



Bilingual Babies' Maturational and Linguistic Milestones as a Function of Their Age of First Exposure to Two Languages

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INTRODUCTION

QUESTIONS

- Are there maturational ages when exposing a child to two languages is most optimal?
- When is it most safe to expose young children to two languages?
Is **early** exposure always better than **later**?
Is **later** bilingual language exposure safer than **early** bilingual exposure (permitting at least one language to take hold)?
- How does linguistic context interact with maturational ages in development as revealed through the rate and extent of bilingual language mastery?

THE BILINGUAL PARADOX

Scientists, educators and parents equally fall prey to it, but in different ways
Children acquire multiple languages effortlessly if exposed in early life
versus
Exposing children to a New language too early will cause developmental language delay

VIEWS

Neuroscience ONLY EARLY IS GOOD
Early exposure, alone, is the critical factor to achieve full dual language mastery

Education THE WITHHOLDING POLICY
Do not expose a child to a New language until the first one is fully established
Bilingual exposure is detrimental
A new language contaminates the old

PREDICTIONS

Neuroscience If learning two languages **early**, alone, is the only factor critical to full bilingual language mastery, then all later exposed children should perform poorly
Education If **THE WITHHOLDING POLICY** is correct, then the older a child has bilingual exposure, the better their bilingual language mastery should be
If bilingual language acquisition is generally detrimental/contaminating, then the introduction of a new language should hurt the old

SUBJECTS

Bilingual children were studied at four key maturational ages, varying number of years into the first bilingual language exposure (first or second year), across three linguistic contexts (Home, Linguistic Community, and Instructional), and four language sets: French & English, Russian & English, Spanish & French, signed Language des Signes Quebecoise (LSQ) & spoken French, (N=15 children, three sessions each, over 6 months, Table 1)

Child	Age of Bilingual Exposure	# of Years into Exposure	Context	Language
Stephanie	5:1	1	Home	French-English
Chantale	5:1	1	Home	LSQ-French
Annabelle	5:1	1	Linguistic Community	LSQ-French
Marie	2:3	1	Linguistic Community	English-French
Neil	2:3	2	Linguistic Community	Russian-French
Elise	4:4	1	Linguistic Community	French-English
Dege	4:4	2	Linguistic Community	Spanish-French
Sally	4:4	2	Linguistic Community	English-French
Marie	4:4	2	Linguistic Community	Spanish-French
Felix	7:9	1	Linguistic Community	Spanish-French
Carole	7:9	1	Linguistic Community	Spanish-French
Nina	7:9	2	Linguistic Community	French-French
Clélie	7:9	1	Instructional	French-English
Jacqueline	7:9	2	Instructional	French-English
Francine	7:9	2	Instructional	French-English

Groups

- Group (i) bilingual from birth
- Group (ii) monolingual from birth and then bilingual (New language) from ages 2-3
- Group (iii) bilingual from ages 4-6
- Group (iv) bilingual from ages 7-9

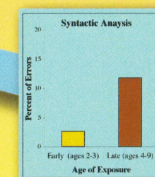
Definitions

Home = Two Languages spoken
Linguistic Community = Intensive New Language external to home, multiple contexts
Instructional = New Language in classroom only

RESULTS

Phonology — Early bilinguals had native phonological productions in each language. Late bilinguals had non-native phonology in their New language Table 3

Phonological Categories	Early (Ages 2-3)	Late (Ages 4-9)
Accurate stress assignment/intonation	YES	NO
Accurate production of Consonants	YES	NO
Accurate production of Vowels	YES	NO
High Lengthened Vowels	YES	NO



Syntax — Early bilinguals had significantly less syntactic errors in their New language as compared to Late bilinguals (Kruskal-Wallis test: $c^2 = 4.23$, $p < 0.05$) Figure 2

Morphology — All children (all ages) had adult-like morphological speech categories in their New language, including those after only 6-7 months of bilingual exposure Figure 1a

This is not so for children in Instructional contexts Figure 1b

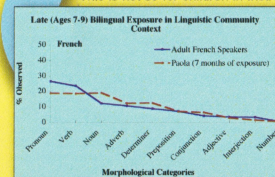


Figure 1a An older Spanish child's distribution and proportion of morphological categories in her New language, French, relative to Adult native French speakers

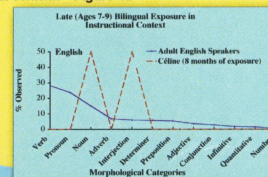


Figure 1b An older French child's distribution and proportion of morphological categories in her New language, English, relative to Adult native English speakers

Are Young Bilingual Babies Delayed? — NO
Babies exposed to two languages during the first year of life achieve linguistic milestones in each language on the identical time course, and the same as monolinguals¹⁻⁴ Table 2

Bilingual Baby	Language	Monolingual Norm
Stephanie	English	French
1 st word milestone	0:11	0:11
2 nd word milestone	0:11	0:10-1:01
Chantale	LSQ	French
1 st word milestone	0:11	1:00
2 nd word milestone	0:11	0:10-1:01
Annabelle	LSQ	French
2 word combination milestone	1:08	1:08
3 word combination milestone	1:06-2:00	1:06-2:00



Does the introduction of a New Language hurt the old? — NO

For all children, the onset of a new language did not disrupt the structure of the Home language Figure 3

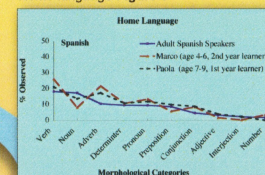


Figure 3 The children's distribution and proportion of morphological categories in their Home language, Spanish, relative to adult native Spanish speakers, after 1 and 2 years of bilingual exposure

METHODS

Bilingual babies from birth

Are bilingual babies delayed in the achievement of universal language milestones?

Core grammatical properties universal to world Languages in each of a child's two languages were assessed

Phonology - finite set of meaningless units, and their combinatory rules, from which all words are formed, including vowels & consonants; also, stress & intonation patterns

How patterned is the use & quality of phonological features in each language?

Morphology - smallest meaningful units of language (words & parts of words, such as nouns, verbs, functors, e.g., prepositions)

Is the distribution of children's use of morphological speech categories in each language comparable to native adult distributions, using standard empirical methods?

Syntax - patterned arrangement of words

What is the proportion of syntactic errors in each language?

CONCLUSIONS

Neuroscience Early bilingual exposure is good

Bilingual language exposure in younger versus older children is highly optimal

Neuroscience Is early exposure, alone, crucial? NO

Context of bilingual exposure interacts with age

Contrary to a prevailing view in neuroscience that early brain experience is a must, nature's window of opportunity extends beyond early life for some select parts of language (morphology): A child's two morphological systems can and will flourish—even if exposure comes at relatively late ages (ages 7-9) but only if the learning context permits extensive exposure to both languages. Instructional exposure is **not** optimal

Education & the Withholding Policy Is later bilingual exposure better than early? NO

Early bilingual language acquisition is neither detrimental nor contaminating

Introduction of the New Language does not hurt the old

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Footnote

Δ All of the comparisons between the Adults and bilingual children's morphological category distributions were analyzed using Pearson Correlations. The correlation coefficients are presented in the Appendix

Appendix Correlation Coefficients

Age Group	Context	# of Years into Exposure	Child	New Language Sessions			Home Sessions		
				1	2	3	1	2	3
2-3	Linguistic Community	1	Marie	.88**	.88**	.88**	.88**	.88**	.88**
		2	Irani	.88**	.88**	.88**	.88**	.88**	.88**
4-6	Linguistic Community	1	Elise	.88**	.88**	.88**	.88**	.88**	.88**
		2	Sally, Diego & Marco	.88**	.88**	.88**	.88**	.88**	.88**
7-9	Linguistic Community	1	Paula & Carole	.88**	.88**	.88**	.88**	.88**	.88**
		2	Nina	.88**	.88**	.88**	.88**	.88**	.88**
7-9	Instructional	1	Céline	.88**	.88**	.88**	.88**	.88**	.88**
		2	Jacqueline & Francine	.88**	.88**	.88**	.88**	.88**	.88**

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

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