

Lexical diversity and productivity in French preschooolers: developmental, gender and sociocultural factors

Marie-Thérèse Le Normand, Christophe Parisse, Henri Cohen

▶ **To cite this version:**

Marie-Thérèse Le Normand, Christophe Parisse, Henri Cohen. Lexical diversity and productivity in French preschooolers: developmental, gender and sociocultural factors. Clinical Linguistics & Phonetics, 2008, 22 (1), pp.47-58. 10.1080/02699200701669945 . halshs-00202088

HAL Id: halshs-00202088
https://shs.hal.science/halshs-00202088

Submitted on 4 Jan 2008

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

LEXICAL DIVERSITY AND PRODUCTIVITY IN FRENCH PRESCHOOOLERS

DEVELOPMENTAL AND BIOSOCIAL ASPECTS

Marie-Thérèse Le Normand,[1] Christophe Parisse,[2] and Henri Cohen[3]

1.INSERM, Hôpital Robert Debré, Paris, France

2. MODYCO, UMR Villejuif, France

3. Université du Québec à Montréal, Canada

Address correspondence to:

M.-T. Le Normand,
INSERM U676
Hôpital Robert Debré, bâtiment écran +3
48, Bd. Sérurier
75019 Paris, France

e-mail: lenormand@rdebre.inserm.fr

Running head: Language production in French Preschoolers

Acknowledgments: This study was supported by grants from INSERM (CRI4U009B; France) and SSHRC (Canada).

ABSTRACT

In this study, we examined the influence of child gender and sociocultural (SCL) factors in language production. Subjects were French Parisian children in nine age groups (24, 27, 30, 33, 36, 39, 42, 45 and 48 months). A total of 316 language samples were recorded during a 20-min standardized play session. Measures of grammatical and lexical development included Mean Length of Utterance (MLU) and word type and token — specifically, grammatical words such as determiners, prepositions and pronouns as well as verbs. ANOVAs revealed strong influences of SCL, with children from high SCL families showing more complex lexical productions and a higher rate of development. These observations suggest that amount of exposure to language accounts for this differential rate of acquisition. Analyses also revealed a general effect of gender, showing a small advantage in language production for girls over boys until 36 months of age.

INTRODUCTION

Several months after they combine their first words, between 18 and 24 months of age, most children move on to a new phase of language development. Important changes can be observed in their linguistic behavior and most of the children show a sudden burst in vocabulary (Goldfield & Reznick, 1990) and a more precise pronunciation of words (de Boysson-Bardies, 2005). From the age of two onwards, children master around 10 new words a day to reach a vocabulary of more than 10,000 words by age 6 (Clark, 1995). It is clear, however, that there is great variability across children in the time course of their acquisition of aspects of language such as vocabulary and syntax (Wells, 1985; Fenson et al., 1994). Based on the normative data of the MacArthur Communicative Development Inventories (CDI), Bates and colleagues (1994) have observed extraordinarily wide variation in number of words produced at every age level, at least in children who are learning English.

Much work has already been conducted on the acquisition of language in English-speaking children. Research has shown that this acquisition process is constrained by a number of factors, including the children's cognitive development, language input in the children's environment, and their linguistic capacity. Although gender differences are not always apparent from general indices of language competence (e.g. Bates et al., 1994; Gottfried & Bathurst, 1983, Gottfried, 1984), they are consistently found in vocabulary growth in children less than two years of age (Doran, 1907; Nelson, 1973; Reznick & Goldfield, 1992, Lieven et al, 1992), after which time these differences disappear (Maccoby & Jacklin, 1974).

It has been reported that mothers tend to speak more to girls than to boys (e.g., Cherry & Lewis, 1978). This suggests that the observed gender differences might reflect differences in exposure to language. Gender is a possible contributor to differences in the capacity to learn from input in early childhood (Huttenlocher et al, 1991, 2001). The issue is not completely clear, though, because other investigators report that the amount of parent speech to girls and boys does not differ (Clarke-

Stewart, 1973; Cohen & Beckwith, 1976 ; Schachter, 1979). Although older studies had provided some evidence that girls were more advanced in language acquisition than boys, more recent findings are equivocal. For example, Schachter (1979) compared length of utterances in toddlers matched for age, sex and race and failed to observe significant MLU differences between boys and girls.

Smolak and Weinraub (1983) compared the amount of speech produced by mothers of children with large versus small vocabularies during a brief laboratory play session. They found that the mothers of children with large vocabularies produced significantly more speech. Similarly, Tomasello et al (1986) found a significant correlation between the number of different words and the number of utterances produced by toddlers and their mothers, respectively, in a brief play session. Although these studies suggest the possibility that amount of parent speech may affect vocabulary growth, they do not provide a direct measure of parent speech in its usual context of daily activity, nor do they examine growth in child vocabulary over time. Other studies have compared amount of parent and child speech across social groups. Ethnographic studies (Heath, 1983; Ward, 1971), as well as naturalistic studies where counts of amount of parent speech have been obtained (Cohen & Beckwith, 1976; Schachter, 1979), show that relatively uneducated and economically disadvantaged mothers talk infrequently to their babies compared with more educated and affluent parents. Correspondingly, children of less educated and less affluent mothers produce less speech (Schachter, 1979, Pan et al, 2004). Although studies of variations in amount of parent and child speech suggest that amount of exposure might be related to vocabulary acquisition (as reflected in children's talkativeness), they do not examine children's vocabulary size directly. Hence, the findings may simply show group differences in language use, not differences in the sizes of children's vocabularies.

Moving outside the boundaries of English, it is possible to explore the wide range of variations that can be observed in the language-learning process. With respect to Romance languages (French, Italian, Portuguese, Romanian, Spanish), the acquisition of morphological markers, including those of gender, number and

person, illustrates the different contrasts that children must master. These markers impact on the number of lexical items, within particular categories, that children acquire. In English, for instance, there is one definite (*the*) and two indefinite articles (*a, an*). In French, there are four definite (*le, la les, l'*) and at least three indefinite articles (*un, une, des*). In contrast to children acquiring English, those who acquire French must also learn to rely on a variety of derivational suffixes, depending on the grammatical gender of noun they need to use. In general, the feminine form adds a consonantal sound to the masculine. For example, *peti(t)*; 'little' becomes *petite*; but other masculine words take the feminine form in a different way. The grammatical gender can also be also marked by *er/ère* (*berger/bergère*; 'shepherd'), *ien-ienne* (*chien/chienne*; 'dog'), or *eur/euse* (*chanteur/chanteuse*; 'singer').

It is not quite clear whether language development, or more specifically the development of vocabulary, proceeds in a uniform fashion across languages. There is evidence that, for some languages, the time course of acquisition of the various language categories does not follow in the same fashion, as is the case with English. In contrast to children who learn English, grammatical words are probably the first markers of syntax for the two-year old child learning French. For example, most of the first combinations of words in French include determiners, prepositions and pronouns — and these occur later in English. Also, the two- and three-word combinations produced by French children are quite similar in structure to those produced by adult speakers. Longer combinations are rare before age two and almost always made up of function words (e.g., *et lui c'est le papa* 'and him is daddy'*)*. In addition, children who learn French master the phonological cues to word gender at around 11 months of age (de Boysson-Bardies, 2005). Later on, they are also able to assign gender to nonsense words, marked with the appropriate articles (Karmiloff-Smith, 1979). Although French children are not strikingly precocious in their first words (Vihman et al., 1994), they nonetheless master gender, number and pronoun use at a very early age.

Developmental data in language acquisition are available for Spanish (de Acedo,

1993), Italian (e.g., Camaioni & Longobardi, 1995) and Portuguese (Valian & Eisenberg, 1996) focusing mainly on the earlier stages of acquisition. In French, early work has focused on the acquisition and development of language in a few children (e.g., Grégoire, 1948). More recent work has been concerned with the acquisition of some of the words in the language of children learning French or with the acquisition of a single class of lexical items (e.g., Jakubowicz, Muller, Kang et al., 1996; Girouard, Ricard & Gouin-Décarie, 1997; Bassano et al, 2000, 2005).

Cross linguistic research in child vocabulary development for age 2 to 4 has been limited to the study of very small samples; however the investigation of large language samples would be useful in all languages. In French, only two large language samples to date have been reported for vocabulary development between the ages of 2 and 4 (Grégoire, 1984; Chevrie-Muller et al, 1997)

Issues about individual differences, variability, its nature, time course and stability need to be addressed. Although one may expect similar developmental trends in French as in other languages, large variations may also be predicted with respect to the rich morphology of the French language, particularly during the preschool period when basic grammatical markers (determiners, prepositions, pronouns) in simple sentences begin to emerge.

The Type/Token ratio (TTR, Templin, 1957) is a measure that has been used traditionally to assess lexical diversity. It involves dividing the total number of words (tokens) in a 50-utterance speech sample by the number of different words (types) in the sample. Watkins et al (1995) found that in speech samples of various sizes, the total number of words (TNW) and the number of different words (NDW) were more sensitive estimates of children's lexical diversity. These estimates, derived from conversational speech samples, may thus be the best means we have available to chart children's lexical diversity (Miller, 1991; Klee, 1992).

Utterance length is also a reliable indicator of syntactic complexity and grammatical development that changes predictably with age (Nice, 1925; Blake, Quartaro & Onorati, 1993; Klee, Schaffer, May, Membrino & Mougey, 1989). Miller

and Chapman (1981) observed a strong relationship between chronological age and MLU in a group of 123 English-speaking children aged 18 to 60 months, and reported a mean growth of 1.2 morphemes per year. Rondal, Ghiotto, Brédart and Bachelet (1987) also reported a strong relationship between chronological age and MLU in a group of 21 English children aged 20 to 32 months.

The aim of the present study was therefore to examine lexical and grammatical development in French children between 2 and 4 years of age, in an effort to determine the extent to which the productive lexicon corresponds to that reported for children in the crosslinguistic literature, and analyze the extent of variation in MLU and lexical production, the rate of lexical categories, and the extent to which age, gender and SCL intervene in the acquisition of early language.

METHOD

Participants

316 typically developing children (144 girls and 172 boys) ranging in age from 2 to 4 years participated in this study. Participants were recruited from homes and nurseries in the Paris area, France. Selection of subjects included passing an auditory screening test, scoring in the normal range on an age-appropriate nonverbal cognitive test (Symbolic Play Test; Lowe & Costello, 1976) and being a native speaker of French. The participants' sociocultural level was also assessed using the classification developed by Desrosières, Goy and Thévenot (1983), taking into account the family income, the father's occupation and the mother's level of education. Table 1 shows the distribution of language samples by age group, gender and high/low SCL, in the 20 min language sample.

---------- Insert Table 1 about here ----------

Language sample

Traditionally, two approaches are used to assess language samples in preschoolers: one focuses on a sample of 50 consecutive utterances minimum (e.g., Templin 1957; Rondal & Defay, 1978) the other on the speech produced during a specific amount of time (e.g., Crystal, Fletcher & Garman, 1976; Tyack & Gottsleban, 1977). As the children in our groups were fairly talkative, we have used a 20-min sample-time approach.

Procedure

Each child participated in a dyadic interaction with a familiar adult partner (parent or nursery teacher) either in the child's home, nursery or school. The child and adult were seated at a small table, and the same standardized set of 22 Fisher-Price toys (house, family members, dog, beds, chairs, tables, rocking horse, stroller, cars, staircase) was used with all children.

Transcription and analysis of recorded language samples

Two trained assistants transcribed the recorded language samples following the transcription and segmentation conventions for spoken French (Rondal, Bachelet & Pérée, 1985, Le Normand, 1986, 1991, 1997, 2006) —allowing for the computation of linguistic production as described in the corpus processing system CLAN (Child Language Analysis; Mac Whinney & Snow, 2000). Standard French spelling was used. The entire corpus of the children's productions was fully tagged by an automatic part-of-speech tagger (POST; Parisse & Le Normand, 2000a), followed by individual corroboration and validation of items not provisionally tagged[1].

For each child, *lexical diversity* (number of different words) and *lexical productivity* which is a measure of vocabulary size (total number of words) were obtained. Onomatopoeic words and interjections were not included in the categories. The definition of word classes was from Grevisse (1975) Gougenheim (1958) and the

[1] POST is based on a Markov model of the resolution of ambiguous biclass succession rules. POST uses a training phase on already tagged data and permits carrying out detailed quantitative and qualitative analyses. POST works well with positional or semi-positional languages such as French or English (see Parisse & Le Normand, 2000a, 2000b)

French lexical database (New et al, 2004). The coding of grammatical words (determiners, prepositions, pronouns) followed the CHILDES conventions (Parisse & Le Normand, 2000b). Inter-rater agreement of transcriptions for the word classes was excellent (98%). In addition, MLU in words was also computed from the transcriptions of the language samples. MLU was calculated in words because nearly all the syntactic categories produced by children were transcribed in standard written French, as separate words. As many word endings are silent in French, there are only a small number of syntactic markers that are both included in the written form of a word and pronounced, even in the adult language (e.g., past-participle and infinitive form of verbs, feminine forms of animated beings, first and second plural person of the verb). These forms are not common in French children's language, with the exception of the past-participle and infinitive forms of verbs.

RESULTS

A three way analysis of variance (9 Age group X 2 Gender X 2 High and Low SCL) was conducted in order to determine whether biosocial factors (age, gender, SCL) had any influence on the different measures of language production (Word Type and Token; Verb Type and Token, Grammatical Type and Token and MLU) No significant interaction was found. Linguistic measures failed to reach significance (all p's > .05).

Subsequently, two way analysis of variance (9 Age Group X 2 High and Low SCL) was carried out. Significant interaction was found for MLU ($F_{(8, 298)} = 5,70$ $p < .001$), Word Token ($F_{(8, 298} = 2,13$, $p < .05$) and Word Type ($F_{(8, 298)} = 1,90$, $p < .05$) as well Grammatical Token ($F_{(8, 298)} = 2,64$, $p < .01$). By contrast, no interaction was found for Grammatical Type ($F_{(8, 298} = 1,83$, $p > .05$), Verb Token ($F_{(8, 298)} = 1,80$, $p > .05$) and Verb Type ($F_{(8, 298)} = 1,20$, $p > .05$). French children showed a steep progression in measures of lexical diversity and productivity from 24 to 36 months. During this period, there was a threefold increase in lexicon and a fourfold increase in grammar, using the same Fisher-Price stimuli. Between 3 and 4 years of age, children showed a moderate increase in lexical diversity and productivity. The high SCL children performed better than those from low SCL families. The low SCL

children's lexical production remained stable from 36 months until 48 months. In contrast, there was a substantial increase in the productive lexicon of high SCL children between the ages of 3 and 4.

Tables 2a and 2b show the mean linguistic performance scores for Low and High SCL children by age group.

---------- Insert Table 2a and 2b about here ----------

Another two way analysis of variance (9 Age group X 2 Gender) showed no significant interaction of Gender on lexical diversity and productivity (all ps > .05). Subsequently, one way analysis of variance were undertaken showing significance for Word Token ($F_{(1, 314)} = 6,22$, $p < .01$), Word Type ($F_{(1, 314)} = 5,26$, $p < .05$) Grammatical Type ($F_{(1, 314)} = 5,11$, $p < .05$) and Grammatical Token ($F_{(1, 314)} = 4,59$, $p < .05$) . No significance was found for MLU ($F_{(1, 314)} = 682$, $p > .05$), Verb Type ($F_{(1, 314)} = 2,62$, $p > .05$) and Verb Token ($F_{(1, 314)} = 3,23$, $p > .05$. Such results suggest that girls are generally more talkative than boys. To a certain extent Girls have a more developed lexical and syntactic maturity than boys.

Tables 3a and 3b show the mean scores on linguistic performance for boys and girls by age group

---------- Insert Table 3a, 3b about here ----------

DISCUSSION

In this study, we observed the variations in language production in typically developing French children between the ages of 2 and 4, and investigated the influence of biosocial variables on lexical diversity and productivity. As a whole, the linguistic productivity of French children increased between ages 2 to 3 and stabilized thereafter. However, the results of interest were that SCL was found to impact strongly on the rate of development on most measures of linguistic performance and gender generally accounted for variation in token and type data in

favor of girls, until about 36 mos of age.

The contribution of sociocultural level factor to language production

With respect to the influence of SCL on patterns of language production, our data suggest that environmental determinants contribute strongly to the rate of language acquisition. In most of the language measures considered, and at each age tested, children from higher SCL were always performing better than children from lower SCL families. In this context, SCL reflects the quality of the home environment, the very milieu where language emerges, is encouraged, imitated, shaped and reinforced. In the present study, comparisons showed that multiword utterances are produced earlier in children from high SCL environments. In these children, utterances were also better organized, both lexically and morphosyntactically. High SCL children also showed an earlier start in language production.

Family sociocultural status has consistently been shown to relate positively to children's vocabulary size (Hart & Risley, 1999; Lawrence & Shipley, 1996; Dollaghan et al, 1999; Hoff, 2003; Hoff-Ginsberg, 1998; Tamis-LeMonda et al, 2001). It is clear that exposure to the words of the language is essential to the acquisition of vocabulary. Although previous studies suggest the possibility that variation in exposure within normal limits may affect the rate of vocabulary growth, systematic evidence is lacking. Rate of vocabulary acquisition may vary with amount of exposure because the frequency of word learning trials is important in establishing sound/meaning correspondences. In addition, exposure may have an indirect effect because current knowledge levels, reflecting earlier exposure, may increase the ability to learn new words. This indirect effect of exposure may explain why vocabulary growth shows acceleration during the early stages of acquisition.

The contribution of child gender to language production

With respect to gender differences, the results showed that girls produced more words than boys up to age 3. These developmental differences between girls and boys probably belong to the dynamic part of the language acquisition process. One possible explanation for this difference is that the biological substrates that underlie

lexical production emerge at an earlier age for girls than for boys. Young girls' overall cognitive abilities change more between the ages of 14 and 20 months, whereas boys show a greater change between 20 and 24 months (Fenson et al, 1994). It is also possible that there exist different cognitive styles between boys and girls at this early age, which reflect the differential rearing and attention patterns of parents towards their offspring.

In conclusion, the developmental trends observed in young French preschoolers show similarities with what has been observed in other languages, particularly in English speaking children. In addition, the often-reported gender effect seen in early language acquisition slowed down by age 3 and sociocultural influences were found to shape in important ways the acquisition and development of all aspects of language in this sample of children.

REFERENCES

Acedo (de), B. (1993). The acquisition of specific grammatical morphemes in Spanish. In J.L. Sokolov and C.E. Snow (Eds.), *Handbook of research in language development using CHILDES*. Hillsdale, NJ: LEA.

Bassano, D. (2000). Early development of nouns and verbs in French: exploring the interface between lexicon and grammar. *Journal of Child Language* 27, 521-559.

Bassano, D., Eme, E. & Champaud, C. (2005). A naturalistic study of early lexical development: General processes and inter-individual variations in French children. *First Language*, 25 (1), pp. 67-101.

Bassano, D. (2005). Production naturelle précoce et acquisition du langage : l'exemple du développement des noms. In M. Savelli (Ed.) *Corpus oraux et diversité des approches*, LIDIL, 31, pp. 61-84.

Bates, E., Marchman, V., Thal, D., Fenson, L., Dale, P., Reznick, J.S., Reilly, J., & Hartung, J. (1994). Developmental and stylistic variation in the

composition of early vocabulary. *Journal of Child Language*, 21, 85-123.

Blake, J. Quartaro, G. & Onorati, S. (1993). Evaluating quantitative measures of grammatical complexity in spontaneous speech samples. *Journal of Child Language*, 20, 139-152.

Camaioni, L., & Longobardi, E. (1995). Nature and stability of individual differences in early lexical development of Italian-speaking children. *First Language*, 15, 203-218.

Cherry, L. & Lewis, M. (1978). Differential socialization of girls and boys: Implications for sex differences in language development. In N. Waterson & C. Snow (Eds.), *The development of communication* (pp. 189-197). New York: Wiley.

Clark E (1995) Later lexical development and word formation. In P. Fletcher and B. McWhinney (Eds.) *The Handbook of Child Language* (pp. 293-312). Oxford,UK: Basil Blackwell.

Clarke-Stewart, K. A. (1973). Interactions between mothers and their young children: Characteristics and consequences. *Monographs of the Society for Research in Child Development*, 38: 1-109.

Cohen, S. E. & Beckwith, L. (1976). Maternal language in infancy. Developmental Psychology Monograph, 12 (4), 371-372.

Crystal, D. Fletcher, P. Garman, M. (1976) *The grammatical analysis of language disability*. A procedure for assessment and remediation. New York: Elsevier-North Holland Publishing. Co.

Boysson-Bardies (de), B. (2005). *Comment la parole vient aux enfants*. Paris: Editions Odile Jacob.

Chevrie-Muller, C. Simon; A. M. Le Normand, M. T. & Fournier, S. (1997) *Batterie d'évaluation psycholinguistique pour enfants de 2 ans 9 mois à 4 ans 3 mois (BEPL).* Paris : Editions du Centre de Psychologie Appliquée.

Desrosières, A., Goy, A., & Thévenot, L. (1983). L'identité sociale dans le travail statistique: la nouvelle nomenclature des professions et catégories socioprofessionnelles. *Economie et Statistique*, 152, 55-81.

Dollaghan, C. A., Campbell, T. F., Paradise, J. L., Feldman, H. M., Janosky, J. E., Pitcairn, D. N. & Kurlasky, M. (1999). Maternal education and measures of early speech and language. *Journal of Speech, Language, and Hearing Research*, 42, 1432-43.

Doran, E. W. (1907). A study of vocabularies. *Pedagogical Seminary*, 14, 401-438.

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).

Girouard, P., Ricard, M., & Gouin-Decarie, T. (1997). The acquisition of personal pronouns in French-speaking and English-speaking children. *Journal of Child Language*, 24, 311-326.

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

Gottfried AW, Bathurst K. (1983). Hand preference across time is related to intelligence in young girls, not boys. *Science* , 221(4615), 1074-6

Gottfried AW (1984) Home environment and early cognitive development integration, meta-analyses and conclusions. In A.W. Gottfried (Ed.), *Home environment and early cognitive development: Longitudinal research.* New York: Academic Press.

Gougenheim, G. (1958). *Dictionnaire fondamental de la langue française*. Paris: Didier.

Grégoire, A. (1948). L'apprentissage du langage. *Lingua*, 1, 162-174.

Grégoire, M. N., Rondal, J. A., & Pérée, F. (1984). Aspects morpho-syntaxiques et lexicaux du langage spontané d'enfants de 2 à 5 ans. *Enfance*, 1, 51-65.

Grévisse, M. (1975). *Le bon usage : grammaire française*. Paris: Larousse.

Hart, B. & Risley, T. (1999). *The social world of children: learning to talk*. Baltimore: Paul Brookes.

Heath, S. (1983). *Ways with words: Language, life and work in communities and classrooms*. Cambridge, England: Cambridge University Press.

Hoff, E. (2003). The specificity of environmental influence: socioeconomic status affects early vocabulary development via maternal speech. *Child Development*, 74, 1368-1378.

Hoff-Ginsberg, E. (1998). The relation of birth order and socioeconomic status to children's language experience and language development. *Applied Psycholinguistics,* 19, 603-29.

Huttenlocher, J., Haight, W., Bryk, A., Seltzer, M., & Lyons, T. (1991). Early vocabulary growth: relation to language input and gender. *Developmental Psychology*, 27, 236-248.

Huttenlocher, J., Vasilyeva, M., Cymerman, E. & Levine, S. (2002). Language input and child syntax. *Cognitive Psychology*, 45, 337-374.

Jakubowicz, C., Muller, N., Kang, O. K., Riemer, B., & Rigaut, C. (1996). On the acquisition of the pronominal system in French and German. In A. Stringfellow (Ed.), *Proceedings of the 20th annual Boston University Conference on Language development, Vol. 1*. Somerville, MA: Cascadilla Press.

Karmiloff-Smith, A. (1979). *A functional approach to child language.* Cambridge: Cambridge University Press.

Klee T. (1992). Developmental and diagnostic characteristics of quantitative

measures of children's language production. *Topics in Language Disorders*, 12, 28-41.

Klee, T., Schaffer, M., May, S., Membrino, L., & Mougey, K. (1989). A comparison of the age-MLU relation in normal and specifically language-impaired preschool children. *Journal of Speech and Hearing Disorders*, 54, 226233.

Le Normand, M. T. (1986). A developmental exploration of language used to accompany symbolic play in young normal children (2-4 years old). *Child: Care, Health and Development*, 12, 121-134.

Le Normand, M. T. (1991). La démarche de l'évaluation psycholinguistique chez l'enfant de moins de 3 ans. *Glossa*, 26, 14-21.

Le Normand, M. T. (1997). Early morphological development in French children. In A. S. Olofsson & S. Strömqvist (Eds). *Learning disorders as a barrier to human development: Cross-linguistic studies of dyslexia and early language development*., Luxembourg: Office for official publication of the European Communities.

Le Normand, M. T. (2006). Premiers mots et émergence des categories syntaxiques chez l'enfant, in Société de Neurophysiologie Clinique de Langue Française, Neurophysiologie du langage, Paris, Elsevier, SAS, 31-46.

Lawrence, V. W. & Shipley, E. F. (1996). Parental speech to middle- and working class children from two racial groups in three settings. *Applied Psycholinguistics*, 17, 233-255.

Lieven, E. V., Pine, J. M., & Dresner Barnes, H. (1992). Individual differences in early vocabulary development: redefining the referential-expressive distinction. *Journal of Child Language*, 19, 287-310

Lowe, M. & Costello, A. J. (1976) *Manual for the symbolic play test, experimental edition*. NFER, Nelson Publishing Company, Windsor,

Berkshire, 1976.

Maccoby, E. & Jacklin, C. N. (1974). *The psychology of sex differences*. Stanford, CA: Stanford University Press.

MacWhinney, B. & Snow C (2000). *The CHILDES project: Tools for analyzing talk, Third edition. Volume I: Transcription format and programs*. Mahwah, NJ: Lawrence Erlbaum Associates.

Miller J. F. & Chapman, R. S. (1981). The relation between age and mean length of utterances in morphemes. *Journal of Speech and Hearing Research*, 24, 154-161.

Miller, J. F. (1991) Quantifying productive language disorders. In J. Miller (ed.) *Research on child language disorder. A decade of progress* (pp 211-220). Austin-Tx. Pro-ed.

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

New, B., Pallier, C., Brysbaert, M., Ferrand, L. (2004). Lexique 2 : A New French Lexical Database. *Behavior Research Methods, Instruments, & Computers*, 36, 516-524.

Nice, M. (1925). Length of sentences as a criterion of the child's progress in speech, *Journal of Educational Psychology*, 16, 370-379.

Pan, B., Rowe, M. L., Spier, E., & Tamis-Lemonda, (2004). Measuring productive vocabulary of toddlers in low-income families: concurrent and predictive validity of three sources of data. *Journal of Child Language* 31, 587-608.

Parisse, C. & Le Normand, M. T. (2000a) How children build their morphosyntax: The case of French. *Journal of Child Language*, 27, 287-292.

Parisse, C. & Le Normand, M. T. (2000b) Fully automatic disambiguation of the

morphosyntax in young children. *Behavior Research, Methods, Instruments and Computers*, 32, 468-481

Reznick, J. S. & Goldfield, B. A. (1992). Rapid change in lexical development in comprehension and production., *Developmental Psychology*, 28 (3), 406-413.

Roberts, J. E., Burchinal, M. & Durham, M. (1999). Parent's report of vocabulary and grammatical development of African American preschoolers: child and environmental associations. *Child Development*, 70, 92-106.

Rondal, J. A. & Defay, D. (1978). Reliability of mean length of utterance as a function of sample size in early language development. *Journal of Genetic Psychology*, 133, 305-306.

Rondal, J. A., Bachelet, J.-F., & Pérée, F. (1985). Analyse du langage et des interactions verbales adulte-enfant. *Bulletin d'Audiophonologie*, 5, 507-535.

Rondal, J. A., Ghiotto M., Bredart S., Bachelet J. F. (1987). Age-relation, reliability and grammatical validity of measures of utterance length. *Journal of Child Language.*14, 433-446.

Schachter, F. F. (1979). *Everyday mother talk to toddlers: Early intervention*. San Diego, CA: Academic Press.

Smolak, L. & Weinraub, M. (1983). Maternal speech: Strategy or response? *Journal of Child Language*, 10, 369-380.

Tyack, D. & Gottsleban, R. (1977). *Language sampling, Analysis and training*. Palo Alto, CA.: Consulting Psychologists Press. Tamis-LeMonda, C. S., Bornstein, M. H. & Baunwell, L. (2001). Maternal responsiveness and children's achievement of language milestones*. Child Development*, 72, 748-767.

Templin, M.C. (1957). *Certain language skills in children: Their development and interrelationships*. Child Welfare Monograph. N.26. Minneapolis:

University of Minnesota Press.

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

Valian, V., & Eisenberg, Z. (1996). The development of syntactic subjects in Portuguese-speaking children. *Journal of Child Language*, 23, 103-128.

Valian, V. (1999). Input and language acquisition, Handbook of child language Acquisition, 497-530, W Richtie & T.K.Bathia (eds), San Diego, CA: Academic Press.

Vihman, M., Kay, E., de Boysson-Bardies, B., Durand, C., & Sundberg, U. (1994). External sources of individual differences? A cross-linguistic analysis of the phonetics of mothers' speech to 1-year-old children. *Developmental Psychology*, 30, 651-662.

Watkins, R. V. Kelly, D. J. Harbers, M. M. (1995). Measuring children's lexical diversity: differentiating typical and impaired language learners. *Journal of Speech and Hearing Research*, 38, 1349-1355.

Ward, M. C. (1971) *The children: a study of language learning*., New York: Holt.

Wells, G. (1985). *Language development in the pre-school years*. New York: Cambridge University Press.

Table 1

Distribution of language samples by age. gender and sociocultural level

Age in months (mo)	24 mo	27 mo	30 mo	33 mo	36 mo	39 mo	42 mo	45 mo	48 mo
Girls	19	14	15	15	18	12	20	17	14
Boys	21	17	21	21	22	21	14	17	18
High SCL	18	17	18	21	22	22	16	21	16
Low SCL	22	14	18	15	18	11	18	13	16

Table 2a

Language production by Socio Cultural Level and age (mean and standard deviation for High SCL)

Age in months (mo)	24 mo	27 mo	30 mo	33 mo	36 mo	39 mo	42 mo	45 mo	48 mo
Word Type[c]									
Mean	52.61	76.29	98.94	148.23	165.81	241.45	196.56	172	219.5
SD	*29.342*	*41.566*	*42.326*	*44.455*	*44.987*	*370.195*	*78.446*	*64.14*	*54.75*
Word Token[c]									
Mean	129.22	237.52	250.16	429	478.13	486.95	574.5	487.85	613.06
SD	*83.628*	*162.563*	*153.43*	*160.072*	*216.997*	*257.654*	*381.772*	*271.089*	*234.77*
Verb Type[d]									
Mean	15.16	25.17	28.11	44.23	50.77	53.50	61.25	51.57	68.75
SD	*9.883*	*15.424*	*14.696*	*16.465*	*14.422*	*20.655*	*27.353*	*23.462*	*18.657*
Verb Token[d]									
Mean	33.50	62.17	63.88	114.61	123.90	125.27	146.06	123.28	153.62
SD	*23.692*	*41.393*	*39.166*	*40.979*	*57.919*	*59.682*	*93.191*	*67.288*	*56.584*
Grammatical Type[d]									
Mean	9.61	18.82	23.77	35.57	39.81	38.59	45.25	39.61	50.12
SD	*7.163*	*10.725*	*11.123*	*8.4*	*10.97*	*10.64*	*13.849*	*11.855*	*8.838*
Grammatical Token[b]									
Mean	24.83	66.58	82.33	153.19	175.36	170.81	213.93	169.23	227.62
SD	*27.929*	*64.238*	*58.177*	*63.484*	*79.172*	*85.585*	*135.908*	*91.055*	*81.278*
MLU[a]									
Mean	1.66	2.47	2.73	3.49	3.83	3.71	4.27	3.81	4.52
SD	*0.3*	*0.801*	*0.606*	*0.622*	*0.701*	*0.422*	*0.927*	*0.657*	*0.887*

[a] $p<.001$; [b] $p<.01$; [c] $p<.05$; [d] $p>.05$

Table 2b

Language production by Socio-Culturel Level (mean and standard deviation for Low SCL)

Age in months (mo)	24 mo	27 mo	30 mo	33 mo	36 mo	39 mo	42 mo	45 mo	48 mo
Word Type[c]									
Mean	34.40	45.57	77.55	98.93	108.61	119.45	134.38	139.38	116.56
SD	*20.768*	*15.481*	*37.847*	*32.871*	*45.083*	*25.121*	*58.791*	*67.122*	*52.19*
Word Token[c]									
Mean	84.04	112.14	191.83	261.73	290.22	381.45	358.44	423.30	292.43
SD	*73.806*	*39.358*	*102.156*	*123.984*	*143.902*	*167.164*	*261.184*	*358.321*	*198.107*
Verb Type[d]									
Mean	8	12	24.88	29.40	34.27	38.63	38.27	44.69	38.50
SD	*6.226*	*6.668*	*13.957*	*13.616*	*17.822*	*9.49*	*19.884*	*22.164*	*19.442*
Verb Token[d]									
Mean	17.31	23.78	52.27	72.93	77.33	118.09	92.22	116.69	75.75
SD	*16.404*	*12.963*	*34.583*	*44.636*	*46.653*	*49.294*	*65.643*	*94.100*	*41.717*
Grammatical Type[d]									
Mean	3.81	7.92	17.22	23.80	26.27	29.72	31.27	33.92	27.68
SD	*3.473*	*2.615*	*9.771*	*9.451*	*11.462*	*7.695*	*12.671*	*12.665*	*10.461*
Grammatical Token[d]									
Mean	9	22.42	52.83	87.8	100.61	122	130.38	160.38	108.93
SD	*12.74*	*9.866*	*40.756*	*53.015*	*60.47*	*52.93*	*94.871*	*129.887*	*74.668*
MLU[a]									
Mean	1.28	1.59	2.12	2.72	2.80	3.03	3.14	3.95	3.46
SD	*0.21*	*0.368*	*0.581*	*0.597*	*0.799*	*0.374*	*0.907*	*0.676*	*0.699*

[a] $p<.001$; [b] $p<.01$; [c] $p<.05$; [d] $p>.05$

Table 3a

Language production by gender and age (mean and standard deviation for boys)

Age in months (mo)	24 mo	27 mo	30 mo	33 mo	36 mo	39 mo	42 mo	45 mo	48 mo
Word Type [d]									
Mean	35.86	51.23	80.24	120.48	129.36	229.48	175.21	168.18	142.78
SD	*19.93*	*18.18*	*45.15*	*44.79*	*49.11*	*382.62*	*75.30*	*72.62*	*62.75*
Word Token [d]									
Mean	80.095	172.82	199.47	319.19	353.41	451.76	513.64	518.70	361.06
SD	*61.67*	*146.91*	*153.38*	*140.52*	*158.08*	*244.62*	*349.19*	*367.91*	*195.91*
Verb Type [d]									
Mean	8.81	16.88	24.05	37.05	41.64	50	51.5	51.05	44.33
SD	*6.91*	*12.45*	*15.58*	*15.96*	*18.66*	*20.92*	*25.95*	*25.40*	*19.34*
Verb Token [d]									
Mean	18.05	41.35	51.67	92.52	99.41	127.57	130.86	130.06	93.67
SD	*16.44*	*37.34*	*39.25*	*48.15*	*50.24*	*58.08*	*84.43*	*91.15*	*51.29*
Grammatical Type [d]									
Mean	4.71	12.23	17.38	28.47	31.73	35.90	38.57	38.41	35.33
SD	*3.63*	*8.75*	*10.52*	*10.48*	*12.55*	*11.72*	*15.90*	*12.48*	*14.99*
Grammatical Token [d]									
Mean	9.62	40.71	58.47	108.38	129.54	157.62	192	185.41	141.16
SD	*9.80*	*56.78*	*59.56*	*54.15*	*66.48*	*87.22*	*123.61*	*127.92*	*78.43*
MLU [d]									
Mean	1.36	2.04	2.28	3.18	3.38	3.57	3.73	3.92	3.93
SD	*0.25*	*0.79*	*0.70*	*0.85*	*1.01*	*0.49*	*0.96*	*0.71*	*1.09*

[d] $p > .05$

Table 3b

Language production by gender and age (mean and standard deviation for girls)

Age in months (mo)	24 mo	27 mo	30 mo	33 mo	36 mo	39 mo	42 mo	45 mo	48 mo
Word Type [d]									
Mean	50.05	76	99.47	137.8	153.17	150.58	155.55	150.88	200.5
SD	*30.74*	*46.41*	*32.64*	*48.67*	*55.93*	*40.33*	*75.01*	*60.18*	*77.16*
Word Token [d]									
Mean	131.21	190.71	251.13	415.47	442.667	451.83	422.65	407.65	570.64
SD	*91.70*	*128.86*	*90.36*	*188.31*	*252.83*	*225.30*	*331.50*	*219.85*	*308.77*
Verb Type [d]									
Mean	13.89	22.07	29.93	39.47	45.44	46	47.4	46.82	65.57
SD	*9.91*	*15.26*	*11.70*	*18.51*	*17.15*	*15.39*	*26.67*	*20.62*	*25.26*
Verb Token [d]									
Mean	31.84	49.07	67.07	103.87	107.28	114.67	108.25	111.47	141.71
SD	*24.13*	*37.35*	*32.43*	*45.66*	*66.55*	*52.85*	*83.09*	*61.89*	*67.79*
Grammatical Type [d]									
Mean	8.32	15.93	24.87	33.73	36.17	35.17	37.35	36.47	43.5
SD	*7.68*	*10.78*	*10.03*	*10.11*	*13.43*	*8.50*	*14.43*	*12.43*	*13.84*
Grammatical Token [d]									
Mean	23.32	53.86	80.33	150.53	156.61	149.17	154.1	146.30	203.14
SD	*29.21*	*47.51*	*36.32*	*77.07*	*93.63*	*65.10*	*121.12*	*76.68*	*111.15*
MLU [d]									
Mean	1.56	2.12	2.63	3.17	3.36	3.33	3.64	3.81	4.07
SD	*0.41*	*0.77*	*0.57*	*0.48*	*0.77*	*0.52*	*1.16*	*0.61*	*0.76*

[d] $p > .05$