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The Use of Word-Learning Principles in Young Monolingual and Bilingual Children

Ilana Frank

A Thesis

in

The Department

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ABSTRACT

The Use of Word-Learning Principles in Young Monolingual and Bilingual Children

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Concordia University, 1999

Adherence to the mutual exclusivity principle, which states that each object category can have only one name, has been demonstrated in toddlers and preschool-aged children. Studies of mutual exclusivity in bilingual children over 3.5 years have generally found a tendency to honour the principle within languages, but not across languages. To date, younger bilinguals' adherence to this principle has not been investigated. Also in question has been whether children's ability to fast map more likely reflects adherence to the mutual exclusivity principle or to the novel name-nameless category (N3C) principle. In the present cross-sectional study, monolingual and bilingual children were tested at 27 and at 35 months of age. In a first task, monolingual and bilingual children were presented with novel labels violating mutual exclusivity within a language, and were tested on their learning of the labels. Bilinguals were also administered a similar task in which mutual exclusivity was violated across languages. An assessment of the bilingual children's vocabulary production was undertaken using the MacArthur Communicative Development Inventory (Fenson et al., 1991), as well as a Québec French adaptation developed specifically for this study. All children in this study were also administered a fast mapping task. A

visual perspective-taking task was administered to determine whether bilinguals have an advantage in this parallel cognitive domain. Across both language groups, children aged 35 months honoured mutual exclusivity more than children aged 27 months. No differences were found between monolinguals and bilinguals in adherence to mutual exclusivity. In addition, bilingual children performed similarly when mutual exclusivity was violated within a language and across languages. The proportion of translation equivalents in the bilingual children's vocabulary did not relate to their mutual exclusivity task performance. Moreover, monolinguals and bilinguals did not differ in fast mapping or in perspective-taking skills. These results suggest that bilingual language experience does not have a significant impact on adherence to the mutual exclusivity principle before the age of 3 years. In addition, fast mapping performance was independent of adherence to mutual exclusivity, supporting the operation of an N3C principle. The results are discussed with reference to the nature of word-learning principles.

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CHAPTER ONE: INTRODUCTION

Early Lexical Development

In recent years, researchers in the area of early language development have been concerned with the question of how young children learn the meanings of new words. Children typically produce their first words around the age of one year, and may understand many words before this point (Benedict, 1979; Huttenlocher, 1974). Around the age of 18 months young children typically go through a "naming explosion", a period lasting several months during which their rate of vocabulary production increases rapidly, with some children acquiring as many as 40 new words per week (Bloom, 1973; Dromi, 1986; Goldfield & Reznick, 1990; Nelson, 1973). Given this rapid development, researchers have been interested in how the new word learner is able to determine which of the many possibilities for the referent of a new word is in fact the correct candidate. The ability to solve this mapping problem is central to children's vocabulary development.

Research has focused on several possible sources of information, both internal and external to the child, which may aid children in accomplishing this impressive task. Once children have moved beyond the initial stages of language development, there is evidence to suggest that they make use of linguistic context, grammatical cues, argument structure, and derivational morphology to determine the meanings of new terms (e.g., Fisher, Hall, Rakowitz, & Gleitman, 1994; Gelman & Taylor, 1984; Gleitman, 1990; Katz, Baker, & MacNamara, 1974; Naigles, Fowler, & Helm, 1992). At the earlier stages of word-learning,

however, children do not yet have the capacities or experience necessary to take advantage of these sources. For this reason, researchers have attempted to determine what other sources of information are aiding them in accomplishing such an important word-learning achievement.

Theoretical Approaches to Early Word-Learning

There are two distinct theoretical approaches taken by researchers investigating children's early word-learning; the lexical principles approach, and the social-pragmatic approach. The lexical principles approach places an emphasis on the cognitive abilities which facilitate children's rapid lexical development. Specifically, researchers in this area have focused on internal hypotheses about word meaning which children might bring to the word-learning task. It has been proposed that children operate using certain assumptions, often referred to as constraints, biases, or principles, as a basis for narrowing their hypotheses about the meaning of new words (Golinkoff, Mervis, & Hirsh-Pasek, 1994; Markman, 1989, 1992; Markman & Hutchinson, 1984; Merriman & Bowman, 1989; Waxman & Kosowski, 1990). For example, Markman (1989) proposed that children are predisposed to assume that the names for different object categories are mutually exclusive; that is, each object should only have one name. She referred to this predisposition as one among several assumptions or constraints, which are generally thought to be default assumptions, and which children are able to override when conditions dictate that other information should be taken into account in determining the meaning of a new word. Markman (1992) has likened word-learning constraints to the

constraints proposed by ethologists exploring the biological bases of animal learning, in particular the nature of constraints as probabilistic, default assumptions which guide animals' choice of behavioural strategies. She argues that word-learning constraints provide a solution to the tension between the need for openness and flexibility in learning words, and the need to solve the inductive problem of determining the appropriate referent of a new word without having to consider every possible hypothesis.

An additional theoretical issue in the area of constraints or principles is the question of their domain specificity. Markman (1992) has suggested that learning constraints are not necessarily language specific, and may in fact have parallels in other cognitive domains. If similar constraints are found in other cognitive domains, she suggested, it might indicate that they have in fact been recruited from the other domain(s) for the purposes of word-learning, and are thus not specific to word-learning. The reverse is also possible, namely that constraints are recruited from word-learning for application in other domains. Markman has also speculated that some constraints might reflect general processes, while others are unique to language learning.

Although Markman's use of the term "constraints" implies a certain biological predisposition, other researchers have attempted to use terms which do not carry similar implications with regard to origin, such as biases or principles. These terms focus attention instead on children's behavioural tendencies. The term "bias" has been favored by Merriman and Bowman (1989), while the term "principle" has been favored by Golinkoff et al. (1994) as a way to

maintain continuity with Slobin's (1973, 1985) notion of operating principles, which he defined as implicit and explicit strategies that children use to acquire language. Clark (1983a, 1987) also favored this term. Unless discussed in association with a particular theorist's proposal, in the present body of work the term "principle" will be adopted.

Proponents of the second major approach to lexical development, the social-pragmatic approach, concentrate on social context as a major factor in language learning. They argue that children are born into richly structured cultural environments, which are thought to combine with their social-cognitive learning abilities to make it possible for them to learn language as one among many other cultural skills (Bruner, 1990; Vygotsky, 1978). In the area of the acquisition of word meaning, researchers with this perspective have focused on the importance of children's use of pragmatics and social cues to determine the intended referents of new words. As an example, Baldwin and Moses (1994) reported that 18- to 20-month-old children are aware of the significance of a speaker's focus of attention and can use it to guide their mapping of words and objects. The importance of the social context has similarly motivated many researchers to examine how variations in the social interaction between parents and children might contribute to variations in word development, exploring such variables as joint attentional focus, and the tailoring of linguistic input to correspond to children's focus of attention (Harris, Jones, Brookes, & Grant, 1986; Smith, Adamson, & Bakeman, 1988; Tomasello, Mannle, & Kruger, 1986; Tomasello & Todd, 1983). Such studies reflect the perspective that word

meaning must be studied as a socially transmitted system, and that its development can be accounted for in large part by this social context.

Given the social context of language development, several researchers (Bloom, 1993; Gathercole, 1987; Nelson, 1988) have argued that it is not necessary to propose lexical principles to account for early word-learning. Social-pragmatic forces, such as children's use of pragmatic cues or the impact of parental input, are said to obviate the necessity for positing word-learning constraints or lexical principles. That is, they claim that word-learning can be accounted for by adults' use of language in a transparent way, and by children's adeptness at figuring out the communicative intent of the speakers around them. They also argue that the empirical data are not compatible with a constraints approach. By way of counterargument, while acknowledging the importance of pragmatic and social cues, researchers in the area of lexical constraints hold that word-learning principles do provide additional explanatory value in accounting for the rapidity of word-referent mapping. Woodward and Markman (1998) review evidence that children learn words to refer to aspects of a situation in ways which cannot be accounted for or predicted by the social-pragmatic approach, and which in fact sometimes run contrary to this approach. For example, research on the taxonomic assumption suggests that while children prefer to sort objects on a thematic basis, hearing a novel word causes them to shift focus and to begin sorting taxonomically instead (Markman & Hutchinson, 1984). Similarly, Woodward (1992) found that in the presence of an appealing dynamic display, upon hearing a novel word, babies switched their attentional focus away from the

dynamic display to a static and less interesting object display. These and other examples suggest that in accordance with the predictions of lexical principles, hearing new words causes children to change their attentional focus in very specific ways. Lexical principles, then, appear to hold an important place among the sources of information about word meaning exploited by young children, and their continued investigation is warranted.

Word-Learning Principles

Several different word-learning principles have been proposed to operate among young children. Barrett (1978) proposed a theory of initial contrast, by which children, from the start of the word-learning process, contrast the negative and positive examples of referents of a word, in order to extract the exact defining dimensions of a word. Clark (1983a, 1987) proposed that from a very early point in language acquisition, children abide by a principle of contrast, which states that any difference in form in a language marks a difference in meaning. Markman (Markman, 1984, 1987, 1991, 1992; Markman & Wachtel, 1988) has focused primarily on the taxonomic, whole object, and mutual exclusivity assumptions. The taxonomic assumption states that children assume that new labels refer to taxonomic categories. Several researchers have also argued that for very young children, the taxonomic assumption primarily reflects a strong attentional focus on shape upon being asked to extend a new word (Baldwin, 1992; Imai, Gentner, & Uchida, 1994; Poulin-Dubois, Frank, Graham, & Elkin, in press). The whole object assumption refers to children's assumption that names label whole objects rather than their parts, their material or

substance, or other qualities of the object. The mutual exclusivity assumption, described above, states that children assume that the names for different object categories are mutually exclusive; that is, each object can only have one name. The focus of the current research was on some of the outstanding questions regarding mutual exclusivity.

Using a slightly different formulation of possible assumptions, another group of researchers (Golinkoff et al., 1994) have organized several lexical principles hierarchically into what they term a "developmental lexical principles framework". In this hierarchy they propose a two tiered developmental sequence, in which each tier includes three lexical principles. In the first tier, children have access to the principles of reference, extendibility, and object scope. The principle of reference states that words can be mapped onto the child's representations of objects, actions, events or attributes in the environment. The principle of extendibility suggests that a word can be used to label referents other than the exact exemplar which has previously been labelled. The principle of object scope states first that words label objects, and second, that words refer to the whole object as opposed to its parts or attributes. These three lexical principles are thought to enable a first stage of deliberate, laborious word-learning. In the second tier, it is proposed that children use the principles of categorical scope, novel-name-nameless category (N3C), and conventionality. Categorical scope refers to the principle that the extension of novel object words occurs mainly on the basis of basic-level category membership. Objects that are related at the basic level, as delineated by Rosch, Mervis, Gray, Johnson and

Boyes-Braem (1976), share characteristics along several dimensions, including both shape and function. Thus, using the principle of categorical scope, children are predicted to extend new words to objects which they consider to be the same kind as the original, for example using the word "cup" appropriately to refer to a new example of a cup. The N3C principle states that novel terms map to previously unnamed objects. Conventionality is the assumption that speakers expect certain meanings to be expressed by conventional forms within their language community. These latter three principles are thought to allow for rapid, extensive word-learning.

The Mutual Exclusivity Principle and its Effects

The main focus of the current research was on the principle of mutual exclusivity. Over the past several years a fair amount of research effort has been devoted to clarifying children's use of this principle, and has included a focus on behavioural predictions stemming from the hypothesized principle, its age of onset, course, and the conditions of adherence to it.

If young children do indeed operate using the mutual exclusivity principle, then one would predict it to have several different effects on word-learning. Merriman and Bowman (1989) and Woodward and Markman (1998) have each delineated a somewhat overlapping series of potential effects of the mutual exclusivity principle on children's word-learning. First, Merriman and Bowman have proposed the "disambiguation effect", which closely resembles Woodward and Markman's description of mutual exclusivity as providing an "indirect means of word-referent mapping". Essentially, the proposal is that children using the

mutual exclusivity principle would be expected to assume that if there are both a familiar object and a new object in the vicinity, then a new term should be taken to refer to the novel object. For example, a child is helping her father fix the sink. Two tools are lying on the floor, and the child knows one of them by the term "hammer". When her father says "pass me the wrench", she is predicted to make the assumption that the wrench cannot also be a hammer, and must therefore be the object whose name she does not know.

The second potential effect of mutual exclusivity proposed by Merriman and Bowman (1989) is the "correction effect". This is a function of mutual exclusivity by which children remove a certain word from the extension of another word, such as in the case of correcting an overextension. For example, mutual exclusivity might help children to stop using the term "*dog*" once they learn the correct extension of the term "*wolf*". Third, Merriman and Bowman refer to the "rejection effect", described similarly by Woodward and Markman (1998) as the avoidance of redundant hypotheses. This effect of mutual exclusivity is said to compel a child to reject a new word for an object for which the child already has a name, for example, saying "*no, pants*" upon hearing the new word "*overalls*". As a fourth proposed effect, Merriman and Bowman refer to "restriction", by which children restrict generalization of a word by avoiding things that are referents of other words. That is, if children know an object by a particular name, they should not generalize other names to it.

Woodward and Markman (1998) have proposed two additional potential

effects of mutual exclusivity. First, they suggest that mutual exclusivity might serve a purpose in helping children to overcome the whole object assumption, when necessary. That is, children can make good use of mutual exclusivity as a way to differentiate their lexicon and learn words for parts, substances, textures, colours, and other properties. Second, Woodward and Markman note that mutual exclusivity may have the effect of overcoming the taxonomic assumption when necessary, allowing children to learn proper names once they already know a category label (Hall, 1991).

In order to test the various proposed effects of mutual exclusivity, several experimental studies have been conducted. Preschool-aged as well as older children have been reliably shown to behave in a manner that is consistent with mutual exclusivity. Markman and Wachtel (1988) conducted a series of studies with 3- to 4-year-olds, aimed at exploring adherence to mutual exclusivity. In their first study, children were shown pairs of objects consisting of a familiar and an unfamiliar object, and were asked, for example, to "show me the dakon". Children treated the new word as a label for the unfamiliar object rather than as a second label for the familiar object. Several other studies have reported similar results (Au & Glusman, 1990; Merriman & Bowman, 1989; Merriman, Marazita, & Jarvis, 1993b), supporting the notion that children as young as 3 years consistently show the disambiguation effect.

This ability of children to learn new words with very little input or without an ostensive definition, that is, without being explicitly told, e.g., "this is a *giraffe*", is in fact not a newly observed phenomenon. In 1978, Carey coined the

term "fast mapping" to refer to children's ability to learn words in such a manner. In recent years, however, researchers interested in the mutual exclusivity principle (e.g., Markman & Wachtel, 1988; Merriman, 1986b; Merriman & Bowman, 1989) have added a theoretical overlay to this fast mapping behaviour, suggesting that it represents a disambiguation effect of the mutual exclusivity principle. That is, children are said to fast map a word to a new object because they are biased not to accept two words for the same familar object, and therefore need to do something else with the second word. Other researchers, however, have argued that the fast mapping behaviour seen in experimental situations is *not* necessarily due to a mutual exclusivity principle. That is, children might attach the novel label to the novel object not because they object to a familiar item having two names, but because they do not like seeing an object which does not have a name, and want to give a name to that object (Clark, 1983a; Golinkoff et al., 1994; Mervis & Bertrand, 1994). These two proposed motivations are quite different from one another; while the first motivation requires a mutual exclusivity principle, the second one does not. Thus, in parallel with the mutual exclusivity principle, two other proposed principles, i.e., the lexical gap principle (Clark, 1983a, 1987) and the N3C principle (Golinkoff et al., 1994), have been said to account instead for fast mapping (or disambiguation) behaviour. The lexical gap principle states that children have a general motivation to fill lexical gaps, and that they invoke the principle of contrast to help them determine that a new word differs in meaning from an old word, and then map the new word to an unnamed object. The slightly simpler N3C principle

states that novel terms map to previously unnamed objects. Since the mutual exclusivity principle and the N3C or lexical gap principles, however, make similar predictions in cases where a novel name is heard in the presence of a novel object, it remains difficult to determine which principle is motivating the children when they engage in fast mapping behaviour.

Other related effects of mutual exclusivity have also been demonstrated among preschoolers. Markman and Wachtel (1988), in another experiment, used both familiar and unfamiliar objects with salient parts. One group of children heard a new nonsense word used to refer to a familiar object, while another group heard the word used to refer to an unfamiliar object. The authors reported that when the new word was used for a familiar object, such as saying "dax" to refer to a vacuum cleaner, the 3- to 4-year-old children were more likely to interpret "dax" as a name for a salient part of the object, such as the nozzle, rather than as a second term for vacuum cleaner. In the condition in which the objects were unfamiliar, children interpreted the novel name as the term for the novel object. These results support mutual exclusivity by suggesting that children prefer to find alternative meanings for new words rather than to accept them as second names for familiar objects. These results are consistent with Woodward and Markman's (1998) hypothesized effect of mutual exclusivity as helping children to override the whole object assumption.

In exploring the limits of mutual exclusivity, Au and Glusman (1990) found that 3.5- to 5.5-year-old children violated mutual exclusivity and accepted two names for an object if they had reason to believe the names came from different

levels of a hierarchy, such as *carrot* and *vegetable*. They did, however, honour mutual exclusivity by their avoidance of giving an object two names if they believed the names came from within one level of a hierarchy.

The studies described above make it clear that children of preschool age and older behave in a way which is consistent with mutual exclusivity. These findings have led researchers to two sets of speculations. First, they have speculated about the age at which mutual exclusivity might first be available to children learning new words. For example, Markman (1992) has suggested that such a principle would be most useful to children in the earliest stages of vocabulary development, when their need for quick learning solutions is strongest and when they are least experienced in using contextual cues to learn new words. Second, the suggestion that children may be capable of overriding mutual exclusivity under certain conditions has caused researchers to speculate about the flexibility of the bias, and the conditions necessary and sufficient for children to override it. This second issue will be addressed following a consideration of the first.

Adherence to Mutual Exclusivity in Very Young Children

There are differing theoretical positions taken with regard to the presence of a mutual exclusivity principle in younger children. Markman (1992) has proposed that children operate with some form of this bias from the very start of word-learning. Her general perspective is that word-learning constraints cannot be learned generalizations from language input. Rather, she considers them to

be universally available to the beginning language learner, particularly because they would be maximally beneficial at that stage. Merriman (1986b; Merriman & Bowman, 1989) holds the opposing position, that the mutual exclusivity bias is not present at the earliest stages of language development, but begins to emerge around the age of 25 months, gathering strength over a period of a year or more until it is fully developed in the 3-year-old child. Thus, of central importance is the empirical data on mutual exclusivity for children under the age of 3 years.

One source of data that has been considered regarding the age of appearance of mutual exclusivity has been the presence or absence of children's overextensions in diary studies. Barrett (1978), in a review of Leopold's (1939; 1949) diary study, found no instances in which the child under study continued to overextend a word to a particular referent after she had learned a correct name for that referent. Barrett hypothesized that children avoid such continued overextensions because they are adhering to a lexical contrast principle, which dictates that an object should not carry two names. Merriman (1987), however, in reviewing this and other language corpora, has noted that there is frequently a period of overlap during which both words are used for the same object, before children arrive at the correct distinction between them. This period of overlap thus violates mutual exclusivity. It is difficult, however, to decide how many examples of violation of mutual exclusivity in diary studies are enough to refute the mutual exclusivity hypothesis. In addition, Woodward and Markman (1998) point out that given the proposed default nature of lexical principles, the

existence of words in a child's vocabulary which violate mutual exclusivity is not necessarily evidence against the principle. That is, in the case of a particular pair of words, children may have received enough input which contradicted the principle to allow them to override it. Merriman (1987) points out additional problems with diary studies, such as the fact that diary keepers pay more attention to the time of appearance of a word than to its disappearance, and that parents' reactions to overextensions are not often recorded. These limitations create difficulties for evaluating the diary evidence for mutual exclusivity. In sum, diary studies may not be the most reliable source of evidence regarding mutual exclusivity in young children.

A few experimental studies have been conducted with children between the ages of 2 and 3 years, aimed at clarifying the age of onset of mutual exclusivity. In an experiment testing the disambiguation effect of mutual exclusivity, Merriman and Bowman (1989) compared the performance of children aged 2 years, 3 years, and 4 years. They presented children with pairs of objects, each of which consisted of one familiar object and one novel object. For each pair they then asked the children, "which one is an X? Put your finger on the X", where X was an unfamiliar name. They found that the children's ability to disambiguate object reference in this task, by choosing the novel object upon hearing the unfamiliar name, increased significantly with age. When the novelty of the unfamiliar items was controlled for by exposing the children to the items for 5 minutes before the start of the experiment, the 2-year-olds performed only below or at chance levels, while 3-year-olds performed above chance and 4-

year-olds showed near-perfect performance. These results lent some support to the authors' hypothesis that mutual exclusivity emerges sometime around the age of 3.

In a second experiment, Merriman and Bowman (1989) tested the disambiguation, correction, and restriction effects of mutual exclusivity in children aged 25 months, 32 months, and 42 months. They again found that 25-month-olds did not reliably show these effects of mutual exclusivity. Children aged 42 months showed all three effects. The 32-month-olds showed the disambiguation and correction effects, but not the restriction effect. On the basis of this experiment, Merriman and Bowman revised their hypothesized age of onset for mutual exclusivity, suggesting that it does not happen before age 2.5 years.

In a study of children aged 28 to 32 months, Golinkoff, Hirsh-Pasek, Bailey, and Wenger (1992) found that when three familiar objects and one unfamiliar object were presented, the children selected the novel object as the referent for a novel term at a rate significantly above chance. The results of this study thus also place the beginnings of the tendency to adhere to the disambiguation effect of mutual exclusivity at a point at least as young as 2.5 years.

In another study of disambiguation, Merriman and Schuster (1991) attempted to clarify the role of several factors, including object novelty, in children's use of lexical principles at the ages of 24 months and 4 years. Contrary to the results reported by Merriman and Bowman (1989), in this study, while controlling for object novelty again reduced the 24-month-olds' success in

disambiguation when presented with pairs of objects, the children also demonstrated behaviour consistent with the disambiguation effect. That is, while the 24-month-olds did not show the disambiguation effect when the unfamiliar items had been preexposed, the children reliably chose the unfamiliar objects more often when they were asked to identify the referent of a new word than when they were simply asked to choose a picture. The authors thus suggested that children of this age show both object novelty and disambiguation effects.

In a recent test of the restriction effect of mutual exclusivity, Merriman and Stevenson (1997) had 24- to 25-month-old children listen to stories in which a novel noun was used for an atypical exemplar of a familiar noun. When the children were then asked for exemplars of the familiar noun, approximately a third of them showed a tendency to avoid the object depicted in the story. The children did not avoid the atypical object when asked for a referent of the familiar noun, however, when the story was told with pronouns or proper nouns instead of novel nouns. The authors thus demonstrated that at least some children of this age adhere to the mutual exclusivity bias by showing the restriction effect.

Continuing the age extension downward, in a study of disambiguation in children under 2 years, Mervis and Bertrand (1994) administered mapping trials in which four familiar objects and one unfamiliar object were presented, and also administered generalization trials. If children failed to map the novel word onto the novel object in a mapping trial, the experimenter showed the child the correct object. The authors reported that only half the children in a group aged 16 to 20 months were capable of choosing the unfamiliar object when a novel label was

introduced. Interestingly, the children who failed this task were found not to have achieved a vocabulary spurt. They were tested again once they had achieved a vocabulary spurt, at which time they ranged in age from 17.5 to 20.5 months. At the time of retest, all of them showed the ability to fast map. Thus, it is possible that some children under 2 years of age can disambiguate reference in this way, and that the ability to engage in this behaviour at such a young age is connected to the achievement of the vocabulary spurt. One difficulty with this study, however, is that while the children who could fast map at the onset of the study had significantly larger vocabularies than those who could not, this constitutes only suggestive evidence that these children had actually achieved a vocabulary spurt at the time the study began. In addition, by providing corrective feedback after each mapping trial, for some children the experimenters may have inadvertently trained a general association between the novel label and the novel object, which may have influenced their behaviour on subsequent mapping trials.

In another recent study aimed at clarifying the relationship between disambiguation (or fast mapping) ability and vocabulary development in the same age range, Graham, Poulin-Dubois, and Baker (in press) presented 16- to 22-month-old children with three objects, two familiar and one unfamiliar, and asked the children for the referent of a familiar label, e.g., a dog, as well as for the referent of an unfamiliar label, e.g., a gonk. The children in the study did demonstrate the disambiguation effect by mapping the novel label to the novel object more often than expected by chance. Furthermore, children who showed

a consistent tendency to disambiguate had larger vocabularies than those who did not, but did not differ in age. The authors also found that while children who consistently disambiguated had met the 50-word productive vocabulary criterion for a vocabulary spurt, not all children who had achieved this criterion were able to consistently disambiguate, suggesting a vocabulary spurt might be a necessary but not sufficient criterion for disambiguation success. These results should be interpreted with caution, however, given recent criticisms of the 50-word criterion as an index of the vocabulary spurt (Goldfield & Reznick, 1996).

Taking a slightly different approach to the question of the operation of a mutual exclusivity principle in young children, Woodward and Markman (1998) have argued that if young children do have a tendency to reject second labels for objects, then it should be expected that they will have greater difficulty in learning two names for the same object. This difficulty should be demonstrated in the form of slower learning of second names for objects, resistance to learning second names, or a failure to learn two names. In a study consistent with this rationale, Merriman, Marazita, and Jarvis (1993a) tested 24- to 28-month-old children by showing them films of several different unfamiliar objects, accompanied by different sound tracks. All of the children heard "This is a zav" during the first film. During a second film, one group of children was shown the same object with a new name, for example, "This is a duff", a condition which clearly violates mutual exclusivity. Another group of children was shown a film in which a different object was called "duff". In this condition, mutual exclusivity is not violated, since each object is given its own name. Two additional groups of

children served in control conditions, in which one of the same two films was shown, but the children heard pronouns instead of labels. In the test phase, the children were asked to "Show me the zav" and to "Show me the duff". For the condition in which each object had been given its own name, more children demonstrated learning of the second label than expected by chance. For the condition in which both names had been used to refer to the same object, however, the number of children who demonstrated learning of the second label was no better than chance. Although several children did show that they had learned the second label in this latter condition, the general findings suggest that at 24-28 months, second labels may be more difficult to learn, supporting the operation of a mutual exclusivity bias, albeit in a simpler form, by the age of 2 years.

In another set of experiments within the same age range, Liittschwager and Markman (1994) taught 24-month-old children one new word for an object; either for a novel object, or for an item which had a name well known to them. The children were equally successful at learning first and second labels, contrary to the predictions of mutual exclusivity. In a second experiment with 24-month-olds, the authors increased the demands of the task by including two objects, and under these conditions, the children showed greater difficulty in learning second labels than in learning first labels. In a third experiment, when shown only one object, children aged 16 months had greater difficulty learning a second name than a first name for the object. The authors argue that mutual exclusivity functions as a fall-back assumption, most useful to children in word-learning

situations in which their processing capacities are taxed. Children may, however, override the constraint in the face of evidence against it. This study suggests that even at the age of 16 months, behaviour consistent with mutual exclusivity can be seen. It is possible however, that behaviour consistent with rejection effects appear at an earlier age, while effects such as disambiguation and restriction appear only after the age of 2, since tasks measuring the latter effects require greater information processing abilities.

In sum, while mutual exclusivity has been very reliably demonstrated in children aged 3 years and over, research on mutual exclusivity in children under the age of 3 years has yielded inconsistent results. Age of success on disambiguation tasks seems to vary from 17 to 30 months, depending on a variety of participant, contextual, and experimental factors. The learning of second labels does seem to be more difficult for children as young as 16 months, although some 24-month-olds were able to learn first and second labels equally easily. Thus, the status of the mutual exclusivity bias among children under the age of 3 years remains to be clarified. Thus, one goal of the current project was to contribute to an understanding of the effects of mutual exclusivity under the age of 3 years.

Suspension of Mutual Exclusivity

Recall that a second important question in this area concerns the flexibility and limits of the mutual exclusivity bias. Despite the fact that mutual exclusivity can function as a useful way of limiting the hypothesis space, at some point, children must be able to override this principle in order to learn synonyms, as

well as to learn superordinate and subordinate terms. Hence, researchers have been particularly interested in determining the conditions under which children will and will not behave in accordance with the principle.

There appear to be several situations in which children consent to violate mutual exclusivity. One example described above is Au and Glusman's (1990) finding that 3.5- to 5.5-year-old children will accept two names for an object if they have reason to believe the names come from different levels of a categorical hierarchy. In another set of experiments (Taylor & Gelman, 1989), children aged 20 to 31 months heard a new name for a familiar object, such as "tiv" for a ball, and were then tested on their extension of the new name by having it embedded in requests for the performance of various actions, such as "Can you put a tiv in the box?". Their experiments were designed to establish which of several semantic relations between novel and familiar words was most consistent with the children's performance in response to such questions. The authors reasoned that if children interpreted the novel label as referring to subordinate members of the already familiar category, they would be more likely to extend that novel label to similar looking objects than to dissimilar objects. Therefore, they asked the children to choose from an array of objects which included both similar and dissimilar category exemplars. Children's object choices were quite consistent with the interpretaton that they took the novel term to refer to a subordinate-level category. Children continued, however, to include the referent of the newly-taught word in their choices when asked to perform an action with the original, familiar word, such as "Can you hide a ball?". This study

thus supports the notion that young children can accept two labels for an object when they believe the labels come from different levels of a categorical hierarchy. Whether this tendency reflects a violation of an active mutual exclusivity principle, or whether in the age range of 20 to 31 months children simply do not yet apply the mutual exclusivity principle, is not clear from this study.

In another recent attempt to identify the limits of mutual exclusivity, Savage and Au (1996) asked what would happen if children heard two names for the same object, without having any access to information indicating the basis on which the labels differed. In two similar experiments with children aged 3 to 5 years, Savage and Au created a procedure in which one experimenter labelled a novel toy several times using a novel term, then left the room while a second experimenter labelled the same toy several times using a different novel term. Children thus heard an object referred to repeatedly using two different labels, input which directly violated mutual exclusivity. Following this phase, the children were asked to find the referent for each of the two novel terms. The experimenters counterbalanced the order in which the labels were taught and the order in which the labels were tested. The results of the experiments suggested that half the children honoured mutual exclusivity by indicating the correct referent for only one of the two taught labels, applying the remaining label to another unfamiliar object in the array. The other half of the children suspended mutual exclusivity, accepting the object as the referent of both novel labels. (Of the children who did honour mutual exclusivity by accepting only one label for the

novel toy, all chose the label that was tested first.) It is noteworthy that in the more typical disambiguation tasks, children in the same age range honour mutual exclusivity at a high rate, while in this study, only half the children honoured mutual exclusivity. The difference lies in the fact that in this case, the children received direct evidence contradicting mutual exclusivity. For some children, at least, the bias is strong enough to withstand this type of violation.

Bilingualism and Mutual Exclusivity

The question of suspension of mutual exclusivity naturally brings to mind the case of children growing up in bilingual environments. In their daily lives, the standard situation is for bilingually exposed children to hear constant violations of mutual exclusivity, since objects are consistently labelled with two different words from two different languages. Given the onslaught of information bilingual children receive which runs contrary to the mutual exclusivity principle, these children should be far less inclined to adhere to it. The degree to which bilingual children abide by mutual exclusivity, then, can provide unique information about the flexibility of this principle, and the conditions under which it can be overriden.

A first source of data regarding mutual exclusivity in bilinguals comes from diary studies of children developing in bilingual environments. A debate exists in the literature concerning the degree of overlap between a young bilingual child's two languages, that is, words said by the child in both languages, in the early productive vocabularies of children learning two languages. Much of this debate has been fueled by the theoretical question of whether young bilinguals begin with an undifferentiated language system which gradually separates into two

languages, or whether they develop two systems from the start of language learning. The diary data evaluated for this purpose, however, also have indirect relevance for the issue of mutual exclusivity. Several researchers (Slobin, 1978; Vihman, 1985, 1986; Volterra & Taeschner, 1978) have interpreted diary evidence to suggest that children raised in bilingual environments have one undifferentiated lexical system early on, and use individual terms from each language without overlap. Over time, these researchers contend, the system becomes differentiated into two languages, with concepts represented by words in both languages. This position indirectly supports the notion of the early operation of a mutual exclusivity bias, since in the early stages the children seem to use only one word per concept. Clark (1993) has suggested that young bilinguals treat their production lexicon as one in which all terms contrast, and thus avoid the production of apparent synonyms. Once children realize that they are learning two language systems, however, Clark believes that children apply contrast only within a language and not between languages.

Not all researchers, however, agree that language mixing at a young age necessarily implies a bilingual developmental pattern which proceeds from lack of language differentiation to differentiation (Genesee, 1989). In addition, the degree to which there is vocabulary overlap is also disputed. Pearson, Fernandez, and Oller (1995) point out that contrary to the claims of Volterra and Taeschner (1978) and Vihman (1985, 1986), other diary studies have yielded evidence of a significant proportion of equivalent terms in the two languages of

bilingual children even in the earlier stages of language development. In addition, it has been shown by Pye (1986) that small differences in the method of calculating the proportion of translation equivalents yield large differences in the estimates of the presence of these equivalents in the early stages of word-learning.

Pearson et al. (1995) have also argued that it is difficult to compare diary data from bilingual infants across studies, because each diarist reports the vocabulary information in a different way. In addition, because the data refer to so few children, it is difficult to determine what is typical and what is not typical in early bilingual development. To address the question of early bilingual production in a more systematic fashion, Pearson et al. used the English (Fenson et al., 1991) and Spanish (Jackson-Maldonado, Thal, Marchman, Bates, & Gutierrez-Clellen, 1993) versions of the MacArthur Communicative Development Inventory (*CDI*) to collect longitudinal data on the developing productive vocabulary of 27 English-Spanish bilingual children. Their study thus offers the advantage of a large sample of bilinguals rather than a single child, and provides a measure of vocabulary development which is consistent across children. The authors found that for vocabulary levels between 2 and 500 words, the average proportion of translation equivalents, or words said in both languages, was stable across the span of the study. That is, between the ages of 8 and 30 months, the average proportion was 31%. (Once vocabulary was beyond 500 words, the proportion of doublets increased to 59%, although only a few children reached this level.) The individual proportions of translation equivalents, however, varied a great deal, as

did the patterns of change over time. Some children showed few translation equivalents at an early stage and a greater proportion later on, as predicted by Volterra and Taeschner (1978), Vihman (1985, 1986), and Clark (1993). Others, however, showed alternate patterns. Some children had a declining proportion of translation equivalents over time, some children had a series of small rises and declines, some had a moderate rise, followed by a decline, followed by another rise, and still others had a relatively stable percentage of translation equivalents over time. In a few cases, children had quite a high proportion of equivalents at a very early stage, in the context of very small total vocabularies. For example, a child at 10 months of age said 9 words in total, 63% of which were translation equivalents. Another child at 16 months had 51 total words, 57% of which were translation equivalents. Together, the results of this study cast empirical doubt on the claim that young bilinguals have an early mutual exclusivity bias which is overridden once word-learning is more advanced. It should also be noted that due to changes in caregiver routine and the amount of time the children spent with each caregiver, the proportions of English and Spanish heard by the children over the course of the study also fluctuated. No doubt such aspects of the social context also influenced children's patterns of word development.

Although there is a general lack of support for the claim that in their productive vocabularies, very young bilinguals at first adhere to mutual exclusivity and then come to violate it, there are several other ways in which bilingualism might have an impact on mutual exclusivity. It is possible that bilinguals would develop adherence to the principle more slowly than

monolinguals, or that adherence to the principle would not emerge in bilinguals. It is also possible that bilinguals would honour mutual exclusivity within a language, but would know to suspend it when second labels come from a different language.

A few experimental studies have addressed the question of whether bilingualism has an impact on the way children react to second labels. Rosenblum and Pinker (1983) explored willingness to accept second labels among 4- to 5-year-old English monolingual and English-Hebrew bilingual children. In response to inquiries as to whether calling a known object by a nonsense name was acceptable or not, equal numbers of monolinguals and bilinguals agreed that it was acceptable; this position was endorsed by a slight majority in each group. In addition, all participants in both the monolingual and bilingual groups followed instructions to manipulate familiar objects, even though the instructions to do so included reference to the objects by a nonsense name. The two groups differed, however, in their justifications for allowing an object to take a different name. The monolinguals tended to provide reasons based on an object's attributes, while the bilinguals gave more reasons referring to the experimental or personal context in which the transfer of names was acceptable. It seems that bilinguals had acquired the metalinguistic knowledge that choice of label is related to situational factors. (While a consideration of the advantages of bilingualism for the development of metalinguistic awareness is beyond the scope of the present work, the reader is referred to several additional sources, such as Bialystok, 1991; Cummins, 1978, 1987; Malakoff & Hakuta, 1991). It is

also possible that sample differences might account for the findings of this study. While the two groups were found to be of equivalent age, sex, nonverbal intelligence, SES, and talkativeness, the monolinguals did score higher than the bilinguals on an English vocabulary test. This finding is typical of research with monolingual and bilingual children (e.g., Ben Ze'ev, 1977; Pearson et al., 1993). As Merriman and Kutlesic (1993) point out, the monolinguals' greater experience with English might help them to learn the referential conditions for using English words. This experience might also account for the tendency of the monolinguals to focus more on an object's attributes in their justifications for allowing second labels.

In an experiment exploring adherence to mutual exclusivity across languages (Au & Glusman, 1990), English-Spanish bilinguals aged 3.5 to 6.5 years were presented with an array of objects and were taught a novel English label for a novel toy. The experimenter who taught the label then left the room, and the children were asked in Spanish by a second experimenter to find referents for a novel Spanish label. Each experimenter spoke in only one language in front of the children. One third of the children honoured mutual exclusivity by avoiding the object already labelled by the first experimenter, while two thirds chose the same object, thus violating mutual exclusivity. These proportions did not differ from random guessing, leading the authors to suggest that bilinguals of this age do not reliably avoid giving two novel names to the same object when the names come from different languages. Nevertheless, it is also possible that the children who behaved as though they were honouring

mutual exclusivity across languages were indeed showing a strategy which differed meaningfully from the children who behaved as though they were violating mutual exclusivity across languages. While the authors did rule out age as a factor in the study, it is possible, for example, that the children who had greater receptive or expressive competency across both of their languages were those who were willing to allow violations of mutual exclusivity. Those with lower competency in one of their languages may have been the ones who adhered more closely to mutual exclusivity. Unfortunately, each child in this study received only one trial, giving them only one chance to display their choice of strategy. Performance over several trials may have aided in clarifying each child's typical response tendency.

Using an almost identical task, DeWitt (1995) found that significantly more English-Spanish bilinguals aged 3.3 to 6 years suspended mutual exclusivity across languages than honoured it, providing stronger support than did Au and Glusman (1990) for this cross-language effect. In addition, the bilinguals in her study suspended mutual exclusivity despite the potential confusion of having heard the Spanish-speaking experimenter mix Spanish and English utterances just prior to the task. Within the same study, using a separate group of children aged 3.5 to 6 years, DeWitt also tested bilinguals' adherence to mutual exclusivity within a language. She found that all the children honoured mutual exclusivity in their object choices, suggesting that bilingual children of this age do distinguish between across-language and within-language violations of mutual exclusivity.

In another study targeting adherence to mutual exclusivity in bilinguals, Merriman and Kutlesic (1993) compared English monolingual and English-Serbian bilingual 5- to 6-year-old and 7- to 8-year-old children's word-learning, both within a language and across languages. In the same-language condition, the children were shown a vignette of a puppet attempting to teach another puppet a second label for an object. In the different-language condition, the children were shown a similar vignette, although accompanied by a preliminary explanation that the puppet was attempting to teach the word in French. The narration of the vignette then continued in English. While the authors offer no explanation for their choice to refer to the second language as French rather than Serbian, it is assumed that this was done in order to equate the experience for the monolinguals and the bilinguals, as well as to isolate the fact that this was a bilingual learning situation for the puppet, without allowing the bilinguals to invoke any particular knowledge of the language. Consistent with Rosenblum and Pinker's (1983) findings, these authors report that when presented with violations of mutual exclusivity within a language, monolingual and bilingual children did not differ in their tendency to show correction and restriction effects. In the dual language condition, however, bilinguals were less likely than monolinguals to honour mutual exclusivity by showing correction and restriction effects. It is striking that the bilinguals were less likely to do so, even though the dual-language condition was essentially administered only in English, and included only brief reference to the fact that the puppet was teaching in French. The results of this study thus also suggest that bilinguals of this age may have a

greater tolerance for cross-language overlap, as a result of frequent experience with mutual exclusivity violation. In addition, the results provided some incidental support for Merriman's (1986b; Merriman & Bowman, 1989) hypothesis that mutual exclusivity develops over time, since within a language, older children generally showed more correction effects of mutual exclusivity than younger children.

In a recently published study, Davidson, Jergovic, Imami, and Theodos (1997) compared English monolingual, English-Urdu bilingual, and English-Greek bilingual children's adherence to mutual exclusivity. Using a disambiguation test, a rejection test, and a restriction test of the constraint, they compared two age groups; 3.5- to 4-year old children, and 5.5- to 6-year-old children. All of these tests focused on adherence to mutual exclusivity within a language. The bilingual children in this study were tested in their non-English language. The authors found that on the disambiguation test, involving pairs of familiar and unfamiliar items, the mutual exclusivity effect was significantly stronger among the older monolinguals than among the older bilinguals, although the two younger groups did not differ from one another. On the rejection task, in which children answered a series of yes/no questions regarding permission for a familiar object to take a new name, at both ages, monolingual children were more likely than bilinguals to reject a new name for the object. On the restriction test, which involved an acceptance of names for objects which the authors referred to as "hybrid" objects, i.e., objects which were constructed to resemble a cross between two familiar objects, monolinguals and bilinguals did

not differ. Thus, on two of the three tests, there was some evidence to suggest that monolinguals adhered to mutual exclusivity more than bilinguals. Overall, the study also supports the notion of a developmental progression in honouring mutual exclusivity, since older monolinguals generally adhered to the constraint more than younger monolinguals.

In sum, the results of the studies including bilinguals suggest that for adherence to mutual exclusivity within the same language, differences have generally not been found between monolinguals and bilinguals (Merriman & Kutlesic, 1993; Rosenblum & Pinker, 1983), and bilinguals do tend to honour mutual exclusivity within a language (DeWitt, 1995). The exception is Davidson et. al.'s recent (1997) study, which found differences between monolinguals and bilinguals in adherence to mutual exclusivity within a language. When mutual exclusivity is studied across languages, however, the results more consistently suggest that bilinguals fail to reliably honour mutual exclusivity (Au & Glusman, 1990; DeWitt, 1995; Merriman & Kutlesic, 1993). Bilingual children aged 3.5 years and older thus seem to make a distinction between word-learning situations, showing some understanding that mutual exclusivity holds within a language but not between languages. Nevertheless, Davidson et al.'s evidence suggests that bilinguals may sometimes also suspend mutual exclusivity within a language.

Given that no experimental studies of mutual exclusivity among bilinguals seem to have been conducted with children under the age of 39 months, several developmental questions remain open. It is not known whether bilingual children

under the age of 3 years show patterns of adherence to mutual exclusivity within a language in ways similar to monolingual children, or whether the bias gains strength between the ages of 2 and 3, as suggested by Merriman for monolinguals (1986b, Merriman & Bowman, 1989). It is also not known whether the hypothesis that bilinguals distinguish between within-language labelling and across-language labelling, which has received some support in data for older children, would receive empirical support among younger bilingual children.

The Present Study

The main goal of this study was to compare adherence to mutual exclusivity in monolingual and bilingual children between the ages of 2 and 3 years. Four groups of children were included in this study in a cross-sectional design: monolinguals aged 26-28 months, monolinguals aged 34-36 months, bilinguals aged 26-28 months, and bilinguals aged 34-36 months. The children were administered a mutual exclusivity task modelled roughly after Savage and Au (1996); mutual exclusivity was violated by having two different experimenters label an object with two different novel labels, within the same language. Children were then asked for the referent of each of the two novel labels. It was hypothesized that at each age, bilinguals would be less likely to adhere to mutual exclusivity than monolinguals.

A second goal of the study was to test the hypothesis that, in line with Merriman and Bowman's (1989) proposal, a developmental change in adherence to mutual exclusivity should be observed, with monolingual children at the older age honouring mutual exclusivity more than the younger monolingual children.

For bilinguals, however, it was hypothesized that the rate of mutual exclusivity would be similar at the two ages, or would in fact be lower at the older age, given bilingual children's experience with violations of mutual exclusivity in their linguistic environment.

A third goal of this study was to compare young bilingual children's adherence to mutual exclusivity both within a language and across languages. The children in each bilingual age group were administered an additional mutual exclusivity task, identical to the first except for the fact that one experimenter spoke only in English and labelled the novel object in English, while the other experimenter only spoke French and labelled the novel object in French. The reason for having the experimenters speak different languages was to highlight the dual-language nature of the task for the children, in an attempt to heighten the cues for overriding mutual exclusivity. Of interest was whether the children would respond accordingly. It was hypothesized that the bilinguals would be more likely to adhere to mutual exclusivity in the task which was conducted within a language than in the task which involved labelling across languages, especially at the older age. At the younger age, it was expected that bilinguals would not yet have learned to distinguish the situations in which mutual exclusivity should be honoured, and would therefore not differ in their adherence across the two tasks.

A fourth goal of the study was to determine whether degree of overlap between languages in the productive vocabulary of the bilinguals, suggestive of increased tolerance for violation of mutual exclusivity, would predict the bilingual

children's performance on the mutual exclusivity tasks. To date, this relationship has not been explored. An adaptation of the *CDI: Words and Sentences* into Québec French was undertaken, so that vocabulary data for each child could be collected in both French and English. A description of the adaptation process is included in Chapter 3. It was hypothesized that the proportion of French-English translation equivalents in the children's vocabulary would predict the extent to which violation of mutual exclusivity would be observed.

A fifth goal of the study was to determine the relationship between adherence to mutual exclusivity on the same-language mutual exclusivity task described above, and children's performance on a fast mapping task, which taps the word-learning behaviour typically measured in tests of the disambiguation effect of mutual exclusivity. It remains unclear whether fast mapping behaviour truly reflects mutual exclusivity, or whether it simply reflects the motivation to fill lexical gaps. It was hypothesized that if the two tasks measure distinct processes, then success on one of these tasks should be independent of success on the other, and different age-related patterns of success might be seen. It was also hypothesized that if the ability to fast map reflects a process of mutual exclusivity, then bilinguals would be at a disadvantage relative to monolinguals on a fast mapping task, since the bilinguals would be more likely to allow a novel label to apply to a familiar item rather than to insist on its application to an unfamiliar item.

A sixth goal of the study was to provide perhaps the first experimental data related to the domain specificity of the mutual exclusivity principle. Although

Markman (1992) raised the theoretical possibility that constraints similar to word-learning constraints might operate in other cognitive domains, to date no experimental exploration of this prediction appears to have been undertaken. In the present study a slightly different prediction was made, namely that the capacity to override a lexical principle might itself bring parallel advantages in a different cognitive domain. Specifically, it was hypothesized that children's exposure to a bilingual environment, in which the mutual exclusivity principle is consistently violated, would afford children an advantage in the area of visual perspective-taking. Visual perspective-taking is the ability to grasp that one's own visual point of view is not necessarily that of another, and it is a skill which requires a certain degree of developmental maturity (Piaget, 1926). Thus, it was hypothesized that the early realization that people speak different languages and label words differently in those languages might act to facilitate bilingual children's development of the understanding of differences in other people's visual perspective.

Flavell and his colleagues (Flavell, Botkin, Fry, Wright, & Jarvis, 1968; Flavell, Everett, Croft, & Flavell, 1981; Flavell, Shipstead, & Croft, 1978; Masangkay et al., 1974) have shown that visual perspective-taking ability is comprised of at least two developmental levels of knowledge. At Level 1, the child can infer what object another person does and does not see, while at Level 2, the child knows that an object which is visible both to the self and to another person may nevertheless present a different appearance to each one. Flavell and his colleagues have demonstrated that children as young as 2.5 years show

Level 1 skills, but that children aged 3.5 years perform poorly on Level 2 tasks. Success on Level 2 tasks is achieved by the age of 4 or 4.5. Given the age range of the children in the present study, a visual perspective-taking task incorporating elements of both Level 1 and Level 2 knowledge was developed and administered. It was predicted that bilingual children would show stronger visual perspective-taking abilities than monolingual children across these two levels combined.

CHAPTER TWO: METHOD

Participants

Participants for this study were recruited using birthlists provided by the Régie Régionale de la Santé et des Services Sociaux de Montréal-Centre after approval by the Commission d'Accès à l'information du Québec. Recruitment was also conducted by placing notices in day care facilities and pediatricians' offices. In addition, notices were placed in several local newspapers, and information about participation in the study was broadcast regularly on a community radio program.

In recruiting children for the study, it was necessary to assess the linguistic environment of each potential participant. To qualify for inclusion in the bilingual group it was necessary for children to be sufficiently exposed to both English and French, and to no additional languages. Children's own language production behaviour did not contribute to the determination of eligibility. Rather, for each child, an assessment of exposure to each language was conducted, taking into account the language(s) spoken by each caregiver and the amount of time spent by the child with that person. This assessment was conducted by telephone before accepting a child into the study. Using a template questionnaire developed specifically for this purpose, the experimenter asked the parent a series of questions, soliciting such information as the child's wake-up time, bedtime, and naptime, the amount of time spent daily with each caregiver both separately and together, and the estimated proportion of time spent by each caregiver interacting with the child in each of the two languages. The linguistic

environment assessment questionnaire is included in Appendix A. Following the telephone interview, the experimenter used the collected information to calculate the child's overall exposure to each language. In order to be included in the study, it was necessary for children to be hearing the nondominant language at least 20% of their waking time. Although ideal participants in a study on bilingualism would be equally exposed to both languages, this cutoff was made necessary because in reality, many very young bilingually exposed children hear 75-80% of their language input from the main caregiving parent, and 20-25% from the parent working outside the home. Thus, a minimum cutoff of 20% reflects regular and fairly substantial exposure to the nondominant language, and allows for the participation of children growing up in very typical bilingual environments. This choice is supported by Pearson, Fernandez, and Oller's (1993, 1995) longitudinal study of 27 bilingually developing children, in which 11% of the children included in the study had less than 25% exposure to their non-dominant language. In the present study, the percentage of bilingual children with between 20% and 25% exposure to their non-dominant language was 9.5%.

While for the majority of children bilingual exposure occurs mainly in the home, exposure in other contexts was also taken into account in determining eligibility for the study. Thus, while the simplest cases involved the mother speaking one language and the father speaking the other, more complex situations required calculations taking into account the languages spoken by such caregivers as grandparents, daycare workers, and babysitters. In addition,

many fluently bilingual parents addressed their children in both languages, and the estimated proportion of time they spent in each language was taken into account in the assessment of the child's language exposure.

In total, 133 children participated in this study. Of these, 7 children were eliminated for reasons of noncompliance and inability to complete the testing, leaving a final sample of 126 children. Two different age groups were tested: 26 to 28 months, and 34 to 36 months. Each of these age groups was further divided into a monolingual language group which included children exposed to English or to French and less than 20% exposure to a second language, and a bilingual language group which consisted of children exposed to both English and French, as described above. Among the monolingual children recruited to the study, 60% had no exposure whatsoever to a second language, and 16% had exposure less than 10%. For ease of communication, monolingually exposed children will hereafter be referred to as 'monolingual' and bilingually exposed children will be referred to as 'bilingual'. The sample thus consisted of four groups: 1) younger monolinguals (N = 32, mean age = 27.53 months, 23 anglophone and 9 francophone, 16 boys and 16 girls); 2) older monolinguals (N = 31, mean age = 35.62 months, 27 anglophone and 4 francophone, 15 boys and 16 girls); 3) younger bilinguals (N = 31, mean age = 27.17 months, 14 with dominant exposure to English, 17 with dominant exposure to French, 19 boys and 12 girls); 4) older bilinguals (N = 32, mean age = 35.30 months, 17 with dominant exposure to English, 15 with dominant exposure to French, 16 boys and 16 girls). After data collection was underway for the bilinguals, it became

evident that age of first exposure to two languages would be useful information, and this question was added to the linguistic environment assessment questionnaire. For families who had already completed their participation, this information was solicited by telephone recontact. Among the bilinguals, 49 children were first exposed to two languages within their first year, 4 were first exposed between the ages of 12 and 18 months, 1 between 19 and 24 months, and 1 at 25 months. Information on age of first exposure was unavailable for 8 bilingual children whose parents could not be recontacted by telephone.

Because there is some indication of a positive relationship between language skills and socio-economic status (SES)(Fenson et.al., 1994; Morisset, Barnard, Greenberg, Booth, & Spieker, 1990), SES rating data were collected for each child using the assessment scale developed by Blishen, Carroll, and Moore (1987). The results of a 2(Age) x 2(Lingual Group) analysis of variance indicated that the children in this sample differed in SES level, depending both upon their age group and their linguistic exposure. The 62 bilingual children had a significantly greater SES level (M = 65.77, SD = 18.78), than the 62 monolingual children (M = 55.44, SD = 13.88), F (1,120) = 12.59, p <.05. There was also greater variability in SES among children in the bilingual group. In addition, the 61 children in the younger age group (across both monolinguals and bilinguals) showed higher SES levels (M = 63.60, SD = 16.71) than the children in the older age group (M = 57.71, SD = 15.58), F (1,120) = 4.00, p <.05. A source table for this analysis is provided in Table 1 of Appendix B.

There are several possible reasons for the difference between the two

linguistic groups. First, it may reflect the recruitment strategies used. While all monolingual participants were recruited from birthlists, bilinguals were recruited both from birthlists and from answers to notices placed in daycares, newspaper ads and public service announcements. Parents who are motivated enough to respond to such ads may be of higher SES. Second, it is possible that parents in Québec who speak two languages are more likely both to have higher SES and to raise bilingual children. The SES difference across the two age groups is more difficult to account for, although it may be less meaningful than the difference found between linguistic groups, given that it is smaller in magnitude than the difference between the two linguistic groups.

The impact of monolingual and bilingual SES differences on the interpretability of the study's results was expected to be minimal, since there was no theoretical reason to expect children of higher SES to generally allow more violations of mutual exclusivity. The SES advantage of the younger age group over the older age group, however, had the potential to yield greater developmental similarity between the age groups in their use of word-learning principles than would be the case in the general population.

Design

The purpose of this study was to compare monolingual and bilingual children's performance at two ages on a series of tasks designed to assess their adherence to the mutual exclusivity principle. Upon arrival for the study, each child was given the opportunity to adjust to the testing environment while the accompanying parent completed the consent form (available in Appendix C).

While for the most part monolingual and bilingual children completed the same tasks and measures, the bilingual children participated in one additional task designed to assess their reaction to a dual-language situation. For this reason, monolingual and bilingual children received somewhat different protocols, and these will be described separately.

Monolingual children completed four tasks during one single visit to the laboratory. These tasks were called Same-Language Mutual Exclusivity (Same-Language ME), Fast Mapping (FM), Perspective-Taking (PT), and Sequencing (SEQ). Each of the first three tasks will be described in more detail later in the text. The fourth task, SEQ, was an imitation task administered for purposes other than this project and will not be described here. In order to control for order effects of the tasks, half of the monolingual subjects received the tasks in the order ME, PT, FM, SEQ. The other half received the tasks in the order FM, PT, ME, SEQ. Note that PT was always administered in between FM and ME in order to provide a break between the two linguistic tasks. Although FM and ME measured different aspects of word-learning performance, the tasks were quite similar in structure, both involving several trials of pointing to objects in response to verbal requests. Administering these two tasks in sequence would likely have yielded progressively poorer cooperation across the trials of the second task. SEQ was always administered last, since as an imitation task it required less compliance and concentration than the other tasks, but was nevertheless sufficiently engaging to maintain the children's cooperation toward the end of the testing session. It was also placed last because it was of secondary interest to

this research project.

In contrast to the monolingual children, the bilingual children visited the lab on two separate occasions. Two visits were necessary for the bilinguals because, in contrast with the monolinguals, they received one additional but highly structurally similar version of the ME task. It was felt that administering the two versions of the ME task in the same visit would create a high risk of contamination between the versions. While every effort was made to schedule the second visit within 2 weeks of the first, the time interval between the first and second visits for the younger bilinguals ranged from 5 to 50 days, with a mean time passage of 23.54 days. For the older bilinguals, the time elapsed ranged from 6 to 75 days, with a mean time interval of 20.88 days. The most outlying cases involved extreme circumstances, such as testing being interrupted for an extended period due to an ice storm. Note that even with the longest delays, the children in the younger bilingual group remained at least 4 months younger at their second visit than were the children in the older bilingual group at the time of their first visit.

As noted above, each bilingual child received two different versions of the ME task; the same version administered to the monolinguals, as well as a dual-language version. The bilingual children completed one version at each visit, in counterbalanced order. Thus, half of the bilingual children received the Same-Language ME Task at the time of their first visit, and half of them received the Dual-Language ME Task at their first visit.

At the first visit, the bilinguals were administered three tasks; one version

of ME, as well as PT and FM. During this visit half of the bilingual children received the task order ME, PT, FM, and the other half received FM, PT, ME to control for order effects of the tasks. Again, PT was always placed in the middle to break up the two linguistically oriented tasks. At the second visit, the bilinguals were administered the remaining version of ME, followed by the SEQ task. During the second visit, ME was always administered before SEQ because it was more directive in nature and required greater attention and willingness to comply. Bilingual children were administered all tasks in their dominant language, as suggested by the information provided by their parents with regard to language exposure. While the Dual-Language ME Task was administered in two languages, the main experimenter always spoke the bilingual child's dominant language. Monolingual children were administered all tasks in their mother tongue. All experimental sessions were videotaped for later coding. In addition, while the experiment was in progress, a written record was taken of each child's experimental choices.

Each parent-participant in the study was also administered a parent report measure of early productive language, the *MacArthur Communicative Development Inventory (CDI): Words and Sentences* (Fenson et al., 1991).

Materials and Procedure

Same-Language Mutual Exclusivity Task

Materials for this task consisted of 16 objects, including toys and household items, and a tray on which to display them. Of these objects, 8 had

names assumed to be well known to the children, and the remaining 8 did not. The task was administered at a child-sized rectangular table, with two female experimenters seated on one side and the child seated on the other. The parent sat to the side of the child. Table 1 provides a list of the objects used in this task.

The task was comprised of four learning sets and required the participation of two experimenters. Each child was administered the four sets in the same fixed order. The administration of each set included both a training phase and a test phase. Monolingual French children were administered the entire task in French, and monolingual English children were administered the entire task in English. Bilingual children were administered this task in their dominant language (no child in this study was an exact 50-50 bilingual). Before the start of the task, parents were cautioned not to name any object, not to request that the children name any of the objects, and not to repeat novel names introduced by the experimenters.

Training Phase: In the training phase of each set, Experimenter 1 showed the child a series of four objects, one at a time, in a fixed order. The first two objects shown were objects considered to be familiar to the children and had familiar names, such as a shoe and a chair. The third one was intended to be unfamiliar and to have an unfamiliar name, such as a garlic press. The purpose of familiarizing the children with these objects before the test phase was to counteract any possible novelty effects of the objects themselves. Experimenter 1 told the child to "look at that" for each one. The children were allowed sufficient time to explore each item in turn, and usually handed back the object voluntarily

Table 1

Objects Used in the Same-Language Mutual Exclusivity Task

	Objects	
Trial	Familiar	Unfamiliar
Trial 1		
	Shoe	Bottle Lid
	Chair	Garlic Press
Trial 2		
	Bicycle	Melon Baller
	Flower	Honey Dipper
Trial 3		
	Duck	Noseguard
	Bathtub	Piece of Black Pipe
Trial 4		
	Sock	Foam Brush
	Motorcycle	Hardware Piece

after approximately 15 seconds. If, however, a child continued to explore the object beyond approximately 25 seconds, the object was gently removed and the next one was given. The experimenter finally presented the fourth object, also unfamiliar, and taught a nonsense name for it. To teach this name Experimenter 1 used it in three consecutive statements while holding out the object, pointing at the object if the child had picked it up, or in describing the child's actions with the object. For example, a typical sequence would be, "Look, that's a mido... you have a mido... you're holding the mido". Again, children were permitted to hold and explore the fourth object, after which Experimenter 1 removed the object and handed it to Experimenter 2, who looked at it and handed it back to the child while naming it with a different nonsense word. Experimenter 2 also used her nonsense word three times, saying for example, "Oh, I see you have a gavi...that's a gavi.... what a nice gavi". Thus, the child was taught two new nonsense names for the same object. Children were permitted to explore the object for the second time until the maximum of 25 total seconds, which includes the time they had spent exploring the object during the first exposure, was reached. Typically, children spent close to 15 seconds exploring the object at first exposure, and almost never chose to continue exploring the object a second time for more than a few seconds. After the child had examined the object again, the object was removed.

All nonsense words used in this task as well as in the Dual-Language ME Task were two syllables long and were constructed using phonemes common in the child's language. Many of the English-sounding nonsense words were borrowed from other studies. All of the French-sounding nonsense words were

constructed specifically for this task, as were several of the English-sounding words. The association between particular nonsense words (eight in total) and particular unfamiliar objects (four in total) remained fixed throughout the task. The nonsense names used in French (for administration to monolingual French children and to bilingual children dominant in French), and in English (for administration to monolingual English children and to bilingual children dominant in English) are presented in Table 2.

When children spontaneously labelled the familiar objects, parents were permitted to acknowledge the children's labels, and the experimenter also indicated agreement when addressed in this way by the child. Pilot testing had shown that children become very insistent upon a response if the adult does not acknowledge the word as correct or incorrect. It was decided that for the purposes of this task, no experimental harm would come of acknowledging the names of familiar objects. Upon children's frequent attempts to use a label for one of the unfamiliar objects, such as "scissors" for a garlic press, they were simply told by the experimenter, for example, "no, it's not scissors". It was expected that in this way the unfamiliar objects would remain nameless in the eyes of the child except when given a nonsense label. Note was made of the labels the children offered, and only on extremely rare occasions did a child offer a correct label for one of the unfamiliar objects. When children requested the name of an unfamiliar object, they were simply told "I don't know what that's called".

Test phase: For each set, following the training phase all four of the objects were placed in a row on the tray. Across the four sets of this task, the

Table 2

Nonsense Words Used to Label Unfamiliar Objects in the Same-Language Mutual Exclusivity Task

	Language of Administration	
Unfamiliar Object	English	French
Garlic Press		
	Mido	Pibord
	Gavi	Fulaille
Honey Dipper		
	Loric	Londeil
	Pinny	Muron
Piece of Black Pipe		
	Husta	Bousin
	Ramen	Riquette
Piece of Hardware		
	Pilson	Tivette
	Archo	Lounard

unfamiliar object which had been labelled by the two experimenters (hereafter known as the **target unfamiliar object**) appeared once in each of the four possible positions on the tray. The remaining three objects were placed at random in the three remaining positions. A fixed series of questions was then asked of the child. One experimenter asked the child to point out one of the two familiar objects, (e.g., "where's the shoe?") and then to point out the target unfamiliar object using the name which had been introduced by that experimenter (e.g., "where's the gavi?"). The other experimenter then asked for the remaining familiar object, followed by a request for the target unfamiliar object using the nonsense name which had been taught by that experimenter. Thus, the child received two requests for objects from one experimenter, and then two requests for objects from the other experimenter. Care was taken always to replace all objects on the tray before each subsequent request. In addition, the experimenters took care not to look at any of the objects, looking instead directly at the child when requests were made. The first object pointed to or touched was considered to be the child's choice in response to each request. The videotape coding instructions are provided in Appendix D.

Requests for the familiar objects were interspersed between requests for the target unfamiliar object because it was assumed that such placement would prevent a situation in which children were required to point twice consecutively to the same object upon hearing two different names for it, an act which may have felt odd or unusual to the children. Requests for familiar objects were also included in the design of this task in order to allow for an assessment of each

child's basic ability to retrieve known objects, demonstrating the child's understanding and capacity to participate appropriately in the task, as well as allowing for a confirmation of the familiarity of these objects. Based on the results of pilot testing, each test set began with a request for a familiar object rather than an unfamiliar one, in order to orient children more easily to the task's demands. In an attempt to control for children's possible preferences for one of the experimenters' labels, on two out of the four test sets Experimenter 1 was the first to request a familiar item and an unfamiliar item, and on the remaining two sets, Experimenter 2 was the first to request a familiar item and an unfamiliar item.

Experimenter 1 had slightly more input in the task than Experimenter 2, by virtue of having the responsibility for showing the objects one at a time, and saying "look at that" for each one. While an attempt was made to control for the impact of the first experimenter by having the two experimenters alternate in taking the role of the first experimenter, the children could not be assigned randomly to each person as first experimenter due to language constraints. Although both main experimenters spoke both languages, one experimenter was more fluently bilingual than the other. Thus, within the monolingual group, the French-speaking children were always assigned to the more fluently bilingual experimenter (whose native language was French) as Experimenter 1. In contrast, approximately two thirds of the English-speaking monolinguals were assigned to the other experimenter (whose native language was English) as Experimenter 1, while the other third of the English-speaking children were assigned to the fluently bilingual experimenter as Experimenter 1. Within the

bilingual group, all but one of the French-dominant children were assigned to the French-speaking experimenter, or, due to her departure in the latter stages of the study, to a substitute French-speaking experimenter for 7 of the children. The great majority of the English-dominant children were assigned to the native English-speaking experimenter as Experimenter 1. In sum, to a great extent, children's assignment to the different experimenters as Experimenter 1 is confounded with their language group membership. This confound would make it difficult to interpret findings which indicate either an experimenter effect or an effect of language group membership.

Dual-Language Mutual Exclusivity Task

Materials for this task consisted of 16 objects, including toys and household items, which differed from the objects in the Same-Language ME Task. Of these objects, 8 again had names assumed to be well known to the children, and the remaining 8 did not. The setup and seating arrangement were identical to the Same-Language ME Task. Table 3 lists the objects used in this task.

The procedure for this task was identical to that for the Same-Language ME Task, with one notable exception. That is, Experimenter 1 spoke to the child in the language which was dominant in the child's bilingual environment, while Experimenter 2 spoke in the child's nondominant language. The first experimenter spoke the child's dominant language in order to help the child feel most comfortable in the testing situation, and in order to remain consistent with the administration language of the remainder of the tests in the battery. In accord with

Table 3

Objects Used in the Dual-Language Mutual Exclusivity Task

	Objects	
Trial	Familiar	Unfamiliar
Trial 1		
	Dog	Whisk
	Boat	Hamburger Maker
Trial 2		
	Knife	Hair Elastic
	Apple	Lemon Juicer
Trial 3		
	Bed	Glasses Holder
	T-shirt	Cap Remover
Trial 4		
	Plate	Mop Handle
	Key	Doorknob Blocker

the division of languages between the two experimenters, the nonsense words used by each experimenter were made up of phonemes common in the language spoken by that experimenter. Thus, in each of the four sets the children heard the target unfamiliar object labelled with both an English-sounding and a French-sounding nonsense word, and during the test phase were requested in two different languages to identify both the familiar and unfamiliar objects. For example, a child would be asked in English by the first experimenter to find a familiar object, as well as to find the unfamiliar object originally labelled in English by that experimenter. Then, the child would be asked in French by the second experimenter to retrieve the remaining familiar object, as well as to find the unfamiliar object originally labelled in French by that experimenter (i.e., the same target unfamiliar object). The same controls for order of words taught and order of words tested were employed in this task as in the Same-Language ME Task. The pairs of English and French nonsense words used for children administered this task are listed in Table 4, and videotape coding instructions are in Appendix D.

As in the Same-Language ME Task, participants' assignment to one of the two experimenters as Experimenter 1 for the Dual-Language ME Task was, of necessity, highly confounded with the language dominant in the child's environment.

Fast Mapping Task

The materials for this task consisted of 12 household objects or toys. Of these, 6 were considered to be familiar to the children and to have names which were known to them, such as a sock, and 6 of them were more unusual objects

Table 4

Nonsense Words Used to Label Unfamiliar Objects in the Dual-Language Mutual Exclusivity Task

	Language	
Unfamiliar Object	English	French
Hamburger Maker	Tukey	Cernault
Lemon Juicer	Nebit	Maraise
Cap Remover	Gliro	Baneuil
Doorknob Blocker	Nemur	Vation

whose names were expected to be unknown to children of this age, such as an unusual conical bottle opener. Unusual versions of standard objects, such as the bottle opener, were difficult to recognize perceptually, even for parents. These objects were presented to the children on the same tray and using the same seating arrangement as described above for the mutual exclusivity tasks. This task was administered in the child's dominant language. Table 5 provides a list of the objects used in this task.

All children were administered two experimental sets for this task. Each set included a familiarization phase, a mapping phase and a generalization phase.

Familiarization phase: In the familiarization phase, the experimenter gave the child five objects, one at a time, to examine. Children were allowed to manipulate each object until they became familiar with it, to a maximum of 25 seconds. Three of these objects were familiar, and two were unfamiliar to the children. As in the mutual exclusivity tasks, when children spontaneously named the familiar objects, the experimenter acknowledged the name. When children attempted to spontaneously name unfamiliar objects, such as calling the conical bottle opener a hat, the experimenter said "no, that's not a hat". When children requested the name of an unfamiliar object, they were told "I don't know". It was intended that the unfamiliar objects would remain nameless in the eyes of the child. As in the mutual exclusivity tasks, note was taken of children's attempts to name unfamiliar objects spontaneously.

Mapping phase: Following the introduction to the objects, for the mapping phase the experimenter set out the three familiar objects and one of the

Table 5

Objects Used in the Fast Mapping Task

	Objects	
Set	Familiar	Unfamiliar
Set 1		
Mapping Trial	Banana Airplane Duck	Conical Bottle Opener
Generalization Trial	Banana Airplane	Conical Bottle Opener (new) Multipart Can Opener
Set 2		
Mapping Trial	Cow Truck Cup	Sink Drain
Generalization Trial	Cow Truck	Sink Drain (new) Strainer

unfamiliar objects. The child was then asked to find one familiar item (e.g., "where's the sock?"), in order to orient them to the task, establish their basic ability to participate, and confirm the familiarity of the familiar objects. Following the response, the child was then asked to identify the referent of a nonsense word (e.g., "where's the lepid?"). For the first set, the nonsense word was "lepid" when administered in English and "mareu" when administered in French. For the second set, the nonsense word was "kipen" when administered in English and "biron" when administered in French. The child's choice of the only unfamiliar object present when the nonsense word was requested was taken as evidence of fast mapping.

Generalization phase: Following the mapping phase of the set, regardless of their performance, each child received a generalization phase in which four objects were presented: two of the familiar objects, a different-coloured exemplar of the unfamiliar object which had appeared in the mapping trial, and the unfamiliar object which the child had seen in the familiarization period but which had not appeared in the mapping trial. Thus, the children had four objects from which to choose, including two familiar and two unfamiliar. The experimenter first repeated the request for the referent of the nonsense word used in the mapping trial (e.g., "where's the lepid") and then requested that the child find another familiar object (e.g., "where's the airplane"?).

The entire procedure was then repeated with the second object set, this time reversing the order in which familiar and unfamiliar objects were requested in the mapping and generalization trials in order to control for order effects.

Videotape coding instructions for this task are provided in Appendix D.

Perspective-Taking Task

Each part of the perspective-taking task made use of coloured pictures of objects very familiar to children, laminated onto the two sides of a 8.5" x 11" piece of cardboard. There were eight such pieces of cardboard, yielding 16 pictures. Table 6 contains a list of the pictured items. The pictures were shown to the children at the same small rectangular table used in the other tasks. The experimenter and child were seated facing one another directly across the table.

This task consisted of six trials in total. In the first portion of this task, borrowing from the picture task developed by Masangkay et al. (1974), children were administered two trials requiring a verbal response. For each trial the children were shown two pictures, on opposite sides of a piece of cardboard. After the child had been exposed to both pictures, the experimenter turned one side to face the child, with the other side facing the experimenter. The children were asked, "What do you see?". Following their verbal response they were then asked "What do I see?". An understanding of perspective was said to be demonstrated when the child was able to answer the second of these questions correctly in each of these two trials.

The next two trials were developed in such a way that they required only a nonverbal response from the children. For each trial, the child was shown two pictures on opposing sides of a piece of cardboard, which this time was placed on a stand to allow it to stand freely. The experimenter then said, for example, "May I see the shoes? Show me the shoes." To demonstrate an understanding of

Table 6

Items Pictured in the Perspective-Taking Task

Trial	Pictures
Trial 1	Dog Cat
Trial 2	Bird Apple
Trial 3	Ball Truck
Trial 4	Banana Shoes
Trial 5	Car Cookie
Trial 6	Balloon Telephone

perspective in these trials, the child was required to turn the card toward the experimenter to show her the correct picture.

Finally, the children received two trials which were designed to measure more advanced comprehension of perspective taking, based loosely on a task used by Flavell et al. (1968). In each trial, the children were shown two identical pieces of cardboard, each with the identical two pictures on front and back. After having the identical nature of the boards pointed out to them, the children were told that one of the boards was theirs and the remaining one was the experimenter's. The experimenter lifted her card to look at one of the pictures, and then asked the child to look at the same picture on the child's own card. The child's board was always placed in such a way that he or she would have to turn the board over in order to gaze at the appropriate picture. Appendix E contains the specific wording used in this task, and Appendix D contains the videotape coding instructions.

Productive Vocabulary Measure

In order to collect information about each child's expressive language skills, the *MacArthur Communicative Development Inventory (CDI): Words and Sentences* (Fenson et al., 1991), a parent report measure of early productive language for 16- to 30-month-olds, was administered. This checklist was designed to assess the language development of toddlers aged 16 to 30 months. It has been developed together with the *CDI: Words and Gestures* (Fenson et al., 1991), which assesses language development in infants aged 8 to 16 months. The *CDI: Words and Sentences* is composed of two major sections. The first

section consists of a list of 680 vocabulary items which are divided into 22 word categories, such as toys, people, action words, and pronouns. Parents are instructed to mark each word produced regularly by their child. The second section, again using a recognition format, is designed to assess the syntactic and morphological development of the child.

The *CDI: Words and Sentences* has many advantages to recommend its use as a measure of vocabulary in this study. First, it has good psychometric properties for the measurement of vocabulary. These include high internal consistency (Cronbach alpha = .96), and high test-retest reliability ($\underline{r}$ = .95) (Fenson et al., 1994). In addition, good concurrent validity has been demonstrated, using the Expressive One Word Picture Vocabulary Test (r = .85) (Dale, 1991). Second, the *CDI* is widely used to assess the vocabulary of very young children. In particular, its use in previous studies of bilingual language development (e.g., Pearson et al., 1993, 1995) allows for potentially useful comparisons of vocabulary development between different groups of bilingual children.

For this study, the measure was available both in the original English version and in a Québec French version developed specifically for the purposes of this project. A description of the development of the French adaptation can be found in Chapter 3 of this dissertation. The two versions of the *CDI* are provided in Appendix F. At the end of their visit to the laboratory, parents of monolingual children were given a copy of the inventory in the appropriate language and were asked to complete it at home and return it by mail. Parents of bilingual children

were asked to complete two inventories, one in each language, in the time period between their first and second visits, and to return them at the time of the second visit. If they failed to do so, they were provided with an envelope in which to return the inventories by mail. Parents were encouraged to return inventories as soon as possible, so as to better reflect the child's development at the time of testing. Completed inventories were typically received within 3 weeks of testing. If an inventory was received more than 3 weeks later, one of the experimenters telephoned the family to determine when the inventory had been filled out. Most late returns were found to be due to late mailing, rather than late completion. If an inventory had been filled out later than 5 weeks beyond testing, it was not included in any analyses.

Parents of bilingual children were requested to have the *CDI* filled out by the caregiver most familiar with the child's vocabulary in the particular language in question. Thus, for bilingual children, sometimes one individual familiar with the child's vocabulary in both languages completed both *CDI*s, while in other cases. one parent completed the inventory for one language and the other parent or caretaker completed it for the other language. Although complete information on who filled out each inventory for each child would be of interest, this data was not systematically collected. The two vocabulary inventories were used to count the number of translation equivalents (TEs) present in the productive vocabulary of each bilingual child, i.e., the number of concepts lexicalized in both languages. In order to effect this calculation, a master list of potential TEs was created. Of 680 words in the English version of the *CDI,* 544 of them had potential TEs in the

French version. Of the 688 words in the French *CDI*, 547 of them had potential TEs in the English version. (Thus, there was potential for a maximum of 547 TEs per child.) The reason for the discrepancy is that there was not always a simple one-to-one correspondence between a word on the English version and a word on the French version. For example, the English words "shirt" and "sweater" both had the potential French equivalent "chandail". (In such cases, a child would receive credit for only one pair of TEs.) Words that are very similar in pronunciation (such as "mitten" and "mitaine"), or identical in the two languages (such as "soup" and "soupe") were considered cognates or cognate forms and were not included as potential TEs, since it was unclear whether the children were truly using them in one language or the other, or in both. Using the master list of potential TEs as a template, the two inventories for each bilingual child were coded for the total number of TEs. The full TE coding procedures can be found in Appendix G.

Given that the age range for the *CDI* extends only up to 30 months, the decision to use this measure for children recruited into the older groups in this study, that is, at age 34 to 36 months, required some consideration. This issue was not relevant for the monolinguals, for whom vocabulary data were collected but not used in any of the study's statistical analyses, since they were not germane to any of the hypotheses relating to monolinguals. Use of the *CDI*s for the older bilinguals, however, was justified based on the findings of Pearson et al. (1993), who found that children exposed to two languages have a vocabulary in each separate language that is, on average, smaller than the corresponding

vocabulary of their monolingual counterparts. For this reason, it was anticipated in this study that the older bilingual children would not perform at ceiling on the *CDI* measures. Also, total vocabulary scores were not used in the study, and the *CDI* data were used only to generate proportions of TEs.

CHAPTER THREE: THE FRENCH ADAPTATION OF THE *CDI*

Initial Development of the Adaptation

In order to be able to assess the relationship between the proportion of translation equivalents (TEs) in bilingual children's vocabulary and their performance on the mutual exclusivity tasks, it was necessary to have measures of their productive language skill in each of their two languages. As noted above, to collect information about each child's expressive language skills in English, the *CDI: Words and Sentences* (Fenson et al., 1991), a parent report measure of early productive language for 16- to 30-month-olds, was available. It was also necessary, however, to develop a way of measuring French productive language ability. Thus, for the purposes of this study, a French adaptation of the vocabulary section of the *CDI: Words and Sentences* was undertaken.

The reasons for the French adaptation of the *CDI* were threefold: 1) no similar standardized test of early French vocabulary could be found in the literature; 2) use of a French adaptation of the *CDI* alongside the English *CDI* in this study allowed for a more direct means of comparison between the lexicons in the two languages of bilingual children than would be possible if two divergent assessment tools were used; 3) the *CDI* has been and continues to be adapted into many languages as an aid to linguistic research. Versions are currently available in up to 20 languages, including Spanish (Jackson-Maldonado et al., 1993), Italian (Camaioni,Caselli, Longobardi, & Volterra, 1990), Finnish (Lyytinen, Lari, Lausvaara, & Poikkeus, 1994), and Japanese (Ogura & Murase, 1991).

Because the focus of the present research was on early lexical development, only the vocabulary portion of the *CDI* was adapted. (An adaptation of the section on grammatical skills as well as further refinements to the vocabulary section were completed following the termination of this research project.) Only the development of the vocabulary section as it pertains to its use in this research project will be described here. While validation and norming studies of the French adaptation of the *CDI* are desirable for the continued use of this instrument as a research measure, they were seen to be beyond the scope of this research project. Since the French adaptation used for this project was in an early phase of development, care was taken to use it solely in order to assess translation equivalents, and not to compare vocabulary scores across children.

The following steps were taken in the development of the French adaptation of the vocabulary section of the *CDI: Words and Sentences*. First, the vocabulary section was translated into Québec French by a native French speaker with experience in translation. This translation was then reviewed by two native French speakers with experience in translation and linguistics. In cases where several different French translations were possible for a single English item, all of the possible translations were retained at this stage.

Following the translation phase, for purposes of identifying additional words of importance in the early vocabularies of francophone children, we consulted a data bank of words produced by 7 Québec francophone children who had participated in a longitudinal study of language development (Poulin-Dubois, Graham, & Sippola, 1995). The 7 children were videotaped in a laboratory setting

during a monthly 20-minute free play session between the ages of 12 and 24 months. Parents also kept a diary of their children's lexical development. The final corpus of French words included both words produced as reported by the parents, and productions made during the taped free play sessions.

Productions from the longitudinal study were included in the *CDI* adaptation in the following manner. If a word not already present on the translated checklist had been produced by 2 or more of the 7 children in the longitudinal study, that word was considered a good candidate for inclusion and was added to the list. Many of these added words were verbs, although new words were added to 15 of the 22 word categories. A few words said by only one child were added, on the judgement of the experimenters that the words would appear commonly in children's early French vocabulary, such as "amener", "débarquer", and "debout". Thus, 45 new words assumed to be common in the vocabulary of francophone children were added to the existing list of 680 vocabulary items. Other new words which appeared in the longitudinal corpus but were synonyms of words already in the checklist translation, such as "bibitte" in addition to "insecte", were included as synonyms on the corresponding item line of the checklist. In total, 24 synonyms were added. Words which functioned as synonyms but which were imported from English, such as "light" for lumière, were not included.

The section of the *CDI: Words and Sentences* which queries words associated with games and routines is particularly sensitive to cultural differences. For this reason, daycare workers caring for francophone toddlers were contacted, and kindly provided additional games and routines thought to be commonly in use

with francophone children in Québec. These were added to the relevant section of the checklist.

In addition to the bank of words obtained from the longitudinal study, an investigation was also undertaken to locate research identifying additional vocabulary items found in the very early vocabulary of Québec francophones. Although three French language corpora were identified through the CHILDES computerized child language data bank (MacWhinney, 1991; MacWhinney & Snow, 1985, 1990), all three involved the use of European French (submitted by Champaud, by Rondal, and by Léveillé). As an additional source of information on early vocabulary use, several French language assessment tools were investigated. Gérard and Jenkins (1994) provide a review of French language evaluation methods for children up to the age of 3 years. The methods identified, however, involve the use of translations of tests like the *Vineland Adaptive Behaviour Scales* (Sparrow, Balla, & Cichetti, 1984) and the *Bayley Scales of Infant Development* (Bayley, 1969), which provide more functional assessments of language development and do not focus on the production of specific words. A battery of tests developed in Québec for early language assessment, known as the *Dudley-Delage* battery (Dudley & Delage, 1978), was also consulted. This battery includes a translation of the *Peabody Picture Vocabulary Test* (*PPVT*: Dunn, 1965) for the assessment of receptive vocabulary. The *PPVT* includes 14 French words which are intended to match the language level of children aged 2.5 to 3.5 years. Despite the fact that this level is beyond the 30-month age limit

for the *CDI: Words and Sentences* and that the mandate of the *PPVT* is to assess comprehension rather than production, the words were examined for their possible relevance to children's early productions. It was established that 9 of these 14 words already appeared on the translated *CDI*. The remaining words were considered to be too advanced for inclusion in the *CDI*, such as *accident*, *tambour*, and *clôture*. The *Dudley-Delage* battery also includes a picture naming test, consisting of 24 items in ascending order of difficulty. The first 9 items appeared appropriate for the age level of 16 to 30 months. Again, all but 1 of these items were already included in the *CDI*.

In sum, existing tests of French language development were not found to be a useful source of additional information about early French word production, mainly because they were constructed to span a wide developmental range, and thus did not include a sufficiently large sample of words for the particular age level targeted by the *CDI*. In addition, they did not carry information about actual French productions by young children. Thus, the data bank of words from the longitudinal study conducted by Poulin-Dubois et al. (1995) constitutes the central source of independent information used in the development of the French *CDI*.

Data Collection for the French Adaptation of the *CDI*

In order to verify whether the words on the newly adapted checklist were in fact commonly used among young children learning French in Québec, a sample of parents of francophone children aged 30 to 34 months were asked to complete the checklist. This sample of participants was separate from the sample who

participated in the experiments reported elsewhere in this dissertation. The age of these children was slightly beyond the 30-month upper limit suggested for use of the *CDI: Words and Sentences*. The reasoning behind this choice of age group was that if a particular word were being produced by few or none of these older children, then the word was unlikely to be used by even younger children, and was probably not a word in frequent use among young Québec francophone children and their parents. Such words would therefore be inappropriate to include on the French adaptation of the *CDI*.

The participation of parents in completing these checklists was solicited in the following way. Checklists accompanied by explanatory letters were sent to a sample of 78 couples who both had French names, listed on birthlists provided by the Régie Régionale de la Santé et des Services Sociaux de Montréal Centre. Permission to consult these lists was provided by the Commission d'Accès à l'information du Québec. The letters were followed up with a telephone call to establish parents' interest in participating, to verify their understanding of the instructions, and to confirm the French language exposure of their child. Parents were asked to complete the checklists at home and mail them back to the laboratory. Of the original 78 couples, 52 expressed a willingness to participate when reached on the phone. Of these, 7 did not return the checklists, however, and 7 more were not included in the final sample due to bilingualism of the child. A child was considered to have bilingual exposure sufficient to influence the data if they heard a second language 20% or more of the time. The final sample was thus composed of 38 completed checklists. At this stage of the *CDI*'s

development, demographic information on the parents who completed the checklists was not solicited. The main purpose of having parents complete the checklists at this stage was to be certain that the words included were truly in use in Quebec. Any attempt to norm the inventory in Quebec should most certainly take demographic factors into account.

The parent checklist data were tabulated in two ways. First, a record was made of the number of respondents who marked each item. Thus, each item received a total score out of 38. Items that were checked by only 6 or fewer of the 38 respondents were considered to be too infrequently used for inclusion and were dropped from the checklist. This particular criterion was decided upon because it allowed for a reasonable balance to be struck between items retained and items dropped. On this basis, 37 items were dropped. All but one of the items which had been added to the checklist based on the longitudinal data met the criterion for continued inclusion. Most of the items added from the longitudinal study had frequencies in the 20's and 30's, supporting the original expectation that words said by at least 2 of the 7 children in the longitudinal study would appear frequently in a larger sample. Children's actual French productions thus served as an important addition to the translated checklist.

The second phase in tabulating the data involved a consideration of the synonyms in the checklist. For items which included synonyms, the parents in the sample had been asked to circle the word more commonly produced by their child. Following the first item tabulation, the number of respondents who circled each of the synonym choices was recorded for those items remaining under

consideration. Since many people endorsed more than one possible choice, note was also made of the overlap, for example the number of respondents who circled both "chat" and "minou". The results for each item with such multiple entries were retabulated and words which were endorsed by only 8 or fewer respondents out of the 38 were dropped in favour of the remaining alternate word(s). If more than 8 respondents endorsed each of the alternatives, then each of the words was kept for that item. In some cases, synonyms had a roughly even split but low response frequency, such as 6 respondents circling "perles", five circling "boules", and 2 circling both. In such cases, even though both words met the criterion for being dropped (8 or fewer), since the split was roughly equal and the overall number of respondents still met the criterion for item inclusion, the item was kept and both word options were retained.

Although a section for soliciting additional words was unfortunately not included in the first version of the checklist, several parents spontaneously added synonyms to the list. If the same word was added by three or more parents, then that word was included on the assumption that if a few highly motivated parents thought to add it to the list, it was probably more frequently used among the remaining children. The resulting version of the French adaptation of the *CDI: Words and Sentences* thus contained 39 items in which two synonyms were available. For comparison, note that based on our own calculations, the English *CDI* includes 6 items with synonyms, the Spanish contains 27 items with synonyms, and the Italian contains 23 items with synonyms. It is probable that the inclusion of many items with synonyms moderately increases the potential for

translation equivalents when comparing across two languages using the *CDI*, since there is a greater chance that a concept lexicalized by a child in one language will have an equivalent in the other language, if parents are able to choose between two words in the latter language. For this reason, an attempt was made to minimize the available number of items with synonyms, by retaining only 39 of the original 178 items with synonyms included in the earliest stage of the French adaptation of the *CDI*.

In several cases, respondents indicated that words presented on the checklist as synonyms in fact represented different concepts to their children, such as "image" and "photo". Based on this type of feedback a few items with synonyms were subsequently divided into two separate items.

Several parents provided additional feedback on the checklist, commenting for instance on the forms of certain words, singular versus plural usage, verb tenses, common child usage such as "*bis*" for *bec*, additional words, and regular routines. Based on these comments several changes and additions were incorporated into the checklist.

The resulting French version of the *CDI: Words and Sentences* included 688 items, as compared with 680 items in the English version, 723 in the Spanish version, and 670 in the Italian version. This resulting version was used throughout the research reported in this dissertation, and has been titled the *CDI: Mots et Énoncés*. A copy of this version is presented in Appendix F. As noted earlier, following the completion of this research, further collections of sample data and

refinements, as well as the development of an adaptation of the *CDI: Words and Gestures* for children aged 8 to 16 months, have taken place. A description of the adaptation process for both measures is available in Trudeau, Frank, and Poulin-Dubois (in press). Validation and norming studies remain to be conducted for both versions.

CHAPTER FOUR: RESULTS

Classification of Children as Monolingual or Bilingual

Of critical importance to the interpretability of results in this study was the reliability of the classification of children into monolingual and bilingual groups. Recall that this classification was originally determined before the children's participation in the study, by calculating each child's exposure to the languages in their environment using a questionnaire on language exposure administered to parents. Children were assigned to the bilingual group if they were exposed to French or to English as their non-dominant language at least 20% of the time, and into the monolingual group if exposure to any second language was below 20%. Following children's participation in the study, production vocabulary data, as measured by parent report on the *CDI*, provided a complementary method for evaluating language competence.

For the younger monolingual group, *CDI*s for 27 of 32 participants were returned. For the older monolinguals, the proportion of returns was 22 of 31. For the younger bilinguals, 26 of 31 *CDI*s were returned, and for the older bilinguals, 26 of 32 were returned. As anticipated, despite being older than 30 months, the data for the older bilinguals suggested that it was appropriate to make use of their *CDI* information; only 6 of the children had a vocabulary approaching ceiling level in one or both of their separate languages. These children were retained in the study since they had not actually reached ceiling in either language.

Using the vocabulary data from the *CDI*s, it became possible to re-evaluate

children's bilingual status. In addition, it was possible to include language comprehension, as measured by children's responses to requests for familar items during the dual-language experimental task, as an additional measure of bilingual competence. Each of the three measures, i.e., exposure, *CDI* production, and comprehension, taps a different, yet potentially important, aspect of bilingualism. Of interest was whether any children had been misclassified as bilingual on the basis of the exposure criterion, taking into account the two additional measures of bilingualism.

In a manner parallel to the calculation of degree of bilingualism as a percentage of exposure time, *CDI* production data for each bilingual child were used to calculate the proportion of words in their total productive vocabulary accounted for by words said in the language with the smaller vocabulary. In this way, a measure of production proficiency in the non-dominant language was obtained.

Given that to be considered bilingual the cutoff of sufficient exposure to the less dominant language was originally set at 20%, production data were compared to the same cutoff score. Of the 52 (out of 63) bilingual children whose parents had returned completed *CDI*s, 19 children had a proportion of words from their non-dominant language that was below 20% of their total vocabulary. (Of these 19 children, 10 were in the younger age group and 9 were in the older age group.) For these 19 children, the proportion of produced words from the non-dominant language ranged from 1% to 19% of their total vocabulary. The remaining 33 children showed a proportion ranging from 20% to 50% of their total

vocabulary. It might therefore be argued that despite the estimated exposure, children who showed less than 20% production in the non-dominant language should not be considered bilingual. This stance, however, does not take into account certain important factors. First, the cutoff of 20% established for exposure is meaningful in that it corresponds to a situation in which a working parent who is not the primary caretaker speaks the non-dominant language regularly to the child. When used in the context of production, however, 20% becomes a somewhat arbitrary cutoff point. Second, given the age range of the children in this study, it is clear that comprehension ability may outstrip productive ability, perhaps all the more so among bilinguals in a non-dominant language; neither exposure nor production takes into account the comprehension skills of the early bilingual. Given especially that the language tasks administered in this study were all in the comprehension domain, it was important to investigate the bilingual children's comprehension skills.

Embedded within the Dual-Language ME task, which was administered only to bilinguals, were requests for four familiar items in the child's dominant language, and four familiar items in the child's non-dominant language, as established by exposure. Children's responses to the requests in each of their languages were examined. Despite being limited by the fact that only four words were tested in each language, an advantage lent by this particular measure of language ability is that it provides one source of information on linguistic ability which is not derived from parent report, unlike both exposure and production.

The children generally performed adequately on familiar items in their

dominant language, with younger bilinguals succeeding on an average of 3.54 out of 4 items (SD = .81) and older bilinguals achieving an average of 3.92 out of 4 items (SD = .27). In their non-dominant language, however, younger bilinguals succeeded on 2.84 out of 4 items on average (SD = 1.29), and older bilinguals succeeded on 3.06 out of 4 items (SD = 1.22). There was therefore greater variability for success in the non-dominant language.

The 9 bilinguals who succeeded on only one or fewer of the four familiar items in their non-dominant language were removed from the sample, because they did not show the basic comprehension skills necessary for the task. Of these 9 children, 8 were also among the 19 children who had shown less than 20% production in the non-dominant language. In other words, of the 9 bilingual children who experienced difficulty with familiar items requested in their non-dominant language, 8 were also among those who produced a smaller proportion of non-dominant language words in their vocabulary. The remaining child was among the 33 children with greater than 20% production in the non-dominant language. These results reflect the fact that success on the four familiar items requested in the non-dominant language was quite highly related to degree of productive proficiency in that language, $r = .48$, $p < .0001$.

These results notwithstanding, there remained 11 children with a proportion of non-dominant words under 20%, who still demonstrated adequate comprehension skills on the familiar items requested in their non-dominant language. Together, these findings suggest that while lower production in the non-dominant language was associated with poorer comprehension skills in the

same language, there were young children for whom comprehension of the non-dominant language was adequate, despite the fact that their non-dominant language production lagged significantly behind that of their dominant language. For the purposes of this study, all such children with adequate comprehension skills in their non-dominant language were retained in the bilingual group. The 11 children without available *CDI* information also performed adequately on the comprehension items, and thus were also retained in the bilingual group.

In sum, based on the above findings, 9 bilingual children with poor comprehension skills, 8 of whom also had a low proportion of non-dominant words in their total vocabulary, were considered to be insufficiently bilingual and were removed from the bilingual group for further analyses.

Just as the rationale for keeping children in the bilingual group was examined, so was the rationale for keeping children in the monolingual group. Recall that English and French monolinguals were originally permitted to have between 0% and 20% exposure to a second language, although not necessarily to French or English. Among the younger children, 14 had some exposure to a second language, and among the older children, 12 had some exposure. It may be that among these monolinguals with exposure to a second language, some may have had productive vocabularies in the second language which exceeded their estimated exposure, perhaps enough even to place them in the above 20% range for production. This conjecture is reasonable given that among the bilinguals, the proportion of exposure to a language and the proportion of vocabulary with words from that language at times differed substantially. These

two measures differed by amounts ranging up to 38%. In addition, in 44% of the bilingual sample, the difference reflected higher production than exposure. It is therefore possible that some monolinguals exposed to a second language might also have shown higher production in that language. This is more likely to be true for children hearing more of the second language. No second language vocabulary data were collected for monolinguals, since the second languages to which they were exposed varied considerably, and measures of vocabulary similar to the *CDI* were usually not available in these languages. Given the monolinguals' lack of second language data, the issue of production vs. exposure cannot be addressed in the same way as for the bilinguals. Instead, the best available method for identifying children who were not sufficiently monolingual was to identify those subjects with greater second language exposure, in combination with a small vocabulary in their main language as compared to the other monolinguals of the same age. The rationale for this approach is that both the results of this study and that of Pearson et al. (1993) suggest that children exposed to two languages have, on average, a larger total vocabulary across their two languages than do monolingual children in their one language, but that the vocabulary in each separate language is, on average, smaller than the corresponding vocabulary of their monolingual counterparts. It was therefore decided that children who had been considered monolingual but who had higher exposure to a second language, combined with a small vocabulary relative to their peers in the main language, could in fact be showing signs of bilingualism.

Based on this reasoning, the vocabulary status of monolingual children at

the higher end of the range for exposure to a non-dominant language, that is, those with between 10% and 20% exposure to another language, was examined. Of the 63 monolinguals, 8 children (6 in the younger group and 2 in the older group) fell into this category of exposure. *CDI* vocabulary data were available for 6 of these 8 children. The vocabulary scores of each of these 6 children was compared to the median vocabulary score for children speaking the same language in the corresponding monolingual age group. There were 3 children (all within the younger group - 2 English speakers and 1 French speaker) who had scores below the corresponding median. Based on the combination of higher exposure to a second language and a relatively small vocabulary in the main language, these 3 children were considered, at least potentially, to bear too much resemblance to bilingual children, and were removed from further analyses. The 2 children with higher exposure to a second language but without vocabulary data were allowed to remain in the monolingual group for lack of sufficient evidence to the contrary.

Bilingual Language Dominance Classification

Recall that the language dominance of children in the bilingual language group was established prior to participation, based on an assessment of their exposure to each language. Children were then tested in the language to which they were exposed most often, except during the Dual-Language ME task, in which they were addressed also in their non-dominant language.

A reasonable question is whether the children's original language

classification based on exposure was supported by the productive vocabulary data subsequently collected. Use of vocabulary information as a guide to language dominance is supported by Pearson et al. (1993), who defined language dominance as the production of more words in one language than the other.

Among the 52 bilingual children whose parents returned *CDI* forms, 26 were originally classified as English dominant based on language exposure, and 26 as French dominant. In 44 of the 52 cases, the children did in fact have larger productive vocabularies in the language to which they were reported to be more exposed. In other words, there was a relatively high concordance rate between the two measurements for these children, the average difference between the measures in estimating the relative strength of a particular language being 13% (Range = 0% to 38%, SD = 9%). In the remaining 8 cases, the children showed greater productive vocabulary in the language which had originally been classified as non-dominant by virtue of exposure. In the case of these 8 children, the two measures differed by 17% on average (Range = 6% to 25%, SD = 6%) in their estimates of the relative strength of a particular language.

For the 8 children whose dominance classification differed depending on whether exposure or production was used as a measure, it was of potential concern that they were tested primarily in their non-dominant productive language instead of their dominant one, leading perhaps to poorer performance in the testing situation. A comparison of these 8 children to the remaining bilinguals in the study suggests that on average, for both exposure and production, the 8

children were closer to the 50% cutoff for dominance classification than were the remaining bilinguals. The productive dominance for the 8 children, as measured by the words in their larger language divided by their total vocabulary, showed a mean of .58, as compared with a mean of .74 for the remaining bilinguals. Similarly, when dominance was defined by language exposure, the 8 children with variable dominance showed a mean proportion of exposure to the more-often-heard language of .41, as compared with .33 among the remaining bilinguals.

In sum, it seems likely that the reason these 8 children had a different classification depending on the measure used is that they were close to being 50-50 bilinguals, with one measure placing them on one side of the 50% cutoff used to establish dominance, while the other placed them just to the other side. This characterization suggests that testing the children in the language that was dominant by exposure, which was done in order to help children feel at ease and perform at their best, did not selectively penalize some of the participants. That is, those children whose productive dominance classification differed from their classification based on exposure were not at a disadvantage on the tasks, since they had comparable fluency in both languages. Support for this contention is lent by the finding that these 8 children performed adequately on requests for familiar items in both of their languages.

Description of the Final Sample

Following the removal of 9 bilingual children and 3 monolingual children, the composition of the four groups was as follows: 1) N = 29 younger monolinguals; mean age = 27.52 months; 21 English and 8 French; 15 boys and

14 girls; 2) N = 31 older monolinguals; mean age = 35.62 months; 27 English and 4 French; 15 boys and 16 girls; 3) N = 26 younger bilinguals; mean age = 27.05 months; 14 with dominant exposure to English, 12 with dominant exposure to French; 15 boys and 11 girls; 4) N = 28 older bilinguals; mean age = 35.30 months; 15 with dominant exposure to English, 13 with dominant exposure to French; 15 boys and 13 girls. Although ideally there would have been replacement of the 12 participants who were removed from the study, such replacement would have required several additional months of recruitment and testing.

The pattern of SES differences reported earlier, between age groups as well as between monolinguals and bilinguals, continued to hold following the removal of the 9 bilingual and 3 monolingual children.

Interrater Agreement

For each experimental task, the videotapes were reviewed and the children's responses were coded. For the mutual exclusivity (ME) and fast mapping (FM) tasks, coding criteria were developed to allow decisions regarding which object a child had chosen. The essential rule was to accept the first object touched or pointed to by the child. Exceptions to this rule included cases in which the child made a second choice and emphasized it with a repetition of the nonsense word, or by saying "ici". In such a case the child's second choice would be accepted. Similarly, if a child pointed first to an object but named it by its correct name, e.g., "pomme", the child's second choice was accepted instead. The full set of coding criteria for these tasks is included in Appendix D.

A second coder, blind to the experimental hypotheses and blind to bilingual or monolingual status, coded a minimum of 20% of the videotape data for each task and each experimental group to determine interrater agreement.

For the younger monolingual group, the coders agreed on 96% of trials for the Same-Language ME task, and on 96% of trials for the FM task. For the older monolingual group, the coders reached agreement on 98% of trials for the Same-Language ME task, and on 97% of the trials for the FM task. For the younger bilingual group, the coders agreed on 95% of trials for the Same-Language and Dual-Language ME Tasks combined, and on 89% of FM trials. For the older bilingual group, agreement between the coders reached 94% of trials across the two ME tasks, and 94% of trials on the FM task.

For the Perspective-Taking (PT) task, some of the coding involved making a determination of whether a child had made an appropriate verbal response to questions such as "what do you see". For the trials appearing later in the task, coding involved making a decision as to whether a child had appropriately completed an action requested by the experimenter, such as "show me the shoes". The later trials proved more difficult to code reliably, since in many cases, particularly for the younger children, the behaviour incorporated elements both of correct and incorrect response, or was rather ambiguous in nature. In addition, it was difficult to determine when a child's behaviour should or should not be considered to be on task. Several initial attempts to create detailed coding schemes to address these difficulties yielded insufficiently high agreement between coders. Finally, a more simplified set of coding categories was used, in

which responses which were too ambiguous to code were scored as a fail. The logic behind this approach was that the children in these cases failed to reliably demonstrate perspective-taking ability. One implication of this approach, however, is that some children's perspective-taking abilities may have been underestimated. Agreement between coders reached 92% of trials across all groups after revising the criteria. The full set of coding criteria for this task is available in Appendix D.

Data Screening and Statistical Treatment

Each variable entered into the analyses was first screened for normality, skewness, and outliers. All of the variables reported here were within acceptable bounds for normality and skewness, with the exception of responses to requests for familiar items on the ME and FM tasks. As expected, since these were control variables, most children achieved success on most of the items. Since these skewed control variables did not lose their skew following data transformation, they were not analyzed statistically. There were four instances of outliers (scores more than ± 3 SDs from the mean); one in the younger monolingual group, one in the younger bilingual group, and two in the older bilingual group. The outliers were treated in two ways. The one outlier on a variable with a wide distribution of scores, i.e., vocabulary, was assigned a score one point beyond the next most extreme score in the distribution, as recommended by Tabachnick and Fidell (1983). For the three outliers on variables with a more narrow distribution of scores, such as violations on the Dual-Language ME task (out of a possible four points), the assignment of the outlier to one score beyond the next most extreme

score would essentially have brought it back to its original score. Therefore, in the three instances in which this situation occurred, the outlier was instead assigned the same score as the next most extreme score.

Rather than include performance on the three experimental tasks completed by all participants (i.e., Same-Language ME, FM, and PT) as dependent measures in the same multivariate analysis of variance, each task was examined in a separate univariate analysis of variance. This approach was adopted instead of a multivariate approach for several reasons. First, this approach allowed for clearer interpretability of the results for each task. While Tabachnick and Fidell (1983) especially recommend multivariate analyses in cases where dependent variables are correlated, the emphasis was somewhat different in the present design. Here, performance was assessed on separate tasks, rather than on variables within the same task or procedure. Relationships between the tasks were of less interest than group and age differences in performance on each particular task. Second, this choice was made in order to maximize the contribution of participants with missing data on any of the tasks, so that they would not be eliminated from the entire analysis based on having missed one task. There were 10 children with missing data on at least one task. Third, a multivariate analysis would not greatly increase the efficiency of the statistical process, since the Dual-Language ME task would still require separate analysis.

In order not to increase the risk of Type I errors through conducting a greater number of tests instead of one multivariate analysis on the tasks

performed by all children, a Bonferroni correction was applied, such that the critical value of F used for each comparison corresponded to an alpha level of .006 (i.e., .05/9, corresponding to three tasks with three analyses performed on each). For the comparison of the Dual-Language ME Task completed by bilinguals with their performance on the Same-Language ME Task, the alpha level was set at .02 (i.e., .05/3, corresponding to the three analyses performed). All tests were two-tailed. Exploratory non-parametric tests focusing on relationships between the tasks retained a standard alpha level of .05.

The results for each separate experimental task are described in the following sections. In the case of the ME and FM tasks, the first step reported is a consideration of how the children performed on the familiar items of the task. For each task, the experimental hypotheses and children's possible behavioural responses are reviewed, and finally, for each task, results of the statistical analyses are reported.

Same-Language Mutual Exclusivity Task Results

This task was administered to all participants, and bilinguals were administered the entire task in their dominant language, as determined by exposure. Of interest is how the children performed on requests for the 8 familiar items, which were included to confirm children's ability to respond to the task's demands. Children in the younger monolingual group were successful on 7.52 familiar items (SD = .74), while older monolinguals were successful on a mean of 7.97 items (SD = .18). Younger bilinguals were successful on a mean of 7.30 items (SD = .97), and older bilinguals were successful on a mean of 7.19 items

(SD = 1.04). Because this was a control variable and the vast majority of children succeeded on 7 or 8 out of the 8 items, the distribution for this variable was very skewed, and all attempts at transformation to a normal distribution met with failure. Thus, the data could not be subjected to a comparison of the means. The data hint, however, at the possibility that bilingual children performed somewhat more poorly on the requests for familiar items than their monolingual counterparts. This finding may reflect their lower overall amount of exposure to the dominant language as compared to the monolinguals. In addition, the data suggest that their performance may show greater variability, perhaps reflecting the varying degrees of exposure to the dominant language among the bilinguals. On the whole, however, it can be stated that the children performed sufficiently well on the familiar items to indicate that they understood the task demands.

On each of the four experimental trials administered in the test phase of this task, children were able to respond in one of three ways. First, children were considered to have *honoured* mutual exclusivity on a trial if they responded by choosing the *target unfamiliar* object as the referent of one of the two novel names, along with choosing the new unfamiliar object, e.g., the garlic press, as the referent of the other novel name. Second, children were considered to have *violated* mutual exclusivity if they chose the target object as the referent for both of the novel names. Third, children could fail to behave in either of these meaningful ways on the trial. Several patterns of response fall under this third category: children may have chosen only familiar objects upon hearing the novel names, or may have learned one of the novel names for the target object but

chosen a familiar object for the additional novel name, or they may have refused to give an object when asked for the referents of one or both novel names. For the purposes of focusing on children's preferences for honouring or violating mutual exclusivity, such alternate patterns were not individually evaluated, and were all subsumed under the category of *no strategy*.

The first hypothesis to be tested was that at each age, bilingual children would be more willing to accept two names for the same object than would monolinguals, and thus, they would be less likely to honour mutual exclusivity. The second hypothesis was that older monolinguals would have a higher rate of honouring mutual exclusivity than younger monolinguals, but that bilinguals would have a similar rate at the two ages, or alternatively a lower rate at the older age.

In order to test these hypotheses, a 2(Age) x 2(Lingual Group) analysis of variance was conducted, with the total number of trials (out of 4) on which mutual exclusivity was honoured as the dependent variable. This analysis was first conducted with Experimenter (i.e., which of the two experimenters served as Experimenter 1) as an additional independent factor, bearing in mind that the experimenter variable was highly confounded with children's main or dominant language. Since the analysis showed no effect of Experimenter, the data were collapsed across this variable. The analysis yielded a significant main effect of Age, with older children from both linguistic groups honouring mutual exclusivity on more trials than younger children ($\underline{M}$ = 2.29, $\underline{SD}$ = 1.08 for older children, $\underline{M}$ = 1.38, $\underline{SD}$ = 1.05 for younger children, $\underline{F}$ (1,109) = 20.33, $\underline{p}$ <.006). Contrary to expectation, there was no main effect of Lingual Group (monolingual $\underline{M}$ = 1.77,

SD = 1.25, bilingual M = 1.94, SD = 1.03, F (1,109) =.86, p >.006), and no Age by Lingual Group interaction (F (1,109) = .30, p >.006). The means for each of the four groups are presented in Table 7. Thus, the analysis suggested that monolingual and bilingual children honoured mutual exclusivity equally, and both groups honoured mutual exclusivity more at the older age. A source table for this analysis is available in Table 2 of Appendix B.

If children had behaved in only two ways on the task, that is, honoured or violated mutual exclusivity, then the two types of responses would have been reciprocal and together would sum to 100% of responses. Due, however, to the presence of the no strategy responses described earlier, it is clear that these two types of response were not reciprocal and could thus be examined independently. In order to examine the hypothesis that bilingual children are more likely to violate mutual exclusivity, another 2(Age) x 2(Lingual Group) analysis of variance was conducted, this time with the dependent variable corresponding to the total number of trials out of four on which children violated mutual exclusivity. Again, the analysis was first done with Experimenter as an independent variable, and since there was no significant effect of Experimenter, the data were subsequently collapsed across this variable. The analysis did not yield a main effect of Age (M = 1.75, SD = 1.27 for younger children; M = 1.17, SD = 1.05 for older children, F (1,109) = 7.40, p >.006). The analysis also did not yield a significant effect of Lingual Group (bilingual M = 1.23, SD = 1.09, monolingual M = 1.65, SD = 1.25, F (1,109) = 3.85, p >.006). There was no Age by Lingual Group interaction

Table 7

Mean Number of Trials on which Mutual Exclusivity was Honoured on the Same-Language Mutual Exclusivity Task

	Age Group	
Lingual Group	Younger	Older
Monolinguals		
M	1.24	2.26
SD	1.15	1.15
Bilinguals		
M	1.54	2.33
SD	.91	1.00

Note. Maximum score = 4.

(F (1,109) = .67, p >.006). Means for each of the four groups are available in Table 8, and a source table for this analysis is available in Table 3 of Appendix B.

Although the results of an analysis of variance on no strategy responses would overlap with the analyses already conducted on honouring and violation of mutual exclusivity, a review of some descriptive statistics is nevertheless warranted. In all four groups, the number of trials on which there was no strategy ranged from one to three of a possible four trials. Table 9 illustrates the mean number of no strategy trials in each group. All of the groups showed a mean of approximately one out of four trials with no strategy, with the exception of the older monolingual group, who showed fewer no strategy trials. Thus, older bilinguals resembled the younger children more than they resembled older monolinguals.

A relationship also emerged between the number of no strategy trials and the number of familiar items children retrieved successfully on the task; success on fewer familiar items was associated with more no strategy trials. For younger monolinguals, the correlation between the two was significant (r = -.39, p <.05). The relationship between the number of no strategy trials and success on familiar items was also significant for younger bilinguals (r = -.52, p <.05), as well as for older bilinguals (r = -.52, p <.05). For older monolinguals, however, there was no relationship between no strategy trials and missed familiar items.

Given that the honouring, violating, and no strategy response types were all interrelated, the presence of no strategy responses may obscure the

Table 8

Mean Number of Trials on which Mutual Exclusivity was Violated on the Same-Language Mutual Exclusivity Task

	Age Group	
Lingual Group	Younger	Older
Monolinguals		
M	1.86	1.45
SD	1.41	1.06
Bilinguals		
M	1.61	.85
SD	1.10	.95

Note. Maximum score = 4.

Table 9

Mean Number of "No Strategy" Trials on the Same-Language Mutual Exclusivity Task

	Age Group	
Lingual Group	Younger	Older
Monolinguals		
M	.90	.29
SD	1.05	.69
Bilinguals		
M	.85	.82
SD	.93	.79

Note. Maximum score = 4.

relationship between honouring and violating mutual exclusivity. Therefore, a calculation was performed on the proportion of violations of mutual exclusivity, out of the total number of trials on which each child performed meaningfully, that is, either honoured or violated mutual exclusivity. Calculated in this way, the proportions of violating and of honouring mutual exclusivity are the reciprocal of one another. This new dependent variable was subjected to a 2(Age) x 2(Lingual Group) analysis of variance. Again, the analysis was first done with Experimenter as an independent variable, and subsequently collapsed across this variable since there was no significant effect of Experimenter. The analysis yielded a significant main effect of Age, with younger children violating mutual exclusivity on a greater proportion of trials than older children (M = .52, SD = .35 for younger children, M = .33, SD = .30 for older children, F (1,109) = 9.97, p <.006). The analysis yielded no main effect of Lingual Group (monolingual M = .47, SD = .36, bilingual M = .37, SD = .30, F (1,109) = 2.90, p >.006). There was also no Age by Lingual Group interaction (F (1,109) = .19, p >.006). Table 10 provides the means for each of the four groups, and a source table is included in Table 4 of Appendix B.

Dual-Language Mutual Exclusivity Task Results

The Dual-Language Mutual Exclusivity (ME) Task was administered only to bilinguals, as two languages were used in its administration. The main purpose of administering this additional task to bilingual children was to provide them with an opportunity to demonstrate their adherence to mutual exclusivity across two languages, so as to compare it with their adherence to mutual exclusivity

Table 10

Mean Proportion of Strategic* Trials on which Mutual Exclusivity was Violated in the Same-Language Mutual Exclusivity Task

	Age Group	
Lingual Group	Younger	Older
Monolinguals		
M	.56	.39
SD	.40	.29
Bilinguals		
M	.48	.26
SD	.29	.29

Note. Maximum score = 1

* Strategic trials refer to trials in which mutual exclusivity was either honoured or violated

within one language. It was expected that bilinguals would be more willing to violate mutual exclusivity on the Dual-Language ME Task, when the two novel words came from two different languages, than on the Same-Language ME Task, especially at the older age. At the younger age, it was hypothesized that the children might adhere to mutual exclusivity equally across the two tasks. Note that as in the Same-Language ME Task, children could respond in one of three ways on any one trial of the Dual-Language ME task: they could honour mutual exclusivity, violate it, or show neither of these meaningful responses, referred to as no strategy.

First, of interest was how the children performed on the 8 familiar items of this task. Younger bilinguals succeeded on a mean of 3.64 items out of 4 in their dominant language (SD = .76), and on a mean of 3.36 items out of 4 in their non-dominant language (SD = .76). Older bilinguals succeeded on a mean of 3.89 items out of 4 in their dominant language (SD = .32), and on a mean of 3.52 items out of 4 in their non-dominant language (SD = .58). Again, because of extreme skewness in the distribution of this control variable, these data do not lend themselves to a comparison of means. The data suggest, however, that bilinguals continued to perform slightly better in their dominant language.

In contrast to the analyses previously conducted on the Same-Language ME Task, the variable of Experimenter (i.e., which of the two experimenters played the role of Experimenter 1), could not be included in the analyses of variance comparing performance on the two ME tasks, because of difficulties related to cell size. Due to the lengthy time period of recruitment of bilinguals, one

of the experimenters had to depart the project, and thus 7 of the bilingual children dominant in French were tested by replacement experimenters as Experimenter 1. Consequently, a grouping based on those who were tested by each of the main experimenters as Experimenter 1, as well as those who were tested by alternate experimenters, yielded largely unequal, and some quite small, groups. In addition, while in almost all cases, care was taken to ensure that children were tested by the same experimenter twice as Experimenter 1, i.e., in both of the mutual exclusivity tasks, due to logistical constraints, 6 children were assigned to one experimenter as Experimenter 1 in the Same-Language task, and to another experimenter as Experimenter 1 in the Dual-Language task. Thus, these 6 children could not be included in an assessment of the impact of experimenter on the children's performance across the two tasks. In short, unequal cell sizes, small cell sizes, and participant attrition contribute to the unreliability of this variable in the bilingual sample. Thus, whether there were any effects of experimenter, or its confounded variable, dominant language of the child, in the comparison on the two ME tasks cannot be statistically evaluated. The lack of experimenter/dominant language effects in the previously reported analyses on the Same-Language ME task, however, may support a low probability of their occurrence in the Dual-Language Task.

Turning to the comparison of the bilingual children's responses on the Same-Language ME Task and on the Dual-Language ME Task, a 2(Age) x 2(Task) mixed analysis of variance was performed, with Age as a between-subjects variable, and Task as a within-subjects variable. Recall that half of the

bilingual children were administered the Same-Language ME Task at their first visit and the Dual-Language ME Task at their second visit, while the other half received the reverse order. Thus, this analysis was first done with the Order of the tasks as an additional between-subjects variable. The analysis was subsequently collapsed across this variable since it did not show any main effects of Order, nor interactions involving Order. The dependent variable was the number of trials (maximum=4) on which the children honoured mutual exclusivity. The analysis yielded a significant main effect of Age, such that older children honoured mutual exclusivity more on both tasks than did younger children (F (1,49) = 12.07, p <.02). Younger children honoured mutual exclusivity on the Same-Language ME Task on a mean of 1.56 trials out of 4 (SD = .92), and on the Dual-Language ME Task they honoured mutual exclusivity on a mean of 1.52 trials out of 4 (SD = 1.05). The older children honoured mutual exclusivity on the Same-Language ME Task on a mean of 2.35 trials out of 4 (SD = 1.02), and on the Dual-Language ME Task they honoured mutual exclusivity on a mean of 2.27 trials out of 4 (SD = 1.22). There was no significant main effect of Task, or Age by Task interaction. A source table for this analysis is presented in Table 5 of Appendix B.

Another 2(Age) x 2(Task) mixed analysis of variance was conducted, with Age as a between-subjects factor and Task as a within-subjects factor. This time, the dependent variable was the number of trials (maximum=4) on which mutual exclusivity was violated. The analysis was first done with Order of tasks as an additional between-subjects factor, subsequently removed since the analysis showed no effect of Order. Again, the analysis yielded a significant main effect of

Age, such that younger children violated mutual exclusivity more on both tasks than did older children (F (1,49) = 6.73, p <.02). Younger children violated mutual exclusivity on the Same-Language ME Task on a mean of 1.68 trials out of 4 (SD = 1.07), and on the Dual-Language ME Task they violated mutual exclusivity on a mean of 1.12 trials out of 4 (SD = .88). The older children violated mutual exclusivity on the Same-Language ME Task on a mean of .89 trials out of 4 (SD = .95), and on the Dual-Language ME Task they violated mutual exclusivity on a mean of .89 trials out of 4 (SD = .82). The analysis showed no significant main effect of Task, and no Age by Task interaction. A source table for this analysis is presented in Table 6 of Appendix B.

It was informative to recalculate violations, this time as a proportion of the total number of trials on which the children responded meaningfully, that is, either honoured or violated mutual exclusivity. Thus, an additional 2(Age) x 2(Task) mixed analysis of variance was performed with violations as the dependent variable, this time after the no strategy trials had been removed. There were 3 children (2 younger and 1 older) who showed no strategy on all 4 trials of the Dual-Language ME Task and were thus not included in this analysis, since for them there were no meaningful trials to form the denominator of the proportion. No child showed such a pattern on the Same-Language ME Task. Recall that in this case, honouring and violating become reciprocal variables. Again, the analysis was first done with Order of tasks as an additional between-subjects variable, but was collapsed across this variable since it showed no significant effects. The analysis again revealed a significant main effect of Age (F (1,48) =

8.50, p <.02), such that the younger children violated mutual exclusivity on a greater proportion of trials on both tasks than did the older children (M = .53, SD = .26 on the Same-Language ME Task, M = .41, SD = .33 on the Dual Language ME Task for the younger children; M = .27, SD = .29 on the Same-Language ME Task, M = .31, SD = .28 on the Dual-Language ME Task for the older children). There was no main effect of Task, and no Age by Task interaction. A source table is found in Table 7 of Appendix B.

As was done for the Same-Language ME Task, it was informative to review the descriptive statistics for the no strategy trials in the Dual-Language ME Task, although statistical analyses were not done since they would have been redundant with the analyses of variance already conducted. In both bilingual age groups, the number of no strategy trials ranged from one to four of a possible four trials. Table 11 provides the mean number of no strategy trials in each age group, as well as a comparison with no strategy trials on the Same-Language ME Task. There are indications that the Dual-Language ME Task did not yield a higher rate of no strategy trials for the older bilinguals than the Same-Language ME Task. For the younger bilinguals, however, the Dual-Language ME Task may have been less successful in eliciting meaningful performance from the children than the Same-Language ME Task; the younger children had more overall no strategy trials on the Dual-Language ME Task (M=1.36), and accounted for by more children, than in the Same-Language ME Task (M =.85).

As in the Same-Language ME Task, there was a relationship on the Dual-

Table 11

Mean Numbers of "No Strategy" Trials for Bilingual Children on the Same-Language Mutual Exclusivity Task and Dual-Language Mutual Exclusivity Task

	Age Group	
Task	Younger	Older
Same-Language ME Task		
M	.85	.82
SD	.93	.79
Dual-Language ME Task		
M	1.36	.82
SD	1.22	.85

Note. Maximum score = 4.

Language ME Task between the number of no strategy trials and the number of successfully retrieved familiar items, but only for the younger children. The correlation was -.65 ($p < .05$), indicating that the fewer familiar items the children were able to retrieve correctly, the more no strategy trials they had. For the older bilingual children there was no such relationship.

Levels of Bilingualism and Performance on the Mutual Exclusivity Tasks

It was hypothesized that the proportion of translation equivalents (TEs) in the bilingual children's vocabulary, as a reflection of their experience with dual naming, would predict violation of mutual exclusivity on the experimental tasks, most particularly the Dual-Language ME Task. Proportion of TEs was calculated for each child by multiplying the total number of TE pairs by two, and then dividing by the total number of words in the child's total vocabulary. (For these purposes, the total number of vocabulary words included only words with potential TEs, and thus excluded cognate forms, as well as words with no equivalent in the other language.) For the correlations with TEs, children were excluded if they showed no strategy on all four trials of the mutual exclusivity task in question.

For the younger bilingual children, the percentage of TEs ranged from 9% to 79%, with a mean of 47%, SD = 22%. For the older bilinguals, the percentage of TEs ranged from 1% to 95%, with a mean of 51%, SD = 29%.

For the Same-Language ME Task, the correlation between younger children's percentage of TEs and the number of trials in which the children violated mutual exclusivity was not significant, $r = .27$, $p > .05$. Similarly, when violation was defined as a proportion out of the total number of trials on which the

younger children either honoured or violated mutual exclusivity, the correlation with percentage of TEs was not significant, $r = .29$, $p > .05$. Turning to the older children, the correlation between percentage of TEs and the number of trials in which they violated mutual exclusivity was also not significant, $r = .20$, $p > .05$. Again, when violation was defined as a proportion of the trials on which children violated mutual exclusivity, the correlation with percentage of TEs was not significant, $r = .09$, $p > .05$.

Turning to the Dual-Language ME Task, the correlation for the younger bilinguals between percentage of TEs and the number of trials in which the children violated mutual exclusivity was not significant, $r = .09$, $p > .05$. Using the modified, proportional version of violation, the correlation was also nonsignificant, $r = .20$, $p > .05$. Neither of the correlations for the older bilinguals was significant, $r = .29$, $p > .05$ for violation of mutual exclusivity, and $r = .17$, $p > .05$ for proportion of violations. All of the above reported correlations remained insignificant when both age groups were combined. Thus, the correlations suggest no meaningful relationship between violation of mutual exclusivity and proportion of TEs.

Proportion of TEs in the children's vocabulary is not the only way of quantifying children's degree of bilingualism. It is possible that the closer children are to having a 50-50 language split in their productive vocabularies, the more they would allow mutual exclusivity to be violated. It is also possible that children's relative exposure to the two languages would predict their performances on mutual exclusivity tasks. Before attempting to correlate these variables with the children's performance on the tasks, these three bilingualism variables, i.e.,

proportion of TEs, degree of productive dominance, and degree of exposure, were first analyzed for potential correlations with one another. The results suggest that the proportion of TEs correlated very highly with degree of productive dominance; among younger bilinguals, $r = -.83$, $p < .05$, and among older bilinguals, $r = -.99$, $p < .05$. That is, the greater the proportion of words spoken in the dominant language, the lower the proportion of TEs the children had in their overall vocabularies. In other words, the larger the size of the child's nondominant vocabulary as compared to the vocabulary in the dominant language (ranging of course from 0 to 50%), the larger the proportion of total words accounted for by TEs. Another way to express this relationship is to say that almost all of the children's words in their non-dominant language function as TEs for words in their dominant language. Degree of exposure, on the other hand, was not found to correlate with the proportion of TEs.

Given the high degree of overlap between proportion of TEs and degree of productive dominance, the only additional language variable entered into a correlation with children's scores on the two mutual exclusivity tasks was degree of exposure. Results for each age group, as well as for the entire bilingual sample combined, again yielded no significant correlations.

Fast Mapping Task Results

In this task, children were administered two mapping trials and two corresponding generalization trials. Recall that to be credited with fast mapping on a trial, when asked for the referent of a novel word, children had to choose the unfamiliar object from an array which included three additional familiar objects.

Success on generalization trials involved choosing a new exemplar of the original unfamiliar object when again asked to find the referent of the novel word, while ignoring a completely novel object in the display. The task was administered to test two hypotheses. First, it was hypothesized that the ability to fast map represents a separate process from the tendency to honour mutual exclusivity, and thus that success in fast mapping would not be related to performance on the mutual exclusivity task. The second hypothesis was that bilingual children would be at a disadvantage for fast mapping relative to monolingual children, since they would be more willing to apply an unfamiliar name as a second term for a familiar item, and would thus not be as motivated to map a new name onto an unfamiliar item.

Of preliminary interest was how the children performed on requests for the 4 familiar items included in the task, to confirm children's ability to respond to the task's demands. Children in the younger monolingual group were successful on a mean of 3.72 out of 4 items, SD =.53. Older monolinguals were successful on a mean of 3.90 items, SD =.30. Younger bilingual children achieved a mean of 3.73 items, SD =.67, and older bilingual children were successful on a mean of 3.93 items, SD =.27. As with the familiar items of the Same-Language ME Task, this was a control variable on which the vast majority of children succeeded on all 4 items. Accordingly, the distribution for this variable was very skewed, and attempts to transform it into a normal distribution were unsuccessful. Thus, familiar items could not be subjected to a comparison of the means. The mean scores suggest, however, that children understood the task's demands well

enough to perform acceptably on the familiar items. The bilingual children seemed to perform as well on these items as monolinguals. It also seems that older children, on the whole, were more successful than younger children on these items.

A 2(Age) x 2(Lingual Group) analysis of variance was conducted on the number of trials (maximum = 2) on which children succeeded to fast map. The analysis revealed no significant main effect for Age (M = .93, SD = .72 for the younger children, M = 1.16, SD = .77 for the older children, F (1,109) = 2.46, p >.006) or for Lingual Group (M = 1.03, SD = .76 for the monolinguals, and M = 1.06, SD = .75 for the bilinguals, F (1,109) = .04, p >.006). There were also no significant interactions. Table 12 provides the means for each group, and a source table for this analysis is available in Table 8 of Appendix B.

Although fast mapping trials provide the purest measure of children's ability to disambiguate novel word reference, another way to operationalize fast mapping success is to include generalization trials together with the fast mapping trials. This approach was taken by Cartwright, Behrend, and Wilcox (1997). The addition of the generalization trials makes the task slightly more difficult, since children must demonstrate both the ability to disambiguate and the ability to extend the novel word to a new exemplar. Adding the generalization trials has the advantage, however, of providing 4 trials for analysis instead of 2, creating increased reliability. A 2(Age) x 2(Lingual Group) analysis of variance was conducted on the combined mapping and generalization trials (maximum=4) on which children were successful. Again, no effect of Age was found (M = 2.40,

Table 12

Mean Number of Successful Mapping Trials on the Fast Mapping Task

	Age Group	
Lingual Group	Younger	Older
Monolinguals		
M	.86	1.19
SD	.69	.79
Bilinguals		
M	1.00	1.11
SD	.75	.75

Note. Maximum score = 2.

SD = 1.18 for the older group, M = 1.91, SD = 1.39 for the younger group, F = 3.92, p >.006). There was also no main effect of Lingual Group (M = 2.03, SD = 1.31 for the monolinguals, M = 2.30, SD = 1.30 for the bilinguals, F (1,109) = 1.27, p >.006) and no significant interactions. Table 13 provides the means for each group, and a source table is provided in Table 9 of Appendix B.

One of the reasons for failing to find differences between groups may be that having only a few trials, especially two trials in the case of fast mapping, creates a restriction on variability. The results for these two trials may therefore be more easily understood using a non-parametric method of analysis. Consequently, all participants were divided into those who succeeded on both trials, versus those who succeeded on no trials or only on one trial, creating a conservative cutoff for success.

A test of the proportion of monolinguals and bilinguals who passed both trials of the fast mapping (FM) task yielded no significant difference between the groups, chi-square = .0003 (df = 1), p >.05. A test of the proportion of children at the younger age and at the older age who passed both trials, however, yielded a marginally significant difference, with more children at the older age passing both trials (chi-square = 3.49 (df = 1), p <.10). When the chi-square test comparing the two age groups was repeated using a more liberal cutoff for success, that is, fast mapping success on at least one of the two trials, the test yielded no significant difference between the age groups (chi-square =.67 (df = 1), p >.05).

An additional test investigating the proportions of children who passed both

Table 13

Mean Number of Successful Mapping and Generalization Trials on the Fast Mapping Task

	Age Group	
Lingual Group	Younger	Older
Monolinguals		
M	1.72	2.32
SD	1.36	1.22
Bilinguals		
M	2.12	2.48
SD	1.42	1.16

Note. Maximum score = 4

trials in each separate group, that is, younger monolinguals, older monolinguals, younger bilinguals and older bilinguals, did not yield group differences, chi-square =4.61 (df = 3), p >.05.

Comparisons Between the Fast Mapping Task and the Same-Language Mutual Exclusivity Task

In order to address the hypothesis that the ability to fast map (or to show the disambiguation effect) and the tendency to honour mutual exclusivity represent two distinct processes, a series of McNemar tests was performed. These tests involve a comparison of the proportion of children passing one task and failing the other, based on a cutoff score representing success on each task. Because this hypothesis was less central and more exploratory, it was decided that a reasonably lenient cutoff would be appropriate; thus, children succeeding on at least half the trials of a given task were credited with some use of the corresponding word- learning principle. For the mapping trials of the FM task, the criterion was thus one out of two trials, and for the Same-Language ME Task, the criterion was two out of four trials. For the purposes of these comparisons, the mapping trials of the FM Task were included without a consideration of the generalization trials, given that the isolated ability to fast map is what has been postulated to be related to mutual exclusivity processes.

For bilinguals, it was found that all relationships noted between the FM Task and the Same-Language ME Task were duplicated in the relationships between the FM Task and the Dual-Language ME Task. For this reason, only

relationships involving the Same-Language ME Task will be reported, in order to compare performance with the monolinguals more directly.

Among the younger monolinguals, the majority of the children both succeeded to fast map and tended not to honour mutual exclusivity. Results of the McNemar test suggested that significantly more of the children succeeded on fast mapping but failed to honour mutual exclusivity, as compared to the number who failed the fast mapping but did honour mutual exclusivity ($p < .05$ by the binomial distribution). Table 14 lists the number of children passing each task.

The picture was different among the older monolinguals. The majority of children both fast mapped and honoured mutual exclusivity. A McNemar test suggested there was no significant difference in the number of participants who fast mapped and failed to honour mutual exclusivity, as compared with those who failed to fast map but honoured mutual exclusivity ($p > .05$ by the binomial distribution). Table 15 contains the proportions of children passing each task.

The pattern which emerged among the younger bilinguals was very similar to that of the younger monolinguals. The majority of the children succeeded in fast mapping. Marginally more children passed fast mapping and failed to honour mutual exclusivity than failed fast mapping but honoured mutual exclusivity ($p < .10$ by the binomial distribution). Overall, the results for the younger children suggest that they generally behaved in a manner consistent with an N3C principle or with the disambiguation effect of mutual exclusivity, but did not tend to honour mutual exclusivity when presented with sufficient contradictory input on the Same-Language ME Task. The number of children passing each task is shown in

Table 14

Number of Younger Monolingual Children Showing Evidence of Lexical Principles

	Same-Language ME Task	
Fast Mapping Task	Honour	Not Honour
Pass	2[a]	7
Fail	8	12[a]

Note. Criteria for credit were 2 of 4 trials honoured for Same-Language ME Task, and 1 of 2 trials passed on Fast Mapping Task.

[a] These two numbers differed, binomial $p < .05$.

Table 15

Number of Older Monolingual Children Showing Evidence of Lexical Principles

	Same-Language ME Task	
Fast Mapping Task	Honour	Not Honour
Pass	6	1
Fail	16	8

Note. Criteria for credit were 2 of 4 trials honoured for Same-Language ME Task, and 1 of 2 trials passed on Fast Mapping Task.

Table 16.

The older bilinguals also resembled the older monolinguals in their patterns of response. The majority both showed fast mapping ability and honoured mutual exclusivity. The small number of participants who passed fast mapping and failed to honour mutual exclusivity did not differ from the small number who failed to fast map but honoured mutual exclusivity ($p > .05$ by the binomial distribution). Table 17 shows the number of children passing each task.

Overall, the results of the McNemar tests support the notion that while the children in all groups generally showed the ability to fast map on at least one out of two trials, their tendency to honour mutual exclusivity was related to the age group to which they belonged (younger children more often failed to honour mutual exclusivity while older children adhered more to the principle), and not to their performance on the fast mapping task.

In order to further contribute to an understanding of the relationship between the FM Task and the Same-Language ME Task, analyses using Cochran's Q test were done to compare the proportions of children passing each task. The criteria for passing the FM Task and the Same-Language ME Task were the same as used above in the McNemar tests. Table 18 lists the percentages of children in each group who fast mapped, and who honoured mutual exclusivity. Among the younger monolinguals, a significantly smaller percentage of children honoured mutual exclusivity compared with the percentage who fast mapped, Cochran $Q = 7.14$ ($df = 1$), $p < .05$. Among the older monolinguals, the percentages of children who fast mapped and honoured

Table 16

Number of Younger Bilingual Children Showing Evidence of Lexical Principles

	Same-Language ME Task	
Fast Mapping Task	Honour	Not Honour
Pass	3[a]	3
Fail	9	10[a]

Note. Criteria for credit were 2 of 4 trials honoured for Same-Language ME Task, and 1 of 2 trials passed on Fast Mapping Task.

[a] These numbers differed marginally, binomial $p < .10$.

Table 17

Number of Older Bilingual Children Showing Evidence of Lexical Principles

	Same-Language ME Task	
Fast Mapping Task	Honour	Not Honour
Pass	5	1
Fail	17	2

Note. Criteria for credit are 2 of 4 trials honoured for Same-Language ME Task, and 1 of 2 trials passed on Fast Mapping Task.

Table 18

Percentage of Children who Fast Mapped and who Honoured Mutual Exclusivity on the Same-Language Mutual Exclusivity Task

	Task	
Group	Honour ME	Fast Mapping
Monolinguals		
Younger	34%	69%*
Older	71%	77%
Bilinguals		
Younger	48%	76%*
Older	88%	77%

Note. Criteria for credit were 2 of 4 trials honoured for Same-Language ME Task, and 1 of 2 trials passed on Fast Mapping Task.

* Significant difference between the two tasks, $p < .05$

mutual exclusivity did not differ significantly, Cochran Q = .29 (df = 1), p >.05.

Among the younger bilinguals, the percentage who honoured mutual exclusivity was significantly smaller than the percentage who fast mapped, Cochran Q = 3.77 (df = 1), p <.05. This pattern resembles that of the younger monolinguals. Among the older bilinguals, the percentage who fast mapped and the percentage who honoured mutual exclusivity did not differ significantly from one another (Cochran Q = 1.29 (df = 1), p >.05). Again, this pattern resembled that of the older monolinguals.

In sum, the results of the Cochran Q tests suggest that for both monolingual and bilingual children, rates of success in the two tasks were independent of one another at the younger age, but that children both honoured mutual exclusivity and fast mapped with similar rates of success at the older age. Fast mapping ability thus seemed to emerge earlier and was observed reliably at 27 months, while the tendency to adhere to mutual exclusivity only emerged later at 35 months.

Perspective-Taking Task Results

In order to test the hypothesis that bilingual children at each age would have an advantage over their monolingual counterparts in perspective-taking ability, a 2(Age) x 2(Lingual Group) analysis of variance was conducted, with perspective-taking score (out of a possible 8 points) as the dependent variable. Seven children were removed from this analysis due to a preponderance of missing data on this task. The analysis yielded a main effect of Age, with older children succeeding on more trials than younger children (M = 6.25, SD = 1.65 for

the older children, and M = 4.56, SD = 2.18 for the younger children, F (1,102) = 21.33, p <.006). No main effect of Lingual Group was found (M = 5.48, SD = 2.05 for monolinguals, M = 5.52, SD = 2.15 for bilinguals, F (1,102) = .03, p >.006), and there was also no interaction effect. Table 19 provides the means for each group on this task, and a source table is available in Table 10 of Appendix B.

Table 19

Mean Scores on Perspective-Taking Task

	Age Group	
Lingual Group	Younger	Older
Monolinguals		
M	4.82	6.07
SD	2.15	1.81
Bilinguals		
M	4.26	6.48
SD	2.22	1.45

Note. Maximum score = 8

CHAPTER FIVE: DISCUSSION

The purpose of the present study was to address a number of different research questions related to adherence to the mutual exclusivity principle and other word-learning principles among monolingual and bilingual children, during the period between 2 and 3 years of age. The study was thus designed to incorporate tests of several primary and secondary hypotheses. Each of these will be considered in turn, and discussed in light of the findings. A consideration of several additional methodological issues will follow, and a summary and conclusions will be presented at the end of this chapter.

Monolinguals' vs. Bilinguals' Responses to Violation of Mutual Exclusivity Within a Language

The main goal of the present research was to compare adherence to the mutual exclusivity word-learning principle in monolingual and bilingual children aged between 26 and 36 months. To date, no tests of mutual exclusivity have been conducted with bilingual children under the age of 3.5 years. Mutual exclusivity tasks conducted within a language with children older than 3.5 years have in some cases yielded no differences between monolinguals and bilinguals (Merriman & Kutlesic, 1993; Rosenblum & Pinker, 1983), but have also shown less adherence among bilinguals in other cases (Davidson et al., 1997). In the present study, young monolingual and bilingual children aged 27 and 35 months were given a test of mutual exclusivity in which they were presented with input violating mutual exclusivity within a language. This task was modelled roughly

after Savage and Au's (1996) methodology. The children heard two novel words for the same object within the same language, and were then asked to choose the referent for each of the two novel words. Of interest was whether the bilinguals at each age would be less likely to adhere to the mutual exclusivity principle than the monolinguals in their object choices, due to their experience of often hearing objects labelled in two languages.

The results of this study indicated that contrary to the hypothesis, monolingual and bilingual children honoured mutual exclusivity equally, at both 27 and 35 months of age. In addition, both monolingual and bilingual children honoured mutual exclusivity to a greater degree in the 35-month-old group than in the 27-month-old group.

The identical rate of adherence to mutual exclusivity among the bilinguals and the monolinguals is all the more striking given that neither group showed a floor effect or a ceiling effect for adherence at either age. That is, while monolinguals violated mutual exclusivity more at the younger age than at the older age, i.e., on an average of approximately two trials out of four at the younger age, there was potential for the younger bilinguals to violate mutual exclusivity still more, which they did not. Similarly, there was room for the older bilinguals to violate mutual exclusivity more than the older monolinguals, who violated mutual exclusivity on an average of 1.5 trials out of 4, but they did not. Thus, it is clear that despite the experience of mutual exclusivity violation across languages in their own environments, for the majority of whom this experience began in the first year of their life, bilinguals under the age of 3.5 treated

violations of mutual exclusivity within a language in the very same way as did monolinguals.

The absence of a difference between monolinguals and bilinguals in adherence to mutual exclusivity replicates the findings of Merriman and Kutlesic (1993) for 5- to 8-year-old children on correction and restriction effects within a language, and those of Rosenblum and Pinker (1983) for 4- to 5-year-old children on acknowledging the acceptability of a second, nonsense name for an object. This study therefore supports a downward extension in age, to 27 months, of the tendency for monolinguals and bilinguals to respond similarly when mutual exclusivity is violated within a language. The results, however, contradict Davidson et al.'s (1997) recent finding that monolingual children aged 3.5 to 6 years showed the rejection effect of mutual exclusivity more than did bilinguals.

The discrepancy between studies might be accounted for by considering the specific manner in which responses were requested of bilinguals in each study. It is possible that while bilinguals are generally no more likely than monolinguals to violate mutual exclusivity within a language, they may be more sensitive to cues in the social context which support the decision to override mutual exclusivity. In Davidson et al.'s (1997) study, children's tendency to reject second names was measured by having them respond yes or no to questions such as "Is this a car and a luga?". It is possible that for bilingual children, the very fact of hearing an experimenter acknowledge this possibility by placing the two labels in the same sentence provides them with a cue that this is a situation in which it is acceptable for an object to have two names. While this cue might be

most salient for children who hear the same adults in their environment speak both languages, it may be that all bilingual children have a better developed ability to attend to cues related to dual object naming. The notion that bilingual children are more sensitive to the social context of object naming is supported by Rosenblum and Pinker (1983), who found that although both monolinguals and bilinguals showed a tendency to accept the use of arbitrary nonsense names, the bilinguals gave more reasons referring to the experimental or personal context in which the transfer of names was acceptable, while monolinguals focused on the objects' attributes. For example, bilinguals gave reasons such as "because it's in our game" or "because you told me and I know what it is and you know what it is", while monolinguals gave reasons such as "because they're both green", or "because it has four legs". It is noteworthy that in Rosenblum and Pinker's study, in which the experimenters provided specific instructions to manipulate objects but called them by nonsense names, both monolinguals and bilinguals showed a slight tendency to accept the second names. Interestingly, Rosenblum and Pinker also provided the children with many sentences which contained two labels for the same object, such as "Can you call this table a shig?". Their finding of a tendency among both groups to accept two labels supports the idea that when provided with enough cues, even monolinguals can suspend mutual exclusivity and respond to the social context. To return to Davidson et al.'s (1997) study, then, it is possible that within the experimental context, subtle cues were inadvertently provided which helped bilinguals, but not monolinguals, interpret the situation as one in which mutual exclusivity should be suspended. In the present

study, as well as in Merriman and Kutlesic's (1993) study, children were tested with a minimum of cues or feedback, and were simply asked to find the referent(s) of a particular word. This open-ended approach may thus have elicited behaviour in the bilinguals which resembled that of the monolinguals.

To experimentally address the possibility that bilinguals may be more prepared than monolinguals to suspend mutual exclusivity based on cues in the social context, one might administer tasks which provide no cues, minimal cues, and clear cues that the experimenter finds mutual exclusivity violation acceptable or even desirable, and then determine if monolingual and bilingual children differ in their reading of the cues.

An additional issue to be considered is whether the bilinguals who were administered the Same-Language ME Task at their first visit showed a greater resemblance to the monolinguals (who had only one visit) than the bilinguals who were administered the same task at their second visit, suggesting the possibility of systematic effects of time passage, as well as task order. This possibility was not formally investigated because the monolingual sample was twice as large as the group of bilinguals who received each task order. The lack of order effects of the two ME tasks for bilinguals of both ages, however, combined with the fact that overall, the bilinguals did not differ from the monolinguals in their performance on the Same-Language ME Task, is evidence against this hypothesis. Instead, it seems clear that the bilingual group as a whole did perform similarly to the monolinguals, and bilinguals were not selectively influenced by time passage or task order.

Bilinguals' Adherence to Mutual Exclusivity Within a Language and Across Languages

A second goal of the present study was to compare young bilingual children's adherence to mutual exclusivity within a language with their adherence to the principle across languages, at the ages of 27 and 35 months. Since the results of studies with children aged 3.5 years and older have suggested that bilinguals fail to reliably honour mutual exclusivity across languages (Au & Glusman, 1990; Merriman & Kutlesic, 1993), of interest was whether children younger than 3.5 years would also fail to honour mutual exclusivity when presented with violations of the principle across languages.

According to the present results, bilingual children showed the same rates of adherence to mutual exclusivity across languages as they did within a language. The older bilingual children honoured mutual exclusivity more than did the younger bilingual children, that is, on a majority of trials, both across languages and within a language. Thus, the bilingual children closely resembled the monolingual children in their patterns of adherence to mutual exclusivity, both when measured within a language and across languages.

Contrary to the findings of studies exploring mutual exclusivity across languages in children of preschool age and older, these results suggest that children at the ages of 27 and 35 months do not treat violations of mutual exclusivity across languages any differently from violations within languages. In this study, the dual-language nature of the additional mutual exclusivity task was

highlighted to a degree greater than in any other study to date. This highlighting was achieved by having each of the two experimenters address the child, label objects, and request objects entirely in a different language. Despite this dual-language context, the children showed behaviour consistent with their performance on the same-language task. These findings suggest that for bilinguals, the relaxing of the mutual exclusivity principle across languages may follow a U-shaped function. According to the results of the present study, around the age of 2 years, bilingual children may tolerate violation of mutual exclusivity both within and across languages; at just under 3 years they honour mutual exclusivity across languages, as they do within languages and as do monolinguals; and beginning at age 3.5 or 4 years, as indicated by the results from Au and Glusman (1990) and Merriman and Kutlesic (1993), they make a distinction between violations within and across languages, honouring mutual exclusivity only within a language. It is thus possible that bilinguals first go through the same stages as monolinguals, and then, after age 3, perhaps having had a critical amount of experience with two languages and having had an opportunity to assimilate the distinctive features of bilingual communication, they finally make a distinction between violations of mutual exclusivity within a language and across languages. To more accurately test this proposed developmental sequence, the same tasks should be administered to bilingual children at all three ages.

It remains puzzling that despite the extensive experience of hearing names for objects in two languages, and despite having demonstrated their bilingualism by having a good proportion of translation equivalents in their own productive

vocabularies (recall that the average proportion of translation equivalents was approximately 50%), children at 35 months honoured mutual exclusivity across languages on more than half the trials in this study. Speculation about the meaning of the children's behaviour can take two possible directions. First, their characteristic experience as bilinguals notwithstanding, at the age of 35 months bilingual children may abide by mutual exclusivity as a default option in situations in which there is little information to suggest an alternative response. The effort to create an experimental task which resembled their everyday dual-language environment may not have succeeded, and thus the experimental situation in this study may have qualified as just such a default situation for these children. Given, however, the dual-language nature of the task, combined with the violation of mutual exclusivity by two adult speakers, it is hard to believe this task constituted a situation inviting a simple default solution for children accustomed to violations of mutual exclusivity across languages. Thus, the second option is to consider that despite considerable exposure to a bilingual environment, by the age of 3 these children have developed an adherence to a mutual exclusivity principle which is relatively impervious to contradictory input, at least if it is presented in a one-time learning situation with little opportunity for repetition or rehearsal, as was done in this study.

One might ask, if bilingual children around 3 years of age operate with such a rigid principle, how is it that they are able to learn so many translation equivalents? As Woodward and Markman (1998) have suggested, given the proposed default nature of lexical principles, the existence of words in a child's

vocabulary which violate mutual exclusivity is not necessarily evidence against the principle. In the case of bilingual children, it may be that they must receive a critical amount of input violating mutual exclusivity for each pair of translation equivalents before they accept the particular overlapping reference. Perhaps some critical mass of word pairs is needed to set in motion the operation of a more general rule, namely that words from different languages should immediately be assumed to be capable of overlapping completely in reference. (One can speculate that perhaps such a rule comes into play after 3 years of age, allowing the bilinguals to distinguish between violations of mutual exclusivity within and across languages at that point.) These speculations lead to several other questions; first, how much input is necessary for a particular pair of words before children will accept overlapping reference, and does the amount vary across children? Second, is the acceptance of overlapping reference in comprehension, which precedes production, a more difficult step for children than the subsequent productive use of equivalent terms? Anecdotally, a few parents related that despite long-time exposure to both languages, their children still resisted adults' use of second names, i.e., labels in the second language, for objects which the children at that point comprehended only in one language. For example, if the child understood only the word *glass*, and the mother used the word *verre* in French, the child would protest and say "no, it's a glass". This reaction is striking in light of the child's habitual dual-language exposure. A systematic approach to the study of this kind of language behaviour would be most useful in clarifying the role of mutual exclusivity in bilingual children's word

acquisition. A first step, for example, might be to take a naturalistic approach and follow the development of a pair of translation equivalents in a child's language. For the first introduced word, a record could be kept as to the number of adult repetitions necessary before the child adopts the word in production. When the equivalent word in the other language is then introduced, one could maintain a careful record of the child's reactions to repeated uses of the new word by speakers in the child's environment, and also determine how many exposures to the word are necessary before the child begins to use the new word in production. The number of repetitions necessary for the equivalent word to be produced in the first language and in the second language could be compared, to determine whether the pattern lends any support for the operation of mutual exclusivity.

To summarize, despite the highlighting of the dual-language nature of the bilingual mutual exclusivity task, children aged both 27 and 35 months did not treat violations of mutual exclusivity across languages any differently from violations within languages. The distinction between violations within and across languages may not occur until after the age of 3, and it can be speculated that for this distinction to be made, exposure to a critical mass of cross- language word pairs is needed.

Translation Equivalents and Adherence to Mutual Exclusivity

An additional goal of this study was to explore the relationship between degree of bilingualism, most notably the proportion of translation equivalents in

the two languages of the bilingual children, and their performance on the mutual exclusivity tasks.

The results showed a lack of correlation between bilingual children's responses on the mutual exclusivity tasks and the proportion of translation equivalents in their vocabulary, as well as a lack of correlation between mutual exclusivity and relative proportion of exposure to the two languages. This lack of relationship can be explained by the overall pattern of results on the mutual exclusivity tasks. That is, given that the rates of adherence to mutual exclusivity did not differ between monolinguals and bilinguals, and given that bilinguals showed similar rates both within and across languages, it is not surprising that no correlations were found. It seems that little or none of the variability in the mutual exclusivity performance of the bilinguals was actually accounted for by bilingualism, and as such, could not be reasonably expected to correlate with measures of bilingual status. One possibility which could explain the lack of relationship between translation equivalents and mutual exclusivity performance, as well as the similarity in mutual exclusivity performance between bilinguals and monolinguals, is that the criteria used for the establishment of bilingual status were not successful. That is, it is possible that parents overestimated their children's bilingual vocabulary production abilities, or that a minimum of 20% exposure to a second language is too liberal a criterion for consideration as a bilingual child. In opposition to this argument, however, it must be re-emphasized that the children retained in the bilingual group performed successfully when asked to retrieve familiar items in their nondominant language, showing an

understanding both of the requested words and of the grammatical frames in which the requests were presented. There is reason to believe, then, that these children were sufficiently bilingual.

Another possible explanation for the lack of relationship between mutual exclusivity performance and proportion of translation equivalents in the children's vocabularies is that proportion of translation equivalents, which reflects children's willingness to violate mutual exclusivity in vocabulary production, is divorced from their tendency to honour mutual exclusivity when faced with a receptive language task. As noted above, the difference between mutual exclusivity in comprehension tasks and mutual exclusivity in production for bilinguals may lie in the length of the learning history for the translation equivalent pairs in their productive vocabularies. Children likely require multiple repetitions of two labels before they will accept both, and eventually incorporate both into their productive vocabulary. Mutual exclusivity tasks like those used in the present study provide children with only a brief exposure to the new words, and therefore may elicit more adherence to mutual exclusivity.

There may be additional factors with regard to bilingualism which would potentially predict differences in children's approaches to mutual exclusivity tasks. One such factor is age at first exposure to a second language. It may be that children who are in bilingual environments from birth (which de Houwer (1995) has termed 'bilingualism as a first language') would respond differently from children who are exposed to a second language later on. While information was collected about time of first exposure to two languages, this was not a variable

which could be used for purposes of comparison in this study, since the vast majority (89%) of the children were classified into the same group, i.e., those who were first exposed between birth and 12 months. The nature of the shifts over time in children's degree of exposure to each language would also constitute a potentially relevant source of information.

A second relevant factor which could play a role in children's approaches to mutual exclusivity tasks might be whether children hear their two languages in separate contexts, such as at home and at daycare, versus in the same context. Similarly, some children hear both languages from fluently bilingual speakers who constantly switch back and forth, while others associate each language with a different person or set of people. These differences might create subsets of bilinguals who would adhere to mutual exclusivity to greater or lesser degrees. For example, those who hear their two languages mixed together on a regular basis might be less likely to honour mutual exclusivity across languages. It is difficult, however, to obtain an adequate assessment of language mixing based solely on parental report. Goodz (1989) has observed that despite a commitment to a one person-one language communication strategy, parents in bilingual families modelled many mixed language utterances to their children. Anecdotally, parents in the present study who claimed to speak only one language to their child were also observed to speak to their child in the other language.

Given that no differences were found between monolinguals and bilinguals in this study, and that degree of bilingualism did not predict performance on the tasks within the bilingual group, it is an open question as to whether even finer

grained distinctions between groups of bilinguals would account for any of the variability in mutual exclusivity performance.

Given the results of studies showing that bilinguals do fail to honour mutual exclusivity across languages at preschool age and beyond, it would be interesting to determine if at that older age, degree of bilingualism would predict behaviour on a mutual exclusivity task across languages. One potential difficulty of such an investigation, however, is that at an older age, children raised in bilingual environments would have had sufficient time to become more proficient in both languages and thus to resemble one another to a much greater degree, contributing to a lack of variability in degree of bilingualism. This problem might be addressed by recruiting children at different stages of bilingual development, such as the stages outlined by de Houwer (1995) corresponding to age of first exposure to a second language.

In a final note about translation equivalents, while it might have been expected that the 35-month-olds in this study would have greater mastery over their two languages, somewhat surprisingly, the average proportion of translation equivalents among the 35-month-olds was no greater than the proportion of equivalents among the 27-month-olds (although a wider range was observed in the older age group). It is possible that the similarity in the average proportions of translation equivalents observed in the two age groups in the present study simply represents the continuation of a very gradual but stable growth curve. That is, it may extend the findings of Pearson et al. (1995), who report a 30% average proportion of translation equivalents in their sample of bilinguals studied

longitudinally between the ages of 8 and 30 months. It would prove informative to build upon the findings of these two studies by longitudinally tracing the growth of translation equivalents from 30 months until 3.5 or 4 years of age.

Developmental Changes in Adherence to Mutual Exclusivity

The design of the present study allowed for a test of Merriman's (1986b; Merriman & Bowman, 1989) hypothesis that the mutual exclusivity bias gains in strength between the ages of 2 and 3 years. The finding that both monolinguals and bilinguals honoured mutual exclusivity more at 35 months than at 27 months provides support for this hypothesis. In addition, the present results indicate some adherence to mutual exclusivity at 27 months, supporting the notion that by this age, children have begun to make some use of the principle. There remains the question, however, of why the results of some other studies (Graham et al., in press; Liittschwager & Markman, 1994; Merriman & Schuster, 1991; Merriman et al., 1993a; Mervis & Bertrand, 1994) are more strongly suggestive of the operation of mutual exclusivity in children even younger than 27 months. The answer may hinge on what is considered to be adherence to mutual exclusivity. Studies showing mutual exclusivity effects under the age of 2 have primarily demonstrated disambiguation, or else have shown that second labels are more difficult to learn than first labels. Other effects of mutual exclusivity, such as correction, restriction, or rejection effects, the last of which most closely resembles the effect shown in the present study, have been demonstrated as emerging in children between 25 and 36 months of age. It is therefore possible that success on disambiguation tasks, as well as the tendency to have difficulty

learning second labels, occur sooner than the tendency to reject two labels for the same object. The relationship between disambiguation and other effects of mutual exclusivity is explored in more detail in the following section.

The Mutual Exclusivity Principle and the Disambiguation Effect

An additional goal of this study was to determine the relationship between children's response to violation of mutual exclusivity and their tendency to show the disambiguation effect. Accordingly, all children were administered a fast mapping, or disambiguation task, very similar to those typically employed in the literature.

The results suggested that for both monolingual and bilingual children, success on the (Same-Language) mutual exclusivity task and on the fast mapping task appeared to be independent. The ability to fast map was observed at 27 months and remained relatively stable across the two ages, with children of both ages succeeding on at least one of two mapping trials. Success on the fast mapping trials did not predict the tendency to honour mutual exclusivity, which was minimal at 27 months but better developed at 35 months.

The finding that at 27 months, the children in this study showed some ability to fast map is consistent with previous studies showing this ability around the age of 2 years or slightly under (Graham et al., in press; Liittschwager & Markman, 1994; Merriman & Schuster, 1991; Merriman et al., 1993a; Mervis & Bertrand, 1994). The results also suggested that monolingual and bilingual

children were equally successful on the fast mapping task, contrary to the expectation that bilinguals might show a disadvantage relative to monolinguals.

Before addressing the meaning of children's performances on the two tasks, one should query whether the two tasks truly measured different processes. The Same-Language ME Task (as well as the Dual-Language ME Task), after all, did include an element which could be considered to tap a disambiguation effect. That is, as part of the object array, children were provided with an unfamiliar object which had never been named. Since children were considered to have honoured mutual exclusivity when they mapped one of the two trained names to this new unfamiliar object instead of to the target unfamiliar object, it is clear that the task may have included an element of disambiguation. It is all the more pertinent, then, that a difference was observed in the present study between the pattern of children's performances in the fast mapping task, which more directly assesses the tendency to disambiguate, and the violation of mutual exclusivity task. If children's choices on the mutual exclusivity task reflected solely a tendency to disambiguate, then the older children should have shown only a slight advantage, if any, relative to the younger children in honouring mutual exclusivity on the task, as was the pattern in the fast mapping task. Instead, the older children adhered to mutual exclusivity significantly more than the younger children did, suggesting that the tasks did measure distinct processes.

Turning to the question of the exact nature of the word-learning strategies measured in these tasks, recall that fast mapping behaviour can be explained both by mutual exclusivity and by the alternative word-learning principle of Novel

Name-Nameless Category (N3C) (Golinkoff et al., 1994). The finding in this study that fast mapping ability was present at 27 months, while the tendency to honour mutual exclusivity was not observed consistently until the age of 35 months, suggests one of two possible interpretations. First, it may be that fast mapping does reflect the use of a mutual exclusivity principle, but is an effect of mutual exclusivity which appears sooner than other effects of mutual exclusivity. Alternatively, it is possible that fast mapping ability reflects the operation of a separate principle like N3C, and developmentally precedes the tendency not to accept violations of mutual exclusivity. The key to answering this question lies in the general nature of the relationships between different proposed mutual exclusivity effects. Let us assume temporarily, for the sake of argument, that fast mapping behaviour does indeed reflect the disambiguation effect of the mutual exclusivity principle, rather than the N3C principle. In this case, we might expect the disambiguation effect to develop in synchrony with other effects of mutual exclusivity, such as restriction, correction, and rejection, and to follow a similiar time frame. If, instead, we see that other effects of mutual exclusivity develop in relative synchrony and only the disambiguation effect follows a different trajectory, or if the disambiguation effect is observed earlier and all other effects develop later, then the notion that the disambiguation effect (or fast mapping behaviour) is a result of the operation of the mutual exclusivity principle would have to be questioned.

To address the issue of the relationship between different effects of mutual exclusivity, one may turn to several studies which have attempted analyses of

such relationships. Davidson et al. (1997) found very few correlations between different effects of mutual exclusivity; rejection (the tendency to reject a new word for an object which already has a name) and restriction (avoiding things that are referents of other words when generalizing a new word) were found to correlate for younger bilinguals, but no such results were found for older bilinguals or for the monolinguals in their study, and disambiguation did not correlate with any other effect. Similarly, Merriman and Bowman (1989) found that despite increases with age in all three effects, no correlations between disambiguation, correction, and restriction effects were found. Cartwright, Behrend, and Wilcox (1997), in a study of children aged 3.5, 4.5, and 6 years, also found that there was no relationship between children's performances on a test of the disambiguation effect and on a test of the correction effect of mutual exclusivity. Similarly, in the present study, success on the disambiguation task was found to be independent of performance on the violation task, which can be said to have measured the rejection effect of mutual exclusivity. On the other hand, in a recent experiment, Merriman and Stevenson (1997) found a strong positive correlation between restriction and rejection effects in young 2-year-olds.

Together, the comparisons between effects of mutual exclusivity provide a picture which makes it somewhat difficult to reach a judgment regarding which of the two principles accounts best for fast mapping behaviour. The general lack of correlation between a variety of mutual exclusivity effects makes it difficult to argue for a clear disconnection specifically between fast mapping, or the disambiguation effect, and the remaining effects of mutual exclusivity. At the

same time, given that fast mapping consistently seems to appear at a younger age than other hypothesized effects of mutual exclusivity, given that it does not correlate with other effects, and given that there is an alternative explanation for its presence, it seems more parsimonious to divorce fast mapping behaviour from mutual exclusivity until positive evidence is found to actively support the notion that this behaviour is driven by the mutual exclusivity principle.

In reflecting on the possible relationship between fast mapping and other mutual exclusivity effects, Cartwright et al.'s (1997) proposal is worthy of consideration. These authors suggest that the ability to fast map, which they term "Simple Mutual Exclusivity", is distinct from "Complex Mutual Exclusivity", such as correction or restriction effects. They argue that the former does not require a capacity for multiple mental representations, and thus appears earlier, while the latter can only emerge after children have developed the ability to coordinate mental representations, since the tasks require them to compare mental representations of the relevant training stimuli. In support of this theory, Cartwright et al. have demonstrated a relationship between children's success on a Complex Mutual Exclusivity task involving the correction effect, and their success on a False Belief task, which is generally accepted as a measure of second-order mental representation, i.e., the ability to simultaneously consider and compare one's own mental representations with those of others.

The distinction made by Cartwright et al. (1997) between fast mapping and other mutual exclusivity effects supports the position being promoted here. One question, however, is whether the mutual exclusivity tasks used in the present

study involve the kind of second-order mental representation described by Cartwright et al. While children completing tests of the correction effect, for example, must hold and compare representations of two different training referents, in the present study there was in fact only one training referent, which was given two names. Thus, it may be that in terms of complexity, the mutual exclusivity tasks in this study fall somewhere in between "Simple Mutual Exclusivity" and "Complex Mutual Exclusivity". Nevertheless, a difference in success between the fast mapping task and the violation of mutual exclusivity task was still demonstrated in the present study.

Contrary to the hypothesis that young bilinguals would be at a disadvantage on the fast mapping task due to a greater willingness to apply a novel label to a familiar object, the monolingual and bilingual children in this study did not show any differences in their tendency to fast map. This finding replicates that of Davidson et al. (1997) for 3- and 4-year-olds; only at the ages of 5 and 6 years did Davidson et al. find bilinguals to be at a disadvantage for showing the disambiguation effect relative to monolinguals. In combination, this study and that of Davidson et al. suggest that bilingualism does not have an impact on the tendency to fill lexical gaps until at least the age of 5 years. Given, however, the results of other studies with older children showing that monolinguals and bilinguals respond similarly when mutual exclusivity is violated within a language (Rosenblum & Pinker, 1983; Merriman & Kutlesic, 1993), it remains somewhat surprising that older bilinguals would be at a disadvantage on a disambiguation task, which is also administered within a language. Since Davidson et al. (1997)

are the only researchers to date who have administered a disambiguation task and found a disadvantage for bilinguals, their result should be replicated before being interpreted further.

Mutual Exclusivity and Perspective-Taking

The last goal of the present study was to compare monolingual and bilingual children's performances on a visual perspective-taking task, in order to determine if bilingualism gives children an advantage in a different but somewhat parallel cognitive domain. This question would potentially have been more relevant if the bilinguals had been found to differ from the monolinguals on the mutual exclusivity task. The results indicated that while older children showed more advanced perspective-taking abilities than younger children, no differences were found between monolinguals and bilinguals. While the age differences found suggest that the task itself was successful at tapping into a real developmental process, success on this task was unrelated to bilingual status.

It is possible that a relationship between mutual exclusivity violation and perspective-taking ability does exist, but only at an older age. That is, given that the acceptance of cross-language violations of mutual exclusivity was not observed in the present study and appeared to be specific to bilinguals of preschool age and older, it may be that advantages in an area such as visual perspective-taking, which continues to develop during early childhood, also would be more likely to be observed after preschool age.

Some research has suggested that advantages which accrue to bilinguals tend to remain within the linguistic domain. For example, Ben-Zeev (1974) found

that the 5- to 8-year-old English-Hebrew bilinguals in her study performed more successfully than monolinguals on language-related tasks tapping flexibility in syntactic rule usage, while on tasks requiring the nonverbal analysis of matrices they did not show advantages relative to monolinguals. Other research, however, has found that bilingual children do have an advantage in other cognitive domains, such as Bialystok's (1992) report that bilinguals have an advantage on tasks requiring selective attention. Thus, it remains an open question as to whether preschool-aged bilingual children would indeed show a perspective-taking advantage.

The absence of an advantage for bilinguals in perspective-taking ability in the present study raises an additional possibility. While there may be a relationship between the operation of a word-learning principle and the operation of similar biases in other, parallel cognitive domains, the inverse may not be true. That is, in this case it was expected that the absence of a word-learning principle, not its presence, would predict an advantage in a different cognitive domain, i.e., perspective-taking. As Markman (1992) has suggested, the presence of a word-learning principle may be related to the presence of biases in other cognitive domains. The absence of a word-learning principle, however, is not necessarily related to the absence of similar constraints in other domains in the same way. The results of the present study may support a distinction between these two lines of thought. To date, however, even Markman's (1992) suggestion of parallels between lexical principles and constraints in other cognitive domains remains speculative due to lack of empirical validation.

Review and Summary of Experimental Findings

To summarize, this study resulted in several main findings. First, it was found that when faced with violations of mutual exclusivity within a language, monolingual and bilingual children honoured mutual exclusivity at equal rates, at both 27 and 35 months of age. The absence of a difference between monolinguals and bilinguals in adherence to mutual exclusivity supports the findings of Merriman and Kutlesic (1993) as well as Rosenblum and Pinker (1983), and suggest a downward extension in age, to 27 months, of the tendency for monolinguals and bilinguals to respond similarly to mutual exclusivity violations. The study also revealed a developmental pattern, in which mutual exclusivity was honoured to a greater degree at 35 months than at 27 months. This pattern supports Merriman's (1986b; Merriman & Bowman, 1989) hypothesis that the mutual exclusivity bias gains in strength between the ages of 2 and 3 years.

The results of the study also suggested that when mutual exclusivity was violated across languages, bilingual children adhered to mutual exclusivity to the same degree as when it was violated within a language. Bilingual children may not make a distinction between violations of mutual exclusivity within and across languages until after the age of 3.5, as indicated by the results from Au and Glusman (1990) and Merriman and Kutlesic (1993). The results of the study also suggested a lack of relationship between bilingual children's mutual exclusivity adherence and the proportion of translation equivalents in their vocabulary.

An additional finding of the study was that for both monolingual and

bilingual children, success on the (Same-Language) mutual exclusivity task and on the fast mapping task appeared to be independent. The ability to fast map was observed at 27 months and remained relatively stable across the two ages, while adherence to mutual exclusivity increased with age. With reference to perspective-taking abilities, the results of the study indicated no differences between monolinguals and bilinguals.

There are several methodological issues which should be taken into account when interpreting the results of this study. A consideration of each of these issues follows in the next section.

Methodological Considerations

"No Strategy" Trials

One unanticipated finding in the present study was that on an average of about one trial in four, the children did not respond either by honouring mutual exclusivity or by violating it. Such trials were labelled 'no strategy' trials. Several alternate responses were subsumed under this category: children chose only familiar objects upon hearing the novel names, or learned one of the novel names for the target object but chose a familiar object for the additional novel name, or they refused to give an object when asked for the referents of one or both novel names. Although statistical analyses on this category of responses were not conducted because they would have been redundant with the other two categories of responses analysed, the descriptive data suggested that older bilinguals gave these responses on more trials than older monolinguals on the Same-Language ME Task. The older bilinguals showed the same frequency of

such responses on the Dual-Language ME Task as they did on the Same-Language ME Task. In addition, younger bilinguals had even more no strategy responses on the Dual-Language ME Task than they did on the Same-Language ME Task.

It seems likely that the design of the experiment was, at least in part, responsible for the high number of responses in the "no strategy" category. Recall that on any one trial, requests for familiar and unfamiliar objects were intermingled. The responses to requests for familiar objects were therefore not independent of the responses to requests for unfamiliar objects. Thus, for example, if a child failed to understand a request for a familiar object and instead pointed to an unfamiliar object, that child might then have been more reluctant to again choose that unfamiliar object when asked for the referent of a novel name. Instead, the child might have ignored the request, or in confusion pointed to one of the familiar objects. The finding of a high correlation, among the bilinguals and also among the younger monolinguals, between the number of failures to retrieve familiar items and the number of no strategy trials supports the notion that it was the nonindependent nature of the two types of requests which accounted for the high rate of no strategy trials.

This scenario also provides an explanation for the fact that bilinguals gave more such no strategy responses. The bilinguals missed more familiar items (usually in their non-dominant language but also in their dominant language), most likely because they had lower exposure than the monolinguals to each of their two languages, and sometimes had a fair degree of imbalance between their

languages. Hence, by committing more errors on familiar items, the bilinguals were also more likely to give no strategy responses. Thus, although the familiar items chosen for inclusion in this study were generally appropriate for monolingual children, bilinguals may not have recognized the labels for these objects in both languages, and their lack of knowledge likely influenced their behaviour on the task as a whole. Future experiments with bilingual children in this young age range should be modified to minimize this type of noise in the tasks. One solution would be to arrange a pretest to assure children's comprehension of the terms in both languages for the specific familiar items to be used. For each child, perhaps a subset of items with well-understood names could then be chosen for inclusion in the experimental task. This process would ensure that subsequent requests for familiar items truly represent a test of children's abilities to respond to the task demands, rather than a test of their comprehension of the specific familiar items.

Classification of Children as Bilingual

Recall that in this study, three different measures of bilingualism were available: parental report on degree of exposure to each language, parental report of vocabulary production in each language using the *CDI*, and children's receptive skills in each language as demonstrated by their response to familiar items on the Dual-Language ME Task. The results of this study suggest that comprehension and production ability in the children's non-dominant language were strongly related. At the same time, however, there were several children whose non-dominant language production lagged considerably behind their

dominant language, but they were still able to demonstrate adequate comprehension skills in their non-dominant language. The implication of these results for experimental studies of bilingual children under the age of 3 years is that comprehension skills should be formally assessed and included as a criterion for bilingual status. In this study, it was simply fortuitous that responses to requests for familiar items were available to be used as a rough measure of comprehension. Future studies should build a comprehension test into the design as a screening device for bilingual participation.

In a similar vein, if language production data are to be used in part to establish bilingual status, then the possibility of using a short language production screening measure should be considered. Short forms of the *CDI* are now becoming available in English (Fenson, Pethick, Renda, Dale, & Reznick, 1998). A similar short form could be adapted for use in the second language, allowing for the administration of two forms to parents of bilinguals over the telephone. Parental report of both production and exposure prior to participation in the study would allow for an initial assessment of the relative strength of each of the child's languages, and could assist the experimenter in making an initial judgment regarding eligibility for the study.

Recommendations for Replication

Given the finding of no differences between monolingual and bilingual groups in this study, the possible implications of null results should be borne in mind. While the findings lend themselves to reasonable interpretation at the theoretical level, it is also possible that they indicate a failure of the tasks to tap

differences which truly existed between the groups. Given that the present study represents the first attempt to assess the mutual exclusivity principle in bilingual children younger than 3.5 years, replication of the study is warranted.

Several modifications would serve to strengthen a replication, if it were to be undertaken for the reasons outlined above. First, for reasons noted earlier, the range of age should be extended to include a third group, at approximately 45 months of age. Second, a replication should avoid the confound of experimenter with bilingual language dominance. While this variable was not found to predict differences between the groups in the present study, the confound should be eliminated in case this variable was found to play a role in another study. In a modified replication of this study, then, two absolutely fluently bilingual adults should be chosen as experimenters, and then children should be randomly assigned to the two experimenters. Thus, each experimenter, when in the role of Experimenter 1, would be required to speak the language that was deemed to be dominant for the child in question.

As a final note, recall that socio-economic status (SES) differences were found between the groups in this study, with bilingual children showing higher SES than monolinguals, and younger children showing slightly higher SES than older children. These SES differences did not appear to have a significant impact on the results of the study. Bilinguals did not show any advantage over monolinguals on tasks tapping what might be considered to be specific developmental processes, such as perspective-taking and fast mapping. Similarly, while one might have expected the two age groups to perform similarly

on the tasks due to the increased SES of the younger children, developmental differences were typically found instead. The exception is the fast mapping task, and it remains possible that had SES been more equal between the two age groups, the older children would have demonstrated greater success than the younger children on this task. Thus, in a modified replication of this study, an additional option to be considered is the matching of participants on SES in order to ensure equality of the groups.

Summary and Conclusions

Bilingual children, by virtue of their experience with the dual naming of objects, provide a unique window into the flexibility of the mutual exclusivity principle. The main purpose of this study was to compare young monolingual and bilingual children's responses to violation of mutual exclusivity. This study constituted the first attempt to investigate adherence to mutual exclusivity in bilinguals under the age of 3.5 years. The data it generated on adherence to the principle in young children shed light on the strength of the principle, its flexibility, and the degree to which it might truly reflect a word-learning constraint.

The results of the study suggested that bilinguals treated violation of mutual exclusivity within a language no differently than monolinguals did. Both groups allowed more violations of mutual exclusivity at 27 months, and honoured the principle more at 35 months. In addition, bilingual children at each age treated violation of mutual exclusivity across languages in the same way as they did within languages. The similarity of the developmental pattern seen here in the bilinguals and in the monolinguals, along with the bilinguals' similar treatment of

cross-language violations despite long-time exposure to dual labelling practices, support the notion that the mutual exclusivity principle reflects a constraint on word-learning which is fairly strong, and fairly impervious to contradictory information. It does remain possible, of course, that the results reflect children's behaviour only as it applies to a short-lived and artificial experimental situation, and do not reflect their typical responses in their daily lives. Nevertheless, these data are significant in that they reflect children's front-line responses to a new word-learning situation.

An additional contribution of this study was the demonstration that adherence to mutual exclusivity increased between the ages of 27 and 35 months, a developmental sequence which provides support for Merriman's (1986b; Merriman & Bowman, 1989) hypothesis that the mutual exclusivity bias gains in strength between the ages of 2 and 3 years. The fairly dedicated manner in which adherence seems to develop over time between these ages, even for bilinguals, suggests that the principle is likely not a strong factor in the earliest stages of word-learning, but is more useful to children as an aid in rapidly expanding their vocabulary at an age closer to 3 years.

The present investigation of mutual exclusivity in bilinguals under 3 years of age was also useful in allowing for a comparison with the results for older bilingual children, thus expanding our understanding of the developmental sequence in adherence to the principle among bilinguals. The results of the present study, in combination with the results of Au and Glusman (1990) and Merriman and Kutlesic (1993), suggest a U-shaped function for adherence. That

is, around the age of 2 years, bilingual children may tolerate violation of mutual exclusivity both within and across languages; at just under 3 years they honour mutual exclusivity across languages, as they do within languages and as do monolinguals; and beginning at age 3.5 or 4 years, they make a distinction between violations within and across languages, honouring mutual exclusivity only within a language. It may be that after the age of 3, bilingual children can finally use their experience with two languages to make the important distinction between violations of mutual exclusivity within and across languages.

The question of the origins of the mutual exclusivity principle continues to be a source of debate among researchers. The general perspective in the area of word-learning principles has been that their development is intrinsic to the child, and does not grow out of social experience with language per se. The implication of this position is that such principles are innate rather than learned. Much of the debate regarding mutual exclusivity to date has thus centered on the age of onset of the principle, as a marker of its nature and origins. Markman (1992), however, has pointed out that the particular age of onset of a principle does not necessarily speak to the question of whether it is innate or learned; innate abilities can be late emerging, and learned abilities can be acquired early. She has also raised the possibility that enough exposure to language might be required to trigger the operation of a particular principle. Thus, determining the origins, whether innate or learned, of the mutual exclusivity principle (and of other principles) is a complex affair. While the principle might indeed grow out of children's experience with word-learning, some of the evidence from the present study, namely that

bilinguals at 35 months of age honoured mutual exclusivity despite a good deal of word-learning experience with dual labelling, does point to a greater role for innate or maturational factors. Thus, an important goal for continued investigation in this area would be to elucidate just how mutual exclusivity develops in the context of a bilingual child's daily life, and not only in the laboratory. Of interest is whether bilinguals do maintain adherence to mutual exclusivity over the course of their daily lives and to what degree, and how difficult it is to maintain adherence to the principle in the face of dual labelling.

Another area of research which may contribute to an understanding of the origins of mutual exclusivity is the consideration of caregiver input factors. Callanan, Sabbagh, and Neilson (1994) as well as Perez, Barajas, and Goldberg (1995) have begun to explore changes over time in caregivers' use of multiple labels to children. A profitable future avenue of exploration might be the relationship between such multiple labelling tendencies and children's adherence to mutual exclusivity. It will be necessary, however, to find ways to address the directionality of such relationships. That is, it would have to be determined whether children independently develop adherence to mutual exclusivity which then drives their parents' labelling behaviour, or whether parental labelling practices contribute to the development of this principle.

To date, of necessity, research in the relatively new area of lexical principles has focused primarily on characterizing the principles, delineating their developmental sequence, and exploring the consequences of their use on children's word development. Accordingly, few theorists have attempted to

provide possible explanations of the mechanism of their development. In one recent account, however, Merriman and Stevenson (1997) outline how the mutual exclusivity bias might be the outcome, or byproduct, of a word-learning model which is based on the way the strengths of cues for words change with experience, combined with rules for choosing between categories of stimuli. As such, the authors suggest, adherence to mutual exclusivity may not reflect children's overt reasoning that because an object has one name it cannot have another, but rather may reflect the unconscious consequences of category retrieval processes. Attempts such as these to explore possible mechanisms accounting for mutual exclusivity and other lexical principles will carry us further along the road toward understanding young children's tremendous word-learning feat.

REFERENCES

Au, T.K., & Glusman, M.. (1990). The principle of mutual exclusivity in word learning: To honor or not to honor? Child Development, 61, 1474-1490.

Baldwin, D.A. (1992). Clarifying the role of shape in children's taxonomic assumption. Journal of Experimental Child Psychology, 54, 392-416.

Baldwin, D.A., & Moses, L.M.. (1994). Early understanding of referential intent and attentional focus: Evidence from language and emotion. In C. Lewis & P. Mitchell (Eds.), Children's Early Understanding of Mind: Origins and Development (pp. 133-156). Hove, England: Erlbaum.

Barrett, M.D. (1978). Lexical development and overextension in child language. Journal of Child Language, 5, 205-219.

Bayley, N. (1969). Bayley scales of infant development. New York, Psychological Corporation.

Benedict, H. (1979). Early lexical development: Comprehension and production. Journal of Child Language, 6, 183-200.

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

Bialystok, E. (1991). Metalinguistic dimensions of bilingual language proficiency. In E. Bialystok (Ed.), Language Processing in Bilingual Children. Cambridge, UK: Cambridge University Press.

Bialystok, E. (1992). Selective attention in cognitive processing: The bilingual edge. In R.J. Harris (Ed.), Cognitive Processing in Bilinguals. Advances in Psychology, 83, 501-513.

Blishen, B.R., Carroll, W.K., & Moore, C. (1987). The 1981 socioeconomic index for occupations in Canada. Canadian Review of Sociology and Anthropology, 24 (4), 465-488.

Bloom, L. (1973). One word at a time: The use of single word utterances before syntax. The Hague: Mouton.

Bloom, L. (1993). The transition from infancy to language: Acquiring the power of expression. Cambridge, UK: Cambridge University Press.

Bruner, J. (1990). Acts of meaning. Cambridge, MA: Harvard University Press.

Callanan, M., Sabbagh, M., & Neilson, J. (1994, June). Parents' multiple labels in speech to infants and toddlers. Paper presented at the International Conference for Infant Studies, Paris, France.

Camaioni, L., Caselli, M.C., Longobardi, E., & Volterra, V. (1990). Construction and validation of a parent report instrument for assessing communicative and linguistic development in the second year of life. Paper presented at the fifth International Congress for the Study of Child Language, Budapest, Hungary.

Carey, S. (1978). The child as word learner. In M. Halle, J. Bresnan, & G.A. Miller (Eds.), Linguistic Theory and Psychological Reality (pp. 264-293). Cambridge, MA: MIT Press.

Cartwright, K.B., Behrend, D.A., & Wilcox, S.A. (1997). Mutual Exclusivity and theory of mind: Does the mutual exclusivity bias require one representation or two? Unpublished manuscript, University of Arkansas.

Clark, E.V. (1983a). Convention and contrast in acquiring the lexicon. In T.B.

Seiler & W. Wannenmacher (Eds.), Concept Development and the Development of Word Meaning (pp. 67-89). New York: Springer.

Clark, E.V. (1987). The principle of contrast: A constraint on language acquisition. In B. MacWhinney (Ed.), The 20th Annual Carnegie Symposium on Cognition (pp. 1-33). Hillsdale, NJ: Erlbaum.

Clark, E.V. (1993). The lexicon in acquisition. Cambridge, UK: Cambridge University Press.

Cummins, J. (1978). Bilingualism and the development of metalinguistic awareness. Journal of Cross-Cultural Psychology, 9, 131-149.

Cummins, J. (1987). Bilingualism, language proficiency, and metalinguistic development. In P. Homel, M. Palij, & D. Aaronson (Eds.), Childhood Bilingualism: Aspects of Linguistic, Cognitive, and Social Development. Hillsdale, NJ: Erlbaum.

Dale, P.S. (1991). The validity of a parent report measure of vocabulary and syntax at 24 months. Journal of Speech and Hearing Sciences, 34, 565-571.

Davidson, D., Jergovic, D., Imami, Z., & Theodos, V. (1997). Monolingual and bilingual children's use of the mutual exclusivity constraint. Journal of Child Language, 24, 3-24.

De Houwer, A. (1990). The acquisition of two languages from birth: A case study. Cambridge, UK: Cambridge University Press.

De Houwer, A. (1995). Bilingual language acquisition. In P. Fletcher & B. MacWhinney (Eds.), The Handbook of Child Language. Cambridge, MA:

Blackwell.

DeWitt, J.E. (1995, April). How a word-learning principle might interact with metalinguistic knowledge and input: Bilingual preschoolers' use of the mutual exclusivity assumption. Poster session presented at the Biennial Meeting of the Society for Research in Child Development, Indianapolis.

Dromi, E. (1986). The one-word period as a stage in language development: Quantitative and qualitative accounts. In I. Levin (Ed.), Stage and Structure: Reopening the Debate (pp. 220-245). Norwood, NJ: Ablex.

Dudley, J., & Delage, J. (1978). Tests de langage Dudley/Delage: Manuel de l'examinateur (DD2). St. Lambert, Québec: Editions de l'ABC.

Dunn, L.M. (1965). Peabody Picture Vocabulary Test. Minnesota: American Guidance Service Inc.

Fenson, L., Dale, P.S., Reznick, J.S., Thal, D., Bates, E., Hartung, J.P., Pethick, S., & Reilly, J.S. (1991). Technical Manual for the MacArthur Communicative Development Inventories. San Diego State University.

Fenson, L., Dale, P.S., Reznick, J.S., Bates, E., Thal, D.J., & Pethick, S.J. (1994). Variability in early communicative development. Monographs of the Society for Research in Child Development, 59 (5, Serial No. 242).

Fenson, L., Pethick, S., Renda, C., Dale, P.S., & Reznick, J.S. (1998, April). Normative data for the short form versions of the MacArthur Communicative Development Inventories. Poster session presented at the biennial conference of the International Society on Infant Studies, Atlanta, Georgia.

Fisher, C., Hall, D.G., Rakowitz, S., & Gleitman, L. (1994). When it is better to receive than to give: Syntactic and conceptual constraints on vocabulary growth. Lingua, 92, 333-375.

Flavell, J.H., Botkin, P., Fry, C., Wright, J., & Jarvis, P. (1968). The Development of Role-Taking and Communication Skills in Children. New York, NY: John Wiley and Sons.

Flavell, J.H., Everett, B., Croft, K., & Flavell, E.R. (1981). Young children's knowledge about visual perception: Further evidence for the Level 1-Level 2 distinction. Developmental Psychology, 17, 99-103.

Flavell, J.H., Shipstead, S.G., & Croft, K. (1978). Young children's knowledge about visual perception: Hiding objects from others. Child Development, 49, 1208-1211.

Gathercole, V.C. (1987). The contrastive hypothesis for the acquisition of word meaning: A reconsideration of the theory. Journal of Child Language, 14, 493-531.

Gelman, S.A., & Taylor, M. (1984). How two-year-old children interpret proper and common names for unfamiliar objects. Child Development, 55, 1535-1540.

Genesee, F. (1989). Early bilingual development: One language or two? Journal of Child Language, 16, 161-179.

Gérard, C., & Jenkins, C. (1994). Méthodes d'évaluation du langage oral chez les enfants de zéro à trois ans [Methods for assessing language development in children aged between 0 and 3 years]. Approche Neuropsychologique des Apprentissages Chez l'Enfant, 6 (1), 11-16.

Gleitman, L. (1990). The structural sources of verb meanings. Language Acquisition, 1, 3-55.

Goldfield, B.A., & Reznick, J.S. (1990). Early lexical acquisition: Rate, content, and the vocabulary spurt. Journal of Child Language, 17 (1), 171-183.

Goldfield, B.A., & Reznick, J.S. (1996). 'Measuring the vocabulary spurt: A reply to Mervis and Bertrand'. Journal of Child Language, 23, 241-246.

Golinkoff, R.M., Hirsh-Pasek, K., Bailey, L.M., & Wenger, N.R. (1992). Young children and adults use lexical principles to learn new nouns. Developmental Psychology, 28 (1), 99-108.

Golinkoff, R.M., Mervis, C.B., & Hirsh-Pasek, K. (1994). Early object labels: The case for a developmental lexical principles framework. Journal of Child Language, 21 (1), 125-155.

Goodz, N.S. (1989). Parental language mixing in bilingual families. Infant Mental Health Journal, 10 (1), 25-44.

Graham, S.A., Poulin-Dubois, D., & Baker, R.K. (in press). Infants' disambiguation of novel object words. First Language.

Hall, D.G. (1991). Acquiring proper names for familiar and unfamiliar objects: Two-year-olds' word learning biases. Child Development, 62, 1142-1154.

Harris, M., Jones, D., Brookes, S., & Grant, J. (1986). Relations between non-verbal context of maternal speech and rate of language development. British Journal of Developmental Psychology, 4, 21-30.

Huttenlocher, J. (1974). The origins of language comprehension. In R. Solso (Ed.), Theories in Cognitive Psychology (pp. 331-368). Hillsdale, NJ:

Erlbaum.

Imai, M., Gentner, D., & Uchida, N. (1994). Children's theories of word meaning: The role of shape similarity in early acquisition. Cognitive Development, 9, 45-75.

Jackson-Maldonado, D., Thal, D., Marchman, V., Bates, E., & Gutierrez-Clellen, V. (1993). Early lexical development in Spanish-speaking infants and toddlers. Journal of Child Language, 20, 529-549.

Katz, N., Baker, E., & Macnamara, J. (1974). What's in a name? A study of how children learn common and proper nouns. Child Development, 45, 469-473.

Leopold, W.P. (1939). Speech development of a bilingual child: A linguist's record: Vol. 1. Vocabulary growth in the first two years. Evanston, Ill.: Northwestern University Press.

Leopold, W.P. (1949). Speech development of a bilingual child: A linguist' record: Vol. 3. Grammar and general problems in the first two years. Evanston, Ill.: Northwestern University Press.

Liittschwager, J.C., & Markman, E.M. (1994). Sixteen and 24-month-olds' use of mutual exclusivity as a default assumption in second label learning. Developmental Psychology, 30, 955-968.

Lyytinen, P., Lari, N., Lausvaara, A., & Poikkeus, A.M. (1994). Lasten varhaisen sanaston ja kommunikonnin arviointi. [Assessment of early lexical and communicative development]. Psykologia, 29 (4), 244-252.

MacWhinney, B. (1991). The CHILDES Project: Tools for Analysing Talk.

Hillsdale, NJ: Erlbaum.

MacWhinney, B., & Snow, C. (1985). The child language data exchange system. Journal of Child Language, 12, 271-296.

MacWhinney, B., & Snow, C. (1990). The child language data exchange system: An update. Journal of Child Language, 17, 457-472.

Malakoff, M., & Hakuta, K. (1991). Translation skill and metalinguistic awareness in bilinguals. In E. Bialystok (Ed.), Language Processing in Bilingual Children. Cambridge, UK: Cambridge University Press.

Markman, E.M. (1984). The acquisition and hierarchical organization of categories by children. In C. Sophian (Ed.), Origins of Cognitive Skills (pp. 371-406). Hillsdale, NJ: Erlbaum.

Markman, E.M. (1987). How children constrain the possible meanings of words. In U. Neisser (Ed.), Concepts and Conceptual Development: Ecological and intellectual factors in categorization (pp. 255-287). Cambridge, UK: Cambridge University Press.

Markman, E.M. (1989). Categorization and naming in children: Problems of induction. Cambridge, MA: MIT Press.

Markman, E.M. (1991). The whole object, taxonomic, and mutual exclusivity assumptions as initial constraints on word meanings. In J.P. Byrnes & S.A. Gelman (Eds.), Perspectives on language and cognition: Interrelations in development (pp. 72-106). Cambridge, UK: Cambridge University Press.

Markman, E.M. (1992). Constraints on word learning: Speculations about their nature, origins, and domain specificity. In M.R. Gunnar & M.P. Maratsos

(Eds.), Minnesota Symposium on Child Psychology: Vol. 25. Hillsdale, NJ: Erlbaum.

Markman, E.M., & Hutchinson, J.E. (1984). Children's sensitivity to constraints on word meaning: Taxonomic vs. thematic relations. Cognitive Psychology, 16, 1-27.

Markman, E.M., & Wachtel, G.F. (1988). Children's use of mutual exclusivity to constrain the meanings of words. Cognitive Psychology, 20, 121-157.

Masangkay, Z.S., McCluskey, K.A., McIntyre, C.W., Sims-Knight, J., Vaughn, B.E., & Flavell, J.H. (1974). The early development of inferences about the visual percepts of others. Child Development, 45, 357-366.

Merriman, W.E. (1986b). Some reasons for the occurrence and eventual correction of children's naming errors. Child Development, 57, 942-952.

Merriman, W.E. (1987, April). Lexical contrast in toddlers: A reanalysis of the diary evidence. Paper presented at the biennial meetings of the Society for Research in Child Development, Baltimore, MD.

Merriman, W.E., & Bowman, L.L. (1989). The mutual exclusivity bias in children's word learning. Monographs of the Society for Research in Child Development, 54 (3-4, Serial No. 220).

Merriman, W.E., & Kutlesic, V. (1993). Bilingual and monolingual children's use of two lexical acquisition heuristics. Applied Psycholinguistics, 14 (2), 229-249.

Merriman, W.E., Marazita, J., & Jarvis, L.H. (1993a, March). On learning two names for the same thing: The impact of mutual exclusivity violation on

two-year-olds' attention and learning. Poster session presented at the biennial meeting of the Society for Research in Child Development, New Orleans, LA.

Merriman, W.E., Marazita, J., & Jarvis, L.H. (1993b). Four-year-olds' disambiguation of action and object word reference. Journal of Experimental Child Psychology, 56 (3), 412-430.

Merriman, W.E., & Schuster, J.M. (1991). Young children's disambiguation of object name reference. Child Development, 62 (6), 1288-1301.

Merriman, W.E., & Stevenson, C.M. (1997). Restricting a familiar name in response to learning a new one: Evidence for the mutual exclusivity bias in young two-year-olds. Child Development, 68 (2), 211-228.

Morisset, C.E., Barnard, K.E., Greenberg, M.T., Booth, C.L., & Spieker, S.J. (1990). Environmental influences on early language development: The context of social risk. Development and Psychopathology, 2 (2), 127-149.

Mervis, C.B., & Bertrand, J. (1994). Acquisition of the novel name-nameless category (N3C) principle. Child Development, 65 (6), 1646-1662.

Naigles, L.G., Fowler, A., & Helm, A. (1992). Developmental shifts in the construction of verb meanings. Cognitive Development, 7, 403-427.

Nelson, K. (1973). Structure and strategy in learning to talk. Monographs of the Society for Research in Child Development, 38 (1-2, Serial No. 149).

Nelson, K. (1988). Constraints on word learning? Cognitive Development, 3, 221-246.

Ogura, T., & Murase, Y. (1991). Communicative Development Inventory.

Congress of Japanese Developmental Psychology, Tokyo, Shimane University, Matsue.

Pearson, B.Z., Fernandez, S.C., & Oller, D.K. (1993). Lexical development in bilingual infants and toddlers: Comparison to monolingual norms. Language Learning, 43 (1), 93-120.

Pearson, B.Z., Fernandez, S., & Oller, D.K. (1995). Cross-language synonyms in the lexicons of bilingual infants: One language or two? Journal of Child Language, 22 (2), 345-368.

Perez, D.R., Barajas, N., & Goldberg, J. (1995, March). Parents' multiple label use in conversations with their young children: Exploring mutual exclusivity in Mexican-descent families. Paper presented at the biennial meeting of the Society for Research in Child Development, Indianapolis, Indiana.

Piaget, J. (1926). The Language and Thought of the Child. New York: Harcourt, Brace.

Poulin-Dubois, D., Frank, I., Graham, S.A., & Elkin, A. (in press). The role of shape similarity in toddlers' lexical extensions. British Journal of Developmental Psychology.

Poulin-Dubois, D., Graham, S.A., & Sippola, L. (1995). Early lexical development: The contribution of parental labelling and infants' categorization abilities. Journal of Child Language, 22 (2), 325-343.

Pye, C. (1986). One lexicon or two? An alternative interpretation of early bilingual speech. Journal of Child Language, 13 (3), 591-593.

Rosch, E., Mervis, C.B., Gray, W.D., Johnson, D.M., & Boyes-Braem, P. (1976).

Basic objects in natural categories. Cognitive Psychology, 8, 382-439.

Rosenblum, T., & Pinker, S.A. (1983). Word magic revisited: Monolingual and bilingual children's understanding of the word-object relationship. Child Development, 54, 773-780.

Savage, S., & Au, T.K. (1996). What word learners do when input contradicts the mutual exclusivity assumption. Child Development, 67, 3120-3134.

Slobin, D.I. (1973). Cognitive prerequisites for the development of grammar. In C.A. Ferguson & D.I. Slobin (Eds.), Studies of Child Language Development (pp. 175-208). New York: Holt, Rinehart, & Winston.

Slobin, D.I. (1978). A case study of early language awareness of a bilingual. In A. Sinclair, R.J. Jarvella, & W.J.M. Levelt (Eds.), The Child's Conception of Language. New York: Springer-Verlag.

Slobin, D.I. (1985). Crosslinguistic evidence for the language making capacity. In D.I. Slobin (Ed.), The Crosslinguistic Study of Language Acquisition: Vol. 2. Theoretical Issues (pp. 1157-1256). Hillsdale, NJ: Erlbaum.

Smith, C.B., Adamson, L.B., & Bakeman, R. (1988). Interactional predictors of early language. First Language, 8, 143-156.

Sparrow, S.S., Balla, D.A., & Cichetti, D.V. (1984). Vineland Adaptive Behavior Scales. Circle Pines, Minnesota: American Guidance Service.

Tabachnick, B.G., & Fidell, L.S. (1983). Using Multivariate Statistics. New York: Harper & Row.

Taylor, M., & Gelman, S.A. (1989). Incorporating new words into the lexicon: Preliminary evidence for language hierarchies in two-year-old children.

Child Development, 60, 625-636.

Tomasello, M., & Todd, J. (1983). Joint attention and lexical acquisition style. First Language, 4, 197-212.

Tomasello, M., Mannle, S., & Kruger, A.C. (1986). Linguistic environment of 1- to 2-year-old twins. Developmental Psychology, 22, 169-176.

Trudeau, N., Frank, I., & Poulin-Dubois, D. (in press). Une adaptation en français québecois du MacArthur communicative development inventory. Journal of Speech Language Pathology and Audiology.

Vihman, M.M. (1985). Language differentiation by the bilingual infant. Journal of Child Language, 12 (2), 297-324.

Vihman, M.M. (1986). More on language differentiation. Journal of Child Language, 13 (3), 595-597.

Volterra, V., & Taeschner, T. (1978). The acquisition and development of language by bilingual children. Journal of Child Language, 5 (2), 311-326.

Vygotsky, L.S. (1978). Mind in Society. Cambridge, MA: MIT Press.

Waxman, S.R., & Kosowski, T.D. (1990). Nouns mark category relations: Toddlers' and preschoolers' word-learning biases. Child Development, 61, 1461-1490.

Woodward, A.L. (1992). The Role of the Whole Object Assumption in Early Word Learning. Doctoral dissertation, Stanford University, Stanford, CA.

Woodward, A.L., & Markman, E.M. (1998). Early word learning. In W. Damon, D. Kuhn, & R. Siegler (Eds.), Handbook of Child Psychology, Vol. 2: Cognition, Perception, and Language (pp. 371-420). New York: Wiley.

Appendix A

Questionnaire for Determining Language Exposure

Date of Coversation:_____

Name of Child:_____ Date of Birth:_____

Mother's Name:_____

Father's Name:_____

Address:_____

_____

Phone Number:_____

Time child wakes up:_____ Time child in bed:_____

Time napping per day:_____Total waking hours per day:_____

Language(s) spoken to child:	***Percentage of time child spends with this person (or at this place) during a typical week:***
Mother:_____	_____
Father:_____	_____
Babysitter:_____	_____
Daycare:_____	_____
Other:_____	_____

Age started hearing English:_____

Age started hearing French:_____

Total percentage English:_____

Total percentage French:_____

Appendix B

ANOVA Source Tables

Table 1

Source Table for Socio-Economic Status: Age Group x Lingual Group ANOVA

Source of Variation	SS	DF	MS	F	p
Between-Subjects Effects					
Within Cells	32187.61	120	268.23		
Age Group	1072.37	1	1072.37	4.00	.048
Lingual Group	3376.73	1	3376.73	12.59	.001
Age Group x Lingual Group	4.17	1	4.17	.02	.901

Table 2

Source Table for Trials Honored on Same-Language ME Task: Age Group x Lingual Group ANOVA

Source of Variation	SS	DF	MS	F	p
Between-Subjects Effects					
Within Cells	123.71	109	1.13		
Age Group	23.07	1	23.07	20.33	.000
Lingual Group	.97	1	.97	.86	.356
Age Group x Lingual Group	.35	1	.35	.30	.582

Table 3

Source Table for Trials Violated in Same-Language ME Task: Age Group x Lingual Group ANOVA

Source of Variation	SS	DF	MS	F	p
Between-Subjects Effects					
Within Cells	142.69	109	1.31		
Age Group	9.69	1	9.69	7.40	.008
Lingual Group	5.04	1	5.04	3.85	.052
Age Group x Lingual Group	.88	1	.88	.67	.415

Table 4

Source Table for Proportions of Violations in Same-Language ME Task: Age Group x Lingual Group ANOVA

Source of Variation	SS	DF	MS	F	p
Between-Subjects Effects					
Within Cells	11.30	109	.10		
Age Group	1.03	1	1.03	9.97	.002
Lingual Group	.30	1	.02	2.90	.091
Age Group x Lingual Group	.02	1	.02	.19	.661

Table 5

Source Table for Trials Honored on Same-Language and Dual-Language ME Tasks: Age Group x Task ANOVA

Source of Variation	SS	DF	MS	F	p
Between-Subjects Effects					
Within Cells	61.00	49	1.24		
Age Group	15.02	1	15.02	12.07	.001
Within-Subjects Effects					
Within Cells	48.40	49	.99		
Task	.09	1	.09	.09	.768
Age Group x Task	.01	1	.01	.01	.926

Table 6

Source Table for Trials Violated on Same-Language and Dual-Language ME Tasks: Age Group x Task ANOVA

Source of Variation	SS	DF	MS	F	p
Between-Subjects Effects					
Within Cells	49.31	49	1.01		
Age Group	6.77	1	6.77	6.73	.012
Within-Subjects Effects					
Within Cells	36.08	49	.74		
Task	2.00	1	2.00	2.71	.106
Age Group x Task	2.00	1	2.00	2.71	.106

Table 7

Source Table for Proportions of Violations on Same-Language and Dual-Language ME Tasks: Age Group x Task ANOVA

Source of Variation	SS	DF	MS	F	p
Between-Subjects Effects					
Within Cells	4.33	46	.09		
Age Group	.80	1	.80	8.50	.005
Within-Subjects Effects					
Within Cells	3.43	46	.07		
Task	.04	1	.04	.60	.442
Age Group x Task	.15	1	.15	2.05	.159

Table 8

Source Table for Success on Mapping Trials of Fast Mapping Task: Age Group x Lingual Group ANOVA

Source of Variation	SS	DF	MS	F	p
Between-Subjects Effects					
Within Cells	60.95	109	.56		
Age Group	1.38	1	1.38	2.46	.119
Lingual Group	.02	1	.02	.04	.844
Age Group x Lingual Group	.34	1	.34	.61	.436

Table 9

Source Table for Success on Mapping and Generalization Trials of Fast Mapping Task: Age Group x Lingual Group ANOVA

Source of Variation	SS	DF	MS	F	p
Between-Subjects Effects					
Within Cells	181.96	109	1.67		
Age Group	6.54	1	6.54	3.92	.050
Lingual Group	2.13	1	2.13	1.27	.261
Age Group x Lingual Group	.38	1	.38	.23	.634

Table 10

Source Table for Perspective-Taking Task: Age Group x Lingual Group ANOVA

Source of Variation	SS	DF	MS	F	p
Between-Subjects Effects					
Within Cells	376.62	120	3.69		
Age Group	78.76	1	78.76	21.33	.000
Lingual Group	.13	1	.13	.03	.854
Age Group x Lingual Group	6.15	1	6.15	1.67	.200

Appendix C

English and French Parental Consent Forms

Parental Consent Form

Child's name:_____ Birthdate: _____

Gender: _____ Weeks at Birth: _____ Birth order: _____

Mother's name: _____ Father's name: _____

Mother's occupation: _____ Father's occupation: _____

Mother's education: _____ Father's education: _____

Mother's marital status: _____ Father's marital status: _____

Address: _____ Telephone: _____(home)

_____ _____(work)

Postal Code: _____ _____(work)

Languages Spoken at Home: _____

In this study, we are examining children's cognitive and language development. We will administer four different tasks. In two tasks we will assess language by showing the children new and familiar objects, and teaching words for them. In a third task, we will use pictures of familiar items to assess children's perspective-taking abilities. A fourth task uses toys to assess children's imitation behaviour. The sessions will be videotaped and all data collected will be kept confidential.

Diane Poulin-Dubois, Ph.D. Ilana Frank, M.A. Maxime Gagnon, Hon. student

The nature and purpose of this study have been satisfactorily explained to me and I agree to allow my child to participate. I understand that we are free to discontinue participation at any time and that the experimenters will gladly answer any questions that might arise during the course of the research.

I would be interested in being contacted regarding future studies with my child at Concordia's Centre for Research in Human Development (yes/no): _____

_____ _____

Parent's signature Date

Subject #: _____ Researcher: _____

Formulaire de Consentement

Nom de l'enfant:_____ Date de naissance: _____

Sexe: _____ Semaines à la naissance: _____ Ordre de naissance: _____

Nom de la mère: _____ Nom du père: _____

Occupation de la mère: _____ Occupation du père: _____

Éducation de la mère: _____ Éducation du père: _____

Statut marital de la mère: _____ Statut marital du père: _____

Adresse: _____ Téléphone: _____(home)

_____ _____(work)

Code postal: _____ _____(work)

Langues parlées à la maison: _____

Au cours de cette étude nous étudions le developement cognitif et le developement du langage chez les enfants. Nous administerons 4 tâches différentes. Deux de ces tâches évalueront le langage en présentant aux enfants des objets nouveaux ainsi que des objets familiers et en leur enseignant de nouveaux mots pour les désigner. Une troisième tâche utilisera des jouets pour évaluer le comportement imitatif des enfants. Chaque session sera filmée et toutes les données accumulées seront tenues confidentielles.

Diane Poulin-Dubois, Ph.D. Ilana Frank, M.A. Maxime Gagnon, étud. au B.A.

Le but et le ("nature") de cette étude m'ont été expliqué de facon satisfaisante et j'ccepte d'autoriser mon enfant à y participer. Je comprends que nous sommes libres d'interrompre notre participation à tout moment et que les chercheurs répondront avec plaisir à toute(s) question(s) qui pourrai(en)t être soulevée(s) au cours de la session de recherche.

Je serais intéressé(e) à être contacté(e) de nouveau pour participer avec mon enfant à de futures études au Centre de Recherche en Développement Humain (oui/non): ____

Signature du parent Date

de sujet: _____ Chercheur: _____

Appendix D

Videotape Coding Instructions

Mutual Exclusivity and Fast Mapping Tasks

When asked for an object:

If child insists they don't know, or points to an imaginary object, or says it's in the bag, code as **NO CHOICE** on all trials.

If child touches or points to one object but then touches, gives, or points to another, go with their first choice. Observe this rule unless child adds a verbal emphasis like "ici" or "ca" to their second choice, or repeats the name requested. In this case, accept the second choice. If the child gives verbal emphasis to both choices, accept the first.

If child responds INCORRECTLY to a FAMILIAR item, e.g. sock, but parent makes clear that child knows "stocking" or "socks" plural or "chaussettes" instead and child then responds correctly to the familiar word, code as **PASS**.

If child chooses the wrong object but names it by its appropriate name, score the child's **SECOND** choice after being asked again by the experimenter. If the child was not asked again by the experimenter, score as **MISSING**.

If the child points to or touches an object and is then asked by the experimenter to respond again, go with the original point if it seems to be a clear and deliberate choice.

If child names the target object spontaneously but fails to choose it when asked, score as **FAIL**.

If child reaches and chooses an object just as it's being asked for, code as **MISSING**.

If child gives object to parent instead of to experimenter, code as usual.

If a parent is clearly cueing the child toward a particular object, code as **MISSING.**

Perspective-Taking Task

All Trials:

Be sure to take first meaningful response based on criteria below. Do not change responses based on a repeat administration of an item, unless task has at first been refused by the child.

Score as **task refusal** if child ignores picture, pushes it away, gives it to parent, etc. If child looks at the picture, points or names it, or holds it up and looks at it on either side, the child should be considered to be on task.

In cases where the child receives parental help in **first 2 trials or second 2 trials,** such as pointing in the correct general area, asking "what's that", or rephrasing the experimenter's question, code as follows: if the child **passes**, score as a pass but **make note** of the parental help, preferably including what kind of help. If the child **fails**, simply score as fail and make no note of the help.

Second 2 Trials:

If child shows picture to parent instead of to experimenter, score as **FAIL**.

If child turns the picture toward the experimenter but at a less than 180 degree angle, score as **PASS** anyway.

Third 2 Trials:

If the child stares at the wrong picture first, score as **failure**. If child simply glimpses at wrong picture before turning and staring at correct one, score as **pass**. Staring first at the right picture is a **pass**.

If parent intercedes in any way at all to break the task down into component parts for the child, for example saying "what is Ilana looking at?" or "what does the lady see", score as **FAIL** (by reason of parental help) even if child eventually succeeds.

If child responds correctly but asks if they are correct, still score this as a **PASS**.

If child interprets the question as a request to look at the experimenter's picture, score as **FAIL**.

If after employing all of the above criteria you still do not feel a decision can be made, consider the response too ambiguous and score as **FAIL.**

Appendix E

Wording for Administration of Perspective-Taking Task

First 2 Trials:

"LET'S PLAY A GAME!"
For each item, show child both sides of the picture. Try to have child name them, then name them for the child.
Show front view, and ask the child, "WHAT DO YOU SEE IN THE PICTURE?"

After response, ask the child, "WHAT DO I SEE?"

Second 2 Trials:

For each item, show child both sides of the picture. Try to have child name them, then name them for the child.

Say to the child, "SHOW ME THE _____"

Third 2 trials:

Say:

"I HAVE TWO CARDS HERE. I WANT TO SHOW THEM TO YOU. ON THIS SIDE IS A CAR, AND ON THIS SIDE IS A COOKIE. THIS OTHER CARD IS JUST LIKE IT. SEE, HERE'S A CAR, JUST LIKE THIS ONE (hold side by side to demonstrate) AND HERE'S A COOKIE, JUST LIKE THIS ONE.

NOW LET'S PLAY A GAME. ONE CARD WILL BE MINE AND ONE WILL BE YOURS. I'LL LOOK AT MY CARD. YOU TAKE YOUR CARD AND LOOK AT THE SAME PICTURE I'M LOOKING AT.

Appendix F: MacArthur Communicative Development Inventories
(original English version and adapted French version)

Nom de l'enfant_____

Date de naissance_____ Date _____

Inventaire MacArthur du Développement de la Communication: Mots et Énoncés

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Adaptation française réalisée par
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PARTIE 1: MOTS QU'EMPLOIENT LES ENFANTS

A. VOCABULAIRE

Les enfants comprennent bien plus de mots qu'ils n'en produisent. Nous sommes particulièrement intéressés aux mots que **produit** votre enfant. Lisez la liste et indiquez les mots que vous avez entendu votre enfant utiliser. **Dans les cas où plus d'un mot est présenté, veuillez encercler le mot utilisé le plus souvent par votre enfant.** Si votre enfant utilise une prononciation différente pour un mot, par exemple "wawal" pour "cheval" ou "ghetti" pour "spaghetti", ce mot est accepté. Souvenez-vous que cet inventaire est un "catalogue" de tous les mots utilisés par une foule d'enfants divers. Ne vous inquiétez pas si votre enfant n'en connaît que quelques-uns en ce moment.
Veuillez noircir le ○ pour chaque mot qu'utilise votre enfant.

1. EFFETS SONORES ET SONS D'ANIMAUX

aïe ○	grr ○	oh oh ○
bêêê bêêê ○	miam miam ○	oua oua ○
cocorico ○	miaou ○	tchou tchou ○
coin coin ○	meuh ○	vroum ○

2. ANIMAUX (réels ou jouets)

abeille ○	cochon ○	loup ○	pingouin ○
agneau ○	coq ○	mouton ○	poisson ○
alligator/crocodile ○	dinde ○	oie ○	poule ○
âne ○	écureuil ○	oiseau ○	poulet ○
animal ○	éléphant ○	orignal ○	singe ○
bibitte ○	fourmi ○	ours ○	souris ○
canard ○	girafe ○	ourson/nounours ○	tigre ○
chat ○	grenouille ○	panda ○	tortue ○
cheval ○	hibou ○	papillon ○	vache ○
chevreuil ○	lapin ○	petit chien ○	zèbre ○
chien ○	lion ○	petit minou ○	

3. VÉHICULES (réels ou jouets)		
auto ○	camion ○	roue ○
autobus ○	camion de pompier ○	tracteur ○
avion ○	hélicoptère ○	train ○
bateau ○	moto ○	traîneau ○
bicyclette ○	poussette ○	tricycle ○

4. JOUETS			
balle ○	cadeau ○	crayon de couleur ○	livre ○
ballon ○	casse-tête ○	histoire ○	pâte à modeler ○
bâton ○	colle ○	jeu ○	poupée ○
bloc ○	craie ○	jouet ○	stylo ○
bulles ○	crayon ○	lego ○	toutou ○

5. NOURRITURE ET BOISSONS			
banane ○	compote aux pommes ○	melon ○	pouding ○
beigne ○	confiture ○	muffin ○	poulet ○
beurre ○	cornichon ○	noix ○	raisin ○
beurre de pinotte/beurre d'arachide ○	crème glacée ○	nouilles/pâtes ○	raisin sec ○
biscuit ○	crêpe ○	nourriture ○	sandwich ○
biscuit soda ○	eau ○	oeuf ○	sauce ○
blé d'inde ○	fraise ○	orange ○	sel ○
bonbon ○	fromage ○	pain ○	soupe ○
café ○	gâteau ○	patate ○	spaghetti ○
carotte ○	glace ○	patate frite ○	suçon ○
céréale ○	gomme ○	pizza ○	thon ○
cheerios ○	hamburger ○	pois ○	toast ○
chips ○	haricot ○	poisson ○	vanille ○
chocolate ○	jello ○	pomme ○	viande ○
citrouille ○	jus ○	popcorn ○	vitamine ○
coke ○	lait ○	popsicle ○	yogourt ○

6. VÊTEMENTS

bas ○	collier ○	pantalons ○
bavette ○	couche ○	pantoufle ○
bottes ○	espadrille/soulier de course ○	perles/boules ○
bouton ○	foulard ○	petite culotte/culotte ○
ceinture ○	gants ○	pyjama ○
chandail ○	habit de neige ○	robe ○
chapeau ○	jeans ○	shorts ○
chemise ○	manteau ○	soulier ○
collants ○	mitaine ○	zip/fermeture-éclair ○

7. PARTIES DU CORPS

bedaine/ventre ○	genou ○	nombril ○
bobo ○	jambe ○	oreille ○
bouche ○	joue ○	orteil ○
bras ○	langue ○	pénis * ○
cheveux ○	lèvres ○	pieds ○
dent ○	main ○	tête ○
doigt ○	menton ○	vagin/vulve * ○
épaule ○	moustache ○	visage ○
fesses * ○	nez ○	yeux ○

* ou tout autre mot utilisé dans votre famille

8. PETITS ARTICLES MÉNAGERS

argent ○	ciseaux ○	lumière ○	peigne ○	seau ○
aspirateur ○	clés ○	lunettes ○	photo ○	serviette ○
assiette ○	clou ○	marteau ○	plante ○	serviette de table ○
balai ○	couteau ○	médicament ○	plat ○	tasse ○
boîte ○	couverte/couverture ○	montre ○	pot ○	téléphone ○
bol ○	cuillère ○	mouchoir ○	poubelle ○	verre ○
bouteille ○	fourchette ○	mouchoir/kleenex ○	radio ○	vidanges ○
brosse ○	horloge ○	oreiller ○	ruban ○	
brosse à dent ○	image ○	panier ○	sacoche/sac à main ○	
camera ○	lampe ○	papier ○	savon ○	

9. MEUBLES ET PIÈCES

bain ○	évier/lavabo ○	poêle ○
banc ○	fenêtre ○	porte ○
bassinette/berceau ○	four ○	pot ○
chaise ○	foyer ○	salle de bain/toilette ○
chaise berçante ○	frigidaire/frigo ○	salon ○
chaise haute ○	garage ○	sécheuse ○
chambre ○	garde-robe ○	sofa ○
cuisine ○	laveuse ○	sous-sol ○
divan ○	lit ○	table ○
douche ○	marche ○	télévision ○
entrée ○	parc (d'enfant) ○	tiroir ○
escalier ○	pièce ○	

10. CHOSES DE L'EXTÉRIEUR

arbre ○	fleur ○	roche ○
arrosoir ○	gazon ○	rue ○
balançoire ○	glissoire ○	sable ○
bâton ○	jardin ○	soleil ○
bonhomme de neige ○	lune ○	toit ○
ciel ○	neige ○	tondeuse ○
cour ○	nuage ○	trottoir ○
drapeau ○	pelle ○	tuyau/boyau ○
eau ○	pierre ○	vent ○
échelle ○	piscine ○	
étoile ○	pluie ○	

11. ENDROITS OÙ ALLER

campagne ○	église * ○	parc ○
camping ○	ferme ○	pique-nique ○
chez nous ○	fête ○	plage ○
cirque ○	forêt ○	terrain de jeu ○
cour ○	garage ○	travail/bureau ○
dehors ○	magasin ○	zoo ○
école ○	maison ○	

* ou tout autre mot utilisé dans votre famille

12. GENS		
ami ○	garçon ○	oncle/mononcle ○
bébé ○	gardienne ○	papa * ○
bonhomme ○	gens/monde ○	personne ○
clown ○	grand-maman * ○	police ○
cowboy ○	grand-papa * ○	pompier ○
docteur ○	madame ○	professeur(e) ○
enfant ○	maman * ○	soeur ○
facteur ○	monsieur ○	son propre nom ○
fille ○	nom de l'animal domestique ○	tante/matante ○
frère ○	nom du gardien(ne) ○	

* ou tout autre mot utilisé dans votre famille

13. JEUX ET ROUTINES		
aller au magasin ○	dîner ○	non ○
allô ○	dodo ○	okay ○
bain ○	donne moi cinq/tappe dedans ○	oui ○
bonjour ○	faire caca/faire pipi ○	parler(au téléphone) ○
bonne nuit ○	faire le tour de la maison ○	retourne-toi ○
bye/au revoir ○	gros comme ça! ○	s'il-vous-plaît ○
chut ○	je te tiens par la barbichette ○	souper ○
collation ○	j'vais t'attraper ○	tappe tappe ○
coucou ○	menouche menouche ○	
déjeuner ○	merci ○	

14. VERBES D'ACTION

Les enfants utilisent habituellement des verbes pour s'exprimer. Ils peuvent dire, par example, "chanter", "chantons", chantes". Veuillez noircir le cercle correspondant à un verbe si votre enfant utilise au moins une des conjugaisons du verbe.

acheter ○	conduire ○	fermer ○	prendre ○
aider ○	construire/bâtir ○	finir ○	ramasser ○
aimer ○	couper ○	frapper dans les mains ○	regarder ○
aller ○	courir ○	glisser ○	renverser ○
allumer ○	courir aprés ○	goûter ○	réparer ○
amener ○	couvrir ○	grimper ○	rester ○
apporter ○	cracher ○	jeter ○	réveiller ○
arrêter ○	danser ○	jouer ○	sauter ○
arroser ○	débarquer ○	lancer ○	sécher ○
asseoir ○	déchirer ○	laver ○	se dépêcher ○
attacher ○	descendre ○	lécher ○	serrer dans ses bras ○
attendre ○	dessiner ○	lire ○	se tenir debout ○
attraper ○	dire ○	manger ○	souffler ○
avoir ○	donner ○	marcher ○	souhaiter ○
balancer ○	donner à manger ○	mettre ○	sourire ○
balayer ○	donner un bis/bizou/bec ○	monter ○	surveiller ○
bercer ○	donner un coup de pied ○	monter à (cheval, bicyclette ...) ○	tapper ○
boire ○	dormir ○	mordre ○	tenir ○
brasser ○	échapper ○	nager ○	tirer ○
briser/casser ○	écouter ○	nettoyer ○	tomber ○
brosser ○	écrire ○	ouvrir ○	toucher ○
cacher ○	embarquer ○	parler ○	tourner ○
chanter ○	enlever ○	partager ○	transporter ○
chatouiller ○	entendre ○	patiner ○	travailler ○
chercher ○	essuyer ○	peinturer ○	trouver ○
choisir ○	faire ○	penser ○	venir ○
cogner (à) ○	faire à manger ○	pleurer ○	verser ○
coller ○	faire semblant ○	pousser ○	voir ○

15. MOTS DESCRIPTIFS

Plusieurs mots de cette catégorie existent dans la forme masculine ou féminine (par ex., vieux, vieille). Veuillez noircir le cercle si votre enfant utilise l'une ou l'autre de ces formes.

(avoir) mal ○	faim ○	orange ○
(avoir) peur ○	fatigué ○	pas vite ○
(avoir) soif ○	fini ○	petit ○
beau/belle ○	fort ○	plein ○
bien ○	froid ○	premier ○
blanc ○	gentil ○	pris ○
bleu ○	gros/grand ○	propre ○
bon ○	haut ○	réveillé ○
brisé/cassé ○	jaune ○	rond ○
brun ○	joli ○	rouge ○
capable ○	long ○	sale ○
chaud ○	lourd ○	sec ○
collant ○	mal ○	tannant/méchant ○
content ○	malade ○	tout petit ○
debout ○	mieux ○	tranquille ○
dégueulasse ○	mignon ○	triste/(avoir) peine ○
dernier ○	mouillé ○	vert ○
doux ○	noir ○	vide ○
dur ○	nouveau ○	vieux ○
endormi ○	parti ○	vite ○
fâché ○	pauvre ○	

16. MOTS POUR PARLER DU TEMPS

après ○	demain ○	matin ○
aujourd'hui ○	heure ○	nuit ○
avant ○	hier ○	plus tard ○
bientôt ○	jour ○	tantôt ○
ce soir ○	maintenant ○	tout à l'heure ○

17. PRONOMS		
à eux ○	elles ○	nous ○
à lui ○	il ○	nôtre/nos ○
à moi ○	ils ○	on ○
à nous ○	je ○	son ○
à toi ○	le mien ○	toi ○
à vous ○	le tien ○	ton ○
ça ○	lui ○	tu ○
ce ○	me ○	vous ○
celui-là ○	moi ○	
elle ○	mon ○	

18. MOTS D'INTERROGATION		
comment ○	pourquoi ○	qui ○
lequel/laquelle ○	quand ○	quoi ○
où ○	quel ○	

19. PRÉPOSITIONS, ADVERBES ET TERMES LOCATIFS		
à ○	de ○	là/là-bas ○
à côté de ○	de l'autre côté ○	loin ○
à terre/par terre ○	devant/en avant ○	par ○
au ○	en ○	par-dessus ○
au-dessus ○	en arrière ○	pour ○
autour ○	en bas ○	sous/en dessous ○
avec ○	en dehors (de) ○	sur ○
comme ○	en haut ○	y (par exemple, "on y va") ○
dans ○	ici ○	

20. QUANTIFICATEURS ET ARTICLES

Plusieurs mots de cette catégorie existent dans la forme masculine ou féminine (par ex., tout, toute). Veuillez noircir le cercle si votre enfant utilise l'une ou l'autre de ces formes.

autre ○	même ○	trop ○
beaucoup ○	pareil ○	un ○
de/du ○	pas ○	un autre ○
des ○	plus ○	un peu ○
encore ○	plusieurs ○	
le ○	tout ○	

21. VERBES AUXILIAIRES

Les enfants utilisent parfois des verbes auxiliaires. Par exemple, ils diront "je peux marcher", je veux manger", etc. Veuillez noircir le cercle correspondant aux verbes auxiliaires qu'utilise votre enfant.

aimerait ○	fait ○	suis ○
avoir besoin ○	il faut ○	vais/va ○
c'est ○	laisse-moi ○	veux ○
essayer ○	peut ○	voudrait ○
est ○	pourrait ○	
était ○	sont ○	

22. CONJONCTIONS

alors ○	mais ○	si ○
aussi ○	parce que ○	
et ○	puis ○	

Appendix G

Coding Procedure for Determining Translation Equivalents for each Child

Use each child's two *CDI* inventories and compare with the two master lists of translation equivalents in the following manner:

1) Use the child's checklist with fewer words as the starting point (to save effort). For each word on the first list, seek the word with the same number on the second list. If the child says both, then mark the item on the first list.

2) If a number has an additional "a" or "b" after it, look to see whether the corresponding number on the other list also does. If it does not, then follow the following procedure: First determine if the child says the word not marked with a or b, e.g., word #540. If so, then determine if the child also says 540a on the other list. If the child does, give credit for the translation equivalent and **stop**. If the child doesn't say 540a, see if they say 540b. If so, give credit for the translation equivalent. If not, give no credit and **stop**. **In other words, the child gets only one "translation equivalent" credit per number, regardless of whether they say one or both of the alternatives.**

3) If the number has an additional a or b after it on both lists, use the following procedure. See if one of the words marked with an a has been checked. If the corresponding word marked with an a on the other list is checked also, credit the translation equivalent and **stop**. If it is not, see if the other alternative is also marked with an a. If so, credit the translation equivalent and **stop**. **If no translation equivalent has been credited thus far,** go back to the first list and see whether the word marked with a b has been checked. If so, check the other list to see if the corresponding word with b has been checked. Credit with a translation equivalent if so. **Again, the child gets only one translation equivalent credit per number, regardless of whether they say one or both of the alternatives on either list.**

4) Note that NE means non-equivalent, so it is not necessary to search the other list for the corresponding number. C means cognate. DC means doublet (or translation equivalent) cognate. Treat these the same way as other translation equivalents. After going through the entire list, count the number of translation equivalents, the number of cognates, and the number of doublet (translation equivalent) cognates, and record each separately on the front of the *CDI* with fewer words.