J. Child Lang. **20** (1993), 523–549.

Early lexical development in Spanish-speaking infants and toddlers*

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(*Received* 20 *August* 1991. *Revised* 9 *September* 1992)

ABSTRACT

This paper describes the early lexical development of a group of 328 normal Spanish-speaking children aged 0;8 to 2;7. First the development and structure of a new parent report instrument, *Inventario del Desarollo de Habilidades Communcativas* is described. Then five studies carried out with the instrument are presented. In the first study vocabulary development of Spanish-speaking infants and toddlers is

[*] This project was funded by grants from the MacArthur Foundation, UCMEXUS, and the June Burnett Institute. Additional support for the second author during data analysis and manuscript preparation was provided by grant No DC00482 from the National Institute of Deafness and Other Communication Disorders. We would like to thank Dora Acosta, Teresa Niño, Silvia Rojas-Drummond, and Susan Nevitt for their help in gathering data and/or obtaining access to parents. We would also like to thank Marjorie Palacios, Karen Muzinek and Elvira Bicaci for their help in transcribing the language samples. Special thanks go to the parents who filled out the Inventarios. It was their time, effort and energy that allowed us to successfully complete this project. Address for correspondence: Donna Thal, Department of Communicative Disorders, San Diego State University, San Diego, CA 92182, USA.

compared to that of English-speaking infants and toddlers. The English data were gathered using a comparable parental report, the *MacArthur Communicative Development Inventories*. In the second study the general characteristics of Spanish language acquisition, and the effects of various demographic factors on that process, are examined. Study 3 examines the differential effects of three methods of collecting the data (mail-in, personal interview, and clinic waiting room administration). Studies 4 and 5 document the reliability and validity of the instrument. Results show that the trajectories of development are very similar for Spanish- and English-speaking children in this age range, that children from varying social groups develop similarly, and that mail-in and personal interview administration techniques produce comparable results. Inventories administered in a medical clinic waiting room, on the other hand, produced lower estimates of toddler vocabulary than the other two models.

INTRODUCTION

A perusal of the recent literature would lead one to believe that interest in the acquisition of Spanish is growing (see Clark, 1985; López-Ornat, 1988, for extensive reviews).[1] Information about Spanish language acquisition is particularly relevant to a country like the United States, where Spanish-speakers constitute approximately 10% of the total population and represent the fastest-growing segment among school-age children (Walker, 1987).

However, a closer look reveals that much work still needs to be carried out. One area requiring attention is early language acquisition in monolingual Spanish-speaking children. Most research has been directed towards later phases of language acquisition, and focused primarily on issues in bilingualism and/or bilingual education. Very few studies are directed towards monolingual Spanish-speakers, and virtually none focus on the first two years of life when the foundation for later linguistic abilities is formed and stabilized. Those studies that have investigated Spanish-speaking children under two years of age have emphasized the acquisition of phonological processes (Melgar, 1976; Eilers, Oller & Benito-García, 1985). Only one or two studies are directed towards the functional bases of language usage, and even fewer (if any) deal with lexical acquisition. These limitations are compounded by the fact that many studies are unpublished dissertations, or they appear in journals with little international circulation.

[1] In addition to these, several recent ethnographic studies (Hernández-Pina, 1984; Zukow, 1986) and doctoral dissertations (Gutiérrez, 1976; González, 1983; Eisenberg, 1985; Jackson, 1989) could be of interest.

The paucity of studies in this area clearly documents the critical need to conduct further studies of the acquisition of Spanish. Such studies should provide information about acquisition in the early years, as well as information relevant to the development of instruments that may be used as language screening and/or assessment tools. As a first step towards this goal, this paper describes the development and preliminary norming of a parental report instrument designed to obtain information about early lexical acquisition in Spanish-speaking infants and toddlers.

Many studies of the early stages of linguistic development in English and Italian have used the method of parental report. One such measure in English is the MacArthur Communicative Development Inventory (CDI) which has both an infant and a toddler version. (For a detailed description of these measures, see Fenson, Dale, Reznick, Thal, Bates, Hartung, Pethick & Reilly, 1991.) Numerous studies have now shown that this parental report measure is an effective and efficient tool for assessing early language development (Bates, Bretherton & Snyder, 1988; Beeghly, Jernberg & Burrows, 1989; Dale, Bates, Reznick & Morisset, 1989; Fenson, Flynn, Vella, Omens, Burgess & Hartung, 1989; Rescorla, 1989; Tomblin, Shonrock & Hardy, 1989; Dale, 1991), providing a rapid overall evaluation that can serve both screening and research purposes.

For English-speaking children, the CDI has been shown to be highly correlated with MLU and Type Token Ratio (obtained through naturalistic language sampling) and with more structured vocabulary measures such as the Expressive One Word Picture Vocabulary Test (EOWPVT), parts of the Stanford-Binet, the Bayley MDI, and the Peabody Picture Vocabulary Test (Bates, Bretherton & Synder, 1988; Dale, Bates, Reznick & Morisset, 1989; Reznick & Goldsmith, 1989; Dale, 1991). Similar correlations with naturalistic language observations have been reported for the Italian inventories (Camaioni, Caselli, Longobardi & Volterra, 1990). The CDI has also been shown to be effective in the early detection of risk for language delay. For example, Thal and her colleagues (Thal & Bates, 1988; Thal, Tobias & Morrison, 1991) have shown that 40% of children who displayed delayed lexical production (as measured by the CDI) between 1;6 and 2;4 were still delayed one year later. Furthermore, language comprehension abilities between 1;6 and 2;4 (as measured by the CDI) were predictive of this subsequent improvement or lack of improvement in expressive language.

Because of its high reliability and validity, the CDI is rapidly becoming incorporated into early language assessment batteries along with other standardized tests and language samples. One key to the success of the CDI is that it adheres to the following strict procedural criteria:

(1) Only current behaviours are assessed.
(2) The focus is on new or emerging behaviours.

(3) A recognition rather than a recall format is used (i.e. parents respond to a checklist).

In addition to the adaptations of the CDI to Italian (Bates, Caselli & Casadio, 1990; Camaioni, Caselli, Longobardi & Volterra, 1990) a Japanese measure has been developed and pilot tested (Ogura & Murase, 1991). In this paper, we present an adaptation of the English (the CDI) and the Italian (Lo Sviluppo Communicativo Nella Prima Infanzia) instruments to Spanish. Both versions were used as the basis for the development of the *Inventario del Desarrollo de Habilidades Comunicativas*. To avoid previous errors in test construction, careful attention was paid to making pertinent linguistic and cultural modifications for its use with Mexican and Mexican American groups.[2]

The remainder of the paper proceeds as follows. In the General Method section, we describe the components of the Inventarios and how they were constructed. In addition, we provide a general description of the population and the procedure we followed for contacting parents and administering the Inventarios. Next, five individual studies are presented. For each, data from a subset of the total Spanish-speaking sample are examined with respect to various theoretical and methodological issues.

The first two studies rely on data obtained via a mail-in procedure similar to that used in the English and Italian samples. In Study 1, we compare English-speaking infants and toddlers who received the CDI with a subset of the Spanish-speaking sample that was matched for mother's education level. In Study 2, this sample was expanded to include mothers from all education levels in order to examine the general characteristics of Spanish language acquisition, as well as the potential influence of socio-economic level on vocabulary development.

Study 3 compares data from inventories obtained via the mail-in procedure with two alternative data collection methods: personal interview and completing the form in a family health clinic waiting room.

Two additional studies present reliability and validity data. In Study 4 test–retest reliabilities for a subset of the Inventarios readministered one month after the first administration are described. Study 5 is a validation study in which results from the Inventarios are compared with vocabulary in spontaneous language samples for a subset of the children.

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[2] The inventarios were developed in the United States and Mexico for use with Mexican and Mexican American children. Use with children who speak other dialects of Spanish will require adaptations in vocabulary and gestures appropriate to those dialects. However, such adaptations are minimal compared with development of an entire new instrument and should provide an interesting challenge for motivated individuals. In the United States adaptations for Cuban Spanish are already under way (Pearson & Fernandez, 1992).

In the General Discussion, the implications of the findings and the merits of each data collection procedure are discussed.

GENERAL METHOD

Linguistic and cultural modifications of the instrument

The adaptation of the English and Italian instruments to Spanish was carried out by the first author who is a fluent English/Spanish bilingual. A preliminary version was reviewed by five Spanish-speaking mothers of children aged 0;8 to 2;6, all residents of the Hispanic community in San Diego. They were asked to review the words on the list and to suggest words that may be missing or that they considered to be irrelevant. Some words were added based on their comments. Taking their suggestions into consideration, the instrument was revised and preliminary data were obtained from the sample described below. Subject recruitment was carried out by Spanish-speaking students at the University of California, San Diego.

The *Inventario* consists of two forms, as do the English and Italian versions: (1) *Primeras palabras y gestos* (for children aged 0;8 to 1;4) and (2) *Palabras y enunciados* (for children aged 1;3 to 2;6). Table 1 compares the number of items in each section on the final versions of the Inventario and the English inventories. The total number of words differs on the two forms primarily because of lexical items carrying morphological information. In addition, *Palabras y enunciados* did not include a Sentence and Grammar section due to limited information about early sentence structures in Spanish. A verb morphology section was included on the Spanish form instead.

Primeras palabras y gestos (hereafter Inv. I) consists of 4 sections: (1) First signs of comprehension (31 items), (2) Speaking styles (2 items), (3) Vocabulary comprehension and production (22 categories, 434 items), and (4) Gestures and actions (6 categories, 65 items). 'First signs of comprehension' consists of a series of questions about phrases and familiar words that young children are likely to comprehend at the beginning of language learning (i.e. from 0;8 to 1;0). In 'Speaking styles', parents are asked about the extent to which their child imitates or 'parrots', and/or the extent to which their child labels or 'names' objects. The 'Vocabulary' section contains a list of words divided into categories where parents are asked whether their child comprehends and/or produces words. The final section, 'Gestures and actions', is comprised of a series of gestural categories that begin with first communicative gestures (e.g. waving, shaking of the head) and move to more symbolic gestures (e.g. imitating adult actions of driving or feeding). In this paper, we will focus only on data from Section 3, the word comprehension and production checklist.

Palabras y enunciados (hereafter Inv. II) consists of 3 sections: (1)

TABLE 1. *Items in Spanish and English inventories*

	Spanish	English
Infants – Inv. I		
1. Vocabulary categories	22	19
2. Number of words (comp/prod)	434	396
3. Comprehension items	31	28
4. Gestures	65	63
5. Styles	2	2
Toddlers – Inv. II		
1. Vocabulary categories	23	22
2. Number of words (production)	723	680
3. Use of words	3	5
4. Verb conjugations	109	–
5. Morphology and syntax	–	113

Vocabulary production (23 categories, 723 items), (2) Use of words (3 items) and (3) Verb conjugations (109 items). 'Vocabulary production' is similar in format to Section 3 on Inventario I, except that it only asks parents about children's word production. In the 'Use of words' section, parents indicate whether their child talks about (1) events or objects that are present, (2) events or objects that are part of the past and/or in the absence of the referent object, or (3) anticipating the future. The final section, 'Verb conjugations', presents the parents with a list of verbs with different conjugations (both regular and irregular) and asks which forms their child uses. Again, the present report of the three studies will focus only on the word production checklist (Section 1).

Development of the vocabulary checklist. Although the structure and general idea of the Inventario derived from the English version, the items themselves were obtained first and foremost from Spanish language studies. This approach is in contrast to a process of developing Spanish language tests which proceeds in the opposite direction, i.e. a direct translation of English lexical items and syntactic structures to Spanish.

In the adaptation procedure used here, we ensured that naturalistic Spanish language acquisition data were the primary basis for creating the measure: however, we also included items taken from language tests, as described above. More specifically, the vocabulary checklists included in Inv. I and Inv. II were developed based on the following sources of information:

(1) Natural language samples obtained from several studies of Mexican Spanish and Spanish spoken in the United States (Gutiérrez, 1976; González, 1983; Eisenberg, 1985; Jackson, 1989).

(2) Corpora from language experiments carried out at the University of the Americas in Mexico City (Jackson-Maldonado, unpublished materials).

These primary sources were supplemented by:

(3) Vocabulary lists from published language and/or intelligence scales: Test Vocabulario Imágenes Peabody (Dunn, Padilla, Lugo & Dunn, 1986), Batería de Evaluación Intelectual Kaufman (Kaufman *et al.*, 1987), WISC-RM (Gómez-Palacio, Padilla & Roll, 1982), Batería de Evaluación de la Lengua Española (Gómez Palacio, 1988).

(4) Items from the English and Italian checklists that were considered to be culturally and linguistically relevant.

All items were screened for linguistic and cultural relevance to ensure that they were appropriate for Mexican and Mexican-American populations. Cultural modifications included the addition of Mexican games and routines, such as *tortillitas* and *ojitos*, instead of *patty cake* and *peek-a-boo*. The people category was expanded to include items such as *madrina* ('godmother') and *padrino* ('godfather'). Items such as *tortilla* and *chile* were added to the Food category. Some household and place items from the English version were discarded for cultural reasons. For example, while the English version includes *backyard*, *sandbox* and *basement*, none of these items was included on the Spanish version.

Since Spanish is a morphologically rich language, several categories of lexical items were expanded to reflect: (*a*) verb conjugations (see modifications to other sections below), (*b*) gender and number in articles and pronouns, and (*c*) gender in adjectives.

In Spanish, articles vary in form according to the gender and number of the accompanying noun (i.e. *el/la*, *el/los*, *la/las*), whereas one definite article is used for both singular and plural nouns in English (i.e. *the*). Thus, items indicating both gender and number in articles were added. The category for pronominal forms was expanded in an analogous fashion. In English, demonstratives typically express two levels of spatial distance: *this* and *that*. However, in Spanish, three levels are typically used: *éste* ('this'), *ése* ('that'), *aquél* ('that', further away). In addition, each of these forms is marked for gender: *esto/éste/ésta*, *éso/ése/ésa*, *aquello/aquél/aquélla*; and number: *esto/éstos*, *éste/éstos*, *ésta/éstas*, *eso/ésos*, *ése/ésos*, *ésa/ésas*, *aquello/aquéllos*, *aquél/aquéllos*, *aquélla/aquéllas*.

Other modifications included reorganization of items into different categories. For example, while locatives are included in the preposition and locations category on the English and Italian forms, they are in a separate category called locations on the Inventario given that, in Spanish, these

forms are often adverbs, rather than prepositions. A separate category, states, was included in the Spanish version on both Inv. I and Inv. II. The Toddler form of the CDI has a category called helping verbs; however, no such category is included on Inv. II. Lastly, articles and prepositions are collapsed into the same category, whereas articles are included with quantifiers on the CDI. This grouping reflects the fact that articles and prepositions are often conflated into single forms like *del* and *al* in Spanish. It is also due to the fact that both prepositions and articles are always bound morphemes in Spanish.

Development of other sections. In addition to changes within vocabulary categories, a major structural change included the addition of a section focusing on the development of verb morphology. Parents were presented with a list of conjugated verbs and were asked to choose among items that varied according to tense, person, aspect and use with clitics. These categories were derived from studies of Spanish verb morphology acquisition (González, 1983), as well as from naturalistic language samples. Parents were asked to indicate all of the verb forms their child says: for example, *acabé* ('to finish', first person past), *acabo* (first person present), *acabó* (third person past), *acaba* (third person present), *se acabó* (past with clitic), *acábatelo* (imperative with clitic), *acabando* (present participle), *acabar* (infinitive). A second verb morphology section was developed which presented a list of irregular verb conjugations and parents were asked to check off whether the child used the correct verb conjugation (e.g. *pude*, 'I could'), or an overgeneralized form (e.g. *podí*).

Modifications were also made in the gesture sections of the Inventario I. Here, culturally relevant gestures such as 'crossing oneself' were added. In addition to modifications made to the inventories themselves, changes were made in the general demographic information requested about the child. This information was registered on a separate general data sheet. For example, in order to reflect the migratory nature of the Spanish-speaking population in the United States, parents indicated what language was spoken in the home (*a*) by and between parents, (*b*) to and by children, and (*c*) between children. The country of origin of the parents and years of residence in the United States were also noted. Education and occupation of parents were obtained using criteria specified by Mercer & Lewis (1979) and Laosa (1980). Data relating to frequency of ear infections were also collected.

Description of the total sample and general procedure

Spanish Inventories were obtained from a total of 328 children, 138 for Inv. I (aged 0;8 to 1;4) and 190 for Inv. II (aged 1;3 to 2;7). Subsets of this sample were used in each of the five studies. Demographic information relevant to each of the subset groups will be described in the individual sections for each study. Due to the limited size of the total sample, an equal

number of subjects per age group was not obtained. Instead, all parents who were willing to participate were encouraged to do so as long as their child fell within the appropriate age range, and had no reported handicap. No children with serious medical problems were included. Subjects were mostly of Mexican origin and lived in the Southwestern states of the United States. A smaller number of participants (approximately 10%) were residents of Mexico.

For the English CDI, subjects were recruited by soliciting responses to advertisements in newspapers, or obtaining recommendations from paediatricians and contacting parents by mail. However, we were concerned that parents in the Hispanic community would be less likely than middle-class Anglo parents to spontaneously fill out and return the Inventarios. In order to facilitate the data collection a system for contacting families was created with emphasis placed on establishing personal contact between the research team and parents. Once contact had been made, the inventories were administered using one of three different techniques by native or near-native Spanish-speakers who were culturally identified with local Hispanic communities. Data collectors typically were university students specifically trained in the administration of the Inventarios. The majority of parents were contacted in their local community through relatives, neighbourhood contacts, local churches, and occasionally, social programmes (for example, Women–Infant–Children Programme (WIC), Community Health Clinics).

Subject recruiting in Mexico followed a slightly different procedure. Two sub-groups of subjects were obtained: one from a rural community near Mexico City and another from urban areas within Mexico City. The parents of children in the rural community were recruited by a Speech-Language Pathologist through personal contacts. The urban sample was obtained by a psychologist at the Autonomous National University in Mexico City, working through three day-care centres: one federal and two private. All parents with children within the desired age ranges were invited to participate in the study. Some urban subjects were also obtained through personal contacts. For both Mexican samples, the Inventarios were explained and distributed in the same way as the post-recruitment procedure in the United States.

STUDY 1. SPANISH–ENGLISH COMPARISONS

In order to facilitate comparison to the English sample, Study I was designed to replicate the sampling and administration procedures used in the CDI norming study as closely as possible. The goal here was two-fold. First, we were interested in taking an initial look at lexical development from a cross-linguistic perspective in Spanish and English children in this age range, as measured by two similarly constructed parental report instruments. Second,

by identifying similarities between patterns of lexical development in the two populations, we hoped to provide information regarding the content validity of the Inventarios.

METHOD

Subjects

The sample consisted of 56 children aged 0;8 to 1;4 whose parents completed Inv. I and 68 children aged 1;3 to 2;7 whose parents completed Inv. II. All children came from families where mothers had a high-school education or beyond. Mother's education was chosen as a criterion for subject definition because research by Laosa (1980) reported that maternal education level was the principal socio-economic factor affecting language development. Subjects were residents of both the U.S.A. and Mexico. For many analyses, subjects were grouped according to age in months. For Inv. I, the following ages were used: 0;7 to 0;8, 0;9, 0;10, 0;11 to 1;0, 1;1, 1;2, and 1;3, to 1;4. For Inv. II: 1;3 to 1;4, 1;5 to 1;6, 1;7, to 1;9, 1;10 to 1;11, 2;0, 2;1, 2;2 to 2;3 and 2;4 to 2;7. Children were collapsed across ages when the number of subjects in each group did not exceed 10. In order to make valid comparisons between these children and those in the English sample, data from Fenson *et al.* (1991) were collapsed according to the same age groupings.

For analyses of vocabulary composition, children receiving Inventario II were grouped into equally sized groups according to size of reported production vocabulary, rather than age in months. Five production levels resulted: less than 72 words, 73 to 181 words, 182 to 304 words, 305 to 484 words, and more than 485 words.

Procedure

A mail-in methodology was employed in which, after the parents were contacted (as described in the General Method section above), the procedure for filling out the inventory was explained to them in a careful manner by a trained assistant. They were asked to return the inventory in a postage-paid envelope. Parents were contacted by phone one week later if the inventory had not yet been received. After an additional week, another follow-up phone contact was made. There were no further contacts after this point. A return rate of approximately 60% was achieved using this method.

RESULTS

Developmental trends. Figures 1 (Inv. I) and 2 (Inv. II) present the median number of words reported on the Inventarios compared to English-speaking

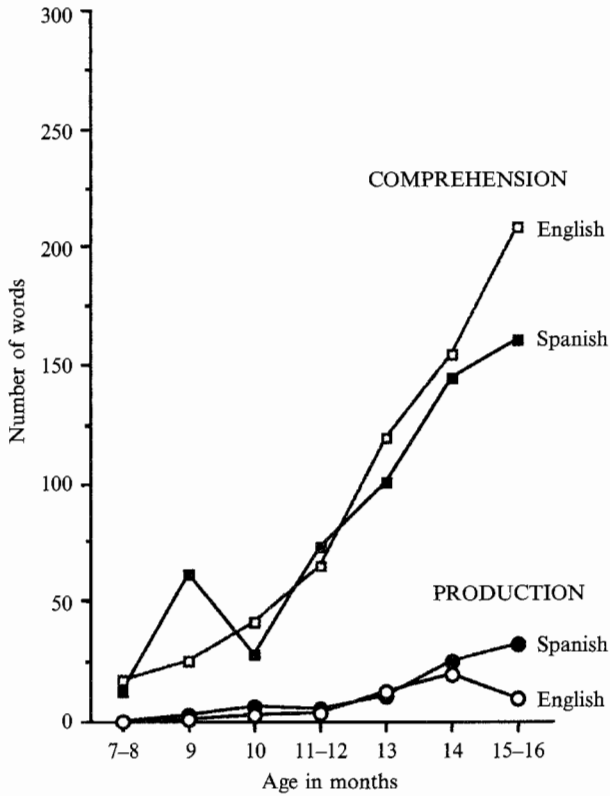

Fig. 1. Median comprehension and production scores: Spanish (Inv. I) vs. English (CDI: Infants).

children in the norming study of the CDI (Fenson *et al.*, 1991). These data indicate that median scores for the English- and Spanish-speaking children are strikingly similar in the two populations. If children in the two language groups are at the same level of vocabulary development for their age level, then we would expect that half of the Spanish-speaking population would be above the English median, and half would be below. Indeed, our expectations were upheld. For Inv. I, 55·3 % of the Spanish-speaking children fell below the English median in vocabulary comprehension, and 51·2 % fell below for vocabulary production. In the older children, 54 % fell below the 50th percentile on vocabulary production as defined by the English group on Inv. II. Binomial tests were performed to determine if a significantly greater number of Spanish-speaking children than would be expected by chance fell above or below the median level of vocabulary development found in

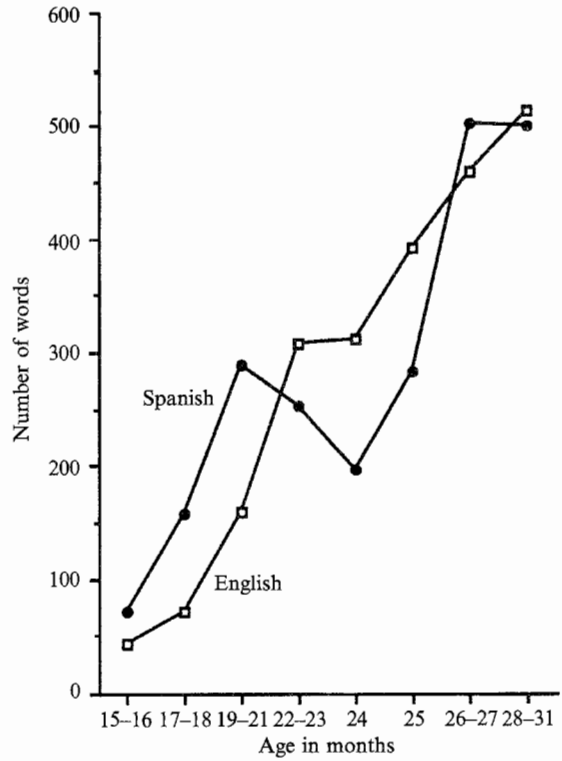

Fig. 2. Median production vocabulary scores: Spanish (Inv. II) vs. English (CDI: Toddlers).

English-speaking children of the same age. None of the tests was statistically significant.[3]

In general then, these data suggest that the relationship between vocabulary size and age is quite comparable in the two populations. For both language groups, vocabulary comprehension is ahead of vocabulary production, with both of these increasing in a linear fashion across age. More specific analyses of the relationship between age and vocabulary development with respect to the acquisition of Spanish are presented in Study 2.

Vocabulary composition. In addition to total size of vocabulary, it is important to examine which categories of words are produced by children in this period

[3] The reader may note that the median number of words produced by 15–16-month-old children reported on Inv. I was around 30, while that for the same age group on Inv. II was closer to 60. This may reflect differences between the size of the vocabulary checklist in the two forms.

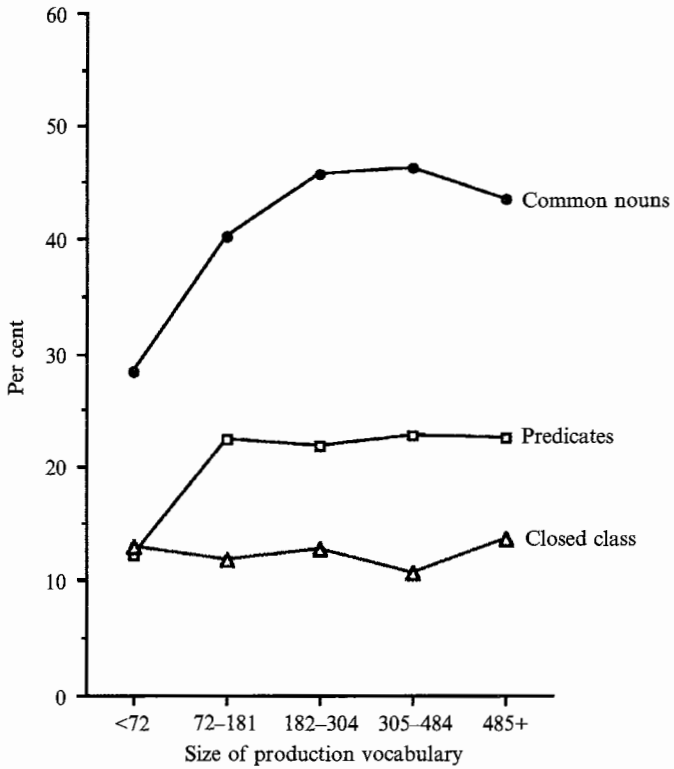

Fig. 3. Vocabulary composition by size of total production vocabulary (Inv. II).

of lexical development. For comparisons to the English sample, we focused on the following three lexical categories: COMMON NOUNS (animal names, vehicles, food & drink, clothing, body parts, toys, small household items and furniture: 300 items), PREDICATES (actions and processes, states and attributes, 168 items), and the CLOSED CLASS (pronouns, questions, articles, quantifiers, locatives and connectives, 106 items).

Recent analyses of English-speaking toddlers using the CDI suggest that production vocabularies are likely to be comprised of mainly common nouns. Predicates and closed class items typically make up less than 20% of total vocabulary size. Interestingly, these categories of lexical items also undergo slightly different developmental trajectories. Early vocabulary growth is characterized by an increase in common nouns, which levels off after about 200 words. For predicates and closed class items, in contrast, their contribution to total vocabulary remains relatively constant in small vocabularies, but shows an increase after vocabularies expand to about 400 words or more (Marchman & Bates, 1991; Bates *et al.*, in press).

Looking only at data from Inv. II, Fig. 3 presents the proportion of total vocabulary accounted for by the three lexical categories at five levels of production vocabulary for the Spanish-speakers. As observed in the English children, production vocabulary across the period is likely to be comprised primarily of common nouns, less so of predicates and closed class items, as indicated by a main effect for vocabulary using a multivariate analysis of variance [$F(2, 126) = 93{\cdot}5$, $p < 0{\cdot}001$]. Further, early vocabulary growth involves an increase in common nouns as shown by univariate analysis over vocabulary levels [$F(4, 63) = 6{\cdot}1$, $p < 0{\cdot}001$]. In this relatively small sample, however, there is no subsequent increase in number of predicates [$F(4, 63) = 1{\cdot}34$, $p < 0{\cdot}26$] and closed class items [$F(4, 63) = 0{\cdot}72$, $p < 0{\cdot}58$], unlike that observed in the English-speaking population. Further analyses with a larger sample are warranted, to verify if a similar trend does exist in Spanish-speakers. In general, however, composition of vocabularies across the course of lexical acquisition in the Spanish-speaking children is quite similar to that observed for the CDI.

Age of acquisition norms for individual items. A subset of the data from Inv. II was analysed in more detail in order to obtain further information regarding which words are reported by parents of children in these age ranges. Table 2 presents those items on the vocabulary checklist that were reported to be produced by at least 60% of the subjects receiving Inv. II. As far as we are aware, these data are the first age of acquisition data to be reported for Spanish in this developmental range.

A similar type of list had been compiled based on the English data (see Fenson *et al.*, 1990). Interestingly, item frequencies from the Spanish-speaking sample were strikingly similar to those for English based on the CDI. For example, in both languages, *mommy* and *daddy* or *papá* and *mamá* were reported to be produced by the greatest number of children. Sounds of animals and objects also had a high frequency of occurrence in both languages, as did names of things that children manipulate (e.g. toys, body parts and foods). Nouns which refer to people were also very frequent items in both the English- and Spanish-speaking children. Interestingly, for both languages, the first pronouns to appear were personal (*I*, *you* or *yo*, *tu*) and possessive (*mine*, *my* or *mía*, *mi*). Certain quantifiers also had a high frequency of occurrence: *more*, *some*, *too*, *all* in English, and *ya*, *más*, and *no hay* ('enough/done/finished', 'more', 'all gone/there isn't any') in Spanish. Both *yes* and *no*, or *sí* and *no*, were reported with high frequency. In contrast, function words and other closed class items were not reported frequently in either language group.

In general then, the patterns of lexical development in this Spanish-speaking population appear to follow a similar pace, to concentrate on similar lexical categories (e.g. common nouns), and even to include some

TABLE 2. *Highest frequency words in infant and toddler production (produced by 60% of the children)*

papá, papi	sopa	dónde está
mamá, mami	galleta	muu
agua	yo	bee
adiós, byebye	dormir	cuacuá
am!	mosca	miau
ay!	gracias	pene*
guaguá	niño	panza
leche	niña	brazo
chichi, pecho	comida	naranja
no	Coca, soda, refresco	baño
sh!	más	cucharo
papas	perro	bolsa
sí	dinero	frijoles
vámonos	gato	carne
pan	biberón, mamila	aquí
ya	pipi	allá
pipí (coche)	popó	bravo
zapato	pañal	tío
carro, coche	abrir	lluvia
jugo	besitos	televisión
globo	cama	gato
pum!	mano	papél
pelota	boca	basura
mía	calcetín	caballo
caliente	plátano	pelo
huevo	dulce	labios
abuelo*	no hay	pollo
abuela*	fuchi	paleta
tía*	oir	
muñeca	bailar	
bebé	casa	
ojo	hola	

* Or word used by family.

identical lexical items compared to those observed in the English norming sample. We feel that these data are a solid first step at outlining crosslinguistic comparisons between English and Spanish, and believe that the Inventarios share the content validity and (hopefully) the external validity that have been demonstrated repeatedly for the CDI.

STUDY 2. DEMOGRAPHIC ANALYSES AND PRELIMINARY NORMS

Study 2 was designed to examine developmental trends in lexical acquisition in Spanish-speaking infants and toddlers across a broader range of socio-

TABLE 3. *Demographic characteristics of the sample*

	Inv. I ($n = 89$) (%)	Inv. II ($n = 117$) (%)
Gender		
Male	45·0	44·4
Female	55·0	55·5
Language of mother		
Spanish	93·3	89·7
English	1·1	4·3
Both	5·6	6·0
Language of father		
Spanish	89·9	85·5
English	4·5	5·1
Both	3·4	5·1
Language of siblings		
Spanish	70·8	71·8
English	0·0	7·7
Both	4·5	6·0
No siblings	24·7	14·5
Mother's residence		
U.S.A.	70·8	65·8
Mexico	29·2	34·2
Father's residence		
U.S.A.	67·4	63·2
Mexico	29·2	33·3
Mother's origin		
Mexico	73·0	76·9
U.S.A.	15·7	16·2
Father's origin		
Mexico	70·8	6·0
U.S.A.	13·5	84·6
Mother's education		
Elementary or Junior High	36·0	38·4
High School or Technical School	26·0	35·8
University or Graduate School	37·0	22·2
Father's education		
Elementary or Junior High	37·1	38·5
High School or Technical School	14·6	25·6
University or Graduate School	43·8	29·9
Mother's occupation		
Work in the home/unemployed	55·1	55·6
Unskilled	9·0	9·4
Skilled	9·0	20·7
Professional, large business	25·8	13·7
Father's occupation		
Work in the home/unemployed	1·1	0·9
Unskilled	34·8	33·3
Skilled	22·5	30·8
Professional, large business	38·2	32·5
Ear infections		
None	64·0	64·9
More than 1	32·5	29·9

economic levels than is appropriate for comparison with the English norming study. By expanding the composition of our sample, we were able to investigate the effects of demographic variables on lexical acquisition, as well as to establish preliminary norms for vocabulary development in monolingual Spanish-speakers.

METHOD

Subjects

The sample consisted of a total of 89 children whose parents completed Inv. I and 117 children whose parents completed Inv. II. These subjects included those who participated in Study 1. As in Study 1, children were grouped by age in months. For Inv. I, the following groupings were made: 0;7 to 0;8, 0;9, 0;10, 0;11 to 1;0, 1;1, 1;2 and 1;3 to 1;4. For Inv. II: 1;3 to 1;4, 1;5 to 1;6, 1;7 to 1;8, 1;9, 1;10 to 1;11, 2;0, 2;1, 2;2 to 2;3, and 2;4 to 2;7.

Procedure

The procedure for contact, administration and returning the inventories (mail-in) was identical to that used in Study 1.

RESULTS

Demographic information. The composition and demographic information of this sample are presented in Table 3. For both inventories, the groups were balanced for gender, with the overall sample comprised of about 55·3% males and 44·7% females. As mentioned above, most of the families participating in the study lived permanently in the United States. Interestingly, however, the majority of the mothers were Mexican born. Only 33 mothers, 16%, were born in the United States. Note also that only a small proportion of the homes could be considered bilingual, regardless of the country in which the family resided at the time of the study. Fewer than 13% of the fathers and 8·7% of the mothers spoke English or both Spanish and English in the home. A similar tendency held for siblings, especially for Inv. I. In general then, for the overwhelming majority of families, Spanish was the primary (and only) language used by both parents and siblings.

The educational level of the mothers who participated in this study was distributed fairly evenly across three different levels: Elementary through Junior High School, High School and/or Technical School, and University. Many mothers worked in the home, although more than half worked outside the home. Fathers were also likely to have an elementary or Junior High school education (37·4%); however, several fathers had a university or graduate education, especially in the Inv. I group. In both samples, fathers

TABLE 4. *Vocabulary production and comprehension: infants* ($n = 68$)

Age (months)	Comprehension			Production		
	Median	10th	90th	Median	10th	90th
7–8	17·0	0·0	97·0	0·0	0·0	8·0
9	66·0	4·0	128·2	6·0	0·6	17·0
10	49·0	4·2	131·2	4·0	0·0	30·4
11–12	63·0	20·1	160·1	4·0	0·3	9·0
13	72·0	23·2	344·6	6·0	0·6	
14	136·0	34·8	267·2	25·5	1·6	137·1
15–16	161·5	23·3	357·5	13·5	0·9	107·3

were equally likely to be employed as unskilled, skilled or professional workers. Less than 1 % of the fathers were unemployed.

More than half of the children in both groups were reported to be free from ear infections within the last year (approximately 65 % overall). The remaining 35 % of the children were reported to have had at least one ear infection in the last 12 months.

Demographic variables and lexical development. Even though this sample was heterogeneous with respect to a range of demographic characteristics, analyses of variance on total comprehension and production vocabulary (Inv. I) and total production vocabulary (Inv. II) in subjects grouped according to the demographic variables yielded little information. First, contrary to some claims, gender differences in vocabulary size were not observed in this sample. One way ANOVAs revealed that boys and girls were comparable as a group on all three vocabulary measures. In addition, contrary to findings based on preliminary analyses using a subset of this sample (Jackson-Maldonado *et al.*, 1990*a*, 1990*b*), children did not differ significantly in size of vocabulary as a function of presence or absence of reported ear infections.

Further, analyses indicated that socio-economic variables were not predictive of rate of lexical development in this sample. For example, ANOVAs examining the effect of mother's education level indicated no group differences across the age range in total comprehension or production vocabulary for Inv. I, nor total production vocabulary on Inv. II. Further, there was no overall difference on any of the vocabulary size measures for those children living in the U.S. compared to those currently living in Mexico. However, for those families currently living in the United States, children born to second-generation mothers may have had an advantage over those born to mothers that were born in Mexico. A trend towards higher production scores [$F(1, 51) = 3{\cdot}02$, $p < 0{\cdot}08$] was found for those infants whose mothers who were U.S. born (but of Hispanic origin), compared with those who were born

in Mexico but recently immigrated to the United States. This difference was significant when analyses concentrated only on the high education groups [$F(1, 30) = 5{\cdot}36$, $p < 0{\cdot}03$].

The small number of families in this sample who spoke English did not allow any test of the effects of language spoken in the home. A study has been planned to obtain additional subjects from truly bilingual homes so that we can assess this factor on the earliest stages of language acquisition more adequately.

Developmental trends. Results from this larger sample showed similar developmental trends to those reported in Study 1. Grouping children by age in months, percentile scores (10th, 50th, 90th) were obtained for total comprehension and production in Inv. I and total production for Inv. II. Tables 4 and 5 present these median and percentile scores. Not surprisingly,

TABLE 5. *Vocabulary production: toddlers* ($n = 68$)

Age (months)	Median	10th	90th
15–16	103·0	8·4	464·8
17–18	127·0	15·5	548·5
19–20	168·0	25·6	593·6
21	216·5	38·8	653·4
22–23	221·0	40·7	358·5
24	189·0	40·2	456·6
25	323·0	53·2	690·0
26–27	397·5	84·8	732·2
28–31	399·0	143·0	669·0

both comprehension and production vocabularies tend to increase with age, with comprehension vocabulary larger than production vocabulary. As indicated in Table 4, comprehension vocabulary increased from 17 words in the youngest children to 63 words at 0;11 to 1;0, reaching a median level of 161·5 by 1;3 to 1;4. In contrast, the median production score on Inv. I was 0 words at 0;7 to 0;8, increased to 4 words at 0;11 to 1;0, and reached 13·5 words by 1;3 to 1;4. Correlational analyses indicated significant relationships with age for both of these measures: total number of words comprehended ($r = +0{\cdot}54$, $p < 0{\cdot}001$) and size of total production vocabulary ($r = +0{\cdot}39$, $p < 0{\cdot}001$). Interestingly, size of comprehension vocabulary was a better predictor of production vocabulary than age ($r = +0{\cdot}61$, $p < 0{\cdot}001$).

Turning to Inv. II, Table 5 indicates that the median production vocabulary scores ranged from 103 words at 1;3 to 1;4 to 221 words at 1;10 to 1;11, finally reaching 399 words at 2;4 to 2;7. Production vocabulary size

in this sample is also positively correlated with age in months ($r = +0{\cdot}42$, $p < 0{\cdot}001$). Again, these developmental patterns are similar to those reported in Study 1 for Spanish-speaking infants and toddlers, as well as those reported by Fenson *et al.* (1991) for children learning English as a native language. The remarkable similarity in patterns of lexical acquisition obtained using the Inventarios and the CDI suggests that both measures may be tapping into reliable and valid information about lexical development in Spanish- and English-speaking infants and toddlers, respectively.

STUDY 3. COMPARISON OF ADMINISTRATION TECHNIQUES

Because we were uncertain that our mail-in method would be effective, we designed a pilot study to compare the mail-in procedure with two others that employed more direct interpersonal contact. One involved a personal interview; in the other, inventories were handed out to parents who were waiting for medical care in a clinic waiting room.

METHOD

Subjects

The personal interview method was used to gather data for 49 subjects with the Inv. I and 22 subjects with the Inv. II. The waiting room method was used for 51 subjects with the Inv. II. These subjects were compared with the sample described in Study 2 which used the mail-in procedure. Subjects included children whose mothers were of all educational levels.

Procedure

Personal interview method. The personal interview method was carried out in a home or clinical setting where one or several parents were gathered. Two slightly different procedures which varied by level of interviewer interactiveness were employed. In the less interactive procedure, the interviewer explained what to do and then let the parents fill out the inventory mostly on their own. The interviewer remained present to answer questions and to explain each step. For example, if there had been no questions when the parents were finished with Part I, the interviewer would ask again if there were any. She or he would then explain the next part of the inventory and ascertain that each parent understood what was expected before they continued.

In the more interactive procedure, the interviewer went through the form,

reading each word, and the parents checked off the words their child understood or produced after they were read. Questions were entertained at all times. If parents were reluctant to fill out the forms themselves (possibly because of illiteracy), the interviewer also checked off each word after reading it if the parent indicated that their child understood or produced that word. The personal interview took a maximum of two hours.

Waiting room method. The waiting room method was used only in a family health clinic setting where parents waited to see a doctor. This method was used only with subjects receiving Inv. II. Interviewers explained how to fill out the forms and then the parents were left to complete it on their own while the interviewer went on to another parent. When the Inventario was completed, the interviewer checked to see that each page was filled out. If there were empty pages the parent was asked if they had intended to leave that page blank, and any other questions that they might have were entertained. Using this method, the Inventario was completed in about an hour at most. There could be interruptions when the children were seen by the doctor or were fed.

This method was of particular interest because data were obtained from parents who might not normally fill out forms if left to mail them back on their own and who were under pressure because of the waiting room situation (the need to watch their children, or the fact that one or more of them may be tired and sick). It differed from the personal interview in that it did not require as much labour on the part of the experimenter.

RESULTS

Inv. I. A one way ANOVA was calculated to compare results from 89 mail-in and 49 personal interview returns for Inv. I (the waiting room method was not used for Inv. I). The ANOVA indicated that the two different sampling procedures produced results that were not significantly different from each other [$F(1, 137) = 2{\cdot}597$, $p < 0{\cdot}11$].

Inv. II. A one way ANOVA was calculated to compare results from 117 mail-in, 22 personal interview, and 51 waiting room returns for Inv. II. Results indicated a main effect for group [$F(2, 187) = 8{\cdot}148$, $p < 0{\cdot}0004$]. Post hoc Tukey tests with alpha set at $p < 0{\cdot}05$ indicated that the only significant difference was between the mail-in and waiting room methods of inventory return. Parents sampled in the waiting room reported significantly fewer words in the production vocabularies of their toddlers than did parents sampled with either the mail-in or personal interview.

STUDY 4. RELIABILITY

It was important to obtain some estimate of the test–retest reliability of the Inventario. With this in mind we asked a subset of parents to fill out the inventory a second time.

METHOD

Subjects

Mothers of 16 children filled out a secondary inventory for Inv. I and mothers of 20 children did so for Inv. II. All these subjects were taken from the mail-in group (Study 3), with an educational range from high school and beyond.

Procedure

One month after the original sampling, parents who had been sampled using the mail-in method were asked to fill out another inventory and return it by mail. The second inventory was the same as the original one allowing us to establish test–retest reliability for both forms. Correlations were then calculated between scores on the first and second samples. Partial correlations were also calculated partialling out the effects of age.

RESULTS

Inv. I. Table 6 presents the full and partial correlations for Inv. I. Full correlations between age, comprehension and production are presented in the lower left half of the table. Partial correlations (with age removed) are presented in the upper right half of the table (in parentheses). Full correlations range from 0·63 to 0·97, with especially strong correlations between the comprehension and production subscales. Even with age removed the correlations are strong, ranging from 0·43 to 0·65.

Inv. II. Table 7 presents the full and partial correlations for Inv. II, in the same manner as in Table 6. Full correlations range from 0·34 to 0·70. With age removed, the correlation between vocabulary production at first and second sample remains strong (0·62).

These data provide evidence of strong reliability, at levels comparable to those reported for the English inventories (Fenson *et al.*, 1991).

STUDY 5. VALIDITY

As we noted earlier, a variety of studies have shown that the English-language version of the CDI correlates highly with laboratory observations

TABLE 6. *Correlations between two administrations of Inv. I*

		Comprehension		Production	
	Age	Time 1	Time 2	Time 1	Time 2
Comprehension					
Time 1	0·68**	xxx	(0·66***)	(0·43*)	(0·65***)
Time 2	0·72***	0·97***	xxx	(0·47**)	(0·65***)
Production					
Time 1	0·63**	0·76***	0·82***	xxx	(0·53**)
Time 2	0·63**	0·91***	0·96***	0·81***	xxx

* = $p < 0·05$; ** = $p < 0·01$; *** = $p < 0·001$.
Correlations without parentheses reflect full correlations. Those within parentheses reflect correlations with age partialled out.

TABLE 7. *Correlations between two administrations of Inv. II*

		Production	
	Age	Time 1	Time 2
Production			
Time 1	0·41*	xxx	(0·62**)
Time 2	0·34~	0·70***	xxx

* = $p < 0·05$; ** = $p < 0·01$; *** = $p < 0·001$.
Correlations without parentheses reflect full correlations. Those within parentheses reflect correlations with age partialled out.

of the same variables. In this final study, we wanted to determine whether the Inventarios demonstrate comparable levels of validity.

METHOD

Subjects

Seventeen of the subjects who participated in the waiting room method study of Inv. I served in Study 5.

Procedure

The children and their parents were asked to return within one week of filling out the Inventario so that a spontaneous language sample could be obtained. The language sample was carried out in one of the speech-language therapy rooms in the community health centre at which the Inventarios were

originally administered. Parents and children were seated on the floor with a predetermined set of toys and the parent was asked to play with their child as they would at home. After 15 minutes an experimenter joined the parent–child pair and play continued for another 15 minutes.

All language samples were videotaped and transcribed at a later date by native speakers of Spanish. Because transcriptions of language samples from children in this age range tend to be highly variable, we chose a conservative method for determining the reliability of the data used. The original language transcript was reviewed by a second transcriber while watching the videotape and all disagreements were marked. Next, the second transcriber and the original transcriber (or a third transcriber) reviewed the items on which there was disagreement together until they came to an agreement. Thus, only words that were identified as intelligible words by at least two trained transcribers were included in the data analysis. A correlation coefficient was then calculated on the number of words reported on the Inventario and the number of different words produced spontaneously in the laboratory language sample[4].

RESULTS

Results showed a strong correlation (0·84, $p < 0{\cdot}0001$) between number of words reported on the Inventario and the number of different words produced in the spontaneous language sample, providing strong evidence for the validity of Inv. II.

GENERAL DISCUSSION

The findings from this preliminary study suggest that both the Inv. I and Inv. II of the Inventario del Desarrollo de las Habilidades Comunicativas have considerable promise for assessment of Spanish language acquisition. First, the developmental trends in lexical development for Spanish are similar to those found in English. While not conclusive, these data demonstrate validity in assessing early linguistic development in Spanish-speaking children. Hence, parental report appears to be an effective method of gathering information about the acquisition of Spanish, as it is for English (Dale *et al.*, 1989; Reznick & Goldsmith, 1989; Dale, 1991). The Inventario will be a first of its kind screening instrument for early Spanish language acquisition and should prove useful for research concerned with developmental issues and early detection of language delay. In addition,

[4] Since the morphological inflections of person in verbs and of gender and number in nouns were not easily identifiable in the spontaneous language samples, the final score for number of different words produced did not include words that differed in those particular morphological inflections.

because the Spanish version of the Inventario is comparable with both the English and the Italian inventories, it should prove invaluable for cross-linguistic studies of early language development.

A second important outcome of this study is the first word frequency list for Spanish language acquisition. This list will have multiple uses for clinical and research purposes. It will serve as a basis for other projects to build research designs and language tests and it can serve as a source of items to use with Spanish-speaking language impaired children in clinical settings. It also provides paediatricians with a list of first words in Spanish to guide them in screening for language delay in Hispanic infants and toddlers.

A third important outcome derives from the comparison of inventory administration methods. We believe that the system for contacting the families adopted in this study is an important factor in the successful collection of data. Although the 'common wisdom' suggests that Hispanic families will not fill out detailed forms, our results suggest otherwise. Hispanic families responded well to the Inventario when it was explained to them in a culturally relevant way. We used three inventory return methods in our entire sample of Spanish-speaking infants and toddlers. About two-thirds of the data were collected via the mail-in method, with that method achieving a return rate of about 60%. This return rate is considered respectable for that kind of sampling procedure in the Anglo culture as well.

A comparison of the mail-in and interview to the waiting room technique suggested that asking parents of toddlers to fill out a long inventory in a clinic waiting room without immediate personal feedback from the researcher results in a lower estimate of vocabulary. There are many reasons why this method could result in reliably lower scores than when a parent is involved in a personal interview or fills out the interview at home and mails it back. Most parents come to the clinic with a number of children, all of whom need to be looked after. In addition, one or more of the children are likely to be ill, creating an additional worry factor. Furthermore, since this group was sampled in only one setting, there may be acculturation factors relating to this particular group of families that we may have failed to pick up on our somewhat limited family history forms. Clearly, this is yet another important area for future research.

Our preliminary reliability and validity studies were small but encouraging. In both studies very strong correlations were found between the measures of interest suggesting that, following revision and a large-scale norming study, the Inventarios are likely to provide a highly valid and reliable method for the assessment of early Spanish language acquisition.

Although many more studies of Spanish language acquisition need to be carried out before we have a reasonably full view of normal stages and processes, the current study provides a substantial early step. In it, data are presented which describe a number of factors related to early stages of the

acquisition of Spanish, all of which can serve as starting points for future studies.

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