

Bilingual Language Acquisition in Children Exposed to a Signed and a Spoken Language from Birth

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ABSTRACT: Divergent hypotheses exist concerning the types of knowledge underlying early bilingualism, with some portraying a troubled course marred by language delays and confusion, and others portraying one that is largely unremarkable. Three French & English young bilinguals were compared to an extraordinary group of bilinguals: three hearing children acquiring a signed and a spoken language, Langue des Signes Québécoise (LSQ) & French. The Results showed that both groups (1) achieved the classic milestones in each language at approx the same time, and followed the same course as monolinguals, (2) exhibited comparable rates of lexical development in each language over time, (3) differentiated between their two lexicons from their earliest use of words (signs) in each of their languages ("translation equivalents"), (4) altered their language choice depending upon interlocutor's language ("interlocutor sensitivity"), and (5) produced language mixing rates that reflected parental mixing rates. (6) LSQ-French children produced signs & words simultaneously, but they were highly patterned. We conclude that the young bilingual's capacity to differentiate between its two languages is in place prior to first words, and we hypothesize that this capacity may derive from mechanisms that enable the establishment of early phonological representations¹

1. Petitto, L. A. Katerelos, M., Levy, B. G., Gauna, K., Tétreault, K., & Ferraro, V. (1999, submitted). Bilingual signed and spoken languages acquisition from birth: Implications for the mechanisms underlying early bilingual language acquisition.

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ABSTRACT

Divergent hypotheses exist concerning the types of knowledge underlying early bilingualism, with some portraying a troubled course marred by language delays and confusion, and others portraying one that is largely unremarkable. Three French & English young bilinguals were compared to an extraordinary group of bilinguals: three hearing children acquiring a signed and a spoken language, Langue des Signes Québécoise (LSQ) & French. The Results showed that both groups (1) achieved the classic milestones in each language at approx the same time, and followed the same course as monolinguals, (2) exhibited comparable rates of lexical development in each language over time, (3) differentiated between their two lexicons from their earliest use of words (signs) in each of their languages ("translation equivalents"), (4) altered their language choice depending upon interlocutor's language ("interlocutor sensitivity"), and (5) produced language mixing rates that reflected parental mixing rates. (6) LSQ-French children produced signs & words simultaneously, but they were highly patterned. We conclude that the young bilingual's capacity to differentiate between its two languages is in place prior to first words, and we hypothesize that this capacity may derive from mechanisms that enable the establishment of early phonological representations¹

BACKGROUND

Divergent Perceptions: "The Bilingual Paradox"

Bilingualism is good...is bad

Divergent Hypotheses: Types of Knowledge

a. One-System Hypothesis²

Young bilinguals begin with a single, fused linguistic representation of two languages that differentiates over time

Evidence: Different developmental rates of two languages; language mixing

b. Two-System Hypothesis³

Young bilinguals possess two representations of their two languages, although precisely when this occurs is not known because subjects are typically in the two-word stage (after 18 months)

Evidence: Patterned nature of language mixes; interlocutor sensitivity

OBJECTIVES

What is the Knowledge Underlying Early Bilingual Language Acquisition?

A. Is infant bilingual acquisition fundamentally similar to monolingual acquisition or is it "delayed?"

Examined: Timing Milestones; Lexical Rate & Growth

B. Do young bilinguals differentiate their two lexicons? When does this begin?

Examined: Translation Equivalents

C. Is language mixing an index of language "confusion?"

Examined: Relationship between Child Mixing & Parental Mixing; Interlocutor Sensitivity; Sequential & Simultaneous Language Mixing

INNOVATIONS

First-Time Empirical Study Of Bilingual Infants from ages 10 months, in addition to comparative analyses with older bilingual children

Unique Population

TYPICAL BILINGUALS

2 Spoken Languages

Exclusively Sequential Production of Words

UNIQUE BILINGUALS

1 Signed & 1 Spoken Language

Potentially Possible Simultaneous Sign & Speech

Will children exploit this possibility?

Principled or Confused?

PREDICTIONS

Fresh Insights From Signing-Speaking Bilinguals

Once the physical constraint of the mouth is removed, these children should exploit the dual modality possibilities in ways that provide fresh insights into the knowledge underlying all bilingual acquisition

One-System Hypothesis

Delay: Should exhibit differential rates across sign & speech due to maturational differences between hands & tongue

Confusion

Interlocutor Sensitivity: Should randomly flip from one language to the other
Language Mixing: Should exhibit no internal systematic patterns

Two-System Hypothesis

Delay: Should show no delay

Confusion

Interlocutor Sensitivity: Should exhibit a patterned relationship between language choice & adult language

Language Mixing: Simultaneous language mixing may exist, but it should exhibit internal systematic patterns

SUBJECTS

6 Hearing Children: 3 LSQ & French, 3 French & English

Studied over 1 year: 6 months approx reported here

	Language	Sex	Ages studied From - To Approximate
Cell 1	LSQ & Fr Fr & Eng	M F	10 mths- 2;0 yrs
Cell 2	LSQ & Fr Fr & Eng	F F	2;5 yrs- 3;5 yrs
Cell 3	LSQ & Fr Fr & Eng	F M	3;5 yrs- 4;5 yrs

METHODS 1

Data Collection

Cell 1: Videotaped every month until "first-word" in each language, then every three months

Cells 2 & 3: Videotaped every three months

5 Conditions: *Experimental Manipulation of "Speakers" & Contexts*

Condition	Goal
1) Multiple "Speakers" Open	Lang. choice in uncontrolled context
2) a. Mother Alone	Lang. choice to familiar (one Lang.)
b. Father Alone	Lang. choice to familiar (other Lang.)
3) Novel Exp. Language 1	Lang. choice to unfamiliar (one L.)
4) Novel Exp. Language 2	Lang. choice to unfamiliar (other L.)
5) Multiple "Speakers" Closed	Lang. Choice in controlled context or "Competition task"

Additional: Experimenter Records & Parental MacArthur CDI

METHODS 2

Transcription & Coding

Cell 1 Fully transcribed

Cells 2 & 3 Standard sampling: 3 minutes of every condition

Criteria for Lexical Attribution

Applied Equally Over Vocal & Manual Productions⁴

- form used in relation to a referent across contexts (extension/intension)
- form minimally had one phonetic unit in common with adult form
- form had a similar pattern of syllabification and stress to adult form

Criteria for Coding & Analyzing Language Use & Mixing

For All Sampled Utterances

- Number of words produced by the child in each of its languages (language indistinguishable = "neutrals")
- Addressed of each utterance and addressed to primary language
- Language(s) that adult had just used with the child

Cells 2 & 3 Additional Analyses for Utterances Containing Language Mixing in Children and Adults

- Sequential mixing (lexicon from one, followed by lexicon from other); all children
- Simultaneous mixing (two lexicon items produced at the same time); LSQ-French only
 - Simultaneous Sign & Word with same meaning = "congruent"
 - Simultaneous Sign & Word with different meaning = "incongruent"

RESULTS 1

All French-English and LSQ-French Children

- Achieved the classic milestones in each language at approx the same time, and followed the same course as monolinguals (Fig. 1)
- Demonstrated relatively comparable rate and growth of lexical development in each language over time. Only French-English children produced "neutrals," as modality differences aided language differentiation across LSQ and French (Fig. 2)
- Differentiated between their two lexicons from their earliest use of words (signs) in each of their languages, see "translation equivalents" (different words/signs from each language with the same meaning; Table 1)⁵
- Altered their language choices depending upon interlocutor's language ("interlocutor sensitivity"); despite a tendency for LSQ-French children to use mixed utterances to all addressees, they demonstrated a clear sensitivity to interlocutor by increasing and decreasing both the amounts of mixed utterances and its language content to match the specific language patterns of a particular interlocutor (Fig. 3)
- Produced language mixing rates that reflected parents' mixing rates (Fig. 4)

RESULTS 2: MIXING

- All Children Produced Mixing That Was Patterned & Systematic. LSQ-Fr children did exploit the modality, but it was highly patterned

FRENCH-ENGLISH MIXING, TABLE 2

Low frequency (2% of each child's utterances); Sequential only

- "Host" language, plus 1 or 2 words from "guest" language⁶
- Guest words not mixed in randomly; Semantically coherent
- Guest words content words (nouns, verbs, adv, adj), but not other syntactic classes (e.g., pronouns)

LSQ-FRENCH MIXING, TABLE 3

High frequency (19%, C 2; 44%, C 3); Seq. (10%) and Simultaneous (90%)

- Lexicon mixed at same time
- Lexicon not mixed in randomly; Semantically coherent
- Lexicon mixed were content words, but not other syntactic classes (as above)

Congruent Mixes - Most Frequent, All semantically coherent

Incongruent Mixes - Least Frequent, All semantically coherent

Type A: Different lexicon/grammatical class produced simultaneously (T3, A)

Type B: Same lexicon/grammatical class produced simultaneously (T3, B)

KEY: Grammar of each distinct language is preserved

SUMMARY

Given All Children's

Capacity to differentiate between their two languages from their earliest attempts at language production

Comparable rates of lexical development in each language over time

Change in language choice & mixing rates depending upon parental mixing rates, child's interlocutor sensitivity and emerging language preference¹

CONCLUSIONS

We conclude

that the young bilingual's capacity to differentiate between its two languages is in place prior to first words. We hypothesize that this capacity may be built up from mechanisms discovered in all infants that are sensitive to distributional and temporal patterns in the input⁷, which in turn may provide the child with the data necessary to build early phonological representations. In Petitto et al.¹ we provide additional details about how these mechanisms might develop in the bilingual infant, and we offer suggestions about why the contradictory views of bilingual acquisition have persisted

Fig. 1. Linguistic Milestones: French-English and LSQ-French Cell 1 children

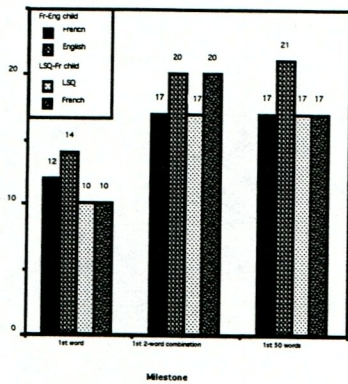


Fig. 2. Types of words or signs produced in sessions over time: (a) French-English and (b) LSQ-French Cell 1 Children

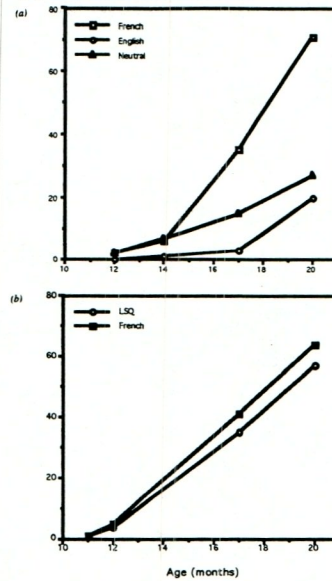


Fig. 3. Language of utterances addressed to each interlocutor

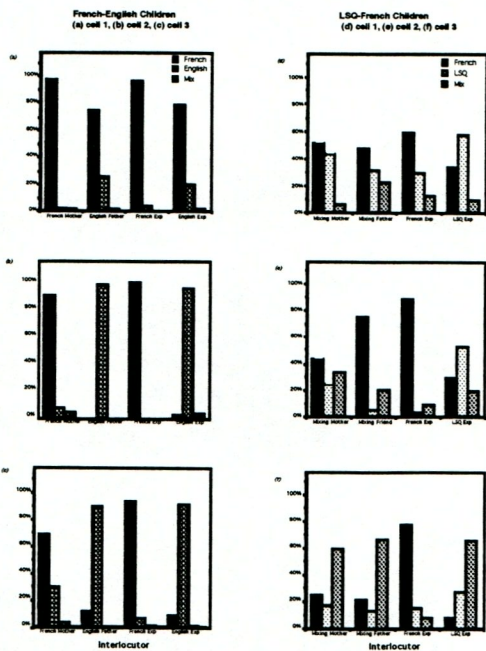


Fig. 4. Child and parent language use: (a) & (b) French-English cell 1, (c) & (d) LSQ-French cell 2

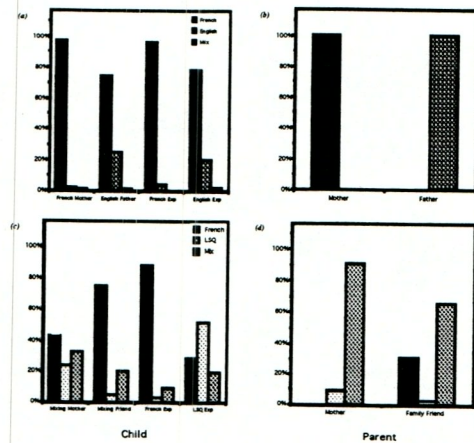


Table 1. Total vocabulary and translation equivalent (TE) percentages for Cell 1 children, and Pearson subjects* matched for age and vocabulary.

Subject	Age	Total Vocab	TE
Cell 1	1;02	22	50%
French-English	1;05	106	36%
Cell 1	1;02	41	40%
LSQ-French	1;05	198	51%
Pearson subject 6A	1;02	27	50%
English-Spanish	1;06	82	36%
Pearson subject V7	1;03	27	41%
English-Spanish	1;06	127	36%

*Pearson subject data from Pearson, Fernandez, & Oller (1995)

Table 2. Sample of French-English children's utterances containing language mixing.

Child to French Addressee	Child to English Addressee
1. Regarde ça c'est un cookie 'Look that is a cookie '	5. Bien . I go get another toy 'Good, I go get another toy'
2. Maman toi fais un curtain 'Mommy you make a curtain '	6. Daddy he's quarante-et-un 'Daddy he's forty-one '
3. Avec le prince va faire des glass slippers hein? 'With the prince will make some glass slippers eh?'	7. A soleil 'A sun '
4. Un tail 'A tail '	8. A bébite 'A bug '

Table 3. Sample of LSQ-French children's utterances containing language mixing.

A. Mixed utterances involving simultaneous mixing of semantically incongruent lexical items ^a		French - lowercase LSQ - UPPERCASE
tiens puis du jus → BOIS JUS	'here and some juice' → 'DRINK JUICE'	
ça brule → MAIN	'it burns' → 'HAND'	
la vaisselle → LAVER	'the dishes' → 'WASH'	
B. Mixed utterances containing dual language-specific syntax ^b		
mon chien → CHIEN MON	'my dog' → 'DOG MY'	
vache petite vache → PETITE VACHE VACHE	'cow small cow' → 'SMALL COW COW'	
hé regarde, toi papa → HE, PAPA TOI	'hey look, you daddy' → 'HEY, DADDY YOU'	
pas vu l'eau → VU PAS	'not see the water' → 'SEE NOT'	

^asemantically incongruent items in color
^blanguage-specific syntax in color

SELECT REFERENCES & NOTES

1. Petitto, L. A., Katerelos, M., Levy, B. G., Gauna, K., Tétreault, K., & Ferraro, V. (1999, submitted). Bilingual signed and spoken language acquisition from birth: Implications for the mechanisms underlying early bilingual language acquisition. For pre-prints please write to L. A. Petitto at petitto@hebb.psych.mcgill.ca
2. For example, Volterra, V. & Taeschner, T. (1978). The acquisition and development of language by bilingual children. *Journal of Child Language*, 5, 311-326; Redlinger, W. E. & Park, T. (1980). Language mixing in young bilinguals. *Journal of Child Language*, 21, 517-542; Vihman, M. M. (1985). Language differentiation by the bilingual infant. *Journal of Child Language*, 12, 297-324.
3. For example, Genesee, F. (1988). Early bilingual development: One language or two? *Journal of Child Language*, 16, 161-179; Meisel, J. (1989). Early differentiation of languages in bilingual children. In K. Hyltenstam & L. Oller (Eds.) *Bilingualism across the lifespan*. Cambridge, England: Cambridge University Press; Lanza, E. (1992). Can bilingual two-year olds code-switch? *Journal of Child Language*, 19, 633-658; Quay, S. (1992). "Explaining language choice in early infant bilingualism." Paper presented at the 9th Sociolinguistics Symposium, University of Reading, England; Genesee, F., Nicoladis, E. & Paradis, J. (1995). Language differentiation in early bilingual development. *Journal of Child Language*, 22, 611-631; Pearson, B. Z., Fernandez, S. C., & Oller, D. K. (1995). Cross-language synonyms in the lexicons of bilingual infants: One Language or two? *Journal of Child Language*, 22, 345-367; Quay, S. (1995). The bilingual lexicon. Implications for studies of language choice. *Journal of Child Language*, 22, 369-387. See especially Genesee (1988) for an excellent review of these two classes of hypotheses.
4. For a full discussion of the criteria for lexical attribution see Petitto, L. A. (1988). "Language" in the pre-linguistic child. In F. Kessel (Ed.). *Development of language and language researchers: Essays in honor of Roger Brown*. Mahwah, New Jersey: Lawrence Erlbaum Associates. Pp.187-221. See also the excellent paper by Vihman, M. M. & McCune, L. (1994). When is a word a word? *Journal of Child Language*, 21, 517-542.
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6. For example, Grosjean, F. (1988). Exploring the recognition of guest words in bilingual speech. *Language and Cognitive Processes*, 3, 233-274. Lanza, E. (1997). *Language mixing in infant bilingualism: A sociolinguistic perspective*. Oxford, England: Clarendon Press.