METAPHONOLOGICAL ABILITY TO JUDGE PHONETIC AND PHONOLOGICAL ACCEPTABILITY IN FIVE-YEAR-OLD MONOLINGUAL AND BILINGUAL CHILDREN

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ABSTRACT

In this study, a series of subtests in Portuguese and in English were constructed in an effort to assess five-year-old children's metaphonological ability to judge acceptability based on phonetic and phonological similarities and differences. It aimed to examine whether monolingual five-year-olds performed better than chance and it also compared monolingual with bilingual five-year-olds in the same set of stimuli in order to detect whether the bilinguals performed better at judging acceptability in their more proficient language.

Thirty one monolinguals (16 Brazilians, 15 Americans) and twenty four bilinguals in Portuguese and English were tested on metaphonological ability subtests, Peabody Picture

Vocabulary Test and Print Concept Test.

The results suggest that the subtests proposed are able to assess acceptablity judgements at the phoneme and distinctive feature levels. In addition, it shows that five-year-old bilingual children, when presented to the same stimuli, are able to perform equally well in the same metaphonological tasks with the exception of two subtests. Since the child´s assessed level of metaphonological ability depends greatly on the phonological knowledge of the oppositions tested and on the task used, this study proposes a specific methodology for the assessment of metaphonological judgment in five-year-old children, showing that the specific method proposed can successfully assess five-year-old children´s metaphonological acceptability judgement based on changes at the phoneme and distinctive feature level. Implications for the development of metaphonological ability are discussed.

RESUMO

A presente pesquisa teve como um de seus objetivos elaborar uma série de subtestes em português e em inglês com o intuito de avaliar a capacidade metafonológica que crianças de cinco anos têm de julgar aceitabilidade baseada em semelhanças e diferenças fonéticas e fonológicas. Examinou, também, se as crianças de cinco anos monolíngües apresentam desempenho acima de possível chance de acaso e comparou o desempenho dessas crianças monolíngües ao desempenho de crianças bilíngües em o mesmo conjunto de estímulos a fim de detectar se as bilíngües testadas em sua língua mais proficiente apresentam um desempenho melhor com relação a julgar aceitabilidade.

Trinta e uma crianças monolíngües (16 brasileiras, 15 americanas) e vinte e quatro bilíngües em português e inglês foram testadas através de subtestes de habilidade metafonológica, teste Peabody de vocabulário e teste de Print Concepts.

Os resultados sugerem que os subtestes propostos são capazes de avaliar o julgamento de aceitabilidade no nível do fonema e de traço distintivo. Além disso, este trabalho mostra que crianças bilíngües de cinco anos, quando testadas com os mesmos estímulos, são capazes de desempenhar igualmente bem nos mesmos subtestes de habilidade metafonológica com exceção de dois subtestes. Uma vez que o nível de habilidade metafonológica examinada depende grandemente de

conhecimento fonológico prévio das oposições testadas e do tipo de teste utilizado, esta pesquisa propõe uma metodologia específica para a avaliação de julgamento metafonológico em crianças de cinco anos mostrando que a metodologia específica proposta pode avaliar com sucesso o julgamento de aceitabilidade metafonológica baseado em mudanças a nível de fonema e de traço distintivo. Implicações para o desenvolvimento da habilidade metafonológica são discutidos.

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CHAPTER I

INTRODUCTION

Statement of the Problem

Prior linguistic research has shown that, with the exception of semantic acceptability and word awareness (awareness of content - Garton & Pratt, 1989), children do not start to make metalinguistic judgements about linguistic forms until they are six or seven years old (Hirsh-Pasek, Gleitman & Gleitman, 1978; Smith & Tager-Flusberg, 1982). One of the major conclusions often drawn from studies is that the ability to make judgements of metalinguistic nature is relatively developed in children more than five years of age (Hirsh-Pasek, Gleitman & Gleitman, 1978). In relation to metaphonological ability in particular (most commonly known as phonological awareness), it has been argued that six-year-old children have mild difficulty segmenting speech into words and show greater difficulty in segmenting words into smaller units such as syllables. However, their greatest difficulty is related to segmenting words or syllables into phonemes (Hirsh-Pasek, Gleitman & Gleitman, 1978). On the other hand, it has also been shown that four-year-old children may be able to isolate and detect some single phonemes (Treiman & Zukowski, 1991). A search of the literature shows that one of the reasons for diverging findings in relation to metaphonological ability in children is the fact that there is a vast array of tasks measuring metaphonological ability. When dealing with any metalinguistic ability, one may be touching upon different areas of the language realm as well as cognition. Therefore, there is debate as to whether or not the range of tasks used to assess metaphonological ability measure the same construct, since tasks vary in kinds of samples, measurement, and cognitive demands (Yopp, 1988). McBride-Chang (1995) has pointed out that "no attention has been given to experimental control within individual phonological awareness" tasks. Nesdale & Tunmer (1984) have suggested that "the child's assessed level of phonological awareness will depend greatly on the task" used (p.60).

The variety of views regarding the relationship between metaphonological ability and reading, metaphonological ability and language development or speech language impairments, metaphonological ability and bilingual development may be the result of researchers using different assessment procedures and thus reaching different conclusions as to what metaphonological ability is and how it is manifest.

Previous investigations have focused primarily on the metaphonological ability linked with

reading and spelling (Buianowski, 1992; Harbes, 1994). However, relatively few studies have focused on measuring the metaphonological ability of preschool children in conjunction with bilingual development. The attention of research on metalinguistic development and bilingualism has primarily focused on the bilingual child's semantic, pragmatic or syntactic developments. Few studies have focused on the phonological component of metalinguistic ability construct. The observation that bilingual children are exposed to two different language systems since an early age, raises questions about whether they may be more metaphonologically able than monolingual chidren to judge phonetic and phonological similarities and differences. It is plausible to hypothesize that bilingual children may develop the ability to judge phonetic and phonological similarities and differences better than monolingual children because of the intrinsic task of acquiring two different languages that they are engaged in. Additionally, no work has been done exploring the relationship between monolingual and bilingual preschoolers on metaphonological judgements tasks to test acceptability based on phonetic and phonological similarities and differences.

Purpose of the Study

The primary goals of this dissertation were to study the metaphonological ability to judge acceptability in five-year-old monolingual children and to devise an experimental task that successfully assessess such ability. It also examined whether five-year-old bilingual children perform better than their monolingual peers in metaphonological ability tasks, the assumption being that five-year-old monolingual children should display some metaphonological ability to judge acceptability at age five (MacLean, Bryant, & Bradley, 1987) and that bilingual children this age might develop a greater ability to judge these differences when tested in their more proficient language. Therefore, this study addressed the following issues:

a) Attempted to devise a specific metaphonological task to assess metaphonological ability in five-year-old-children;

b) Investigated the metaphonological ability to judge acceptability in five-year-old monolingual children in terms of whether these children are able to judge phonetic and phonological similarities and differences at an age that most researchers suggest is a stage for judging only larger units (e.g., syllables);

c) Compared five-year-old children who are raised bilingually with children the same age who are

raised monolingually on metaphonological ability to judge acceptability in order to investigate whether bilingual children develop a better judgement ability in relation to their monolingual peers when tested in their more proficient language.

Therefore, these assumptions should translate into three types of outcomes:

a) The manufacturing of an experimental task that assessess the metaphonological ability to judge phonetic and phonological acceptability in five-year-old children;

b) Monolingual children perfomance scores in these acceptability judgement tasks being better than chance, and

c) Bilingual children's scores in acceptability judgement tasks being higher than their monolinguals peers' when these tests are given in the bilingual child's more proficient language.

Research Questions

1. Is it possible to devise a subtest that assesses the metaphonological ability to judge phonetic and phonological acceptability in five-year-old children?

2. Are 5-year-old monolingual children metaphonologically able to judge phonetic and phonological acceptability? If so, how well do monolingual children perform in judgement tasks that manipulate phonetic and phonological acceptability?

3. If bilingual 5-year-olds are tested on the same phonetic and phonological acceptability tasks will they show a better performance than their monolingual peers when tested in their more proficient language?

Significance of the Study

According to Bryant, Maclean, Bradley, & Crossland (1990) there is one fact concerning children's phonological skills that is very well accepted among most researchers: that children's phonological ability develops across time and that as children grow older, their capability to judge phonological segments improves (MacLean, Bryant, & Bradley, 1987). Conflict remains about which unit of speech is first acquired metalinguistically: syllable, onset x rime or phoneme. In other words, there is no consensus about the developmental stages of metaphonological ability (Catts, 1991).

Bryant & Bradley (1985), Dowker (1989), and Gipstein (1992) among others, have suggested that the rhyming ability is the first metaphonological skill to be acquired. Others (Liberman, 1973; Liberman et al., 1974; Swank, 1991) have argued that the most accessible metalinguistic units to

younger children are the syllables and then onset-rimes (Gombert, 1992). The phoneme has always been considered to be the last unit to be metalinguistically acquired. If these theories are correct, it would follow that most possibly phonemes as well as distinctive features are accessible metalinguistically to children only later in life and most possibly after they learn to read (Morais, 1991).

This study investigates the building up of subtests that are able to capture the metaphonological ability in the form of metalinguistic judments at the level of phonemes and distinctive features. Working with preliterate five-year-old monolingual children may bring some insight about whether these children show the ability to make metaphonological judgements on acceptability at the phonemic and distinctive featural level. Another purpose of the present study is to examine whether there are differences between monolingual and bilingual five-year-olds in relation to metaphonological ability at the level of phonemes and distinctive features. Contribution to the study of metaphonological ability construct as well as how metaphonological ability and bilingualism interact will be discussed.

CHAPTER II
REVIEW OF THE LITERATURE

A large body of research on metaphonological ability (henceforth, MPA) has examined the relationship between MPA and reading (Bradley & Bryant, 1991; Fox & Routh, 1975; Morais, 1991; Treiman & Zukowski, 1991; among others) and the relationship between MPA and speech language impairments (Lewis & Freebairn, 1992; Catts, 1993; see Larivee, 1994 for a review). Another body of research (Ianco-Worral, 1972; Ben-Zeev, 1977; Bialystok & Ryan, 1985; Galambos & Hakuta, 1988) has studied the relationship between bilingual development and metalinguistic ability. Few studies (Buianowski, 1992; Bruck & Genesee, 1995) have addressed the relationship between bilingual development and MPA in particular. The variety of views regarding the relationship between MPA and reading, MPA and normal versus impared language development, and MPA and bilingual development is the result of researchers using different assessment procedures, thus reaching different conclusions as to what MPA is and how it is manifested.

This chapter will examine important aspects of the MPA construct. It will discuss the definition and development of MPA. It will further touch upon the importance of designing the appropriate task in order to better operationalize the MPA concept. Finally, it will review the relationship between MPA and bilingualism.

Definitions of Metaphonological Ability

MPA, most commonly known as *phonological awareness*, has extensively been researched from different and controversial perspectives. In the present study, the term *awareness* was avoided due to its use in the study of psychological reality in the linguistics literature. Magnusson (1990, p.114) has pointed out that "many suggestions have been made as to how to define metalinguistic ability, either by focusing on the linguistic aspects or on the pshychological aspects". According to Magnusson, this variability in definitions is rooted in the debate in how one considers certain types of behavior as evidence of metalinguistic ability. In other words, it all depends on which theoretical framework one adopts. She suggested two basic frameworks: the psychological-based definitions of MPA and the linguistic-based definitions of MPA. Gombert (1992) has argued that this terminological distinction might be crucial, since what a psychologist considers to be 'metalinguistic in nature' may not necessarily be ackowledged as such by a linguist.

Psychological-based Definitions of MPA

According to the psychological oriented approach, *phonological awareness* is seen as a reflection of a change in the cognitive development that permits an intentional reflection about the mental operation products (Cazden, 1976; Levelt et al., 1978; Hakes, 1980; Pratt & Grieve, 1984; Tunmer & Herriman, 1984). Therefore, according to this framework *phonological awareness* is considered to be the capacity of making language an object of thinking; a metacognitive ability that follows the concrete operational capacity (Magnusson, 1990). Elsewhere, it has been referred to as the explicit conscious act of realizing the units of speech sounds, and more restrictly phonemes, or units that contrast phonemically (Tunmer & Rohl, 1991). The psychological-oriented approach tends to argue that perceptual discrimination and MPA are essentially different in one important aspect: that the former is done intuitively and at a subconscious level while the latter requires higher levels of consciousness. Moreover, the underlying idea conveyed by this paradigm is that there is a fundamental distance between perception and MPA (Tunmer & Herriman, 1984).

Linguistic-based Definitions of MPA

Mattingly (1972) was one of the first to use the term *metalinguistic awareness* to describe the speaker's reflections and conscious insights about the basic linguistic activities. *Phonological awareness* according to this approach refers to the conscious awareness that words are comprised of discrete phonological segments. Yelland, Pollard & Mercuri (1993, p. 423) have defined *phonological awareness* as "the knowledge that the spoken word is composed of distinct units of sound at both the subsyllabic and phonetic levels".

Furthermore, the term *phonological awareness* has also been used to refer to awareness of larger phonological units such as rhyme, syllable and onset and rime. Therefore, at first place, there is a need to define what MPA means for this present study.

Metaphonological Ability Defined

Gombert (1992) argues that the psycholinguistic meaning of the term 'metalinguistic' is broader than that which linguists give to the term, since the linguist considers only the metalinguistic **utterance** as the source for providing an object of study for the discipline. On the other hand, the psychologists rely on the psychological factors (especially cognitive factors) to qualify a linguistic production as metalinguistic in nature.

In this present research, to study MPA was to investigate how much

knowledge children have about linguistic structures and the degree to which they can judge phonetic and phonemic similarities and differences. It was required of children that they made judgements of linguistic units that go beyond ordinary language use. Thus, a linguistic-based approach was pursued. Therefore, for the purposes of this study MPA was defined as *an ability that involves some kind of judgement of the perceptual stimuli*; *an ability that requires greater sensitivity to distinctive features and phonemes that allow children to do particular tasks that involve judgement of the stimuli in a higher cognitive way/that goes beyond ordinary language use*.

Tunmer & Rohl (1991) have argued that it is important to delimit boundaries between MPA and auditory perception. *Auditory perception* is the early acquired discrimination of either linguistic or non linguistic sounds (Nesdale, Herriman & Tunmer, 1984; Ingram, 1989). This auditory perceptual discriminatory ability involves a higher level of automaticity; it is an ability which is biologically inherited by humans with normal hearing. In other words, it is part of the human's built in psychology and at least some of it is so automatic that it is not even learned. Even infants have this capacity of distinguishing between small differences in linguistic sounds (Eimas et al., 1971; Bertoncini & Mehler, 1981). MPA differs from auditory perception in the sense that it involves some intentional attention to the perceptual stimuli. Therefore, the distinction between auditory perception and MPA for this study was drawn by considering auditory perception as a more basic and automatic ability, whereas MPA is considered to require a certain degree of conscious judgment.

The Development of Metaphonological Ability

In reviewing the work in the area of MPA it is clear that children may show metalinguistic ability to units of speech (e.g., sentence, word or syllables) at some point of language development. However, the developmental route of these units or even a hierarquical model for the acquisition of metalinguistic units is still in debate. In this section, a brief overview of the developmental stages of MPA will be discussed, followed by the developmental units of acquisition proposed by authors in the field of MPA.

Developmental Stages of Metaphonological Ability

Self-corrections as a first sign of MPA

Clark (1978) defends that self-corrections, also called self-repairs, can be viewed as attempts that children make to repair communicative gaps. Due to a breakdown in the interaction, the child might feel the need to respond to it by filling in the gap. It has been argued that this response requires a certain degree of conscious reflection on the linguistic structure beyond tacit knowledge. Vihman & McLaughlin (1982) have extended this notion suggesting that these self-corrections show a metapragmatic ability that can be seen in children as young as two years of age. Tunmer & Herriman (1984) and Magnusson (1990) consider speech repairs as just an adequate response at a pragmatic level that attempts to better convey a second time the message that did not go through properly the first time. They argue that self-corrections might not be a clear evidence that the child is really focusing on the linguistic forms. It has also been argued that self-corrections or playing with rhymes can be considered only as manifestations based on intuitions rather than on real reflection (Gombert, 1992). Smith & Tager-Flusberg (1982) however, have suggested that judgements of speech in childhood can be considered as manifestations of metalinguistic ability. The fact that children do make judgements, self-correct themselves and play with words might, in some cases, provide evidence of a MPA. Garton & Pratt (1989) have made an interesting observation in regard to

this:

> "Whereas we would argue that the existence of speech repairs does not in itself constitute evidence for metalinguistic awareness, as many of them occur spontaneously, *we certainly cannot conclude that all speech repairs do not involve awareness.* In many cases it is likely that either the production of an error or the act of correcting it, although triggered at a subcounscious level, will cause the individual to reflect on the language. (...) It is likely therefore that speech repairs will serve as the basis for some conscious reflection on language, but the fact that it is conscious will not necessarily be evident to observers of these errors." (1989: p.130) (my own italics)

Metapragmatic ability

Gombert (1992) defines metapragmatic ability based on Hickmann's definition as 'a specific metalinguistic ability, notably the ability to represent, organize and regulate the use of speech itself' (Hickmann, 1983, p. 21).

According to Nesdale & Tunmer (1984), the first metalinguistic ability to be developed is the metapragmatic, followed by the metalexical and meta- phonological. It has been reported that five-year-old children show signs of metapragmatic ability in tasks that require detecting inconsistencies in short stories (Tunmer, Nesdale & Pratt, 1983).

Metalexical Ability Developed Before MPA

Bowey & Tunmer (1984) have argued that the word is the first unit to be metalinguistically acquired and that MPA emerges as a consequence of a previously acquired metalexical ability. Before entering school, children might develop metalexical ability to content words. Children this age more likely interpret "word as refering to properties of the objects or actions represented by words" (Garton & Pratt, 1989, p. 143).

Playing with Rhymes as Sign of MPA

Young children at age two or three can either appreciate or make up rhymes in a way that shows they recognize there is something about the two rhyming words that makes them similar (Maclean, Bryant & Bradley, 1987). This ability can be seen as one that does not require any ability to segment the syllable in smaller phonemic units. It only requires the child to judge in a very broad way different words according to how similar they are (Morais, 1991).

Ability to Detect and Recognize Phonemes

According to Byrne (1996) the ability of phonemic segmentation and phonemic synthesis is practically inexistent before knowing how to read and write alphabetic languages. It has been argued that the nature of the relationship between literacy and these two types of MPA is one of causality. However, it is still debatable whether the ability to detect and recognize phonemes is a prerequisite for learning to read and write or it is triggered by the literacy process (Treiman & Zukowski, 1991; Mann, 1991).

Research on the development of MPA has also displayed conflicting views of the acquisition units of MPA, described and discussed below.

Acquisition Units of Metaphonological Ability

The Rhyme as a Metaphonological Unit Acquired by Kindergarteners

A line of evidence has documented that children show sensitivity to syllable rime similarities, i.e., to words that rhyme (Bryant & Bradley, 1985; Maclean, Bryant & Bradley, 1987). When two words rhyme they may share similar syllables (e.g.,

partake-intake) or similar rimes (e.g., pencil-tender, leopard-hazard, Gipstein 1992, p. 2; "in one-syllable words, rhyming words are just those that share the linguistic unit rime' Treiman & Zukowski, 1991, p. 71). They may also share what is commonly called *rhyme*[1]. When the child plays with rhymes he is actually showing he is able to recognize a common pattern across words. Studies have demonstrated that children become sensitive to rhymes as early as three and four-years-old (Dowker, 1989; Smith & Tager-Flusberg, 1982). Even in children younger than two years of age spontaneous rhyming has been observed (Bryant & Bradley, 1985). Gipstein (1992) has proposed that the rhyme is the most accessible metaphonological unit to four and five-year-olds. MacLean, Bryant & Bradley (1987) have also demonstrated that three-year-olds performed well in rhyme and alliteration production and in detection tasks.

The Syllable as the Most Accessible Unit to Kindergarteners

Other studies have demonstrated that the emergence of metasyllabic ability is considered to occur prior to metaphonemic ability (Liberman, 1973; Liberman et at, 1974; Fox & Routh, 1975). This approach implies that children learn to segment words into syllables first. Sawyer (1991) suggests that metasyllabic ability might be the "first indication that children are able to shift attention from units of meaning to units of sound" (p.101). Only after acquiring this ability would they be able to segment words into phonemes. Liberman (1973) and Liberman et al. (1974) showed that syllable tasks were easier than phoneme tasks in three age levels (preschool, kindergarten and first grade), and that performance in both tasks improved with age (Table 1).

Table 1 Performance success in phoneme or syllable counting task according to age in Liberman 1973 and Liberman et al. 1974 (measured in %):

	phoneme counting task	*syllable counting task*
preschool	almost zero	46%
kindergarten	17%	48%
first grade	70%	90%

In line with Liberman's suggestion, Fox & Routh (1975) provided support for the finding that phoneme segmentation ability is more difficult and therefore, emerges later than syllable segmentation ability.

The Onset/Rime as an Intermediate Level Between Syllabic and Phonemic Levels

Onset is defined as the initial consonant (e.g., park) or initial cluster in a syllable (e.g., play). The rime is the remaining part of the syllable (e.g., park, play). Treiman & Zukowski (1991) have argued for the existence of a subsyllabic unit (onset and rime) in the acquisition of MPA. They proposed that the syllable is the first and primary unit of analysis and that young children would first be expected to segment speech into syllables and then into subsyllabic units, and ultimately into phonemes (Treiman, 1985; Treiman & Danis, 1988; Bowey & Francis, 1991). In line with this idea, Goswami & Bryant (1990) suggested that the meta ability for onset and rime developmentally precedes the manipulation of individual phonemes.

[1]Defined as the 'stressed vowel and the remainder of the word'. In words like: handle and candle, *andle* is the rhyme. "Since rhyme involves the stressed vowel and the remainder of the word, it can extend across the syllable boundary in words made up of more than one syllable" (Gipstein, 1992).

It is possible to sum up the previous approaches into two main different accounts of the developmental units of MPA. The first approach argues that rhyme *awareness* emerges prior to syllable *awareness* (Gipstein,1992). According to Gipstein, rhyme *awareness* (mountain-fountain) would be the easiest for preschool children, followed by syllable *awareness*, and lastly by onset-rime *awareness* (pencil-tender). The second approach argues that syllable *awareness* develops earliest, followed by onset-rime, and then the phoneme (Treiman & Zukowski, 1991). According to this approach, the onset and rime, without taking into consideration the syllable level, are the first intrasyllabic units of organization acquired metaphonologically. In other words, onset and rime would be more metaphonologically accessible to the child than the phoneme. As noted by Gipstein, both explanations of the development of MPA agree in that the phonemic is the final linguistic level to be acquired, i.e., metaphonological tasks at the phonemic level are the last ones to be mastered by the child (Liberman et al., 1974; Bryant & Bradley, 1985; Sawyer, 1991). This illustrates that there is only partial consensus in the literature as to which units are easiest to access metaphonologically. The developmental status of the other units of metaphonological acquisition (rhymes, onset-rimes, and syllables), however, are still in debate. As suggested by Gipstein, the above disagreement may be due to varying task demands across studies and may be also related to questions about the psychological reality of the syllable as a discrete unit.

Cole & Mengler (1994) suggested there are three levels of MPA that reflect a developmental progression of complexity (each level involves increasing complexity in cognitive and linguistic processes): meta ability for onset-rime > simple phonemic ability[2] > compound phonemic ability[3]. The difficulty of each level, they argue, varies in terms of three factors: 1) the refinement of the sound in focus (whether it is a composite unit of phonemes or individual phonemes), 2) the number of manipulations of sound, and c) memory load. According to this argument, simple phonemic tasks, such as phoneme segmentation, require only one cognitive operation. Compound phonemic tasks such as phoneme deletion (see Figure 1 for examples) are more complex (Yopp, 1988). Furthermore, Yavas & Haase (1988) argue for a linguistic-based account for the variability in metalinguistic performance. In other words, the development of MPA seems to depend on a previously internalized organization and on the linguistic level of the unit being assessed. There is still a need for some clarification as to what level of that internalized organization one is refering to as well as the linguistic level one is paying attention to when assessing MPA so that we may be able to bridge a possible gap between MPA and phonological development per se.

The discussion that follows will first present the most used tasks in the literature to assess MPA. It will be followed by a brief exposition of the problems related to metaphonological ability assessment, setting the stage for the current study.

Metaphonological Ability Assessment in the Literature

There has been discussion in the literature about methodological flaws and

[2] Ability that requires just one metaphonological operation. See details on the section Tasks Used to Assess Metaphonological Ability

[3] Ability that requires holding a given sound in memory while performing a second operation (Yopp, 1988). Compound phonemic tasks have been considered to be the best predictors of reading achievement (Cole & Mengler, 1994), specially phoneme segmentation (Lenchner et al., 1990).

their implications to the MPA research field. Nesdale et al. (1984), for example, have argued that *what* the child is required to do in an experimental situation (task) and *how* the construct is assessed (procedures) are important distinctions any study on MPA should differentiate. Any study on MPA should use both controlled experiment procedures - since they provide most valid estimates - and tasks with minimized linguistic and cognitive demands.

On this view, what should be the characteristics of a controlled experiment procedure to test MPA specifically? What kind of MPA better meets the criterium of minimized linguistic and cognitive demands for the child? Nesdale et al. (1984) have pointed out that one of the main problems developmental authors in the MPA field have is delimiting a developmental route to MPA. The underlying reason for such a controversy is the fact that studies on MPA differ in their methodological approach. According to these authors, either the tests or the procedures used to assess MPA vary considerably in terms of cognitive requirements as well as different kinds of samples and measurement (Nesdale et al., 1984; Nesdale & Tunmer,1984; Yopp, 1988; McBride-Chang, 1995). Moreover, both the amount and the degree of difficulty of tasks administered to children across some studies have lacked control (Smith & Tager-Flusberg, 1982). As a consequence, wrong interpretations can not be avoided. In other words, the great variety of tasks used in the literature to assess MPA makes the comparison and interpretation of research findings difficult. Larivee (1994) has suggested that "the choice of a particular phonological awareness task may affect the outcome of an investigation" (p. 76). Thus, different tasks may lead to different outcomes which in turn may lead to different views of how MPA develops as well as how it manifests itself. In addition, it raises doubt about whether these different tasks are indeed measuring the same basic construct (Yopp, 1988).

According to Kazdin (1992), there are two indispensable requirements that have to be met by the dependent measure in any experimental study: validity and reliability. Kazdin emphasizes that validity and reliability have diverse definitions due to their broad concepts. Thus, "in a given situation, a specific type of reliability and validity may not be relevant" (p. 225). The following discussion will be a quick review on these two topics. Characteristics of the dependent measure that are relevant exclusively to the MPA construct will be considered[4].

Validity

In a broader sense, validity answers the question 'to what extent will the interpretations of the test scores be appropriate, meaningful, and useful?' (Gronlund, 1993, p. 160). For the present study, the following two types of validity are of interest:

Construct Validity

The term *construct validity* is often used to refer to the extent to which a specific measure assesses a domain or characteristic of interest (Cronbach & Meehl, 1955). That is, the construct

[4] Due to being beyond the scope of the present study, it will not be possible to discuss validity and reliability in much detail. For further reference and more detailed account see Kazdin (1992) and Gronlund (1993).

underlying the measure should provide the interpretation of that measure (Kazdin, 1992). There is much debate as to which types of validity apply to which types of research (Pedhazur & Schmelkin, 1991). On this view, a test that intends to assess an ability that is metaphonological in nature should provide enough information as to ensure that the MPA construct is really being assessed. McBride-Chang (1995) has shown that there are at least three essential components shared by virtually all MPA assessment tasks: speech perception, short-term memory and general cognitive ability:

1) Speech perception: the stimulus must be correctly perceived and the segment must be discriminated adequately. Evidence for the association of speech perception with different phonological processing skills in elementary school children has been reported elsewhere (Tallal, 1980) and according to McBride-Chang (1995) "a large part of phonological awareness is simple speech perception. Speech manipulation clearly affects the difficulty of phonological awareness tasks" (p. 189);

2) Short-term memory: the child has to remember the stimulus for a short period of time (in the case of a MPA testing situation, usually one to three seconds in average) in order to operate on that stimulus;

3) General cognitive ability: the child must reason well enough in order to be able to think about the stimulus and operate on it.

Therefore, these three components should be addressed by the MPA instrument to be developed.

Yopp (1988) has suggested that one way of approaching the problem of validity and reliability of most MPA tasks is to give the same group of children several MPA tasks and compare their performance. Yopp argues that many authors (Nesdale, Herriman & Tunmer,1984; Backman, 1983, among others) have shown there is evidence that performance on one task is significantly correlated with performance on another.

Content Validity

"Content validation is a matter of determining whether the sample is representative of the larger domain of content it is supposed to represent" (Gronlund, 1993, p. 162); it has to do with "the appropriateness of the sample and not simply with the appearance of a test" (Hatch & Farhady, 1982, p. 251).

Gronlund suggests three steps which can ensure the building up of a test that measures valid results. The researcher has to (1) identify the learning outcomes to be measured by defining the content of what he wants to measure (2) prepare a test plan which specifies the items to be used, and (3) has to build up a test that closely fits the set of test specifications. Specifically, to meet content validity requirements, the test must measure a representative sample of whatever the researcher wishes to investigate. Content validity, in this sense, is related to how well the test represents the subject matter or the behavior to be tested (Hatch & Farhady, 1982). These authors suggest there are some specific factors that influence the content validity of test results: a) whether the directions on the testing session are clear enough so that the participant does not misunderstand how to do the task; b) whether the language used in the interaction or directions is too difficult for the participant in terms of vocabulary and syntax, c) whether the test is too difficult or too easy for the level of the construct being assessed by the test, d) whether the items chosen to be tested are poorly constructed, e) whether there is ambiguity in the questions or items, f) whether the test is too short or too long for the construct being assessed, g) whether the items are arranged in such a way that difficult ones come first causing the participant to loose interest, h) whether the answers are patterned in a way that the participant gets items right just by guessing the answers.

There are further concerns that should be taken into consideration when studying MPA in children. In relation to the procedures, the time spent in administering the test should be carefully decided due to children's usual short attention span. Moreover, importance should be given to administering the test on an individual basis. In relation to the scoring system, it is equally important to have an easily scored test and scores which are easy to interpret. Thus, a thrustworthy interpretation of any test result is based on three main assumptions: 1) that the test was constructed in such a way as to avoid the threats to validity mentioned ealier, b) it should be sensibly administered and, 3) it should be well scored as to avoid dubious interpretation of test scores.

Reliability

Reliability can be defined as "the extent to which a test produces consistent results when administered under similar conditions" (Hatch & Farhady, 1982, p. 244). Reliablity can be viewed as the relation of two measures when they are maximally similar, e.g., "alternative forms of the same

measure, or the identical measure administered at different points in time" (Kazdin, 1992, p. 224). These authors point out that no matter what kind of test the researcher uses to assess a certain variable, the test must be reliable. If the measure is unreliable, "a greater portion of the subject's score is due to unsystematic and random variation" (Kazdin 1992, p. 56).

Since there are different types of reliability, the reader is advised to see Kazdin (1992) for further reference. The specific type of reliability revelant to this present study is the internal consistency reliability, discussed below.

Internal Consistency Reliability

Internal consistency reliability requires only one test administration, providing a unique estimate of reliability for that single test administration. There are two types of internal consistency reliability that can be calculated (Carmines & Zeller, 1979, p. 41):

a) Split-half coefficient - is calculated by taking the total set of test items and dividing it into halves. The scores are then correlated to obtain an estimate of reliability. For example, test scores can be divided by placing even-numbered items in one group and odd-numbered items in the other group and then calculating the correlation between the two groups. This correlation is the reliability for each half of the test. To obtain reliability for the total test, Spearman-Brown made a statistical correction so that it is possible to calculate the reliability for the whole test. A limitation to the split-half method is that the reliability coefficients that are obtained are based on different ways that the items can be grouped together into halves. Therefore, each time the coefficient is calculated a different reliability estimate is obtained.

b) Kuder-Richardson 20 Formula - is used to estimate reliability of dichotomous scored items. It is "an estimate of the expected correlation between one test and a hypothetical form containing the same number of items" (Carmines & Zeller, 1979, p. 48). The coefficient alpha (commonly known as Cronbach's alpha) is a generalization of the Kuder-Richardson formula and both are interpreted the same way.

According to Yopp (1988), there have been studies in which no reliability data were given and test lenght was too short (e.g., subtests containing only four testing items). Therefore, the reliability of such tests is in serious doubt.

Addressing each threat to validity and reliability perfectly well is not possible in a study. However, some essential features of the experimental manipulation that addresses MPA should be held constant. Extraneous factors such as: how the instrument is implemented, administering instructions, materials used and interaction of the experimenter with the child should not vary across different participants.

One final observation is that most experimental studies contain two essential components: conceptualization of the research question and methodological adequacy. Some studies include a third element: statistical inference. According to Kazdin (1992), the value of any study is assessed more as a function of its conceptualization and methodological adequacy, rather than whether statistical differences are observed. In other words, the "conceptualization and design of an investigation bear no necessary relation to the outcome of an experiment" (p. 369). That is, any investigation should be conducted on the basis of the best and more adequate available design as well as proceed with the greatest methodological care. The only concern about the results is that they should be interpretable.

In the next chapter, all these important considerations about validity and reliability will be rediscussed, since they play a fundamental part in the construction of the MPA subtests for the present study.

Tasks Used in the Literature to Assess Metaphonological Ability

There has been a great number of studies in the last three decades which has used a variety of different tasks to operationalize the concept of MPA. A carefull review of MPA studies shows there is a definite set of MPA tasks that are commonly used in the literature. Studies may differ in how many tasks are used in a single study or the way each author names each task particularly. The following are the basic tasks one finds across studies on MPA (see Figure 1 for detailed examples): sound comparison (recognition or production of rhyme, word-to-word matching, same sound), oddity, detection (sound-to-word matching), sound/word elicitation task, segmentation (tapping, counting, syllable segmentation, onset/rime segmentation, isolation of a sound, word segmentation, syllable deletion, phoneme deletion, phoneme addition, phoneme reversal, phoneme substitutuion, pig latin, invented spelling) and blending (syllable blending, onset/rime blending, phoneme blending).

>From phoneme deletion - considered to be one of the most difficult tasks (Golinkoff, 1978; Lenchner, Gerber & Donald, 1990) - to the detection of rhyme and alliteration - considered to be the easiest MPA task (Yopp, 1988) - some researchers have compared MPA tasks and have found that performance in one MPA tends to correlate significantly with performance on another. However, few comparisons have been conducted in order to examine both the relative difficulty of MPA tasks and the

order of emergence of specific MPA abilities (Yopp, 1988). On this view, Cole & Mengler (1994) have proposed there are two basic types of MPA tasks used in the literature:

a) Simple phonemic tasks - which require only one operation on the phonemic units followed by a response. The phoneme segmentation task, for example, requires the reception of a specific word and the isolation of all sounds in sequence of that particular word. For example, the experimenter asks the child to say the sounds of cat: c-a-t (other examples are phoneme blending and phoneme counting).

b) Compound phonemic tasks - which require two operations: the operation of holding a given phonemic unit in memory while performing another operation that requires manipulation and a greater load on sequence. The phoneme deletion task, for example, requires the elision of a specified phoneme, and the identification of the resulting word (see Figure 1 for examples).

Tasks may differ in other ways: a) according to the size of the starting units (e.g., multisyllabic versus monosyllabic words, Lundberg, 1978); b) the context in which the unit is embedded and manipulated - for example, whether the onset of the word is one consonant or whether it is a consonant cluster; b) the position the unit being manipulated occupies in the word - the unit can be in initial, medial or final position (Walley, Smith & Jusczyk, 1986 showed that attention to the sounds at the beginning of words emerges prior to attention to sounds at the end of words); c) the amount of cognitive operations asked of from the child - for example, one or two operations; d) the type of operation - deletion, reversal, segmentation, to name a few. McBride-Chang (1995) has suggested that there has been little standardization within individual tasks and "no attention has been given to experimental control within individual phonological awareness" tasks (see also Stahl & Murray, 1994).

Lundberg (1978) proposes a hierarchy among three types of MPA tasks. According to him, a rhyming task should be the easiest since it does not require a very analytic attitude from the child; in initial and final phoneme segmentation tasks, such analytic thinking would be needed. However, only in a phoneme deletion task would the cognitive load be greater on the child. Therefore, from easiest to more difficult, the hierarchy of tasks difficulty proposed by Lundberg would be the following: rhyming > initial/final phoneme segmentation > phoneme deletion.

McBride-Chang proposes that different task demands, in fact, represent different influential effects which may play an important role in the building of a MPA task. For example, the number of operations a child has to perform in a task as well as the position of the segment being tested seem to correlate with levels of cognitive difficulty. A task may be more or less difficult depending on how many phonemes the child has to segment (e.g., in Wagner et al., 1993, the child had to segment from two up to five phonemes). Accordingly, a metaphonological task may differ depending on whether the stimulus contains only one type of manner of articulation - e.g., only stops in initial position - rather than containing some words with stops while others with fricatives in initial position (Stanovich, Cunningham & Cramer, 1984). All of these seem to affect difficulty level in MPA tasks (Stahl & Murray, 1994). As Treiman & Zukowski (1991) puts it, "just as children's performance depends on the cognitive demands of the task, so it depends on the linguistic level that the task taps"(p.67). Tasks which present different memory, cognitive and linguistic demands cannot be all equally adequate measures of the same ability (Lenchner et al., 1990).

Finally, MPA tasks may differ in the nature of the participation being called for from the child. There are assessments which require verbal production from the child

(Bruce, 1964; Fox & Routh, 1975; Marsh & Mineo, 1977; Treiman & Baron, 1981; Bryant et al., 1989; Wagner et al., 1993), and there are assessments that require, for example, only pointing at a figure or tapping the right answer, thus not requiring any verbal response from the child (Liberman, 1973; Liberman et al., 1974; Treiman & Zukowski, 1991).

Although at four-years-old it is said that children have acquired quite a lot of their phonological system (Ingram, 1976) some kindergarteners may still present difficulty with few sounds (Kent, 1994). Consequently, it might be the case that assessing MPA in kindergarteners through a task that requires some kind of verbal production from the child may be at some degree influenced or biased by the somewhat limited speech production of some children. Suppose a child is metalinguistically able to judge a phonemic difference between *thin* and *tin.* If this child is asked to perform a metaphonological action and substitute one segment for the other, it may happen that the answer might come out biased. In case the child has difficulty in pronouncing theta correctly, he might as well avoid to sound out the correct answer to avoid an incorrect pronounciation. Therefore, there seems to exist a difference between the ability of tapping the number of segments in a word without having to sound out the answer, for example, and the ability to make segmentations and deletions in spoken words. It may be the case that the types of outcomes assessed in these two tasks are actually of different nature. Levelt et al. (1978) argue that "the development of the child's capacity to explain verbally shouldn't be confused with his growing capacity to reflect on language: methodological care is required to keep these issues apart" (p.11). This also leads to another question: what is the relationship between receptive MPA (assessed by tasks where the child is only required to point to a picture, for example) and productive MPA (assessed by tasks that require verbal response)? Since it is debatable whether there is a relationship between MPA and speech-sound production ability (Larivee, 1994), a metaphonological task that avoids the verbal ability variable should be less biased and more appropriate for the construct.

To sum up, since it has been shown that differences in assessment techniques presume increasing levels of cognitive demands (Yopp, 1988), it is important to have a very clear idea of the type of task one is going to use, the difficulties the chosen task will present to the child, and to what extent the task in question assesses the MPA level the researcher is interested in. The following paragraph by Oller, Cobo-Lewis & Eilers (in press) addresses and summarizes very well the metaphonological assessment issue:

> "One of the difficulties in differentiating empirically among possible causal connections between phonological awareness and reading is that the capability for phonological awareness appears to be removed in varying degrees from tasks that are used to assess it. For example, the awareness of phonemic units (which are, by definition, abstractions) is often tested in segmentation tasks that require pronounciation of isolated chunks of sounds that presumably correspond in some important way to abstract phonemic units, but which are clearly *not* those units. Moreover, the required pronounciations of isolated units are artificial, especially in the case of consonants, because they are not naturally produced in isolation. In the case of stop consonants (a type common to all world's language), isolated pronounciation requires the addition of at least one short vowel-like element (whether voiced or voiceless), an obvious intruder that complicates the correspondence between the presumed awareness of the phoneme and the action that is presumed to illustrate that awareness. It seems distinctly possible that a person might have substantial awareness of phonemic units *without* the ability to perform well in a segmentation task that requires generating artificial pronounciations". (Oller, Cobo-Lewis & Eilers, in press, p. 4)

Figure 1 - Types of MPA tasks used in the literature adapted from Yopp (1988) and Catts & Scott (1994)

Task	Example
Sound Comparison	
Recognition or production of rhyme	- Do *cat* and *hat* rhyme? Which of the following words rhymes with *cat; bat* or *house*?
Word-to-word matching	
Same sound	- Do *dog* and *door* start the same? Which word begins the same as *cat; cake* or *boat*? - Which of the following words start the same: *big, ball* or *coat*? (or child may be asked to choose from groups of pictures, words that start with a target sound).
Oddity	- Child is presented with three or more words and is asked to choose the word that does not rhyme, begin, end or share the same sound with the other words.
Detection	- Is there a /s/ in *soap*? (or child may be asked if a target sound is at the beginning or ending of a word).
Sound-to-word matching	- Child may be asked to judge whether or not words contain errors or mispronounciations.
Sound/Word Elicitation	- Suject is asked to say a word that rhymes with a target word. - Child is asked to produce a "short word" and a "long word". - Child is asked to produce a word that starts with the target sound or the same sound as a target word.
Segmentation	
Tapping	- Child is asked to tap a dowel rod or clap hands for each syllable in a word (or for each phoneme in a word).
Counting	-How many sounds do you hear in the word *cake*?
Syllable segmentation	- Child is asked to say each of the syllables in a word.
Onset /rime segmentation	- Child is asked to say a word a funnny way by separating the onset and the rime.
Isolation of a sound	- What is the first sound in *rose*?
Word segmentation	- Child is asked to say a little bit of a word.
Syllable deletion	- Say the word *cowboy* without *cow*, or say *picnic* without *nic*.
Phoneme deletion	- Say the word *seat* without /s/. What sound do you take away from *sit* to get *it*?
Phoneme addition	
Phoneme reversal	- Child is asked to pronounce a syllable after adding a target phoneme.
Phoneme substitutuion	- Say *os* with the first sound last and the last sound first.
Pig latin	- Say the word *gate*. Now say it with a /l/ sound instead of the /g/ sound at the beginning.
Invented spelling	- Child is asked to say a word after moving the initial sound to the end of a word and adding *ay*. - Child is asked to spell, as best he/she can, a spoken word.

Blending	
Syllable blending	- Child is presented with several syllables produced separately and asked to blend them together to produce a word.
Onset / rime blending	- Child is presented with an onset and rime produced separately and asked to blend them together to produce a word.
Phoneme blending	- Child is presented with a series of phonemes produced separately and asked to blend them together to produce a word.

Metaphonological Ability and Bilingualism

The interest in discovering the effects of bilingualism on children's metalinguistic ability has been widely reported in the literature. However, the effects of bilingualism on children's MPA have rarely been addressed (Buianowski, 1992).

Current consensus is that balanced bilingual children (who have a "similar but not necessarily equal degree of competence in both languages"; Cummins 1977, p.4) or additive bilingual children (who add a second language to their repertoire without suffering L1 loss; Lambert, 1975) tend to perform better in metalinguistic tasks than monolingual children (Ianco-Worrall, 1972; Ben-Zeev, 1977; Cummins, 1977; Galambos & Hakuta, 1988; among others). Hakuta & Diaz (1985) have suggested that the ratio of proficiency in second language relative to first language determines the metalinguistic benefits from acquiring a second language. That is, the more proficient in L2, the more the child benefits metalinguistically. Cummins (1977), for example, proposed the *threshold hypothesis* in which the child has to achieve a certain degree of proficiency in the second language in order to be able to receive the benefits from bilingualism.

The literature reports that bilingual children seem to develop a more analytic orientation to linguistic structures as a strategy to separate the two languages into two independent functional systems (Ben-Zeev, 1977). If this is true, then bilingual children may develop higher levels of metacognitive functioning. Therefore, since cognitive control is a prerequisite for the metalinguistic operations to be processed, being bilingual may be advantageous in terms of developing a superior metalinguistic functioning. In line with it, other researchers compared bilingualism versus intelligence, selecting participants that fit in the pattern of balanced bilinguals. The results suggested that, in the majority of cases, bilinguals had better results when compared to monolinguals in terms of cognitive flexibility.

Bialystok (1985, 1986, 1988) demonstrated that metalinguistic tasks place high demands on both the skill to analyze linguistic knowledge and the skill to control linguistic processing[5]. She also showed that the tasks which assess metalinguistic ability vary on the relative demands placed on each ability. Bilingual children tend to outperform monolingual children on metalinguistic tasks that require high levels of cognitive control. Bialystok (1988) suggests that the higher the child's competency in a second language the better the child's access to the explicit knowledge of language structure. She further suggests that there is one ability that is more critical to the development of metalinguistic ability, the knowledge that different language systems exist. This ability would facilitate a more conscious reflection on the acquired linguistic knowledge and it could be the most critical ability to the development of

[5] Bialystok defines metalinguistic awareness as "a reflection of the growth of two skill components involved in language processing: the analysis of linguistic knowledge into structured categories and the control of attentional procedures to select and process specific linguistic information" (Bialystok, 1986, p.498)

metalinguistic ability. In fact, she was able to show that even children with low L2 proficiency were able to benefit from their low proficiency by outperforming monolinguals in tasks that accessed word-referent distinctions. However, in tasks that required more explicit linguistic analysis, (e.g, correcting grammatical errors in sentences) these bilinguals performed at the same level as the monolinguals. Only bilinguals with high L2 proficiency outperformed the monolinguals in this task. This suggestion finds support in the study conducted by Yelland et. al. (1993) where low proficient bilinguals demonstrated a heightened appreciation of the separation of word and referent attributes when compared to matched monolingual controls. According to Yelland e al., children who have had very limited contact with a second language are able to show increased metalexical ability.

Upon comparing these three views: a) Cummins' threshold hypothesis - that the bilingual child can only benefit metalinguistically after having achieved a certain bilingual proficiency, b) Bialystok's proposal - that metalinguistic skills do not depend on an equivalence of competence in the two languages, and c) the results of Yelland et al. - where children with limited contact with an L2 may show increased metalexical ability - one asks some important questions: in what specific metalinguistic abilities do low proficient bilingual children benefit from? Do additive or balanced bilingual children benefit on the same abilities as the low proficient bilinguals? Is the low proficient bilingual more prone to have higher metalinguistic ability only at the pragmatic or lexical level? Or is the additive or balanced bilingual the only bilingual who will have higher metalinguistic ability at the phonological level?

It might be the case that metalinguistic ability as a general construct may be related to bilingualism in a more intricate way. Or maybe different levels of metalinguistic ability - metapragmatic, metasemantic, metasyntatic, metalexical and metaphonological - may be independently related to different types or levels of bilingualism (low proficiency x high proficiency; subtractive[6] x additive; sequential x simultaneous[7]). For example, let us take the suggestion of Bowey & Tunmer (1984) which states that the word is the first unit to be metalinguistically acquired and that MPA emerges from the development of metalexical ability. Yelland et al. (1993) demonstrated that for a child to benefit from bilingualism in terms of metalexical ability, he does not depend on a critical threshold proficiency level in the L2. According to this logic, it would follow that low proficient bilingual children may be more metalinguistically able than monolingual only at the metalexical level, whereas high proficiency bilinguals may be more metalinguistically able than monolinguals at the metalexical level but also at the metaphonological level. Obviously this is an empirical question that only highly controlled experiments may touch upon in the future and try to answer it.

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[6] "When second-language learning is part of a process of language shift away from the first or the 'home' language" Appel & Muysken (1987, p.102)

[7] The child who is exposed to two languages since birth is said to be acquiring an L2 simultaneously. In case the child starts acquiring an L2 later, say, after three years of age, it is said to be acquiring the L2 sequentially (McLaughlin, 1978).

CHAPTER III
METHOD
Participants

The participants included four different groups of children: American monolinguals, bilinguals tested in English, bilinguals tested in Portuguese and Brazilian monolinguals[8]. The data collection for the first three groups was conducted in the United States and for the fourth group in Brazil.

Participants' Selection

The participants were selected according to the following criteria:

Physical development

Children that had had frequent and not treated otitis media in infancy or any apparent handicap in the speech apparatus were disregarded;

Age

Children on the five-year-old range were prefered. At five-years of age, children usually attend kindergarten and it is easier to track them down through the school system. Efforts were made to find younger bilingual participants at four years of age for pilot testing, however due to the extreme difficulty in finding them, it was impossible to have an expressive number of four-year-olds in the study. Although five-year-olds were prefered, the five-year-old interval was not blocked statistically since it would impose serious restrictions on the finding of suitable bilingual children in Portuguese and English for this study. Thus from the total children who participated in the data collection (N= 73), 17 children were on the four-year-old range, 43 on the five-year-old range and 13 on the 6-year-old range.

Sex

[8] Brazilian Portuguese was chosen because the author's L1 is Brazilian Portuguese. American English was used because part of the data collection for the present study was conducted in the United States.

Although the variable sex was not computed in the correlation analysis of the data, there was an attempt to have an approximately equal sex distribution among groups. It has been suggested that there may be some differences between boys and girls not only in terms of language development but also in terms of how willing to participate the child can be in a testing situation (Shriberg, personal communication[9]). Therefore, an effort was made to keep the groups balanced for equal number of boys and girls so that there would be no bias in the results due to sex effect (see Part Two of the Results Chapter for the number of boys and girls in each group tested).

Socioeconomic status

All participants were children of working class parents[10].

Amount of Literacy Eposure

Consistent exposure to literacy instruction was avoided since it has been shown that reading instruction might have a considerable impact on metaphonological skills (Read, Zhang & Ding, 1986; Morais, 1991). Although it can be argued that kindergarten children may have already had some contact with the process of learning to read and write, the intention in choosing the five year-old age range was to avoid selecting the child that had significant exposure to reading instruction. By working with kindergarten children the confounding effects of consistent reading instruction exposure were minimized.

How Much Children are Exposed to Nursery Rhymes at Home

According to Maclean, Bryant & Bradley (1987) there is a strong correlation between the amount of exposure 3-year-olds have with nursery rhymes and their improvement in the metalinguistic ability for sounds (and hence greater success in learning to read). Since children's books usually contain a considerable amount of rhymes, it was hypothesized that this information might be useful to give a broad idea of the child's contact with nursery rhymes and well as print concepts. Therefore, Questionnaire A was given to all parents (monolingual and bilingual groups) and addressed the frequency of children's stories read to the child per week (see Appendix D).

Specific Requirements for the Monolingual Children

The child should not have been consistently exposed to a second language and could not have parents and/or any person living in the same house who spoke another language.

Specific Requirements for the Bilingual Children

The child should speak Brazilian Portuguese and American English (a detailed account of each child's bilingual experience was provided through Questionnaire B given to the parents - Appendix D).

The Bilingual Child's Own Nativeness in the Language he was Tested

Any bilingual child has a particular linguistic history and seems to represent a unique linguistic case (Nicolaidis, 1992). In a sense, accounting for the outcomes in any bilingual children's sample means accounting for individual differences in each child of that sample. Furthermore, controling for probable different levels of

[9] With his large experience with child language assessement, Larry Shriberg has observed that girls tend to be more cooperative and try to please more the researcher in a test taking situation than boys. This characteristic tends to make girls better participants/test takers than boys.

[10] See Appendix A for the reasons underlying this choice.

bilingualism is a hard task (Snow, 1987). A standard measure of bilingual proficiency was not administered because the validity of those measures is debatable. Thus, in order to assess each bilingual child's nativeness in the language he was tested (Portuguese or English), a long questionnaire (Questionnaire B - Appendix D) was sent out to the parents[11].

Bilingual participants

A survey was conducted in order to contact Brazilian families in the United States who had bilingual children in the five year-old age range. The following sources were consulted: Brazilian Consulate in Chicago, Brazilian Consulate in Boston and the Brazilian Student Associations at: The University of Wisconsin - Madison, Cornell University, Ohio State University - Columbus, Ohio University - Newark, Northwestern University and University of Minnesota - Minneapolis. Personal phone calls were also made to some Wisconsin, Minnesota, Illinois and Massachusets locations. The Brazilian Consulate in Boston gave notice of a bilingual program for Portuguese and English effective in selected public schools throughout the Boston area. Three preschools were contacted but only one agreed to participate in the study.

The James Otis Public School, located in a poor neighborhood in Boston, serves a predominantly working class, Latin-American immigrant population. The school has two bilingual kindergarten classes: kindergarten 1 and kindergarten 2, both taught by the same Portuguese teacher. Since the school requested that all bilingual children's parents should be consulted, 40 consent forms were sent out to all students, avoiding any bias on referred children. Thirty eight consent forms were returned. With the exception of one girl who had been diagnosed with speech problems, all children who had their permission slips returned were tested. Four children were tested in their own houses in Boston and thirty three were tested in the school environment. All children spoke Brazilian Portuguese as first language. Twenty nine out of the thirty seven children who participated in the study had been born in the United States. From the eight children who were not born in the United States: two arrived in the United States right after birth, three at two years of age, three at three years of age and one child at four years of age.

Although most of these children were actually born in the United States, it is difficult to classify their bilingual experience as a simultaneous one. When asked about the age their children started to be consistently exposed to English (Questionnaire B), their parents answered, in average, that consistent exposure started after 3 years of age. However, it is important to note that these bilingual children have individual and different linguistic experiences regarding their contact to English and Portuguese. Although Portuguese is the predominant language spoken at home, their contact with English most probably started earlier through contact with television, playgrounds and other social activities. A detailed account of each child's bilingual profile was provided by Questionnaire B, answered by most parents.

Ideally, data should have been collected from children who had exact similar bilingual histories. In this way, it might have been possible to determine if lenght of exposure to English and Portuguese was a primary factor in the performance of MPA subtests. However, due to tremendous difficulties to select bilinguals for this study, it was not possible to block on that variable. Rather, it was felt that it was far more important to find a bilingual sample that would be more representative of the bilingual Brazilian-American population living in the United States.

[11] I am indebted to Catherine Snow for this suggestion.

There was a higher proportion of bilingual children who were withdrawn from the study (total of 13) when compared to the other two groups (American monolinguals had two withdrawals and Brazilian monolinguals had three). These 13 bilingual kids presented one of the following characteristics: did not want to participate, did not understand the game, did not want to engage in the game as the game was originally planned (wanted to play in a different way), had difficulties paying close attention to the game or could not participate until the end because the parent interrupted the session.

There might be some sociolinguistic reason for such a discrepancy among the three groups that might have influenced negatively the bilingual group. For example, the fact that these bilinguals were from a bigger city and children of immigrant families, may have influenced some of these bilingual kids so as to make some of them less testable than average. It is important to note that this high proportion of bilingual withdrawal may reveal an important characteristic of this bilingual group. Explanations for this fact, however, are beyond the scope of the present study.

The data collection was conducted in April of 1996.

American Monolingual Participants

In the effort to find participants that matched the Boston bilingual group, six preschools were contacted in the Madison, WI area. Only Gompers Elementary Public School had a preschool program for children of working class families and was thus selected. The two kindergarten groups available belonged to a state program for integration of children coming from troubled homes. A total of 25 consent forms was sent out by the teacher and 20 were returned.

It should be noted that because the James Otis School and Gompers Elementary are located in two different cities, as well as regions in the US, some sociocultural differences between these two groups of children are inevitable.

The data collection was conducted in May and June of 1996.

Brazilian Monolingual Participants

In order to contact matching Brazilian monolingual children for the Boston bilingual group, three schools were contacted in the Porto Alegre, RS area. Due to burocratic requirements imposed by the local Porto Alegre public schools system and time constraints, it was not possible to work with a Brazilian public school. Therefore, a semi private school was chosen. Escola Jerusalém is located in the outskirts of Grande Porto Alegre and serves a predominant working class. It is a cooperative society school funded by the local city hall. The data collection was conducted in October and November of 1996 .

Experimental Design

In methodological terms, in order to address the questions, do five-year-old monolingual children show a metaphonological ability to judge acceptability; and do bilingual five-year-olds have a more developed metaphonological ability than monolingual children, the games which the children participated in were constructed in such a way that phonemes as well as distinctive features were tested (see Metaphonological Ability Measure for the rationale used in the construction of each subtest). This procedure was presented to the monolingual as well as bilingual child in the form of 4 subtests, each containing 20 items, totaling 80 possible scores. The idea of having 20 items per subtest was based on the need to have enough spread of scores in order to deal with the common guessing rate among children and to be able to meet statistical assumptions. The score was the number of items successfully

answered (maximum score = 20).[12]

The subtests designed for this study were based on Finnegan's (1976) paradigm and were designed to assess the child's ability to judge phonetic and phonological similarities and differences in the form of acceptability judgement subtests. The modifications as well as the implementation of toys and pictures were pilot tested (see Appendix A for a complete description of the series of pilot tests conducted). All subtests required the child to engage in a puppet game where the puppets' voices had been prerecorded on tape (see Appendices B and C for the entire puppet games' tape scripts). The child listened to a short introductory dialogue in the beginning of each subtest followed by a sequence of 20 questions made by one of the puppets. The child had to listen to the puppet's question, judge it and act upon it by answering the question. No verbal response was required from the child. The only requirement made of the child was to play the game with the puppets. Each game or subtest had twenty trials of which ten words assigned with the modified pronunciation (with the respective phonemic and distinctive feature changes) and ten words with the correct pronunciation (foils), in a quasi-random order within each subtest. The order for the items in each subtest was determined in such a way as to avoid giving the child clues to the right answer (e.g., sequences of answers such as: correct, incorrect, correct, incorrect, correct, incorrect were avoided. See Puppet game for more details on the game).

Procedure

Modifications on Finegan's Procedure

The development of the puppet game was based on the paradigm used by Finegan (1976). In his work, Finegan makes use of cardboard figures to test permissible/non permissible phoneme sequences in English.

Following Cowan & Hatasa's (1994) suggestion that longer tests increase the reliability of a study, the subtests presented to the child were built with twenty questions each. Due to the increased testing length, some modifications were necessary. First, the introductory part played by the puppets was shortened for the sake of not losing attention from the child. Secondly, the scoring system was also modified. Finegan used the 'pointing to a picture' technique with on site scoring. Since the four MPA subtests were presented through four games with 20 questions each, it would be very difficult to score the child on site. Four different sets of toys were thus manufactured in such a way that each object being manipulated by the child would correspond to one response or score. For example, in test P4/E4 twenty (2.5 cm/1 inch) wooden bunnies numbered from one to twenty were piled up and placed in a wooden stand through a little hole in each bunny. The child was given the stand containing the twenty bunnies before the game started. During the game, the child answered the questions by pulling out one of the numbered bunnies ordered according to the question numbers (these modifications also were pilot tested).

A binary type of response from the child was pursued in this experiment in order to avoid possible ambiguous interpretations of the child's answer. The option for a binary type of task is supported by the premise that this type of test tends to be simpler and more objective, leaving a short space for dubious interpretations when analyzing the data. One option could have been to elicit spontaneous responses from

[12] I am indebted to Larry Shriberg for most suggestions in this section.

the child when in contact with the puppets. However, this approach did not seem appropriate for this research because it might require a more analyzed and detailed answer from the child imposing on the researcher a bigger need for subjective analysis. Although the response from the child by all means encompasses a far more complex answer than just a binary answer imposed by the experiment, this reductionism was pursued due to its intrinsic practicality.

Thirdly, it was considered to be more interesting for the child to play a game with manipulation of objects instead of just pointing to a cardboard figure. The game should pose some challenge to the child and promote a relaxed interaction with the researcher since the role the researcher played was that of an indirect mediator between child, puppets and game.

In order to minimize sources of variation, the puppets' voices were recorded in tape (see The stimulus tape).

The Puppet Game

The puppet game proceeded as the following: a hand puppet that could not speak properly was introduced to the child. It committed mistakes such as: it said [mu] for moon (without the nasal consonant neither nasal spreading) instead of saying [mun] (normal pronunciation). Then a second hand puppet, who always spoke correctly was introduced to the child. Finally, a third hand puppet, the narrator puppet, interacted with the child asking the question "Guess who says ....?" with the item being tested uttered twice. When each puppet spoke out a word, a picture representing that word was simultaneously shown to the child. After having been exposed to eight practice items that were always introduced in the beginning of the game, the child felt comfortable enough to start playing the guessing game. In each practice item the child received feedback by being corrected. The same procedure was used in both languages.

The toys used as answering devices were manufactured by a professional carpenter and pilot tested with children who played with them. The objects included (all of them numbered from 1 to 20): lids, bean bags, milk caps, bunnies and chips. For each set of twenty objects, a special wooden stand was manufactured. In addition, 160 pictures relative to the words being tested were drawn or copied from story books. All the pictures displayed had comparable sizes and were presented in black and white in 20 x 30 cm / 5" x 8" inches paper. Colored pictures were avoided since they could be a source of distraction to the child.

The toys to be used would have to trigger the child's interest but should not entertain the child to such an extent that he would be distracted from the real task involved in the games, i.e., the auditory stimuli. Both speech perception and judgement tasks involve short-term memory. Therefore, the toys used should not distract the child allowing him to forget the answer of the test while playing with them. The toys should also be cognitively adequate for the child's age as well as to the preschool child's motor skills.

The Stimulus Tape

The tapes used in the puppet show for the puppets' voices were recorded at the University of Wisconsin Phonetics Laboratory with sound proof booth and professional microphone. Both the masters and copies were high bias metal tapes with high definition.

The Portuguese voices for the Portuguese speaking puppets were recorded by the researcher in standard Portuguese from Rio Grande do Sul and reviewed by three judges: Regina R. Lamprecht, Carmen L. M. Hernandorena and Mary Lou

Daniel. The English voices for the English speaking puppets were recorded by Jean Demerit in standard American English dialect from the Midwest and judged by Charles Read, Lawrence Shriberg and Raymond Kent. All the items used had 100% agreement across all judges. The English tape was also analyzed on a real-time spectograph by Raymond Kent. Those items which received any kind of criticism were recorded on a second occasion at the same laboratory and obeyed the same previous recording specifications and criteria.

The items analyzed by the judges were the following: adequate quality and volume of the recording, clarity of the recorded stimuli, consistency in performance of the puppet's voices and in the alophonic and phonemic changes in the stimuli, and adequate spacing between testing items in the recorded tape.

Each word was presented two times in order to reduce potential attention and short-term memory problems. By hearing the word twice the child had more probability not to miss the testing item than if presented to only one token. The spacing between questions was of four seconds in order to avoid as much as possible that children might sound out or silently repeat the item being tested. In case the child needed more time to answer the question, the researcher was always ready to stop the tape so that the child might comfortably have time to answer without missing the next question.

As much as possible, the ten words assigned to undergo phonetic or phonological change in each subtest were selected in such a way as to avoid possible confusion with other permissible words in the language being spoken by the puppet. For example, in the subtest E4 - where the feature aspiration was manipulated and the puppet rendered ten unaspirated initial stops in English - a word like *pig* was avoided. The monolingual English-speaking child upon hearing *pig* (with unaspirated p) would probably consider it as *big*.

Task Administration

Each child was tested individually outside of his or her classroom. Prior to the session the teacher introduced the researcher to the class. Fifty to sixty minutes were spent with each child. The researcher first introduced herself and explained that she was going to play a fun game with three puppets and two other games (Peabody Picture Vocabulary Test and Print Concepts Test - see Measures for specific discussion on each of the measures used). After the introduction, she proceeded with the testing session. The child was seated comfortably on a chair in front of a tape recorder with two loudspeakers (approximately 30 cm/one foot away), a distance that allowed easy listening of the tape stimulus as well as easy viewing of the pictures being shown during the puppet game. The researcher was positioned behind the tape recorder facing the child. In each of the four puppet games - P1, P2 P3, P4 or E1, E2, E3, E4 - the child was asked to answer to questions by distributing objects to one of two puppets. Each puppet had an identified can with its corresponding picture on it. Each can was equally positioned for comfortable performance of the game. Therefore, a response was credited for correct judgment if the child selected the correct puppet can. The position of the two cans was counter-balanced from child to child. The objects were previously numbered from one to 20 and each test had different sets of objects (lids, bean bags, milk caps, bunnies and chips).

The testing session interspersed the MPA subtests, the Peabody Picture Vocabulary Test - Revised (PPVT- R) and the Print Concepts (PC) Test so as to reduce as much as possible the effects of boredom and practice. The session was conducted in the following way:

1) Presentation of the first puppet game (P1 or E1): 10 minutes
2) Break in which the child was encouraged to fill out a small accomplishment chart with a sticker: 1 to 2 minutes
3) Presentation of the second puppet game (P2 or E2): 10 minutes
4) Break for filling out the accomplishment chart with a sticker : 1 to 2 minutes
5) Peabody in Portuguese or English: 10 minutes
6) Presentation of the third puppet game (P3 or E3): 10 minutes
7) Break for filling out the accomplishment chart with a sticker: 1 to 2 minutes
8) Print Concepts: 10 to 15 minutes (recorded on audio tape)
9) Presentation of the fourth puppet game (P4 or E4): 10 minutes

(at the end of the session, the child received a gift from the hand puppets: a toy or a set of stickers).

The 10/15-minute interaction during the Print Concepts test was recorded on audio tape. The objective of the recording was to have a small speech sample of each child. Both the speech sample and the PPVT-R provided information about the child's linguistic profile. The contents of the tapes were transcribed by the researcher. The researcher found no difficulty in transcribing the tape with the exception of three African American monolingual children. With the help of an African American friend, the researcher was able to recognize and transcribe the words of those three African American children. In adittion, one child who had been diagnosed with speech problems was dropped out from the study.

Control for the child's self-corrections was also pursued. When playing the game, if the child chose one response and immediately changed his mind, the second answer was considered as the real response of the child. On the other hand, if the child picked one answer, and five to eight seconds later, changed his mind, the first answer was considered as the real response. If the child delays in answering to the auditory stimuli, it may be possible that he repeats to himself the word, thus compromising his answer since he may be basing his answer on his own production and not on what he heard[13].

Measures

The measures used in the present investigation were selected to assess receptive vocabulary knowlege, print concepts knowledge and metaphonological ability at both the phonemic and distinctive feature level. Descriptions of the individual measures chosen are described below.

Metaphonological Ability (MPA) Measure

Eight subtests were constructed to assess MPA in the form of acceptability judgement both in Brazilian Portuguese (four subtests) and American English (four subtests). Series of pilot tests were conducted in constructing these MPA subtests. Descriptions of the methodology used and the results obtained in the pilot study are presented in Appendix A.

The Construction of the MPA Subtests

A contrastive analysis of the phonetic and phonological characteristics of both Brazilian Portuguese and American English was conducted (Azevedo, 1987). The contrastive analysis was meant to focus only on distinctive feature contrasts between Brazilian Portuguese and American English. However, it was impossible to find enough differences between Brazilian Portuguese and American English at the

[13] I am indebted to Joan Kwiatkowski for this observation.

distinctive feature level without implying a segmental change. Therefore, it was impossible to build enough subtests that tested distinctive features or acoustic features only. The following oppositions were found:

Figure 2 - Presence or absence of segments in Portuguese and English according to the contrastive analysis

segments	***English***	***Portuguese***
aspirated stops	yes	no
retroflex /r/	yes	no
interdental fricative	yes	no
nasal vowels	no	yes
palatal nasal	no	yes
laminopalatal lateral	no	yes

>From these six differences three were disregarded. The palatal nasal as well as the laminopalatal lateral were disregarded because there were only few lexical items in Portuguese containing the two segments which would be appropriate for the child's lexicon. The retroflex /r/ was not considered due to the existence of the Paulista dialect that uses it as an allophone of the Portuguese /r/ in coda position.

Two phonological contrasts were tested: the nasal vowels and the segment theta. One phonetic contrast was tested: the distinctive feature [aspiration]. The child would have to judge the stimuli according to changes that were meant to sound as foreign sounds. An exception to this is the aspiration subtest in English, where the initial stops were produced unaspirated, thus producing an allophonic change in English.

Rationale for the Oppositions Being Tested

The whole idea of presenting stimuli contaning phonetic and phonological similarities and differences (PPSD) to both groups (monolinguals and bilinguals) had to do with testing the assumption whether monolingual and bilingual children are able to judge PPSD in auditory stimuli in a higher cognitive way. The following Figure shows the oppositions tested in respect to each language:

Figure 3 - Distribution of phonetic/phonological differences tested according to language

deletion of syllable final nasal	absent in English	absent in Portuguese
phoneme theta	present in English	absent in Portuguese
oral stricture in syllable final nasals	present in English	absent in Portuguese
aspiration	present in syllable initial stops in English	absent in Portuguese

Eight subtests were built. Both groups of subtests - four in Portuguese and four in English - tested each of the differences shown in the Figure above. The four oppositions tested were assigned the following labels and ordering in the testing session:

Portuguese subtests:

P1: Deletion of syllable final nasal

P2: Interdental fricative: substituting initial theta for /t/
P3: Production of the oral stricture in syllable final nasal
P4: Production of aspirated word initial stops
English subtests:
E1: Deletion of syllable final nasal
E2: Interdental fricative: substituting initial [t] for theta
E3: Deletion of oral stricture in syllable final nasal
E4: Production of unaspirated word initial stops

It should be noted that in both P1 and E1 the puppet rendered words with their syllable final nasal deleted. In P2, the puppet substituted initial theta for /t/. However, in E2 the puppet did the opposite, it substituted initial [t] for theta. In P3, the puppet produced the oral stricture in syllable final position whereas in E3 it did the reverse. The same happened with P4 and E4. While in P4 the puppet produced aspirated stops in initial position, in E4 the puppet produced unaspirated stops in initial position.

Each subtest rationale is explained in detail below.

Final Nasal Deletion Subtests (P1 & E1)

Both monolingual and bilingual groups were tested with ten words that had the final nasal and the nasalization of the preceding vowel deleted. The nasal segment was removed altogether from English and Portuguese CVN (consonant-vowel-nasal) syllables. As a consequence, the CVN syllables were produced by the puppet as CV. P1 and E1 were included in the experiement not because it deals with any particular mirror difference between Portuguese and English, as it is the case with the other set of three subtests. The assumption underlying P1 and E1 is that both monolingual groups should display some ability to judge a novel change absent in Portuguese and in English. A novel change that does not belong to either Portuguese or English might provide a better chance for the bilinguals to show whether they can handle something novel, other than the oppositions from the two systems; whether they display a higher sensitivity to PPSD through the judgemental ability to a novel change due to their possible enhanced metaphonological ability.

It is important to note the difference between subtests P1 and E1 when considering what happens after the nasal consonant is deleted. In P1, a word like *pente* had its nasal segment deleted plus its nasal vowel produced as non nasal ([peci]). Therefore, two things happened. First, the syllable structure was modified from CVN to CV. Second, the nasalization over the preceding vowel was deleted. In other words, P1 tested whether the child realized the opposition non-nasal vowel versus nasal vowel (the nasal vowel was replaced by a non-nasal vowel) and whether the child realized there was a change in syllable structure (from CVN to CV). Thus, it examined whether children were able to judge not only the deletion of a segment - thus, a change in syllabe structure - but also the exchange of phonemes (from nasal to non nasal).

Example of a CVN syllable used in P1: *Dumbo* was produced by the puppet as [dubo]. Lexical items tested in P1[14]: elefante, presente, pendurado, tinta, onda, rinoceronte, ventilador, tombo, escrevendo, Dumbo. Foils (produced by the puppet with correct pronounciation): correndo, bomba, dormindo, mingau, dentro,

[14] See Appendices B and C for the entire transcriptions of the tape stimuli presented to the child during the puppet game.

tempestade, pingo, doente, comendo, sentado.

Vowel nasality in English does not seem to have the same status as it has in Portuguese. Consequently, the deletion of syllable final nasals in E1 may not have the same effect as the modifications in P1. It might be argued that this deletion may not be as distinctive in English as it is in Portuguese. Thus, the deletion of a syllable final nasal in E1 differed phonologically from its Portuguese counterpart, since E1 tested only whether the child realized the change in syllable structure caused by the deletion of a nasal segment - it was not testing the opposition: nasal vowel versus non-nasal vowel.

Example of CVN syllables used in E1: *drum* was produced by the puppet as [dr]. Lexical items tested in E1: dolphin, woman, indian, lion, drum, valentine, bedroom, pumpkin, clown, watermelon. Foils in this subtest: mailman, game, fan, muffin, pan, policeman, mitten, button, dragon, kitchen.

Substitution of Interdental Fricative for [t] (P2) and Substitution of /t/ for Theta (E2)

Portuguese does not have the interdental fricative (henceforth, theta). The Brazilian monolinguals and the bilinguals tested in Portuguese were both tested with P2 containing the substitution of theta for [t] in word initial position. Example: *testa* produced by the puppet as [st]. Lexical items tested in P2: tomate, tênis, tucano, testa, toalha, televisão, tocar, torto, turma, tosse. Foils: telha, talher, torpedo, tapar, tábua, tapa, tomar, terra, teia, torta.

English has the phoneme /t/ sometimes substituting for theta in acquisition. The American monolinguals and the bilinguals tested in English were both tested with E2 containing [t] instead of theta in word initial position, a phonemic change. Example: *think* produced by the puppet as [t k]. Lexical items tested in E2: thunder, thirsty, theater, thanksgiving, think, thirteen, thermometer, thank you, through, Thursday. Foils: thief, throat, three, thick, thin, throw away, throne, thing, thigh, thorn.

Production of Oral Stricture (P3) or Absence of Oral Stricture in Syllable Final Nasal (E3)

The Brazilian monolinguals and the bilinguals tested in Portuguese were both tested with P3. In P3, the puppet fully articulated a final nasal consonant rendering an oral stricture in CVN syllables. Example: *jardim* was produced by the puppet as [zarjim].

A word like *nuvem* was produced by the puppet as [nuveym], with the production of both the glide and the fully articulated final nasal. It should be noted that in the present analysis a nasalized vowel at the surface representation was assumed to have a vowel + an underspecified nasal consonant in the underlying representation (Moraes & Wetzels, 1992). The glide should be considered to have been inserted during derivation (Portuguese nasalized vowels in syllable final position tend to suffer dipthongalization[15]). Thus, two alterations were actually done to the underlying representation of *nuvem*: first a glide was inserted during derivation, then the nasal consoant was fully articulated at the surface level. Thus, the nasal element was not dropped out as it is assumed to happen during derivation (Moraes & Wetzels, 1992; Battisti & Vieira, 1996).

P3 was intended to test whether the child perceived there had been a change at the surface level; whether the child discriminated between C+nasal vowel versus CVN. Since this change does not occur naturally in Brazilian Portuguese, it was

[15] Câmara (1953) considers this diphthong as an allophone of a nasal archiphoneme.

hypothesized that the child might judge this change as something “silly”.

Lexical items tested in P3: carruagem, jardim, trem, laranja, criança, bombom, batom, garagem, balanço, cinza. Foils: canguru, banco, bombeiro, índia, tronco, patim, fantasma**,** quente, brinquedo, silêncio.

English does not have deletion of oral stricture in nasal consonants in syllable final position. Therefore, the American monolinguals and the bilinguals tested in English were both tested with E3 containing deletion of oral stricture in syllable final position in nasal consonants. CVN syllables were produced as CV (the vowel rendered as nasalized vowel). Example: *bean* produced by the puppet as [bi]. Lexical items tested in this subtest: phone, crown, can, plane, penguin, racoon, icecream, hen, spoon, pine. Foils: pen, train, kitten, snowman, sun, melon, green, brown, baloon, rain.

Production of Aspirated Stops (P4) and Unaspirated Stops (E4)

Portuguese does not have aspirated stops. The Portuguese monolinguals and the bilinguals tested in Portuguese were both presented with P4 containing aspirated stops in word initial position, a total foreign sound at the phonetic level. Example: *porta* produced by the puppet as [p rt]. Lexical items tested in P4: telefone, porco, tartaruga, peru, touro, porta, tubarão, cadeira, palhaço, caminhão. Foils: pesado, queijo, cachorro, telhado, pipoca, camelo, cama, carro, pirulito, pé.

English has aspirated stops in syllable initial position. The American monolinguals and the bilinguals tested in English were both tested with unaspirated stops in initial position. E4 consisted of presenting an allophone in an environment where it does not belong. Example: *car* produced by the puppet as [kar] with unaspirated *k*. Lexical items tested in E4: table, tiger, car, peanut, pie, turtle, cow, camera, tie, telephone. Foils: king, tooth, tomato, puppy, tent, purse, key, tea, cake, toe.

P4 and E4 included a phonetic difference that is at a slightly lower level (at the level of distinctive features). It may be argued that a change in the aspiration feature may be perceived by the child as a phonemic change. A child who listens to the word ‘table’ with an unaspirated [t] in E4 may be discriminating either the feature change, thus hearing an unaspirated [t], or discriminating the phonemic change, thus hearing a [d]. What is the child’s judgement really based on? In the case of aspiration it is debatable.

The Figure below presents visually the distribution of tests per language group:

Figure 4 - Maximum scores per language group and per subtest

Subtest	Bilinguals in Portuguese	Brazilian Monolinguals	Bilinguals in English	American Monolinguals
P1	20	20		
P2	20	20		
P3	20	20		
P4	20	20		
E1			20	20

E2			20	20
E3			20	20
E4			20	20
Total possible scores	**80**	**80**	**80**	**80**

Essentially, all subtests presented to the children were assigned a non native accent on both languages which manifested itself differently according to each language. The children were tested to see whether they were able to judge those phonetic and phonological changes as "silly" or not; whether they thought their long term storage of particular allophones, phonemes and phonotactics was correct or not; whether they accepted the changes at the surface forms of the words as "silly" or not.

Since the bilingual group would be tested with either the Portuguese set of subtests or the English set of subtests, even if the results showed possible differences in means due to the difference in the nature of the stimuli (in the case, for example, if the Portuguese monolinguals scored higher than the English monolinguals), it is still assumed that the design built control for these differences because this study aimed to compare the bilinguals with both groups of monolinguals and not compare English monolinguals with Portuguese monolinguals.

The experimental design was meant to present a set of subtests which had comparable stimuli to both monolingual and bilingual groups. However, it was not possible to build perfect mirror image tasks in both Portuguese and English. On one hand, the above pairwise oppositions tested may be considered comparable to each other, since the same distinctive features and segments were manipulated on both languages. On the other hand, from a phonemic/allophonic or nativeness/non nativeness point of view, they are not precisely analogous due to the intrinsic phonetic and phonological characteristics of each language.

Based on the previously discussed design, the data was collected (half of the bilinguals tested in Portuguese and half in English) having in mind the following comparisons:

a) First comparison: Bilinguals tested in Portuguese and Brazilian monolinguals were presented with the same ordering of subtests during the testing session: P1, P2, P3, P4.

b) Second comparison: Bilinguals tested in English and American monolinguals were presented with the same ordering of subtests during the testing session: E1, E2, E3, E4.

The subtests were developed in such a way as to allow scores' spreading to occur, hopefully under a normal distribution. In order to avoid ceiling or floor effects, a test needs to have items that differ in their level of difficulty. Since it was not possible to have different levels of difficulty within individual subtests, the idea of having four subtests that tested four different oppositions seemed to fulfill this assumption due to the unlikelihood that the subtests would present equal difficulty or ease to the children.

Further Content Validity Considerations

Type of words used

Treiman & Breaux (1982) suggest that simpler syllable onsets (e.g single

consonants instead of consonant clusters) tend to be easier for detection tasks. Although the present study did not use detection tasks, a simplification of the stimuli to CV monosyllables or CVCV disyllables was pursued. However, such simplification was not always possible due to the lack of lexical items suitable for the child's vocabulary. It was hypothesized that simpler and more uniform word onsets might rule out some possible differential perceptual effects caused by different consonant clusters. This control was specially applied in the subtests where initial sounds were tested (P2, E2, P4 and E4). In the subtests where nasals were in syllable final position - not in onset position (P1, E1, P3 and E3) - this control was not always followed due to the lack of lexical items containing less complex onsets.

Position in the Syllable

In this present study, two positions in the syllable were tested: onset (P2, E2, P4 and E4) and rime (P1, E1, P3 and E3).

Vowel Contexts

Sendlmeier (1995) suggests that the quality of vowels is of primary importance in similarity judgements only for monosyllabic words. In more complex stimuli vowel similarities would be of minor influence on perceived word similarities.

This present study supports the idea that the strength of the distinctive feature and/or segment is derived from its use from many different preceding and/or following vowel contexts. In other words, if the distinctive features and/or segments being tested here are useful in discrimination, then they should be evident across different vowel contexts. There is some risk involved in using different vowel contexts due to the variability that a varied vowel context imposes on the stimuli. However, the change in vowel quality should be a robust effect in the auditory discrimination portion of the subtests in the present study. In addition, the power of a distinctive feature or segment is that it generalizes across all words of a language, i.e., a feature or segment can be used in many different vowel contexts but still maintains its own identity; that is, featural and phonemic contrasts should be effective across words that differs in vowel contexts. In other words, having a variable set of vowel contexts allows us to better capture the idea of generalization. Therefore, whenever possible, a varied vowel context was pursued in constructing the subtests. Another reason for using different vowel contexts in the stimuli has to do with avoiding training effects. The tape stimuli had twenty words per subtest, thus using only one vowel context twenty times would probably cause a strong learning effect. Consequently, different vowel contexts were used in the stimuli as much as possible. [16]

Cognitive Demands

From the previous discussed research design, it can be suggested that the amount of operations involved in the present puppet game were minimum, thus imposing less cognitive demands on the child. Lundberg (1978) has suggested that acceptability judgements require "attention shift" or a shift from content to form that does not require difficult cognitive operations. Thus, an acceptability type of task was considered the more appropriate for five-year-old children for not requiring complex cognitive operations.

Considerations About not Using a Verbal Production Task to Assess MPA

Considering that the phonological system develops gradually and that children to participate in this study might not have completely acquired the phonological system of Portuguese and/or English, it was hypothesized that an assessment requiring judgement of the speech stimuli without verbal production

[16] I am indebted to Ray Kent for these ideas.

would be more appropriate (see Review of Literature). Therefore, this study avoided any kind of verbal production as a response in the judgement's tasks. The games the child played encouraged him to pay closer attention to the PPSD without having to produce them verbally. The speech production variable was avoided as an attempt to assess acceptability judgment ability only and not have to deal with a production variable when assessing these judgement skills.

Standardization of MPA Tasks

McBride-Chang (1995) suggests there is little standardization within individual MPA tasks and that there are at least three essential components shared by virtually all MPA assessment tools: speech perception, short-term memory and general cognitive ability. In line with the idea of a need for standardization within MPA tasks, the MPA tasks developed specially for this present study have the three essential components suggested by McBride-Chang:

1) Speech perception: the stimulus must be first correctly perceived and identified, then the segment must be judged adequately. In the present study, the child had to listen initially to the puppet's manipulation on words at distinctive feature and segment level presented on tape and judge the PPSD on those items. The type of judgment asked of from the child differed in nature from judgements of perceptual discrimination in the sense that it required the child to judge acoustically the stimuli, but it also involved lexical access of the item tested. In other words, upon hearing the testing item, lexical access of that word was activated. Then the child had to compare the stimulus word heard with the stored lexical item and assign to it a judgement of appropriateness. In other words, the child had to judge whether the pronounciation of the stimulus word was adequate/correct by labeling it as "silly" or "not silly". This judgement goes beyond basic speech perception and categorization of the sounds involved. It is a metaphonological judgement.

2) Short-term memory: the child had to remember the stimulus for a period of time in order to operate on that stimulus. In the present tasks, the child had to hold in memory the speech segment change long enough to be able to assign a judgement to the stimulus word he heard.

3) General cognitive ability: the child had to reason well in order to be able to think about the stimulus and operate on it.

Subtests Arrangement on the Testing Session

There was an attempt to arrange the subtests in the testing session in such a way that easy subtests should come first in order to avoid the participant to loose interest in the game and also to counterbalance the learning effect at the last subtests. The subtests judged to be the easiest perceptually among the four (E1 and P1 respectively according to language) were placed first in the testing sessions. It was hypothesized that P1 and E1 might be easier perceptually to both groups of children due to the probable more salient acoustic effects caused by the losing of an entire nasal segment.

It had been hypothesized that E4 might be the most difficult subtest perceptually in the English set of subtests for two reasons: a) subtest E4 deals with one single feature (aspiration), and b) its manipulation rendered an unaspirated allophone in English - this could represent some difficulty to the American monolingual child. For this reason, E4 was placed at the end of the English testing session. The same could not be hypothesized in relation to P4 - the mirror subtest of E4 in Portuguese - since in P4 stops received aspiration, a totally foreign sound and most likely more perceptible to children tested in Portuguese. However P4, by

analogy, had to placed at the end of the Portuguese testing session.

After having assigned P1/E1 as the first subtests in their respective testing sessions, and P4/E4 as the last ones, the theta subtests P2/E2 were placed between P1/E1 (which are the nasal deletion subtests) and P3/E3 (also dealing with nasals) to intersperse the sequence.

The subtests were tentatively rank ordered according to level of perceptual difficulty based also on the pilot data results with the American monolingual kids. The decision of dealing with different degrees of difficulty is anchored on the assertion that it would be necessary to expose the child to subtests that reflected different roles in perceptual magnitude. Therefore, if MPA is acquired in a continuum, then a rank ordered test mode is able to detect increasing performance and thus able to test such assumption. However, due to the inovating character of the instrument constructed for the present study, the arrangement of subtests was only tentative.

Receptive Language Test: Peabody Picture Vocabulary Test - Revised

The Peabody Picture Vocabulary Test-Revised (PPVT-R; Dunn & Dunn, 1981) is a norm-referenced measure of receptive vocabulary which has been designed for children as young as two years and five months to adulthood. It is important to note that the Portuguese version of the PPVT-R was an adaptation to Portuguese of the Teste de Vocabulario y Imagenes Peabody (TVIP; Dunn, Padilla, Lugo & Dunn, 1986) in Spanish, translated by the author. The TVIP in Spanish is a collection of the best items taken from version L and M of the Peabody in English. The selection of items for the Spanish adaptation obeyed all the selection criteria used for the original version. In addition, cultural differences were taken into consideration in the selection of items. Therefore, in the lack of a standardized and attested Portuguese version, the researcher decided to use a translation to Portuguese of the Spanish version due to the cultural and language similarities.

Standard scores obtained by each child were reported. These scores followed the PPVT-R raw scores standardized according to age in years and months at the time of testing. The age norms mean that the child's score can be compared with a large group of children of the same age upon whom the Peabody test was standardized. For the TVIP, the standard scores were derived from the Combined Hispanic Norms (Normas Hispanas Compuestas). The decision to use the Combined Hispanic Norms was based on the fact that they might better generalize for the Portuguese speaking participants in this study, since they were obtained from Mexican and Puerto Rican norms combined together.

In order to have an independent and standardized linguistic measure, the PPVT-R was chosen because it was considered to be a reliable measure of the receptive vocabulary[17]. Standardized bilingual proficiency measures were avoided in this present study due to problems in the reliability of such tests. Therefore, the PPVT-R served as a tool to provide extra important information in the building of both monolingual and bilingual child's linguistic profile.

Ben-Zeev (1977) has reported that bilinguals had significantly lower scores on the PPVT-R when compared to monolinguals. She argues that due to a more limited experience with each language, the bilingual child may experience some limiting effects on vocabulary knowlege. Cummins (1977) also suggests that "since the bilingual's language experience is divided between two languages he has less

[17] The researcher presents to the child four pictures at a time. The child has to point to the picture that best represents a word being read by the examiner. Successive items become progressively harder. Testing continues until the child gets at least six of the last eight items wrong.

opportunity for experience with the vocabulary of either" (p.13). Therefore, the bilingual children in the present study were not expected to perform better in PPVT-R than their monolinguals controls.

Literacy knowledge test: Early School Inventory - Print Concepts

The ESI is part of the Metropolitan Readiness Assessment Tests and has been reported to be a reliable measure of knowledge of print concepts and literacy routines (Swank, 1991; Larivee, 1995). In this study, The Print Concepts portion of the ESI was used. This portion assesses the child's understanding of the following print concepts: what one reads, why one reads and how one reads:

a) What one reads: In this task, the researcher shows picture plates; each plate contains three pictures. The child is asked to point or select the pictures he/she would read (e.g., the first plate shows pictures of a pencil, book and a girl). There are two practice items and ten test trials.

b) Why one reads: The child is asked to explain why he/she would read the item he/she has just picked. There are ten test trials.

c) How one reads: The child is presented with a large picture plate with print on the bottom and is asked ten questions about print conventions (e.g., "Where do you start to read?", "Where do you finish reading?", "Show me a number").

Expressive language assessment

The Print Concepts portion was recorded on audio tape (10 to 15 minutes). This small speech sample was transcribed and was meant to provide a brief view of the child's phonological and phonetic inventory.

CHAPTER IV
RESULTS

The data were examined in two parts. The first part deals with the analysis of the subtests used in this present study in terms of their validity and reliability. Second part deals with the analysis of the subtests' scoring across both monolingual and bilingual groups.

Part One: Subtests' Validation

The first question that is possible to be asked is: Can five-year-olds make metaphonological judgments about phonetic and phonological similarities and differences (PPSD) at the phonemic and distinctive featural levels? The answer is clearly yes. For the subtests design proposed, it was set a rigid criterion of success, which children would be most likely to meet if they were simply guessing rather than making the judgement in question: at least 14 out of 20 items correct in each subtest ($p = .021$, binomial test) assuming the probability of a correct response by chance on each trial was .5. Seventy-five percent of the children tested in Portuguese reached criterion in P1 and 71% in P4; 66% of the children tested in English reached criterion in E1 and 51% in E4. Many of the children just missed criterion with 12 or 13 out of 20 items correct. For the calculation of 13 out 20 items correct in each subtest ($p = .058$) and assuming the same probability of success on each trial as .5: 85% reached criterion in P1, 57% in P2, 71% in P3, 75% in P4, 81% in E1, 44% in E2, 81% in E3 and 63% in E4. It was also calculated the percentage of children who reached criterion on at least two subtests (considering 14 out of 20 items correct) and the following figures were found: 44% of children showed above chance performance on both E1 and E4 and 53% on both P1 and P4. Considering 13 out of 20 items correct, 55% showed performance above chance level on both E1 and E4 and 71% showed above chance performance on both P1 and P4. Still considering 13 out of 20 items correct, the following figures were found for the percentage of children who

reached criterion on at least three subtests: 59% showed above chance performance on at least three English subtests and 64% showed above chance performance on at least three Portuguese subtests. Thus the majority of children showed ability to make MPA judgment on at least three subtests across the two language groups (see Appendix F for individual scores in each subtest).

The subtests developed for this research were also analyzed by the basic approaches to test validation suggested by Gronlund (1993): content and construct validity, and by a reliability coefficient.

Content Vadility

Content validity is related to a) how well the subtests proposed represent the acceptability judgement of PPSD, and b) to the appropriateness of the sample. To meet content validity requirements, the subtests measured a representative sample of items containing PPSD in both Portuguese and English. The following criteria proposed were achieved:

Directions and Level of Test Difficulty

The majority of the participants understood the directions easily. This can be attested by the fact that the directions given to the children in the beginning of the puppet game, in the practice items and throughout the testing session were clear and unambiguous to 67 children (from the total of 73 children who participated in the data collection only six did not understand the directions).

The language used in the directions as well as in the interaction of the interviewer with the child was well adapted to the 5-year-old age range in terms of syntax and vocabulary (the subtests avoided "adult vocabulary" in order to make the test more accessible and more adequate to the child's lexicon).

There were no ceiling nor floor effects across subtests. Therefore, the subtests assessed a good distribution of scores and were neither too easy nor too difficult for the age range tested.

In relation to types of testing words used as a possible complicating effect, both the size of the syllables and the size of onsets were taken into consideration. However, it should be noted that the size of words may be more important to a MPA task difficulty if the task in question requires verbal production from the child. A MPA task that requires verbal production places higher demands on short term memory and cognitive ability (e.g., in a task where the child has to segment a word or has to delete one phoneme and speak out the remaining word). In a task where the child has to judge the auditory stimuli without manipulating it verbally, syllable size and onset size may not be so critical for task difficulty. However, this is an empirical question that should be further investigated in future studies.

Adequate Sampling of Items and Answer Patterns

With the exception of E2, which did not have enough lexical items to be improved, items provided adequate samples of the particular segment or distinctive feature tested. All the subtests, in both languages, contained varied and representative items suitable to the child's vocabulary. In relation to answer patterns, test items were disposed in such a way as to avoid clues to the answer.

Subtest Lenght

The pilot series helped the researcher to realize some modifications necessary to avoid boredom for the child. The results were extremely positive. Although the subtests were long (20 questions each) and the testing session lasted 50 to 60 minutes in average - which is usually considered to be a long time for a five-

year-old - from the 73 children who participated in the data collection, only two had difficulties in concentrating on the game due to testing lenght. Therefore, subtest lenght was adequate to the child's age and short attention span.

According to McBride-Chang (1995), MPA studies should use more items per subtest at each level of task difficulty in order to maximize participants' variability. In the case of the present instrument, the number of 20 items per subtest helped to maximize children's variability and provided enough spread of scores so that the statistic used was sensitive to real differences.

Subtest Administration

The interruptions or breaks between subtests proved to be very practical and meaningful to the child since they added motivation, provided a little rest and kept the child involved in the task. The subtests interspersed with the Peabody and the Print Concepts tests contributed to a momentaneous change of focus and proved to be effective in keeping the child's interest throughout the testing session. Moreover, importance was given to administering the test on an individual basis.

Scoring System

Previous studies have aimed at training MPA by focusing on pronounciation. However, for the purpose of assessing MPA in the sense of who has more or less of it, a simple and binary type of response was desirable. Thus the scoring was based on unambiguous dichotomous responses that were easy to interpret.

As previously discussed at the Review of Literature, a thurstworthy interpretation of any test result is based on three main assumptions: a) that the test is constructed in such a way as to avoid threats to validity, b) it should be sensibly administered and, c) it should be well scored as to avoid dubious interpretation of test scores. In other words, when constructing a test, the above topics are of extreme importance in order for content validity to be high. The subtests proposed for this study followed a systematic procedure for specifying and selecting the sample items. The subtests were constructed with high-quality items, adequate for testing PPSD and were arranged in such a way that their administration and scoring were efficient. In addition, the outcomes - identified as a dichotomous judgement based on phonetic and phonological changes in the auditory stimilus - were not biased by dubious interpretation of scores. Therefore, having in mind that the content validity asks the question: how adequately does the sample of test items represent the domain of content to be measured, the subtests proposed in the present study were able to meet the essential criteria for content validity.

Construct Validity

Construct validity answers the question "to what extent will the interpretations of the test scores be appropriate, meaningful, and useful?" (Gronlund, 1993, p. 160). That is, the MPA construct underlying the subtests constructed should provide the interpretation of the acceptability judgement of PPSD. On this view, the instrument should provide enough information as to ensure that the construct was really assessed.

The subtests developed were intended to assess an ability that is metaphonological in nature.

According to McBride-Chang (1995), the three essential component skills that underlie the MPA construct are: speech perception, short-term memory and general cognitive ability - speech perception being the stronger predictor of the MPA construct. Construct validity was confirmed by demonstrating that the eight subtests developed were successful in addressing these three essential underlying skills. The present research design emphasized the speech perception skill on the construction of the instrument: the subtests required auditory perception of the stimuli, a mental judgement of the stimuli heard and the holding of that judgement in memory followed by an immediate non verbal response. The fact that the instrument did not require any verbal production from the child is in agreement with McBride-Chang's proposal that the stronger predictor of MPA is speech perception not necessarily speech production.

In relation to short-term memory and general cognitive ability, as previously discussed, the subtests were constructed in such a way as to place minimum demands on these two underlying skills. Because the subtests did not require any verbal production, demands were neither heavy on short-term memory nor on complex cognitive operations such as deleting one segment and speaking out the remaining of the word type of task. Thus the instrument constitutes a simple metaphonological ability task (opposed to complex metaphonological task in the sense of Cole & Mengler, 1994) with minimum amount of cognitive operations asked of from the child.

Reliability

The formula used to estimate internal consistency reliability of the dichotomous scored items across subtests was the Kuder-Richardson Formula. The following coefficients per set of subtests were found:

English subtests: E1 + E2 + E3 + E4: r = .73 (mean = 14.28, SD = 3.68) Portuguese subtests: P1 + P2 + P3 + P4: r = .53 (mean = 14.09, SD = 2.91)

The reliability values found (.73 and .53) are moderate to moderate. These figures are reasonably acceptable for short non norm-referenced subtests such as the ones proposed. Although the Portuguese subtests obtained a lower reliability coefficient, this fact does not preclude its future replication. In fact, both coefficients ensure that the subtests are a reliable measure and are an incentive for replication of this instrument in future studies.

One particular statistical tool that was not used in the present study was factor analysis which

has been used as a strategy to surface underlying factors among instrument items. It would be interesting to have factor analysis as the basis for analysis in future studies or as an extension of this study. That will probably add important information that shows the present instrument developed is worthy of use for metaphonological testing.

Before advancing to Part Two where the language comparison groups will be discussed, it should be recalled that of the 73 children who participated in the data collection, 37 were bilinguals, 17 were American monolinguals and 19 were Brazilian monolinguals. As mentioned before, from the 37 bilinguals, only 24 were included in the study. Twelve bilinguals were tested in English and twelve in Portuguese.

The 13 bilingual children who were withdrawn from the study presented the following characteristics: 6 did not understand the task, 3 did not want to engage in the game as it was originally planned (wanted to play in a different way), one had difficulty paying close attention to the game, two could not participate until the end because the parent interrupted the session and one child was from Portugal and was not considered elligible due to his different home language input. From the 17 American monolinguals, one child did not understand the game and one could not concentrate on the game, therefore only 15 American monolinguals participated in the study. From the 19 Brazilian monolinguals, three children were withdrawn: one boy did not understand the game, one girl wanted to play the game in a different way, and one boy had developmental language disabilities. All the children who were withdrawn from the study were not hindered from playing the puppet games, however their scores were not counted as valid.

Part Two: Comparison Between Monolinguals X Bilinguals

The scores on the four English subtests (E1, E2, E3, E4) were analyzed using independent *t* tests[18]. Mean scores on the bilingual group tested in English (n=12, 7 boys and 5 girls) were higher than in the American monolingual group (n=15, 8 boys and 7 girls) across subtests E1, E3 and E4, but these differences were not statistically significant: *t*E1 (24.16)=1.04, p<.307; *t*E3 (24.65)=1.53, p<.139; *t*E4 (23.45)=.50, p<.623, all two-tailed. In subtest E2 the mean difference was significant in favor of the monolingual group *t*E2 (24.93)=-2.55, p<.017, two-tailed.

Figure 5 summarizes the average participants' mean performances on the MPA English subtests according to group membership (bilinguals tested in English and American monolinguals). Number of items, mean scores and standard deviations

[18] See Appendix F for individual scores in each English and Portuguese subtests.

are given on each subtest:

Figure 5 - Maximum Score, Mean (M) and Standard Deviation (SD) per English Subtest

Condition	Subtest	Max score	M	SD
Bilinguals in English	E1	20	16.33	2.74
Bilinguals in English	E2	20	10.17	2.59
Bilinguals in English	E3	20	16.50	2.61
Bilinguals in English	E4	20	14.58	3.75
American monolinguals	E1	20	14.93	4.20
American monolinguals	E2	20	13.13	3.44
American monolinguals	E3	20	14.87	2.92
American monolinguals	E4	20	13.87	3.66

The scores on P1, P2, P3 and P4 were also analyzed using independent *t* tests. Mean scores on the bilingual group tested in Portuguese (n=12: 6 boys, 6 girls) were higher than in the Brazilian monolingual group (n=16: 6 boys, 10 girls) across subtests P3 and P4 (*t*P3 (25.51) = .977, p<.338; *t*P4 (24.99) = .22, p<.828), and lower in subtest P2 (*t*P2 (25.98) = .84, p< -1.79, all two-tailed, but these differences were not statistically significant. In subtest P1, the mean difference was significant in favor of the monolingual group (*t*P1(22.89) = -2.56, p<.018, two-tailed). Figure 6 summarizes the average participants' mean performances on P1, P2, P3 and P4 according to group membership (number of items, mean scores and standard deviations on each subtest are given):

Figure 6 - Maximum score, mean (M) and standard deviation (SD) for each Portuguese subtest

Condition	Subtest	Maximum score	M	SD
Bilinguals in Portuguese	P1	20	13.33	3.20
Bilinguals in Portuguese	P2	20	12.25	2.00
Bilinguals in Portuguese	P3	20	13.50	1.24
Bilinguals in Portuguese	P4	20	15.08	2.42
Brazilian monolinguals	P1	20	16.37	2.98
Brazilian monolinguals	P2	20	13.87	2.77
Brazilian monolinguals	P3	20	13.00	1.46
Brazilian monolingual	P4	20	14.81	4.05

A Levene's Test for Equality of Variances was conducted prior to each *t* test and the *unequal variances* approach was used for the calculations of all *t* tests. Due to the reasonably small sample sizes, there was a concern in relation to not violating

the important underlying statistical assumption of normality of observations. The non-parametric Wilcoxon Mann-Whitney U corrected for ties was also conducted and had comparable results.

Therefore, in each on the two comparison groups: Brazilian monolinguals (BM) versus bilinguals tested in Portuguese (BP) and American monolinguals (AM) versus bilinguals tested in English (BE), monolinguals and bilinguals performed similarly, with the exception of one subtest in each comparison group. For the English language comparison, E2 showed significance to the AM. For the Portuguese comparison, P1 showed significance to the BM.

Phonological Explanation for the Findings According to the Oppositions Tested

Theta Substitution

E2 was difficult for both AM and BE since both groups scored lower in E2 when compared to the other three English subtests. The low scores across the two groups tested in English might be explained partially on the basis of theta's relatively inaudibility. Kent & Read (1992) report that the theta sound tends to be less perceptible due to its weakest acoustic strenght in overall energy. The low acoustic strenght of theta is also attested by the fact of its low frequency of occurrence across 317 languages (Kent & Read, 1992).

In relation to the AM group in particular, the theta subtest may have posed some difficulty for these children. It has been reported that theta is considered to be one of the latest sounds to be acquired in English as L1 (sometimes it is acquired as late at 7 years of age; Kent, 1994). As a consequence, substitution of /t/ for theta is a common phonological process in L1 acquisition of English. It may be that judging the substitution of /t/ for theta might have posed some difficulty for the AM group so that they did not score higher than 13.13 in average.

Regarding the BE group specifically, E2 was the only English subtest where the BE scored significantly lower (M=10.17) when compared to the AM (M=13.13). The fact that E2 was the subtest that presented more difficulty to the BE may be partially explained by the profile of this sample of bilingual children. When comparing some bilingual with monolingual children, Cummins (1977) argues that some monolinguals might focus more on the acoustic properties than on semantic properties of words when asked about the similarity between words:

> "Bilingual children, brought up in a one-person, one-language home environment, were significantly more sensitive than unilingual chidren to semantic relations between words and were also more advanced in realizing the arbitrary assignment of names to referents. Unilingual children were more likely to interpret similarity between words in terms of an acoustic rather than a semantic dimension (e.g. cap-can rather than cap-hat) and felt the names of objects could not be interchanged" (Cummins, 1977, p.28).

A more discriminative type of task that does not require a higher degree of "awareness" - like the one presented by Cummins - might not favor a bilingual child who receives accented language as L2 input. When comparing a bilingual child who is consistenly exposed to accented language to a monolingual counterpart, the bilingual child may be less proficient in perceiving phonetic details of his L2 at a pure discriminative level than his monolingual peer. In this sense, the type of bilingualism may have contributed to the BE's significant lowering of scores in E2. Due to their exposure to accented English from their parents, it is possible that the BE did not assign the judgement of "silly" to the substitution involving theta due to their familiarity with this substitution in the home environment. In other words, this group of BE might have been in disadvantage when compared to the AM in terms of the amount of exposure to unaccented input. When compared to this sample of BE, it could be argued that the AM might be specialists in the theta segment due to being exposed to unaccented L1 input since birth and to their higher phonetic proficiency in English in relation to theta.

An analysis of the speech production of the twelve bilinguals tested in English was conducted in order to examine whether these children mastered the segment theta in production. The child's speech was recorded while he participated in the Print Concepts task. As a consequence, not all the twelve bilingual children produced as many words containing theta in initial position as to provide an accurate phonetic profile of this segment in the whole group. The analysis showed that seven out of the twelve BE substituted /t/ for theta (children numbers: 1, 2, 4, 5, 7, 8 and 11). However, these seven BE who substituted /t/ for theta do not represent the ones who did worse on judging theta substitution. It can be argued that in order to produce theta the child should at least perceive it. On the other hand, if the child produces theta with interference, it is not possible to argue the child does not perceive it correctly. In the case of these seven BE, it is not possible to argue that because they have not mastered theta completely in production they can not discriminate it and further judge its substitution.

In relation to the substitution of theta for /t/ in the Portuguese subtest P2, a similar pattern was found. Both groups tested in Portuguese scored low in this subtest, although no statistical significance was observed between BM and BP.

Portuguese does not have the theta phoneme. Theta may occur in Portuguese phonetically in some children who lisp. Lisping occurs in Portuguese more commonly associated with the substitution of /s/, not with the substitution of /t/ in initial position as is the case of P2. However, it is possible to suppose that some children from both groups of children tested in Portuguese might have made mistakes in judging the theta substitution due to a possible confusion with lisping in Portuguese.

According to the binomial probability for success (at least 14 out of 20 items correct), both the MP and the BP did not reach criterion at the $p < .05$ in P2 because they had subtests means of 13.87 and 12.25 respectively, thus lower than 14. This means that both groups performed equally likely and that P2 was not an easy subtest for them. The fact that both groups of children tested in Portuguese did not reach criterion in P2 in average - which tests a substitution inexistent in Portuguese - may support the idea that theta might be less perceptible for Portuguese speakers as well as for English speakers.

To sum up, despite the intrinsic differences of the stimulus in Portuguese versus the stimulus in English, both subtests dealing with theta (P2, E2) had low scores across the four groups tested. As it has been already argued, this result might

probably be explained partially on the basis of theta's relatively inaudibility due to its low acoustic strenght. This crosslinguistic finding for theta may add support the fact that theta has a low frequency of occurrence across 317 languages (Kent & Read, 1992) and is thus less used in the languages of the world due to its implicit acoustic characteristics.

Aspiration

In the aspiration subtests the feature change is not distinctive neither in English nor in Portuguese. The fact that the bilinguals in both groups (BP, BE) did not outperform statistically their monolingual counterparts (BM, AM) in the aspiration subtests (P4, E4) shows that this phonetic change was judged equallly by all four groups. A possible explanation for no differences in means across groups in P4 and E4 may be due again to the characteristics of this bilingual sample: their exposure to unaspirated English stops and their familiarity with accented language from their parents may have influenced these BE in their assignment of the judgement of "silly" to the substitution involving English stops in word initial position.

Portuguese stops differ from English stops in the same way Spanish stops differ from their English counterparts. Portuguese voiced stops are produced with voicing lead (or prevoicing) while the [-voice] stops are produced with short lag (the onset of glottal vibration just after articulatory release) (Kent & Read, 1992; Kushner,1986). English, however, has a contrast of aspirated and unaspirated stops (in initial stressed position). The [+voice] stop is produced with a short voicing lag similar to the short lag of the Portuguese [-voice] stops, while the [-voice] is produced with a long lag, also called aspiration, which means that voice onset occurs considerably after stop release (Kushner,1986, p.94). In other words, initial stops in Portuguese differ from their English counterparts in terms of voice onset time. Voice onset time (VOT) is defined as the "interval between the articulatory release of the stop and the onset of vocal fold vibrations" (Kent & Read, 1992 p.108).

In relation to the guessing rate, E4 had low scores below the guessing rate only across the AM group (group mean = 13.87). The other three groups scored higher than the guessing rate (BE= 14.58, BM= 14.81, BP= 15.08). This finding supports at least partially what had been hypothesized. It had been hypothesized that the phonetic change in P4 should be a little more obvious than the allophonic change in E4. Perceiving and judging a sound that does not occur in the language at all (aspirated stops in Portuguese) might be more obvious/easier than perceiving and judging a sound that does occur in the language, however only in a certain specific environment (unaspirated stops in English). Furthermore, it has been argued elsewhere that there seems to be a specialness about the high frication noise on the aspirated sound so that even speakers who do not have aspiration in their language systems can do much better than chance on hearing the difference between aspirated *pa* and unaspirated *pa* (Williams, 1980). Maybe this differencial effect translated into VOT differences between Portuguese and English may have accounted for the slight higher scores in P4 when compared to E4 across both groups.

Nasal Deletion and Oral Stricture in Syllable Final Nasals

Three groups (BM, AM, BE) tested with nasal deletion (P1, E1) performed in average above chance level (BP performed above chance level only when considering 13 out of 20 correct: p= .058, binomial test). This finding together with the calculation of the percentage of individual children who scored above chance performance (see the Subtests' Validation part of this chapter) suggest that most

children tested were able to discriminate and judge metaphonologically the mispronounciation of the puppet in relation to syllable nasal deletion.

Although neither in Portuguese nor in English the deletion of syllable final nasal is a common phonological process, it seems that this substitution caused a different impact in the Portuguese stimulus than it did in the English stimulus. Both English and Portuguese have vowel nasalization. As Kent & Read (1992) point out, "in general, vowels preceding following nasal consonants tend to be nasalized to some degree. Experiments have shown that listeners are sensitive to the vowel perceptual judgments about the neighbouring consonants. In other words, the acoustic cues for nasalization often can be found beyond the nasal consonant segment" (p.136). According to Cohn (1990), American English vowel nasalization seems to differ from French vowel nasalization, for example. Although there has been no acoustic analysis between specifically the American English nasalization and Brazilian Portuguese nasalization, it may be plausible to suppose that there seems to exist differences in degrees of nasalization, i.e., differences in the nasalization status between English and Portuguese.

In P1, two things happened: first, the nasalization over the vowel was deleted; second, the syllable structure was modified from CVN to CV. In other words, P1 tested whether the child realizes that the nasal vowel is replaced by a non-nasal vowel and that there has been a change in syllable structure from CVN to CV. Thus it examined whether BP and BM were able to judge not only the exchange of phonemes (from nasal to non-nasal) but also the deletion of a segment, thus a change in syllabe structure. In P1 deleting the nasal consonant implied in a change of phonemes, since the nucleus vowel became a non-nasal vowel. This is a phonological change in Portuguese. The results show that the deletion of a segment plus the changing from nasal vowel to non-nasal vowel were more perceptible to BM than to BP. This fact was captured in the significant statistical difference found between BM and BP in P1 in favor of the BM group. P1 had lower scores only in the BP group (M=13.33). For the BM, P1 was the subtest they had the highest mean (M=16.37).

It is possible to suggest that by responding correctly to P1 above chance level in average, both monolingual (p= .05) and bilingual (only when considering 13 out of 20 correct, p= .058, binomial test) children who participated in this study showed they consider nasal versus non-nasal vowels a contrastive opposition in Portuguese. The monolinguals, however, seemed to be more sensitive than the bilinguals to this phonological change.

There was no significant difference for E1 between AM and BE in relation to nasal deletion. This result may be partially explained by the fact that P1 differs from E1 in an important aspect: E1 is **only** deleting the nasal consonant; it is not testing the opposition nasal vowel versus non-nasal vowel in English. Therefore, P1 and E1 differ phonologically in what they are assessing. In English, the nasal deletion does not seem to be as distinctive as it is in Portuguese since in P1 there was a change of segment but also a change in syllable structure whereas in E1 there was just a cancellation of one segment. Therefore, it is plausible to suppose that if there is no contrast in English between nasal vowel versus non-nasal vowel and the puppet substituted a nasal vowel for a non-nasal one, it may be that this change might not be as evident as if the puppet i) denasalized a nasal vowel that is contrastive in the language, and ii) changed the syllable structure (which are the two changes the puppet made in P1).

In relation to the oral stricture subtests (P3, E3), no significant differences were found across groups, therefore both monolinguals and bilinguals performed equally likely in these subtests also. AM and BE performed in average above chance levels in E3. BM and BP performed above chance only when considering 13 out of 20 correct in P3 (p= .058, binomial test). The fact that both groups tested in English displayed higher means may be due to some intrinsic differences between P3 and E3. English does not have deletion of oral stricture in nasal consonants in syllable final position. The children tested in English heard CVN syllables produced as CV (the vowel rendered as nasalized vowel) and had to judge whether it is permissible to have a nasal vowel in the surface representation of English. On the other hand, P3 was intended to test whether the child discriminated between C+nasal vowel versus CVN (with the nasal consonant fully articulated) and whether the child perceived there was a change at the surface level due to the fully articulated nasal. Since both changes do not occur naturally in American English and Brazilian Portuguese it was hypothesized that the child would judge this change as something "silly".

Although nasal consonants are among the first sounds to be acquired in production in both Portuguese and English and possibly also in perception, it seems that nasals in coda position may have a distinctive status than nasals in onset position, at least in terms of perception. Upon commenting on Repp & Svastikula's (1988) findings, Kent & Read (1992) argue that "full VC syllables containing [m] or [n] were not identified as well as full CV syllables with the same consonants. A possible reason for the poorer identification of nasals in VC syllables was the 'relative absence of a salient spectral change between the vowel and the murmur in VC syllables'" (p.134). Therefore, it is plausible to suppose that the lower mean scores in P3 (BM: M= 13.00, BP: M= 13.50) when compared to E3 (AM: M= 14.87, BE: M= 16.50) may be accounted for by a possible poorer identification of the fully articulated nasal coda position in Portuguese by the children tested in Portuguese.

The present findings contribute to the understanding that five-year-old children can not only discriminate nasal consonants in coda position in Portuguese and English as well as nasal vowels in Portuguese and English above chance levels, but they can also access them both metaphonologically in a higher cognitive way (P1, E1, P3, E3).

One limitation to the present analysis is that since P1 tested two different modifications in the Portuguese stimulus (change in vowel quality and change in syllable shape) at the same time, it is not possible to argue that children tested in Portuguese judged the stimulus modification based only on vowel quality change or only on syllable shape change, or based on both. A future replication of this study should control for one of these variables to be able to define if five-year-old children are able to judge metalinguistically as "silly" a stimulus modification based on syllable shape change only or based on nasal vowel quality change only in Portuguese CVN syllables.

As previously suggested, the fact that P1 presented more difficulty to the BP only may be due to crosslinguistic differences in nasality in Portuguese and English, i.e. nasality may have different status in Portuguese than it has in English. In fact, the oppositions tested by P1 and P3 deal with a very debatable and controversial subject in Portuguese (Moraes & Wetzels, 1992). A full discussion of the nasal vowel is beyond the scope of the present analysis, however, the present findings show that both five-year-old Brazilian monolinguals and bilinguals tested in Portuguese can a) first, discriminate between nasal vowels and non-nasal vowels and/or be sensitive to

syllable structure change, and b) can further judge metaphonologically whether both substitutions are acceptable or not in a higher cognitive way.

To sum up, the five-year-old monolingual children who participated in this study were able to show an acceptability judgment skill across PPSD tasks in both Portuguese and English. Furthermore, the bilingual five-year-olds also displayed the same ability across different subtests. When compared to each other, monolinguals outperformed bilinguals in just one subtest per language comparison (P1, E2).

It is possible that the bilinguals can be more metaphonologically able to judge PPSD due to having two linguistic systems. However, since the bilinguals who participated in this study have been sistematically exposed to accented language, it may be that they can also be more flexible in expressing their opinion in the form of metaphonological judgment tasks. These bilinguals may have discriminated and metaphonologically accessed the PPSD manipulated in the stimuli better than the monolinguals. However, when asked for a judgment that involves either personal preferences or a pragmatic judgement (as the assignment of sillyness or unapropriateness), it may be that these bilinguals have been more flexible than the monolinguals in their judgement assignment. The implicit assumption was that the bilingual children should be more sensitive to featural and segmental differences when tested in their more proficient language (Portuguese). However, for the present study it was shown that they are not.

Finally, it should be recalled that it had been hypothesized that E4 might be the most difficult subtest in the English language set of subtests, therefore it was tentatively placed at the end of the English testing session. P4 was put at the end of the Portuguese testing session in order to keep the same ordering across the two language groups. In order to counterbalance the learning effect at the last subtests (P4 and E4), the subtests judged to be the easiest perceptually among the four (P1 and E1 according to language) were placed first in their respective testing sessions. E4 and E2 had the lowest scores across the AM and BE, however E2 had lower scores when compared to E4. It is possible that E4 had slightly higher scores in relation to E2 just because it was placed at the end of the testing session. Thus ordering effect might have played a definite role in highering E4 scores. This confounding effect was not able to be eliminated in the initial stages of the experimental design since it would have required much larger sample sizes on both groups in order to test all possible orderings in the subtests. Further studies should be conducted in order to eliminate possible ordering effects by presenting these subtests in a counterbalanced order across participants.

Peabody and Print Concepts

An analysis of the Peabody in Portuguese (TVIP) and the Peabody in English (PPVT-R) and Print Concepts was conducted for both comparison groups (see Figure 7 and 8). The results indicate that the BP scored within one standard deviation below average in receptive vocabulary in Portuguese compared to the mean of the population (μ=100, SD=15), and significantly lower when compared to the BM

(t(24.96)=-4.958, p<.000). The BE were more than one standard deviation below average in receptive vocabulary in English when compared to the mean of the population (μ=100, SD=15), and significantly lower when compared to the BM (t(23.48)= -5.868, p<.000).

This pattern of results for the Peabody confirmed the expectations that the bilinguals tested in their least proficient language (English) displayed indeed lower scores on vocabulary in their L2. In relation to the BP, althought they were tested in their more proficient language (Portuguese), they also scored lower than their monolingual counterparts (BM). This result can be partially explained by the fact that due to a more limited experience with each language, the bilingual child may experience some limiting effects on vocabulary knowledge on both L2 and L1 (Ben-Zeev, 1977; Cummins, 1977; Nicolaidis, 1992). Since lower Peabody scores might be an indication of lesser knowledge of the lexicon, this would indicate lesser proficiency of language vocabulary. Ben-Zeev (1977) argues that "lower PPVT scores are expected for the bilinguals. The bilinguals usually have had to learn two different labels for any given referent, one from each language. Therefore, any particular label from one language or the other has occurred with less frequency in his experience and is less well learned" (Ben-Zeev, 1977, p.1013).

Figure 7 - Means (M) and Standard Deviations (SD) for Age, Peabody in English (PPVT-R) and Print Concepts (maximum score = 30) per group in the English language

	Age (months)		**PPVT-R**		**Print Concepts**	
	M	*SD*	*M*	*SD*	*M*	*SD*
Bilinguals in E.	69.50	5.68	75.42	12.14	20.50	3.83
Am. Monolinguals	60.80	4.11	99.36	13.67	17.07	3.99

Figure 8 - Means (M) and Standard Deviations (SD) for Age, Peabody in Portuguese (TVIP) and Print Concepts (max score= 30) per group in the Portuguese Language

	Age (months)		**TVIP**		**Print Concepts**	
	M	*SD*	*M*	*SD*	*M*	*SD*
Bilinguals in P.	68.25	7.43	86.25	10.27	21.33	4.99
Br.Monolinguals	64.12	6.60	109	9.99	20.62	4.95

Correlation analysis

A Pearson correlation coefficient was computed between the MPA average scores on all four subtests and age, Peabody and Print Concepts to determine if any association existed among these variables for both groups. Significant correlations were found for the groups tested in English (see Figure 9). No correlations were found among these variables for any of the groups tested in Portuguese (see Figure 10).

MPA x Age

The sample ended up containing a considerable amount of variability in age in both the monolingual and bilingual participants. Therefore, age was included in the

correlation analysis to see whether the scores on MPA tasks correlated with age or not. The results showed that there was no significant correlation between age and MPA performance for the MP, BP and BE. The AM were the only ones who had a significant moderate correlation of r = .64. The lack of correlation in three groups (MP, BP, BE) and the positive correlation in just one group (AM) should be analyzed with care. A possible reason for no correlation in the BE group concerns the lenght of exposure to English in this group specifically. The fact that the BE tested vary individually in their lenght of exposure to English (see Analysis of Some Individual Bilingual Children's Data) may have accounted for the lack of correlation between MPA and age in this group. In other words, due to individual variability in relation to the lenght of exposure to English, a correlation analysis based purely on chronological age was not sensitive to capture the English "age" of the participants. Therefore, a measure that assesses MPA in English did not correlate with chronological age, since this age does not represent the actual English age of the children.

For the BP the chronological age matches the Portuguese language age since they have been exposed to it since birth. It is interesting, however, that no correlation between MPA and age has been found for this group either. Because the BP were tested in their more proficient language, it may be that MPA did not correlate with age because MPA increases independently from age for this group. In other words, future studies should confirm this suggestion which would argue that MPA in bilingual children tested in their more proficient language may correlate more to other factors, such as type of bilingualism, for example, than age. The bilingual tested in his more proficient language would not need to necessarily get older in order to benefit from MPA performance.

The fact that only the AM had positive correlation between age x MPA shows that as age increases, MPA increases for this monolingual group. Since there was no significant correlation in the other monolingual group (MP), no definite conclusion about a possible monolingual pattern can be drawn from the above figures. However, a future replication of this study with similar groups should examine whether age might correlate with MPA tasks not only in monolingual groups. If that pattern is confirmed in future studies it will be possible to argue that the acepptability judgment assessed by these MPA tasks is sensitive to age differences and it gets higher as age increases.

MPA x Peabody

Among the BE, MPA and Peabody was significantly correlated (r =.69). In the AM group, analysis showed a lower correlation between Peabody and MPA subtests (r = .55). Since lower Peabody scores might be an indication of lesser knowledge of the lexicon this would indicate lesser proficiency of language vocabulary and a possible lesser phonological knowledge. This result might pose some questioning of whether the BE's performance on MPA tasks was most influenced by their mastery level of the English vocabulary items or due to differences in metaphonological ability. The fact that the BE group was tested in their lowest proficient language and that the MPA subtests proposed called upon phonological knowledge of English, their lower knowledge of English may have obscured the results of their MPA performance.

MPA x Print Concepts

According to the questionnaire data, AM had been more exposed to rhymes and had been more in contact with print through children's books at home when

compared to the BE. In other words, the BE were in average less exposed to print concepts when compared to the AM. It is interesting to note in Figure 7, however, that it was the BE who performed better in the Print Concepts task (M= 20.50 against M=17.06 in the AM group, statistically significant: $t(24.12)=2.27$, $p<.03$). The BP had a slightest higher mean in the Print Concepts test in relation to the BM, but this difference was not statistically significant ($t(23.97) = .377$, $p<.71$). The fact that bilinguals and monolinguals had different previous experiences with print did not account for the difference in the results of the Print Concepts test. Why did the bilingual children have higher scores in the Print Concepts test even being less exposed to reading materials at home? It may be that the Print Concepts test may not be capturing something important or even that the information captured on the questionnaires is not revelant for the Print Concepts construct. The Print Concepts test is a measure of the extent to which the child has learned something about the nature of print. The test does not deal with phonological units specifically, since the questions are: what is in this page? Is it words or pictures?, etc.

It has been reported elsewhere that children may learn print concepts by being read to (MacLean, Bryant & Bradley, 1987). Although the Print Concepts test is intended to provide information on some aspects of learning to read, it should be noted that it assesses a very different part of learning to read. The MPA subtests constructed for the present study assessed a metaphonological judgment based on PPSD. Therefore, the Print Concepts test does not measure the same construct the MPA test measures, or the concepts each test assesses are different in nature. Therefore, the lack of correlation of Print Concepts and MPA for the bilinguals might suggest that the Print Concepts measure may not be completely adequate for the bilingual group or is not relevant to MPA.

The bilingual result on print concepts points out to another important issue. In case the bilinguals are able to transfer knowledge of print concepts from L1 to L2, a monolingual measure of print concept might not be sensitive to what these bilingual children know. Therefore, such a measure may not be able to accurately reflect the ranking or performance of these bilinguals' knowledge of print concepts.

The above correlation analysis reveals that the number of correlations differed according to group membership. It was found one significant correlation in the BE group, four significant correlations in the AM group, while no correlation was found in the groups tested in Portuguese (BM, BP). The findings suggest that the PPVT-R and the Print Concepts measures in English used for both monolingual and bilingual groups may be more appropriate for the English language only. Furthermore, since the PPVT-R and the Print Concepts measures were developed for an American monolingual population, it may be that they are not completely suitable for a bilingual sample. This points out to the necessity of suitable measures for either bilingual children in Peabody and Print Concepts for Portuguese speaking participants in future studies.

Figure 9

Correlations between MPA, PPVT, Print Concepts and Age for the Bilinguals tested in English and the American Monolinguals

GROUP			MPATOTAL	PPVT	PRINTCON	AGE
Bilinguals tested in English	Pearson Correlation	MPATOTAL	1,000	,693*	,426	,381
		PPVT	,693*	1,000	,400	-,127
		PRINTCON	,426	,400	1,000	,297
		AGE	,381	-,127	,297	1,000
	Sig. (2-tailed)	MPATOTAL	,	,012	,167	,222
		PPVT	,012	,	,197	,694
		PRINTCON	,167	,197	,	,349
		AGE	,222	,694	,349	,
American Mono-linguals	Pearson Correlation	MPATOTAL	1,000	,554*	,703**	,640*
		PPVT	,554*	1,000	,730**	,169
		PRINTCON	,703**	,730**	1,000	,471
		AGE	,640*	,169	,471	1,000
	Sig. (2-tailed)	MPATOTAL	,	,032	,003	,010
		PPVT	,032	,	,002	,547
		PRINTCON	,003	,002	,	,076
		AGE	,010	,547	,076	,

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 10

Correlations between MPA, PPVT, Print Concepts and Age for the Bilinguals tested in Portuguese and the Brazilian Monolinguals

GROUP			MPA	PPVT	PRINTCON	AGE
Bilinguals tested in Portuguese	Pearson Correlation	MPA	1,000	-,018	,480	,167
		PPVT	-,018	1,000	,372	-,175
		PRINTCON	,480	,372	1,000	,521
		AGE	,167	-,175	,521	1,000
	Sig. (2-tailed)	MPA	,	,955	,114	,604
		PPVT	,955	,	,234	,587
		PRINTCON	,114	,234	,	,082
		AGE	,604	,587	,082	,
Brazilian Mono-linguals	Pearson Correlation	MPA	1,000	,485	,191	,484
		PPVT	,485	1,000	,427	-,155
		PRINTCON	,191	,427	1,000	,471
		AGE	,484	-,155	,471	1,000
	Sig. (2-tailed)	MPA	,	,057	,478	,058
		PPVT	,057	,	,099	,568
		PRINTCON	,478	,099	,	,066
		AGE	,058	,568	,066	,

Analysis of Some Individual Bilingual Children's Data

One issue considered important for the present analysis was whether

differences between chronological age versus age of consistent/constant exposure to English had any relationship. A detailed analysis based on the questionnaire information of each bilingual child was conducted. As pointed out by DeHouwer (1995, p.223), it is important to differentiate between two types of bilingual acquisition: Bilingual First Language Acquisition (BFLA) which refers to acquiring two or more languages from birth or at most after birth, and Bilingual Second Language Acquisition (BSLA) which refers to any bilingual acquisition situation that differs from BFLA. DeHouwer argues that BSLA studies should consider the time of first exposure to L2 as a possible confounding variable. She suggests that BSLA studies should inform **when** the bilingual participants start to be regularly exposed to L2 so that the researcher might be able to examine any possible effects on acquisition patterns. In the present study, regular exposure to Portuguese and English from birth was addressed in the Questionnaire B data and it was meant to assess when permanent contact with English started forcing the bilingual child to develop communicative skills at an interactive level. For example, a child who is put in a L2 day care since very young is forced to develop communicative skills in the L2 with other children and careholders. However, a child who lives in the United States but stays most part of the day at home with a Portuguese speaking relative or parent, may have a predominant Portuguese speaking environment where Portuguese is the only means of communication among the persons. The latter child is exposed to L1 with more intensity and may be exposed to English only in a more indirect way, e.g., by exposure to television programs. This kind of language exposure could be said to be a more passive kind of exposure, since the child does not need to develop communicative interaction skills while watching television. It was of interest to ask the bilingual parents when their children started being consistenly exposed to English either by being put in an English speaking day care, or by playing regularly with monolingual Americans. The Questionnaire B data also provided detailed information as to which language the child uses at home and with whom. Accordingly, the bilinguals were analyzed in relation to whether they were born in the US or whether they moved to the US after birth (Appendix F displays this detailed information).

For example, child 10 (a bilingual tested in English) was 75 months at the day of testing. Her family had moved to the United States (US) when she was 24 months old. Her family reported she started being exposed consistenly to English when she was 69 months. Therefore, her English "age" was only 6 months. Child 11 (a bilingual tested in English) was 79 months at the day of testing. His family had moved to the US when he was 48 months old. His family reported he started being exposed consistenly to English when he was 43 months. Therefore, his English "age" was 36 months. These two kids are the only ones from the group of bilinguals tested in English who were not born in the US. All the other 10 children were born in the US. However, their parents also report differing lenghts of consistent exposure to English. Thus, the English "age" of these children may be argued to differ from child to child. Appendix F shows the tables containing each child's scores and respective ages.

From the group of bilinguals tested in Portuguese, child 33 was 69 months at the day of testing. His family had moved to the US when he was 36 months old. His family reported he started being exposed consistenly to English when he was 43 months. Therefore, his English "age" was 26 months. Child 35 was not born in the US and was 71 months at the day of testing. Her family had moved to the US when she was 24 months old. However, her family reported she started being exposed consistenly to English when she was 53 months. Therefore her English "age" was 18

months.

Due to the extreme limited exposure to English of children 10 and 11, the same *t* tests previously computed for E1 through E4 were conducted again without subjects' 10 and 11 scores to see whether there might have occurred some differences in the results; to see whether the amount of exposure on the second language might be an important factor on this sample of bilingual children tested in English. However, no differences occurred. This finding shows that at least these two children's scores were not the main responsible effect for the difference found in favor of AM in E2.

These data show that the bilingual sample participating in this study differed in their lenght of consistent exposure to English. In this sense, most of them can be considered to have acquired English as a second language (BSLA), not as another L1 (BFLA).

This sample of bilingual children had some specific psychological characteristics that are worth mentioning. The 37 bilingual children who participated in the data collection tended to display hiper activity behaviour in average. Some of them showed more difficulty in concentrating on the tasks and seemed more agitated when compared to both their American and Brazilian monolingual peers. One possible reason for such a behavior may be due to the two bilingual kindergarten classes from Boston being bigger (around 20 students per group) when compared to the sizes of the classes in the American monolingual (around 15) and Brazilian monolingual (around 12) groups. It might be that this behavior or any other possible sociolinguistic[19] or psychological reason may have influenced performance on the bilingual sample. However, any possible explanation why these bilingual children had more difficulty in participating is beyond the scope of the present study.

A final observation is that although effort was made in order to rule out all possible differences among the groups it was not possible to obtain complete comparable samples. Not only finding the bilingual participants was a hard task, but finding a testable group available to the researcher proved to be a big challenge. For the results to be generalizable, the monolingual and bilingual groups should be similar, however this does not seem to be the case for this sample. Therefore, the conclusions drawn for the bilingual sample specifically should be taken as tentative and restricted to the present sample of children.

[19] Due to belonging to low income immigrant families living in a big city such as Boston, the James Otis school children may face more emotional stress than the other two groups of children.

CHAPTER V

DISCUSSION

The primary goals of this dissertation were to study the metaphonological ability (MPA) to judge acceptability in five-year-old children, the assumption being that five-year-old monolingual children might display MPA to judge acceptability at age five (MacLean, Bryant, & Bradley, 1987), and to devise an experimental task that successfully assessess such ability. It was also hypothesized that five-year-old bilingual children might perform better than their monolingual peers in MPA tasks due to a possible bilingual advantage in terms of a greater ability to judge these differences when tested in their more proficient language (Portuguese). Therefore, this study addressed the following issues:

a) Attempted to devise a specific metaphonological task to assess MPA;

b) Investigated the MPA to judge acceptability in five-year-old monolingual children in terms of whether these children are able to judge phonetic and phonological similarities and differences (PPSD) in the form of PPSD tasks at an age that most researchers suggest is a stage for judging larger units (rhymes and syllables),

c) Compared the effects of five-year-old children who are raised bilingually versus children the same age who are raised monolingually on MPA to judge acceptability (whether bilingual children develop a

better judgement ability in relation to their monolingual peers when tested in their more proficient language).

Therefore, these assumptions should result into three types of outcomes:

a) The manufacturing of an experimental task that assesses MPA to judge phonetic and phonological similarities and differences in five-year-old children,

b) Monolingual children perfomance scores in these acceptability judgement tasks being better than chance, and

c) Bilingual children's scores in acceptability judgement tasks being higher than their monolinguals peers when these tasks are given in the bilingual child's more proficient language.

Revisiting the Research Questions

1. Is it possible to devise a subtest that assesses the metaphonological ability to judge phonetic and phonological acceptability in five-year-old children?

The present study has indicated that the metaphonological ability to judge phonetic and phonological acceptability can be tested reliably in five-year-old monolingual children. This investigation differed from previous studies on MPA in important aspects. First, most previous studies have lacked explicit rationale for the use of tests, or at best, few provide weak rationale for the choices made. This research, however, provided rationale for each of the subtests constructed. In addition, it took into account many extraneous variables such as socioeconomic status, sex, physical and linguistic development, amount of literacy exposure and amount of exposure to rhymes at home.

Another important point is that in assessing the judgement ability at a subsyllabic level, the instrument was contructed in a way that differed from common existing tasks. For example, in Treiman & Zukowski's (1991) experiment, the child is presented to two words and is asked to jugde whether they share the same kind of syllable, e.g., whether *retreat/entreat* share the whole syllable. The child is also presented to *acclaim/inflame* which share just part of the final syllable and is also asked to judge whether the words share the same kind of syllable. Treiman & Zukowski's task is intended to assess metaphonological ability a) at the syllabic level, and b) at a smaller part of the syllable of equal lenght (rime). Their results showed that children were successfull in both a) and b). As Read (1991) points out, in an experiment like that "children may well have construed the task as a judgement of

rhyming, a familiar task for most kindergartners" (p.121) not according to subsyllabic differences. Thus in the Treiman & Zukowski task, it is possible that the child may have judged the sequence only by rime similarities in both cases a) and b) because the task may have induced the child in both cases to play with rhymes, rather than judging differences a) at the syllablic level and b) at the subsyllabic level. Since American children are used to playing with rhymes, a task like that may not be sensitive to what the researcher is really looking for (Read, 1991). The present experiment differed from the one above in that it did not use rhyming words or games that might call the attention of the child to a possible previously acquired rhyming skill.

Addressing each threat to validity and reliability perfectly well is not possible in experimental research. However, some essential features of the experimental manipulation that addresses the underlying construct should be held constant. In this study, extraneous factors such as: how the instrument was implemented, administering instructions, materials used and the interaction of the experimenter with the child did not vary across different participants. Accordingly, reliability measures were provided. Moreover, the present subtests payed attention to experimental control within the individual tasks used in terms of cognitive demands (fewer operations asked of from the child), position of the segment being tested, number of phonemes, manner of articulation, type of onset and item arrangement per subtest.

In relation to types of stimuli used as a possible complicating effect, both the size of the syllables and the size of onsets were taken into consideration. However, a comparative study between CV syllables versus CCV syllables was not conducted to examine whether these two differerent contexts might have influenced within subtest difficulty. This could be done in a future study.

There was a concern that the subtests should display different degrees of perceptual difficulty. This was pursued based on the assertion that if MPA is acquired in a continuum, then exposing the child to subtests that reflected different roles in perceptual magnitude might be able to detect increasing performance and thus be able to test such assumption. The idea of having four subtests that tested four different oppositions per language group may have supported this assumption due to the unlikelihood that the subtests proposed would present equal difficulty or ease to the children. The results showed that the subtests seem to have differed in perceptual difficulty level across language

groups. For the Portuguese language comparison, P1 was more difficult for the Brazilian monolinguals, P2 and P3 had means below chance levels for both groups (considering 14 out of 20 correct, p= .05, binomial test) and P4 had means above chance levels for both groups. Considering that there might have been learning from ordering effect at P4, the children tested in Portuguese performed better at this last subtest. For the English comparison, E2 was more difficult for the bilinguals tested in English, however the monolingual Americans also had lower scores on this subtest. Both E1 and E3 had means above chance levels across both groups, and in E4 the bilinguals only had a mean better than chance (considering 14 out of 20 correct, p= .05, binomial test). Therefore, it is suggested here that the phonetic and phonological differences manipulated in the stimuli might be considered to have different degrees of perceptual difficulty due to different performances across subtests and across groups. However, it should be noted that no item difficulty scaling procedure and no acoustic analysis was done in the data. Therefore, due to the inovating character of the instrument constructed for the present study the above suggestion should be taken as tentative. A future replication of this study using the same subtests should probably use an item difficulty scaling procedure and acoustic analysis in order to examine whether some subtests may indeed be harder than others.

Although the four judgment tasks may have differed in their phonetic and acoustic characteristics for both Portuguese and English, they required similar metalinguistic skills: one single speech perception operation of the opposition in focus, short-term memory to operate on the stimulus heard and general cognitive ability to reflect upon the stimulus heard in order to assign to it an acceptability judgment. In this sense, it is possible to argue that the instrument developed required a minimum and similar number of cognitive operations. The child was required to act equally across the four subtests on the phonological knowledge he has in a higher cognitive way, that is, in a metalinguistic way, without imposing high cognitive demands on the child.

The judgement asked of from the children required more than just pure auditory perception. Besides auditory perception, recognition and categorization of some sounds, it involved a higher degree of knowledge about the language. In other words, it required the above capabilities plus a further categorization and judgement that go beyond auditory perception: a metalinguistic judgement

in nature.

2. Are five-year-old monolingual children metaphonologically able to judge phonetic and phonological similarities and differences? If so, how well do monolingual five-year-olds perform in judgement tasks that manipulate phonetic and phonological acceptability?

The present investigation aimed to assess how much knowledge monolingual five-year-old children have about some specific PPSD in Portuguese and in English and the degree to which these children can articulate metaphonologically these PPSD in the form of acceptability judgements. The present findings suggest that the five-year-old monolinguals tested were able to make metaphonological judgements about the PPSD at the phonemic and distinctive featural level. Therefore, it is plausible to argue that these monolingual children demonstrated MPA to recognize distinctive feature and phonemic changes.

It was assumed that all monolingual children who participated in this study were able to discriminate (at the level of basic auditory perception) the distinctive features and segments tested, since they had been exposed to them since infanthood (at least the distinctive features and segments belonging to their respective L1 phonological systems). This assumption is based on data from the infant perception literature which have demonstrated, for example, that infants are able to discriminate between VOT values at the first months of life (Ingram, 1989). In other words, the five-year-old monolingual children who participated in this study have had implicit (or unconscious) knowledge of some oppositions tested by the MPA tasks proposed since very young (Clark, 1978), or long before they were tested by this experiment. The present subtests required children just to discriminate these PPSD at a more subconscious level, but to act on that knowledge in a higher cognitive way.

The subtests developed for the present research had similarities across the two language groups in the sense that the same features or segments were manipulated. However, there were differences across the two languages in how obvious and how perceivable the changes were in each language. It did not all go in one direction. In some cases the Portuguese subtests obtained higher means above chance level (P1, P4) and in some cases the English subtests obtained higher means (E1, E3). No comparative study between the two monolingual groups had been previously planned. Thus no statistical analysis was conducted in relation to this comparison. Therefore, it is not possible to argue whether there was any real difference between the two monolingual groups. If indeed there were, it might be attributed to how evident the changes are according to language.

3. If bilingual five-year-olds are tested on the same acceptability judgment tasks will

they show a better performance than their monolingual peers when tested in their more proficient language?

There was no prediction in relation to the bilinguals tested in English, their weaker language. Indeed, consistent with previous studies, it was found that there were generally no differences found between the bilinguals tested in English and the monolingual Americans. There was only one significant difference between these groups in favor of the American monolinguals (E2, phoneme theta).

The fact that mean performance in E2 for the bilingual group is at the guessing rate (M = 10.17) either supports the suggestion that the bilingual children lacked mastery of the segment theta or that this subtest presented some intrinsic difficulty to these bilingual children. There are a number of possible explanations for this finding. One possibility is that the nature of the MPA tasks called on both MPA and knowledge of the English contrasts. As Channey (1994) points out, "children cannot be expected to reflect metalinguistically about structures they have not yet acquired" (p.386). Therefore, lesser knowledge and mastery of the English language contrasts tested may have affected bilingual children's performance on E2. In other words, the lesser knowledge of English by these bilingual children might have contributed to their possible confusion and underscoring in E2. This shows the need for a certain level of mastery of the phonetic and phonological contrasts when assessing the same contrasts in a metaphonological task situation (Gombert, 1992).

The bilingual group tested in English had on average lower scores on two subtests (E2 significant and E4 non significant statistically) that dealt with a common mispronounciation in accented English being acquired by Portuguese speaking persons. In other words, either the substitution of [t] for theta or the release of unaspirated initial stops are common errors L2 Portuguese speaking learners of English commit when acquiring theta and aspirated stops (Piper, 1987). This suggests that these bilingual chidren might have been confused due to exposure to accented English of their parents. As a consequence, the amplitude of sociolinguistic acceptance of the accented language may be higher in this bilingual group. It is possible that these bilingual children have recognized the accented input in the puppet's voice and have been able to access it metaphonologically, however not having considered as "silly". The fact that these bilingual children might have accepted interference as something permissible in their L2, may be a sign of their pragmatic competence in their

interlanguage[20] (Selinker, 1972). Therefore, the fact that they were still acquiring the English phonological system and had been exposed to accented English from their parents might have influenced their performance on tasks that call upon more than just speech perception and a metaphonological operation: the task presented to the children dealt with a judgement of "what sounds silly" or not. In this sense, since the parent's linguistic role might have been one of a phonological model to them, their performance in the subtests proposed might have been compromissed.

According to Vihman & McLaughlin (1982) initial stages of L2 acquisition may be particularly hard on the child causing interference. Yelland et al.'s (1993) suggestion seems to enlight this same idea:

> "While competence may not be the determining variable for the acquisition of a metalinguistic benefit, it seems possible that the level of competence in the second language might determine the degree of benefit gained by the child or the speed at which the benefit accrues." (p. 439)

Accordingly, Cummins (1977) and Galambos & Hakuta (1988) further suggest that metalinguistic abilities seem to be heightened by the knowledge of two languages, however, children who have higher degrees of bilingualism may be more metalinguistically successful given the same level of first language proficiency.

The present finding for the bilinguals tested in English does not support the idea that metaphonological ability is enhanced during the initial stages of a second language (Buanowski, 1992) since some of these bilinguals did not benefit from their early L2 acquisitional stage in terms of outperforming their monilingual Americans peers. It may suggest, however that the higher the child's competency in a second language the better chances the child will have to access the explicit knowledge of language structure (Bialystok, 1988).

Ingram (1989) suggests three factors that might interact in the acquisition of an opposition: perceptual salience (in terms of acoustic properties), articulation (the difficulty of articulating a sound), and phonological salience (in terms of the frequency of a sound in the language system). These three factors, as he argues, can be reckoned as possible reasons for the later acquisition of an opposition. On this view, depending on the type of bilingualism (e.g., if exposed to accented input), the bilingual

[20] According to Selinker, *interlanguage* can be defined as the L2 learners' internalization of a series of rule systems which might be separate from both their L1and the target language.

child may have a more restricted exposition to unaccented L2, thus having a more restricted exposition to a particular phonological salience. As a consequence, a bilingual child who is tested in his least proficient language would have lesser chances to be successful in tasks that assess speech perception and discrimination of a less salient opposition.

In comparison with previous studies on this issue, the present investigation hypothesized that if any of the bilingual groups tested were to have enhanced acceptability judgement skill to judge PPSD, it would be the bilingual group tested in Portuguese (their more proficient language). This hypothesis was based on the idea that the bilingual children tested in their more proficient language might display a better judgemental ability at the level of phonemes and distinctive features due to the intrinsic task of acquiring two different languages.

In contrast to the expected results, this research has demonstrated that there were no significant differences between Brazilian monolinguals and bilinguals tested in Portuguese. Where there was a significant difference it was the bilinguals who scored lowest (on subtest P1).

Because the bilingual children tested in Portuguese were more proficient in Portuguese than in English (according to parent questionnaire data), it was surprising to see them present a different pattern for P1. The failure of the above prediction may be at least in part related to these bilingual's lower Portuguese vocabulary knowledge, which may have made the MPA tasks difficult for them. According to Cummins (1977), "bilinguals may suffer some vocabulary lag and possibly some lag in grammatical competence" (p.39).

CONCLUSION

In this study, a series of subtests in Portuguese and in English were constructed in an effort to assess five-year-old children's metaphonological ability to judge acceptability based on phonetic and phonological similarities and differences. Furthermore, it aimed to compare monolingual with bilingual five-year-olds in the same set of stimuli in order to detect whether the bilinguals were better at judging acceptability in their more proficient language. The results suggest that the subtests proposed were able to assess acceptability judgements at the phonemic and distinctive feature levels beyond chance levels. In addition, it showed that five-year-old bilingual children, when presented to the same stimuli, were able to perform equally well in the same metaphonological tasks with the exception of two subtests.

On the basis of the experimental findings summarized above, certain conclusions concerning the MPA in five-year-old children can be formulated. These conclusions should be regarded as tentative, however, due to the small number of participants involved in the study and the restricted scope of analysis.

One first conclusion about the MPA subtests developed for this study is that it has shown itself to be a reliable test to assess acceptability in terms of metalinguistic judgements in five-year-old monolingual children. However, since the bilingual sample showed more variability across subtests and performed significantly lower than monolinguals in one subtest per language group, it may be that some of these subtests may not be totally adequate for metaphonological testing with bilinguals who are exposed to accented language. Bilinguals who are raised without being exposed to accented language may better profit from the metaphonological subtests proposed (e.g., when each parent is a native speaker of one of the two languages being acquired by the child).

Another conclusion is that, as previously stated, it was observed in this experiment that this sample of five-year-old children were able to judge acceptability of PPSD at the phonemic and distinctive feature levels. This finding appears to contradict the notion that children are only able to show metaphonological skills at

these levels after learning to read. The fact that these children were able to judge acceptability at the phonemic and distinctive featural at an age that most researchers say it is an age to show MPA for larger units, suggests that the type of MPA tasks used indeed influenced the results. It seems plausible to suggest that the the instrument developed in this research was able to demonstrate that five-year-old monolinguals can make metaphonological judgements about phonemes as well as distinctive features even before they have been consistently exposed to literacy. Such result agrees with Larivee (1994) in that the choice and design of an experiment on MPA may greatly influence research findings.

The current research findings open an interesting avenue to rethinking the MPA construct. The author's view of the developmental course of MPA is that MPA is a continuous process that takes place gradually in the child's language development and that there are different degrees of metalinguistic ability that develop in response to special circumstances. Implied in this assumption is the belief that there are different levels of metalinguistic ability. This metaphonological ability to judge small phonological similarities and differences should improve with aging, i.e., over time. However, aging alone can not account for the developmental course of the MPA. For everything the child knows linguistically, there is a continuum with respect of how *aware* he is, how well he can articulate it, manipulate it or even describe it. Depending on the demands of a specific task or situation, children might show different levels of an increasing ability to articulate linguistic knowledge in a more overt way. This account of MPA agrees with Karmiloff-Smith's (1984, 1986) view which suggests that children's metalinguistic abilities are not necessarily linked to any particular stage of cognitive development. Rather, children may show metalinguistic ability of various aspects of language at the same time, since these various aspects of language should be related to the phase of development of that specific linguistic form. According to Karmiloff-Smith, the same child may be at the beginning stage of metalinguistic ability of a certain newly acquired linguistic form, whereas also being at a more developed - and possibly at a more overt and conscious stage - of a more mastered linguistic form. In this sense, Lundberg (1978) explains this metalinguistic ability as an "attention shift" that occurs in steps. For each level of metalinguistic ability, some specific triggering effect might be needed to develop that level. For example, when exposed to nursery rhymes on a constant basis, children's ability to discriminate rhymes tends to increase (Maclean, Bryant & Bradley, 1987). When exposed to alphabetic literacy, adults have their metaphonemic ability enhanced (Morais et al., 1986). Also, the existence of crosslinguistic secret languages in children and adults who speak languages which are not alphabetic (e.g. Luganda in Africa; Mann, 1991) points out to the fact that MPA does not depend exclusively on age and alphabetic literacy only. There seems to be the case that some kind of "necessity", sociolinguistic need, or as Mann (1991) puts it, the "experience in manipulating the internal structure of words" may play a definite role in the development of MPA. Sendlmeier (1995) provides support to this view from an auditory perception approach by arguing that

> "the demonstration that a listener can detect or manipulate a unit of any size does not necessarily indicate, however, that that particular unit is constructed during normal speech processing. But it does show that the listener can make use of acoustic-phonetic information at that level of granularity (feature, syllable, word) in performing the task at hand. The demonstration that different answers to the question of which unit is primary in perception can be obtained with different tasks, gives evidence that *listeners are able to attend to different*

levels of information in speech perception." (Sendlmeier, 1995 p. 180) (my own italics)

Sendlmeier argues that a listener is able to switch from phonemes to distinctive features when discriminating minimal pairs, switching back to syllables or word level when progressing in the recognition process. According to this view, the perceptual activities of a listener vary according to the specific demands of each task. Thus, it seems plausible to suppose that different aspects of metaphonological ability might be acquired throughout childhood and even later in life as a consequence of specific demands and also as individual differences in metalinguistic capacity (Hirsh-Pasek, Gleitman & Gleitman, 1978; Levelt, Sinclair & Jarvella, 1978).

Considering life around the globe (including differing linguistic experiences such as a child raised by parents who are linguists, a child raised in a preliterate tribe, and an adult without literacy access, among other examples) it seems that the development of metaphonological ability is also life-situation dependant rather than exclusively linguistic and/or cognitive dependant. It may be that younger preliterate children do not show a greater metaphonemic ability at, say two years of age, because at this age level there are usually greater demands on more global aspects of speech, such as the semantic and pragmatic adequacy. These demands would make the child not need to develop a metability at any smaller level of granularity (distinctive features, for example) at that moment since communicative skills are the ones which are more often called upon from the child.

In addition, a developmental view of MPA has to further imply a minimum degree of previously acquired phonological knowledge, since one may only be able to be conscious of something after having acquired it (Yavas & Haase, 1988). As phonological development unfolds - as children master unconsciously different levels of phonology - specific levels of MPA may be triggered as a result of specific needs. In other words, MPA may develop both in children and adults as a result of specific demands originated by linguistic playing, educational demands or sociopragmatic needs (Levelt et al., 1978; Read, 1978; Roazzi, Oliveira, Bryant & Dowker, 1994). It is also implied that metaphonological ability in children may well be closely related to the mastery of specific linguistic units (Karmiloff-Smith, 1984, 1986). However, when considering an adult who has already acquired completely the phonology of his L1, mastery of specific linguistic forms is not an issue anymore. In this case, specific demands would play a more important role in triggering MPA at different linguistic levels (syllabic, onset-rime or

phonemic).

It is possible then that what happens in phonology is transparent and individuals may become metaphonologically 'aware' of some of the units and operations only after they are confronted with something that forces them to pay attention to language, for example in the case of alphabetic literacy learning by either children or adults. On this view, to study MPA is to investigate how much knowledge children or adults have about the structures, about the phonemic, distinctive features, onset-rimes, syllables and the degree to which they can pay attention to these structures, articulating their knowledge of these units in an overt way.

The fact that MPA has been extensively related to alphabetic literacy may be in part to the fact that for most people (children or adults), the only experience they get that forces or stimulates them to develop, e.g. metaphonemic ability of syllable structure, is from reading instruction (Read et al., 1986). It could be said that such a specialized knowledge as the metaphonological knowledge of onset-rime and of phonemes is not usually needed for most every day tasks. In a sense, it is obvious that people can go through their entire lives without having to become 'aware' that syllables have internal parts. The hard task upon the researcher then is to be able to create an environment (in the form of an experimental test) to allow this metaphonological need to come into existence.

At the same time, another question rises: is there any levels of difficulty in different MPA skills? In other words, can a child acquire metaphonologically both the syllable and phonemes, or should one precede the other developmentally? Lundberg (1991) argues that there seems to exist different levels of difficulty among the metaphonological abilities, since rhyme recognition, e.g., seems to develop more spontaneously in preschool children. Metaphonemic ability, however, has been seldomly reported among prereaders. However, this is an empirical question still open to debate which leads to the question: how much does the child know or how sensitive is the child to the phonological structure in a way that enables him to act metaphonologically on that knowledge? It is implied in this logic that a child would only be able to make a metaphonological judgement about a phonetic similarity or difference, for example, after having learned that phonetic similarity or difference (it does not imply necessarily that the child is able to produce it verbally).

On this view, the results presented in this dissertation find support in Bialystok's (1988)

suggestion that the higher the child's competency in a second language, the better the child's access to the explicit knowledge of language structure. At the same time, the present study did not find support for a bilingual advantage when L2 proficiency is low, contradicting another of Bialystok and Nicolaidis' (1992) findings. According to them, even low L2 proficiency should benefit from their low proficiency by outperforming monolinguals. Specifically in Bialystok' study, it was shown that low L2 proficient bilinguals outperfomed monolinguals in tasks that accessed word-referent distinctions. However, in tasks that required more explicit linguistic analysis, (e.g, correcting grammatical errors in sentences) these bilinguals performed at the same level as the monolinguals. Only bilinguals with high L2 proficiency outperformed the monolinguals in this task. This suggestion finds support in the study conducted by Yelland et al. (1993) where low proficient bilinguals demonstrated a heightened appreciation of the separation of word and referent attributes when compared to matched monolingual controls. According to Yelland et al., children who have had very limited contact with a second language are able to show increased metalexical ability.

According to this logic, even very low levels of contact with a L2 might be sufficient to trigger a more basic level of metalinguistic ability. Perhaps Bialystok (1988) and Yelland et. al. (1993) found support for this hypothesis because they tested it in relation to metalexical ability. This means that because the children tested by them were low proficient bilinguals and consequently did not have high linguistic knowlege of L2, a bigger phonological unit such as the word was more accessible to the child metalinguistically. Hirsh-Pasek, Gleitman & Gleitman (1978) argue that "the lower the level of linguistic representation called for in a judgemental task, the more difficult the task for young children" (p. 101). Therefore, it has been suggested in the literature a certain kind of hierarchy which will be named here as the *metaphonological size hierarchy*. According to the metaphonological size hierarchy, the bigger the phonological unit, the easier it is accessed metalinguistically. In other words, the higher the phonological unit is in this metaphonological size hierarchy, the less cognitive effort is demanded from the child. In this metaphonological size hierarchy, phonological units differ in terms of size and range from large to small: word > syllable > subsyllabic units (onset, rime, nucleus, coda) > semental level (phoneme) > distinctive features. This hierarchy is based on the findings that larger units are metaphonologically acquired first, e.g., the metalinguistic ability for words are usually acquired before

metasyllablic ability; metasyllabic before onset-rime; and onset-rime before metaphonemic. For example, Tunmer (1989) suggests that MPA is an extension of metalexical ability, since both metalexical ability and MPA seem to combine the ability to reflect on subunits of spoken language (words for the former, syllables and phonemes for the latter).

What units become metalinguistically accessible under which conditions? The issue is to determine whether and to what extent there really is a hierarchical acquisition of these subunits. It remains to be seen whether new paradigms such as the notion of prosodic constituents (Bisol, 1996) may provide better support for this empirical issue. To solve this problem it may require that future research tests whether monolingual as well as bilingual children follow a possible developmental sequence for the acquisition of MPA according to the metaphonological size hierarchy. Since the parameter used to base the metaphonological size hierarchy is the phonological system, it again implies that a metaphonological judgement about whether, e.g., a certain distinctive feature belongs or not to the child's system can only be made after that distinctive feature is already stored in the child's mental lexicon. In other words, children may show metalinguistic ability of various aspects of language at the same time, however these various aspects of language should be related to the phase of development of the specific linguistic form being acquired metalinguistically.

Concluding, the fact that there is just partial agreement on the acquisition of the units first acquired by children metaphonologically shows that in terms of the study of MPA the field has yet to improve its assessment procedures in order to fully detect what young children are really able to do metaphonologically. With appropriate tasks that engage the child in a playfull and meaningful situation, we might be able to tap different levels of metaphonological ability with children much younger that the field has currently witnessed. This research has been a modest, however important step into this direction.

Limitations of the Present Study and Topics for Future Research:

A number of interesting research questions remains to be investigated in the area of the MPA in preschoolers and its implications for the development of the phonological system of both monolingual and bilinguals this age, and for the development of literacy. In order to further validate the

conclusions concerning the ability to make metaphonological judgments about PPSD in preschoolers, several modifications could be undertaken; among them:

1) No conclusions about causal associations among the skills assessed were able to be drawn from this study. However, the present data suggest the need for future researchers to consider longitudinal techniques in estabilishing causal relations among bilingualism and MPA, in which the bilingual's MPA is investigated as a function of his developing linguistic competence. In other words, it is clear that longitudinal data on the development of MPA in monolingual and bilingual children are needed to adequately examine the interplay between language acquisition and metaphonological development.

2) The present study suggests that the effects of bilingualism on children's MPA warrants further investigation. In fact, if bilingualism can be shown to be predictive of better metaphonological ability at different levels (e.g, at the syllable and phonemic levels), this could potentially have consequences for literacy acquisition theory as well as for the identification of those bilingual children who experience reading disability problems. Determining the extent to which bilingualism can predict later metaphonological ability and subsequent literacy success may be an important step in understanding the phonological development per se. Furthermore, since the literature on MPA has provided strong support for a causal link between metaphonemic ability and success in learning to read, it is very important that future investigations examine the development of MPA both in monolingual and bilingual children. A future research to follow up monolingual and bilingual children in reading assessment is thus recommended.

In addition, MPA training in bilingual children should also be conducted in future longitudinal studies in order to determine whether monolingual and bilinguals profit differently from MPA training.

3) Cowan & Hatasa (1994) argue that L2 studies with sample sizes of 30 participants or under are unrepresentative of the L2 learner ability investigated due to proficiency variability in such a small sample precluding generalizability. They suggest that this variability could be reduced by increasing sample sizes. Therefore, a suggestion for future study would be to replicate this study with an increased sample size in order to allow for generalizability.

4) Another limitation to this study was that it was not possible to record the time chidren took to respond to the puppet's questions. As it is suggested by Ben-Zeev (1977), time spent in answering

may be different to bilinguals than to monolinguals. In Ben-Zeev's study there were no group differences in a symbol substitution task, however in terms of time spent in the task, bilinguals took longer to respond. Future studies should account for possible differences between bilinguals and monolinguals in relation to the time spent to answer to MPA tasks.

REFERENCES

Ackerman, P. & Dykman, R. (1993) Phonological processes, confrontational naming and memory in dislexia. Journal of Learning Disabilities. 26 (9): 597-604

Appel, R. & Muysken, P. (1987) Language Contact and Bilingualism. London: Edward Arnold.

Arnqvist,A.(1991) Phonemic Awareness in Preeschool Children: Four Studies on the Relationship Between Phonemic Awareness, Reading and Short-term Memory. Doctoral dissertation at Uppsala University. Uppsala.

Azevedo, M. (1987) A contrastive Phonology of Portuguese and English. Washington, D.C.: Georgetown University Press.

Backman, J. (1983) The role of psycholinguistic skills in reading acquisition: a look at early readers. Reading Research Quaterly. 18: 466-479.

Battisti, E. & Vieira, M. J. (1996) O sistema vocálico do português. In: L. Bisol (ed.) Introdução a Estudos de Fonologia do Português Brasileiro.Porto Alegre: Edipucrs.

Ben-Zeev, S. (1977) The influence of bilingualism on cognitive strategy and cognitive development. Child Development. 48: 1009-1018.

Bertoncini, J. & Mehler, J. (1981) Syllables as units in infants' speech perception. Infant Behavior and Development, 4: 247-260.

Bialystok, E. (1985) Toward a definition of metalinguistic skill. Merril-Palmer Quaterly. 31(3): 229-251.

_____ (1986) Facts in the growth of linguistic awareness. Child

Development. 57: 498-510.

_____ (1987) Influences of bilingualism on metalinguistic development. Second Language Research 3 (2):153-166.

_____ (1988) Levels of bilingualism and levels of linguistic awareness. Developmental Psychology. 24 (4): 560-567.

_____ (1988) Aspects of linguistic awareness in reading comprehension. Applied Psycholinguistics. (9): 123-139

Bialystok, E. & Ryan, E. (1985) Toward a definition of metalinguistic skill. Merril-Palmer Quaterly. 31 (3): 229-247.

Bisol, L. (1996) Constituintes prosódicos. In: L. Bisol (ed.) Introdução a Estudos de Fonologia do Português Brasileiro. Porto Alegre: Edipucrs.

Blachman, B. (1991) Phonological awareness: implications for prereading and early reading instruction. In: S. Brady & D. Shankweiler. Phonological Processes in Literacy: a Tribute to Isabelle Liberman. New Jersey: Lawrence Erlbaum.

_____ (1994) What we have learned from longitudinal stuides of phonological processing and reading, and some unanswered questions: a response to Torgensen, Wagner and Rashotte. Journal of Learning Disabilities. 27 (5): 287-291

Bohn, O. & Flege, J. (1993) Perceptual switching in Spanish/English bilinguals. Journal of Phonetics 21: 267-290

Bowey, J. & deBhal, M. (1994) Selective prompting speech repairs in stages I to V: a technique for investigating early metalinguistic abilities. Journal of Psycholinguistic Research 23 (3): 267-275

Bowey, J. & Francis, J. (1991) Phonological analysis as a function os age and exposure to reading. Applied Psycholinguistics. 12: 91-121.

Bowey, J. & Rinu, K. (1988) Metalinguistic ability and early reading achievement. Applied Psycholinguistics. 9: 367-383

Bowey, J. & Tunmer, W. (1984) Word awareness in children. In : W. Tunmer, C. Pratt & M. Herriman (eds) Metalinguistic Awareness in Children. New York: Springer-Verlag.

Bradley, L. (1992) Rhymes, rimes and learning to read and spell. In: C. Ferguson, L. Menn & C. Stoel-Gammon. Phonological Development: Models, Research,Implications. Maryland: York Press.

Bradley, L. & Bryant, P. (1991) Phonological skills before and after learning to read. In: S. Brady & D. Shankweiler. Phonological Processes in Literacy: a Tribute to Isabelle Liberman. New Jersey: Lawrence Erlbaum.

Brown,W., Morris, R. & Weiss, R. (1993) Comparative methods for measurements of VOT. Journal of Phonetics 21: 329-336.

Bruce, D. (1964) The analysis of word sounds by young children. The British Journal of Educational Psychology.34:158-170

Bruck, M. & Genesee, F. (1995) Phonological awareness in young second language learners. Journal of Child Language, 22: 307-324.

Bryant, P. & Bradley, L. (1985) Children's Reading Problems: Psychology and Education.Oxford: Basil Blackwell.

Bryant, P.,Bradley, L., Maclean, M., Crossland, J. (1989) Nursery rhymes, phonological skills and reading. Journal of Child Language, 16: 407-428.

Bryant, P., Maclean, M., Bradley, L., Crossland, J. (1990) Rhyme and alliteration, phoneme detection and learning to read. Developmental Psychology 26 (3): 429-438

Buianowski, E. (1992) Bilingualism and Phonological Awareness. Unpublished Paper. Boston University: Applied Linguistics Program.

Byrne, B. (1996) Treinamento da consciência fonêmica em crianças pré-escolares: por que fazê-lo e qual o seu efeito? In: C. Cardoso-Martins (ed) Consciência Fonológica & Alfabetização. São Paulo: Vozes.

Byrne, B. & Fielding-Barnsley, R. (1991) Evaluation of a program to teach phonemic awareness to young children. Journal of Educational Psychology 83(4): 451-455

Calfee, R., Lindamood, P., Lindamood, C. (1973) Acoustic-phonetic skills and reading: kindergarten through twelfth grade. Journal of Educational Psychology 64 (3): 293-298

Câmara, M. (1953) Para o Estudo da Fonêmica Portuguesa. Rio: Edição da Organização Simões.

Campbell, D. & Stanley, J. (1963) Experimental and Quasi-experimental Designs for Research. Boston: Houghton M. Company.

Caravolas, M. & Bruck, M. (1993) The effect of oral and written language input on children's phonological awareness: a crosslinguistics study. Journal of Experimental Child Phychology 55: 1-30.

Cardoso-Martins, C. (1995) A habilidade de crianças em idade pré-escolar de identificar uma palavra impressa desconhecida por analogia a uma palavra conhecida. In: C. Cardoso-Martins (ed) Consciência Fonológica & Alfabetização. Petrópolis:Vozes.

Carmines, E. & Zeller, R. (1979) Reliability and Validity Assessment. Newbury Park, CA: Sage.

Carrilo, M. (1994) Development of phonological awareness and reading acquisition: A study in Spanish language. Reading and Writing (6) 3: 279-298.

Cary, L. & Verhaeghe, A. (1994) Promoting phonemic analysis ability among kindergartners: effects of different training programs. Reading and Writing 6 (3): 251-278.

Catts, H. (1993) The relationship between speech-language impairments and reading disabilities. Journal of Speech and Hearing Research, 36: 948-958.

Catts, H. & Scott, V. (1994) Measuring Phonological awareness. Unpublished paper. Kansas Early Childhood Research Institute. The University of Kansas.

Cazden, C. (1976) Play with language and metalinguistic awareness: one dimension of language experience. In: J. Bruner & K. Silva (eds) Play: Its Role in Development and Evolution. New York: Basic Books.

Chaney, C. (1992) Language development, metalinguistic skills and print awareness in 3-years-old children. Applied Psycholinguistics 13: 485-514.

_____ (1994) Language development, metalinguistic awareness, and emergent literacy skills of 3-year-old children in relation to social class. Applied Psycholinguistics 15:371-394.

Clark, E. (1978) Awareness of language: some evidence from what children say and do. In: A. Sinclair, R. Jarvella & W. Levelt (eds) The Child's Conception of Language. New Yrok: Springer-Verlag.

Cohn, A. (1990) Phonetic and phonological rules of nasalization. UCLA Working Papers in Phonetics, 76.

Coimbra, M. (1993) Aquisição Fonológica do Português em uma Criança Bilíngüe: Estudo de Caso. Unpublished Master Thesis. Pontifícia Universidade Católica do rio grande do Sul (PUCRS). Porto Alegre.

Cole, P. & Mengler, E. (1994) Phonemic processing of children with language deficits; which tasks best discriminate children with learning disabilities from average. Reading Psychology: An International Quaterly 15: 223-243

Collischonn, G. (1996) A sílaba em português. In: L. Bisol (ed.) Introdução a Estudos de Fonologia do Português Brasileiro. Porto Alegre: Edipucrs

Cowan, R. & Hatasa, Y. (1994) Investigating the validity and reliability of native speaker and second-language learner judgments about sentences. In: E. Tarone, S. Gass, A. Cohen (eds) Research Methodology in Second-language Acquisition. Lawrence Erlbaum: Hillsdale.

Cronbach, L & Meehl, P. (1955) Designing Evaluations of Educational and Social Programs. San Francisco: Jossey-Bass.

Cummins, J. (1977) The cognitive development of bilingual children: review of recent research. Unpublished paper from the Centre for the Study of Mental Retardation - University of Alberta, Edmonton, Canada.

_____ (1978) Bilingualism and the development of metalinguistic awareness. Journal of Cross-Cultural Psychology 9 (2): 131-149

Cunningham, A. (1990) Explicit versus implicit instruction in phonemic awareness. Journal of Experimental Child Psychology.50: 429-444

Davis, K. (1992) Phonetic and phonological contrasts in the acquisition of voicing: a linguistic and developmental study of voice onset time production in Hindi and English. Unpublished doctoral dissertation. Cornell University.

Day, K & Day, H. (1986) Tests of metalinguistic awareness. In: D. Yaden & S.

Templeton (eds) Metalinguistic Awareness and Beginning Literacy: Conceptualizing What it Means to Read and Write. Portsmouth, NH: Heinemann.

DeHouwer, A. (1995) Bilingual language acquisition. In: P. Fletcher & B. MacWhinney. The Handbook of Child Language. Cambridge: Basil Blackwell.

Dunn, L. & Dunn, L. (1981) Peabody Picture Vocabulary Test - Revised. Circle Pines, MN: American Guidance Service.

Dunn, L., Padilla, E., Lugo, D., Dunn, L. (1986) Teste de Vocabulario en Imagenes Peabody. Circle Pines, MN: American Guidance Service.

Ekman, F. (1987) Word-final consonant clusters in interlanguage. In: A. James & J. Leather (eds) Sound Patterns in Second Language Acquisition. Holland: Foris Publications.

Eimas, P., Siqueland, E., Jusczyk, P. & Vigorito, J. (1971) Speech perception in infants. Science, 171: 303-306.

Ellis, R. (1994) The Study of second Language Acquisition. Oxford: Oxford University Press.

Finnegan, D. (1976) Receptive Phoneme Sequencing Knowledge of Kindergarten and Elementary Scools Age Children. Unpublished doctoral dissertation. University of Wisconsin - Madison.

Flege, J. & Hillenbrand, J. (1987) Limits on phonetic accuracy in foreign language speech production. In: R. Scarcella, R. & M. Long (eds.) Issues in Second Language Research. Newbury House Publishers.

Franklin, M. (1979) Metalinguistic functioning in development. In: N. Smith & M. Franklin (eds) Symbolic Functioning in childhood. Hillsdale: New Jersey.

Fox, B. & Routh, D. (1975) Analysing spoken language into words, syllables and phonemes: developmental study. Journal of Psycholinguistics Research 4: 331-342.

Galambos, S. & Hakuta, K. (1988) Subject-specific and task-specific characteristics of metalinguistic awareness in bilingual children. Applied Psycholinguistics 9 (2):141-161

Garton, A. & Pratt, C. (1989) Learning to be Literate: the Development of Spoken and Written Language. Cambridge: Basil Blackwell.

Gass, S. (1994) The reliability of second-language grammaticality judgements. In: E. Tarone, S. Gass, A. Cohen (eds) Research Methodology in Second-language Acquisition. Lawrence Erlbaum: Hillsdale.

Gierut, J., Simmerman, C., Neumman, H. (1994) Phonemic structures of delayed phonological systems. Journal of Child Language 21: 291-316

Gipstein, M. (1992) Phonological awareness in four-and five-year-old children. Unpublished doctoral dissertation. University of Rhode Island.

Golinkoff, R. (1978) Phonemic awareness skills and reading achievement. In: F.B. Murray & J.H. Pikulski (eds) The Acquisition of Reading: Cognitive, Linguistic, and Perceptual Prerequisites. Baltimore: University Park press.

Gombert, J. (1992) Metalinguistic Development. Chicago: The University of Chicago Press.

Göncz, L. & Kodzopeljic, J. (1991) Exposure to two languages in the preschool period: metalinguistic and the acquisition of reading. Journal of Multilingual and Multicultural Development. 2(12): 137-163

Goswami, U. & Bryant, P. (1990) Phonological Skills and Learning to Read. Hillsdale: Erlbaum.

Gouch, P. & Larson, K. (1996) A estrutura da consciência fonológica. In: C. Cardoso-Martins (ed) Consciência Fonológica & Alfabetização. São Paulo: Vozes.

Gronlund, N. (1976) Measurement and Evaluation in Teaching. New York: Collier MacMillan.Third edition.

_____ (1993) How to make Achievement Tests and Assessments (5th edition) Needham Heights, MA: Simon & Schuster Inc.

Grosjean, F. (1982) Life with two Languages. Cambridge: Harvard Univ. Press

Hakes, D. (1980) The Development of Metalinguistic Abilities in Children. New York: Springer-Verlag.

Hakuta, K. (1987) The second-language learner in the context of the study of language acquisition. In: P. Homel, M. Palij & D. Aaron (eds) Childhood Bilingualism : Aspects of Linguistic, Cognitive and Social Development. Hillsdale: L. Erlbaum.

Hakuta, K. & Diaz, R. (1985) The relatioship between degree of bilingualism and cognitive ability: a critical discussion and some new longitudinal data. In: K. Nelson (ed) Children's Language, vol. 5.

Harbes, H. (1994) The Impact of Intervention on Production, Feature Awareness, and General Phonological Awareness. Unpublished doctoral dissertation. Universtity of Illinois at Urbana - Champaign.

Hatch, E. & Farhady, H. (1982) Research Design and Statistics for Applied Linguistics. London: Newbury House Publishers.

Hirsh-Pasek, K., Gleitman, L., Gleitman, H. (1978) What did the brain say to the mind? A study of the detection and report of ambiguity by young children. In: A. Sinclair, J. Jarvella, W. Levelt (eds) The Child's Conception of Language. Heildelberg: Springer-Verlag.

Huang, H. & Hanley, R. (1994) Phonological awareness and visual skills in learning Chinese and English.Cognition 54: 73-98

Ianco-Worrall, A. (1972) Bilingualism and cognitive development. Child Development, 43: 1390-1400.

Ingram, D. (1976) Phonological Disability in Children. London: Edward Arnold.

_____ (1989) First Language Acquisition: Method, Description and Explanation. New York: Cambridge Univ Press.

_____ (1991) Toward a theory of phonological acquisition. In: J. Miller (ed)

Research on Child Language Disorders. Austin, TX: Pro-Ed.

International Conference on Infant Studies (1996) Providence, Rhode Island. April 18-21.

James,A. (1987) Prosodic structure in phonological acquisition. Second Language Research. 3 (2): 118-140

_____ (1984) Children's problem solving. In: M. Lamb, A. Brown, B. Rogoff (eds) Advances in Developmental Psychology. Vol 3. Hillsdale, NJ: Erlbaum.

_____ (1986) From meta-processes to conscious access: evidence from children's metalinguistic and repair data. Cognition 23: 95-147.

Kato, M. (1992) A Concepção da Escrita pela Criança. Campinas: Pontes.

Kazdin, A. (1992) Research Design in Clinical Psychology. (2nd edition) Massachussets: General Psychology Press.

Kemper, R. & Vernooy, A. (1993) Metalinguistic awareness in first graders: a qualitative persepective.Journal of Psycholinguistics Resarch. 22 (1):41-57

Kent, R. (1992) The biology of phonological development. In: C. Ferguson, L. Menn, C. Stoel-Gammon. Phonological Development: Models, Research and Implications. Maryland: York Press.

_____ (1994) Reference Manual for Communicative Sciences and Disorders: Speech and Language. Austin: Pro-Ed.

Kent, R. & Read, C. (1992) The Acoustic Analysis of Speech. San Diego: Singular Publishing Group.

Kenstowicz, M. (1994) Phonology in Generative Grammar Cambridge: Blackwell.

Kess, J. & Hoppe, R. (1983) Individual differences and metalinguistics abilities. The Canadian Journal of Linguistics. 28 (1): 47-52

Klein, H., Lederer, S., Cortese, E. (1991) Children's knowledge of auditory - articulatory correspondence: phonologic and metaphonologic. Journal of Speech and Hearing Research 34: 559-564

Knafle, J. (1974) Children's discrimination of rhyme. Journal of Speech and Hearing Research 17: 367-372.

Kolinsky, R., Cary, L., Morais, J. (1987) Awareness of words as phonological entities: the role of literacy Applied Psycholinguistics 8: 223-232

Konefal, J. & Fokes, J. (1981) Voice onset time: the development of Spanish/English distinction in normal and language disordered children. Journal of Phonetics 437-444

Kushner, M. (1986) The relationship between perception and production in the speech system of children in the process of becoming bilingual. Unpublished doctoral dissertation. Boston University. Boston.

Ladefoded, P. (1982) A Couse in Phonetics (2nd) San Diego: Harcourt, Brace,

Jovanovich.

Lambert, W. (1975) Culture and language as factors in learning and education. In: A. Wolfang (ed) .Education of Immigrant Students Toronto: Ontario Institute for Studies in Education.

Lamprecht, R. (1991) Aquisição da linguagem pela criança depois dos cinco anos de idade. In: M. Tasca (org.) Desenvolvendo a Língua Falada e Escrita. Porto Alegre: Sagra.

Larivee, L. (1994) An Investigation of the Relationship Between Speech-sound Production Deficits and Phonological Awareness. Unpublished doctoral dissertation.University of Kansas.

_____ (1995) The relationship between phonological awareness and speech, language, and reading. Poster Session Presented at the Symposium on Research in Child Language Disorders, University of Wisconsin- Madison. June 2, 3.

Larsen-Freeman, D. & Long, M. (1991) An Introduction to Second Language Acquisition Research. New York: Longman.

Lehman, S. (1961) Exact and approximate distributions for the Wilcoxon statistic with ties. Journal of the American Statistical Association (JASA) 56: 293-298.

Lenchner, O., Gerber, M., Donald, R. (1990) Phonological awareness tasks as predictors of decoding ability: beyond segmentation. Journal of Learning Disabilities 23 (4): 240-247

Levelt,, W., Sinclair, A. & Jarvella, R. (1978) Causes and functions of linguistic awareness in language acquisition: some introductory remarks. In: A. Sinclair, J. Jarvella, W. Levelt (eds) The Child's Conception of Language. Berlin: Spring-Verlag.

Lewis, B. & Freebairn, L. (1992) Residual effects of preschool phonology disorders in grade school, adolescence, and adulthood. Journal of Speech and Hearing Research, 35: 819-831.

Lewkowicz, N. (1980) Phonemic awareness training: what to teach and how to teach it. Journal of Educational Psychology 72 (5): 686-700

Liberman, I. (1973) Segmentation of the spoken word. Bulletin of the Orton Society, 23: 65-77.

Liberman, I., Shankweiler, D., Fisher, F., Carter, B. (1974) Explicit syllable and phoneme segmentation in the young child. Journal of Experimental Child Psychology 18: 201-212

Lindeman, R. (1976) Medidas Educacionais: Testes Objetivos e Outros Instrumentos de Medida para a Avaliação de Aprendizagem. Porto Alegre: Editora Globo.

Lowe, R. (1994) Phonology: Assessment and Intervention Applications in Speech Pathology. Baltimore: Williams & Wilkins.

Lundberg, I. (1978) Aspects of linguistic awareness related to reading. In: A. Sinclair, R. Jarvella & W. Levelt (Eds.) The Child's Conception of Language. Berlin:Springer-Verlag.

_____ (1991) Phonemic awareness without reading instruction. In: S. Brady & D. Shankweiler. Phonological Processes in Literacy: a Tribute to Isabelle Liberman. New Jersey: Lawrence Erlbaum.

Maclean, M., Bryant, P. & Bradley, L. (1987) Rhymes, nursery rhymes and reading in early childhood. Merrill-Palmer Quaterly, 33: 255-282.

Machado, M. (1993) Fenômenos de nasalização vocálica em português: estudo cine-radiográfico. Cadernos de Estudos Lingüísticos (25): 113-127

Magnusson, E. (1990) Consciência metalingüística em crianças no desenvolvimento normal e com desvios. In: M. Yavas (ed) Desvios Fonológicos em Crianças: Teoria, Pesquisa e Tratamento. Porto Alegre: Mercado Aberto.

Mann, V. (1991) Are we talking too narrow a view of the conditions for development of phonological awareness? In: S. Brady & D. Shankweiler. Phonological Processes in Literacy: a Tribute to Isabelle Liberman. New Jersey: Lawrence Erlbaum.

_____ (1993) Phoneme awareness and future reading ability. Journal of Learning Disabilities. 26 (4): 259-269

Mann,V. & Libernman,I. (1984) Phonological awareness and verbal short-term memory. Journal of Learning Disabilities. 17: 592-599

Marascuilo, L. & Serlin, R. (1988) Statistical Methods for the Social and Behavioral Sciences. New York: W.H. Freeman & CO.

Marsh, G. & Mineo, R. (1977) Training preschool children to recognize phonemes in words. Journal of Experimental Psychology, 69: 748-753.

Massaro, D. & Cohen, M. (1983) Phonological context in speech recognition. Perception & Psychophysics 34(4): 338-348.

Mattingly, I. (1972) Reading, the linguistic process, and linguistic awareness. In: J. Kavanagh & I. Mattingly (eds) Language by ear and by eye. Cambridge: MIT Press.

McBride-Chang, C. (1995) What is phonological awareness? Journal of Educational Psychology 87 (2): 179-192.

McLaughlin, B. (1978) Second Language Acquisition in Childhood. Hillsdale: Lawrence Erlbaum.

Menyuk, P. (1993) Metalinguistics difficulties in children with specific language impairment: implications for diagnosis and intervention. In: H. Grim, H. & S. Helmut, (eds) Language Acquisition and Reading Disorders: Aspects of Diagnosis and Intervention. Berlin: De Gruyter.

Moraes, J. & Wetzels, L. (1992) Sobre a duração dos segmentos vocálicos nasais e nasalizados em português: um exercício de fonologia experimental. Cadernos de Estudos Lingüísticos. (23):153-166. Campinas.

Morais, J. (1985) Literacy and awareness of the units of speech: implications for research on the units of perception. Linguistics 23: 707-721

_____(1991) Phonological awareness: a bridge between language and literacy. In: D. Sawyer & B. Fox .(eds) Phonological Awareness in Reading: the Evolution of current perspectives. Berlin: Springer-Verlag.

_____(1991) Constraints on the development of phonemic awareness. In: S. Brady & D. Shankweiler. Phonological Processes in Literacy: a Tribute to Isabelle Liberman. New Jersey: Lawrence Erlbaum.

_____(1994) Introduction: Reasons to pursue the study of phonological awareness. Reading and Writing (6) 3: 219-220.

Morais, J., Cary, L., Alegria, J. & Bertelson, P. (1979) Does awarenes of speech as a sequence of phones arise spontaneously? Cognition. 7: 323-331

Morais, J., Bertelson, P., Cary, L., Alegria, J. (1986) Literacy training and speech segmentation. Cognition 24: 45-64.

Morais, J., Content, A., Bertelson, P., Cary, L. & Kolinski, R. (1988) Is there a critical period for the acquisition of segmental analysis? Cognitive Neuropsychology. 5 (3): 347-357

Mota-Maia, E. (1986) No Reino da Fala: A linguagem e Seus Sons. São Paulo:Ed Ática.

Näsland, J. & Schneider, W. (1991) Longitudinal effects of verbal ability, memory capacity and phonological awareness on reading performance. European Journal of Psychology of Education. 6 (4): 375-392

Nesdale, A. & Tunmer, W. (1984) The development of metalinguistic awareness: a methodological overview. In: W. Tunmer, C. Pratt, M. Herriman (eds) Metalinguistic Awareness in Children. New York: Springer-Verlag.

Nesdale, A., Herriman, M., Tunmer, W. (1984) Phonological awareness in children. In: W. Tunmer, C. Pratt, M. Herriman (eds) Metalinguistic Awareness in Children. New York: Springer-Verlag.

Nicolaidis, E. (1992) Word and Phonological Awareness in Preliterate children: the Effect of a Second Language. Unpublished Master Thesis. McGill University, Montreal.

O'Connor, R., Jenkins, J., Leicester, N., Slocum, T. (1993) Teaching phonological awareness to young children with learning disabilities. Exceptional Children 59 (6): 532-546

O'Connor, R., Jenkins, J., Slocum, T. (1995) Transfer among phonological tasks in kindergarten: essential instructional content. Journal of Educational Psychology 87 (2): 202-217

Oller, K., Cobo-Lewis, A. & Eilers, R. (in press) Phonological translation in bilingual and monolingual children.To appear in: Applied Psycholinguistics.

Parker, R. (1993) Threats to the validity of research. Rehabilitation Counseling Bulletin (36): 130-138.

Pedhazur, E. & Schmelkin, I. (1991) Measurement, Design and Analysis: an Integrated Approach. Hillsdale: Earlbaum.

Piper, T. (1987) On the difference between L1 and L2 acquisition of phonology.

Canadian Journal of Linguistics 32 (3): 245-259.

Pratt, C. & Grieve, R. (1984) The development of metalinguistic awareness: an introduction. In: W. Tunmer, C. Pratt & M. Herriman (eds) Metalinguistic Awareness in Children. New York: Springer-Verlag.

Read, C. (1971) Pre-school children's knowledge of English phonology. Harvard Educational Review. 41(1): 1-34.

_____ (1978) Children's awareness of sounds, with emphasis on sound systems. In: A. Sinclair, J. Jarvella, W. Levelt (eds) The Child's Conception of Language. Berlin: Spring-Verlag.

_____ (1991) Access to syllable structure in language and learning. In: S. Brady & D. Shankweiler. Phonological Processes in Literacy: a Tribute to Isabelle Liberman. New Jersey: Lawrence Erlbaum.

Read, C., Zhang, Y., Nie, H., Ding, B. (1986) The ability to manipulate speech sounds depends on knowing alphabetic spelling. Cognition 24, 31-44.

Repp, B. & Svastikula, K. (1988) Perception of the [m]-[n] distinction in VC syllables. Journal of the Acoustical Society of America. 83: 237-247.

Roazzi, A., Oliveira, G., Bryant, P. & Dowker, A. (1994) As habilidades lingüísticas e sua relação com o nível de consciência fonológica. Cadernos de Estudos Lingüísticos. (26):135-158.

Rueda, R. (1983) Metalinguistic awareness in monolingual and bilingual mildy retarded children. NABE (The Journal of the National Association for Bilingual Education) 8(1): 55-67

Sawyer, D. (1991) Inquiry into the nature and function of auditory segmenting abilities: in search of the roots of reading. In: D. Sawyer & B. Fox (eds) Phonological Awareness in Reading: the Evolution of Current Perspectives. New York: Spring-Verlag.

Scliar-Cabral, L. (1991) Introdução à Psicolingüística. São Paulo: Ed. Ática.

Sendlmeier, W. (1995) Feature, phoneme, syllable or word: how is speech mentally represented? Phonetica 52: 131-143.

Selinker, L. (1972) Interlanguage. International Review of Applied Linguistics 10: 209-231.

Seymour, P. & Evans, H. (1994) Levels of phonological awareness and learning to read. Reading and Writing: An Interdisciplinary Journal 6(1): 221-249.

Sinclair, A., Jarvella, R. & Levelt, W. (1978) The Child's Conception of Language. Heildelberg: Springer-Verlag.

Slocum,T., O'Connor, E., Jenkins, J. (1991) Transfer among phonological manipulation skills. Journal of Educational Psychology 85 (4): 618-630

Smith, C. & Tager-Flusberg, H. (1982) Metalinguistic awareness and language development. Journal of Experimental Child Psychology.34: 449-468

Snow, C. (1987) Language proficiency: towards a definition. In: G. Appel, H.

Dechert (eds) A Case for Psycholinguistics Cases. Amsterdam: John B. Publishing Company

_____ (1993) Bilingualism and Second Language Acquisition. In: J. Gleason & N. Ratner (eds) Psycholinguistics Today. Holt, Rinehart & Winston.

Spector, J. (1992) Predicting progress in beginning reading: dynamic assessment of phonemic awareness. Journal of Educational Psychology 84 (3): 353-363.

Stahl, S. & Murray, B. (1994) Defining phonological awareness and its relationship to early reading. Journal of Educational Psychology 86 (2): 221-234

Stanovich, K., Cunningham, A., & Cramer, B. (1984) Assessing phonological awareness in kindergarten children: Issues of task comparability. Journal of Experimental Child Psychology 38: 175-190.

Swank, L. (1991) A Two Level Hypothesis of Phonological Awareness. Doctoral dissertation at the University of Kansas.

Tallal, P. (1980) Auditory temporal perception, phonics, and reading disabilities in children. Brain and Language, 9: 182-198.

Tangel, D. & Blachman, B. (1995) Effect of phoneme awareness instruction on the invented spelling of first-grade children: a one-year follow-up. Journal of Reading Behavior 27 (2): 153-185

Torgesen, J., Morgan, S., Davis, C. (1992) The effects of two types of phonological awareness training on word learning in kindergarten children Journal of Educational Psychology. 84 (3): 364-370

Treiman, R. (1985) Onset and rimes as units of spoken syllables: evidence from children. Journal of Experimental Child Psychology, 39: 161-181.

Treiman, R. & Breaux, A. (1982) Common phoneme and overall similarity relations among spoken syllables: their use by children and adults. Journal of Psycholinguistic Research. 11 (6): 569-597

Treiman, R. & Danis, C. (1988) Short-term memory errors for spoken syllables are affected by linguistic structure of syllables. Journal of Experimental Psychology, 14: 145-152.

Treiman, R. & Zukowski, A. (1991) Levels of phonological awareness. In: S. Brady & D. Shankweiler (eds) Phonological Processes in Literacy. New Jersey: L. Erlbaum.

Tropf, H. (1987) Sonority as a variability factor in second language phonology. In: A. James & J. Leather (eds) Sound Patterns in Second Language Acquisition. Holland: Foris Publications.

Tunmer, W., & Herriman, M. (1984) The development of metalinguistic awareness: a conceptual overview. In: W. Tunmer, C. Pratt & M. Herriman (eds) Metalinguistic Awareness in Children. New York: Springer-Verlag.

Tunmer, W. & Nesdale, A. (1982) The effects of digraphs and pseudowords on phonemic segmentation in young children. Applied Psycholinguistics. 3: 299-311

Tunmer, W., Herriman, M., Nesdale, A. (1988) Metalinguistic abilities and beginning reading. Reading Research Quaterly 23 (2): 134-158

Tunmer, W., Nesdale, A. & Pratt, C. (1983) The development of young children's awareness of logical inconsistencies. Journal of Experimental Child Psychology, 36: 97-108.

Tunmer, W. & Rohl, M. (1991) Phonological awareness and reading acquisition. In: D. Sawyer & B. Fox (eds) Phonological Awareness in Reading: the Evolution of Current Perspectives. New York: Springer-Verlag.

Utman,J. & Blumstein, S. (1994) The influence of language on the acoustic properties of phonetic teatures: a study of the feature [strident] in Ewe and English. Phonetica (51): 221-238.

Varella, N. (1993) Na Aquisição da Escrita pela Criança Ocorrem Processos Fonológicos Similares aos da Aquisição da Fala? Dissertação de Mestrado. PUCRS. Porto Alegre.

Vellutino, F. & Scanlon, D. (1988) Phonological coding, phonological awareness and reading ability: evidence from a longitudinal and experimental study. In: K. Stanovich. Children's Reading and the Development of Phonological Awareness. Detroit: Wayne State University Press.

Vihman,M. & McLaughlin,B. (1982) Bilingualism and second language acquisition in preeschool children. In: C. Brainerd & M. Pressley. Verbal Processes in Children: Progress in Cognitive Development Research. New York: Springer-Verlag.

Wagner, R., Torgesen, J., Laughon, P., Simmons, K., Rashotte, C. (1993) Development of young reader's phonological processing abilities. Journal of Educational Psychology 85 (1): 83-103

Walley, A., Smith, L. & Jusczyk, P. (1986) The role of phonemes and syllables in the perceived similarity of speech sounds for children. Memory and Cognition, 14: 220-229.

Walton, P. (1995) Rhyming ability, phoneme identity, letter-sound knowledge, and the use of orthographic analogy by prereaders. Journal of Educational Psychology 87 (4): 587-597

Williams, L. (1980) Phonetic variation as a function of second-language learning. In: Yeni-Komshian, Kavanagh, C. Ferguson (eds) Child phonology vol. 2: Perception. New York: Academic Press.

Wode,H. (1992) Categorical perception and segmental coding in the ontogeny of sound systems: a universal approach. In: C. Ferguson, L. Menn, C. Stoel-Gammon. Phonological Development: Models, Research and Implications. Maryland: York Press.

_____ (1994) L1 and L2 phonology: looking ahead. In: M.Yavas (ed) First and Second Language Phonology.San Diego: Singular Publishing Group, Inc.

Yavas, F. (1988) Habilidades metalingüísticas na criança: uma visão geral Caderno de Estudos Lingüísticos 14: 39-51

_____ (1991) Fatores no desenvolvimento da consciência fonêmica. Boletin da Abralin 12: 117-127

Yavas, F. & Haase, V. (1988) Consciência fonêmica em crianças na fase da alfabetização. Letras de Hoje, 74: 31-56.

Yelland, G., Pollard, J., Mercuri, A. (1993) The metalinguistic benefits of limited contact with a second language. Applied Psycholinguistics 14: 423-444

Yopp, H. (1988) The validity and reliability of phonemic awareness tests. Reading Research Quaterly 23 (2): 159-177

Zhurova, L. (1963) The development of analysis of words into their sounds by preschool children. Soviet Psychology and Psychiatry 2 (2): 17-27

APPENDIX A

PILOT SERIES

Methodology Used

It had been hypothesized that the average bilingual child to participate in this study would be living in the United States and would possibly be more proficient in Portuguese. Due to the low probability of finding at least 15 participants that might fit the above criteria, the first design proposed tried to avoid the problem of low power to estimate the effect size in small samples by proposing a design in which children would be tested twice, i.e., in two different occasions. Therefore, in the first research design constructed, the bilingual group would always be tested in their more proficient language first (Portuguese) and second in English. For comparability and equality of treatments in the groups, the monolingual groups should also be tested twice. The testing sessions were designed to test the same oppositions twice, with the exception of the phoneme theta (see explanation below).

Each participant should be tested in two sessions of one hour each scheduled to two different days, the idea being that the same four basic oppositions (nasal deletion, phoneme theta, deletion or production of oral stricture in syllable final position and aspiration) should be tested in both occasions. For this reason, all subtests were doubled. However, the subtest dealing with the phoneme theta was not doubled due to the lack of lexical items with this phoneme in word initial position in English suitable for the child's vocabulary. Therefore, it was possible to create only one test for this opposition (test E6). In order to equate the treatment of the bilinguals and monolinguals, two comparable sets of three tests containing the oppositions: nasal deletion, deletion or production of oral stricture in syllable final position and aspiration were developed. In addition, a foil test was added in each group to compensate for the limitation imposed by the phoneme theta so that same testing length could be preserved on both languages.

A brief summary of each opposition being tested and its respective subtest label is listed:

American Monolingual Group:

Testing Session One

E1: Nasal Deletion

E2: foil to preserve the same testing lenght: ex: *family* produced by the puppet as [s mli]

E3: Deletion of the oral stricture in syllable final nasal

E4: Aspiration

Testing Session Two

E5: Nasal deletion
E6: Phoneme substitution with theta
E7: Deletion of the oral stricture in syllable final nasal
E8: Aspiration

Bilingual Group:
Testing Session One
P1: Nasal deletion
P2: Foil
P3: Production of the oral stricture in syllable final nasal
P4: Aspiration
Testing Session Two
E5: Nasal deleetion
E6: Phoneme substitution with theta
E7: Production of the oral stricture in syllable final nasal
E8: Aspiration

Brazilian Monolingual Group:
Testing Session One
P1: Deletion of final nasals
P2: Phoneme substitution with theta
P3 Production of the oral stricture in syllable final nasal
P4: Aspiration
Testing Session Two
P5: Deletion of in final nasals
P6: Foil test to preserve the same testing lenght
P7: Production of the oral stricture in syllable final nasal
P8: Aspiration

It should be added that it had been hypothesized that the pairwise comparisons between monolingual and bilingual should meet a specific criterium. The main comparison would be the bilinguals tested in their more proficient language (Portuguese) versus monolingual Portuguese. Thus the ordering of subtests in the two sessions for this comparison for each child would be the following: a) Bilinguals tested in Portuguese would be tested with P1, P2, P3, P4 in the first session and with E5, E6, E7, E8 in the second session, and b) Brazilian Monolinguals would be tested with P1, P2, P3, P4 in the first session and with P5, P6, P7, P8 in the second session. These two groups' scores would then be compared only at P1, P2, P3 and P4.

The second comparison would be the bilinguals tested in English versus monolingual Americans. The ordering of tests in the two sessions for this comparison would be the following: a) Bilinguals in English would be tested with P1, P2, P3, P4 (in session one); and with E5, E6, E7, E8 (in session two), and b) Monolingual Americans with E1, E2, E3, E4 (in session one); E5, E6, E7, E8 (in session two). The valid comparisons for these two groups would be pairwise comparisons on tests E5, E6, E7 and E8 only.

The Figure below displays visually the distribution of subtests per language group (each subtest contains 20 lexical items, therefore 20 possible total scores per subtest):

Figure 11- Total number of possible scores per language group in the first research design

Subtests	Bilingual in Portuguese	Brazilian Portuguese	Bilingual in English	American Monolingual
P1	20	20	20	--
P2	20	20	20	--
P3	20	20	20	--
P4	20	20	20	--

P5	--	20	--	--
P6	--	20	--	--
P7	--	20	--	--
P8	--	20	--	--
E1	--	--	--	20
E2	--	--	--	20
E3	--	--	--	20
E4	--	--	--	20
E5	20	--	20	20
E6	20	--	20	20
E7	20	--	20	20
E8	20	--	20	20
Total possible scores per group	160	160	160	160

The following reasons are given why this first design was not used in the present study:
1) Timewise restrictions - The Brazilian Consulate in Boston gave notice of a bilingual program for Portuguese and English effective in selected public schools throughout the Boston area very late. From Madison, WI, the whole process of getting official permission as well as the contacting of schools, sending out consent letters and receiving responses back in Madison (due to a delay in the parenting sending of the consent forms) took five months. The data collection in Boston started only in April 10, 1996. This posed a serious restriction in terms of testing each child twice, since the data collection in Madison had already been scheduled for May 17. It was not possible to postpone the data collection with the monolingual children in Madison because the preschool year ends up in the first week of June. Therefore, instead of testing fewer bilingual children twice, it was decided to test all the participants only once.
2) Bilingual children's preschool attendance - According to the James Otis kindergarten teacher in Boston, the bilingual children attendance was not very reliable and the researcher might have problems tracking down the same child for two different testing sessions. In fact, the researcher was able to confirm this observation while collecting the data in that school, since a considerable number of kids consistently missed classes. The reason for such a high rate of missing classes might have to do with two possible reasons suggested by the teacher: first, the preschool schedule poses some discomfort to some parents who have to leave their jobs in the middle of the working day to pick up or deliver the child (the two kindergarten schedules are the: from 8:30 am to 11:00 am or from 11:30 am to 2:00 pm). Second, because some parents work at night hours, it is very common for them to sleep in during the morning hours, provoking their child to stay home and miss school.

The first two groups of children found

The first bilingual group found

The first responses of the survey were received mostly by E-mail and totalled ten children in Madison, WI, three in Minneapolis, MN and one in Ithaca, NY. All these fourteen bilinguals were children of doctorate students in their respective cities.

The first monolingual group found

In order to contact matching American monolingual children for the fourteen bilinguals mentioned above, the researcher applied for the Waisman Center kindergarten program (Waisman Early Childhood Program - WECP) in Madison. The kindergarten program at WECP is attended by predominantly American middle class families. A great number of the WECP parents are professors or have related faculty jobs at the university. Therefore, the profile of the Midwest bilingual and Madison monolingual groups matched very well. The final permission to work with the WECP childern was granted in Feb 1996. However, due to small sample sizes it was decided not to use the Midwest group.

The second bilingual group found

The profile of the bilingual children from Boston differed significantly from the fourteen bilinguals first contacted in Madison, Minneapolis and Ithaca. Two major differences are listed below:

Midwest Group Parent's Profile: a) Brazilian middle class; b) average parent schooling: doctoral level.

Boston Group Parent's Profile: a) Brazilian lower middle class; b) average parent schooling:elementary and high school level.

Due to the intrinsic sociolinguistic disparities between the two groups listed above, it was not possible to use them together in this research. Since the Boston group (n=37) outnumbered the Midwest group (n=14) it was decided to collect the data in Boston instead of in the Midwest.

The Pilot Testing

The subtests had first been planned to be presented to the child in a video tape show fashion. However, the high cost for the tv show turned out to be a hindrance to the project. The idea for a video tape evolved from the idea that a video show tends to have less variability than a live puppet show, since the audio and visual stimuli are already pre recorded and thus fixed ruling out any possible variation on the visual stimuli. Although the live puppet show presents some variability in terms of visual performance, it adds to a more comfortable and interactive testing environment, both to the child and to the researcher.

In relation to the ordering of the subtests in the testing session, the subtests were tentatively rank ordered according to level of perceptual difficulty based on the pilot data results with the monolingual English kids. As discussed in the METHOD chapter, the decision of dealing with different degrees of difficulty is anchored on the assertion that it would be necessary to expose the child to tests that reflected different roles in perceptual magnitude.

In May 1995, the full script for the puppet show was recorded by the researcher in a homemade tape. A pilot session was conducted with two American adults (Anna and Theresa). In these two occasions, subtests E1 and E2 were shown and the participants were encouraged to point to the puppets in order to answer the questions, instead of manipulating the toys (see Figure 12). The objective for this pilot with two adults was to see whether the instructions were clear and accecible. The idea of testing every child for one hour posed the challenge of overcoming the child's short attention span. In order to avoid a burdensome session for the child, the puppet games were pilot tested with intervals in between games.

Five pilot sessions were conducted with five monolingual American children in Madison - Wisconsin. These pilot sessions were intended to analyze whether the script and the first version of the toys were adequate to the preschool age as well as to see if they were good enough to keep the child's interest and motivation throughout the testing session. The pilot sessions were conducted at the children's own houses and four metaphonological ability subtests per session were presented to the children without pictures (Abi, Mall, David, Lydia and Maggie). The results showed that the instrument was adequate to the preschool age level and that the pictures representing each word being tested were really necessary. The pilot conducted was also useful to detect the need for special toys to be used in the real data collection so that the child might have a better performance in the game by playing with the toys.

Since the stimulus tape was compromised by the researcher's Portuguese accent, these first pilot sessions were not intended to evaluate the child's mephonological ability.

A third pilot series was conducted. This time with five American monolingual children (Hillary, Joseph, Sam, Kelsey and Aaron) and one Brazilian bilingual child (Lucas). This third series was conducted in November/December of 1995 in Madison - Wisconsin.

It is clear in Figure 12 that the first research design proposed (two sessions per child) was used in all pilot sessions. The adults and four of the children: Abi, Mall, Maggie and

Kelsey were tested only once. Six children were tested in two sessions: David, Lydia, Hillary, Joseph, Sam and Aaron, all monolingual Americans. Lucas, the only bilingual child piloted, was tested first in Portuguese (P1 through P4) and second in English (E5 through E8).

An item analysis was conducted with the pilot data. Only one item was missed by all children and this item was not used on the data collection.

The design that was actually adopted for the present study (only four subtests instead of eight subtests) was developed in order to account for the possibility of finding at least 20 bilingual participants. In this case, half of the bilingual children would be tested in Portuguese and the other half in English only, ruling out the necessity for having two testing sessions. According to this second design, all children would be tested only once. The tape stimuli used on this second desing was a collection of the best testing items taken from the first tape which contained the former eight subtests. The selection of items for this shrunk version of the stimuli was done based on an item analysis done with the pilot data.

Figure 12 - Pilot scoring in each subtest followed by the observation of whether or not pictures were shown to the child, status of stimuli and the PPVT standard scores

Participant (Age in years)	**E1**	**E2**	**E3**	**E4**	**E5**	**E6**	**E7**	**E8**	**OBS.**	**PPVT**
Anna (27)	19	18	-	-	-	-	-	-	No toys; no pictures; compromised tape stimuli*	n/a**
Theresa (26)	18	18	-	-	-	-	-	-	No toys; no pictures; compromised tape stimuli*	n/a
Abi (3:8)	12	10	12	12	-	-	-	-	Use of toys; no pictures; compromised tape stimuli*	n/a
Mall (5:6)	17	16	12	17	-	-	-	-	Use of toys; no pictures; compromised tape stimuli*	n/a
David (3:7)	10	14	4	14	14	11	13	6	Use of toys; no pictures; compromised tape stimuli*	n/a
Lydia (6:11)	19	15	17	17	18	17	18	19	Use of toys; no pictures; compromised tape stimuli*	n/a
Maggie (6:2)	18	19	16	13	-	-	-	-	Use of toys; no pictures; compromised tape stimuli*	n/a
Hillary (3:8)	16	13	11	12	15	13	11	10	Use of pictures and toys; First professional version of tape stimuli	113
Joseph (4:0)	16	17	14	12	14	6	12	11	Use of pictures and toys; First professional version of tape stimuli	116
Sam (4:1)	15	16	14	9	14	13	16	11	Use of pictures and toys; First professional version of tape stimuli	114
Kelsey (4:4)	12	14	7	14	-	-	-	-	Use of pictures and toys; First professional version of tape stimuli	106
Aaron (5:1)	18	19	18	14	20	16	19	19	Use of pictures and toys; First professional version of tape stimuli	110
	P1	**P2**	**P3**	**P4**	**E5**	**E6**	**E7**	**E8**		
Lucas (5:2)	17	17	11	13	20	13	20	15	Use of pictures and toys; First professional version of tape stimuli	P[1]: 108 E[2]: 99

* compromised stimuli = homemade tape in which the researcher did the voices of the English speaking puppets with Portuguese accent
** not applicable
[1] Peabody in Portuguese
[2] Peabody in English

APPENDIX B

ENGLISH SUBTESTS TAPE SCRIPT

SUBTEST E1

The researcher starts the session playing with the child so that the child gets comfortable. The researcher invites the child to join in a fun game. The tape recorder is turned on and a narrator puppet enters the scene.(10-second-song)

Hubert

Hi, today we are going to meet two friends. They are fun to play with. Their favorite game is: Guess who said the word! You get to play with them. But first let's meet them. *(10-second-song)*

Spot

Hi, I'm Spot. I'm so silly. Nobody else talks like me. Listen! Everybody else says **moon** (normal pronouciation, therefore, it is a foil = f). I say **moon** (without nasal consonant neither nasal spreading = WN). Do you want to hear another one? Everybody else says **gum** (f). I say **gum** (WN). Don't I sound silly? *(10-second-so.kng)*

Dick

Hi! My name is Dick. I say words like everybody else. I say words that are right. I always laugh at Spot because he's so silly. Spot talks silly. Spot says **moon** (WN) . I say **moon** (f). Spot says **gum** (WN), but I say **gum** (f). See? Dick always talks right!

The child is introduced to two replicas of Dick and Spot. Under each replica there is a box and the child is instructed to answer to the puppet's questions by putting a token (an object) in the respective puppet's box. The researcher explains that the child will be playing 4 games and at the end of each game the child will stick a picture to a corresponding box on a game chart as a sign of accomplishment of each game The tape is turned on again. (5-second-song)

Hubert

Here is how we play: First, point to who always talks silly. And what's his name? Very good! Point to who always talks right. And what's his name? All right! So now you will hear many words and you have to guess who said the word, ok? If you think it's Dick speaking, you give Dick a lid. If you think it's Spot speaking, you give Spot a lid.

(The researcher stops the tape and interacts with the child to be sure that he/she is understanding the task by asking):

Let's see, if I say the word: **fun** (f) like this, who will you give the lid to? And if I say the word **ten** (WN) like that, who will you give the lid to? Good job! Listen hard! Be a good guesser and you'll win a surprise at the end of the 4 games!

The researcher places on the hand of the child the first lid labeled with the letter A that will be used to answer the first training question before the scoring questions begin. The tape is on again. (5-second-song)

Hubert

Let's start our first game! Guess who says **sun, sun** (WN). Give Spot or Dick a lid.

The researcher pauses the tape to give time for the child to answer. After the child answers, the researcher gives to the child another lid (labeled B) and turns the tape on again:

Let's see if you did it right. Spot says **sun** (WN) like that, right? Did you give **Spot** the lid? Ok! Guess who says **pin, pin** (f). Give Dick or Spot a lid.

The researcher pauses the tape to give time for the child to answer. The tape is turned on again. Hubert continues asking:

Did you give Dick the lid? All right! ... Guess who says **rain, rain** (f) like that? Give Dick or Spot a lid.

The researcher pauses the tape to give time for the child to answer. The tape is turned on again. Hubert continues asking:

Did you give Dick the lid? Very good. *(10-second-song)*

Spot
Here's another word that I say in a silly way: **broom** (WN). Only Spot can talk like that! I love to talk silly!
(10-second-song)
Dick
Spot is so silly! I don't talk like him. I say **broom** (f). I always talk right. *(10-second-song)*
Hubert
So now you're ready to play! Listen hard! Be a good guesser!...
1. Guess who says **mailman, mailman** (f)? Give Spot or Dick a lid.
2. Guess who says **dolphin, dolphin** (WN)? Give Spot or Dick a lid.
3. **Woman** (WN). Who says **woman** (WN) like that?
4. **Game** (f)**.** Who says **game** (f)? Give Spot or Dick a lid.
5. **Fan** (f). Who says **fan** (f)?
6. **Indian** (WN). Who says **indian** (WN)?
7. **Lion** (WN). Guess who says **lion** (WN), Spot or Dick ?
8. **Muffin** (f). Who says **muffin** like that (f)?
9. **Drum** (WN). Who says **drum** (WN) like that?
10. And how about **valentine, valentine** (WN)?
11. **Pan** (f). Who says **pan** (f)?
12. Guess who says **bedroom, bedroom** (WN)?
13. And how about **policeman** (f). Who says **policeman** (f) like that? *(5-second-song)*
Hubert
Dick and Spot are having fun with you. Guess hard and you can win a surprise! Are you ready for more words? Here they come....
14. **Mitten** (f). Who says **mitten** (f) like that, Spot or Dick?
15. **Pumpkin** (WN). Who says **pumpkin** (WN)?
16. **Button** (f). Who says **button** (f)?
17. **Dragon** (f). Who says **dragon** (f)?
18. **Clown** (WN). Who says **clown** (WN) like that?
19. **Kitchen** (f). Who says **kitchen** (f) like that?
20. And the last one: **watermelon** (WN). Who says **watermelon** (WN)? *(10-second-song)*

SUBTEST E2
The researcher shows the child the kind of object she will manipulate in order to answer the questions.The tape is on again. (10-second-song)
Hubert
Spoot! Diiick! Where are you? *(10-second-song)*
Spot
Here's another word that I say in a silly way. **Thumb** (initial theta produced as [t]). Listen to the beginning of **thumb** ([t]). Nobody says **thumb** ([t]) like that only Spot! *(10-second-song)*
Dick
No, no, no, no, no. Spot is always so silly. I don't say **thumb** ([t]) like Spot. I say **thumb** (correct pronunciation: foil=f). I say the beginning of **thumb** (f) correctly. Dick always talks right. *(5-second-song)*
Hubert
And now the questions!
1.Guess who says **thunder**, **thunder** ([t]) like that? Give Dick or Spot a bean bag.
2. **Thief** (f). Who says **thief** (f) like that?
3. How about **thirsty,thirsty** ([t])?
4. Who says **throat**, **throat** (f) like that?
5. **Three**, **three** (f)?
6. Who says **theater, theater** ([t])?
7. Who says **thanksgiving, thanksgiving** ([t]) like that?
8. And how about **thick**, **thick** (f)?
9. **Think**, **think** ([t])?
10.Guess who says **thirteen**, **thirteen** ([t])?
11. **Thin**. Who says **thin** (f) like that, Spot or Dick?
12. **Throw away, throw away** (f)?

13. **Throne, throne** (f)?
14. Who says **thermometer, thermometer** ([t])? ... Very good!
15. How about **thing**, **thing** (f)?
16. Who says **thigh**, **thigh** (f) like that?
17. **Thank you, thank you** ([t])?
18. And who says **through**, **through** ([t])?
19. **Thorn, thorn** (f)?
20. And now the last one! Who says **Thursday, Thursday** ([t]) like that?

10-second-song plays to signal the end of the second game. The tape is paused. The researcher signals the end of the game by showing the child how to put the second sticker on a chart. The tape is turned on again for subtest E3.

SUBTEST E3

(10-second-song)

Spot

Now I want to play with other words. Like **bean** (without oral stricture = WO). Listen to the end of **bean** (WO). Only Spot can say the end of words like that. How about **onion** (WO)? Everybody else says **onion** (correct pronounciation: foil=f). I say **onion** (WO). Don't I sound silly? *(10-second-song)*

Dick

I don't talk like Spot. He is so silly! Spot says **bean** (WO). I say **bean** (f). Spot says **onion** (WO), but I say **onion** (f). *(10-second-song*)

Hubert

Now I want to see if you can guess these words...

1. Guess who says **pen, pen** (f) like that? Give Dick or Spot a cap.
2. And how about **train**, **train** (f)?
3. **Phone** (WO). Guess who says **phone** (WO) like that?
4. **Crown** (WO). Who says **crown** (WO)?
5. **Kitten**, **kitten** (f)?
6. Who says **snowman, snowman** (f) like that?
7. **Can, can** (WO)?
8. How about **sun**, **sun** (f)? *(10-second-song)*

Spot: I'm having a lot of fun! How about you, Dick?
Dick: Me too! I love these guessing games!
Spot: Hey, little friend, are you ready for more words?
Dick: Here they come! *(10-second-song)*

9. Who says **plane**, **plane** (WO)?
10. Who says **melon**, **melon** (f) like that?
11. **Green, green** (f)?
12. **Penguin** (WO). Who says **penguin** (WO)?
13. Who says **raccoon, raccoon** (WO) like that?
14. **Ice cream, ice cream** (WO)?
15. **Brown, brown** (f)?
16. And who says **hen**, **hen** (WO)?
17. Who says **balloon, balloon** (f)? ... Very good!
18. **Spoon, spoon** (WO)?
19. How about **pine**, **pine** (WO)?
2O. And now the last one of this game! Who says **rain**, **rain** (f)?

10-second-song plays to signal the end of the third game. The tape is paused. The researcher signals the end of the game by showing the child how to put the third picture on a chart. The tape is turned on again for subtest E4

SUBTEST E4

(5-second-song)

Hubert

This is our last chance to play with Spot and Dick. Be a good guesser and you'll win a surprise from Spot and Dick! Spooot! Diiiick! Where are you? *(10-second-song)*

Spot

This is our last game! So let me show you my favorite words! Everybody else says **candy** (correct pronounciation: foil=f), but I say **candy** (without aspiration= WA). Listen to the beginning of **candy** (WA). Everybody else says **taxi** (f), but I say **taxi** (WA). Have you ever heard someone saying **candy** (WA) and **taxi** (WA) like that? No, only Spot can talk this way! How about this one: everybody else says **toothpaste** (f), but I say **toothpaste** (WA).
(10-second-song)

Dick

Isn't Spot silly? I always say the words correctly. Spot says **candy** (WA). I say **candy** (with aspiration = A). Spot says **taxi** and **toothpaste** (WA) but I say **taxi** (f) and I say **toothpaste** (f). Dick is always right. *(10-second-song)*

Hubert

1. Who says **table , table** (WA) like that? Give Dick or Spot a bunny.
2. **Tiger, tiger** (WA) ?
3. Who says **king**, **king** (f) like that?
4. **Tooth, tooth** (f)?
5. **Tomato** (f). Who says **tomato** (f)?
6. Who says **car** , **car** (WA)?
7. Who says **puppy** , **puppy** (f) like that?
8. **Peanut**, **peanut** (WA)?
9. **Tent**, **tent** (f)?
10. **Purse, purse** (f)?
11. **Pie** , **pie** (WA)?
12. **Turtle, turtle** (WA)?
13. Guess who says **Key**, **key** (f)?
14. **Tea**, **tea** (f)?
15. **Cow, cow** (WA)?
16. **Camera, camera** (WA)?
17. And who says **cake, cake** (f) like that?
18. How about **tie, tie** (WA) ?
19. Who says **telephone, telephone** (WA)?
20. And now the last one! Who says **toe** , **toe** (f)?

(10-second-song plays in the background while Hubert says):
You won! You won! You're THE WINNER! So bye for now... Bye!

- END OF SESSION -

APPENDIX C
PORTUGUESE SUBTESTS TAPE SCRIPT

SUBTEST P1[21]

The researcher starts the session playing with the child so that the child gets comfortable. The researcher invites the child to join a fun game. The tape recorder is turned on and a narrator puppet enters the scene. (10-second-song)

Bingo

Hoje nós vamos conhecer dois amigos. Eles são divertidos! O jogo preferido deles se chama: Adivinha quem disse a palavra! Você vai brincar com eles. Mas primeiro, vamos conhecê-los. *(10-second-song)*

Sapeca

Oi! Aqui quem fala é Sapeca. Eu sou tão engraçado. Ninguém fala igual a mim. Todo mundo diz **pomba** (correct pronounciation: foil = f). Eu digo **pomba** (without the syllable final nasal and the nasal spreading over the preceding vowel = WN)**.** Quer escutar outra? Todo mundo diz **pente** (f), mas eu digo **pente** (WN)! Eu não sou engraçado? *(10-second-song)*

Dindo

Oi! Meu nome é Dindo. Eu falo as palavras igual a todo mundo. Eu falo direito! Eu tenho que rir do Sapeca porque ele é tão engraçado. Sapeca fala tão esquisito! Ele diz **pomba** (WN). Eu digo **pomba** (f)! Sapeca diz **pente** (WN), mas eu digo **pente** (f). Tá vendo? Eu sempre falo certo!

The child is introduced to two replicas of Dindo and Sapeca. Under each replica there is a can and the child is instructed to answer to the puppet's questions by putting a token (an object) in the respective puppet's can. The researcher explains that the child will be playing 4 games and at the end of each game, the child will affix a sticker to a corresponding can on a game chart as a sign of accomplishment of each game. The tape is turned on again. (5-second-song)

Bingo

A gente joga assim ó: primeiro aponte para o boneco que sempre fala engraçado. E qual é o nome dele? Muito bem! Aponte pra quem sempre fala certo. Equal é o nome dele? Legal. Então, agora, você vai ouvir muitas palavras e você vai ter que adivinhar quem disse a palavra, certo? Se você acha que é o Dindo falando, dê uma tampa pro Dindo. Se você acha que é o Sapeca falando, dê uma tampa pro Sapeca.

The researcher stops the tape and interacts with the child to be sure that she is understanding the task by asking:

Mostre pra mim. Se eu digo a palavra **cinto** (f) desse jeito, prá quem você vai dar a tampa? E se eu digo a palavra **onça** (WN) desse jeito, prá quem você vai dar a tampa? Muito bem! Escute com bastante atenção! Adivinhe direitinho que você pode ganhar uma surpresa no final dos 4 jogos!

The researcher places on the hand of the child the first token labeled with the letter A that will be used to answer the first training question before the scoring questions begin. The tape is on again. (5-second-song)

Bingo

Vamos começar nosso primeiro jogo! Adivinhe quem diz **gigante, gigante** (WN). Dê uma tampa pro Sapeca ou pro Dindo.

The researcher pauses the tape to give time for the child to answer. After the child answers, the researcher gives to the child another cap (labeled B) and turns the tape on again:

Vamos ver se você fez direitinho. Sapeca diz **gigante, gigante** (WN) desse jeito, ne? Você deu a tampa pro Sapeca? Muito bem! ... Adivinhe quem diz **dançar, dançar** (f). Dê uma tampa pro Dindo ou pro Sapeca.

The researcher pauses the tape to give time for the child to answer. The tape is turned on again. Bingo continues asking: Você deu a tampa pro Dindo? Muito bem! ... Adivinhe quem diz **tambor, tambor** (f). Dê uma tampa pro Dindo ou pro Sapeca.

The researcher pauses the tape to give time for the child to answer. The tape is turned on again. Bingo continues asking: Você deu a tampa pro Dindo? Legal! *(10-second-song)*

Sapeca

Tem uma outra palavra que eu falo de jeito engraçado: **bandido** (WN). Só o Sapeca consegue falar assim! Como eu gosto de falar engraçado! *(10-second-song)*

Dindo

---

[21] All the testing words containg vowels that underwent modification in this subtest maintained their phonetic characteristics after the syllable final nasal deletion, with the exception of the word *elefante* (question number 1). Preceding a syllable final nasal, the vowel **a** in Portuguese becomes a schwa. After deleting the final nasal, the schwa pronunciation for /a/ was mantained due to its closest resemblance to the natural way of pronouncing it. Other testing words with vowel *a* were thus avoided.

Sapeca é mesmo engraçado! Eu não falo como ele. Eu digo **bandido** (f). Eu sempre falo direito! *(10-second-song)*

Bingo

Agora você esta pronto pra jogar! Preste bastante atenção. Adivinhe direitinho!...

1. Adivinhe quem diz **elefante, elefante** (WN)? Dê uma tampa pro Sapeca ou pro Dindo.
2. Adivinhe quem diz **correndo, correndo** (f)? Dê uma tampa pro Sapeca ou pro Dindo.
3. Adivinhe quem diz **bomba**, **bomba** (f)? Dê uma tampa pro Sapeca ou pro Dindo.
4. **Dormindo** (f). Quem diz **dormindo** (f) desse jeito?
5. **Presente** (WN). Quem diz **presente** (WN) desse jeito?
6. E que tal **pendurado, pendurado** (WN)?
7. **Mingau** (f). Quem diz **mingau** (f)?
8. **Dentro** (f). Quem diz **dentro** (f), Dindo ou Sapeca?
9. **Tinta** (WN). Quem diz **tinta** (WN)?
10. **Tempestade** (f). Quem diz **tempestade** (f) desse jeito?
11. E que tal **onda** (WN). Quem diz **onda** (WN) desse jeito?
12. **Rinoceronte** (WN). Quem diz **rinoceronte** (WN)?
13. **Pingo** (f). Quem diz **pingo** (f)? *(5-second-song)*

Puxa! Sapeca e Dindo estão se divertindo com você! Continue adivinhando prá valer que você pode ganhar uma surpresa! Pronto pra mais umas palavras? Então lá vai!...

14. **Ventilador** (WN). Quem diz **ventilador (**WN)?
15. **Doente** (f). Quem diz **doente** (f)?
16. **Comendo** (f). Quem diz **comendo** (f)?
17. **Tombo** (WN). Quem diz **tombo** (WN)?
18. **Sentado** (f). Quem diz **sentado** (f)?
19. **Escrevendo** (WN). Quem diz **escrevendo** (WN)?
20. E agora a última!... **Dumbo** (WN). Quem diz **Dumbo** (WN)? *(10-second-song)*

The tape is paused. The researcher signals the end of the game by showing the child how to put the first sticker on a chart. The tape is turned on again for subtest P2

SUBTEST P2

(5-second-song)

Sapeca

Eu sei brincar com outras palavras também. Que nem em **tapete** (initial /t/ pronounced as theta) Escute o começo dê **tapete** (theta). Todo mundo diz **tapete** (correct pronounciation: foil= f). Eu digo **tapete** (theta). Quer escutar outra? Todo mundo diz **torre** (f). Eu digo **torre** (theta). Eu não sou engraçado? *(10-second-song)*

Dindo

Você não acha que Sapeca é um boneco engraçado? Sapeca diz **tapete** (theta). Eu digo **tapete** (f). Sapeca diz **torre** (theta), mas eu digo **torre** (f). Eu falo igual a todo mundo. Eu sempre falo certo! *(10-second-song)*

Bingo

E agora as perguntas!...

1. Adivinhe quem diz **telha, telha** (f) desse jeito. Dê um sorriso pro Dindo ou pro Sapeca.
2. Adivinhe quem diz **tomate**, **tomate** (theta) desse jeito. Dê um sorriso pro Dindo ou pro Sapeca.
3. Quem diz **tênis, tênis** (theta)?
4. E que tal **talher, talher** (f)?
5. **Torpedo, torpedo** (f)?
6. **Tapar, tapar** (f)?
7. Quem diz **tucano, tucano** (theta)?
8. **Testa, testa** (theta)?
9. **Tábua, tábua** (f)?
10. Quem diz **toalha, toalha** (theta) desse jeito?
11. E que tal **televisão, televisão** (theta)?
12. **Tapa, tapa** (f)?
13. **Tocar, tocar** (theta)?
14. E quem diz **terra, terra** (f)? Muito bem.
15. **Torto, torto** (f)?
16. Quem diz **tomar, tomar** (theta)?

17. **Teia, teia** (f)?
18. Quem diz **turma, turma** (theta) Sapeca ou Dindo?
19. **Tosse, tosse** (theta)?
20. E a última desse segundo jogo... quem diz **torta, torta** (f)? *(10-second-song)*
The tape is paused. The researcher signals the end of the game by showing the child how to put the second sticker on the chart box. The tape is turned on again for subtest P3.

SUBTEST P3
(5-second-song)
Sapeca
Agora, eu quero brincar com outras palavras. Quer ver? **Ganso** (with oral stricture = OS). Escute bem! **Ganso** (OS). Só Sapeca é que fala desse jeito. E que tal **nuvem** (OS)? Todo mundo diz **nuvem** (correct pronounciation: foil=f). Eu digo **nuvem** (OS). Eu não falo engraçado? *(10-second-song)*
Dindo
Eu não falo como o Sapeca**.** Ele é tão engraçado! Sapeca diz **ganso** (OS). Eu digo **ganso** (f). Sapeca diz **nuvem** (OS), mas eu digo **nuvem** (f). *(10-second-song)*
Bingo
E agora, vamos ver se você consegue adivinhar estas palavras!
1. Adivinhe quem diz **carruagem, carruagem** (OS) desse jeito? Dê uma tampinha pro Sapeca ou pro Dindo.
2. Quem diz **canguru, canguru** (f) desse jeito?
3. E que tal **jardim, jardim** (OS)?
4. **Banco, banco** (f)?
5. **Bombeiro, bombeiro** (f)?
6. E que tal **trem, trem** (OS)?
7. **Índia** (f). Adivinhe quem diz **índia** (f) desse jeito?
(10-second-song)
Sapeca: Eu tô me divertindo à beça! E você, Dindo?
Dindo: Eu também! Como eu gosto desses jogos de adivinhar!
Sapeca Ei, você, pronto pra mais umas palavras?
Dindo: Então lá vai! *(10-second-song)*
8. Adivinhe que diz **laranja**, **laranja** (OS) desse jeito?
9. **Tronco**, **tronco** (f)?
10. Quem diz **patim, patim** (f), Dindo ou Sapeca?
11. Quem diz **criança, criança** (OS)?
12. **Bombom, bombom** (OS)?
13. **Fantasma, fantasma** (f)?
14. Quem diz **batom, batom** (OS) desse jeito?
15. E que tal **garagem, garagem** (OS)?
16. Quem diz **quente, quente** (f)?
17. **Brinquedo, brinquedo** (f)?
18. E que tal **silêncio, silêncio** (f)?
19. **Balanço, balanço** (OS)?
20. E agora a última palavra! Quem diz **cinza**, **cinza** (OS)? *(10-second-song)*

SUBTEST P4
(5-second-song)
Bingo
Essa é a última chance de brincar com Dindo e Sapeca. Adivinhe direitinho que você pode ganhar uma surpresa do Dindo e do Sapeca! Sapeeeca! Diiiindo! Onde vocês estão? *(10-second-song)*
Sapeca
Este é o nosso último jogo! Por isso, eu quero mostrar pra você as palavras que eu mais gosto! Todo mundo diz **pato** (correct pronounciation: foi=f), mas eu digo **pato** (with aspiration = A). Ouça o começo de **pato** (f).Todo mundo diz **tatu** (f), mas eu digo **tatu** (A). Você já ouviu alguém dizer **pato** e **tatu** (A) desse jeito? Claro que não! Só o Sapeca consegue falar assim. Todo mundo diz **castelo** (f), mas eu digo **castelo** (A). *(10-second-song)*

Dindo
O Sapeca não é engraçado? Eu falo sempre certinho! Sapeca diz **pato** (A). Eu digo **pato** (f). Sapeca diz **tatu** e **castelo** (A), mas eu digo **tatu** e eu digo **castelo** (f). Dindo tá sempre certo. *(10-second-song)*
Bingo
1. Quem diz **telefone, telefone** (A). Dê um coelhinho pro Sapeca ou pro Dindo.
2. **Pesado** (f). Quem diz **pesado** (f)?
3. **Queijo**, **queijo** (f)?
4. Quem diz **porco**, **porco** (A)?
5. Quem diz **tartaruga, tartaruga** (A) desse jeito?
6. Quem diz **cachorro**, **cachorro** (f)?
7. Quem diz **telhado**, **telhado** (f) desse jeito?
8. **Pipoca, pipoca** (f)?
9. E quem diz **peru, peru** (A) desse jeito?
10. **Touro, touro** (A)?
11. **Camelo, camelo** (f)?
12. **Porta, porta** (A)?
13. E que tal **tubarão, tubarão** (A)?
14. **Cadeira, cadeira** (A)?
15. **Cama**, **cama** (f)?
16. **Carro**, **carro** (f)?
17. Quem diz **pirulito, pirulito** (f)?
18. **Palhaço, palhaço** (A)?
19. **Pé**, **pé** (f) ?
20. E agora a última palavra! Quem diz **caminhão, caminhão** (A)? *(10-second-song)*
Bingo
Você ganhou! Você ganhou! Você merece a surpresa! Tchau! Tchau!

- END OF SESSION -

APPENDIX D

QUESTIONNAIRE A
QUESTIONNAIRE TO PARENT

1. Child's name: Sex: M F

2. Child's date of birth:

3. Child's place of birth:

4. Do you have any other children? YES ___ NO ___
   If yes, please specify age and sex

5. Is English the primary language spoken in your home? YES ___ NO ___
   If no, other language(s) spoken in the home.

6. Has your child had any diagnosed hearing problems? YES ___ NO ___
   If yes, please inform when, for how long and what it was.

7. Has your child had any diagnosed speech problems? YES ___ NO ___
   If yes, please explain:

8. Do you (or your spouse/family member) have the habit of reading children's story books to your child?
   YES ____ NO ____

(a) If yes, please inform of what age your child was when you first started reading to him/her and also if you still do it today:

(b) How often during the week do you (or your spouse/family member) read these books to your child? (if it applies)

THANK YOU FOR YOUR HELP!

QUESTIONNAIRE A

QUESTIONÁRIO PARA OS PAIS

1. Nome da criança: Sexo: M F

2. Data de nascimento: dia: ____ mês: ____ ano:____

3. Lugar de nascimento:

4. Você tem mais filhos? SIM ___ NÃO ___
   Se a resposta é afirmativa, por favor, especifique a idade e sexo:

5. O português é a língua falada em sua casa a maior parte do tempo? SIM ___ NÃO ___
   Se outras línguas são faladas em sua casa, por favor indique quais são:

6. O seu filho(a) já teve algum problema auditivo diagnosticado pelo seu médico? SIM ___ NÃO ___
Se sim, por favor, informe quando, por quanto tempo e o que foi diagnosticado:

7. Seu filho(a) já apresentou algum problema de fala ? SIM___ NÃO____
Se sim, por favor, explique qual foi o problema e com que idade ele ocorreu:

8. Você (seu cônjuge ou outra pessoa na família) tem o hábito de ler histórias infantis para seu filho(a)?
SIM ____ NÃO ____

(a) Se sim, por favor, informe a idade de seu filho(a) quando você começou esse hábito de leitura e informe, também, se você ainda o mantém hoje em dia:

(b) Com que freqüência durante a semana você (seu cônjuge ou outra pessoa na família) tem o hábito de ler livros ou histórias para seu filho(a)? (se for o caso)

OBRIGADA POR SUA AJUDA!

QUESTIONNAIRE B

QUESTIONNAIRE TO BILINGUAL CHILDREN'S PARENTS
--Home Language Survey --

IN RELATION TO LANGUAGE USE:		
	Portuguese	English
a) What language did your child speak first?		
b) Please, specify if you are: Father ___ Mother___ What language do **you** speak most often to your child at home?		
c) In what language do **you and your spouse** interact at home?		
d) What language does your child speak most often to **you** ?		
e) What language does your **spouse** speak most often to **child** ?		
f) What language does **your child** most often use when speaking to your **spouse**?		
g) What language does **your child** most often use to speak to **his/her brothers and sisters** ?		
h) What language does your child most often speak with **other Portuguese speaking kids his/her age**?		
i) What language **your child** most often speak to **other adults**		

living in the house? j) What language does **your child** most often speak to **American kids his/her age**?		
k) What language does **your child** most often speak to **other Brazilian adults** who visit the house?		
l) What language does your child most often speak to **you** when both of you are among **English speaking people who do not speak Portuguese**?		

IN RELATION TO LANGUAGE HISTORY:

How long have you been in the US?

Do you think your child has been consistently exposed to English since you arrived in the U.S. or would you consider his/her exposure to English to be practically none when you first came?

Specify the age he/she started being exposed to English:

Have you ever had any English-speaking babysitter that do not speak Portuguese? YES ___ NO ___ (If yes, please ckeck the alternative that applies):

_____ I used to but I do not anymore. The babbysitter used to babbysit for _____ days a week, _____ hours each time.
_____ I usually have babbysitter _____ days a week, _____ hours each time.
_____ I seldom hire a babby sitter. That happens _____ time(s) a month , for _____ hours each time.

IN RELATION TO DAILY ACTIVITIES:

Is your child attending any preschool/kindergarten? YES ___ NO ___
If yes, for how long has he/she been attending it?

What are the situations where your child is in contact with English?

	Yes	If yes, specify how many days a week:	How many hours a day:
Kindergarden			
TV			
Playing with other children			
Church			
Other (specify):			
Other (specify):			

Please, give an overall view of how much time your child is exposed to English and Portuguese every day during a normal week:

Hours of Exposure to Portuguese & English per Week

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Portuguese	hrs	hrs	hrs	hrs	hrs	hrs	hrs
English	hrs	hrs	hrs	hrs	hrs	hrs	hrs

In your opinion, what language is your child more comfortable and more fluent in?
Portuguese_____ English_____ Both_____

Is your child exposed to any language other than English and Portuguese? YES ___ NO ___
If yes, which

THANK YOU FOR YOUR HELP!

QUESTIONNAIRE B

QUESTIONÁRIO PARA OS PAIS DAS CRIANÇAS BILÍNGÜES
--Pesquisa sobre a línguas faladas em casa--

Responda abaixo por favor:

EM RELAÇÃO AO USO DA LÍNGUA:	Português	Inglês
a) Qual a língua que seu filho(a) falou **por primeiro**? b) Por favor, especifique se você é: Pai ___ Mãe___ Qual língua que **você** mais freqüentemente utiliza para se comunicar com seu filho(a)?		
c) Em que língua **você e seu cônjuge** mais freqüentemente se comunicam em casa?		
d) Que língua o **seu filho(a)** mais freqüentemente utiliza para se comunicar **com você** ?		

e) Qual língua **o seu cônjuge** mais freqüentemente utiliza para se comunicar com seu filho(a)?		
f) Que língua o **seu filho(a)** mais freqüentemente utiliza para se comunicar com o **seu cônjuge ?**		
g) Que língua **seu filho(a)** mais freqüentemente utiliza para se comunicar com seu(s)/sua(s) **irmão(s) e/ ou irmã(s)**?		
h) Que língua o **seu filho(a)** mais freqüentemente utiliza para se comunicar com **outros filhos de brasileiros de sua idade**?		
i) Que língua o **seu filho(a)** mais freqüentemente utiliza para se comunicar com **outros adultos residentes na sua casa**? (se for o caso) j) Que língua o **seu filho(a)** mais freqüentemente utiliza para se comunicar com **crianças americanas de sua idade**?		
k) Que língua o **seu filho(a)** mais freqüentemente utiliza para se dirigir **a adultos brasileiros** que visitam a sua casa?		
l) Que língua o **seu filho(a)** mais freqüentemente utiliza para se dirigir **a você** quando vocês estão **em presença de americanos** que não falam o português?		

EM RELAÇÃO AO HISTÓRICO LINGÜÍSTICO:

Há quanto tempo você e sua família estão nos Estados Unidos?

Você considera que seu filho(a) tem sido exposto consistentemente ao inglês desde que vocês chegaram aos Estados Unidos? SIM____ NÃ0____

Caso seu filho(a) tenha começado um contato efetivo e freqüente com o inglês somente mais tarde, especifique a partir de que idade e por que:

Você já contratou alguma vez serviços de babysitter americana que **não fala português**?
SIM ___ NÃO ___ (Se sim, por favor, assinale a alternativa correta):

____ Costumava ter babysitter há um tempo atrás (a babysitter costumava vir _____ dias por semana; _____ horas cada vez)
_____ A babysitter que tenho agora costuma vir _____ dias por semana, _____ horas cada vez.
_____ Raramente contrato babysitter. Isso ocorre _____ vez(es) por mês, por _____ horas cada vez.

EM RELAÇÃO ÀS ATIVIDADES DIÁRIAS:

Seu filho(a) está matriculado na pré-escola ou kindergarden? SIM ___ NÃO ___

Se sim, há quanto tempo?
Em quais situações o seu filho(a) está em contato com o inglês?

	Sim	Se sim, especifique por quantos dias na semana:	Quantas horas por dia:
Kindergarden			
TV			
Brincando com outras crianças			
Igreja			
Outro(especifique):			
Outro(especifique):			

Por favor, dê uma visão geral de quanto tempo seu filho(a) é exposto ao português e inglês durante cada dia da semana:

Horas de Exposição ao Português & Inglês por Semana

	Domingo	Segunda	Terça	Quarta	Quinta	Sexta	Sábado

Português	hrs	hrs	hrs	hrs	hrs	hrs	hrs
Inglês	hrs	hrs	hrs	hrs	hrs	hrs	hrs

Na sua opinião, que língua seu filho(a) é mais fluente e fala mais confortavelmente?
Português_____ Inglês_____ Ambas_____

OBRIGADA POR SUA AJUDA!

APPENDIX E

CONSENT FORM

Title of Research: "Phonological Awareness in 5-year-old Bilingual Children"
Investigator: Miriam Coimbra, doctoral student, Department of Linguistics - University of Wisconsin - Madison (Phone: (608) 274-6720)
Faculty Adviser: Charles Read, Dean of the School of Eucation - University of Wisconsin - Madison (Phone: (608) 262-2707)

PURPOSE AND BENEFITS

This study is designed to compare the effects of children being raised bilingually with children being raised monolingually. The research may contribute information about how bilingualism affects children's development of speech awareness as well as provide understanding of its possible implications for the child's learning to read and write.

As part of a partial fulfillment of the requirements for a graduate degree in Linguistics, this research is part of the Catholic University of Rio Grande do Sul - Brazil together with the Graduate Program at the University of Wisconsin - Madison and is supported by CNPq (Brazilian National Council for Research).

PROCEDURES

The child will participate in one testing session that will last approximately 60 minutes. The child will be presented to two puppets who will talk to him/her. The child will be encouraged by the pre-recorded voices of the puppets to join in a game in which he/she will be asked to play with different objects. At the end of the game, each participant will receive a small prize as a reward. The child will also participate in a vocabulary testing game (Peabody Picture Vocabulary Test Revised, 1981 - PPVT-R) that will last approximately 15 minutes in which he/she plays with pre-printed pictures. The child will also participate in the Reading Assessment Test - Preliteracy - where the researcher asks the child some questions regarding his/her experience and appreciation for children's books and stories. This interaction will also be recorded on audio tape. The objective of the recording is to have a small speech sample of the child. The speech sample and the PPVT-R provide valuable information about the child's linguistic profile. The content of the tape will be transcribed by the researcher and will be supervised by Prof. Charles Read.

The monolingual and bilingual speaking parents will be given a questionnaire for background information. The bilingual children's parents will be given an extra questionnaire in which they will be asked pertinent questions concerning their children's language development history.

The pilot study was conducted in July, 1995 and the data collection for the dissertation will be completed in the first semester of 1996.

RISKS, STRESS, or DISCOMFORT

The children who participate in the study and are attending preschool or kindergarden will miss approximately one hour of class time.

OTHER INFORMATION

The identity of all participants will remain confidential. Only the researcher, graduate adviser, and classroom teacher will have access to the data and the tapes transcribed, which will have been assigned an arbitrary code number. The researcher will keep the tapes up to the day of graduation scheduled to be held in April 97. All children will be free to participate and/or withdraw at any time without penalty. Parents wishing to learn their child's scores or requesting information about the study may do so at any time by contacting the researcher.

_____ _____

Signature of Investigator Date Signature of Graduate Adviser Date

PARENT'S STATEMENT:

The study described above has been explained to me, and I voluntarily consent to let my child/children participate in this research. I have had an opportunity to ask questions and understand that future questions I have about the reserach or about the subject's rights will be answered by the investigator listed above.

_____ _____

Name of Participating Child Date Signature of Parent/Legal Guardian Date

FORMULÁRIO DE CONSENTIMENTO

Título da Pesquisa: "Consciência Fonológica em Crianças Bilíngües de Cinco Anos"
Investigador: Miriam Coimbra, doutoranda, Pós-Graduação em Letras da Pontifícia Universidade Católica do Rio Grande do Sul - PUCRS Tel.: (051) 3391511 - ramal 3176
Professora Orientadora: Regina Ritter Lamprecht, PhD - Professora e Pesquisadora

PROPÓSITO E BENEFÍCIOS

Este estudo tem como objetivo comparar crianças bilíngües e crianças monolíngües em relação à sua consciência dos sons da fala. A pesquisa poderá contribuir com informação sobre como o bilingüismo afeta o desenvolvimento da consciência da fala pela criança, assim como prover um maior entendimento de suas possíveis implicações para a alfabetização.

Como requisito parcial para a obtenção do grau de doutor em Lingüítica, esta pesquisa faz

parte do Programa de Pós-Graduação da Pontifícia Universidade Católica do Rio Grande do Sul - Brasil, juntamente com a Universidade de Wisconsin - Madison nos Estados Unidos e subsidiada pelo Conselho Nacional de Pesquisa Brasileiro (CNPq).

PROCEDIMENTOS

A criança participará de uma sessão de coleta de uma hora aproximadamente. A criança será apresentada a dois bonecos que brincarão com ela, encorajando-a a participar de um jogo que envolve figuras e vários objetos. Ao final do jogo, cada participante receberá uma pequena surpresa (um adesivo, um pequeno brinquedo ou algo similar) dos bonecos como recompensa. Com relação ao restante da sessão, a criança participará de um jogo sobre vocabulário (Teste de Vocabulario e Imagenes Peabody -TVIP, 1986) que durará aprtoximadamente 15 minutos, no qual a criança brinca com várias figuras. Essa amostra e o TVIP fornecem valiosa informação sobre o perfil lingüístico da criança. A criança participará, também, de um jogo integrante do Reading Assessment Test: Preliteracy - no qual a criança brinca com algumas figuras que estão relacionadas à sua experiência e contato com livros e histórias infantis. Esta interação será gravada em fita cassete e tem como objetivo obter uma pequena amostra da fala da criança. O conteúdo da fita será transcrito pela pesquisadora e supervisionado pela Professora Regina R. Lamprecht

Os pais receberão um questionário cuja informação servirá como base para o histórico lingüístico da criança.

A pesquisa piloto foi conduzida no segundo semestre de 1995 e a coleta definitiva para a presente tese deve efetuar-se neste segundo semestre de 1996.

TEMPO DISPENDIDO

As crianças que participarem do estudo e estiverem freqüentando a pré-escola perderão, no total, aproximadamente uma hora de aula.

OUTRAS INFORMAÇÕES

A identidade de todos os participantes permanecerá confidencial. Apenas a pesquisadora, a professora orientadora e a professora da pré-escola terão acesso aos dados e às fitas transcritas as quais receberão um número de codificação arbitrário.

Todas as crianças têm a liberdade de participar e/ou cancelar sua participação a qualquer momento. Os pais que desejarem informação sobre os escores ou tiverem qualquer outra pergunta/dúvida sobre esta pesquisa podem contactar a pesquisadora responsável a qualquer momento.

_____ _____

Assinatura do Investigador Data Assinatura do Professor Orientador Data

DECLARAÇÃO DOS PAIS OU RESPONSÁVEL:

O estudo acima descrito foi explicado e eu voluntariamente consinto que meu filho(a) participe nessa pesquisa. Tive oportunidade de sanar dúvidas e entendo que quaisquer futuras dúvidas e/ou perguntas sobre este estudo ou sobre os direitos de cada participante serão respondidas pela pesquisadora acima referida.

_____ _____

Nome da Criança Data Assinatura do Pai ou Mãe ou Responsável Data

Letter to American Monolingual Parent

Dear Parent,

It is quite amazing that children ages five to six have learned not only how to speak, but also, they learn how to recognize an incredible amount of different words and sounds in a short period of time. Children have to

master this great amount of information in such a way that at seven years of age they can apply all the sounds they learned in order to be able to read and write. In this whole process, each age and stage are important. However, developmentally, the five year-old has been considered to be at the border of readiness to learn to read and write.

Some studies have also analyzed the difficulties children face in their first school year and have discovered that there are some important prerequisites for a child to be successful in his or her process of learning how to read and write. One prerequisite is called "phonological awareness," or simply, how aware the child is of the sounds that the words are made of. At age five, we find that this is a crucial age where the child makes the transition into the next stage of language development. This is exactly what this research project is exploring.

Ms. Pamela Klinzing showed a great interest in the idea of having some of the 4 and 5-year-old program kids participate in this research, and I am very excited with that. But I need your agreement too! In order that your child share his or her awareness of the sounds in words, I need your written permission.

I would like to meet your child on one occasion. We start by playing a fun game with three hand puppets: Spot is a funny puppet who always talks in a different way, while Dick is the puppet who always talks right. After getting to know these two new friends, the narrator puppet explains how we can play the game: 'Guess who said the word!' Your child, then will be asked a series of questions, for example, 'Guess who said "table"?' Your child will have different objects in order to answer the questions and will also participate in two other fun activities.

As you will read in the enclosed material, this study will not take more than one hour of class time and I would be meeting your child at the school facilities. I would appreciate your filling out the enclosed questionnaire. Thank you in advance! I am sure your child will enjoy and have a fun time while participating in this study.

Sincerely,

Miriam Coimbra
Doctorate Student at the
University of Wisconsin
5002 Sheboygan Ave # 108 Madison, WI 53705
Ph. (608) 2746720

Letter to Bilingual Parent

Dear Parents,

A bilingual child is someone who hears sounds, words and phrases simultaneously in two languages since very little. This same child is even able to master two languages in the short period of 6 to 7 years! To understand this tremendous capability of absorbing two or more languages since infanthood has been a big challenge researchers in language development have faced.

In order to study the degree of sound perception a child has to master in order to speak two languages I am conducting a research here in the United States together with the Catholic University of Rio Grande do Sul. One of the hypotheses of this research is related to the fact that due to being bilingual, these children might develop a better ability to judge the sounds of Portuguese and English.

I am addressing this letter to you dear parent because I would really appreciate having your child as a participant in our research. The James Otis School has already shown interest in our study, however I need your

written consent! As you will read in the enclosed material, this study will not take more than an hour of class time and I would be meeting your child at the school facilities. I have been researching with kids in the Madison, WI area and they have enjoyed very much playing the games with the hand puppets.

I would appreciate your answering the enclosed questionnaire, since I need some information before collecting the data.

Thank you in advance and I will be looking forward to seeing you soon! I am sure your child will enjoy and have a fun time while participating in the study.

Cordially,

Miriam Coimbra
Doctorate Student at the
University of Wisconsin
5002 Sheboygan Ave # 108
Madison, WI 53705
Ph. (608) 2746720

Carta Para os Pais Bilíngües

Prezados Pais,

Uma criança bilíngüe é alguém que ouve sons e palavras em duas línguas simultaneamente desde pequeno e é capaz de aprender duas línguas com a destreza de um adulto durante o curto período de 6 a 7 anos de idade! Entender essa tremenda capacidade de absorver duas ou mais línguas desde tão tenra idade tem sido um grande desafio para os pesquisadores em desenvolvimento da linguagem infantil.

Com o intuito de estudar o grau de percepção dos sons que a criança precisa dominar para falar duas línguas é que estou conduzindo uma pesquisa nos Estados Unidos através da Universidade de Wisconsin juntamente com a Pontifícia Universidade Católica (PUC) do Rio Grande do Sul. Essa pesquisa tem como uma de suas hipóteses a idéia de que as crianças bilíngües podem apresentar uma melhor capacidade de julgar os sons do português e inglês, já que elas são bilíngües.

Dirijo esta carta a vocês, pois gostaria muito de ter seu (sua) filho(a) como participante em minha pesquisa. A escola James Otis está interessada neste estudo, todavia dependo de uma autorização de cada pai ou responsável! Como vocês poderão ler no material que envio em anexo, a pesquisa não tomará mais do que uma hora no total. Já trabalhei com crianças americanas em Madison, WI e elas têm gostado muito de participar dos joguinhos com os bonecos.

Ficaria muito agradecida se pudessem responder ao questionário em anexo, pois necessito obter essas informações antes de iniciar o estudo.

Agradeço previamente sua atenção e estou certa de que seu (sua) filho (a) vai se divertir e gostar muito de participar da pesquisa.

Desde já agradeço cordialmente,

Miriam Coimbra
Doutoranda em Lingüística
University of Wisconsin
5002 Sheboygan Ave # 108
Madison,WI 53705
Ph (608) 274-6720

APPENDIX F
INDIVIDUAL SCORES ACROSS GROUPS

Bilinguals Tested in English

Child	Age	PPVT	E1	E2	E3	E4	Print C.	Age moved to US	Age consistent English exposure began	English language age
1	56	73	14	14	11	8	17	birth	birth	56
2	63	75	16	7	15	14	19	birth	39	24
3	68	90	18	13	17	17	22	birth	36	32
4	70	89	20	11	19	19	25	birth	36	34
5	70	69	14	8	13	15	21	birth	46	24
6	70	90	18	12	17	17	24	birth	36	34
7	70	65	13	5	15	12	15	birth	48	22
8	71	78	20	10	20	18	14	birth	59	12
9	71	86	19	9	18	17	26	birth	36	35
10	75	74	17	11	19	11	19	24	69	6
11	79	66	12	12	17	18	23	48	43	36
12	71	50	15	10	17	9	21	birth	59	12

American Monolinguals

Child	Age	PPVT	E1	E2	E3	E4	Print Concepts
13	55	98	10	9	12	12	15
14	55	78	12	6	9	11	8

15	55	106	16	10	13	10	16
16	58	99	13	17	14	18	20
17	59	120	20	16	17	18	22
18	60	98	10	14	13	9	16
19	62	119	17	16	18	13	20
20	63	96	13	10	12	10	14
21	63	74	18	13	17	17	12
22	65	110	18	15	17	13	22
23	66	112	18	16	18	18	18
24	67	98	20	13	18	18	22
25	57	97	7	10	12	11	15
26	64	86	12	14	15	11	17
27	63	125	20	18	18	19	19

Bilinguals Tested in Portuguese

Child	Age	PPVT	P1	P2	P3	P4	Print C.	Age moved to US	Age English exposure began	English language age
28	58	78	14	12	13	19	16	birth	36	22
29	58	81	8	15	14	12	11	birth	50	8
30	58	99	15	12	13	14	26	birth	34	24
31	65	81	14	10	14	16	18	birth	24	41
32	66	97	13	12	15	14	26	birth	birth	66
33	69	102	17	11	12	19	25	36	43	26
34	70	96	7	11	12	15	18	birth	36	34
35	71	69	11	16	12	15	21	24	53	18
36	73	82	16	9	14	11	20	birth	49	24
37	74	90	16	14	14	17	23	birth	50	24
38	78	82	13	13	13	14	25	birth	71	7
39	79	78	16	12	16	15	27	birth	55	24

Brazilian Monolinguals

Child	Age	PPVT	P1	P2	P3	P4	Print Concepts
40	50	112	14	10	13	8	16
41	54	111	18	14	14	18	8
42	56	123	18	15	14	9	26
43	60	100	17	13	11	10	19
44	61	108	18	11	12	10	24
45	63	101	9	8	10	15	20
46	64	105	12	18	13	12	17
47	65	123	19	15	13	19	24
48	66	95	15	14	13	19	14
49	66	109	20	15	14	15	14
50	67	125	19	16	15	19	26
51	68	105	17	13	13	18	19
52	70	96	15	13	12	14	22
53	71	98	14	17	13	13	23
54	71	122	18	18	12	19	25

55	74	111	19	12	16	19	23