Phonological Development in Mi'kmaq and the Phonological Characteristics

of Child Directed Vocabulary in Mi'kmaq

by

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ABSTRACT

The present study used the theory of Minimal Words within the Prosodic Hierarchy to examine the early phonological development of Mi'kmaq-speaking toddlers and the child directed vocabulary used by Mi'kmaq-speaking adults. Participants included four Mi'kmaq-speaking children (three boys, one girl) aged 1;7, 1;10, 2;1, and 2;2 at the beginning of the study. Language samples were obtained through video- and audio-taped mother-child interactions on a bi-monthly basis for up to nine months. In this study, Minimal Word shapes in Mi'kmaq were identified. The simplifications in syllable shape of Child Directed Speech lexicon items were identified and the prosodic shape of these items was then compared to the prosodic shape of children's early words. It was found that many of children's early words and Mi'kmaq CDS vocabulary items were Minimal Words. Simplifications in prosodic shape rendered all identified CDS vocabulary items to one prosodic shape that corresponds to a prosodic shape used by Mi'kmaq toddlers in early prosodic development. The acquisition of syllables and word shapes by Mi'kmaq-speaking toddlers was examined and compared to what is known about prosodic development in other languages in terms of the Prosodic Hierarchy. Overall, Mi'kmaq speaking children were found to follow the same pattern of prosodic stage acquisition as children in other languages. When a comparison was conducted between English- and Mi'kmaq-speaking children, the two groups showed comparable language levels (Mean Length of Utterance) at all stages of prosodic stage acquisition. The prosodic simplifications made by the children in their attempts at adult targets were tracked longitudinally and interpreted based on prosodic stage. Seven of sixteen samples did not follow the simplification patterns predicted based on assigned stage of the prosodic hierarchy and maintained more complex prosodic shapes than predicted based on assigned prosodic stage. Post hoc analyses revealed that large proportions of the maintained supraminimal targets were proper nouns. Analyses also revealed that in each sample across children, proper supraminimal targets were maintained more than common noun supraminimal targets when prosodic stage would predict that all supraminial targets would be simplified in prosodic shape. Possible explanations for why proper nouns may be learned and produced with greater accuracy than common nouns supraminimal targets are discussed. This research attempts to expand the focus of phonological development beyond segmental acquisition, which has long characterized the field of early language acquisition. Implications for future research of prosodic development in other languages and clinical applications of the prosodic hierarchy in language development are discussed.

LIST OF ABBREVIATIONS AND SYMBOLS USED

1. Child Direct Speech – CDS

2. Syllable - σ

3. Mora - μ

4. Mean Length of Utterance – MLU

5. Total items in sample – N

6. Total types examined in a sample – T

7. Consonant – C

8. Vowel – V

ACKNOWLEDGEMENTS

The Setting

The research project described herein involves the Mi'kmaq language. The purpose of the following information is to provide context and understanding of the culture and language of the Mi'kmaq people.

Mi'kmaq is an Algonquian language spoken by 3,000 to 5,000 people in the Atlantic Provinces of Canada and eastern parts of the United States (Foster, 1982). Mi'kmaq has been remarkably successful at maintaining its status as a language spoken in the home. In many Mi'kmaq families, children are brought up using Mi'kmaq as their mother tongue and are not exposed to English until they go to school. Other Mi'kmaq children are brought up speaking both Mi'kmaq and English, and there are, of course, some children who only speak English.

The data collected in this study came from children living in Eskasoni. Eskasoni is the largest Mi'kmaq reserve in Nova Scotia with an approximate population of 1200. It is located on the great inland Bras d'Or Lakes, in Cape Breton, Nova Scotia. The population is predominantly Catholic (95%) and by most accounts, contemporary Mi'kmaq Catholics engage in religious practices similar to those of non-native Catholics (Schmidt & Marshall, 1995). At Eskasoni, as at all reserves in Nova Scotia, the schools are operated by the local Band Council in an attempt to preserve both the culture and language. Both Mi'kmaq and English are taught in these schools with Mi'kmaq being taught by teachers fluent in the language. According to Marshall (1995) some of the traditions and values which have helped Mi'kmaq society to survive include respect for the human spirit from birth to death, respect for elders, sharing, individual

non-interference, beliefs for behavior modification in children (discipline), and the belief

that aging is a privilege.

<u>The Language</u>

Phonological system. The Mi'kmaq Phonology consists of eleven consonants

which are p, t, k, q [x], kw, qw [xw], s, j [dʒ], m, n, l where q and qw are uvular

fricatives. Consonants are voiced intervocalically and voiceless and unaspirated in other

environments. The orthographic system of Mi'kmaq is essentially phonemic such that

there is a one-to-one relationship between letters and sounds in this language. There are

six short vowels, i, u, e, [ə], o, a, and five long vowels i', u', e', a', and o'. The sound ə is

produced as schwa. The maximum syllable structure of Mi'kmaq is (C)VC word

internally, and (C)V(C)(C) in word-final position. In Mi'kmaq, [l], [m], and [n] may

form syllabic peaks in addition to vowels. Therefore, words need not contain a vowel at

all (e.g., *kmtm* 'mountain' and *nsm* 'my niece') (Inglis, 1986; Pacifique, 1990).

Syntactic and morphological system. Mi'kmaq, like other Algonquian languages,

has three main word types: nouns, verbs, and particles. Word formatives in Algonquian

are traditionally divided into five categories: preverb (PV), root (R), medial (M), final

(F), and inflection (I) (Fidelholtz, 1968; Hewson, 1978, 1986, 1990). Finals are further

divided into verb finals (VF), noun finals (NF), and particle finals (PF).

The root formative is the base of the Mi'kmaq word. Preverbs, medials, finals,

and inflectional endings are added to the root, either directly or indirectly. Preverbs are

the formatives that add aspectual or adjectival information to roots. Preverbs normally

end in -i, and prefix to the root. Medials usually have a nominal sense, and are positioned

between the root and its final. Finals occur before the inflection in both nouns and verbs. Often in nouns there is no inflectional ending, and the final then occurs word finally.

Many nouns and particles consist only of a root and no other informative (Inglis, 1986). Verbs, on the other hand, most frequently contain another formative after the root, so that minimally, a verb contains a verb final and an inflectional ending (a very small set can occur without the finals). The extended verb formative pattern is given in Inglis (1986). The derivative suffix -ew can be added to a noun root to derive a verb (Inglis, 1986), to recycle a verbal form into a noun, or to derive a possessive pronominal meaning (i.e., this marker probably indicates a change in the grammatical class of the root).

Introduction

Since the 1990s, a new body of language acquisition research has focussed on prosodic, or suprasegmental aspects of children's early word forms. Prior to the 1990's most acquisition research focussed on segmental acquisition, which examined the order in which children acquire the sounds of their language (Fee, 1997). Prosodic, or suprasegmental structure includes the elements of language that help organize the segments and phonological components of language. The prosodic level of phonology is made up of structural elements, such as syllables, words, phrases, breath and intonational groups, and the processes such as stress and rhythm that are determined by these elements (Demuth & Fee, 1995; Fee, 1997). The elements which form part of the Prosodic Hierarchy important for this paper are given in Figure 1.

The Prosodic Hierarchy includes *moras*, which are sub-syllabic units of syllable weight, the *syllable* itself, the *foot*, and the *phonological word*. Selkirk (1984) and Nespor and Vogel (1986) demonstrated that the prosodic level of structure, above the segmental level of phonology, is composed of a series of hierarchical units as depicted in Figure 1. Each unit in a superior level of the hierarchy is composed of structures from lower levels of the hierarchy. *Syllables* are groupings of consonants and vowels, each of which has a nuclear element, referred to as the syllable peak. For example, in English, the syllable peak may consist of a vowel or a syllabic nasal or liquid. Syllables may contain a consonant or consonants to the left of the peak that is referred to as the onset of the syllable. Optional consonants may also exist to the right of the peak and are referred

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Figure 1. The Prosodic Hierarchy

Pw   (Prosodic Word)

|

Ft   (Foot)

|

σ   (Syllable)

|

μ   (Mora)

to as the coda. Syllable structure is specific to a given language but some aspects of syllable shape are shared by all languages. For example, all languages have onsets, but not all languages allow codas (Fee, 1997). The *mora* is the sub-syllabic component that occupies the lowest level in the prosodic hierarchy and it is directly linked to a segment. Moras represent the concept of syllable weight. A syllable is maximally bimoraic, with heavy syllables containing two moras and light syllables containing one mora. In English, heavy syllables are those which contain a vowel and a coda consonant or a long vowel or diphthong. As will be shown, this is also the case for Mi'kmaq. Some languages differ with respect to which segment types may be associated with a second mora within a syllable. In some languages, only long vowels or a short vowel plus a coda consonant count as heavy (associated with a second mora). English and Mi'kmaq are two such languages. The final component of the prosodic hierarchy making up the phonological word, is the prosodic *foot*. Syllables are linked to prosodic *feet*. Feet contain both strong and weak positions, reflecting the rhythmic pattern of language and are linked in a binary fashion to two elements further down in the hierarchy. That is, a foot is linked either at the syllabic or moraic level (McCarthy & Prince, 1986; 1995). Single, unfooted syllables existing at the edge of a word are directly linked to the phonological word. Feet may be iambic, where a heavy syllable is the right-most member of a foot (e.g., as in 'forget' [for'gɛt]), or trochaic, where the heavy syllable is the left-most member of a foot (e.g., as in 'baby' ['bebi]) (Fee, 1997). Feet are linked to prosodic words and these are the highest prosodic unit that will be discussed in this paper.

 Minimal words can be defined as content words that contain at least one foot that is binary branching. Lexical (or content) words will therefore minimally contain two

syllables or two moras. The choice of what qualifies as a minimal word in a given language is determined by the moraic restrictions that exist in that language. A number of studies (McCarthy and Prince, 1986, Maddeison, 1984, and Piggott, 1992) have discussed the importance of the minimal word in various languages. In English, bimoraic syllables are possible, therefore word minimality can be fulfilled either by two monomoraic syllables or by one bimoraic syllable (See Figure 2). In English, long vowels and diphthongs are bimoraic in form, whereas lax vowels are monomoraic. It is possible for the second mora in a syllable to be associated with a consonant. Therefore, in English a monosyllabic word with a lax vowel must contain a coda consonant in order to be bimoraic. A constraint in English which restricts content words to being minimally bimoraic explains why monosyllabic words containing lax vowels in open syllables are ungrammatical but tense vowels in open syllables are possible (e.g., both *beet* [bit] and *bee* [bi] are allowable forms while *bit* [bɪt] is possible but [bɪ] is not). Minimal words were first identified as important prosodic units in adult speech in work such as McCarthy and Prince (1986), Maddeison (1984), and Piggott (1992) and have been described as important prosodic units in the early development of children's language (Nespor & Vogel, 1986; Selkirk, 1984).

One context in English where the minimal word restriction can be seen is the formation of hypocoristics (nicknames) (McCarthy & Prince, 1986; Fee, 1992). Shortened forms of common names are always at least bimoraic. For example *Susan*

Figure 2. Minimal Words in English

'mama'   'bee'
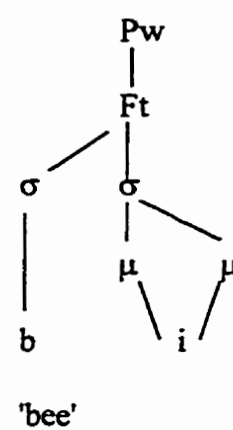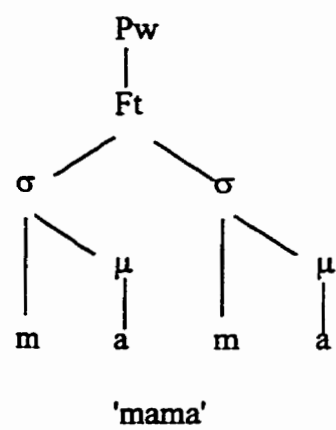
becomes *Sue*, *Edward* becomes *Ed*, and *Robert* becomes *Rob*. The nicknames for

Edward and *Robert* contain coda consonants because the vowels are lax and therefore

cannot exist in open syllables.

A number of papers on phonological acquisition argue that the same prosodic

restrictions which operate in adult phonological systems play a major role in determining

the size and shape of children's early words (Demuth, 1995; Demuth & Fee, 1995; Fee

1992). Demuth and Fee (1995) have proposed that the notion of minimal word plays an

important role in early phonological development. According to their theory, the

representations available to a child at any particular period of development are

determined by both universal grammar and the child's current stage of language

development. The authors have demonstrated that in Dutch and English many of the

children's early attempts at words were linguistically well-formed units of the Prosodic

Hierarchy and that children's abilities to use these prosodic units develop over time.

Demuth and Fee (1995) have proposed that at the earliest stage of prosodic development,

none of the units of the prosodic hierarchy are differentiated. Gradually syllables and

words become differentiated forms, and then later, moras become differentiated from

syllables. The minimal word stage occurs when children have different structures for

words and syllables, and words are restricted to either a bisyllabic form consisting of two

simple syllables (e.g., [mama]), or a monosyllabic form containing two moras (e.g.,

[mam]). The last stage of prosodic development occurs when feet are differentiated from

words.

A number of recent studies of phonological acquisition (e.g., Demuth, 1995;

Demuth & Fee, 1995; Fee, 1992; Fikkert, 1994; Gerken, 1994) have argued that prosodic

restrictions play a major role in determining the size and shape of children's early words. This research suggests that although children are able to perceive most of the segmental and syllabic content of target words, their output forms do not always match their perceptions. Children's word attempts are severely constrained by immaturities of the prosodic system, dictated by the prosodic stage they are in. Demuth and Fee (1995) examined the early words of English and Dutch speaking children and how their ability to use units of the Prosodic Hierarchy developed systematically over time. The authors described how the four stages of the prosodic hierarchy became fully differentiated over time. These stages are outlined in Table 1. A similar set of developmental stages is described in Fikkert (1994) for children learning the Dutch language. The difference between Fikkert's stages and those of Demuth and Fee (1995), who used Fikkert's 1994 data for further application of the theory, is that Demuth and Fee integrated the developmental sequences for the acquisition of syllable and foot structures by appealing to the notion of word minimality. Both studies used the notion of 'stage' based on Ingram's (1989) continuity requirement: specific prosodic behaviors are observed at different points on a time continuum and development is assumed to be unidirectional. If we view development at any single stage we get a 'snapshot' view of the predominant prosodic shapes used by a child at one point in time. As pointed out by Fikkert (1994), this does not mean that forms characteristic of an earlier or perhaps later stage, in addition to the present stage, may not be used. It simply means that the most frequent

Table 1. <u>Stages in the Development of Prosodic Words (Demuth and Fee, 1995)</u>

STAGE	PROSODIC WORD FORM
I Core Syllables	[dʌk] for <u>duck</u>
II Minimal Words	
IIa Bisyllabic core syllables	['dʒusi] for <u>juice</u>
IIb Bimoraic syllables – coda consonants	[bis] or [bɪs] for <u>please</u>
IIc Bimoraic syllables – vowel length	[bi] for <u>please</u>
III Stress – Feet	['maːdo] for <u>tomato</u>
IV Prosodic words	['ɛfɛlɛnt] for <u>elephant</u>

forms used by a child will be representative of the stage they are in, and that over time, they will move forward in the sequence of stages. The examples I will use to demonstrate the four prosodic stages have been taken from Demuth and Fee (1995) and Fikkert (1994).

According to Demuth and Fee (1995), during the first prosodic stage (Stage I – Core syllables), children's words are composed of a single monomoraic syllable and therefore do not meet the minimal word requirement. Presumably, children at this stage have not yet realized that words and syllables are distinct elements and sub-minimal words are therefore possible.

At stage II, children's words become minimal words, composed of either two monomoraic syllables or one bimoraic syllable, as shown in Figure 3. Three substages of Stage II have been identified (Fee, 1997): Stage IIa – Bisyllabic core syllables; Stage IIb – Bimoraic syllables with coda consonants; and Stage IIc – Bimoraic syllables with long vowels. As children move from one stage to the next, new possibilities for minimal word structures emerge in the children's systems. It should be noted that as children progressed beyond Stage IIa, simpler word shapes did not disappear from production, they were just lower in frequency. Children's productions then, contained more variety of word shapes.

In Demuth and Fee (1995), it is argued that the minimal word provides the child with a constrained learning space for further exploration of segments and subsyllabic structure during this stage. That is, for a period during the second year of life, minimal words seem to provide an upper bound for the shape of children's words. Complexities

Figure 3. Structures for Minimal Word Types

Bisyllabic Minimal Word
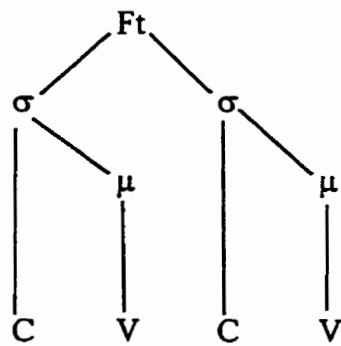
Bimoraic Minimal Words
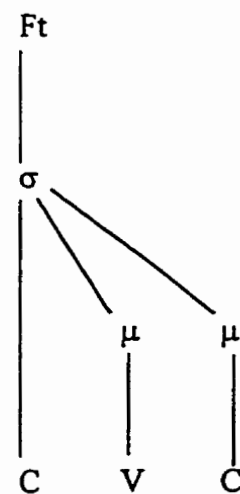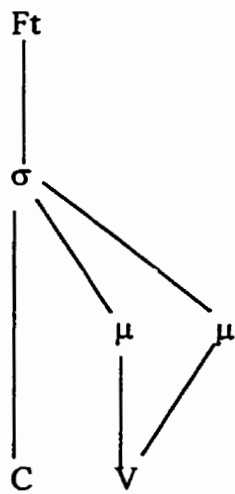
of segmental or syntactic structure may cause a child to use a form which is sub-minimal (i.e., smaller than what qualifies as a possible word shape in a given language); however, the majority of a child's productions during this stage will fit the minimal word template.

At Stage IIa – there is not yet a contrast between monomoraic and bimoraic vowels, and coda consonants, which in the adult system would be linked to a second mora within the syllable, are not yet produced. The bisyllabic form is therefore the only possible structure which will meet word minimality. During this stage children not only produce adult bisyllabic forms as bisyllables (i.e., [baba] for bottle or [kɛni] for candy) but sometimes produce bisyllabic forms for adult monosyllables (i.e., [dzusi] for juice and [fowə] for straw). The acquisition data from both English (Demuth & Fee, 1995) and Dutch (Fikkert, 1994) suggest that not all children go through Stage IIa. In Demuth and Fee (1995), it was suggested that either some children pass through this stage too quickly to document, or that they go directly from Stage I to Stage IIb, where coda consonants become possible.

At Stage IIb, which all children pass through, children have discovered that coda consonants may be linked to a second mora within a syllable. Monosyllabic bimoraic word forms with the second mora linked to a consonant then become a second possible structure which fills word minimality. At this stage then, the predominant 'word' shape is CVC. English and Dutch children were sometimes found to use CVC forms for bisyllabic targets at this stage (e.g., [gɛn] for again or [bat] for pocket).

At Stage IIc, children begin to use vowel length in a contrastive manner. This new development means that bimoraic forms containing long vowels now contrast with monomoraic forms containing short vowels. In English, this acquisition means that

children have a contrast between syllables containing tense vowels or diphthongs and those containing lax vowels. Until Stage IIc, tense and lax vowels in English are frequently used randomly. An example from Demuth and Fee (1995) demonstrates this point using data from a child named P.J. aged 1;8. She used both [u] and [ʊ] in her productions for the target juice, but by 2;0, all forms for this word contained the tense vowel [u]. As is the case with any aspect of acquisition, the bimoraic/monomoraic vowel contrast plays out gradually in the child's system. Once the moraic contrast is discovered, children learn to produce all the tense/lax contrasts in English over approximately a 4-6 month period (Fee, 1997). During Stage IIc, children's forms are still predominantly restricted to minimal word size, which suggests that coda consonants generally will not be produced for targets containing long vowels. See Fee (1997) for further examples of children's productions in the three substages of the Minimal Word Stage of prosodic development.

Beyond Stage II, children's words expand beyond the minimal word size. At Stage III, children's words begin to show evidence of the stress-foot, first with one stress-foot per word, and later in this stage, begin to include more than a single stress-foot per word. At Stage III, children also begin to produce extra-prosodic segments in their forms: consonants following bimoraic vowels become possible, and represent forms that are greater than a minimal word. For a detailed review of the acquisition of stress, refer to Fikkert (1994).

By stage III, children are able to produce true prosodic words in their attempts at supraminimal word shapes. Prior to this stage, children are able to match minimal targets in prosodic shape but produce a majority of supraminimal targets as minimal (Salidis and

Johnson, 1997). Their forms may contain trochaic and iambic stress patterns, even though the segmental content of the forms may not always be correct. For example, a child discussed in Demuth and Fee (1995) produced [ti'membə] for remember where the segmental content does not match the adult form, but the prosodic shape of the word has been matched. The data from Fikkert (1994) and Demuth and Fee (1995) suggest that most children have achieved Stage III, or are regularly producing supraminimal words by the age of 3;0.

It is important to study various theories of language acquisition with data from many different languages to assess what are the universal features of all languages and what are cultural- and language-specific features. Ferguson (1964) studied the aspects of "babytalk" in six languages to investigate the universality of this register and certain features within this register. Minimal words have cross-linguistic applications. Although what qualifies as *minimal* varies somewhat across languages, the concept of a minimal shape that can qualify as a word in a language appears to occur in many languages. Demuth and Fee (1995) demonstrated that minimal words in Sethoso (a Southern Bantu language) must be bisyllabic. Fikkert (1994) applied the Minimal Word theory to Dutch and found that children's early words fit the stages of prosodic development. McCarthy and Prince (1990) demonstrated that in Arabic, productive words must be at least bimoraic. For a review of cross-linguistic research in the application of the minimal word, see McCarthy and Prince (1995).

Child directed speech (CDS), the speech register used by adults and older children when speaking to infants and younger children, has been examined in some detail in a number of languages. In CDS, speakers have been found to simplify their phonology

(dePaulo & Bonvillian, 1978) and lexicon (Ferguson, 1977), to use redundancy

(Ferguson, 1977; Snow, 1977), and to modify prosodic factors such as pitch, amplitude,

stress and prosodic shape (Ferguson, 1977; Fernald, 1984; Garnica, 1977). These special

vocabulary items tend to have a specific, restricted prosodic shape that differs

systematically from the adult form of the words. It is these simplifications in syllable

structure that will be part of the focus of this study.

There have been several different explanations for why the modifications of CDS

take place. It has been suggested that the nature of CDS has beneficial effects on the

child's language acquisition. These beneficial effects follow if the slowed rate, repetition,

higher, more variable pitch, and simplifications in syntax and lexicon make language

easier for children to attend to and learn (Berko-Gleason, 1977; Brown, 1977; Cross,

1977; Ferguson, 1977; Snow, 1972). Ferguson (1964) suggested that CDS may serve as

a special source for children's pregrammatical 'vocables', enabling them to create items

(i.e., novel 'babytalk' words of simple prosodic shape that are used consistently and

meaningfully to refer to an object) which they can discard as they acquire true words and

grammar. Brown (1977) suggested that the prosodic features of CDS might facilitate the

acquisition of segmentation through capturing a child's attention, and making certain

aspects of the phonology of these words more salient. Snow (1972) postulated that the

repetition in CDS may have a grammatical function in giving information about the

boundaries of units within utterances. Overall, many studies have supported the notion

that CDS is important in language acquisition and may aid in language development

(Cooper & Aslin, 1990; Ferguson, 1964, 1977; Fernald, 1984, 1985; Fernald &

Morikawa, 1993; Snow, 1972; Werker & McLeod, 1989).

There is a school of thought that says that CDS is universal and therefore shared by all languages. Certain authors (e.g., Ferguson, 1977; Garnica, 1977; Sachs, 1977) have inferred that some or all aspects of CDS are universal, part of the Universal Grammar. Ferguson (1977), for example, discussed CDS as being a linguistic subsystem or register that may exist in all speech communities. If all communities have a special way of speaking that they deem appropriate when speaking to young children, this suggests that CDS is universal and plays an important role in helping young children acquire and learn language (Ferguson, 1977).

In efforts to determine which aspects of language and CDS are universal, it is important to study language acquisition patterns in many different languages. Ferguson (1964) described the characteristics of CDS (he and others referred to CDS as 'Babytalk') in six different languages. Among the CDS characteristics identified by Ferguson were a restricted set of lexical items particular to this register. In each language, special CDS vocabulary items consisted of simple, more basic kinds of consonants, a small set of vowels, and a typical form or prosodic structure (usually CVCV). Comparing CDS items to the adult-directed speech vocabulary forms showed phonological simplifications, pitch modifications, and prosodic simplifications such as loss of unstressed syllables (e.g., 'nana' for 'banana'). CDS items also showed a predominance of reduplication of syllables ('bye-bye', 'boo-boo', 'night-night'). Further, the lexicon of CDS contained many common topics across different languages, including kin names, nicknames, body parts, bodily functions, basic qualities such as good and bad, the names of animals, and games (Ferguson, 1964). It is the prosodic simplifications or syllable structure changes of words within the CDS lexicon that will be a focus of this study. The prosodic simplifications of

adult words to children will be referred to as syllable structure changes in adult speech to children throughout this paper. The other factors usually associated with the term CDS (i.e., high pitch and phonological simplifications) will not be examined in this study.

Ferguson (1977) pointed out that many CDS vocabulary items are similar to children's early words. The similarity in the shape of special vocabulary items in CDS to that found in minimal words suggests that these special CDS items may in fact be minimal words. To date, this hypothesis has not been examined.

The present study applied the theory of Minimal Word acquisition within the Prosodic Hierarchy to the Mi'kmaq language and used the theory to examine Mi'kmaq language acquisition. The first objective of this study was to identify what a Minimal Word was in the Mi'kmaq language. That is, what was the smallest prosodic shape that qualifies as a lexical word in this language?

The second objective of this study was to examine the special CDS vocabulary items used by Mi'kmaq-speaking adults and to compare the prosodic characteristics of these vocabulary items to what we currently know about CDS vocabulary items in other languages. Ferguson (1977) implied that there is a similarity in prosodic shape between CDS items and children's early words. In the present study, the hypothesis that CDS vocabulary items were minimal words and similar in prosodic shape to children's early words was tested. This hypothesis was tested by examining the syllable shape simplifications of the special CDS lexicon items and comparing the shape of the CDS items to what was known about minimal words in the Mi'kmaq language. The prosodic shape of Mi'kmaq CDS vocabulary items was then compared to the prosodic shape of

Mi'kmaq-speaking children's early words. The hypothesis that both sets of words are minimal words was tested.

The third objective was to examine the acquisition of syllables and word shapes used by Mi'kmaq-speaking toddlers and to compare these results to what we know about prosodic development in other languages. In particular, the purpose was to determine if children in this study demonstrated a Minimal Word Stage and if their productions followed the predictions of the Minimal Word Theory. The particular focus was on prosodic acquisition during the Minimal Word stage (Stages IIa, IIb, and IIc of the Prosodic Hierarchy) and beyond. For the purposes of this study any form longer than a minimal word is referred to as a 'supraminimal word' and any form shorter than a minimal word is referred to as 'subminimal'. When examining a child's early word attempts, certain predictions were made based on the child's level of prosodic development. A child in a particular stage of the prosodic hierarchy would be expected to make simplifications in prosodic shape in attempts at adult targets that exceed that stage. For example, a child in the sub-minimal stage would be expected to frequently reduce or simplify the prosodic shape of both minimal word shapes and supraminimal words to subminimal productions in attempts of these targets. A child in the minimal word stage would be expected to frequently reduce supraminimal shapes to minimal word shapes and match the prosodic shape of minimal targets.

Method

<u>Participants</u>

The participants were four mother-child dyads from predominantly

Mi'kmaq-speaking homes. All participants reside in Eskasoni, Cape Breton, Nova Scotia,

in homes where Mi'kmaq is the dominant language. Families volunteered to participate

by responding to advertisements made in their community and/or following a contact

phone call made by the Mi'kmaq research assistants hired from the same community.

Dyads were video- and audio-recorded during play interactions approximately once every

4 to 6 weeks for up to nine months. At the beginning of the data collection, the children's

ages were B = 1:8, R = 2:3, F = 1:11, and J = 1;7, with each child's utterances consisting

primarily of one-word sentences. B, a female, is the second in a two-child family; R, a

male, is an only child; F, a male, is the second youngest in a four-child family, and J, a

male, is the eldest of two children. All children have two parents living at home. Table 2

provides the ages, sexes, and MLUs of the child participants during the course of the

study.

Data was obtained from participants on approximately a monthly basis for up to

nine months. One child, B, left the study and was replaced by another participant, J.

<u>Procedure</u>

The mother-child dyads were audio- and video-recorded in naturalistic settings

using a Sony digital audiotape recorder (DAT) (model TCD-D3). The recording sessions

took place in the children's homes. Omni-directional condenser microphones were used

to audio record all sessions to maximize the quality of recording and minimize

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Table 2. <u>Child Age and Mean Length of Utterance</u>

CHILD	R. (male) Age / MLU	B. (female) Age / MLU	F. (male) Age / MLU	J. (male) Age / MLU
Session 1	2;2 1.28	1;10 1.12	2;1 1.16	1;7 1.0
Session 2	2;4 1.24		2;3 1.25	1;9 1.0
Session 3	2;6 1.19		2;5 1.3	1;11 1.18
Session 4	2;7 1.25		2;6 1.54	
Session 5	2;9 1.4		2;9 1.45	
Session 6	2;11 1.52		2;10 1.6	

background noise. These microphones permitted the participants to move about freely during the interactions. During these recording sessions, no control was placed on whom was present and interacting with participants or on what objects or what toys were used by the participants during the interactions.

When studying language from other cultures, it is the responsibility of the researcher to find ways to sample the language of participants in ways that do not interfere with important cultural standards and patterns that are inherent to the way individuals use language. The usual empirical methods for controlling targets attempted and restricting interactions to mother and child come from a method grounded in Western culture. The culture of empirical research that places many restriction on methodology may go against some of the basic uses of language in a given culture. In many English-speaking cultures, encouraging a child to produce a specific word is common in how adults interact with their children. In Mi'kmaq however, this is not the case. Therefore, a decision was made to not enforce certain aspects of empirical research that may have helped ensure more data but may have interfered with capturing language in its natural use. In this study, there was no pre-determined groups of toys and objects that were used during recording sessions to help ensure that certain language targets were attempted across sessions. Such sets of objects are commonly compiled in studies of English-speaking children's language. A set of toys for the Mi'kmaq language did not already exist and was not compiled for this study because language in natural interactions was the desired goal for this study. It was decided among researchers and research assistants that such control would make the interactions less natural. During the recording sessions, Mi'kmaq adults were not observed to strongly encourage their child

to perform and produce language. In Mi'kmaq social interactions, it is common for neighborhood children and adults and family members to come and go freely from others' homes. The traditional research paradigm that limits the interactants to mother and child was not enforced in this study as this was not what naturally occurred in the child's typical environment. During recording sessions, other children and adults were often present and interacted with the mother and child research participants. In sum, there were areas of mismatch between the Mi'kmaq culture and the culture of empirical research that lead to compromises between the two cultures' styles. Language targets were not controlled and restrictions on whom was present during recording sessions were not enforced.

The types of interactions that did occur during recording sessions consisted of the child participant playing with a certain toy, with or without other children present, while the child's mother commented on what was happening and occasionally played directly with the child and a toy. Interactions also centered around daily routines such as getting a snack or a drink or getting dressed.

Recording sessions were performed by a research assistant who is a fluent speaker of Mi'kmaq and was able to answer any questions the participants may have had concerning the data collection sessions. As much as possible, Mi'kmaq was used as the language of interaction in these data gathering sessions. The sessions ranged from 45 to 60 minutes in length.

Transcription The children's speech was broadly phonetically transcribed (according to IPA standards) by two graduate students at the School of Human Communication Disorders, Dalhousie University. These transcriptions were checked for reliability in the

following way. Each transcriber listened to every tape independently and performed a

broad phonetic transcription. A preliminary measure of reliability between transcriptions

was calculated on every second tape for each child and ranged from 81 to 90 %.

Following these reliability calculations, the transcribers listened to each of the tapes

together and identified where disagreements existed. Areas of disagreement were

listened to by both transcribers again, and if a consensus could not be reached, the word

or phrase was not used in the analysis. Thus, at the end of this final listening, 100%

agreement was achieved for those words used in the analyses.

Linguistic Analysis Initially, a phase of six months was taken to investigate the

phonology, morphology and syntax of the Mi'kmaq language. Biweekly meetings were

held between the supervisor of this thesis, four student volunteers, and three research

assistants (who were native speakers of Mi'kmaq). Meetings involved identifying and

examining various groups of words in Mi'kmaq such as family and kin names, casual

forms of words, feelings, body parts, animals and nature, household objects, greetings

and other common words and phrases. These groups of words were analyzed for

meaning, and morphological markers that could be added to roots were identified and

recorded. Morphological markers, such as gender, were identified. The Pacifique

Dictionary (1990), Mi'kmaq audiotapes, and Inglis (1986) were used as guides and

reference materials to supplement our discussions at meetings. Through this

examination, morphological markers, function words, particles and lexical words were

identified. The minimal prosodic shapes in the language that could qualify as words were

determined. That is, what the minimal word shapes in Mi'kmaq were identified. Also at

these meetings, cultural and linguistic issues were discussed. The Mi'kmaq research

assistants provided insight and background information regarding Mi'kmaq language use and interactions styles. They discussed issues such as how language is used with children, when children are considered to have 'learned' language in their culture, whether or not Mi'kmaq adults use 'Babytalk' when addressing young children, and how adults in this culture interact with their children. The research assistants shared valuable information about their cultural use of language and how styles of language do indeed vary depending on who the interactants are. A formal register tends to be used with elders, and a more casual style is used with one's peers. However, the Mi'kmaq assistants reported that adults do not use 'Babytalk' when speaking to young children. There are several simplified words that are used with young children but other features of 'Babytalk' that are common in English-speaking cultures such as frequent repetition and use of a high pitch are not common. Based on research assistants' reports, Mi'kmaq adults tend to let their children play independently and intervene during conflict and challenge more rarely than adults in 'English' cultures. Discussions with research assistants also revealed that Mi'kmaq adults's conception of when a child has learned language differs from the view in English-speaking cultures. In English-speaking cultures, language production frequently serves as a measure of a child's language abilities and adults consider a child to know language based on what the child is able produce. In Mi'kmaq, a child is considered to have learned language when he or she responds to and understands language. Thus, in Mi'kmaq culture, children are considered to lean language at a younger age. It would not be unusual to have a Mi'kmaq mother report that her child can 'talk' by the age of eight or nine months.

CDS special lexicon items. Informants who were native speakers of Mi'kmaq identified special vocabulary items that were commonly used by adults when speaking to children and also helped identify special CDS words in the data transcripts. An analysis of these particular words was conducted. The prosodic shape of CDS items and how the related adult directed forms differed in prosodic shape were examined. CDS items were discussed in the research meetings with the research assistants with respect to type of words used, their shape and whether the research assistants considered their culture to have a certain way of talking to children (i.e., special CDS vocabulary items). Special vocabulary items used by the adults when speaking to children were identified and orthographically and phonetically transcribed with the help of a fluent Mi'kmaq speaker. The prosodic structure of these words was identified and analyzed for evidence that they were minimal words. CDS items were also compared to the related adult-directed items (e.g., 'tummy' compared to 'stomach') and a set of Mi'kmaq CDS substitutions was identified. The CDS forms identified for Mi'kmaq were compared to CDS forms described in the languages cited in Ferguson (1964, 1977).

Analysis of Children's words During Video-taped Interactions. Children's phonetic forms of words and the related adult targets were entered into a database called Childphon (1990) which is an application using the 4th Dimension for Apple Macintosh. Childphon is a database that has been designed to store phonetically transcribed child language and related information in several fields. The transcribed utterances are stored together with information on their phonological structure and the different types of phonological phenomena that are encountered in their utterances. Each child form and adult target was entered and coded for syllable and moraic structure. Each child form

was further coded for segmental and prosodic processes. Children's utterances were analyzed with respect to how many of their productions were minimal words. The frequency and type of minimal words was tracked longitudinally in the children's utterances.

Three phases of data analysis were conducted on children's word data obtained during the video-taped interactions: an independent analysis of word shapes produced by children, a relational analysis which examined children's accuracy in matching the prosodic shape of adult targets, and an independent analysis of vowel length acquisition. For the analyses of children's language, principled, a priori decisions were made with regard to which words to include in the analyses. It was decided that only lexical words would be used and that function words, word-particles, and inflectional endings would not. Of the lexical words used, nouns, verbs, and adjectives were included. One important characteristic of the Mi'kmaq data recorded for this study was that many English words were produced within the same utterance by Mi'kmaq speakers. Of the English words produced by Mi'kmaq-speaking children in this study, some were used in the analyses and some were discarded. It was decided that English words that were considered borrowed, that were assimilated into the Mi'kmaq language by being inflected with Mi'kmaq endings and having Mi'kmaq particles added to them, would be used in the analyses. Also, English words considered to be of recent and technological origin for which there was no Mi'imaq equivalent, were used in the analyses. For example, words like 'car' and 'tractor' were used because it was reasonable to assume that no Mi'kmaq word existed for these objects since exposure to English language and culture began sooner in history than the origin of these objects and words. Of the nouns that were

analyzed, some were proper nouns and some were common nouns. Of the proper nouns that were used in the analyses, the majority were names of Mi'kmaq family members friends and English proper nouns. The names used were not traditional Mi'kmaq words and many contained sounds from outside the Mi'kmaq language. The English proper nouns included names and words that came primarily from children's movies and thus had no Mi'kmaq equivalent (e.g., 'Batmobile', 'Powerman').

Independent Analysis An independent analysis of the prosodic shape of children's words produced in each child's transcripts was conducted. The purpose of this first phase was to assign each child to a stage of the prosodic hierarchy based on his/her most frequent 'type' of prosodic shape produced, independent of adult target shape. Ingram (1989) described a protocol to be followed when determining a child's acquisition of a distinction in a language. His protocol was used in the present study to determine each child's most typical prosodic shape for each target word. Prototypical productions were used when multiple shapes were produced for a given target. This involved a four-step protocol to determine the most typical shape produced for each vocabulary item. That is, categorizing each vocabulary item by its most typical prosodic shape (for a particular age) and disregarding other attempt shapes when categorizing that a particular vocabulary item. These principles have been applied to prosodic shape in the present study and are as follows.

(a) If a prosodic shape occurs in a majority of tokens, select it.

(b) If there are three or more prosodic shapes, select the one that shares the most elements with the other attempts.

(c) If there are two prosodic shapes, select the one that is not produced correctly.

(d) If none of the above work, select the first shape listed (Ingram, 1989, p. 204).

When the most typical prosodic shape for each lexical vocabulary item at each age was determined, it was then categorized according to prosodic stage in a table. This procedure was completed for each lexical item at each age level, for each child. The proportion of prosodic shapes produced was then calculated using only these most typical shapes. Prosodic stage assignment was accomplished using these proportions. For a given session, the category or stage of prosodic development having the greatest proportion was considered to be the child's prosodic stage.

The independent analysis of prosodic shape, then, was used to assign each child to a stage of the prosodic hierarchy based on the greatest proportion of prosodic shape at a given age. Simplification patterns (e.g., syllable shape reductions) were examined relative to the child's developmental stage.

Relational Analysis   The second phase of data analysis was a relational analysis of the prosodic shape data for each child. This procedure involved documenting children's utterances according to whether or not they matched the adult target prosodic shape and if not, the shape of each attempt. The proportion of children's prosodic shapes that matched adult target shapes was calculated. Modifications in prosodic shapes produced by children attempting adult targets were recorded. Note that when supraminimal targets are described as being matched, this definition applies only in so far as the supraminimal status is maintained. Some prosodic simplifications from the target shape may still have occurred but the simplified target remains within the supraminimal category.

Vowel Length Acquisition   The third phase of data analysis concerned the issue of vowel length acquisition. The definitive test of a child's acquisition of vowel length

distinction would be when a child produces a minimal pair where his/her distinctive use of vowel length is evident. Procedures in this study were such that targets produced in the children's samples were not controlled. Since minimal pairs are difficult to obtain in data obtained from participants so young, minimal pairs of vowel length were not observed in the data of this study. This created the need for a way to determine acquisition through other means. Again a procedure borrowed from Ingram (1989) was used in determining when a child had acquired vowel length in his/her language. Ingram considered a distinctive sound "to be a part of a child's phonological system (i.e., becomes a phoneme in the child's phonology) when it is frequent; or when it is used, and it appears as a match, or substitute" (1989, p. 207). These principles were applied to the present data set to determine when and if each child acquired vowel length distinction in his/her language. In the present study, no adult targets having the prosodic shape CVV were attempted by any child. To look at vowel length, then, children's attempts at supraminimal adult targets containing long vowels were followed longitudinally, across sessions, for each child. The vowel length distinction was considered to be acquired when a child used a long vowel consistently for a given target and used the short member of the equivalent vowel appropriately. In using Ingram's protocol, the substitution of a long vowel for another long vowel as evidence for length acquisition was allowed in this study.

The point when a child acquires the length distinction between vowels in his or her language is significant in that previous authors have used this factor in interpreting a child's transition from prosodic stages (Demuth & Fee, 1995; Fikkert, 1994). That is, a child is not considered to have moved through Stage IIb (CVC) to Stage IIc (CVV) of the

Prosodic Hierarchy until the vowel length contrast has been acquired (i.e., used

consistently). Demuth and Fee (1995) showed that before the acquisition of this

important distinction, vowel length in CV(V) shapes were produced inconsistently (i.e.,

produced interchangeably with either a long or short vowel), and were thus considered to

be CV (subminimal). Fikkert (1994) stated that until a child controls vowel length, there

is presumed to be no difference between his/her long and short forms of vowels. Demuth

& Fee (1995) and Fikkert (1994) postulated that this inconsistency existed because

children in their studies had not yet learned that vowels could be bimoraic and that the

short/long distinction exists. That is, vowel length was not yet contrastive at this point.

The authors provided the following rationale for using a separate analysis for determining

vowel length (independent from the proportional data of prosodic information). The

issue of vowel length is related to the fact that there is both a quantity and quality

difference between long and short vowels (i.e., in English [e] versus [ɛ]). It is possible

that a child might use the quality distinction without being aware of the quantity

distinction (i.e., the fact that short vowels are monomoraic and long vowels are

bimoraic). Thus, it is not possible to hear and transcribe a child's form and subjectively

describe whether it was a CV form or a CVV form. So, a way to determine whether a

child was using two vowels was needed. It is only when a child uses two vowel members

of a long/short pair contrastively, that we can say they are acquired. With children, it is

almost impossible to find minimal pairs, or to get the same or similar vocabulary across

time periods, so Ingram (1989) developed a method designed to determine contrastivity.

His method incorporates a combination of frequency data (based on an independent

analysis of the child's forms) and substitution data (based on a relational analysis of the

child's and adult forms) to determine if sounds are acquired or used contrastively in the child's system.

The present study replicated the principles used by Demuth and Fee (1995) and Fikkert (1994) in assigning stage with respect to vowel length acquisition. These authors used Ingram's protocol to determine when the vowel length distinction is acquired. It was inferred that once a child learned that the vowel length distinction existed (indicated by the criteria for acquisition: the long/short vowel contrast was used consistently) the child had made the transition from Stage IIb (CVC) to IIc (CVV). Before vowel length was used consistently, a CVV production was not considered to be different from CV. Only when length was used consistently, were true CVV's considered to exist as evidence for transition into Stage IIc (CVV) of the prosodic hierarchy.

Results

Minimal Words in Mi'kmaq

Based on an extensive investigation of Mi'kmaq word shapes and types as described in the methods section above, the minimal forms of words in Mi'kmaq were determined to be CVCV, CVC, and CVV (long vowel or diphthong) (See Tables 3 and 4). Thus the English and Mi'kmaq minimal word forms are identical. Because [l] and nasals may be syllabic, Mi'kmaq words need not contain a vowel at all (i.e., kmtm 'mountain', nsm 'my niece').

Syllable Structure Changes in Adult Speech to Children

The present study examined the syllable structure changes of special words used to children, from the original adult syllable shapes. There were several items identified by native Mi'kmaq speakers that were considered to be unique to speech directed to children. These words differed systematically in syllable shape from their adult-directed form (See Table 5). The syllable structure changes that occurred when these words were directed to children rendered them a particular prosodic shape, that being CVCV. The simplifications in prosodic shape that occurred, included final consonant deletion, unstressed syllable deletion and reduplication of the remaining and/or stressed syllable (See Table 5). It is interesting to note that all the identified simplified vocabulary items were simplified to the CVCV level which, in the Prosodic Hierarchy, is Stage IIa (CVCV), the simplest and earliest form of Minimal Word learned in prosodic development.

Table 3. Examples of Minimal Words in Mi=kmaq

CVCV	CVC	CVV
kji [kəji] 'big'	jel 'also and even'	ma' 'no'
sku [səku] 'leech'	wen 'who/someone'	nu' 'daddy'
peju [pəju] 'fish'	tam 'ask him for it'	tey 'wife/husband'

Table 4. Shortened forms that are Minimal Words

CDS	ADT (Adult Directed Talk)
nunu	nunnaqnoq 'bottle'
papa	nepan 'sleep'
SHORT FORMS (Informal Speech)	
mimi	mimikej 'butterfly'
moqo	moqowey 'no'

Table 5. <u>Special CDS Vocabulary Used By Adults to Children</u>

Child Directed Lexical Item	Adult Equivalent	English Translation
nunu CVCV	nunaqnoq	Bottle
papa CVCV	nepan	Sleep
moqo CVCV	moqwey	No
nana CVCV	naqsi	Eat
yaya CVCV	No adult equiv.	hurt (booboo)
pasi CVCV	papat	Sit
pusi CVCV	pusit	take-off/embark

Prosodic Stage Assignment and Patterns of Prosodic Simplification

Each of the four children's prosodic development will be discussed in terms of prosodic stage at each age and whether their pattern of stage acquisition followed the progression predicted by the theory. Comparisons between Subminimal, Minimal and Supraminimal prosodic stages will be made as well as an analysis of development within the three sub-stages of the Minimal Word Stage (Stages II a, b, and c). Also, each child's prosodic simplification patterns at each age will be examined in relation to what was expected based on assigned prosodic stage.

Only a single session for B was used in this study (See Table 6). This session occurred at age 1;10. The category with the greatest proportion of prosodic shapes at this point was the Subminimal (CV) Stage (.46). The remainder of B's words were produced as CVC, (.36) and Supraminimal, (.18). These data suggest that she was clearly in the Subminimal Stage of the prosodic hierarchy at age 1;10. Being in the Subminimal Stage, the greatest proportion of B's words had a prosodic shape of CV, with no vowel length distinction exhibited. Given that many of B's attempts at words were reduced to subminimal shapes, prosodic simplifications were frequent (See Table 7). Some examples of prosodic simplifications are as follows.

Gloss	Phonetic Shape	Prosodic shape
'keka' (look)	[kɑ]	CV
'papis' (rabbit)	[pə]	CV
'ital' (close it)	[dæ]	CV

Table 6. <u>Proportion of Prosodic Shape</u>

B	SUB	CVCV	CVC	CVV	SUPRAMINIMAL	TYPES
1;10	<u>0.46</u>	0	0.36	0	0.18	n=11

<u>Note</u>: Underlined values indicate assigned Prosodic Stage based on greatest proportion.

Table 7. Proportion of Syllable Shape of Child Attempts at Adult Target Syllable Shape

Child: B

AdTarget:														
hAttemp	SUB		CVV	CVC	SUB	CVCV	CVV		SUB	CVCV	CVV	CVC		SUB		OTHER
1;10	0.5		0.25	0.25	0.76	0.03	0		0.15	0.15	0	0.32		.73		0

Note: Shaded columns indicate syllable shape of child attempts that match adult target syllable shape. Other columns include child attempts that differ from adult target syllable shape according to column heading. N= tokens or total items per sample. T = total different word types per sample.

In the relational analysis, B. produced .73 of minimal word targets as subminimal (See Table 7). She produced .15 of her supraminimal targets as subminimal and .47 of supraminimal targets as minimal word shapes. B followed the expectation based on prosodic stage, in that overall, the majority of her word attempts were produced as subminimal.

The next child, J, was examined at three sessions. His data suggest that at age 1;7, he was in the Subminimal stage, making simplifications in the same way as B. did above (See Table 8). However, at his next session, age 1;9, the greatest proportion of his prosodic shapes was supraminimal. This pattern does not fit with what we would expect based on the model of Prosodic Development and the Minimal Word theory. In his last session, J produced the greatest proportion of prosodic shapes in Stage IIa (CVCV) suggesting that his session at age 1;9 may not have been representative of his true prosodic stage. At age 1;9, J produced .57 of his words as supraminimal in shape and the remaining .43 of his words as subminimal. Note that in this situation, stage assignment has occurred based on a difference in proportions of only .10. Based on Ingram's methodology, vowel length was not acquired. When a relational analysis was conducted, J's data continued to differ from what was predicted (See Table 9). At. Age 1;7, J made the expected simplifications in prosodic shape for a child in the subminimal stage. He reduced all occurrences of minimal targets to subminimal, 1.00 and reduced a high proportion (.75) of supraminimal targets to subminimal or minimal. He matched a low proportion of minimal, 0, and supraminimal targets .25 at age 1;7. At age 1;9 J matched a higher than expected proportion of supraminimal targets (.60). At age 1;11, J's most typical prosodic shapes indicated that he was in Stage IIa (CVCV) of the minimal

Table 8. <u>Proportion of Prosodic Shape</u>

Child: J

J	SUB	CVCV	CVC	CVV	SUPRAMINIMAL	TYPES
1;7	<u>0.57</u>	0.43	0	0	0	n=7
1;9	0.43	0	0	0	<u>0.57</u>	n=7
1;11	0	<u>0.5</u>	0.17	0	0.33	n=6

<u>Note</u>: Underlined values indicate assigned Prosodic Stage based on greatest proportion.

Table 9. <u>Proportion of Syllable Shape of Child Attempts at Adult Target Syllable Shape</u>

Child: J

AdTarget:															
ChAttemp	SUB		CVV	CVC	SUB	CVCV	CVV		SUB	CVCV	CVV	CVC		SUB		OTHER
1;7	0.44		0	0	1	0	0		.25	.50	0	0		.58		0
1;9	0		0	0	0	0	0		0	0.4	0	0	0			0
1;11	0		0	0	0	0	0		0	0.37	0	0		0		0

<u>Note</u>: Shaded columns indicate syllable shape of child attempts that match adult target syllable shape. Other columns include child attempts that differ from adult target syllable shape according to column heading. N= tokens or total items per sample. T = total different word types per sample.

word stage, with .50 of his words being CVCV in shape. However, he matched a high proportion, .63, of supraminimal targets at this age. The minimal word theory would predict that J progress from the Subminimal stage to Stage IIa (CVCV) of the Minimal Word Stage and his data did not demonstrate this pattern.

Data from the third child, F, were examined at six sessions (See Table 10). At age 2;1, F produced the greatest proportion of his word attempts as Subminimal in shape (.34), placing him in the Subminimal Stage of the Prosodic Hierarchy. At age 2;3, the greatest proportion of F's prosodic shapes was CVCV, at .37, placing him in Stage IIa in prosodic development. At ages 2;5 and 2;6, F's greatest proportion of prosodic shapes were CVC (.60, and .39 respectively), placing him in Stage IIb for these two sessions.

At age 2;9, F was given credit for having achieved the vowel length distinction in his language. Ingram's protocol for determining acquisition was used to determine vowel length acquisition. When a child was determined to have acquired the vowel length distinction, this method overrode the prosodic procedure for assigning stage. Thus, F was assigned to Stage IIc at age 2;9 despite the fact that the most frequent type of his word shapes was CVC, at a proportion of .60. Finally, at age 2;10, F achieved the supraminimal stage with .44 of his word shapes being supraminimal.

At age 2;1, many of F's targets were reduced to subminimal, as shown below.

Table 10. <u>Proportion of Prosodic Shapes</u>

Child: F

F	SUB	CVCV	CVC	CVV	SUPRAMINIMAL	TYPES
2;1	<u>0.34</u>	0.25	0.16	0	0.25	n=12
2;3	0	<u>0.37</u>	0.18	0.18	0.27	n=11
2;5	0	0	<u>0.6</u>	0	0.4	n=5
2;6	0.06	0.11	<u>0.39</u>	0.11	0.33	n=18
2;9	0	0	0.6	*vowels	0.4	n=5
2;10	0	0.18	0.38	0	<u>0.44</u>	n=16

<u>Note</u>: Underlined values indicate assigned Prosodic Stage based on greatest proportion.

At age 2;9 credit was given for achieving vowel length acquisition based on Ingram's

methodology.

Gloss	Target Shape	Child Phonetic Shape	Child's Pros.Shape
keka	CVCV	[kə]	CV
wennet	CVCVC	[nɛ]	CV

F did not reduce as great a proportion of his attempts to subminimal as expected. It was predicted that the greatest proportion of targets would be reduced to the prosodic shape of the assigned stage based on most frequent prosodic shape produced. In F's sessions from age 2;3 to 2;5, he matched a greater proportion of supraminimal targets than predicted, ranging from .54 to .87 (See Table 11). However, several of his attempts did follow the expected simplification patterns.

Gloss	Target Shape	Child Phonetic Shape	Child's Pros.Shape
Age 2;3/StageIIa (CVCV):			
wennet (where)	CVCVC	[wɛnɛ]	CVCV
kiju (Grandma)	CVCV	[kiju]	CVCV
Age 2;5 and 2;6/Stage IIb (CVC):			
walipot (boat)	CVCVCVC	[pot]	CVC
kewisin	CVCVCVC	[sin]	CVC
mu'k (don't)	CVVC	[muɡ]	CVC
Age 2;9/Stage IIc (CVV): vowel length acquisition/CVV syllable shape acquired			
ni'n (mine)	CVVC	[ni'n]	CVVC
pi'si (urinate)	CVVCV	[pi'si]	CVVCV
Age 2;10/Stage III (Supraminimal):			
mekwek	CVCVCVC	[mɛkwɛɡ]	CVCVC
wenjeni'n	CVCCVCVVC	[wɛjəni'n]	CVCVCVVC

Table 11. Proportion of Syllable Shape of Child Attempts at Adult Target Syllable Shape

Child: F

Adult Target Child Attempt	SUB		CVV	CVC	OTHER	SUB	CVCV	CVV		SUB	CVCV	CVV	CVC		SUB		OTHER
2;1	0		0.09	0	0.18	0	0	0		0.17	.33	.33	0		0		.13
2;3	0.1		0	0	0	0.15	0	0		0.13	0	0	0		.13		.03
2;5	0		0	0	0	0	0	0		0	0	0	0.4		0		0
2;6	0.08		0	0	0.08	0	0	0		0.07	0.31	0	0.07		.05		.05
2;9	0		0	0	0	0.17	0	0		0	0	0	0		.17		0
2;10	0		0	0	0	0	0.25	0		0	0.15	0	0.23		0		0

Note: Shaded columns indicate syllable shape of child attempts that match adult target syllable shape. Other columns include child attempts that differ from adult target syllable shape according to column heading. N= tokens or total items per sample. T = total different word types per sample.

The fourth child, R., demonstrated a developmental transition from the Minimal Word Stage to the Supraminimal Stage. This transition is especially visible when the three substages of the Minimal Word Stage are considered (See Table 12). At age 2;2, R.'s most frequent type of prosodic shape, .52, was CVCV, placing him in stage IIa. At ages 2;4 and 2;6, R's most frequent prosodic shape was CVC with greatest proportions at each age of .32 and .38 respectively. At ages 2;7, 2;9 and 2;11, R's greatest proportion or most frequent shape was supraminimal, placing him in Stage III (Supraminimal) for the last three of his sessions. The respective proportions of supraminimal shapes at these ages were .57 at age 2;7, .39, at age 2;9 and .57 at age 2;11 (See Table 12).

R.'s patterns of prosodic simplifications (relational analysis tables) clarify his development (See Table 13). At age 2;2, R. simplified half, .50, of his supraminimal targets to minimal and matched the expected low proportion of supraminimal attempts with .27 of supraminimal targets being matched in prosodic shape. At age 2;4, R matched the majority of his minimal targets in prosodic shape but also matched an unexpected high proportion of supraminimal targets, .73. At age 2;6, R was again assigned to the Minimal Word Stage and the expected simplification patterns for a child in Minimal Word stage, occurred. In this session, R. was highly accurate, with .82 of his attempts at minimal words matching the target shape. In this session, his data also followed the prediction of reducing attempts at supraminimal words, where only .33 of supraminimal targets were matched. At ages 2;7, 2;9 and 2;11, R. was assigned to the supraminimal stage. His data are consistent with this stage with a range of .66 and

Table 12. Proportion of Prosodic Shape

Child: R

R	SUB	CVCV	CVC	CVV	SUPRAMINIMAL	TYPES
2;2	0.04	<u>0.52</u>	0.2	0.04	0.04	n=25
2;4	0.2	0.2	<u>0.32</u>	0	0.28	n=25
2;6	0.31	0.23	<u>0.38</u>	0.08	0	n=13
2;7	0	0.29	0.14	0	<u>0.57</u>	n=7
2;9	0.09	0.36	0.11	0.05	<u>0.39</u>	n=44
2;11	0.03	0.23	0.17	0	<u>0.57</u>	n=30

Note: Underlined values indicate assigned Prosodic Stage based on greatest proportion.

Table 13. Proportion of Syllable Shape of Child Attempts at Adult Target Syllable Shape

Child: R

Target Child Attempt	SUB		CVV	CVC	SUB	CVCV	CVV		SUB	CVCV	CVV	CVC		SUB		OTHER
2;2	0		0	0	0.03	0	0		0.13	0.50	0	0.09		.02		0
2;4	0.13		0	0	0.14	0	0		0.13	0.07	0	0.07		.14		0
2;6	0.11		0	0	0.43	0	0		.33	0.33	0	0		.19		0
2;7	0		0	0	0	0	0		0	0.17	0	0.17		0		0
2;9	0.11		0.07	0	0.03	0	0		0.04	0.07	0	0.11		.09		0
2;11	0.15		0	0	0.05	0	0		0.02	0.06	0	0.04		.09		0

Note: Shaded columns indicate syllable shape of child attempts that match adult target syllable shape. Other columns include child attempts that differ from adult target syllable shape according to column heading. N= tokens or total items per sample. T = total different word types per sample.

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.88 of his supraminimal targets being matched in prosodic shape. At this stage R. also matched a very high proportion of minimal targets as would be expected with mastery of both minimal and supraminimal stages (See Table 13).

No evidence for Stage IIc (CVV) was seen in R's. However, he did demonstrate the vowel length distinction once assigned to the supraminimal stage. Given that he progressed from Stage IIb (CVC) to Supraminimal, it is possible that he did go through Stage IIc, (CVV) but that this stage was not caught in the sampling method. Perhaps there were not enough data available or this stage was missed by the taping schedule. It is also possible that some other artifact of the data (low frequency of targets attempted with vowel length) obscured R's time in this stage.

With respect to the independent analysis and stage assignment, fifteen of sixteen samples followed the developmental progression predicted by the Prosodic Hierarchy. In J's second sample, it is possible that certain factors affected the types of words J attempted during this session. This possibility is further supported because in his last session, at age 1;11, the majority of his words were of the Minimal word shape. If he had remained in the supraminimal stage in his third session, it may have been speculated that J had passed through the Minimal Word Stage and that this stage had not been captured by this study. Further evidence that may support the position that J's assignment to supraminimal at age 1;9 was invalid exists in the fact that J did not exhibit vowel length distinction during this session. If, at age 1;9, he was truly in the supraminimal stage, he would be expected to demonstrate appropriate use of vowel length in obligatory contexts. The types of words J produced at each session were examined to help explain this unexpected stage progression. Upon investigation, it was determined that a high

percentage (80%) of the supraminimal targets produced with greater accuracy than expected at age 1;9 were proper nouns. These proper nouns consisted of primarily English words or names of Mi'kmaq family members and friends that contained English sounds such as repeated attempts at words such as 'Barney', 'Chrisma' and 'Batmobile'. This high percentage of supraminimal words resulted in J being assigned to the supraminimal stage. Overall, the great majority of samples support the predictions of the sequence of prosodic development of the Prosodic Hierarchy.

With respect to the relational analysis that examined prosodic simplifications based on assigned prosodic stage, several samples did not follow the predictions. The pattern of simplifying supraminimal targets to the prosodic level of assigned stage did not occur as frequently as would be expected given that the theory predicts that the Prosodic Stage a child is in places an upper limit on the shapes a child will most often produce. This unexpected pattern of matching more supraminimal shapes than expected can be partially explained by verifying the subjective observation that a high percentage of these matched supraminimal targets were highly familiar, proper nouns from the child's family or from frequently watched cartoon movies. A visual examination of the data in these cases revealed an apparent abundance of proper nouns. This observation was then examined more thoroughly. The percentage of proper nouns was calculated for each of the samples where supraminimal targets were matched with greater accuracy than predicted. It was found across all children that all of these samples had a relatively high percentage of proper nouns as targets. At age 1;9 and 1;11 J matched a higher than expected amount of supraminimal targets. Of these, 80% and 57% respectively were highly familiar proper nouns. These proper nouns consisted of the names of familiar

people in J's family and names from frequently watched cartoon movies (the most common being 'Simba', 'Barney', 'Hohoho', 'Batmobile'). It is reasonable to expect that these very familiar and frequent words would be produced with greater prosodic accuracy than would be expected based on prosodic stage. Thus, two things are possible. It is possible that the types of words attempted and the degree of familiarity and practice of these caused J to be falsely assigned to the supraminimal stage and to match these supraminimal targets with greater accuracy than would be expected.

F matched a greater proportion of supraminimal targets than predicted in sessions from age 2;3 to 2;9. For these sessions, an average of 87% of supraminimal tartgets were proper nouns. This knowledge may help explain why when F was within the substages of the Minimal Word Stage he was able to match a higher proportion of supraminimal shapes than would be predicted based on his stage of prosodic development. The most common of his proper nouns were names such as 'Chrisma', 'Shaelynn', and 'Mufasa' and/or words seen in frequently watched movies such as 'powerman', 'batmobile', etc.

At age 2;4, R matched a greater proportion of supraminimal targets than predicted based on Prosodic Stage. When an analysis of the types of words driving R's high proportion of matched supraminimal targets was conducted, it was found that 73% of the matched supraminimal targets were again proper nouns (e.g., 'Hohoho', 'Batman', Batmobile', and 'Chrisma').

The samples where supraminimal targets were simplified in prosodic shape as expected based on prosodic stage were also examined for the percentage of proper nouns that they contained. These samples contained lower percentages of proper nouns than those samples where supraminimal targets were maintained with greater accuracy than

predicted. The percentages ranged from 0% to 34% proper nouns in samples where supraminimal targets were simplified as predicted based on assigned prosodic stage.

A more direct test of whether or not the prosodic shape of supraminimal proper nouns was maintained more than supraminimal common nouns was conducted. In this analysis, supraminimal common and proper nouns in all sessions where simplifications were expected based on prosodic stage, were examined with respect to whether they were maintained or simplified as expected based on assigned prosodic stage. It was found across all children that the prosodic shape of supraminimal proper nouns was maintained more than supraminimal common nouns in subminimal and Minimal Word stage samples. Overall, across these samples, 78% of supraminimal proper nouns were maintained in prosodic shape while only 34% of supraminimal common nouns were maintained in prosodic shape. In addition to these overall percentages, it should be noted that in each sample, the percentage of supraminimal proper nouns maintained in prosodic shape was always greater than the percentage of proper common nouns maintained.

Discussion

The first objective of this study was to determine the prosodic shape of Minimal Words in the Mi'kmaq language. The processes of syllable structure changes that can be applied to the special lexicon items of Mi'kmaq CDS were identified and described. The child production data supported the developmental stages described by the Minimal Word Theory in that the majority of sessions followed the predicted progression of prosodic development that has been shown to occur in other languages (Demuth & Fee, 1995; Fikkert, 1994). Prosodic simplification patterns in children's productions did not occur as predicted for all sessions. Seven of sixteen samples had children matching supraminimal targets with greater accuracy than expected based on assigned prosodic stage. The supraminimal targets attempted during these seven sessions were characterized by an overall high percentage of highly familiar proper nouns.

Syllable Structure Changes in Mi'kmaq CDS Lexical Items

Many languages have a special lexicon used by adults when speaking to children. This lexicon exists within Child Directed Speech that differs from adult directed speech on several parameters including pitch, segmental simplification, and syllable shape simplifications. Ferguson (1977) studied this speech register in many different languages. He found that these special vocabulary items tend to have a specific, restricted prosodic shape that differs systematically from the adult form of the words. Some words used in the adult register of a language have a comparable form in the lexicon of CDS that can be derived through a simplification process. It is these CDS vocabulary items that have a simpler prosodic shape than their counterparts within the adult register of the Mi'kmaq language that were examined in this study.

An examination of various CDS vocabulary items in Mi'kmaq, revealed a striking pattern of prosodic simplification from the adult-directed form of the word. Special Mi'kmaq CDS vocabulary items used in speech to children differed from their 'adult' versions by two processes: reduplication and final consonant deletion. These processes rendered all CDS items simplified to CVCV prosodic shape. The prosodic shape of these particular words when directed to children, provided supporting evidence during the investigation for word minimality in the Mi'kmaq language. This prosodic shape corresponds to Mi'kmaq children's forms produced when they were in Stage IIa of the prosodic hierarchy and to the simplest form of Minimal Words in Mi'kmaq. When reflecting back to Ferguson's (1977) discussion of 'Babytalk' words across languages, we recall that he described simplification patterns of adult words that occurred when these words were directed to children. One of the simplification patterns he noted was that many words consisted of a typical form or prosodic structure, usually CVCV. Also, these CDS items differed from the adult form by systematic simplification processes, including deletion of unstressed syllables, leaving a simpler prosodic shape. Some English examples from Ferguson's work (1977) include *"tummy"* for *"stomach"*, *"nana"* for *"banana"*, *"bye-bye"*, and *"boo-boo"*. It is very interesting to note that Mi'kmaq adults used this CVCV shape in their speech to children. CVCV is the simplest form of the minimal word in the Mi'kmaq language. In doing so, they were showing children about minimal words (i.e., that word differ from syllables and moras), and they were using the particular minimal word form that is first acquired by children in this language.

Ferguson (1977) made the observation that these 'babytalk' items used by adults to children were similar to children's early words and the most common shape of these

special vocabulary items was CVCV across all of the languages he studied. The prosodic shape of CDS lexical items matched that of children's early word shapes. It has been established in the present study that the Mi'kmaq children studied followed the Stages of the Prosodic Hierarchy in the development of their early word shapes. One of these stages is Stage IIa, the first Minimal Word substage, occurred when the children's most typical prosodic shape was CVCV. The shape of all identified special CDS vocabulary items in this study was also CVCV. This similarity between children's early word shapes and the shapes of these special words used by adults only when speaking to children, supports Ferguson's proposal that there is a link between 'babytalk' words and the early words children most typically produce. Perhaps by using a simpler prosodic shape when speaking to children, adults serve to provide language that is close to the child's level of prosodic development. These simplifications may enhance the child's ability to match and ultimately produce such words because they are within the child's prosodic range of ability.

Linguistic theories have predicted that certain aspects of language acquisition are universal. It is presumed that factors necessary for language-learning would be found across languages and that those aspects of early language that are not common to all languages are not vital to the acquisition of language. The similarity of prosodic stage acquisition between English and Mi'kmaq children supports the notion that all children may acquire the prosodic aspects of their language in a similar developmental sequence that involves the acquisition of minimal words. Prosodic or suprasegmental structure includes the elements of language that help organize the segments and phonological components of language. The prosodic level of phonology is made up of structural

elements, such as syllables, words, phrases, breath and intonational groups, and the processes such as stress and rhythm that are determined by these elements (Demuth & Fee, 1995; Fee, 1997). Segmentals are the actual phonemes in a language that are distinctive or carry meaning. For example /p/ and /b/ are distinctive in English because /pat/ and /bat/ differ only by the voiceless and voiced first segments, which change the meaning. The Mi'kmaq language however, does not differentiate between voiced and voiceless stops. That is, voicing is not distinctive in the language so only /p/ exists in the language and may be pronounced voiced or voiceless without affecting the meaning. Therefore, voicing is an aspect of segmentals that can vary between languages. Other aspects of segmentals (characteristics that make sounds meaningful in a given language) that may vary across languages are place and manner of articulation. While segmentals tend to vary between languages, prosodic aspects of language lend themselves more readily to comparison across languages. For example, syllable shape is an area of language above the segmental level that can be looked at independently of the segments of languages. There will be some aspects of prosodic structure, however, that do vary between languages (i.e., whether or not codas are allowed in syllables). It is the prosodic commonalities, independent of segmental variables, that enable researchers to compare across languages in attempts to identify those aspects of language that are universal.

Prosodic Stage Acquisition

Following a detailed examination of four Mi'kmaq-speaking children's early language, patterns in prosodic development were found that mirror early prosodic development in other languages. The data were analyzed with respect to the Prosodic Hierarchy, with the prediction that Mi'kmaq children's early word shapes would follow

this hierarchy in their development, as did English- and Dutch-speaking children (Demuth and Fee, 1995). The data in the present study have supported the Minimal Word theory of Prosodic development in that the prosodic shape of the Mi'kmaq children's early words followed the order predicted by the Minimal Word theory within the Prosodic Hierarchy.

The most typical prosodic shapes produced by children in this study were indeed comparable in prosodic shape to those produced by English and Dutch children at comparable language levels. The types of syllables produced followed the developmental sequence of increasing complexity of prosodic shape as outlined by the Prosodic Hierarchy. Two of the Mi'kmaq children who were sampled for nine months, showed an overall development of their shapes from Subminimal (CV), through the three Substages of the Minimal Word Stage (CVCV, CVC, and CVV), and on to the Supraminimal Stage. Children in this study demonstrated an overall developmental pattern of prosodic acquisition that corresponded to the stages defined in the Prosodic Hierarchy. However, not all children were captured developing through all stages. B, J and F demonstrated the subminimal stage in their development where their most typical prosodic shape was subminimal but R was not observed during this stage. Also, Stage IIc (CVV) was only documented in one child's data.

An important observation in these data is the documentation of the subminimal stage. Demuth and Fee (1995) were only able to document one child in the subminimal stage, as the other children in that study did not show evidence of this stage. The authors hypothesized that the data sampling for other children in their study did not begin early enough in their development to capture the subminimal stage of prosodic development.

Another important aspect of this study was the investigation of Stage IIc (CVV), the vowel length distinction. Child F demonstrated distinctive use of vowel length at age 2;9. Given that R also achieved the supraminimal stage, he was expected to demonstrate the vowel length distinction prior to progressing into the supraminimal stage. However, his data did not demonstrate this expectation. Based on the examined data, he did progress from CVC to the Supraminimal stage during the study. He was observed to use vowel length distinctively once in the supraminimal stage, at age 2;11. He was not, however, observed in the CVV stage. It is possible that R did go through Stage IIc but that it was not captured by the sampling method used in this study. It is also possible that there were not enough data to reflect his prosodic stage, or that some artifact of the data (e.g., targets attempted) prevented this stage from being documented. Following a subjective examination of adults' language across all sessions, it would appear that words that are CVV in shape are infrequent in the adult language. The low frequency of CVV words in the Mi'kmaq language means that there are fewer such targets in general and that children would have less exposure to CVV targets from the adults in their environments. This could be an explanation for why R was not observed in Stage IIc. The fact that the children in this study followed the same overall developmental patterns of prosodic development as English- and Dutch-speaking children lends support to the concept of the universality of the Minimal Word in all languages and its role in early prosodic development.

Cross-Linguistic Comparison of Stage Progression and Language Level

It is important in cross-linguistic research to compare results obtained in one language to those found for other languages studied. Here, prosodic stage progression for

the Mi'kmaq-speaking children in this study will be compared to that for English children (Demuth & Fee, 1995) with respect to language level (i.e., MLU, mean length of utterance). In Demuth and Fee (1995) three English-speaking children's language was analyzed with respect to prosodic development and language level. P.J. (aged 1;8 to 2;0 over the course of study) progressed from Subminimal through the three sub-stages of the Minimal Word Period. Her MLU increased from 1.05 to 1.49 during this period of language development. NP's (aged 1;5 to 2;1 over the course of the study) MLU ranged from 1.18 to 1.53 as he progressed through the three substages of Minimal Word development. AM (aged 1;6 to 2;0 over the course of the study) had MLU's ranging from 1.04 to 1.34 across the same period of prosodic development.

When compared to the Mi'kmaq-speaking children followed in this study, the language levels related to prosodic development were comparable. Over the course of the present study, child B had an MLU of 1.12 at age 1;10 when she was in the Subminimal stage of prosodic development. J's MLU ranged from 1.0 to only 1.18 from age 1;7 to 1;11. The confusion of his prosodic development described in the results section may be clarified by MLU evidence. It was suggested that his supraminimal stage assignment at age 1;9 may not have been valid given that no vowel length distinction was exhibited, that at age 1;11, he was assigned to Stage IIa, and that the majority of his supraminimal targets were proper nouns. Another reason to suspect that assignment of Supraminimal at age 1;9 may have been inaccurate is that other children with comparable MLUs were in a lower prosodic stage. For example, English speaking children with comparable MLU levels (1.0-1.18) were at subminimal and minimal stages of prosodic development. Therefore, J's relatively low MLU levels suggest that he may have been in

a lower prosodic stage than was assigned. Child F's MLU increased from 1.16 to 1.6 over the course of this study as he aged from 2;1 to 2;10. His prosodic development progressed from Subminimal to Supraminimal during this period. Finally, R (aged 2;2 to 2;11 over the course of this study) progressed from Stage IIa (CVCV) of the Minimal Word Stage to Suprmaminimal over the course of this study as his MLU increased from 1.28 to 1.52. Examination of language levels and corresponding prosodic development revealed parallels between English and Mi'kmaq speaking children.

English-and Mi'kmaq-speaking children progressed through most stages of the prosodic hierarchy with comparable language levels. That is, with MLUs ranging from 1.04 to 1.60, the majority of children, both English and Mi'kmaq, progressed either from subminimal or minimal prosodic stages to supraminimal in prosodic development. Those children captured in the Subminimal stage had MLUs of 1.05, 1.12, and 1.16. These MLUs which correspond to the same prosodic stage suggest similar language levels. For the remainder of the children who progressed through the three substages of the Minimal Word Stage, the English MLUs ranged from 1.04 to 1.53 for English-speaking children and 1.0 to 1.6 for the Mi'kmaq-speaking children. In sum, it can be said that the English- and Mi'kmaq-speaking children had comparable language levels as they progressed through the same stages of prosodic development.

Unexpected High Accuracy of Supraminimal Targets

For several samples, children were more accurate than expected in their attempts at supraminimal targets. Given their assigned prosodic stage, it was predicted that the majority of their attempts at supraminimal targets would be reduced to a simpler prosodic shape. An examination of the data in these cases was conducted to investigate what

factors may have been driving this unexpected high accuracy of supraminimal targets. The degree to which these words were proper versus common nouns was investigated.

A striking pattern was revealed that may account for those sessions when the predicted simplifications in prosodic shape did not occur. Children were more accurate in their attempts at proper noun supraminiml targets than was predicted based on their assigned prosodic stage. An analysis of the data showed that overall, supraminimal proper nouns were maintained more than supraminimal common nouns in sessions where simplifications in supraminimal targets were expected based on prosodic stage. In each of these sessions, more supraminimal proper nouns were maintained than supraminimal common nouns. These results suggest that children showed greater prosodic accuracy with proper nouns than common nouns in that supraminimal proper nouns were more likely to be maintained in situations where all supraminimal targets were expected to be simplified. There are a few possible explanations to explain why proper nouns were produced more accurately than common nouns by the children in this study.

Perhaps proper nouns occur with greater frequency and with more repetition in the children's environments than other types of supraminimal nouns causing them to be learned and produced with greater accuracy than expected based on prosodic stage. Ingram (1989) discussed variability among the early language development of children learning the same language. One source of variability among children learning a language is the production of forms above linguistic stage. Variation due to environmental effects includes obvious factors such as the need to hear a language to speak it and more subtle factors such as the effect of frequency on specific language forms (Ingram, 1989). It is this effect of frequency on specific language forms that may

be responsible for those instances when children produced supraminimal targets with greater accuracy than expected. Ingram suggested that items produced with greater accuracy that expected based on a child's developmental stage, may be learned as 'chunks' or whole units. That is, certain items within the child's linguistic system are idiosyncratically produced with greater accuracy than would otherwise be dictated by a child's prosodic stage (Ingram,1989).

Ideally, to further investigate the types of prosodic simplifications made by children with respect to predicted simplifications based on assigned prosodic stage, a relational analysis of all supraminimal targets excluding proper nouns would be conducted. This was not possible in this study due to small amounts of data for several sessions. Had proper nouns been removed from samples, the remaining sample size would be too small to analyze and maintain a suitable degree of reliability and validity. A large data set is desirable as it is considered to be more representative of a child's abilities.

Implications and Future Research

It will be important in the future to continue to study the prosodic development of children learning other languages in other cultures of the world. The more that is known about the common features of language development, the more will be learned about what is necessary for normal language development to occur in any language. This knowledge will have implications for early language assessment and intervention across languages. With an ever-increasing diversity of cultures in clinical caseloads, cross-cultural aspects of language development will be vital to providing appropriate services to this population.

Anyone who has worked clinically with children can attest to the great variety in children's error patterns in early language production. The ways in which children simplify and change the targets they attempt can vary greatly from child to child. One of the ways children may vary in their production of targets is in the tradeoffs they make in what aspect of a target gets simplified in their production. Will the segments get simplified and the prosodic shape be maintained or vice versa? The interaction between prosodic shape and segmental complexity is an important area warranting future research. Based on general observation of the data in this study, children were occasionally observed to simplify the segmental aspects of a relatively complex target while maintaining the prosodic shape. In other instances, the segmentals of a target were maintained while the prosodic structure was simplified. Newhook (1998) conducted a study using the same Mi'kmaq data investigating these trade-offs that occurred between segmental and prosodic complexity in some target words. Her findings were that there was indeed a tradeoff between segmental complexity and prosodic shape with respect to consonants. That is, if segmental complexity was maintained, prosodic shape was often compromised and vise versa. Newhook (1998) found that in Mi'kmaq-speaking children's early word productions, this pattern held true for consonants but not for vowels. It seems logical to assume that given a limited amount of processing resources, a child attempting a syllable shape may maintain the phonetic complexity, while simplifying prosodic shape or vice versa. This trade-off would be more likely within a more complex phonetic environment, than with a simpler phonetic environment where the child may be able to maintain both the simpler phonetic environment and the prosodic shape. Thus, the types of prosodic simplifications a child makes in a given prosodic

stage may be affected by the segmental complexity of the target and the relative complexity of a given target (i.e., more complex than assigned prosodic stage). For example, it is possible that a child in Stage IIb (CVC), would simplify various supraminimal targets differently based on the segmental complexity of the target. A possible pattern might be that if segmental complexity is maintained, the prosodic complexity gets simplified and vice versa; happening more frequently within extremely complex phonetic environments than in simpler ones. The factor of segmental complexity, then, may have a role in the kinds of simplification patterns made by children in various stages of prosodic development. The interaction of segmental complexity and prosodic shape deserves further investigation.

      <u>Complications Related to Humans as Participants and Language as Data.</u> An issue related to methodology has become apparent due to the fact some predicted patterns did not follow as expected. For example, R's data did not permit us to see him in Stage IIc (CVV) where vowel length was use distinctively. Also, several samples had participants matching more supraminimal targets than expected which was possibly due to the overall high percentage of proper nouns as supraminimal targets in these cases. Collecting data from a human population in naturalistic settings has certain inherent hazards to methodology. In efforts to use naturalistic, representative data in a natural context, it is impossible to control the amount of data and the targets attempted during sampling. A human population of such a young age-range, simply magnifies these difficulties. The decision to decrease empirical control during recording sessions may have also had effects on the data collected. Manipulation of sessions such as controlling targets attempted and people present is more reflective of English-speaking cultures. In

such cultures encouraging a child to produce certain words and having a more controlled environment where no other people were permitted to participate would be not be considered unusual. However, cultures have different conceptions of what is normal and appropriate. Exerting these types of empirical controls within the Mi'kmaq culture was not considered appropriate as it did not reflect the natural use of language in the Mi'kmaq culture. Limitations to the data set such as English words being used in the samples, targets attempted and amount of data collected were the result of pure naturalistic sampling procedures. Manipulation and control of sessions were not done in an attempt to ensure the validity of the sessions as representative samples of the participants' natural use of language. It is possible that other factors intrinsic to the sampling method used in this study contributed to Stage IIc (CVV) being missed in R's progression. Perhaps the sampling schedule caused this stage to be missed, or the targets attempted did not allow vowel length to be examined in particular sessions. Another study to examine the vowel length issue in more detail is warranted. Perhaps a quasi-experimental design where targets are controlled using specific toys during each session would better illuminate when a child uses vowel length distinctively. More frequent taping sessions would also prevent the possibility of missing a particular stage in development.

Another possibility for future research examining prosodic stage development concerns stage assignment and the predicted prosodic simplification patterns that follow. In the present study, stage assignment was based on the most frequent prosodic shape (greatest proportion) produced during each sampling session. The predicted prosodic simplification patterns did not always occur in this study. This is most likely due to the types of words attempted in these cases as described earlier with respect to proper nouns.

In the present study the amount of difference between proportions was not considered for stage assignment. Stage assignment was based on greatest proportion regardless of how much greater the proportion was from other stages. For example, whether the deciding difference in proportions for stage assignment was .90 or .05 was not interpreted in this study. Perhaps in a future study, predicted prosodic simplifications should be examined only when the proportions for stage assignment are made based on greater differences in proportions (e.g., .90 and .10 as opposed to .45 and .55). It would be interesting to see if the predicted simplification patterns occurred more reliably if a child is assigned to a stage based on a predetermined larger difference (e.g., a minimum of .25 between stages) in deciding proportions. Such control and consistency would be very difficult to achieve except in a very controlled experiment, where language in its natural use would not be captured.

A further implication of the results of this study is the consideration of what types of words should be used in phonological analyses. The complication caused by proper nouns in this study suggests that they may be learned and stored differently from other types of nouns and words in a language. Perhaps if large enough data sets could be obtained, analyses that excluded proper nouns could be conducted which more aptly reflect the prosodic development in a language.

Conclusion

Although language research with human participants of such a young age has limitations, it is an important area that requires further study in other languages. Knowing and understanding the universal aspects of language can only be ascertained through studying many different languages. This knowledge has important clinical

implications. It will better enable clinicians to help children who are having difficulties learning their language. The present study was not only a step toward learning the universals of language acquisition with respect to prosodic development and the importance of the Minimal Word in early language development. The information gained from this study will also help with the treatment of language disorders in children who speak the Mi'kmaq language.

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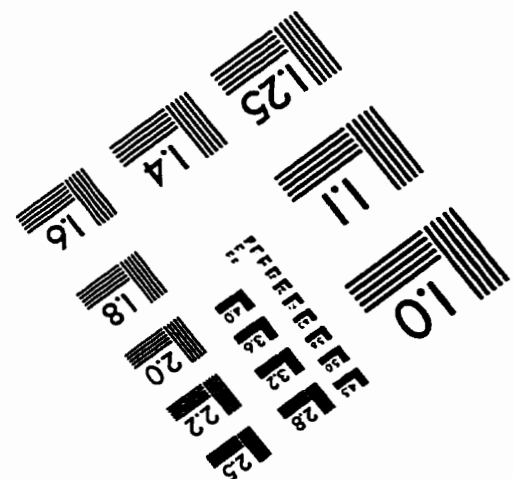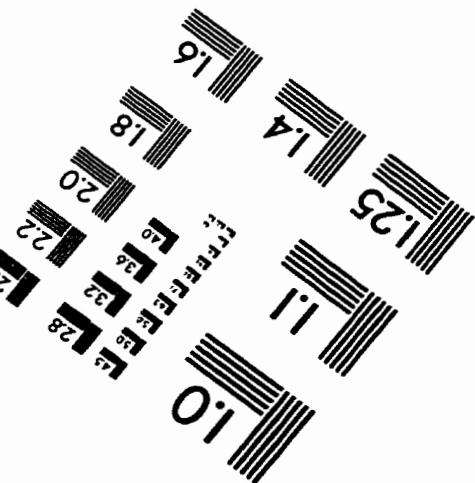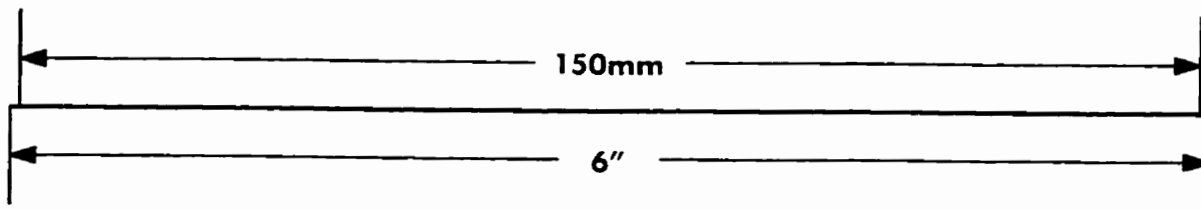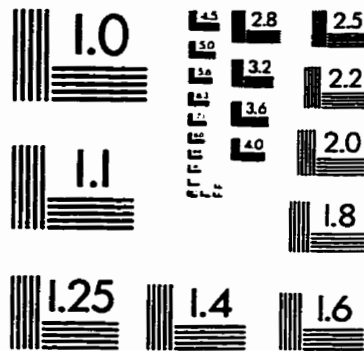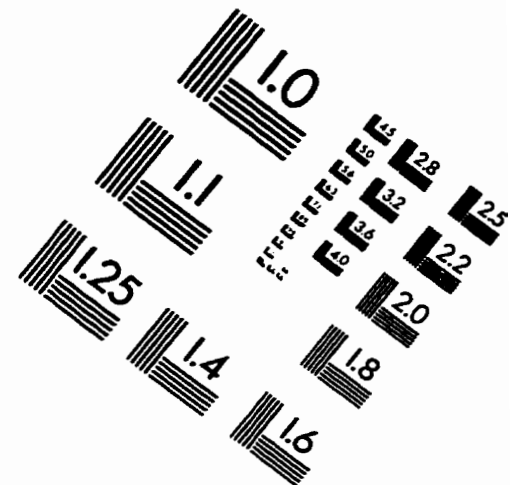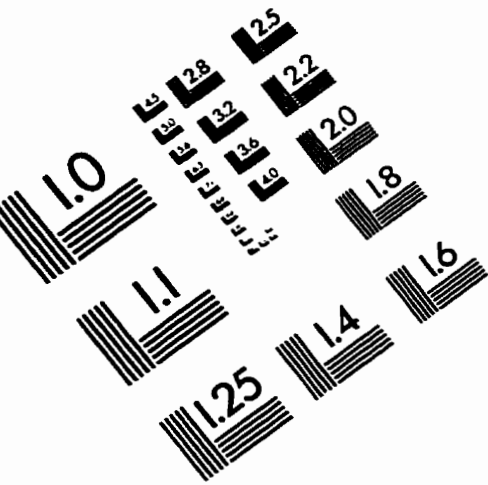
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