Prosodically-Determined (Late) Acquisition of [+dorsal] in Arabic: Linguistic Intervention and Language Disorders

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Abstract

In the Arab world, studies (Sabi, 2017) have established moderate to high incidence of language and hearing issues among children about to enter the school system. All areas of screening, viz., hearing, comprehension, expression, voice, fluency and articulation were reportedly affected. Pre-school screening is a dire need in the Arab region because most communication disorders go undetected for being non-mandatory under insurance cover. Currently, there are two, apparently conflicting, claims in the literature of child phonology. The first is that the onset position of a syllable is strong. This, in fact, has the implication that elements should be acquired in the onset earlier than in any other position in a syllable. The other claim is that dorsal/ back obstruents are acquired in the coda position earlier than in the onset. This paper looks at the speech of five Arab children to demonstrate that the acquisition of back obstruents depends a great deal on prosodic position. Two, it shows that back stops seem to be acquired earlier than back fricatives in the onset position. The reverse seems to hold: dorsal fricatives are acquired earlier when in the coda position. The paper then attempts an OT account for this phenomenon.

Keywords: speech impairment, communication disorders,[+ dorsal], onset, coda, OT, constraint, constraint ranking

Introduction

In a path-breaking paper titled 'Child Phonology: A Prosodic View' (1971), Waterson concluded that perception of the schemata and the sound pattern of utterances governs the child's capacity for phonological acquisition of the mother tongue. Jumping to another study almost half a century later, Becker and Tessier (1982), paired their analysis with computational implementation to describe, contrast, and analyse two kinds of developmental paths in the phonological acquisition of the subject (a child learning North American English). The research demonstrated a U-shaped trajectory in the subject's consonant acquisition, in contrast to the more typical S-shaped progression of his complex onsets. Such phenomena, however, have not been systematically studied in Arabic speaking subjects. It has often been questioned whether acquisition of sounds follows a universal order. It is relevant to quote Jakobson (1941) here as he talks of a certain order in sound acquisition: Unmarked sounds, that is, the sounds that are found cross linguistically are acquired earlier than marked or language specific sounds. Further, and this is also what the current study proposes to prove, that stops are acquired before fricatives. Also, back consonants are acquired earlier than front consonants.

Codas are typically considered more marked than onsets. This paper attempts to assess the (late) acquisition of back consonants by Arabic-speaking children. There are more than eight known dialects of Arabic popular in the country. In addition, each tribe also has its own dialect and sometimes evensub-dialects such as that of the *Harb* Tribe - a well-known *Hijaz* Tribe. Not only is this sub-dialect, it also varies from the east of Madinah toward the Coastal Area of Red Sea.

Further, the *Harb* tribe in Najd region has a different but comprehensible Najdi Bedouin dialect. Then there is the more standardized Arabic of the media, mainly television which stands distinctly apart from the conventional dialects. With such language diversity within one country, an early question that cropped up was how to select a dialect for the study. A 2007 publication of Al-Wer, Caubet and Watson came in handy. According to the study, various Arabic dialects share a systemic unity between themselves and with Classical Arabic (a note on this and its variations follows later in the discussion). The study also refers to a concept called Koine or Koineization derived from Hellenic linguistic tradition. The term has been used in case of urban Arabic vernaculars and reinforces the idea that these dialects are more mixed than others. However, the **origin** of the vernacular remains a more important criterion of classification rather than geographical location. This is also supported by the fact that most urban dwellers still identify themselves by the 'tribal-regional-family' affiliation rather than the current place of residence. The study comprises five young Arabic speakers who come from families that speak the Modern Standard Arabic, with two of these from KSA and three from Yemen.

A Note on Arabic

Judged by the United Nations as the fifth most important language of the world, Arabic is the official language of twenty-three countries in the world, with sometimes many dialects in vogue in each of these.The term 'Arabic' can be used to refer to Classical Arabic (spoken between 7th and 9th centuries), and Modern Standard Arabic (the colloquial language of literature and the media in the present). It may also be used to represent the different dialects of Arabic that vary to the extent of incomprehensibility amongst them. The very names of the dialects, such as, Madini, Jeddawi, Taifi (Saudi Arabia) and many more derive from place names (Medinah, Jeddah, Taif), and Sanaani, Taizi, Tehami (Yemen) derive from the place names(Sanaa, Taiz, Hodeidah) demonstrating the fact that regions have popular dialects: a difficult though joyous situation for a linguist!

Arabic belongs to the Semitic Languages Family and is closely related to Hebrew and the ancient language Aramaic. Being the language of prayer, there is a large world populace that uses Arabic even though they may be speakers of other languages. It is a practice to write this script calligraphically from right to left. There are at least seven countries, including Chad and Israel that have Arabic as the 'co-official' language. In schools in Saudi Arabia and Yemen, the standard version of Arabic (which derives from Quranic Arabic) is taught and used: it is known as Modern Standard Arabic.

Literature Review

Weber and Zonneveld (1996) investigated the acquisition of syllable structure and stress in a case study that confirmed three acquisitional stages: monosyllabic words, polysyllabic words, and words containing the precise number of syllables as produced by adults. They assert that the study was meaningful to the study of prosody. Gnanadesikan (1996) showed that the least marked onsets are acquired earlier by children acquiring their first syllables. Dinnsen, O'Connor, and Gierut (2001) considered the error patterns in a case study that concluded that opacity is a naturally occurring effect even in early stages of acquisition. This was derived from the interaction of the velarisation and stopping error patterns.

Goswami (2002) studied phonological acquisition among dyslexic children and concluded that instead of being a precursor to reading, 'phonemic awareness' is actually a consequence to it among these children learning to read. Stites, Demuth and Kirk (2004) showed in their study of two children between the ages 1 and 2 years, that one child acquired the more but more frequent stop codas first while the other child acquired the less marked but less frequent nasal and fricative codas first. Based on their findings, they concluded that both markedness and frequency may play a role in determining the path of language development.

In a research of Gradient Prosody in Japanese, Kurisu (2005), in an intra-linguistic study, compared five different morphological from the perspective of prosodic augmentation and bimoraic sharing. Cedeño (2007) in a study of the acquisition of Spanish Codas showed that Spanish speaking children develop medial and final codas around the same time. Further, in the case of stressed syllables, children acquire medial codas earlier than final ones. The study also established that prosody alone does not determine the occurrence of codas n Spanish. Finally, Spanish speaking children acquire sonorants before obstruents. In a Longitudinal study of phonological acquisition in English speaking children, Barlow (2007) studied the intervocalic consonant acquisition of a child within the framework of Optimality Theory. It is notable that at stage 1, the child shows evidence of phonologically opaque surface forms. In stage 2, with nasal harmony being added, a new error pattern emerges.

In a study of coda consonant acquisition by Catalan and Spanish children, Comes and Prieto (2013) found that bilinguals are more receptive to the prosodic structure of their dominant language. This can have large scale implications for language teachers. Their results show that frequency of distributional patterns in the input language play a significant role in speech perception and production.

Phonemic inventory of Arabic: Sound system of Classical Arabic

Classical Arabic has twenty-eight consonants distributed[1] on nine places of articulation, as illustrated here.

Table1. Place of Articulation: Classical Arabic

	Labial		coronal			Dorsal			
	Bilabial	Labio-dental	dental	Dental-alveolar	Palatal[4]	Velar	uvular	Pharyngeal	Laryngeal
Plosive Phar[2]	B			t d tˤ	ɟ	K	Q		ʔ
Fricatives Phar		f	Θ ð ðˤ	s z sˤ	ç		X ʁ	ħ ʕ	h
Nasal	M			N					
Lateral Phar				l dˤ					
Trill/tap				r					
Glide					j	W			

Language being a dynamic entity, Classical Arabic has seen considerable changes since the ninth century with several dialects developing, and also, undergoing transformations. For example, one may note the disappearance of [q] in some dialects in Yemen, and substitution of [j] for the palatal fricative [ç] in Gulf dialects. Similarly, phonetic cues, called *ḥarakāt*, such as *fatḥah* to show the opening of the mouth and *kasrah* to show letter length are now widely used to resolve pronunciation ambiguity (since classically, these boundaries were not demonstrated).

Focus of the study

This study looks at the acquisition of back obstruents, consonants that have the feature [+dorsal]. These include velars, specifically, [k] and [g] (in those dialects that have it), uvulars,[q], [X] and [ʁ], and pharyngeals, [ħ] and [ʕ][3]. The study also considers the pharyngeal zed sounds, such as [sˤ] and [tˤ]since a dorsal feature is added. This and other such studies on language acquisition among infants can prove useful especially in the field of speech and hearing disorders, as enunciated under Implications of the Study.

Methodology: Subjects and Data

Data for this study were collected by eliciting speech responses of five children with age groups spanning 1.5 – 4.5 years. At the time of collection of data, Mohannad and Azzooz (both from KSA) were both aged 1.8, Abbodi and Dareen were aged two and a half years; Leen(all three from Yemen) was aged four and a half years. Dareenand Leen are girls, others are boys. Since the target language is the same, we tried to draw a generalization about the developmental process of acquisition of dorsal sounds, keeping the variation of age in mind.

Informal casual meetings in the presence of their fathers were arranged with the children and short dialogues were initiated to elicit speech samples. These were electronically recorded, minutely analysed using the Dutch programme, PRAAT, an imperative form of the Dutch word 'to speak'. This free software was developed by Paul Boersma and Vincent van Heuvenfor phonetic analysis of speech and this software continues to develop.

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[1]Sounds to the left in a set are voiceless; to the right are voiced

[2]*Phar* refers to pharyngealized sounds. In this case pharyngealized plosives. Sometimes a dot under the symbol is used to indicate pharyngealization.

[3]Laryngeals presumably are not specified for place of articulation. Whatever be the case, laryngeals are acquired early, almost by the age of 1; 8.

The outcome was later transcribed in IPA (International Phonetic Association) symbols to break down the utterances to morphemes.

The utterances elicited were such as the sound under study occurred in different prosodic positions, i.e. onset, coda; in monosyllabic words, disyllabic and polysyllabic words.
Following were ensured:

- First few words are always monosyllabic. For if a child has acquired a particular sound, they, a priori, would pronounce it in monosyllabic words. In addition, a child would not be misled by the length of the word.
- Apart from the sound under observation all other obstruents are 'unmarked', in the sense they have already been acquired by the child. Generally, these are either labials or alveolars beside the sound in question.
- Polysyllabic words are also included. These are meant for older children (2;5& 4 years), to see if they have fully acquired the sound (i.e. in all prosodic positions).
- Sometimes words that belong to child-specific expressions are used, such as [bəħ], meaning "there is nothing left". This is utilized when there is no common word with the intended structure. In all, we collected twenty-five utterances from each of the five subjects. Simple frequency distribution was applied to see the occurrence pattern, if any.

Analysis

The study clearly established that acquisition of back obstruents is still not complete even to the age of five years, with few individual variations that are not remarkable. We reproduce here a few words tested:

Utterance	Meaning	Azooz	Mohannad	Leen	Dareen	Abbodi
[qalam]	Pen	[qalam]	[talam]			
[kuku]			[kuku]			
[gamil]						[kamil]
[gəd]	Grandfather			[g/kəd]		
[ħɪmar]	donkey					[himar]
[xal]					[hal]	
[ʁəd]						[ʔət/d]
[xatəm]				[xatəm]		

Thus,individual variations do occur in acquiring dorsal obstruents in the onset position. But, one common pattern is discernible:stops seem to be acquired before fricatives in this prosodic position.

However, with respect to the coda position, we find that children tend to acquire fricatives first. Some variation is seen here as well though.

Utterance	Meaning	Mohannad	Abbodi
[abuk]	your father	[but]	
[ftaħ]	Open	[taħ]	
[ʁali]	Costly		[ʁali]
[baʁ]	Sack		[baʁ]

Pedagogical Implications

While we know from experience that speech /language rehabilitation is a lesser developed field in Saudi Arabia, in a 1995 study, AlAbdulkarim concluded that there existed a large percentage of 'need and acceptance' of the role of speech pathologists in the country, while there was much ignorance about the domain of these professionals in school situations. In plain words, their role in communication disorders is highly underutilized. While data specific to children in the Arab region is not chronicled, according to NIDCD (National Institute of Deafness and Other Communication Disorders), in the United States itself, the prevalence of speech sound disorder in young children is 8 to 9 percent.

Further, by the first grade, speech disorders are noticed in about 5 percent of the children. Stuttering is another speech disorder affecting a sizeable adult population and this clearly develops in early childhood. Other speech/language disorders are delayed speech in preschool years (sometimes identified by teachers), phonological and articulation disorders, and dysarthria.

The saving grace is, in most cases these can be overcome with timely intervention of a speech pathologist with an adequate grounding in Linguistics. Assisting speech/language pathologists with linguistic grounding is precisely the aim of this paper, though in a limited way, as it deals only with the acquisition of the back obstruents in pre-school Arabic speakers.

Conclusion

It appears that because of the (perhaps long) friction that fricatives attain in the coda position, they are acquired earlier in this position. It was also noted that while acquiring language, children seem to resyllabify. For example, Abboodi (2.5) has not fully acquired [ħ]. He shows two pronunciations for [bɪxir], meaning 'fine', viz.[bɪhir] and [bɪxir]. In the latter case, Abboodire-syllabified the fricative as the coda of the first syllable.

In OT (Optimality Theory proposed by Alan Prince and Paul Smolensky in 1993) terms, the acquisition of back obstruents in Arabic tends to be sensitive to prosodic positions. The strategy followed by children in acquiring the phonology of a language is constraint promotion and demotion.[4]

A straight forward account for having back obstruents in the onset position would promote the following constraints:

Survived(+ dorsal) which ensures that a dorsal like [k] in the input should surface. Of course, in addition to this constraint, we should have another *family* of Ident/ Survived constraints to save the distinctive features of [k]. For example, we could have Survived (-voice), Survived (-cont). Clearly, these constraints have to be promoted high in the constraint ranking of the child. This is also what Azzooz has done for [q], and what Mohannad is trying to do (because of the variability, [kuku] for [kuku] but [tab] for [kalb]. The onset here is always preserved by the high ranking of Onset.

To militate against back stops in the coda position, initially in the acquisition, we can have co-occuring constraints like Co-occuring (Rime/ Coda   +continuant). In fact, [+/- continuant], the distinctive feature of fricatives (as opposed to stops) falls in nicely. The unmarked feature of Rime, contrary to Onset, is [+continuant]. And since prosodically, coda is part of rime, it should typically be [+continuant], hence a fricative. Pharyngealized sounds also fall within OT up to the age of 4.5years, the Not Constraints that children start with are still very high. The study echoes findings of earlier research. In a Korean study (Kim and Gammon, 2010) of acquisition of word initial Korean obstruents by children aged between two to four, results agreed with universal patters: stops were acquired before fricatives and affricates. Kent (1992) surmised that sound categories that are easier to perceive or produce will be acquired early on.

Predicatably, as we elicit the response of the older child, Leen, obstruents are vocalized correctly as much as 87% of the times. Among the younger subjects, frequency of correct utterances are almost at par with Abbodi and Dareen (both 2.5 years old) being at 28% and 31% respectively, and the youngest Mohannad and Azooz (both 1.8 years old) being at 6% and 8% respectively.

Recommendations

The study is a nascent step in the field of Linguistic intervention for speech disorder correction. As in the case of earlier studies, the authors understand the greater generalisability of the results with a larger number of subjects and analysis of other Arabic sounds. However, what it does establish is the role of age in obstruent acquisition.
Clinical Linguistics uses linguistic principles (such as the ones dealt with in this paper upon the acquisition of the Back Obstruent sounds by Arabic speakers), to clinical setting and communication disability. This is a hitherto unknown field in both Saudi Arabia and Yemen needs to be developed in close tandem with linguists, psychologists and speech specialists. Broadly speaking, it deals with language breakdown or disorders in children and adults in remediation programmes.

Language and Linguistics related research can play a decisive role in the way language teachers deal with hurdles in language acquisition by young learners in Saudi Arabia and Yemen. Clearly, the early school or pre-school teaching community can benefit from training in the principles of Applied Linguistics.

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[4]The strategy is that Survived constraints are promoted, while Not constraints are demoted in the course of acquisition of phonological systems. This claim is well-entertained in the literature (e.g. Bernhardt & Stemberger 1998, Hayes2004).

Such training can enable the teachers to determine the resource, practice, training technique that can best work while teaching learners a new language. Specific communication disorders, such as, Paraphasia where the phonological module is affected, Apraxia that is caused by problems with phonetic planning, and Disarthria that stems at the articulatory level, will need strong linguistic grounding to be dealt with. In addition, problems with Syntax (sentence formation) that are often encountered by teachers among the young learners can also be addressed with studies such as this being undertaken in Arabic language.

Rehabilitation of speech disordered Aphasic patients can be achieved with greater success with the involvement of linguists in addition to other professionals. For example, if we arrive at theories in the acquisition of certain Arabic sounds, say A and B and conclude from research that acquisition of B depends upon the acquisition of A, then we can surmise that in an aphasic patient, the loss of sound A implies loss of sound B. The same principle also applies to enabling such patients 'relearn' the sounds. It may be stated here that language studies is a well-developed field in the western world. However, nearer home, it is little known. Micro and macro research should be encouraged in this field in the Arab world for far reaching benefits both in education and medicine.

References

Al-Sabi, Y. N. (2017) The JISH Speech Language and Hearing School Readiness Screening in Jeddah, Saudi Arabia *Journal of Otolaryngology -ENT Research* Vol. 7, Issue 5, accessed 1630 hrs, 29.9.2017.

Arabic in the City: Issues in Dialect Contact and Language (2007) Catherine Miller, E. A.DominiqueCaubet, Janet C.E. Watson (eds.) Oxon: Routledge

Barlow, J. (2007) Grandfather Effects: A Longitudinal Case Study of the Phonological Acquisition of Intervocalic Consonants in English. *Language Acquisition,14*(2), 121-164.

Becker, M., &Tessier, A. (2011) Trajectories of faithfulness in child-specific phonology. *Phonology,28*(2), 163-196.

Bernhardt, B. H. and Stemberger, J. P. (1998) *Handbook of Phonological Development: From the Perspective of Constraint-Based Nonlinear Phonology.* California: Academic Press.

Gnanadesikan, A. (2004) Markedness and Faithfulness in Child Phonology. In R. Kager, J. Pater and W. Zonneveld (eds.), *Constraints in Phonological Acquisition.* Cambridge: Cambridge University Press, 73-108.

Goswami, U. (2002) Phonology, Reading Development, and Dyslexia: A Cross-linguistic Perspective. *Annals of Dyslexia,52*(1), 141-163.

Gussenhoven, C. and Jacobs, H. (1998) *Understanding Phonology*. London: Arnold.

Hayes, B. (2004) Phonological Acquisition in Optimality Theory: the early stages. In R. Kager, J. Pater and W. Zonneveld (eds.), *Constraints in Phonological Acquisition.* Cambridge: Cambridge University Press, 158-203.

http://www.fon.hum.uva.nl/paul/papers/speakUnspeakPraat_glot2001.pdf accessed 19:11, 28.9.2017

https://www.nidcd.nih.gov/health/statistics/statistics-voice-speech-and-language, accessed 1443 hrs, 27.9.17

Kent, RD. The biology of phonological development. In: Ferguson CA, Menn L, Stoel-Gammon C, editors. Phonological development: Models, research, implications. (1992) Timonium: York Press, pp. 65–90.

Kurisu, K. (2005) Gradient Prosody in Japanese. *Journal of East Asian Linguistics,14*(3), 175-226.

Lohuis-Weber, H., &Zonneveld, W. (1996) Phonological Acquisition and Dutch Word Prosody. *Language Acquisition,5*(4), 245-283.

M., Kim and Gammon, Stoel, C. (2011) Phonological development of word-initial Korean obstruents in young Korean children. *Journal of Child Language,38*(2), 316-340. doi:10.1017/S0305000909990353

Núñez-Cedeño, R. (2007) The Acquisition of Spanish Codas: A Frequency/Sonority Approach. *Hispania,90*(1), 147-163.

Odden, D. (2005) *Introducing Phonology.* Cambridge: Cambridge University Press.

Stites, J., K. Demuth, & C. Kirk. (2004) Markedness versus frequency effects in coda acquisition. In AlejnaBrugos, LinneaMicciulla, & Christine E. Smith (eds.), *Proceedings of the 28th Annual Boston University Conference on Language Development*, pp. 565-576.

Waterson, N. (1971). Child Phonology: A Prosodic View. *Journal of Linguistics,7*(2), 179-211.

Watson, J.C.E. 2002. *The Phonology and Morphology of Arabic*. Oxford: Oxford University Press.

www.forum.wordreference.com accessed 16:57 hrs 28.9.2017

www.istizada.com accessed 16:42 hrs 28.9.2017