

GENERATIVE ACCOUNTS OF MISARTICULATIONS  
OF TWO JORDANIAN CHILDREN

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ABSTRACT

This study describes the misarticulations of two Jordanian children within a generative framework. Accordingly, each child's phonological system is accounted for via some context-free inventory constraints and phonological rules. It is claimed that misarticulators possess differential knowledge which is not identical to the ambient system. Also, markedness violations are observed in each child's system. We furthermore put forward hypotheses with regard to the ease and difficulty of unlearning the deviant speech habits in favor of the normative data. We thus provide the necessary information for speech therapists to devise remedial programs for speech misarticulating children. This claim, however, could be tested clinically. [Research supported by Yarmouk University, Jordan].

INTRODUCTION

This paper examines the speech of two functionally misarticulating Jordanian children and illustrates the contribution of generative phonology to phonological descriptions. The term 'functional misarticulation' is typically used to describe the speech of speakers whose chronic articulatory errors cannot be attributed to any obvious organic disorders such as hearing impairment or cleft palate [7, 1]. The basic assumption of most of the work done on speech misarticulations is that children's knowledge is identical to that of the ambient speech community [2, 9]. Within this framework, misarticulators are viewed as a homogeneous group. However, the many diverse phonological rules that have been posited to change the underlying structure into misarticulators' surface structure makes it difficult to arrive at any but gross commonalities across functional misarticulation systems [7]. Any discrepancy between the misarticulators' system and the ambient system is described as a 'process' [12]. Such an assumption is a clear misrepresentation of the apparent differences

across the misarticulation systems [6]. Recent development in the literature has shown an increasing interest in employing the generative framework to further characterize misarticulations in children [5, 8, 10]. Within this framework, misarticulators are classified into groups depending on the severity of the problem and the markedness violations [8]. Thus, phonemic inventory constraints are placed on children's productions and phonological rules are posited to convert misarticulators' underlying representations into their phonetic production. The purpose of this paper is to further support the claims of generative phonology to account for misarticulations.

METHOD

Two female Jordanian children, aged 7:2 (Child 1) and 7 (Child 2) years, served as subjects in the present study. Purely spontaneous speech samples were collected from the two children by eliciting certain alternations making use of picture naming, friends and family naming, and questioning the children. The two children were enrolled in regular schools in the second grade. They were referred to the research for speech remediation.

PHONOLOGICAL ANALYSIS

Child 1, age 7:2, produces 14 consonants of the 28 ambient language phonemes. Among the non-strident obstruents, she produces [b, t, d, h, ʔ, h]. The non-stridents [ʔ, d, k, q, θ, ð, ʒ, x, ʕ] are never produced in any position, as can be gathered from the following forms:

Child	Ambient
tawil ʔatab ʔat	tawil ʔatab ʔat
dāl mudal ʔad	dar muɖar ʔad
tum zuteyt mafat	kum jukeyt mafak
ʔalam ʔidlami ʔalad	qalam ʔaqlam ʔalad
tum ʔittil talat	θum ʔikθir θalθ
dāl ʔadan muʔad	ʕal ʔaʕan muʔaʕ
ʔalid munʔal muh	xalid munxar mux
ʔadah ʔalmahlil dahdah	ʕadah ʔalmahlil dahdah

These forms, support a claim that this

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child represents her morphemes underlyingly without non-anterior stops and low fricatives. This fact is described by a general context-free inventory constraint:

[-sonorant]	→	[-continuant]	}	a. [b, t, d]
				[+anterior]
[-strident]	→	[-high]	}	b. [h, ʔ, h]

(All non-stridents are either anterior stops or low fricatives)

As for strident obstruents, this child shows knowledge of anteriors [f, s, z] whereas the non-anteriors [ʃ, ʒ] are never produced, as illustrated by the following forms:

Child	Ambient
sāmi ʔaslaf ʔiflās	ʕāmi ʔaʕraf ʔifraʕ
sulah ʔasfal bas	ʕurah ʔaʕfar baʕ

To describe this fact, a second context-free inventory constraint is proposed:

[-sonorant]	→	[+anterior]
[+strident]		

(All stridents are anteriors, i.e. f, s, z)

With regard to liquids, Child 1 never produces [r]. Notice, for example, the following forms:

Child	Ambient
lās tundalah dāl	rās kundarah dār
lam bilal dāl	lam bilāl dāl

Thus, a third context-free inventory constraint is postulated to limit liquids to [l]:

[+consonantal]		
[+sonorant]	→	[+lateral]
[+continuant]		

Child 1 sometimes deletes obstruents word-finally, as illustrated by the following:

Child	Ambient
bawā ʔizlābā ʔadā	bawāb ʔizrabat ʔadād
tufa fara ʔalū	tufaʔ faras xaruf

However, the child's speech shows obstruents in word-final position as in the following forms:

Child	Ambient
ʔahad lās ʔuz ʔalaf	ʔaxax rās ruz xalaf

These forms suggest that the child's morphemes are represented underlyingly with obstruents in all positions. Thus, an optional rule that deletes obstruents word-finally is proposed:

[-sonorant]	→	∅ / — # Opt.
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A second collapse of obstruent contrast is found in the speech of this child. Obstruents are optionally devoiced word-initially, as exemplified by the following forms:

Child	Ambient
tub subdih	dub zubdih
tanab talabni	ʔanab ʔarabni

However, voice contrast is observed in all positions. The following forms illustrate this fact:

Child	Ambient
tam sāl	kam sār
dam zāl	dam zār

Therefore, the presence of voicing contrast in all positions motivates representing her morphemes underlyingly with voiced and voiceless obstruents. The devoicing process is accounted for by the following optional rule:

[-continuant]	→	[-voice] / # —
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To conclude, Child 1 has a limited knowledge of ambient phonemes indicated by the absence of [ʔ, d, q, k, ʒ, θ, ð, ʃ, s, ʒ, x, ʕ, r]. To account for the absence of these consonants, three context-free inventory constraints are proposed to limit non-strident obstruents to anterior stops and low fricatives, stridents to anteriors, and liquids to the lateral [l]. Two phonological rules are motivated to optionally delete word-final obstruents and neutralize voice contrast word-initially. The second child, age 7 years, produces the obstruents [b, t, d, f, θ, ð, s, z, ʃ, s, ʒ, ʔ, ʕ, h] and the sonorants [m, n, y, w]. The stops [ʔ, d, q, k, ʒ] are never produced in any position, as can be seen in the following forms:

Child	Ambient
tawayih batak	bat ʔawlih baʔih baʔ
difdāh madyab	baʔut difdat maɖrab baʔuɖ
dayam ʔiwidiwi warat	qalam ʔiwɔwiti waraq
tasih matatih mafat kasih	makatih mafak
zamay ʕazayih ʔas	jamal ʕajarih haʔ

Morphophonemic evidence given by these examples supports a claim that the child's underlying stop phonemes are limited to [b, t, d]. This knowledge is described by the following context-free inventory constraint:

[-continuant]	→	[+anterior]
		i.e. b, t, d

As for continuants, the child does not show any knowledge of [x, ʕ] in any position, as illustrated by the following forms:

Child	Ambient
ʔatim suʔnih way ʔatmih	xatim suxnih walxatmih
ʕeym duʕyi fayiʕ	ʕeym duʕri farix

Therefore, we postulate the following context-free inventory constraint that limits the non-anterior non-coronal fricatives to low ones:

[+continuant]		
[-anterior]	→	[-high] i.e. h, ʕ
[-coronal]		

With regard to sonorants, this child never produces [l, r]. Notice, for example, the following forms:

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Child	Ambient
yubih tayib	lubih talib
yamat ?izyih	ramad ?izriih
musaziyy fay	musajil far

A third context-free inventory constraint is proposed to account for the absence of liquids from the child's phonemic system:

[+sonorant]	→	[-syllabic]
[-nasal]		[-consonantal]
i.e. w, y		

Thus far, we have established that child 2 exhibits three context-free inventory constraints that limit production of stops to anteriors, non-anterior non-coronal fricatives to low consonants, and prohibit production of liquids. To further characterize this child's phonological system, it is necessary to turn to some of the phonological processes motivated in her speech.

Child 2 devoices coronal obstruents word-finally, as illustrated by the following examples:

Child	Ambient
?aswat mos hāfiθ	?aswad mōz hāfiθ
nāfiθ marit	nāfiθ marid

Initial and medial voice contrasts are observed in the speech of this child as exemplified by the following forms:

Child	Ambient
tum zeyn θa	kum zeyn θa
dam sīn θa	dam sīn θa
hata bizzi ?anab	hata bizzi ?anab
hada bissih ?eahlab	hada bissih ?eahlab

We, thus, propose that this child represents morphemes underlyingly with both voiced and voiceless coronal obstruents. A neutralization rule that devoices coronal obstruents word-finally is motivated:

[-sonorant]	→	[-voiced] / # Oblig.
[+coronal]		

A second phonological process devoices the non-high back pharyngeal /ʕ/ post-vocally, as exemplified by the following forms: *maḥāt sāḥih* *maḥāk sāḥih*. However, this consonant is observed in other positions:

ʕabdayah	lubih	ʕabdallah	lubih
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Morphophonemic evidence of this type supports a claim that /ʕ/ is posited underlyingly in all positions. Therefore, a neutralization rule that changes /ʕ/ into its voiceless counterpart [h] in post-vocalic position is proposed, specifically

[+low]	→	-voice / V — Oblig.
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#### DISCUSSION

Examining the generative accounts of the phonological systems of the two children, we, first, realize an apparent violation of markedness. Thus, the two children

produce the voiced alveolar stop /d/ for the voiceless uvular stop /q/. Child 1 devoices stops word-initially, but medial and final contrasts are preserved. Recall, Child 2 devoices the laryngeal fricative /ħ/ word-medially whereas she uses /h/ word-initially and-finally. In both cases of devoicing, voiced segments are posited underlyingly. Violations of markedness seem to serve as one factor in characterizing the population of functionally misarticulators [8]. That is, phonological systems that evidence markedness violations are classified as "deviant" whereas other systems are said to be "delayed" [3]. The degree of deviancy is based on the severity of markedness violation.

These violations may question the assumptions of the typological-based implicational universals proposed by Dinnsen and Eckman [4]. For example, implicational universals predict that the presence of voice contrast word-finally implies the presence of this contrast word-medially and word-initially. Child 1 represents a counter example to this prediction. Recall, Child 1 evidences stop voice-contrast word-medially and word-finally, but not initially. Child 2 also violates the predictions of implicational universals; she produces /ʕ/ word-initially and-finally but she changes /ʕ/ into its voiceless counterpart /h/ word-medially. To offer a generative account for each child's knowledge, non-ambient underlying representations are posited and inventory constraints are placed to restrict production of certain consonants that would be otherwise used by normal speakers. However, it could be argued that the two children possess ambient-like underlying representations, but production errors relative to the normal speakers' system are still present [8]. To account for such errors, we can entertain two factors [8]. First, the children have underlying structure identical to the ambient system in certain positions but not in others. Child 1 uses voiced and voiceless stops in word-medial and-final positions but not word-initially. Child 2 shows voice contrast of /h-ʕ/ in word-initial and-final but not intervocalically. The second factor is to assume that the child uses rules alternating ambient-like representations. Thus, Child 1 uses a phonological rule that optionally deletes obstruents word-finally. This implies that this child does not extend her knowledge of contrast to all morphemes. According to the approach that takes these two explanatory factors of speech misarticulation, we need to account for many processes of substitution and deletion which are found in the child's phonological system in reference to the normative data. However,

it is a costly account due to the many rules and features needed to describe such processes. Also, it is not always easy to justify these processes within the framework of naturalness. Within the framework of generative phonology, we can give specific characterization of the phonological systems of functional misarticulators by formulating context-free inventory constraints that specify each child's knowledge of the ambient-like system. Also, underlying representations specific to misarticulators can be posited to account for the phonological processes in each child's system. The generative accounts enable speech therapists to design remediation programs based on the actual knowledge of misarticulators. Accordingly, it is hypothesized that misarticulating children will find it easier to learn the sounds and sound contrasts they have knowledge of than those of which they have no knowledge [5, 11]. Based on this assumption, it is expected that differences in knowledge among misarticulators result in differences in learning during speech therapy [8]. Taking the generative accounts into consideration, therefore, we could predict that Child 1 will find /b, t, d, ʔ, ʕ, h, f, s, z, l/ easier to learn than /ʕ, k, q, θ, ʒ, t, ʔ, ʒ, x, ʕ, r/ and the voice-contrast in stops word-medial and-final positions is easier than in initial-position, although medial and final contrasts are typologically more marked than initial ones. For Child 2, it could be hypothesized that fricatives are easier than the stops /t, ʔ, q, k, ʒ/ and the liquids /r, l/. Recall, stops are typologically less marked than fricatives. Also, this child is predicted to have no difficulty with voice-contrast word-initially and word-medially but would encounter difficulty in the acquisition of coronal voice-contrast word-finally which is more marked than other positions.

#### CONCLUSION

In conclusion, generative accounts are provided for the speech of two misarticulating children. These accounts contribute to a better understanding to the role of generative phonology to further characterize the knowledge of misarticulators of the ambient system. Descriptions of each child's phonological system are evaluated against the predictions of implicational universals. Thus the severity of the misarticulation problem can be measured according to the extent of markedness violations. Moreover, we point out that the generative framework furnishes speech therapists with the necessary information to devise efficient remedial programs. However, the validity of this claim could be tested clinically.

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