English Speech Sound Development: Effects of a Russian-English Bilingual Environment

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BILINGUAL DEVELOPMENT

Bilingual children are faced with the challenge of mastering two complete sets of language components.

Research on phonological development in bilingual children has shown a pattern that deviates from that of monolingual children, including increased errors and some unique error patterns[3].

STATEMENT OF THE PROBLEM

9.7 million school-age children living in the U.S. speak a language other than English at home[1].speech disorder affects at least 10% of otherwise typical children entering school[2].

Data are needed on typical bilingual development to be able to diagnose and treat disorder in bilingual children. These data should come from diverse language groups and examine the influence of the different phonological characteristics of L1 on English development.

COMPARISON OF RUSSIAN AND ENGLISH PHONOLOGY

	Russian	English	Russian differs from English in:
Initial consonants	p pj b bj t tj d dj k kj g gj m mj n nj f fj v vj s sj z zj ʃ ʃj: ʒ x j l lj r rj ts tʃj	p b t d k g m n f v s z ʃ ʒ h θ ð w j l ɹ tʃ dʒ	*nearly twice the number of stops, nasals, and fricatives*
Vowels	a e i o u aj ej ij oj uj	ɑ æ e ɛ i ɪ o ɔ u ʊ eɪ oʊ aɪ aʊ ɔɪ	*a much simpler vowel system*
Consonant Complexity	42% of consonants have Elaborate or Complex articulations[1]	17% of consonants have Elaborate or Complex articulations[1]	*more complex consonant articulations*
Final consonant use	30% of words end in consonant[2]	67.7% of words end in consonant[3]	*more open syllables*
Final obstruents	Always unvoiced	Voiced or unvoiced	*no final voiced obstruents*
Syllable structure	38% monosyllabic[2]	60% monosyllabic[3]	*longer words*

RESEARCH QUESTIONS

1. Do children from English (E) and bilingual Russian-English (RE) environments have similar phonetic inventories? Do any differences reflect influences of Russian phonology?

2. Do children from RE environments exhibit a greater number of speech sound errors than English-speaking children? How do simultaneous and sequential bilinguals differ?

3. Do children from RE environments exhibit more frequent and/or atypical phonological error patterns than English-speaking children? How do simultaneous and sequential bilinguals differ?

PARTICIPANTS

Monolingual Children (n=11)
- Aged 4;6 - 5;2

Bilingual Children (n=5)
- 2 simultaneous bilinguals (4;8, 5;3)
- 3 sequential bilinguals (4;8, 5;11, 5;1)

PROCEDURES

Task
- 115 single word stimuli in picture format
- Targeting consonants and consonant clusters in all positions, monophthong, diphthong, and rhotic vowels
- Spontaneous production targeted; delayed and direct imitation accepted

Data Analysis
- Inventories, PCC, PVC, and 17 error patterns analyzed through LIPP[4].
- Across language comparisons - One-way ANOVA with Planned Comparisons (p >.10) (Bilinguals to Monolinguals combined)
- Within language comparisons across age groups - T-tests (p >.10)

RESULTS

PHONETIC INVENTORIES

Use of Russian phonemes was nonexistent in English Monolinguals. Rare use of Russian phonemes by Bilinguals.

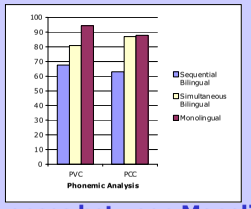
Exception: Russian low central vowel /a/ for /æ/ and /ɑ/.

Sequential vs. Simultaneous Bilinguals:

SQ missing more consonants in more places overall, and produced more voiced obstruents in final position than SM.

ACCURACY

PVC and PCC measures compared: Monolingual, Simultaneous, and Sequential groups



PVC differences between Monolingual and Bilingual groups (SM and SQ combined) are statistically significant (p >.01), but not for PCC.

PHONOLOGICAL ERROR PATTERNS

Error Pattern	Bilingual Group Mean (s.d.)	Monolingual Group Mean (s.d.)	2-Tailed t-Test p-value
Strong Syllable Deletion	3.6 (2.4)	1.0 (.3)	0.006
Stopping	6.1 (1.8)	2.0 (1.5)	0.000
Gliding	17.0 (8.0)	5.8 (8.8)	0.030
Final Devoicing	40.6 (28.8)	15.2 (17.7)	0.046
Consonant Backing	6.8 (4.1)	1.4 (1.6)	0.039
Common Consonant Substitution	12.6 (5.4)	5.7 (4.1)	0.013
Uncommon Consonant Substitution	7.1 (3.8)	1.4 (1.5)	0.026
Diphthong Reduction	6.7 (4.6)	0.7 (1.5)	0.041
Common Vowel Substitution	20.0 (7.2)	4.1 (2.9)	0.006

DISCUSSION

- Word Recall did not differ systematically.
  - Three children with PAE performed like their typical matches.
  - Two children (PAE 3 & PAE 4) recalled substantially fewer words than typical peers.
- In general, children in both groups demonstrated the same error types: omissions, interference intrusions, and within set intrusions.
  - In examining the distribution of errors, children with PAE omitted words 90% of the time.
  - For typical peers, 30% of the missed words were attempts or "errors of creation," possibly indicating the use of alternate strategies to recall target words as demands increased.

IMPLICATIONS FOR FUTURE RESEARCH

- In this preliminary data, 2/5 of the children with PAE demonstrated substantial differences in working memory as compared to matched peers. We hypothesize that their performance deteriorated as demands exceeded working memory capacity.
- Increasing processing demands during simultaneous processing and storage tasks may reveal differences in working memory.
- The word memory task (Montgomery, 2000) will allow us to measure working memory when additional processing demands are added.

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