preceding behaviourist era, by being broken down into small units so that modification of easily observable behaviours could take place (Norris and Damico, 1990). In fact, such fragmentation of language into the smallest parts, often with the least contextual support, is viewed as increasing, rather than decreasing, linguistic difficulty (Norris and Damico, 1990). An integrated approach to language learning is congruent with a trend in general education towards holism. (Shapiro, 1990)

#### **3.3.3.1 Implications of the WLA to the Deaf child in the classroom**

Norris and Damico (1990) note two important implications of the WLA, both relevant to speech development of the Deaf child.

#### **3.3.3.1.1 Importance of non-linguistic variables are important.**

Additional variables, such as motivation and anxiety, influence language learning (Norris and Damico, 1990). Meaningfulness, for example, is pivotal to motivation. Children do not learn language in order to articulate correctly or speak well-formed sentences, but rather to derive meaning and accomplish purpose (Norris and Damico, 1990).

It follows that Deaf children attending special schools will respond equally to aspects of motivation and anxiety. Therefore, speech should be taught in educational contexts that are motivating and relaxing. Fortunately, the WLA provides the teacher of the Deaf with opportunities to use naturally appealing activities such as story-telling, drama (Sauder, 1995; Whitesell and Klein, 1995) and poetry (Sauder, 1995). With regard to anxiety, in addition to its negative affect on motivation, the deleterious influence tension has on the speech production mechanism has been accentuated (Chapter 2).

#### **3.3.3.1.2 Inter relationship of language components and processes.**

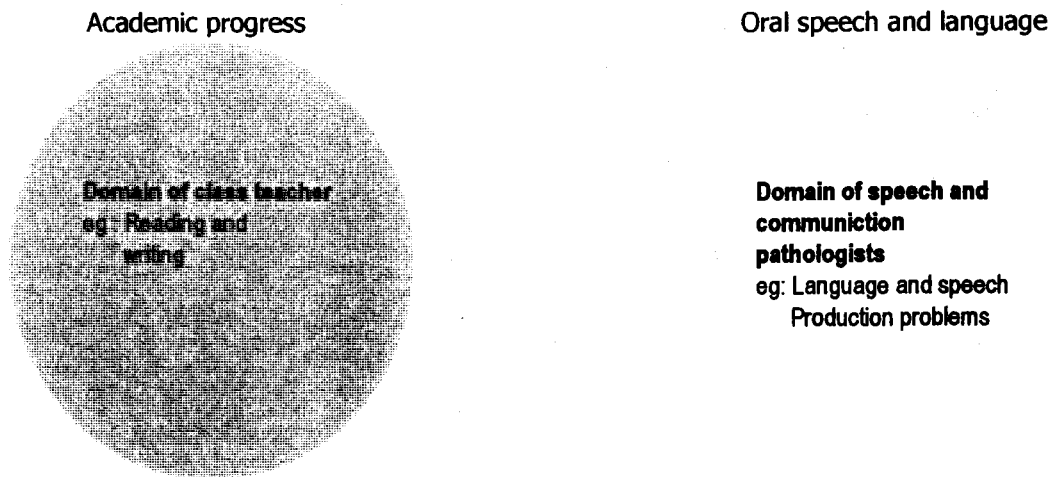
The WLA proposes that language components (e.g phonology and syntax) and processes (e.g speaking and reading) are interconnected. (Harste, Woodward and Burke, 1984; Goodman, 1986; Crystal, 1987; studies cited by Norris and Damico, 1990). This occurs to the extent that one individual component or process cannot change without affecting and being affected by the other.

Two important consequences that have relevance to the speech development of the Deaf child are sourced in this inter-relationship. There is a connection between, firstly, speech and language and academic progress (Catts and Kami, 1987; Simon, 1991; Larson and McKinley, 1995 – studies cited by Stewart et al, 1997) and, secondly, between phoneme and grapheme errors. Each of these is discussed below.

- **Relationship between speech and language and academic progress**

This modified the roles of educators in regular classrooms (Norris and Damico, 1990; Shapiro, 1992; Stewart et al, 1997) and has relevance for educators in special schools for Deaf children. Traditionally, the domains of communication pathologist and class teacher were seen as separate. Academic progress was the responsibility of the class teacher, whereas problems of speech and communication fell to the communication pathologist. (Figure 3.5).

**Figure 3.5: Two separate spheres of responsibility: class teacher and communication pathologist**

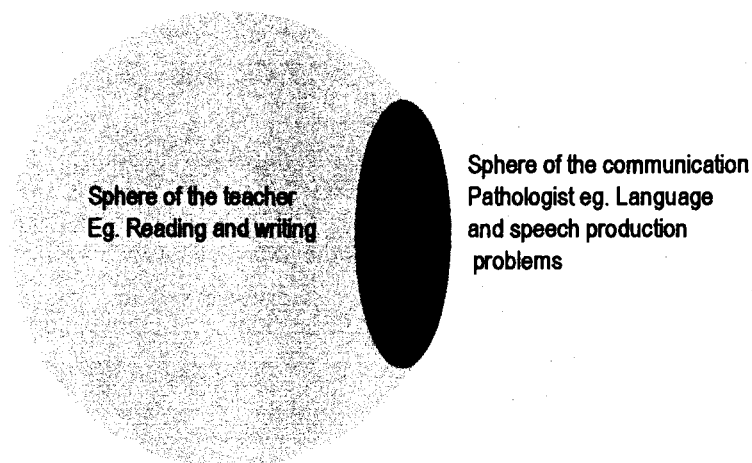


Source: Original graphic

Figure 3.5 shows how the areas of responsibility of speech teacher and communication pathologist were regarded as separate domains.

A prerequisite of the WLA is that the two domains become interconnected. This is graphically depicted in figure 3.6.

**Figure 3.6: The WLA emerges as a new system when the areas combine**



Source: Original graphic



Figure 3.6 shows how, analogous to the mixing of colours, a new entity - ie the Whole Language Approach, - is activated when the two domains are meshed. The colour analogy above demonstrates how blue (the teacher's domain) and yellow (the communication pathologist's domain) combine to form something different, i.e green (the emergence of the WLA).

A consequence of the need for relatedness is that aspects of speech and language previously deemed solely the province of the communication pathologist, are now considered part of basic educational practices (Norris and Damico, 1990; Shapiro, 1992; Stewart et.al, 1997). Consultation and collaboration between teacher and communication pathologist are a prerequisite if this new area of knowledge is to reach the child in the classroom.

Currently little information is available to describe how pathologists and teachers negotiate and divide responsibilities for speech-related skills at schools for normally hearing or Deaf children (Otis-Wilborn, 1992). There is an acknowledged need for such collaboration (Tomes and Sanger, 1986, cited by Otis-Wilborn, 1992).

- **There is a relationship between phoneme and grapheme errors**

Several studies present compelling evidence attesting to the link between the grapheme errors and speech performance in normally hearing children (Harris, 1958, cited by Hoffman 1990; Hoffman and Norris, 1989, cited by Hoffman, 1990; Hoffman, 1990).

- Harris (1958, cited by Hoffman, 1990) showed that children misspell words containing phonemes they misarticulate more frequently than words they articulate correctly.
- Hoffman (1990) demonstrated an even more precise connection. Children who delete final consonants in speech are likely to delete final consonants in reading and spelling. He suggests that attention to reading and writing could remediate speech faults.

Hoffman's (1990) suggestion, that attention to the grapheme could support phoneme correction, is a core assumption supporting the view that the WLA could be used to improve speech production of Deaf children in the classroom.

A prefacing question is whether Deaf children, who do not acquire phonemes in the same way as hearing children (ie through the auditory channel), will be able to profit from such an inter-relationship.

Derman's (1987 – this writer's) analysis of spelling errors of Deaf children demonstrated a strong relationship between grapheme and phoneme errors as evidenced in misspelling, but did not test Hoffman's hypothesis that attention to the grapheme could aid correction of phonemes.

In her research, pupils with hearing losses were shown a picture of the target word, given opportunities to imitate a spoken model provided by the teacher and then told to write the word. Results showed, firstly, that only a small proportion of spelling errors were typical of those made by hearing children; secondly, that there was a link between level of speech proficiency and number of atypical errors; and, thirdly, congruent with Monsen's (1981:47) statement that "there is a logic to even the most deviant and unintelligible **speech** produced by a profoundly Deaf speaker" (emphasis added) - there appeared to be a logic to even the most deviant and incomprehensible **spelling** of the child with a hearing loss. The basis for this logic was located in phoneme/viseme confusion. This is demonstrated in Table 3.2 which explains the logic for the misspelling of a Deaf child of the Afrikaans word "klippe" (English translation: "stones") as "lem".

**Table 3.2 The underlying logic of a Deaf child's misspelling of the word "klippe" as "lem"**

Correct spelling	k	L	I	p	p	E
Deaf child's incorrect spelling		L	E	m		
Explanation of deviant logic according to phoneme/viseme confusion	The /k/ phoneme, often invisible, is in this case completely obscured by the upward movement of the tongue in preparation for production of /l/ phoneme. The "k" grapheme is therefore omitted in the child's misspelled version	the /l/ phoneme is visible – the child sees the tongue move into position. The corresponding "l" grapheme is correctly written	the /i/ phoneme represented by the "i" grapheme is written by the child as the grapheme "e". This can be understood as a logical substitution, since the two vowels are closely related	"p" grapheme is incorrectly substituted by a "m" grapheme. /p/ and /m/ present as one viseme. The child has taken the viseme of the lips closed as representing the /m/ phoneme and therefore writes the "m" grapheme		The "e" grapheme is omitted finally as the child assumes the word is completed with the closing of the mouth for what he perceives is the final phoneme – a /m/. He does not hear the final syllable and perceives the viseme as the lips parted in silence

Source: Derman, 1987

Table 3.2 demonstrates how the Deaf child's misspelling can be understood with reference to phoneme/viseme confusion.

The correlation between the common genesis of speech and spelling errors, strongly suggests that, in the same way as for hearing children, attention to the grapheme could aid phoneme correction in Deaf children. Such a connection has not yet been exploited in speech programmes for Deaf children. The grapheme offers numerous advantages which are, as van Uden (1987) states, even more significant for a Deaf than a hearing child. These include:

- The grapheme is accessible as it is visible. The phoneme may be neither visible nor audible.
- Graphemes are not confusing, as are lip-read phonemes.
- The grapheme is constant, whereas the phoneme is a fleeting image.
- There is a fortuitous correlation between grapheme and phoneme (Olefsen and Lundber, 1983) in

Anglo-Saxon languages which can be exploited for the Deaf child. It is not present in all languages. Chinese orthography for example, relies on associations between individual printed words (Treiman and Baron, 1983) and not phoneme-grapheme correlation.

- Teachers may feel more comfortable teaching speech as part of familiar educational activities such as spelling, reading or writing, rather than in the unfamiliar arena of speech pathology.
- The printed word is freely available. No monetary expense need be incurred, unlike the financial outlay required to purchase technological aids such as computers or mechanisms for biofeedback.
- Spelling, reading and writing constitute regular scheduled periods during the school day. If speech lessons were incorporated into an existing infrastructure, there is a greater likelihood that they will be taught regularly.
- Finally, the Listening, Reading, Speaking (LRS) method, proven in speech improvement, could be incorporated into existing academic structures such as of spelling, reading and writing.

In conclusion, selected aspects of the WLA could be effectively incorporated into a speech programme for Deaf children. The only disadvantage is that currently no body of literature exists describing its implementation or efficacy.

### **3.3.4 THE PHONOLOGICAL APPROACH: A NEWER METHOD IN SPEECH REMEDIATION FOR CHILDREN WITH NORMAL HEARING**

A newer method, termed the phonological approach, has been developed for remediation of speech faults of hearing children. The discussion below will demonstrate its applicability to Deaf children.

Thus far the term “phonological” has been used, as does Ling (1976), to describe remediation of speech at the level of language in contrast to the term “phonetic”, which describes remediation of speech in non-meaningful contexts. In this section the term “phonological” is used differently and to refers to a method of speech therapy. Qualifying descriptors such as “approach” or “method” will be used for clarification.

### 3.3.4.1 EVALUATION OF THE BASIC TENETS OF THE PHONOLOGICAL APPROACH TO SPEECH REMEDIATION OF DEAF CHILDREN

There is general agreement amongst proponents that three principles are basic to this approach (Elbert, 1992; Fey, 1992, Gieret et.al, 1996). These are set out in table 3.3 in conjunction with a description of applicability to Deaf children.

**Table 3.3: Evaluation of the basic tenets of the phonological approach in relation to speech remediation of Deaf children with hearing losses.**

Basic tenet of the phonological approach	Applicability of tenet of the phonological approach in relation to the remediation of the speech of children with hearing losses
<p><b>Principle One</b> There is an emphasis on a modification of <b>groups of sounds</b> which are treated in the same fashion by the child (Elbert, 1992). The rationale for the efficacy of phonological treatment rests on the basic assumption that pronunciation patterns are rule-governed and predictable (Grunwell, 1985 – cited by Khami, 1992). It is a conceptually based system of remediation which investigates and treats underlying patterns of production that account for several errors at one time (Klein, 1992), thereby introducing a change into the child's sound system (Gieret et al, 1996)</p>	<p>This principle is highly applicable to remediation of the speech errors of children with hearing losses because their pronunciation patterns are rule-governed and predictable (Dodd, 1976; Monsen, 1981). A major source of errors is phoneme-viseme substitution due to the limitations of lip-reading. Misarticulated sounds can therefore be grouped so that underlying patterns of production are identified which can account for several errors at one time</p>
<p><b>Principle Two</b> There is an emphasis on the establishment of <b>previously neutralised phonological contrasts</b>, rather than sound production per se</p>	<p>This has limited applicability. On a positive level, it can be utilised in relation to supplying the child with an accessible visual or tactile "gestalt" of the process he is neutralising. On a negative level, the child with a hearing loss will need direct feedback to know whether or not he has achieved a target sound. It will not automatically follow that the establishment of previously neutralised contrasts will lead to correction of specific phonemes if no direct attention to the phoneme is given</p>
<p><b>Principle Three</b> There is an emphasis on the use of speech sounds of <b>communication purposes</b>, rather than correct production of the sound as a goal in itself (Elbert, 1992)</p>	<p>This option exists. Ling's emphasis is on the phonetic level, whereas van Uden teaches sounds in a meaningful context. Due to the rarity of comparative evaluations of speech training methods (Dagenais, 1996), the efficacy of one approach over another has not been definitively assessed</p>

Sources: Dodd, 1976; Monsen, 1981; Elbert, 1992; Khami, 1992; Gieret et al, 1996; Dagenais, 1996

As Table 3.3 demonstrates, the first principle, correction of groups of sounds, is the most applicable to Deaf children.

The phonological method provides educators with a conceptual framework for grouping sounds according to underlying error patterns. The important proviso is that error patterns are correctly identified in relation to the unique system of speech errors that exists for Deaf speakers. There is a plethora of evidence to support the view that the phonological approach is more effective than the traditional approach with normally-hearing children (Klein, 1992). It is suggested that appropriate adaptations would similarly render the method more effective than traditional methods of speech remediation of speech in Deaf children.

#### **3.3.4.2 EVALUATION OF THE BASIC TENETS OF THE TRADITIONAL APPROACH TO SPEECH REMEDIATION OF CHILDREN WITH HEARING LOSSES**

A brief description of traditional speech teaching serves two purposes: firstly, it clarifies the essence of the phonological method by juxtaposing contrastive principles; secondly, it delineates those aspects of the traditional method which cannot be discarded, thereby rationalising their continued inclusion in speech remediation protocols for Deaf children.

Klein (1992:318) specified six criteria that represent a traditional approach. These are presented in Table 3.4 in conjunction with an evaluation as to their applicability to Deaf children. All references given under principles of traditional therapy are from Klein's (1992) article.

**Table 3.4 – Criteria of traditional therapy**

<b>Principle of traditional therapy</b>	<b>Applicability to Deaf children</b>
Direct instruction in the mechanism of phoneme production using techniques such as successive approximation (Van Riper, 1972) and prompts such as mirror, tongue depressor, peanut butter, pictures of the mechanism or motor posturing	Direct instruction, using the strategies described, are applicable. The question of mirror usage has been discussed earlier (3.1.4)
Use of motor exercises (eg Scripture and Jackson, 1927), sensory-motor training (McDonald, 1964) or a comparable strategy, with the goal of increased motor control	Use of motor exercise forms the basis of Ling's approach. Therefore gaining increased motor control is compatible with established tenets in the remediation of the speech of Deaf children.
Use of sound discrimination training (eg Winif, 1975) in order to remediate a supposed underlying auditory discrimination problem	The hearing child has an auditory dysfunction; the Deaf child has an auditory loss. Sound discrimination training will be of limited use. Where a sound cannot be perceived, training is pointless. This principle has extremely limited applicability
Extensive use of modelling and subsequent requests for direct imitation by the children	This has little applicability as the faulty production is largely a result of the perception gained from direct imitation. Giving additional opportunities will not change faulty perception
In all cases, except where the sensory motor approach (McDonald, 1964) was used, production began at the isolated sound level and then progressed through syllables and higher levels of production. During use of the McDonald (1964) programme, therapy began at the syllable level.	Ling's system progresses in the manner described for McDonald.
Therapy is directed at one or, at most, two incorrect sounds.	This is currently applicable to Deaf children. The effectiveness of dealing with one sound versus a group of sounds, as in the phonological method, has not been documented

Source: Klein's (1992:318) criteria, with original commentary

Table 3.4 describes five criteria representing the traditional paradigm. One strategy – direct instruction in the mechanism of phoneme production – appears to be indispensable. Two strategies are common practice in speech teaching for Deaf children, although their effectiveness has not been evaluated, ie motor exercises and using the phoneme or syllable as a first step to the progression of higher levels of production. Two strategies appear to have extremely limited applicability: firstly, auditory training, which can only be of benefit if the potential for hearing is present and, secondly, direct imitation, which simply repeats the confusing visual cue that is the genesis of the speech fault.

In summary, it would seem that the basic assumptions of a purist phonological approach cannot be adopted *carte blanche*. Aspects of the traditional articulation-orientated approach appear to be indispensable and need to be incorporated. In this regard, Ling's (1991) comments are cogent: work in accordance with the phonological process theory does not refute work based on the established principles that underlie more traditional procedures (Ling, cited by Hoffman and Daniloff, 1990). The purpose of evolving theory is to extend, rather than replace, established practice.

### **3.3.4.1 DISADVANTAGES OF THE PHONOLOGICAL APPROACH FOR DEAF CHILDREN**

A major disadvantage of using relevant aspects of the phonological method with hearing-impaired children is the lack of current research (Ling, 1991). It is unlikely that this method can simply be transplanted without adaptation. Several important factors support this cautionary note. These include:

- Even where faults are similar to those produced by hearing children, causal mechanisms and treatment differ (Ling, 1991). This is analogous to a skin rash, which may be caused by exposure to poison ivy or to – symptoms are similar, but cause and treatment differ.
- Certain faults are idiosyncratic to the Deaf. As Monsen (1981:846) notes, referring to the English-speaking Deaf population: “When Deaf speakers make an error, they don't just substitute some other English sound but... frequently... produce a sound that does not occur in English...”
- The transition from immature, faulty phonology to mature, correct phonology, which occurs naturally for hearing children (Edwards, 1992) as a consequence of normal development (Fey, 1992), has little applicability to the Deaf. The absence of audition compromises the development of articulatory behaviours (Tye-Murray, 1992). Deviant speech patterns described for adult Deaf speakers give support to this argument. No amount of accrual in terms of chronological age can obviate a speech fault that stems from a lack of auditory acuity.

Seen in the light of these considerations, Kimbrough-Oller et. al.,'s (1978) account of similarities between phonological processes of young hearing and hearing-impaired speakers does not seem useful.

Possibly the plethora of speech faults in the hearing-impaired means that parallels may be drawn with



hearing speakers which result from a maximum of opportunity, rather than from valid similarities.

#### **3.3.4.4 ADVANTAGES OF EMPLOYING THE PHONOLOGICAL APPROACH WITH DEAF CHILDREN**

As Ling (1991) pertinently states, little has been written on the benefits or limitations of this method in relation to the speech of the Deaf. Two benefits are, however, clearly apparent that may render the phonological approach even **more** suitable for the Deaf than for hearing speakers.

- **Unintelligibility and multiple speech faults are common among Deaf speakers**

Unintelligible children with multiple speech faults are considered to be the most suitable candidates for phonological remediation (Hodson, 1992). Hearing children seldom have multiple speech faults which render them unintelligible (Hodson, 1992). In contrast Deaf children are well described as being highly unintelligible and exhibiting multiple speech faults. According to these criteria, proportionately more Deaf children are suited to a phonological approach than hearing children.

- **A single causal factor to explain the majority of underlying error patterns**

This has been constantly alluded to throughout the study, ie the rule-governed nature of speech errors of Deaf speakers. Monsen's pithy statement is repeated to support this argument (1981:847): "There is a certain logic to even the most deviant and unintelligible speech produced by a profoundly Deaf speaker."

Dodd (1976) ascribes the genesis of this pathological "logic" the inefficiency of lip-reading, the primary avenue of information available to Deaf children which governs phonological output. The Deaf speaker may not be able to perceive certain phonemes and or to differentiate between others. This confusion is reflected in expressive speech patterns (Dodd, 1976). Ling's reference in 1991 to Dodd's 1976 article on the phonological approach, demonstrates that Dodd's theory is still considered relevant. This single causal factor gives rise to a stringent set of rules which are predetermined, predictable, logical and unique.

### **3.3.4.5 CRITIQUE OF LING'S (1991) EVALUATION OF THE PHONOLOGICAL METHOD FOR THE DEAF**

Since Ling is the foremost figure in speech-teaching for the Deaf and has been one of the few educators to evaluate the phonological method, it is important to take cognisance of his comments. His view of the “benefits and banes” of the method, as they relate to the Deaf, is as follows (Ling, 1991:15).

He notes the following advantages:

- The emphasis on stringent evaluation procedures. This authors view is that stringent evaluation is insufficient, if it is to serve remediation according to a phonological approach. It must not only be congruent with principles of phonological assessment, but must also take cognisance of the rule-governed error pattern unique to the Deaf. Currently no such assessment procedure exists.
- The focus is on treatment of related phonemes. This is congruent with the authors view and has been emphasised throughout the discussion. Errors in related phonemes have a logical basis arising out of the limitations of lip-reading, which are reflected in predictable speech errors.
- The emphasis is on the relationship between speech and language. The author feel that it is unclear whether this relationship will improve speech production, since no comparative studies exist. In fact, Ling appears to be criticising his own method, which has a strong phonetic basis.

He notes the following disadvantages

- The phonological method is only concerned with segmental aspects and does not address prosodic features. The author agrees with Ling. Suprasegmental faults also need to be addressed in the speech remediation of the Deaf. The phonological approach is focused on articulation. This demonstrates again, how systems designed around the needs of hearing children cannot be simplistically transposed to fulfil the needs of Deaf children. Suprasegmental problems among Deaf speakers are common (Chapter 2).
- Co-articulation is neglected. Paradoxically, he states elsewhere in the same article that attention to phonological contrasts among groups of sounds, rather than a phoneme-by-phoneme approach, permits the use of anticipatory set. It is speculated that the development of anticipatory set enhances the cognitive pre-planning needed for co-articulation. However, in agreement with Ling, it is noted

that direct and detailed attention is not accorded to the problems of co-articulation. Unlike the hearing child, it cannot be assumed that the Deaf child will learn these skills naturally.

- Specific treatment strategies and prerequisites for ameliorating the production of sounds common to a particular process are not described. This criticism seems less of a limitation since such strategies are, as Ling himself notes elsewhere in the article, "... scattered throughout the literature" (Ling 1991:15). This is not a new obstacle to speech work with hearing-impaired children.
- There is relatively little objective evaluation of outcomes of application with hearing children and more so with Deaf children. It may be said that this criticism extends to all methods of speech teaching for the Deaf, Ling's included, as comparative evaluations of speech training programmes are rare (Dagenais, 1996).
- Remedial emphases are not a productive alternative to the prevention of deviant patterns through appropriate verbal interaction from early infancy.

This criticism lacks clarity. Ling (1991) confuses strategies for development of normal speech with strategies for correction of deviant speech. It is axiomatic that prevention of deviant patterns is paramount. The phonological method does not presume to develop speech, but offers an opportunity to correct sounds that have not developed naturally or have developed incorrectly.

### **3.3.5 CREATIVE APPROACHES TO VOCAL IMPROVEMENT**

#### **3.3.5.1 Speech and drama**

The techniques used in speech and drama to improve speech and voice among the normally hearing have not been exploited for use with Deaf children.

It is suggested that the wide repertoire of techniques used by actors for vocal development could be adapted for Deaf children. Some have been passed down traditionally in theatre schools, others have been documented in books on voice production. These include, for example, *Freeing the Natural Voice* (Linklater, 1976), which describes relaxation techniques and provides clear, visually suggestible illustrations, and *Speech Training for You* (Sneddon, Second Edition, no date given), which uses more formal phonetic drill patterns.

There is a lack of material that describes or evaluates the use of such techniques for Deaf children. Several strategies taken from the creative elements of speech and drama appear to have direct applicability to the Deaf child. These include:

- **The phoneme is used to improve speech production.** Examples of how the phoneme is used to effect vocal improvement are /b/ to effect forward vocal placement and /m/ to improve resonance. Phonemes may be combined in tongue-twister-type formats to promote articulatory dexterity. The Deaf child's habitual use of cul-de-sac resonance (Ling, 1976) and lack of articulatory dexterity due to tongue retraction and immobility, make each of these aspects relevant.
- **Imagery is used.** The actor may be told to imagine his voice moving to the back of the theatre or flowing like oil. Such images, if chosen for maximum visual suggestibility, may provide important sensory referents which create orosensory gestalts.
- **Relaxation is seen as a prerequisite for healthy vocal performance.** Synchronising body movement and vocalisation is commonly used to aid vocal relaxation. This has similarities to Guberina's (1981) verbatonal method. The adverse effects of vocal tension were described in Chapter 2.

### 3.3.5.2 Singing and music

Educators from several countries have advocated the use of music to improve speech performance. These include Claus Bang (1996) of Denmark Guberina (1981) of Yugoslavia and composer Carl Orff of Germany (Hummel, 1971).

Two attitudes prevail. The first is that involvement with music (and song) is merely "a fun thing" (Hummel, 1971:242) for Deaf children. The second is that music and song can be used remedially to effect speech and voice improvement. van Uden was described as "probably the world authority on music for very young deaf children" (Hummel, 1971:243) is an example of the second attitude. He uses a system termed the sound perception method whereby children are given bodily experience of sound through two mediums. The first is contact resonance, whereby the child touches the musical source and feels the vibrations. The second is bodily resonance, whereby the child does not touch the instrument, but stands on a non-vibrating surface so that his own body becomes the resonating chamber. The "play-song" is central to the method. Briefly described, the "play-song" is improvised during the lesson.

Words have musical notation scored according to stress patterns. The child then plays the tune on a blow organ. Later he listens to a tape-recorded version of the song sung by a male singer with a strong, bass voice. Finally, the pupil sings and dramatises the “play-song”. van Uden sees benefits in increased breath control, memory, rhythmic stress patterns, auditory perception and creativity (van Uden, printed lecture material entitled: Text of the Video-tape Shown in the Lecture on Musical Development, Auditory Training, 1987). A clinical evaluation of this method indicates that the tune constructed out of stress patterns cannot be judged to be lyrical or attractive to children and, as such, is difficult - even for a hearing individual - to memorise.

It is speculated that this structured, somewhat artificial method for music and singing may fall into the same trap as the now discarded highly structured language systems of the past, such as the Fitzgerald Key, which attempted to simplify structured language teaching in a behaviourist type mode. The underlying assumption was that the sum of the parts was equal to the whole. According to more recent holistic educational trends, modifying easily observable aspects of behaviour is not viable, since more complex processes need to be taken into account (Norris and Damico, 1990). The play-song is an example of simplification that does not take into account the complex nature of musicality, and creates material which is unappealing and therefore more difficult to learn. The author believes that natural musical input should be used.

In a rare article on singing in relation to hearing-impaired children, Tait (1986) reports benefits in the classroom. A limitation to his study is that children who could not hear voice, were excluded. This means that the gains described cannot be extrapolated to all Deaf children. The author’s clinical experience, supports the view that even children with the most profound hearing losses react positively to singing. Gains reported by Tate, may therefore apply to children with all levels of hearing loss.

**Table 3.5 Tait's (1986) Research on the benefits of singing for hearing-impaired children**

Function that improved	Tait's (1986) research findings	Author's commentary on potential for speech improvement
<p><b>1</b></p> <p><b>Sensory input</b></p> <p><b>Lipreading</b></p> <p><b>Auditory function</b></p>	<p>Children looked at the teacher twice as much during singing, as compared with speech</p> <ul style="list-style-type: none"> <li>• 80% of the time during singing</li> <li>• 40% of the time during speech</li> </ul> <p>Auditory training improved for children who could hear voice. This was judged by the child's ability to indicate an object after listening to the word in a spoken or sung phrase. Tate suggests that even if this is because the auditory task is easier, since singing is louder and more sustained, the important point is, that sound is presented to the Deaf child in an acoustic form to which he can gain access</p>	<p>(The benefits of both lip-reading and auditory aspects are dealt with together because of the inter-relatedness of functions)</p> <p>It is possible that singing not only makes the auditory task easier, but also that the archetypal appeal of a song reaches the child's psychic core. He therefore focuses with heightened auditory concentration and improves auditory functioning. The importance of non-linguistic variables, particularly motivation, was described in 3.2. Where auditory stimulation is appealing, the child with a hearing loss does not need to be directly instructed to concentrate, but does so of his own volition.</p> <p>van Uden (1987 lectures) describes the love of music as located in the soul, not the ear, and therefore also available to the Deaf individual.</p> <p>Because of the child's motivation to gain a maximum of sensory input, it is suggested that he simultaneously attends more acutely to the mouth and in this way supplements the auditory stimulus. Congruent with a holistic approach, the child attends to lip-reading and auditory input as a whole. He does not fragment the task by separating it into discrete, formalised, uninteresting learning experiences</p>



Source: Tait (1986); Ling 1976; van Uden; 1987 (lecture material) and additional original commentary

Table 3.5 demonstrates the importance of singing for the vocal and psychological development of the child with a hearing loss.

This is in contrast to an attitude that views singing as only a “fun thing” which, although enjoyable, is not considered to be significant. The excerpt by Beattie (1992:71) exemplifies such an attitude. He describes the role of singing as “an activity (that) may be a favourite pastime of small groups, ... practising of songs for a public performance (eg Christmas concerts)”.

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### 3.4 CONCLUSION

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A wide variety of approaches to speech-teaching for the Deaf has been described. Few, such as Ling's (1976), are well documented for Deaf children. van Uden's method, designed specifically for Deaf children, is available to a limited number of educators because of a lack of published material. Computers remain unknown to the majority of educators, and the high cost prevents their becoming common aids (Khami, 1992). Newer educational trends, such as teaching speech within a holistic, integrated setting or using a phonological approach to correct faults, are seldom described in relation to the speech of the Deaf child. Speech and drama techniques, known since antiquity, have not been described in terms of vocal improvement for the Deaf. The benefits of singing and music have received little emphasis.

Additionally, comparative evaluations of known speech training programmes for hearing-impaired speakers are rare. While many protocols demonstrate improvement (Monsen and Shaugnessy, 1978; Osberger, 1987, cited by Dagenais, 1992), the efficacy of one approach over another has not been empirically tested (Dagenais, 1992). Because of this limitation, the choice of elements included in a speech programme, although based as far as possible on available scientific evidence, also relies on subjective preferences. These are rationalised as far as possible in accordance with theoretical principles.

This chapter concludes the background information of problems of Deaf Education and problems of



vocal deviance and availability of options. Using the theoretical underpinnings as a background, a new focus is presented assessing the attitudes and needs of educators working in the field of Deaf education. This is done by entering into their life-world. Chapter 4 opens the door to this new world. It describes the research methodology used to gain entry.