

A follow-up study of phonological development in bilingual children: Implications for clinical assessment

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A lack of information about typical phonological development in bilingual children presents as a challenge to many speech-language pathologists assessing **bilingual children with suspected speech sound disorder**. The purpose of the current study was to investigate **age-related changes in speech accuracy (percentage of consonants correct) and error production in Korean-English bilingual children**, drawn from a larger study conducted in New Zealand. Sixteen Korean-English bilingual children were followed up at a six-month interval, totalling three time points of data collection. They were aged between 3;1 and 5;11 at the first point of data collection. The Diagnostic Evaluation of Articulation and Phonology was used to obtain single-word samples in English and the Assessment of Phonology and Articulation for Children was used for Korean. We found **considerable individual variations** in the longitudinal data. Age-related changes in speech accuracy were not sensitive to those changes in error production. Significantly, we found some **error patterns emerged during the course of development**, instead of being progressively resolved with age. Unlike previous findings in the literature with monolingual children, the findings related to re-emergence of error patterns were **not limited to young children**. Our findings suggest that speech-language pathologists should take **a considered approach** to identifying bilingual children with speech sound disorder solely **based on the information provided in cross-sectional studies**. We suggest that **a follow-up session may provide valuable information facilitating the clinical assessment procedure** to identify bilingual children with speech sound disorder.

Speech sound disorders (of presently unknown origin)

One of the most common developmental disorders in children

Differential diagnosis (Dodd, 2005)

- Error patterns are the best criterion to determine whether a child's phonological development is typical or disordered

Availability of information re: developmental error patterns is essential

- Lack of such information for bilingual children, putting bilingual children at risk of misdiagnosis

Systematic review of the literature (Hambly et al. 2013)

- Qualitative differences in phonological development between monolingual and bilingual children
- Monolingual norms should not be used for bilingual children
- Need for further research

Current study

Kim et al. (2016) presented a cross-sectional study involving 52 Korean-English bilingual children (3;0-7;11) in New Zealand

- Diagnostic Evaluation of Articulation and Phonology (English) and Assessment of Phonology and Articulation for Children (Korean)





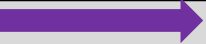
Parents of 16 children (3;1-5;11) agreed to take part in a six-monthly follow-up

- This presentation reports on the longitudinal changes in relative measures (percentage of consonants correct and error patterns)

Participants

Participant code	Gender	Birth country	English Exposure	Age			Proportion of language exposure		
				Time 1	Time 2	Time 3	Time 1	Time 2	Time 3
3A	M	New Zealand	36	3;1	3;9		7.17	3.64	
3B	F	New Zealand	0	3;6	4;1		3.09	2.39	
3C	F	Korea (12)	41	3;7	4;1		4.06	1.02	
3D	M	New Zealand	0	3;11	5;3		2.28	1.16	
3E	F	New Zealand	27	3;11	4;7	5;5	2.16	3.05	2.06
4A	M	New Zealand	34	4;0	4;7	5;1	1.33	2.27	0.46
4B	F	Korea (7)	7	4;3	4;11		4.83	2.06	
4C	F	Korea (35)	46	4;8	5;4	5;10	5.05	1.61	1.17
4D	F	New Zealand	12	4;8	5;3	5;9	1.77	2.03	1.65
4E	M	New Zealand	0	4;11	5;7	6;1	1.03	0.86	0.56
4F	M	New Zealand	0	4;11	5;5		2.50	1.97	
5A	M	New Zealand	39	5;0	5;6	6;0	2.03	2.16	0.52
5B	F	New Zealand	0	5;3	5;9		0.70	0.51	
5C	F	New Zealand	34	5;5	6;1	6;9	1.65	1.00	1.67
5D	M	New Zealand	48	5;6	6;3		1.11	1.11	
5E	M	New Zealand	27	5;11	6;7	7;5	1.86	1.77	1.97

Percentage of consonants correct in English

	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;5	5;6-5;11	6;0-6;5	6;6-6;11	7;0-7;5
3A	68.79	78.01							
3B		78.01	82.98						
3C		57.45	68.79						
3D		84.40			92.20				
3E		63.83		81.56	83.69				
4A			81.56	88.65	92.25				
4B			48.20	60.99					
4C				90.78	92.20	97.16			
4D				86.52	96.45	95.04			
4E				99.29	95.04		99.30		
4F				74.47	89.43				
5A					97.16	99.29	99.30		
5B					95.74	97.16			
5C					97.87		97.16	97.87	
5D						78.72	83.69		
5E						97.87		100	99.29

Error patterns in English

	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;5
3A	CR, STOP, AFF , DEPAL, WFDEV	CR, STOP			
3B		GLIDE, STOP, WVOW	GLIDE		
3C		CR, GLIDE, STOP, AFF , WVCON	CR, CVE , STOP		
3D		STOP			NONE
3E		CR, GLIDE, STOP		CR, GLIDE	CR, GLIDE
4A			DENTAL , WFDEV	NONE	NONE
4B			CR, STOP, WFDEL, WIDEL	CR, CVE , GLIDE, STOP, WFDEL	

Error patterns in English

	4;6-4;11	5;0-5;5	5;6-5;11	6;0-6;5	6;6-6;11	7;0-7;5
4C	NONE	NONE	NONE			
4D	GLIDE	NONE	NONE			
4E	NONE	NONE		NONE		
4F	STOP, WFDEL	NONE				
5A		NONE	NONE	NONE		
5B		NONE	NONE			
5C		NONE		NONE	NONE	
5D			GLIDE	GLIDE, STOP		
5E			NONE		NONE	NONE



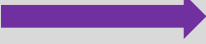




Error patterns in English

	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;5
3A	CR, STOP, AFF , DEPAL, WFDEV	CR, STOP			
3B		GLIDE, STOP, WVOW	GLIDE		
3C		CR, GLIDE, STOP, AFF , WFCON	CR, CVE , STOP		
3D		STOP			NONE
3E		CR, GLIDE, STOP		CR, GLIDE	CR, GLIDE
4A			DENTAL , WFDEV	NONE	NONE
4B			CR, STOP, WFDEL, WIDEL	CR, CVE , GLIDE, STOP, WFDEL	

Error patterns in English

	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;5
3A	CR, STOP, AFF , DEPAL, WFDEV	CR, STOP			
3B		GLIDE, STOP, WFVOW	GLIDE		
3C		CR, GLIDE, STOP, AFF , WFCON	CR, CVE , STOP		
3D		STOP			NONE
3E		CR, GLIDE, STOP		CR, GLIDE	CR, GLIDE
4A			DENTAL , WFDEV	NONE	NONE
4B			CR, STOP, WFDEL, WIDEL	CR, CVE , GLIDE, STOP, WFDEL	

Percentage of consonants correct in Korean

	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;5	5;6-5;11	6;0-6;5	6;6-6;11	7;0-7;5
3A	86.67	96.04							
3B		83.33	86.14						
3C		89.11	94.06						
3D		89.11			93.07				
3E		76.24		88.12	87.13				
4A			86.14	93.07	97.03				
4B			68.04	74.26					
4C				99.01	100	100			
4D				95.05	93.07	99.01			
4E				96.04	97.03		96.04		
4F				89.11	99.01				
5A					100	100	97.03		
5B					95.96	94.06			
5C					97.03		100	98.02	
5D						91.09	86.14		
5E						97.03		100	100

Error patterns in Korean

	3;0-3;5	3;6-3;11	4;0-4;5	4;6-4;11	5;0-5;5	5;6-5;11	6;0-6;5	6;6-6;11	7;0-7;5
3A	LAX	LATFLAP							
3B		AFF, DISASS	TENSE						
3C		AFF	PAL						
3D		WMSIDEL			WFASP				
3E		WMSFDEL, WFDEL		NONE	NONE				
4A			DENTAL	ADJASS					
4B			STOP, DEAFF, DISASS	STOP, DEAFF, WFDEL					
4C				NONE	NONE	NONE			
4D				NONE	WFASP	NONE			
4E				NONE	NONE		TENSE		
4F				ADJASS, STOP, LATFLAP	NONE				
5A					NONE	NONE	NONE		
5B					NONE	NONE			
5C					NONE		NONE	NONE	
5D						NONE	WFASP, DISASS		
5E						NONE		NONE	NONE

Implications for clinical assessment

Emergence of error patterns during the course of development

- Cross-linguistic effects (e.g. word final stop aspiration in Korean) as an ongoing process rather than a product or a permanent manifestation of the interacting phonological systems
- The reorganisation of two phonological systems, wherein the dynamic processes of specifying phonemic contrasts and allophonic variations for each language take place – Manifests as overgeneralisation of language-specific realisation rules in the production of the other language
- U-shaped learning or regression may be a more prominent feature in bilingual phonological development – Reorganisation within and between languages

Cross-sectional studies which can only provide a probabilistic age range at which certain error patterns are expected to be resolved may not be adequate in capturing the typical rates and patterns of bilingual phonological development in a way that is clinically meaningful

Implications for clinical assessment

The direction in research has been

- We need normative data to identify bilingual children with SSD
- We do not have normative data for bilingual children
- We need a normative study with lots of bilingual children
- This will allow accurate identification of bilingual children with SSD

Bilingual children are extremely heterogeneous in their language experiences

- There is no average bilingual experience or bilingual skill profile (Hoff & Core, 2015)
- Normative data tends to reflect the average skill profile in the population of interest

Implications for clinical assessment

There is a need to take a more considered approach when comparing a bilingual client in our everyday clinical practice against the normative or cohort studies in the current literature

Phonological disorder as a developmental disorder


- We should consider development in our clinical assessment
- A follow-up assessment may allow us to do so

Large-scale cross-sectional studies of bilingual phonological development are useful

- To get a complete picture of the typical rates and patterns of bilingual phonological development, the cross-sectional data should be supplemented with longitudinal data



Age-related changes in segmental accuracy and error production in Korean-English bilingual children: implications for clinical speech sound assessment procedures

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