1992

The development of a test of concept identification, semantic and syntactic performance for use with hearing impaired children

Heather Joan Hussey
Edith Cowan University

Edith Cowan University

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THE DEVELOPMENT OF A TEST OF CONCEPT IDENTIFICATION, SEMANTIC AND SYNTACTIC PERFORMANCE FOR USE WITH HEARING IMPAIRED CHILDREN

BY

Heather Joan Hussey, BA

A thesis submitted in Partial Fulfilment of
the Requirements for the Award of

Bachelor of Education with Honours
at the School of Education, Edith Cowan University

Date of Submission: 8.6.92

Abstract

The purpose of this study was to develop the *Concept Identification Instrument (CII)*; an instrument for measuring prelinguistically deaf children's concept identification, semantic and syntactic abilities in a reading situation. Analysis of the related literature suggested that isolation of some of the factors which contribute to the problems faced by deaf children in reading development, such as concept identification, may lead to improved chances of understanding, reducing or eliminating reading problems and improving reading outcomes for these children.

The subjects were 21 prelinguistically deaf children who attended or had previously attended the Speech and Hearing Centre for Deaf Children (WA) Inc. The CII was developed from a testing instrument created by Sloan (1974). It was comprised of 10 sets of five declarative statements using the cloze form, which had an artificial word in place of the concept which was to be identified. The responses were scored to provide separate data about concept identification performance, semantic performance at both sentence and discourse levels, and syntactic performance. The validation of the CII was undertaken by calculating convergent validity with the *Progressive Achievement Tests (PAT)* as a measure of reading comprehension and the *Language Assessment, Remediation and Screening Procedure (LARSP)*. Both the PAT and the LARSP were found to correlate significantly with concept identification performance, semantic performance at both sentence and discourse levels as well as syntactic performance, as tested by the CII. Content validity was confirmed after consultation with four specialists in

the fields of reading and hearing impaired teaching. Cronbach's Coefficient Alpha, testing internal consistency, was used to confirm reliability.

The development of the CII as a reliable, valid measure of deaf children's concept identification ability, semantic ability at sentence and discourse levels as well as syntactic ability, makes it an important addition to the assessment tools available to researchers and teachers alike. In addition there may be important value in its use as a teaching aid.

Declaration

I certify that this thesis does not incorporate, without acknowledgment, any material previously submitted for a degree or diploma in any institution of higher education and that, to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where due reference is made in the text.

HEATHER HUSSEY
School of Education
Edith Cowan University
Mt. Lawley W.A. 1992

Acknowledgments

The following people assisted me greatly in the preparation of this thesis. Dr. M. Rohl, Dr. A. Blackmore and Dr. P. Sloan provided guidance and encouragement. Mrs. K. Venard, Principal of the Speech and Hearing Centre for Deaf Children (WA) Inc., encouraged this research, provided valuable suggestions and sanctioned my involvement with staff and students associated with the Centre. The teaching staff associated with the Speech and Hearing Centre, Miss B. Beale, Mr. C. Martin, Ms. J. Plumb and Mr. G. Reader, made teaching time available for the research, and were encouraging and supportive. Mr. K. King, Principal of St. Brigid's Catholic Primary School, Middle Swan and Mr. T. Freeman, one of the Year Four teachers, gave me access to pupils with whom I conducted the pilot study. My husband, Chris, provided assistance in so many ways, and, together with my children Nicole and Janine, was supportive and tolerant, making my commitment to this thesis possible.

Heather Hussey

June 1992

Table of Contents

List of Tables

Chapter 1

Introduction and Statement of the Problem

Introduction

The language background to effective reading is well established (Carroll, 1986; Gibson & Levin, 1975; Holdaway, 1979; King & Quigley, 1985; Latham & Sloan, 1979; Smith, 1971). Effective reading is more than just recognising words (Wheeler, 1970; Wittrock, Marks & Doctrow, 1975) or even sentences (Barclay, 1973; Bransford, Barclay & Franks, 1972; Carpenter & Just, 1975). It involves being able to synthesise a meaning for a chunk of text (Latham, 1973). It depends on the ability of the reader to construct a context (Bransford & Johnson, 1972; Klein & Klein, 1973) or text schema which aids in predicting and confirming meaning (semantic information), language structure (syntactic information) and letter sequences (grapho-phonic information) (Latham & Sloan, 1979; Smith, 1975). The interaction of semantic, syntactic and grapho-phonic data provides the reader with the bases for making meaning out of a written text (Latham & Sloan, 1979; Wildman & Kling, 1978). The central meaning control in reading is semantic information (Lyons, 1977; Smith, 1973). Semantic information comprises the store of concepts about the world held by the reader (Goodman, 1970; Kukla, 1980). Concept development (the increasing ability to construct concepts of increasing complexity) is thus related to reading success. A poor conceptual background inhibits reading effectiveness. Although in some normal populations poor conceptual development in readers may be closely related to impoverished backgrounds or low intelligence, it is not

the case in hearing impaired children whose background is not impoverished and who are of normal intelligence. Hearing impaired children are open to the same tactile experiences as hearing children in their interaction with concrete objects in the real world. They are, however, far less competent in acquiring syntactic knowledge which is more abstract and learned from whole language structures, which are not as readily available to deaf children as they are to hearing children (McAnally, Rose & Quigley, 1987). In reading it is the interaction of semantic and syntactic information which provides for effective reading and the acquisition of new concepts (Latham & Sloan, 1979).

Although not providing much in terms of *concrete* meaning, the syntax does act as a *control* over meaning. For example, the noun-verb-noun structure of the following two sentences contains the same words, but the meaning is altered by the order:

The boy chased the dog.
The dog chased the boy.

In the following sentences, where a preposition change occurs, syntax influences the meaning, not of the concept words but of the interactions, and thus produces different concepts:

The boy went into the girl's house.
The boy went by the girl's house.

Concepts, mental structures with which we represent categories, are acquired (Moates & Schumacher, 1980) through the processes of

generalisation and differentiation. In the process, any syntactic deficit experienced by deaf children should be a major factor in the acquisition of even concrete concepts and consequently a significant factor in their poor reading achievement and language development.

The acquisition of language rates as one of the most critical achievements of childhood (Webster, 1986). Language acquisition by deaf children is affected by their hearing impairment, as "the linguistic skills of most deaf children lag far behind those of children with normal hearing" (Carroll, 1986, p. 383). Deaf children are poorly equipped to begin reading, due their limited exposure to fluent language in their normal environments during infancy and early childhood (King & Quigley, 1985). McAnally et al. (1987) found that:

> the acquisition of language requires fluent communicative interaction between children and mature language users as well as intact sensory mechanisms to transmit linguistic information to the brain (p. 29).

Thus deaf children are deprived of language experience, as they lack continual exposure to this "interaction" and are consequently handicapped linguistically. Their lack of language ability is reflected not only in their oral communications, but also in their reading and writing. It is widely recognised that deaf children rarely learn to read well (Gibson & Levin, 1975; Webster, 1986).

Limited language ability has several effects on deaf children as they attempt to read. Deaf students' lack of language schemata and conceptual frameworks for semantic, syntactic and grapho-phonic

knowledge place them at a disadvantage when reading. Although reading primarily involves 'decoding to meaning', rather than 'decoding to sound' (Latham & Sloan, 1979; Smith, 1973), readers need an adequate base of semantic, syntactic and grapho-phonic knowledge in order to read successfully (Goodman, 1984; Holdaway, 1979; Latham & Sloan, 1979; Parker, 1985; Sloan & Whitehead, 1986).

In addition, schemata are not simply "definitions of concepts, which specify some particular relationship" (Moates & Schumacher, 1980, p. 193), but are "representations of the general knowledge that people have of their world" (Moates & Schumacher, 1980, p. 193). They are essential prerequisites to reading success as they provide a structure for organising meaningful concepts in memory (King & Quigley, 1985).

Without appropriate schemata, concept identification cannot take place readily and the reading process is interrupted. The importance of concept identification in reading and language is summed up by Goodman (1971) where he states that "the reader brings meaning to the search [for meaning] in order to get meaning from it. If he lacks relevant experience *or concepts* he cannot read a particular story or book or article" (p. 8). Consequently an examination of students' concept identification abilities was perceived to be a possible way to predict reading abilities in deaf children. If this were the case, a high correlation between concept identification performance and syntactic performance would be expected, since use of syntactic structure is a key element in reading for meaning.

A reliable, valid instrument which measured concept identification ability and reading ability in deaf children would provide important research data as well as being a useful diagnostic tool for teachers. In addition, identification of a significant relationship between concept identification performance and syntactic performance would provide further information which may lead to improved teaching practice with deaf children, as more emphasis may be placed on concept development, and thus better reading performance may be expected.

The Purpose of the Study

The purpose of this study was to develop a reliable, valid instrument which measured prelinguistically deaf children's concept identification ability in a reading situation. In addition, the instrument was to provide information about the children's semantic and syntactic abilities.

Statement of the Problem

As language ability is an essential factor in reading success, the assessment of reading performance is an assessment of various interactive aspects of general language ability (Gibson & Levin, 1975). With respect to deaf children, the assessment of reading performance is difficult, with inconsistent results being derived from different reading tests. King and Quigley (1985) suggest that the reading levels of deaf children are probably even lower than the levels obtained using standardised reading tests. A reading assessment tool which is also an assessment of language ability may be a better predictor of reading

than some of the traditional "reading in isolation" assessment techniques which have been used in the past (Webster, 1986).

McAnally et al., (1987) found that deaf children progress through similar stages and sequences in language development and growth to hearing children, although the rate is delayed. The Language Assessment, Remediation and Screening Procedure (LARSP) is used by many teachers of deaf children to assess their students' syntactic levels (performance). Deaf students' ability to *integrate* information across linguistic units appears to be the key factor in their ability to process information at sentence and intra-sentence level (Anderson, 1981; McAnally et al., 1987). Quigley, Power and Steinkamp (1977) found that by 18 years of age most deaf students had attained mastery over only a few syntactic structures of English. They suggested that the complex *semantic* nature of sentences containing the syntactic structures was the cause of at least some of the problems. As researchers do not agree on the nature of the relationship between syntactic and semantic factors in language acquisition, more research in this area is needed. Some aspects of this study respond to this need.

In addition, isolation of some of the factors which contribute to the problems faced by deaf children in reading development, such as concept identification, may lead to greater understanding of the language acquisition, memory and/or reading related problems facing deaf students. Improved chances of reducing or eliminating those problems may follow.

Although instruments for testing language development and reading ability were common, prior to the completion of the present study there was no instrument available for testing concept identification suitable for use with deaf children.

Definition of Terms

The following terms have special relevance to this study.

'Acceptable alternate' Scoring

This term refers to a cloze task scoring system where "responses which make sense given the grammar and context, but don't necessarily match the author's words exactly" (Treece, 1989, p. 7) are counted as correct.

Concepts

"A mental structure with which we represent a category is called a concept" (Moates & Schumacher, 1980, p. 208). Concepts are "defined by one or more attributes related to a rule" (Moates & Schumacher, 1980 p. 209) or further, as ideas or events that have some similar features in spite of other dissimilar features (Di Vesta, 1974). They are learned by corrective feedback, as the important characteristics that define a concept and the rules appropriate to combining features are identified. Concepts are varied in nature. Moates and Schumacher (1980) gave some examples of different types of concepts. They wrote:

> Many concepts will have finite sets, such as that of "Planets in the Solar System", some have indefinitely large sets, such as the concept of "Human Being" or of "Walnut Tree". Still others have empty sets, such as the concept of "Living Dinosaurs" or of "Gold Pennies". (p. 208)

Concept Identification Ability

Concept identification ability is the ability to recognise ideas by their attributes and the rules related to them, as well as by elimination of inappropriate ideas.

Concept Identification Performance

Concept identification performance is the demonstrated concept identification ability. In this study, students' concept identification ability was tested using the Concept Identification Instrument (CII) in which the reconstruction of concepts in declarative statements in cloze tasks was necessary.

Cloze Task

"The standard cloze format requires subjects to replace words missing in text without the accompaniment of prompts or distractors [sic]" (Treece, 1989, p. 5). There are a number of variations to this format, one of which is the use of a substitute word in place of the missing word. In this variation, the word substituted may be an *artificial* word. It is this variation which is used in this study.

In this study, a cloze task is a task in which children are required to identify the meaning of a word in the text which is represented by an underlined, artificial word.

Discourse

Discourse is defined by Emmitt and Pollock (1991) as "a group of sentences related in some sequential manner" (p. 189). It may also be defined as a language sequence including two or more sentences on a topic. The sentences must be linked by meaning, be tightly connected or possess a high level of coherence (Latham & Sloan, 1979; Sloan, 1983). Gibson and Levin (1975), when discussing discourse, refer to "relations between sentences, often where they are considerably displaced from one another and where information from several assertions must be combined" (p. 386).

In this study, then, discourse is defined as a language sequence including two or more sentences on a topic, which are *linked by meaning*, although the sentences are not necessarily tightly connected or possessing a high level of coherence.

Prelinguistically Deaf Subjects

This term refers to subjects who have sensorineural hearing impairment of 90 dB or greater that occurred prior to the age of 2 years (McAnally, et al., 1987).

Semantic Information

Semantic information is the store of knowledge of ideas and events which represent a reader's life experiences. In some circumstances the term *semantic* can be used interchangeably with *meaningful*" (Latham & Sloan, 1979), as semantics is "the study of meaning in language" (Emmitt & Pollock, 1991, p. 191).

Semantic Ability

Semantic ability is the ability to match prior knowledge sensibly with other information, that is, the ability to locate correctly, and to use appropriately, semantic knowledge.

In this study, semantic ability is tested using the CII. The results attained are referred to as Semantic Performance at either sentence or discourse level. Separate definitions for these two variables appear in this section.

Semantic Performance at *Sentence* level

Semantic performance at *sentence* level is the *demonstrated* semantic ability of a subject in relation to one sentence only. It may be measured when the ability to choose a sensible, or meaningful, response within the context of a *sentence* is demonstrated.

Semantic Performance at *Discourse* level

Semantic performance at *discourse* level is the *demonstrated* semantic ability of a subject in relation to two or more sentences. It may be measured when the ability to choose a sensible or meaningful response within the context of a piece of *discourse* is demonstrated. The response must be appropriate to *all* of the information which has been revealed in the discourse.

Syntax

Syntax is defined as "the arrangements and interrelationships of words, phrases, clauses and sentences" (Emmitt & Pollock, 1991, p. 192).

Syntactic Information

Syntactic information is the description given to the structure of language at sentence level, and its cohesion at discourse level (Latham & Sloan, 1979).

Syntactic Ability

Syntactic ability is the ability to use appropriately the arrangements and interrelationships of words, phrases, clauses and sentences in a given situation, or to match correctly additional syntax to existing oral or written syntax.

In this study, syntactic ability is tested using two instruments; the CII which has a limited assessment of some aspects of syntax, and the LARSP which involves a complex analysis of syntax.

Syntactic Performance

Syntactic performance is the *demonstrated* syntactic ability of a subject.

Research Questions

This section outlines the way in which the purposes of this study were translated into the research questions from which the hypotheses were formulated.

Purposes

The purpose of this study was to develop a reliable, valid instrument which measured prelinguistically deaf children's concept identification ability in a reading situation. In addition the instrument was to provide valuable information about the children's semantic abilities at sentence and discourse level and limited information about their syntactic abilities.

In order to achieve this purpose, research questions were formulated to permit the subsequent generation of specific hypotheses associated with obtaining data. Accordingly, the study was designed to

provide information responding to the research questions presented below.

Research Questions

1. Can a reliable, valid instrument be developed which measures the concept identification ability of prelinguistically deaf children in a reading situation?

2. Can a reliable, valid instrument be developed which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *semantic ability at sentence level*?

3. Can a reliable, valid instrument be developed which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *semantic ability at discourse level*?

4. Can a reliable, valid instrument be developed which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *syntactic ability*?

Significance of the Study

Despite the large amount of research which has been conducted with deaf children regarding their language acquisition and reading ability, there is still much to be discovered. A reliable, valid instrument

which provided information about various aspects of deaf children's reading and language abilities would be a worthwhile achievement.

King and Quigley (1985) state that "studies of the effects of discourse-level variables with deaf children are almost nonexistent. This area is fertile ground for research" (p. 142). The instrument developed in this study provides data about deaf students' semantic performances at discourse-level.

The conflicting and inconclusive results from studies in the area of syntax and deaf students again suggests a need for further research in this area, according to King and Quigley (1985). This study examines new information about aspects of syntactic performance as they relate to reading and spoken language through a significant correlational relationships with other reading related areas.

Although the cloze procedure has been recognised as a valid testing measure (Aubret, 1986; Treece, 1989; Webster, 1986), and has been used in many different ways (Marshall, 1970a,b; Treece, 1989; Webster, Wood & Griffiths, 1981), this study does not duplicate any other studies in its particular use of the cloze procedure. The refinement of the cloze task in the form of a concept identification instrument in this study is a significant development.

The creation of a reliable concept identification tool which has its valid use in a reading situation with deaf children has implications for teaching deaf students and for the diagnosis of their problems in either reading or language. Such an instrument would provide researchers with

new information to help their understanding of the reading ability, concept storage and memory functions of deaf children. In addition, an instrument which simultaneously obtains information about semantic or syntactic ability may be a useful diagnostic and testing tool. Current teaching practice could be altered to include a greater focus on the teaching of concepts with an expected outcome of increased reading performance.

Since the subjects of this study were prelinguistically deaf, conclusions drawn may be applied to other children who have been similarly classified. The conclusions might also be appropriate to partially and postlingually deaf children, as most hearing impaired children exhibit some problems in reading.

Limitations of the Study

The factors listed below are noted as limitations affecting the findings reported in this study.

1. The study was limited by the number of subjects (N=21). Although a larger sample would have been preferable, the difficulty in gaining access to deaf children made a larger sample prohibitive for this study.

2. Prior knowledge, memory, vocabulary, and other aspects of language were being indirectly tested, and therefore undoubtedly had an influence on the results. In future studies, consideration could be given to controlling or testing these factors to ascertain or reduce their influence on results.

Plan of the Thesis

The investigation is reported according to the plan set out below.

Chapter 2

Chapter 2 sets out, in the form of a literature review, a brief summary of research related to this study.

Chapter 3

Chapter 3 discusses the conceptual framework on which this investigation was established. From this framework, and based on the relevant research, the hypotheses tested in this investigation were drawn.

Chapter 4

Chapter 4 describes the development of the Concept Identification Instrument, including descriptions of the procedure, research design, pilot study and final version of the CII used in the study.

Chapter 5

Chapter 5 presents the validation of the Concept Identification Instrument.

Chapter 6

Chapter 6 contains a presentation of the general findings and conclusions that are drawn from the study, as well as limitations of the study and implications for future research.

Chapter II

Review of the Related Literature

Introduction

Analysis of literature in the areas of reading, the acquisition of language, semantic development, syntactic development, concept identification, inferencing skills and discourse levels in deaf children was the source of information from which the present study emanated. Information obtained from literature regarding cloze procedure provided additional impetus for the study as well as information which assisted in the development of the instrument devised for this study. The areas mentioned here are dealt with separately in this section, although there is, naturally, some integration of these areas. The first area to be reviewed, reading and language acquisition, is the one to which all the other areas are conceptually connected.

Reading and the Acquisition of Language Structure

McAnally et al. (1987) make the alarming statement that "almost every deaf child reads (or at least looks at) books in English for 10 to 20 years in school without much of the vocabulary or structure being acquired (internalised)" (p. 204). This aspect of deaf children's limited language acquisition has disturbing implications, particularly for current teaching practice with deaf children. The lack of language structure acquisition by deaf children, despite long-term exposure, provides incentive for research into this area, as increased understanding of deaf

children's specific needs, as well as more accurate testing instruments, is needed. Specific consideration of concept development, semantic and syntactic factors is important in the attempt to identify schema break-down in the language acquisition process.

Gibson and Levin (1975, p. 501) noted that "the problem of deaf children learning to read is not, strictly speaking, a problem of reading per se, but of language development in general". Similarly, Hart (1978) observed that:

> learning to read is more difficult for deaf children because they are not just learning to read; they are also learning new language at the same time. Deaf children do not learn to understand and use language as a natural maturational process; they must be taught language deliberately. (p. 204)

The problems deaf children experience are directly related to the attributes and functions of language and result in reading problems, specifically with decoding, inferencing, and predicting (King & Quigley, 1985). These problems are met by all deaf children, whether they are learning English as a second language (e.g., after sign language) or not, as their prior exposure to the spoken language is minimal in either circumstance.

Summary

This section has reviewed literature which highlights the importance of examining language acquisition and reading in deaf children, due to the problems they experience in this area. The connection between syntactic and semantic factors, and their interconnection with concept

development, all of which are a part of language acquisition, provides a basis for the examination of each of those areas individually in any research dealing with language acquisition.

The particular problems experienced by deaf children during language development, acquisition and reading have been outlined, thus identifying the area targeted for research in the present study. Literature relevant to some of the specific areas which affect language acquisition, development and reading are examined below.

Semantic Development

Semantic information is "the store of knowledge of ideas and events which represents the sum of the reader's life experiences - real, vicarious and imaginary" (Latham & Sloan, 1979, p. 13).

The cognitive-semantic view is that the basis for children's language development is that which is real to them (Bloom, 1970; Bowerman, 1973; Slobin 1973). That is, children first learn about objects and events, and *then* learn to name them. The normal development of semantic knowledge is described by McAnally et al. (1987), who wrote that:

> young hearing children have an abundance of experiences accompanied by a wealth of language input. Even with this advantageous background, hearing children are not expected to use expressive language until approximately 12 months after their language experiences begin, and two-word utterances are not anticipated until the child is 18 to 20 months old. In other words, hearing children have about 1½ years to learn about their environment and to receive language information before they begin to use connected language. They, of course, continue to learn

about their world as they continue to acquire language and talk about their experiences. (p. 86)

McAnally et al.'s (1987) explanation that children talk about what they know, and that the expression of semantic knowledge requires both experiences and language knowledge has particular significance for deaf children and their semantic development, as they frequently lack the abundant language experience of hearing children. McAnally et al. (1987) pointed out that "(deaf children) do not have access to large amounts of language information" (p. 87) during early experiences. Consequently their semantic development is affected. Green and Shephard (1975) observed that the semantic systems of deaf children were of a similar standard to hearing children 2 to 5 years younger.

Tweeney, Hoeman and Andrews (1975) researched the way words were organised semantically in deaf adolescents. They provided both deaf and hearing subjects with three lists to be sorted into categories of similar meanings. Of the three lists, one of concrete nouns, one of pictures and one of words representing sounds (e.g. meow, hiss, toot), the last gave deaf subjects more difficulty. Tweeney et al. observed that deaf subjects differed only in minor ways from hearing subjects with nouns and pictures, but differed significantly in the choice of words representing sounds. In fact they found that deaf subjects' selections of "sound" words were not always based on semantic relations, but were sometimes based on the visual similarity of words, e.g. 'whine' in place of 'whack'. The study led Tweeney et al. to conclude that deaf subjects resorted to this inappropriate matching when they lacked semantic grounds for classification. As the

inappropriate grouping of words occurred with the "sound" words, they concluded that those words were apparently unfamiliar to the deaf subjects.

McAnally et al. (1987) suggested that "deaf people store information in long-term memory in terms of semantic characteristics" (p. 13), but that the difference in semantic selections may be due to differences in accessing the meanings in long-term memory.

Summary

This section looked at the cognitive-semantic aspect of language development. Deaf children's semantic ability is affected by their storage and retrieval of semantic information, both of which have been shown to be problematic as a result of their hearing impairment. As semantic knowledge is used when identifying concepts, the research suggests that deaf children may have problems in concept identification, which possibly reduce with age. In addition, research suggests that semantic development in deaf children may be similar to that of hearing children, but that it occurs at an older age.

Syntactic Development

During their work with deaf subjects, Quigley et al. (1977), observed that syntactic rules of standard English were not well established in deaf children even among the 18-year-old students. They concluded tentatively that English syntactic structures in deaf children develop similarly to those of hearing children, but at a much slower

rate. There were some specific problems identified, such as particular difficulties with some sentence structures. Quigley et al. (1977) suggested that the problems may be explained by the complex *semantic* nature of sentences containing the structures causing difficulties when they were first encountered. Future studies involving syntax in deaf children should include consideration of familiar and/or complex syntax in material used, as well as the degree of difficulty caused by complex semantics.

A major factor in deaf children's language difficulties is their use of linear rather than hierarchical structure when processing English (McAnally et al., 1987). This problem included two main factors: that deaf children frequently imposed a subject-verb-object pattern on comprehension of English sentences, whether or not this order applied; and that they tended to connect the nearest noun phrase and verb phrase, leading to misinterpretation of sentences containing embedded relatives. Russell, Quigley and Power (1976) concluded that these two problems probably accounted for most of deaf children's difficulties with the English language.

Studies conducted by Odom, Blanton and Nunnally (1967) and Walter (1978) used cloze procedure to determine deaf children's knowledge of words and word classes. Their results indicated that deaf students' selections of syntactic categories of words are frequently appropriate (e.g. nouns, verbs, etc.) but they often choose inappropriate words from within those categories. Consequently it was the *semantic* aspect of selection which caused problems for the students. In the present study, the *syntactic category* in the cloze task was controlled (always a noun)

in order to explore students' selections *within* these categories. Consequently more emphasis was placed on the *semantic* knowledge required for word selection in the CII, as is detailed in Chapter 4.

Drury and Walter (1979) found that as syntactic complexity increased in cloze passages, which were controlled for vocabulary and content levels, comprehension in deaf students decreased. These findings were not supported by Anderson (1978) and Noretsky (1981), whose studies with deaf students did not show improved comprehension with simplified syntax. King and Quigley (1985) suggested that more research is needed in this area.

In the present study an attempt was made to use sentences of low syntactic complexity, particularly in reference to vocabulary and sentence construction, and, to a lesser degree, sentence length. This was done to reduce the potential effects of poor comprehension relating to the studies by Drury and Walter (1979). This is discussed in greater detail in Chapter 4 of the study.

Summary

This section examined literature related to the development of syntax, particularly in deaf children. Again the rate of development (level of understanding) in deaf children was of concern, as well as the difficulties they experience as a result of complex syntax.

Some of the problems were identified specifically, with reference made to the way in which it affected the development of the CII.

Syntactic performance is likely to vary somewhat with the complexity of the syntax in a given task. Some conflicting results of studies related to syntactic complexity were reviewed, and the effect they had on the construction of the CII was identified.

Inferencing Skills

Inferencing may be defined as "a relationship noted between one event and another that is not directly stated" (Santrock, 1986, p. 284).

Moates and Schumacher (1980) stated that part of the constructive process in memory is the tendency for reasonable inferences to be incorporated into the semantic knowledge stored in memory.

"Inferencing is ubiquitous in reading comprehension" (King & Quigley, 1985, p. 48) and the ability to draw inferences from context, using prior knowledge, is essential for correct completion of cloze tasks. Waldron and Rose (1983) conducted research into the inferencing skills of deaf children. In their study, actions which implied that particular events had taken place were used; for example a bandaged knee implied that the knee had been hurt. Their studies led them to conclude that inferencing skills are not related to auditory or language skills. Rose (1975) conducted a study investigating the social inferencing skills of deaf adolescents. The subjects were asked to describe what had happened in pictures they were shown. Rose found that although deaf students were able to draw inferences about the people and actions implied by the pictures, their inferences were different from those of hearing students. In that study the differences between deaf and

hearing students' inferences were apparently as a result of the complex situations involving a number of concepts which were presented to them. In view of these findings, studies which involve inferencing skills in deaf children should involve the use of simple situations and a limited number of concepts.

The limited nature of deaf children's early experiences and cognitive and linguistic skills most likely leads to deaf children beginning reading with very limited background knowledge on a variety of commonplace subject areas. As the knowledge base is likely to be deficient, especially where inferencing is involved (King & Quigley, 1985), deaf children involved in tasks requiring inferencing, even with commonplace subject matter, are likely to have difficulty. Details of the effect of this research on the conceptual framework for this study appear in Chapter 3.

Summary

The literature on inferencing was reviewed in this section, particularly in relation to deaf children. It was found that deaf students' inferences differ to those of hearing students, and that the combination of those differences, together with deaf students' language impairments are likely to affect their inferencing ability, even with familiar subjects.

Discourse Levels

Research related to discourse levels (a group of sentences related in some sequential manner) and their effects on deaf children is scant; a fact noted by King and Quigley (1985), in their review of research. They noted that research involving discourse analysis has included the form (genre) of text and the structures which lie within it. The narrative form was the subject of most of this research. The responses of deaf children to single sentences or to discourse have been explored to a limited extent by Wilbur (1977). The effects of discourse in the creation of a familiar context as opposed to isolated sentences has been investigated by McGill-Franzen and Gormley (1980).

Wilbur (1977) observed that deaf children's limited exposure to discourse features of spoken language affected their writing ability. Although his research was related to deaf children's ability to *write* discourse, it is reasonable to assume that reading would be similarly affected by the limited exposure. Wilbur (1977) found that deaf children tended to tackle writing 'sentence by sentence', with little regard for the discourse as a whole. Wilbur did not, however, examine whether reading was tackled in a similar manner.

McGill-Franzen and Gormley (1980) examined passive sentences (e.g., "The wolf was killed') which were presented to deaf children in context and in isolation. Their results demonstrated the importance of context, and therefore discourse, to deaf readers, as the subjects were able to comprehend a sentence in a familiar context, which they had been unable to comprehend in isolation. As they used well-known fairy

tales in their study, however, the validity of their claims that the deaf readers' improvement was due to the context, may be questioned. In that study the influence of prior knowledge was not addressed and may have affected the results, as it was not possible to determine to what extent the subjects were responding to the text.

Studies by Ewoldt (1981) supported the theory that deaf children read for meaning, using contextual clues, and therefore use features available in discourse to gain meaning. Mandler and Johnson (1977) also conducted studies which analysed the effects of discourse on deaf subjects. The results of their study supported the contention that deaf subjects used a "broad reconstructive 'top-down' schematic approach" to reading (p. 467), suggesting that they were reading for meaning. The use, by deaf readers, of discourse features in order to comprehend is therefore also supported.

The need for further research in this area prompted the inclusion in the present study of the examination of semantic comprehension at discourse level, as well as at single sentence level.

Summary

The literature reviewed in this section related to research conducted on discourse. Wilbur's (1977) findings of deaf children's lack of ability to operate at discourse level when writing was examined, prompted his conclusions that their ability to read at discourse level was poor. McGill-Franzen and Gormley's (1980) findings, however, did not support this, as they found that deaf children did use context when

reading, and that their comprehension improved as a result. Nevertheless the reliability of their results is questionable. Research by Ewoldt (1981) and Mandler and Johnson (1977) also supported the contention that deaf readers use context clues when reading. These apparently conflicting findings may be explained by the differences in their studies, as Wilbur's (1977) study focussed on deaf children's writing ability, whereas McGill-Franzen and Gormley (1980) researched reading ability. The fact that the report genre has been chosen for this study introduces new data in this area. The theoretical position relating to *reading* at discourse level for this study is examined in Chapter 3.

Concept Identification

Before concept identification of any type can take place, concepts must be formed and stored. This process involves our experiences, knowledge and understanding, with concepts helping to "organise both our perceptions and our knowledge" (Di Vesta, 1974, p. 60).

The ability to form concepts "requires more than merely learning attributes, features, or characteristics of objects ... the learner must also learn rules for combining features and seeing relationships among them" (Di Vesta, 1974, p. 60). "Concepts are stored in memory as part of the cognitive structure" (Di Vesta, 1974, p. 62) and are available for recall or manipulation.

Successful readers are able to use information efficiently to identify concepts by a process of elimination and confirmation, a process further explained by Di Vesta (1979) when he stated that:

> any word or idea conveys a set of alternative meanings. Many alternatives mean more information but also more ambiguity. Accordingly, syntactical arrangements, contrasts and contexts clarify meaning, thereby reducing the alternative features to the one to which the listener/reader must attend. (pp. 88-89)

The ability to identify concepts by confirmation as well as elimination, as described by Di Vesta above, has been focussed on in the present study, and is evident in the CII itself. Full details of this aspect of the CII are presented in Chapter 4.

There is considerable evidence that good readers read for 'meaning' (Adams, 1990, Goodman, 1973, 1975; Smith, Goodman & Meredith, 1976; Holmes, 1973; Latham & Sloan, 1979; Sloan, 1983; Smith, 1973) and, consequently, that information retrieved may be expressed in more than one way. The implications of this are that "concepts" may be correctly identified, although words may not be identical, e.g. either of the words "aeroplane" or "plane" would correctly name a concept described as "a winged vehicle which is flown by a pilot". For this reason, as well as others detailed under "cloze procedure" in the present chapter, the 'acceptable alternate' method of scoring (in which responses which make sense both grammatically and in context, yet which may not exactly match the author's response are counted as correct) was adopted in the present study.

Summary

This section reviewed literature pertaining to concepts, their formation, access, use and availability. Concepts are identified as being ideas conveying meaning, and consequently concept identification

involves the recognition of the intended meaning. The permitted flexibility of word choice within these constraints is seen to be the most suitable way of determining correct concept identification, when the 'acceptable alternate' method of scoring is used.

Cloze Procedure

The cloze procedure is widely used for testing and diagnostic purposes because:

> the errors which children make in cloze procedures can be very revealing. They may reveal what the child knows about linguistic forms, the structure of sentences, the content of a passage; together with some insights into the strategies the child adopts in order to make sense of the linguistic puzzles the test presents. (Webster, 1986, p. 115)

Cloze, as a testing instrument, is considered to be suitable when testing reading-related behaviour. When developing an instrument which involves or tests reading, it is important to use a testing measure which is suitable for use with reading. The cloze procedure was determined to be consistent with language-thinking models of reading (Bormuth, 1967; Cooper & Petrosky, 1976; Neville & Pugh, 1976-1977; Sloan, 1983). As reading is a "language-thinking process" (Sloan, 1983, p. 67), and as there is an "important interaction between language and thought in reading" (Sloan, 1983, p. 68), the cloze procedure was deemed to be an appropriate format for use in the instrument being developed in the present study.

The validity of using the CII as a testing device is supported by Aubret's (1986) research where he used a version of the cloze procedure in which blanks corresponded to function words.

LaSasso (1978) conducted research on the validity of the cloze procedure as an accurate test of reading comprehension in deaf students. This did not yield convincing evidence in favour of cloze testing as a suitable measure. The scoring system she used was the 'verbatim' method (in which only exact word identification is counted as correct), which she felt did not produce accurate results. Consequently she concluded that future investigations should incorporate 'acceptable alternate' scoring in addition to verbatim scoring with deaf subjects. Although LaSasso expressed concern about the use of verbatim scoring, as did LaSasso and Davey (1983), the deaf subjects' cloze performances in her study correlated significantly with scores on the reading comprehension sub-test of the SAT.

In addition, Treece (1989) conducted research to study the use of the cloze procedure to measure reading comprehension and language ability of the deaf. Although none of the cloze procedures examined in his study was identical to the one used in this research, a number of relevant points emerged. 'Verbatim' scoring has been found to correlate extremely highly with 'acceptable alternate' scoring, endorsing the latter as an acceptable method of scoring. In fact Treece recommends the 'acceptable alternate' method of scoring for investigations with deaf subjects, stating that, "in addition, variance in cloze performance should be maximised by employing 'acceptable alternate' scoring, in addition to verbatim scoring, for the deaf" (Treece,

1989, p. 48). Acceptable alternate scoring, however, necessarily incorporates verbatim scoring. Strong evidence that the cloze procedure is able to measure both reading comprehension and language ability (Fischler, 1983; Treece, 1989) makes it a most acceptable tool in the present study. In fact, the cloze format has been "less controversial in relation to measuring language proficiency than it has in measuring reading comprehension" (Treece, 1989) and measures "the skilled inferencing with language" (Treece, 1989, p. 21). In addition, Treece's conclusion that cloze tests are most appropriate assessment devices and that more research is needed in the area of the cloze procedure and its use with the deaf population supports the use of the cloze procedure in the present study.

Traditionally the deletion of content words only is considered to be the most difficult cloze form (Treece, 1989). This is particularly relevant where several different content words are deleted in close proximity to each other. In fact Rankin and Thomas (1980) suggested that *the way* in which materials are used by different investigators accounts for many of the conflicting findings related to cloze test performances.

Kelly and Ewoldt (1984) found that the cloze procedure produced valid comprehension results when they conducted research using cloze exercises with hearing impaired children. They used cloze versions of stories (narrative genre) and judged responses using both acceptable alternative and verbatim scoring methods.

Summary

The literature reviewed in this section examined several forms of the cloze procedure and its application to deaf subjects. Although there have been some mixed results when the cloze procedure has been administered to deaf subjects, most researchers condone its use when acceptable alternate scoring is used. It is compatible with the language-thinking models of reading and it has been recognised as a valid procedure for testing reading and language achievement.

Validity and Reliability of Tests

Gay (1990) states that "validity is the most important quality of any test. Validity is concerned with what a test measures and for whom it is appropriate; reliability refers to the consistency with which a test measures whatever it measures" (pp. 127-128). Both concepts are examined more closely in the following discussion. The actual methods used in this research are described in this section.

Validity

The validity of a test is the degree to which a test measures what it is supposed to measure. It is concerned with how appropriate a test is. For example, a mathematics test may be appropriate (valid) for testing mathematics skills, although it is not appropriate (valid) for testing gymnastic skills. Similarly, a reading comprehension test written in German may be appropriate (valid) for testing the reading comprehension of German speakers, although it is not appropriate (valid)

for testing the reading comprehension of non-German speakers. There are a number of different types of validity which may be considered when examining a test. Some of the acceptable measures of establishing validity are discussed below.

Content Validity. Content validity involves an examination of a test, usually by experts in the domain involved, to see whether they believe it will test what it is intended to test, and whether they believe it will be appropriate to the subjects proposed. The experts use their prior knowledge and experience in the area to provide an educated opinion as to the validity of a test.

Convergent (Concurrent) Validity. Anastasi (1982) explains convergent validity by referring to the fact that a valid test should correlate highly with variables with which it is theoretically expected to be related.

Reliability

The reliability of a test is the degree to which a test consistently measures whatever it measures. One way in which to test reliability is to measure internal consistency using Cronbach's Coefficient Alpha. This may be used where test items are given a score. Internal consistency reliability is usually expressed as a coefficient, with a high coefficient indicating high internal consistency reliability. (Anastasi, 1982)

Summary

In this chapter, literature pertaining to many areas of language acquisition and reading, particularly in deaf children, was examined. It was shown that concept identification in deaf students involves the acquisition of language itself, and therefore involves aspects of semantic, syntactic and concept development as well as inferencing.

In addition, literature which involved tests and testing procedures relevant to the development of the CII, such as a variety of cloze procedures, was scrutinised.

Three significant points emerged:

1. There is a reasonable body of research which supports the use of the cloze procedure as a measure of reading and language acquisition.

2. Instruments used for testing need to be examined statistically for validity and reliability.

3. Deaf children are expected to go through many of the same stages of language acquisition as hearing children, but at a later age.

The literature which has been reviewed laid the groundwork for the theoretical position adopted for this study, and led to the formation of the research questions and hypotheses, which are presented in Chapter 3.

Chapter III

Conceptual Framework

Introduction

Three main areas were examined in the literature which was reviewed in the previous chapter. One area involved the literature pertaining to reading, language acquisition and related areas which are inherent in performing the task of concept identification. Another area specifically examined literature relevant to testing instruments which used the cloze procedure and was therefore able to provide information helpful in the development and construction of a concept identification instrument. Within these two areas, literature involving deaf subjects was particularly targeted as being more pertinent to the present study. The third area involved validity and reliability of tests and instruments.

These areas, collectively, have provided the bases from which the theoretical framework for the present study was formulated. Accordingly, this chapter provides a review of the theoretical positions derived from the previous chapter that underpinned the formulation of the research questions of the present study, and the hypotheses which were derived from them.

Review of Theoretical Positions

The following is a brief review of theoretical positions derived from literature detailed in the previous chapter, which underpinned the theoretical framework of this investigation.

Concept Identification

Concept identification involves recognition of the intended meaning. Concept formation, access, use and availability in deaf subjects are affected by limited language development. Successful readers efficiently use information to identify concepts.

Semantic Development

Deaf children's semantic ability is affected by their storage and retrieval of semantic information, both of which have been shown to be problematic as a result of their hearing impairment.

Discourse Levels

Research related to reading at discourse level supported the theory that deaf students use context clues when reading. Although the conclusions of one study supporting this theory were questionable, the majority of evidence supporting the contention that deaf students use information from more than one sentence at a time, and therefore have the potential to respond at discourse level, is sound.

Syntax Development

The level of understanding of syntax in deaf children is delayed. Complex syntax causes problems and difficulties for deaf children when first introduced.

Reading and the Acquisition of Language

The particular problems experienced by deaf children during reading, language development and acquisition are reflected in their syntactic, semantic, inferencing and concept development.

Inferencing Skills

Deaf children's knowledge base is likely to be deficient, especially in the area of inferencing. They are therefore likely to have difficulty with cloze tasks, which require inferencing skills, even when dealing with familiar subjects.

Cloze Procedure

Cloze procedure is recognised as a valid procedure for collecting data which may act as an indicator of both reading and language achievement. The recommended method of scoring cloze responses is the 'acceptable alternate' method.

Research Questions and Derivation of Hypotheses

In Chapter 1, the purposes of this study were outlined and the research questions derived from the purposes were stated. The theoretical bases of this study, together with the research questions provide the basis for generating the set of testable hypotheses which are presented below.

Research Question 1

Can a reliable, valid instrument be developed which measures the concept identification ability of prelinguistically deaf children in a reading situation?

Hypothesis 1. It is possible to develop a reliable, valid instrument which measures the concept identification ability of prelinguistically deaf children in a reading situation.

Research Question 2

Can a reliable, valid instrument be developed which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *semantic ability at sentence level*?

Hypothesis 2. It is possible to develop a reliable, valid instrument which measures the concept identification ability of

prelinguistically deaf children in a reading situation, which also measures their *semantic ability at sentence level.*

Research Question 3

Can a reliable, valid instrument be developed which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *semantic ability at discourse level?*

Hypothesis 3. It is possible to develop a reliable, valid instrument which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *semantic ability at discourse level.*

Research Question 4

Can a reliable, valid instrument be developed which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *syntactic ability?*

Hypothesis 4. It is possible to develop a reliable, valid instrument which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *syntactic ability.*

Overview of Procedure

Chapter 4 describes the initial stages of development of the CII, including modification of Sloan's (1974) instrument and its theoretical origins. Problems and considerations relevant to its development are presented, together with an explanation of the effects they had on the evolution of the instrument.

Details of the pilot testing with hearing children and modifications which resulted from these tests are presented. The pre-test instructions which were formulated are presented in both pilot and final forms.

The final version of the instrument is described as well as the method of analysis and scoring.

Chapter 5 presents a description of the procedure followed during the hearing impaired children's testing with the CII. Details of other tests undertaken by the children and the process of validation of the instrument follow. In addition, statistical calculation of reliability is presented.

Summary

The research questions and subsequent hypotheses determined the design of this investigation. The development of a reliable, valid test of concept identification ability, semantic ability at sentence and discourse levels and syntactic ability in deaf children was undertaken. An overview of the procedure has been presented in this chapter. The

complete details of the development and validation of the Concept Identification Instrument appear in Chapters 4 and 5.

Chapter IV

Development of the Concept Identification Instrument

Introduction

All aspects of the *development* of the CII are documented in this chapter. Chapter 5 describes the *validation* process undertaken for the CII.

Procedure

Initial development

I developed the Concept Identification Instrument from a testing instrument created by Sloan (1974). The original instrument consisted of sets of five sentences in each of which, one word was repeatedly replaced with an *artificial* word. The use of artificial words rather than the more usual blanks was chosen for several reasons. This method encourages language to flow, rather than be interrupted by pausing at blanks. Further, information obtained from Speech and Hearing Centre staff revealed that the subjects were familiar with the artificial word cloze procedure. There was, therefore, an opportunity for the creation of a different instrument which might provide new and worthwhile data for testing, diagnosis and teaching of hearing impaired children.

Initially, the intention was that the subjects would identify and nominate a sensible word identifying a concept which represented the

meaning of the artificial word in the test, using the context clues. Only one answer would be required per *set* of sentences. This was consistent with Sloan's original instrument. At that stage, the identification of only one concept per set of statements was the primary objective of the instrument. This was the basis of Hypothesis 1. However, it was felt that more information could be gained about the thinking processes of the children, if they responded after each sentence. A better understanding of how they determined a suitable name for the concept was expected to be gained using this process. Consequently it was planned that the children would reveal one sentence at a time and write a response prior to revealing the next sentence. It was reasoned that this method of considering the concept in stages would give readers the opportunity of demonstrating both confirmation and elimination involved concept identification, as described by Di Vesta (1974), and reviewed in Chapter 2.

It became apparent that more valuable information than was originally envisaged could be tapped using the CII. Consequently Hypotheses 2, 3 and 4 were formulated and the research was broadened. During construction of each set I ensured that more than one alternative was semantically acceptable after each new sentence had been revealed until the final statement had been revealed and had eliminated many previous possibilities. In this way children were more likely to be placed in a position of having to reconsider their responses at some time during each set, forcing them to reconsider all sentences before finally identifying the correct concept.

As four different types of analysis were to be undertaken on the CII, clear definitions of correct and incorrect answers for each type were formulated. The four definitions which guided the scoring follow.

Concept Identification Performance. Concept identification performance was considered to be the measured ability of a subject to nominate a concept which corresponded to all of the information contained in a set of five sentences, including descriptions of the attributes and the rules related to the ideas.

Semantic Performance at Sentence Level. Semantic performance at sentence level was considered to be the measured ability of a subject to choose a sensible (meaningful) response for each individual *sentence*. If the response made sense within the particular sentence under examination, and therefore made sense *at sentence level*, it was scored as being correct, regardless of whether the response would have been correct for the *other* sentences in the set.

Semantic Performance at Discourse Level. Semantic performance at discourse level was considered to be the measured ability of a subject to choose a semantically acceptable response within the *discourse*. The response had to be a sensible response which fitted into *all* of the exposed sentences (the entire piece of discourse which was revealed), if it was to be scored as being correct.

Syntactic Performance. Syntactic performance was considered to be the measured ability of a subject to match correctly the syntax of a

sentence, and of discourse, while performing a concept identification task.

The use of an artificial word in this study is consistent with a method recommended for children when dealing with unknown words they encounter during reading. In that method children are advised to substitute the unknown word with an artificial word until they are able to guess at its likely meaning (Sloan & Latham, 1981, p. 148). In addition, the precedent has been set for using artificial words in a cloze passage to encourage or assess children's use of context clues, by activities such as Using Non-Words, (Reading K-7 Teachers' Notes, 1983, p. 140) and tests such as Werner and Kaplan's (1950, p. 251).

In view of the findings from the studies concerning the inferencing skills of deaf children described in Chapter 2, the inferencing involved in the current study was controlled to ensure that each sentence involved few concepts. Findings were that research involving prelinguistically deaf children should involve the use of simple situations and a limited number of concepts. Since the sentences in Sloan's instrument were too complex to be used in this study, they were modified and the syntax was simplified. In my modification, the sentence structure was much simpler and the concepts were replaced by items familiar in daily life. Both tangible concepts (e.g., a rose) and intangible concepts (e.g., sad) were used in the initial construction.

The sentences were designed to be simple, declarative statements in order to reduce the effects of insufficient *syntactic* knowledge, and to ensure that they had a greater emphasis on *semantic* understanding.

The simple declarative statements used in the CII were constructed in such a way as to attempt to avoid the syntax-related problems identified by Russell et al. (1976) in Chapter 2. The artificial word was always a noun, so that children's selections should come from that category of words. Consequently more emphasis was placed on the *semantic* knowledge required for word selection than on the *syntactic* knowledge.

There was no time limit placed on the children, nor were they hurried to respond. Belmont, Karchmer and Pilkonis (1976) found that retrieval of information from memory is slower in deaf subjects. Consequently identification of concepts where information about the concept is revealed sequentially is likely to result in slower (or later) concept identification. The unlimited time opportunity was included to ensure that the children's concept identification ability was being tested, rather than their ability to retrieve information quickly.

In Chapter 2 research by Quigley et al. (1977) was discussed which involved problems associated with the development of deaf children's syntax. During the development of the CII, special attention was paid to these problems in order to avoid interference of results obtained during CII testing. The areas which were controlled during CII development included the following:

1. The grammatical category of words chosen for substitution in the cloze sentences was controlled. In each case the artificial word was a noun.

2. The semantic nature of the sentences was kept simple. This was done by making the sentences carry as few additional concepts as possible, within the constraints of building up a working context into which the artificial word would fit.

3. The syntax of the sentences was largely controlled, avoiding the problems specifically identified by Quigley et al. (1977), such as negatives (e.g., the water is *not* hot), relativisation (e.g., the boy *who hit the girl* ran away), and complementation (e.g., I lost the watch *that you gave me*). Sentence length was generally kept fairly short in order to reduce the potential effects of poor comprehension for the reasons identified in Drury & Walter's, (1979) research in Chapter 2.

4. The subjects were accustomed to the cloze format which uses artificial words, eliminating a potential problem had the format been unfamiliar to them.

The CII, being a cloze instrument, gave children the opportunity to use their semantic and syntactic knowledge in the production of replacement responses.

Pilot Tests

Exploratory data gathering studies were undertaken during the developmental phase of the CII. This involved a series of pilot tests which were run using hearing children from a Catholic primary school, during several phases of the instrument's development.

During the first pilot study, 20 sets of concepts were trialled on two hearing children, a Year 6 student and a Year 4 student, in order to make an early identification of any significant problems. As a result, some of the concepts were modified, making the syntax simpler and removing ambiguities. Some of the sets were found to be unsuitable and were abandoned.

At this time the procedure for answering was reviewed. It became apparent that the children attempted to avoid responding to each of the first four sentences until they were all revealed, so that they could have the "right" answer to all five. This occurred despite the explanation that the answers were likely to change or be modified as more information was revealed, and that the original answers would be judged according to how well they suited the limited amount of information revealed.

The instrument administration procedure was modified in order to ensure that a response was given after each sentence was revealed. The new method meant that the tests were to be administered in a one-to-one situation. I controlled the physical action of the uncovering of the sentences, only one of which was revealed at a time, in order to elicit five responses per set. This was done by placing a blank card over the set of sentences. I slid the blank card down just enough to reveal the top sentence. After I had been given a response and had written it down, I slid the blank card down again to reveal the next sentence. This continued until all five sentences had been revealed and answers written. The blank card was then replaced on the pack of cards and the recently completed set's card was slipped out and placed

at the bottom. The blank card remained in position over the new set until I revealed the sentences in the manner described above.

The information which was considered essential for effective response to the test was formalised and is summarised below. Each point was explained to subjects during the practise time, using this list as a guide but trying different methods of explanation in an attempt to identify the most successful explanations so that the instructions could be somewhat standardised. The instructions given to the children were based on the following:

1. The underlined words are *nonsense* words, which I have invented. They do have meanings, and it is your task to identify their meanings and name them.

2. Answers need to be able to replace the *nonsense* words in the sentences, where they need to be grammatically correct as well as sensible.

3. Answers can to be repeated when I show you the following sentence, if you believe it is still correct after the addition of the new information.

4. If your last answer is no longer correct, you should try to think of a sensible new answer which fits all of the information.

5. You should check your new answers by saying them in place

of the nonsense word as you read each sentence, to be sure the new answer fits sensibly and grammatically in them all.

6. An answer given early in the set, which has to be changed later, should not be seen as a poor answer given earlier. You should not be concerned if you have to change your answers as you find out more information.

7. I am able to help you with answers in the practice items, but not in the others. Your teacher will discuss any sentences or answers with you later.

In order to standardise the content of the sentence sets, the report text-type (Latham & Sloan, 1989) was used as a framework for the construction of each set. The four essential components of the report text-type, as set out by Latham and Sloan, were included in each set. These included a category, such as a common group name in which the object may be sorted (e.g. a pread is a musical instrument); a location, such as where an object may be found (e.g. a pread is held against the shoulder); a description of some aspect of the object (e.g. (a pread is mainly wooden); and one aspect of the objects dynamics or action (e.g. a pread is played using a bow). The modified version of the sets of five sentences included one sentence concerning each of category, location, and description, and *two* sentences concerning the dynamics of the concept.

After these modifications, further trials took place with 22 Year 4 hearing children from the Catholic primary school. During each of the

next few trials the children were given between two and four sets for the practice session, during which time I gave instructions. Following that, they were tested on 10 concept sets. Four practice concept sets and 10 test concept sets were then chosen to comprise what it was hoped would be the final instrument. These were trialled with a further 10 Year 4 children, were deemed successful and were not altered.

The essential pre-test instructions were transformed into a checklist of abbreviated language using terminology which was familiar to me. That allowed me to scan and recognise each point quickly, so that I could easily check them off as I explained them. I modified my language to suit the children, rather than using the terminology on the list. The actual words I used in my explanations varied as I endeavoured to meet the needs of each individual, particularly important with deaf children who sometimes need repeated or varied instructions to understand. The final checklist is presented below.

1. The underlined words are "nonsense" words.
2. They do carry a meaning.
3. Your task is to identify the meaning of the underlined word.
4. Answers must be sensible in regard to the sentence.
5. Answers must make sense in regard to all revealed sentences.
6. Check answers in all revealed sentences by substitution.
7. Answers must be grammatically correct.
8. Answers may be repeated if they fit the next sentence.
9. Answers should be changed if they do not fit a newly revealed sentence.
10. You may pass if you are unable to give a sensible answer.

11. The first sentence usually has several possible good answers.
12. Later sentences have fewer options.
13. I can't help you with the answers once we've finished the practice items.
14. Don't hurry, there is no time limit, but do pass if you are stuck.

Final Version

The final version of the CII was comprised of 10 sets of five cloze statements, each set appearing on a separate A4 card, with an additional four practice sets included and one blank A4 card. For an example of the presentation of each set, see Appendix A.

Each set had one word which appeared in each sentence in the set, which had been replaced by an underlined 'artificial' word. In each set the word chosen was a content word. For example, the set based on the concept "mosquito" was presented as follows:

Prisks are insects.
Prisks have wings.
Prisks make a humming sound as they fly.
Prisks live near water.
Prisks suck blood from humans.

For the complete sets of statements see Appendix B.

Method of Scoring and Analysis

As explained in the literature, research by LaSasso (1978) led her to recommend the 'acceptable alternate' method of scoring, in which responses which make sense both grammatically and in context, yet which may not exactly match the author's response are counted as correct. In addition, Treece (1989), after studying the use of the cloze procedure to measure reading comprehension and language performance of the deaf, also recommended the 'acceptable alternate' method of scoring. The 'acceptable alternate' method was therefore adopted for this study.

Concept Identification Performance

Responses were scored using the 'acceptable alternate' method (Treece, 1989). As previously described, a marker using this method recognises as correct those responses which satisfy the criteria, that is meaningful responses whether or not they are the particular responses identified by the marker. Each acceptable answer was therefore assigned a score of one and each unacceptable answer was assigned a score of zero. A pass was considered to be an unacceptable answer. The range of possible scores for concept identification per set was 0-1, and per test was 0-10.

Semantic Performance at Sentence Level

Each response was assessed to determine its acceptability as a semantically acceptable response at *sentence* level. The responses were

again scored using the 'acceptable alternate' method (Treece, 1989). Each acceptable answer was assigned a score of one, and each unacceptable answer was assigned a score of zero. Consequently the range of possible scores per set was 0-5, and per test was 0-50.

Semantic Performance at Discourse Level

In order to ascertain whether each subject used the entire discourse available, or only some sentences, the scoring system used for this variable was somewhat different from that of the previous variables. Again, responses were scored using the 'acceptable alternate' method (Treece, 1989) although the response to the first statement was not scored as it did not offer the opportunity of reading at more than single sentence level. The second response in a set was assigned one mark if it was semantically acceptable to the first *two* sentences, or no marks if not. The third response in a set was given two marks if the response was appropriate to *all three* exposed sentences, or no marks if not. The fourth response in a set was given three marks if the response was appropriate to *all four* exposed sentences, or no marks if not. The fifth response in a set was given four marks if the response was appropriate to *all five* exposed sentences, or no marks if not. The possible mark increased in line with the number of sentences, and therefore the size of the discourse, being read. The maximum possible score per set, then, was 10 (i.e., 1 + 2 + 3 + 4 = 10); the range of possible scores per set was 0-10 and per test was 0-100.

Syntactic Performance

The syntactic analysis was done at a sentence level. A score of one mark was allocated for each response in which the syntax was correct, and a score of zero was given if the answer was not syntactically correct. For example, if a response given was plural instead of singular, or was not a noun, a score of zero was allocated. Consequently the range of possible scores per set was 0-5, and per test was 0-50.

Materials

1. A prepared answer sheet for responses to the CII statements was used for each student. Answer sheets included space for students' names, ages and their responses to all statements, including the examples. See Appendix C for an example of the answer sheet.

2. A audio tape recorder was used to tape all data collected using the CII. Tapes of all interviews were subsequently analysed during the scoring process, to ensure that all answers had been recorded correctly.

Ethics

Parents' permission for their children to participate in the research was sought and received prior to the data collection. Confidentiality was maintained by avoiding use of the children's names in the discussion of the results. Individual students could not be identified in any way.

The students had been made aware of the purpose of the research by their hearing-specialist teacher, prior to their participation. In addition, I explained the procedures of the administration of the CII immediately prior to the session.

Chapter V

Validation of the Concept Identification Instrument

Introduction

In Chapter 4, the development of the CII was detailed. The procedure undertaken to validate the CII is presented in this chapter. Conclusions and discussion of the findings are presented in Chapter 6.

Subjects

Twenty one children between the ages of 9 and 17 ($\underline{M}$ = 12.8, SD = 2.8) who attended or had previously attended the Speech and Hearing Centre were chosen for this study. The subjects were selected on the basis of their hearing impairment. Only children whose sensorineural hearing impairments were classified as prelinguistically deaf, that is children with an average hearing range of less than 90 dB (HTL), and in whom the hearing impairment was present at birth or occurred during their pre-lingual years (i.e., before 2 years of age), were included. To reduce interference from other language variables, hearing impaired children with less severe or post-lingual impairments were not chosen to participate.

A decision was made as to which of the deaf children were likely to be able to participate in the CII testing. All of the deaf children were tested using the Language Assessment, Remediation and Screening Procedure (LARSP) (see the discussion of the LARSP on page 69). Those

whose levels were either 5, 6 or 7 were chosen. Children with lower levels were not included as it was considered unlikely that they would be able to work independently on the CII. This decision was based on their limited language ability, as assessed using the LARSP results. The two highest achieving children in level 4 of the LARSP were tested on the CII to verify this decision. As expected, they were unable to work independently on the CII, a result consistent with their teachers' assessments. Consequently the decision was ratified and only children in levels 5 to 7 became subjects of this study. All children associated with the Centre who met the selection criteria were included.

School situations differed for the children, with some attending the Speech and Hearing Centre full-time, some attending mainstream Catholic primary or secondary schools with access to teachers who are hearing specialists within the school and some attending secondary schools with occasional access to teachers who are hearing specialists.

The Speech and Hearing Centre is a non-government establishment. Although the socio-economic status of students is not uniform, it is to be expected that few lower socio-economic hearing impaired children would attend, as they would be more likely to enrol in a government school.

Children communicated using a combination of speech and lip-reading, with additional assistance from hearing aids and a method of cuing where the finger sign for some sounds was signalled by a speaker's hand during speech to assist understanding.

Procedure

Data collection took place in various types of rooms within the children's schools. The primary school children's interviews were held in the rooms in which the children normally saw their hearing-specialist teacher. The secondary students were interviewed in one of their schools' interview rooms. The children attending the Speech and Hearing Centre were interviewed in an interview room at the centre. In most cases the interviews were conducted with the children's hearing-specialist teacher present, although not participating.

The interviews followed a standard procedure involving a preliminary chat between myself and the children to put them at ease and to ensure that we were able to understand each other. The children were then introduced to the CII using the four practice concept sets. I gave all necessary instructions and information about the test during the presentation of the four practice concept sets.

While helping students to understand and to respond appropriately to the practice sets, I took advantage of the children's errors and misunderstandings to explain the procedure. After the practice sets had been presented, the students worked through the 10 concept sets without further assistance.

Instructions were not standardised as I decided that it was important that all children should be given sufficient instructions to ensure that they began the test with a full knowledge and understanding of their task. The conversational tone was intended to help prevent the

children feeling anxious, which may have otherwise been detrimental to their results. The checklist of essential pre-test information was checked off as I discussed each point with the children, to ensure that no vital information was missed with any child. The language used in the checklist was modified from the written version to an oral version which was more suitable for the children. This was important as deaf children have individual language needs and do not always understand new instructions after one explanation. A typical example of the pre-test interaction follows.

I began the sessions by introducing myself and asking the child's name, which I would write down. I checked that I had spelt it correctly. After brief discussion on general matters such as family, school etc. I checked every child to ensure that they were able to understand me clearly. As the children had usually become used to my speech during our brief conversation, most responded confidently. I then asked whether they knew what we were doing that day, to which most responded "no", despite their teacher having informed them about our intended activities.

I told them that I was a teacher doing some research into reading and that I had a *different* reading exercise for them to do. I showed them the first practice sheet, revealing all five sentences and explained that I had a number of sets of five sentences, like the one displayed. I continued, "They all have five sentences". The children usually counted the set quickly and confirmed that there were five sentences. Then I explained, "Each sentence has one word which is underlined. Can you see one on this page?" They indicated the artificial word. "This word

is a nonsense word, because I made it up." Laughter normally followed. "I made the word up, but it does have a meaning. Your job will be to work out what the nonsense word means. The same word is in each sentence in the set."

After they had confirmed their understanding so far, I covered up all but the first sentence of the first set (A brulk is a flower), and said, "When I show you the set I will begin by showing you just one sentence, like this. You will read the sentence and tell me something which the nonsense word could mean." The children read the sentence and some volunteered a word in response. If children needed help I suggested an appropriate response: "A daisy is a flower, isn't it, so the word "daisy" would be a good answer for this sentence. Can you think of something else which might fit?" Sometimes I needed to prompt with, "Can you tell me another flower?" After finding and trying other flowers in the sentence, and confirming which responses were correct and which were incorrect, I encouraged the children to choose one of the correct answers as the first response. I wrote down the answer which had been chosen.

Then I revealed the next sentence (A brulk has many petals). Using one of the flowers *they* had nominated, if possible, I read the sentence and then asked, "Does a daisy have many petals?" The answer was discussed, altered if necessary and substituted in the sentence. When an appropriate answer had been found, I wrote it down, ensuring that the children checked that I had written the correct word.

I revealed the next sentence (A brulk may smell pleasant). I read the sentence and then, using the last agreed upon answer, I put the question, "Does a daisy smell pleasant?" If so, we would agree to keep the answer, if not, the answer was modified. The correct answer was written and the fourth sentence was revealed.

By that time the children were usually quick to read the sentence themselves, and check their last answer to see if it fitted. I encouraged them to become independent in nominating answers as soon as possible, assisting them only when they needed help. I checked off each aspect of the procedure on the checklist once they had demonstrated that they had mastered it, and interrupted at times to ensure that all possible situations were explained. For example, I sometimes tried to use plural where singular was appropriate, and we discussed the problem and the need to ensure that the word fitted correctly into the sentences as they are written. I covered the majority of the instruction during the first two or three practise sets, endeavouring to leave the children to try the final practise item alone, with discussion afterwards if they had encountered problems.

Next I revealed the test sets one at a time, sentence by sentence. The children read the sentences, either aloud or silently. They responded by attempting to identify the concept in the manner practised. I wrote the children's answers and they checked them. The answer sheet was kept within the children's full view. This was done to provide the opportunity for them to check that I had understood their answers and had written the concept correctly.

If the children did not know an answer they stated "pass" and the next sentence was revealed. No time limit was set. The students took approximately 30 minutes each, with a range of 15 to 45 minutes.

The children did not appear to have any difficulty reading the artificial word or engaging in the process of substitution.

The hearing-specialist teachers were given copies of the instrument and the children's results immediately after the testing in order that they could discuss the concepts with the children, ensuring that the procedure was a learning exercise for the children, as well as eliminating the children's possible frustration if the answers remained unknown. In addition, teachers used the results diagnostically. They also used the instrument in later teaching sessions with children with all levels of hearing impairment, in order to teach concepts.

Convergent Validity

In order to examine the convergent validity of the CII, the subjects' reading and language achievement was also measured using other instruments. The particular instruments chosen were selected because their results were theoretically expected to correlate with the results obtained from the CII, due to the closely connected relationship between the variables being measured.

The *Progressive Achievement Tests (PAT)* (Australian Council for Educational Research, 1973) measured reading comprehension, which is closely associated with the semantic analysis conducted with the CII.

Both the CII and the PAT involved subjects in a reading situation. In addition, the availability of statistical data on the validity and reliability of the PAT made it a suitable instrument for investigating convergent validity with the CII.

The *Language Assessment, Remediation and Screening Procedure (LARSP)* measured syntactic ability. It is a measure of language achievement which was devised for use with language impaired (including hearing impaired) subjects and has been widely used with deaf children, such as in the Speech and Hearing Centre. Consequently its use as an instrument for investigating the convergent validity of the CII was also considered to be appropriate. Details of research into the validity and reliability of the LARSP were unsuccessfully sought in literature and from the authors of the book explaining the procedure. Research appears to be confined to case studies. The only response to my letters which was received before submission of this thesis confirmed the lack of statistical data on the reliability and validity of the LARSP. See copies of the correspondence in Appendix D.

Details of the two instruments used to validate the CII, the PAT and the LARSP, are presented below. This is followed by a presentation of the statistical data on the relationship between children's performances on the CII and children's performances on the PAT and the LARSP.

The Progressive Achievement Tests (PAT)

The reading comprehension PAT (Australian Council for Educational Research, 1973) measure "skill in 'plain-sense' comprehension and interpretation of prose material" (p. 1). They are comprised of two equivalent forms of reading comprehension which measure both factual and inferential comprehension of prose material. Prose passages containing 200 - 300 words, graded in complexity from simple to hard, are presented together with multiple-choice items, each involving five choices. The prose passages comply with the general definition of discourse presented in Chapter 1, in that it involves a group of sentences related in some sequential manner.

The PAT are standardised reading tests which were tested for reliability using the Kuder-Richardson formula 20. Data obtained from the New South Wales samples included KR_{20} correlations which ranged from .87 to .91. In addition, PAT validity has been established using content validity and concurrent validity methods.

The PAT were therefore considered suitable for this study as their validity and reliability as reading comprehension tests were well documented. In addition, the close theoretical connection between both reading and language development areas, affecting both the CII and the PAT meant that the PAT fulfilled the requirements for calculating convergent validity correlations with the CII.

The PAT may be administered by qualified teachers, as was done for this study, where the students' hearing-specialist teacher undertook

the task. Detailed instructions for administration of the test as well as scoring and interpreting the results are provided in the teachers handbook, ensuring consistency. In addition, a test norming programme was conducted in all states in Australia in 1970. As a result, norm tables for all Australian states are included, with specific instructions for their use.

The Language Assessment, Remediation and Screening Procedure (LARSP)

The LARSP, an instrument which provides a comprehensive assessment of the grammatical patterns observed in children's language, was devised by Crystal, Fletcher and Garman (1976). It was selected as suitable for use in establishing convergent validity with the CII in this study for several reasons. Not only was it comprehensive, but it was created specifically for use with language-impaired children, and was therefore particularly suitable for use with the hearing impaired.

The LARSP provides a profile of the grammatical patterns which appear in children's language as they progress from the most primitive stages, through to the stages at which most of the grammatical features of adult language are mastered (Webster, 1986). Crystal (1989) described the LARSP as "a method of grammatical analysis which produces a profile description of a child or adult language sample, as a basis for clinical assessment and remediation" (p. 212). Crystal et al. (1976) recognised that syntactic development is a continuous process. Consequently they described the seven stages used in the LARSP as "arbitrary divisions" along the process. Each stage corresponds to some

general linguistic process which it is possible to identify in formal terms. Consequently, Crystal et al. (1976) felt that the stages provided teachers with a workable scheme for assessment and remediation. When a detailed profile of children's syntactic performance is collected, the information may be used to grade the children into one of the seven LARSP stages, providing a single-grade (level) category of LARSP performance obtained from the data collected for the profile. For a description of the LARSP Child Data Collection Instructions, see Appendix E.

The children's syntactic performances were categorised into one of seven LARSP 'stages' in the following manner. Stages 1 to 5 were assessed by observation of the features of speech described, although stages 6 and 7 were assessed by a combination of observation of improved speech and the number of errors in complex speech. The first five stages, then, involved identification of the students' use of the nominated sentence structures for each level. Levels 6 and 7, however, were determined by identification of a combination of new, advanced features as well as a reduction in the number of errors in complex speech (which was primarily achieved by level 5). See Appendix F for examples of each stage. Although children in this study belonged to only three of the seven LARSP stages, the stages are hierarchical, and therefore each stage relates directly to, and builds onto, the previous stages (Crystal, 1976; Crystal et al., 1976).

It is worth considering that the limited range of only three LARSP scores may have the effect of reducing the correlation

coefficients, which may otherwise be higher, had it been possible to have a wider range. Gay (1990) stated:

> Another factor that may lead to a coefficient representing an underestimate of the true relationship between two variables is a restricted range of scores. The more variability there is in each set of scores, the higher the coefficient is likely to be. (p. 240)

The LARSP was the data-gathering instrument used by the teachers associated with the Speech and Hearing Centre to categorise children's syntactic performance into levels, in order to assess language achievement. The collection and analysis of data which produced the results for this study was done by the children's hearing-specialist teachers. As previously discussed, however, no data on the validity and reliability of the LARSP was available for use in this study.

Descriptive Statistics

The statistical calculations for the correlations undertaken for this study were completed using the Lionheart Multivariate Analysis computer programme and the Minitab statistical programme. Other statistical measures followed the guidelines presented in Gay (1990).

Table 5.1 presents the descriptive statistics for the CII, the PAT, and the LARSP. There was a wide range of actual scores for sub-areas, with no ceiling or floor effects.

The mean stanine for the PAT was 4.3 which indicated that the

Table 5.1

Descriptive Statistics for the Progressive Achievement Tests (PAT), the Language Assessment, Remediation and Screening Procedure (LARSP) and the Concept Identification Instrument (CII)

Variable	N	Mean	SD	Range	
				Actual	Possible
CII Conc	21	5.9	2.7	0-10	0-10
CII Sent	21	33.7	9.4	15-46	0-50
CII Disc	21	57.1	22.8	8-90	0-100
Synt	21	32.5	7.4	18-44	0-50
PAT	16	4.3	1.8	1-7	1-9
LARSP	21	5.9	0.6	5-7	1-7

Note. CII Sent = Semantic performance at sentence level, measured using the CII

CII Disc = Semantic performance at discourse level, measured using the CII

CII Synt = Syntactic performance, measured using the CII

PAT = Reading comprehension stanines, measured using the PAT

LARSP = Syntactic performance, measured using the LARSP

reading performance of the subjects in this sample was within the normal range, although on the low side.

Although the possible LARSP range was 1-7, the subjects in this sample were concentrated in the 5-7 range.

Correlations between the CII and the PAT

The correlation coefficients which were calculated between the CII and the PAT are presented in Table 5.2.

All sub-areas of the CII were significantly correlated with the PAT, which confirms the convergent validity of the test.

As stanines are statistically related to grades, no separate statistical control for age was calculated.

Correlations between the CII and the LARSP

The correlation coefficients which were calculated between the LARSP and the CII are presented in Table 5.3.

Table 5.3 shows that all sub-areas of the CII were significantly correlated with the LARSP at the .001 level. Along with the results of Table 5.2, this further confirms the convergent validity of the test.

In order to check whether the correlations in Table 5.3 were

Table 5.2

Progressive Achievement Tests (PAT) and Concept Identification Instrument (CII) Correlation Coefficients

CII	PAT
Conc	.63**
Sent	.73**
Disc	.70**
Synt	.55*

n = 16

* $p<.05$ ** $p<.01$

Table 5.3

Language Assessment, Remediation and Screening Procedure (LARSP) and Concept Identification Instrument (CII) Correlation Coefficients

CII	LARSP
Conc	.70***
	(.74)***
Sent	.77***
	(.76)***
Disc	.74***
	(.76)***
Synt	.66***
	(.75)***

Note. The figures which appear in the table in brackets are the correlation coefficients when age is statistically controlled using partial correlation coefficients.

n = 21

*** p<.001

inflated by the wide age range, partial correlation coefficients were calculated to statistically control age. The results are displayed in Table 5.3 in brackets. These results indicate not only the strength of the correlations, as the correlation coefficients are marginally higher when age is statistically controlled, but also make clear the fact that the high correlation coefficients are not due to the age range.

Content Validity

In order to provide content validity for the CII, its final version was presented to four university lecturers with specialisations in the areas of reading and hearing impaired children. All four consultants agreed that the instrument tested concept identification, semantic ability at sentence and discourse level and a limited range of syntactic ability.

In addition, their responses included suggestions that the CII tested reading comprehension; sequencing ability; memory; inferencing ability; concept knowledge and identification ability; reasoning ability; selection ability; IQ; grapho-phonic knowledge; and subjects' ability to ignore nonsense words which may have distracting grapho-phonic cues. The last suggestion was introduced by one lecturer who was particularly concerned by the possible distracting nature of the cloze format using artificial words. This concern was alleviated regarding this study when she was made aware of the fact that the subjects were already familiar with that type of cloze format.

After careful consideration of the four sub-areas which the instrument was designed to test, the experts all agreed that they were

reasonable and appropriate. After discussion with me about the method of analysis of the data, their responses were that it was also sound. Their confirmation of the appropriate nature of the CII provided it with content validity.

Reliability

Internal consistency of the CII

The reliability of the CII was examined using Cronbach's Coefficient Alpha to determine internal consistency. Table 5.4 presents the results of these calculations. As the correlation coefficients for internal consistency were highly significant (.01 or above), the reliability of the CII was confirmed.

Intercorrelations of the Sub-skills of the CII

The relationships of all sub-areas measured in the CII were examined. Table 5.5 presents the intercorrelations of the sub-areas.

All sub-areas were highly correlated at the .001 level, further confirming internal consistency. The highest correlation coefficient was .98 for semantic ability at sentence level with semantic ability at discourse level. The lowest correlation coefficient was .65 for concept identification ability and syntactic ability.

Table 5.4

Concept Identification Instrument (CII)

Internal Consistency Coefficients

Conc	.78***
Sent	.86***
Disc	.84***
Synt	.66**

n = 21

** p<.01 ***p<.001

Table 5.5

Intercorrelations of Sub-skills of the Concept Identification Instrument (CII)

	CII Sent	CII Disc	CII Synt
CII Conc	.88***	.94***	.65***
	(.89)***	(.94)***	(.65)***
CII Sent		.98***	.76***
		(.98)***	(.78)***
CII Disc			.75***
			(.76)***

Note. The figures which appear in brackets are the correlation coefficients which result when age has been statistically controlled using partial correlation coefficients.

n = 21

***p<.001

Chapter VI

Conclusions

Introduction

The central aim of this study was to develop a reliable, valid instrument which measured prelinguistically deaf children's concept identification ability, semantic ability at sentence and discourse level and syntactic ability in a reading situation. This chapter describes the conclusions which resulted from this study. Initially, the specific findings in relation to the hypotheses for this study are presented and conclusions drawn. General findings and conclusions are then presented, followed by limitations of the study and implications for further research and educational practice.

Specific Findings

Hypotheses 1 - 4 provided the bases for the data collected. Each hypothesis is stated below, relevant data are presented and conclusions are drawn.

Hypothesis 1

Hypothesis 1 stated:

It is possible to develop a reliable, valid instrument which

measures the concept identification ability of prelinguistically deaf children in a reading situation.

Convergent validity in response to Hypothesis 1 has been provided by several factors. The first is the correlation coefficient calculated between the scores of the concept identification performance of prelinguistically deaf children measured using the CII and the PAT scores ($r(14) = .63$, $p<.01$), presented in Table 5.2, and the correlation coefficient calculated between the scores of the concept identification performance of prelinguistically deaf children measured using the CII and the LARSP scores ($r(19) = .70$, $p<.001$), presented in Table 5.3. In addition, confirmation of content validity was provided by experts in relevant fields. Consequently the CII was shown to be a valid instrument for measuring concept identification ability.

The significant internal consistency correlation coefficients presented in Table 5.4 confirm the reliability of the CII.

Conclusion. Hypothesis 1, predicting that it is possible to develop a reliable, valid instrument which measures the concept identification ability of prelinguistically deaf children in a reading situation, was supported.

Hypothesis 2

Hypothesis 2 stated:

It is possible to develop a reliable, valid instrument which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *semantic ability at sentence level.*

Convergent validity in response to Hypothesis 2 has been provided by several factors. The first is the correlation coefficient calculated between the scores of the *semantic performance at sentence level* of prelinguistically deaf children measured using the CII and the PAT scores ($r(14) = .73$, $p<.01$), presented in Table 5.2, and the correlation coefficient calculated between the scores of the concept identification performance of prelinguistically deaf children measured using the CII and the LARSP scores ($r(19) = .77$, $p<.001$), presented in Table 5.3. In addition, confirmation of content validity was provided by experts in relevant fields. Consequently the CII was shown to be a valid instrument for measuring *semantic performance at sentence level.*

As mentioned above, the significant internal consistency correlation coefficients presented in Table 5.4 confirm the reliability of the CII.

Conclusion. Hypothesis 2, predicting that it is possible to develop a reliable, valid instrument which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *semantic ability at sentence level,* was supported.

Hypothesis 3

Hypothesis 3 stated:

It is possible to develop a reliable, valid instrument which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *semantic ability at discourse level.*

Convergent validity in response to Hypothesis 3 has been provided by several factors. The first is the correlation coefficient calculated between the scores of the *semantic performance at discourse level* of prelinguistically deaf children measured using the CII and the PAT scores ($r(14) = .70$, $p<.01$), presented in Table 5.2, and the correlation coefficient calculated between the scores of the concept identification performance of prelinguistically deaf children measured using the CII and the LARSP scores ($r(19) = .74$, $p<.001$), presented in Table 5.3. In addition, confirmation of content validity was provided by experts in relevant fields. Consequently the CII was shown to be a valid instrument for measuring *semantic performance at discourse level.*

As mentioned above, the significant internal consistency correlation coefficients presented in Table 5.4 confirm the reliability of the CII.

Conclusion. Hypothesis 3, predicting that it is possible to develop a reliable, valid instrument which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *semantic ability at discourse level,* was supported.

Hypothesis 4

Hypothesis 4 stated:

It is possible to develop a reliable, valid instrument which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *syntactic ability*.

Convergent validity in response to Hypothesis 4 has been provided, to a limited extent, by several factors. The first is the correlation coefficient calculated between the scores of the *syntactic performance* of prelinguistically deaf children measured using the CII and the PAT scores ($r(14) = .55$, $p<.05$), presented in Table 5.2. The correlation coefficient calculated between the scores of the concept identification performance of prelinguistically deaf children measured using the CII and the LARSP scores ($r(19) = .66$, $p<.001$), presented in Table 5.3, also provides validity. Although the correlation coefficients were significant, they were lower than the other correlation coefficients calculated, possibly as a result of the limited nature of the syntax being measured by the CII. Nevertheless, the CII was shown to be a valid instrument for measuring *syntactic performance*. In addition, confirmation of content validity was provided by experts in relevant fields.

As mentioned above, the significant internal consistency correlation coefficients presented in Table 5.4 confirm the reliability of the CII.

Conclusion. Hypothesis 4, predicting that it is possible to develop a reliable, valid instrument which measures the concept identification ability of prelinguistically deaf children in a reading situation, which also measures their *syntactic ability*, was supported.

Summary

The hypotheses for this research were supported. A reliable, valid instrument which measured prelinguistically deaf children's concept identification ability, semantic ability at sentence and discourse level and syntactic ability in a reading situation was developed. In addition, significant relationships were found to exist between prelinguistically deaf children's abilities measured using the CII and the PAT, as well as between the CII and the LARSP, providing convergent validity. The reliability of the CII was verified using Cronbach's Coefficient Alpha to determine internal consistency. Content validity was confirmed after consultation with experts in reading and hearing impaired fields.

General Findings and Conclusions

The significant correlation coefficient ($r(14) = .63$, $p<.05$) found between prelinguistically deaf children's concept identification performance, measured by the CII and their reading performance measured by the PAT showed a significant positive relationship between these variables. In addition, a significant correlation coefficient ($r(19) = .70$, $p<.001$) was found between concept identification performance measured by the CII and syntactic performance, measured by the LARSP. The literature suggested that the relationship could be expected to be significant, as there is, theoretically, a close connection between both reading and language development areas. Concept identification may have a close enough relationship with reading for the CII to be predictive of reading performance.

Despite the limited LARSP range and small number of subjects the correlation coefficients were still high, indicating that very strong relationships exist.

There was a correlation coefficient of ($r(19) = .77$, $p<.001$) between prelinguistically deaf children's LARSP syntactic performance and their semantic performance at sentence level, which shows a significant positive relationship between the two variables.

The significant correlation coefficients between the semantic performance at discourse level and the PAT ($r(14) = .70$, $p<.05$), as well as the LARSP ($r(19) = .75$, $p<.001$) show significant positive relationships between the CII and the two other variables.

The correlation coefficient of ($r(19) = .66$, $p<.001$) between the LARSP and CII syntactic scores shows a significant positive relationship between the two variables.

The significant correlation coefficients found between the PAT reading comprehension test and concept identification performance ($r(14) = .63$, $p<.05$), semantic performance at sentence level ($r(14) = .73$, $p<.05$) semantic performance at discourse level ($r(14) = .70$, $p<.05$) and syntactic performance ($r(14) = .55$, $p<.05$) all measured by the CII, show significant positive relationships. All sub-areas have significant positive relationships with reading comprehension.

The high correlation coefficient between semantic performance at sentence and discourse levels ($r(19) = .98$, $p<.001$) presented in Table 5.5

confirms that there is a strong relationship between the two aspects of semantic performance. As one (discourse level) is dependent on the other (sentence level) it is not surprising that the correlation coefficient is high. It would have been possible, however, to have a high score in semantic performance at sentence level and a low score in semantic performance at discourse level, but not to have the reverse situation.

Latham and Sloan (1979) explained that in reading the interaction of semantic and syntactic information provides for effective reading and the acquisition of new concepts. This study, however, takes the investigation of that interaction one step further, by exploring the relationship of concept identification performance with reading comprehension and syntactic performance. The demonstration of high correlation coefficients between concept identification and these two factors provides evidence of their connection. Future studies may explore these relationships further, possibly examining the effects on reading and language performance of instruction specifically designed to increase subjects' concept knowledge.

Although deaf children's age was not the subject of a hypothesis, correlation coefficients with age were calculated, in order to see whether there was a relationship between prelinguistically deaf children's chronological age and their syntactic performance, as measured by the LARSP. There was a significant negative correlation coefficient ($r(19) = -0.52$, $p<.05$) between the scores of prelinguistically deaf children's syntactic performance, as measured by the LARSP, and their chronological age. The negative correlation coefficient may be due to the considerable change in technology over the period of the older

children's lives, making early detection more likely in more recent times. This may have lead to earlier commencement of special education for the younger deaf children. In addition, changes in teaching practice with deaf children over recent years may also have contributed to the results. Further research in this area is needed.

The relationships between deaf children's chronological age and their semantic performance at sentence level, their semantic performance at discourse level, and their syntactic performance, as measured by the CII were also examined. In each case the correlation of age with these variables did not produce significant correlation coefficients.

Limitations

The factors listed below are noted as limitations affecting the findings reported in this study.

The syntactic performance being tested by the CII was limited, as it only allowed for variation between singular and plural, or of the category of word, eg noun vs non-noun. Consequently a child with a strength or weakness in ability in either of these areas which was not representative of their syntactic ability generally could achieve higher or lower results in the CII test. An isolated strength or weakness would not be likely to affect the results in the same way, as it is a more comprehensive syntactic profile. In many cases, however, the results may not differ.

As discussed in Chapter 1, the study is limited to some extent by the number of subjects, when only 21. However, in view of the strong correlation coefficients obtained, this factor was not significant.

The limited number of LARSP stages (three only) in which the children are categorised limits the opportunity for a high correlation. Despite this limitation, however, the correlations are significant and consequently the strength of the relationship between the variables is clearly demonstrated.

The lack of reliability and validity data for the LARSP reduces its potential as a validating instrument for the CII. Nonetheless, its widespread use among deaf populations and the fact that it was designed for use with language impaired populations makes it worthwhile. The excellent reliability and validity information about the PAT, however, confirm its suitability in the role of a validating instrument.

Implications for Further Research and Educational Practice

The CII may be successfully used as a teaching aid or an assessment tool with hearing impaired subjects. It has the potential to be used with other populations, such as children and adults with or without language problems. More research is needed to determine areas in which its use is appropriate.

The instrument, in its current design, is limited in that it requires a one-to-one situation between examiner and subject, making it less

practical for a class teacher than a group administration test. Further development of the CII may overcome this limitation.

The report genre was the only genre utilised by the CII. The results of a test using other genres may be different. Further research using different genres such as the procedure or narrative genres would be worth investigation.

Modifications to the CII may make it appropriate for subjects with minimal literary skills, who would otherwise be unsuitable candidates. An oral version where the sentences were read to the subjects without giving them the opportunity to read them, would place a greater emphasis on memory and may allow it to be used with subjects lacking the prerequisite reading skills for CII use as it is now.

The CII may be suitable for use with students with a non-English speaking background, who are learning English. Specific research in this area would be needed to determine its suitability.

Research into the relationship between CII results obtained from hearing and hearing impaired subjects may provide data which could assist research into the areas of the functional differences between the two groups, and the resultant implications.

With additional research, the CII may be found suitable for use as a predictive tool in language and reading areas. Alternatively it may be used to complement other diagnostic or assessment tools.

Further implications of increased teaching of concepts leading to better reading and/or language performance need to be researched, probably using an experimental design.

Although the correlation coefficient between the two syntactic variables was high ($r(19) = .66$, $p<.001$), consideration could be given to the effect of different levels of syntactic complexity within the structure of the CII in future studies. The level could be controlled to determine the effect it has on the results. This would provide important practical information for teachers, as increased knowledge about this specific area may help them deal with deaf students' difficulties with syntax and the effect that has on other areas of development.

Concluding Summary

An instrument was developed which was found to be a reliable, valid tool for use in assessment of concept identification ability, semantic ability at sentence, semantic ability at discourse levels and syntactic ability in deaf children.

Some aspects of teaching practice have already been influenced by this study as a result of the observations made by teachers of the techniques used in the administration of the CII. The CII has also been used to diagnose concept identification problems in other hearing impaired children. In addition, it has been used as a teaching tool whereby deaf students were taught about the concepts presented in the CII, as well as the nature of concepts generally.

The CII's value as a probe into the importance of conceptual knowledge and its relationship to language and reading ability, together with implications for future teaching practice aimed at improving students' conceptual knowledge should not be overlooked.

The worth of this study lies in the successful development of a new instrument with potential use in a range of educational circumstances.

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Appendices

Appendix A

Concept Identification Instrument

Example of Presentation

A cruse is a tool.

A cruse has a handle and a blade.

A cruse is used by a builder.

A cruse is pushed and pulled.

Some people use a cruse to cut firewood.

Appendix B

The Concept Identification Instrument

1. A plagel is an animal.

   A plagel has a tail.

   A plagel can be found in many homes.

   A plagel makes a good pet.

   Some people use a plagel to guard their house.

2. A cruse is a tool.

   A cruse has a handle and a blade.

   A cruse is used by a builder.

   A cruse is pushed and pulled.

   Some people use a cruse to cut firewood.

3. A pread is a musical instrument.

A pread is mainly wooden.

A pread has strings.

A pread is held against the shoulder.

A pread is played using a bow.

4. Zinders are used by swimmers.

Zinders protect part of the body.

Zinders have an elastic strap.

Zinders are worn around the head.

Zinders keep water out of the eyes.

5. A yacker carries people.

A yacker can travel between cities.

A yacker has a captain and a crew.

A yacker has wings.

A yacker can fly fast.

6. A twisher is clothing.

A twisher has sleeves.

A twisher keeps you warm.

A twisher is often knitted.

A twisher is worn over a shirt.

7. Prisks are insects.

Prisks have wings.

Prisks make a humming sound as they fly.

Prisks live near water.

Prisks suck blood from humans.

8. A grisp is a toy.

A grisp is held by the hand.

A grisp is made from a small wheel and string.

The string of a grisp goes on your finger.

The wheel of a grisp spins up and down the string.

9. Welts are used to make things.

Welts are heavy.

Welts may be stacked on top of one another.

Welts make strong houses and fences.

Welts are joined to other welts using mortar.

10. A snulsh is a type of bag.

A snulsh has a clasp and a handle.

A snulsh carries papers to and from work.

A snulsh holds important papers.

A businessman may carry a snulsh.

Appendix C

Concept Answer Sheet

NAME _____ YEAR_____ AGE _____

Examples

au	2a	3a	4a
1b	2b	3b	4b
1c	2c	3c	4c
1d	2d	3d	4d
1e	2e	3e	4e

1a	2a	3a	4a
1b	2b	3b	4b
1c	2c	3c	4c
1d	2d	3d	4d
1e	2e	3e	4e

5a	6a	7a	8a
5b	6b	7b	8b
5c	6c	7c	8c
5d	6d	7d	8d
5e	6e	7e	8e

9a	10a
9b	10b
9c	10c
9d	10d
9e	10e

Appendix D

Correspondence

H. J. Hussey
[redacted]

29 April 1992

Dr. Paul Fletcher
Department of Linguistic Science
University of Reading
Great Britain

Dear Sir

I am currently in the final stages of the write up of a thesis which will complete my Bachelor of Education with Honours degree.

The study I conducted included information collected using the LARSP. I am having difficulty finding data on the validity and reliability of this procedure and wondered whether you might be able to assist me if you have relevant statistics, or by recommending any articles or references which address this aspect of the LARSP.

Your assistance in this matter would be greatly appreciated.

Yours faithfully

Heather Hussey (Mrs)

H. J. Hussey
[redacted]

29 April 1992

Dr. Michael Garman
Department of Linguistic Science
University of Reading
Great Britain

Dear Sir

I am currently in the final stages of the write up of a thesis which will complete my Bachelor of Education with Honours degree.

The study I conducted included information collected using the LARSP. I am having difficulty finding data on the validity and reliability of this procedure and wondered whether you might be able to assist me if you have relevant statistics, or by recommending any articles or references which address this aspect of the LARSP.

Your assistance in this matter would be greatly appreciated.

Yours faithfully

Heather Hussey (Mrs)

H. J. Hussey
[redacted]

29 April 1992

Prof. Dr. David Crystal
Department of Linguistic Science
University of Reading
Great Britain

Dear Sir

I am currently in the final stages of the write up of a thesis which will complete my Bachelor of Education with Honours degree.

The study I conducted included information collected using the LARSP. I am having difficulty finding data on the validity and reliability of this procedure and wondered whether you might be able to assist me if you have relevant statistics, or by recommending any articles or references which address this aspect of the LARSP.

Your assistance in this matter would be greatly appreciated.

Yours faithfully

Heather Hussey (Mrs)

H. J. Hussey
[redacted]

29 April 1992

Dr. J. Cooper
The National Hospital's College
of Speech Sciences
Chandler House
2 Wakefield Street
London
WC1N 1PG

Dear Madam

I am currently in the final stages of the write up of a thesis which will complete my Bachelor of Education with Honours degree.

The study I conducted included information collected using the LARSP. I am having difficulty finding data on the validity and reliability of this procedure and wondered whether you might be able to assist me if you have relevant statistics, or by recommending any articles or references which address this aspect of the LARSP.

Your assistance in this matter would be greatly appreciated.

Yours faithfully

Heather Hussey (Mrs)

THE NATIONAL HOSPITAL'S
COLLEGE OF SPEECH SCIENCES

Chandler House, 2 Wakefield Street, London WC1N 1PG
Telephone: 071-837 0113 Fax: 071-713 0861

16 May 1992

Dear Mrs Hussey

Thank you for your letter of 29 April, which Dr Snowling (Dr Cooper's successor) passed on to me.

As you may be aware from the explanatory literature on LARSP, it is not a test, but a descriptive profile. Hence issues of statistical validity and reliability do not arise. In a more general sense, these issues are addressed in the various texts on LARSP. I enclose some references that may be useful. There have also been articles on LARSP in the British Journal of Disorders of Communication, over the past few years. If you wish to pursue the matter further, it might be more convenient for you to contact the speech pathology department at a more local university! Alternatively, you could contact Professor Fletcher or Dr Garman, co-authors of LARSP at the Department of Linguistic Sciences, University of Reading.

Best of luck with your project,

[redacted].

Bill Wells (Dr)
Lecturer in linguistics

CLINICAL LINGUISTICS

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Appendix E

Child Data Collection Instructions

Child Data Collection Instructions

(taken from Crystal et al., 1976)

Each subject is taped for 15 to 30 minutes in the following way:

a. approximately 15 minutes in an unstructured, free play situation (using low noise toys); books, pictures etc. should not be used unless you find yourself with no alternative; interviewer should play with the child in what he considers to be a natural, appropriate way; if the child stays fairly quiet, the session can be turned into a prompted dialogue (asking the child what he's doing, what's happening etc.);

b. approximately 15 minutes of dialogue, on some aspect of the child's experience not to do with the immediate play situation.

Exclude the first few minutes of contact with the child from the above times, especially if he is not at ease with the recording situation in some way.

The interviewer should be alone with the child.

As soon after the recording as possible (preferably *within 24 hours*):

a. fill out the Recording Data Sheet (below)

b. listen to the tape and transcribe as much of the child's utterances as possible, concentrating especially on stretches which may cause an outside listener difficulty (e.g. due to immature articulation, family slang), and giving a gloss to those utterances which may not be clear out of context (e.g. *give me that* = give me the toy dog; *fall down* = his lego house has just fallen down; *doggy*

the toy dog; *fall down* = his lego house has just fallen down; *doggy* = he has just caught sight of his dog);

c. write your utterances and each of the child's on separate lines.

d. fill out the Child Data Sheet (attached).

Recording Data Sheet

1. Where did the recording take place?
2. Date of recording.
3. Anything abnormal in the child's general behaviour, health etc.?
4. Anything abnormal in the situation, which may have influenced the way he reacted, and which is not obvious from the tape?

Child Data Sheet

Name:

1. Date of birth:
2. Sex:
3. Age and sex of siblings:
4. Age of father: of mother:
5. Occupation of father: of mother:
6. Where living now:
7. Does either parent have a noticeable regional accent?
8. Have either any obvious speech/hearing impediment?
9. Child's medical history: normal birth?
   any long stays in hospital?
   any major disability/illness?
10. Any school/nursery/creche etc. attendance? (state type and length of time)
11. Is the child in regular contact with other adults at home? (state relationship)
12. Does the child have any contact with languages other than English? (state which)
13. Give any psychological testing scores which may be available:
14. Any other information you consider relevant:

Appendix F

Examples of sentence patterns at different Language Assessment Remediation and Screening Procedure (LARSP) Stages

Stage	Examples of sentence structures
1 (single words)	Mummy, car, biccy, hot, more, teddy
2 (two elements)	dolly bed, naughty baby, where Daddy, Mummy wash, give teddy
3 (three elements)	Mummy rided car, where my doggy, I eated my din din, Nana going now
4 (four elements)	We going to the swimming bath today You give Daddy a sweetie. I got a new dress for the party.
5 (complex sentences)	We had our tea and then we watched telly and then we went to bed. I can come out when I've put my toys away. That boy who was in the car opened the door.
6 (clause sequences)	She's sleeping *'cos* she tired. The car goes away and it comes to here. The car parked in the street and painted all red belongs to... The man in the shop with a coat on.
7 (advanced phrases and fewer errors)	I should have been able to see it. She's been bitten by a dog. This is ready to eat. Hardly had I gone before it rained. Actually I did not expect to win. Here comes Mummy's *little* helper!

(Webster, 1986, p. 54, & Crystal et al., 1976, pp. 75-84.)