On the phonological development of the early words

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Abstract

In the present study, we discuss the phonological development of the early words based on data from a child acquiring Greek as first language. We will propose that the child’s early words take the shape of prosodically well-formed units of the prosodic hierarchy and this phonetic shape is a bisyllabic maximum on word size, which applies at about age two. What is preserved is rather the canonical left-headed foot (prosodically based minimal word), and that the constraints invoked play a role in the stress system of Greek. We will also provide an example of constraints that are fully satisfied in the child language becoming minimally violable later in the development, that is development as constraint reranking.

Keywords: summarising, argumentative texts, foreign language teaching, meta-functions of language, explicated and implicated meanings

1. Introduction

The present paper is a preliminary investigation of the phonological development of the early words and the acquisition of prosodic structure in Greek and how the structure of the child’s utterances gradually approach corresponding adult forms. We present a case study from a child’s phonology and we will use longitudinal spontaneous production data of the child Sofia, from the age of 1;7,10 up to the age of 2;9,27.

The developmental patterns in acquisition data reveal that the child’s phonology reflects properties of the Universal Grammar. At the first stage, the child produces only the unmarked CV-syllables. Sofia’s phonology has not any codas or complex onsets. She tries also to preserve the prosodic structure of the
adult (target) forms. In case of disyllabic adult forms she produces also disyllabic forms, i.e. she preserves the binary foot (trochee, in the case of Greek). The plurisyllabic adult forms are realised either as disyllabic (section 2.1) or she tries to preserve the number of syllables of the adult form, by means of reduplication (section 2.2), i.e. she preserves the unmarked trochaic foot, and the single, unfooted (reduplicated) syllable occurring at the left word edge is associated directly to the prosodic word (McCarthy and Prince 1995, “feet are binary”). Sofia avoids the onsetless syllables and she uses a repair strategy for the few onsetless adult words, that she selects: either by copying and filling in the empty onset of the syllable (Fikkert 1994 for Dutch), or by reducing the onsetless syllable. By means of this repair strategy, she reduces the markedness of her output. In case of forms beginning with complex onsets, she simplifies the clusters to a single onset, e.g. the adult form [spiti] is produced as [piti], ‘house’ (Kappa 1999).

In the present study, we will propose that the child’s early words take the shape of prosodically well-formed units of the prosodic hierarchy and this phonetic shape is a bisyllabic maximum on word size, which applies at about age two (Pater 1997). What is preserved in these words is rather the canonical left-headed foot (Fee 1996; Fikkert 1994: “prosodically based minimal word”\(^1\)), and that the constraints invoked play a role in the stress system of Greek. We will also provide an example of constraints that are fully satisfied in the child language becoming minimally violable later in the development, that is development as constraint reranking.

2. Development of prosodic structure in Greek

In the early stages of phonological development, children display a variety of prosodic processes in their productions of multisyllabic words. They delete and add syllables in certain positions more than others, they restrict the shape of their words to a bisyllabic maximum and they alter stress patterns in a systematic fashion. Investigators have accounted for these patterns in a number of ways: one of the most frequent approaches has been the use of a trochaic metrical constraint (cf. among others, Fikkert 1994, Gerken 1994, 1996). This constraint is central in Gerken’s account of weak syllable omissions, invokes templates that restrict children’s words to a single stressed/unstressed (Strong/Weak) rhythmic sequence and has been incorporated into recent models of

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\(^1\) In Fikkert’s analysis is used a prosodically based “minimal word” template that imposes a single foot limit.

In contrast to accounts that posit metrical templates, other investigators propose more abstract phonological accounts of children’s prosodic pattern. In Demuth (1995a) is argued that children’s earliest word shapes follow a systematic course of development in terms of prosodic hierarchy. She claims that children’s productions expand from core syllables into minimal words, stress-feet, and finally, phonological words, where the minimal word is the unmarked prosodic word. In this analysis, a trochaic metrical template alone is unable to account for the diverse patterns of children’s earliest word shapes. Demuth (1995b) provides an optimality theoretic account in which a constraint that demands a minimal prosodic word outranks the faithfulness constraints.²

We will examine whether the MG data are consistent with predictions of prosodic circumscription, template mapping and development according to the stages of the prosodic hierarchy. Our findings show that the previous approaches are unable to account for two robust findings in the Greek data: 

a. Children preserve final unstressed syllables more frequently than non final unstressed syllables in their truncations.

b. Children preserve unstressed syllables with obstruent onsets more frequently than unstressed syllables with sonorant onsets.

Both of these above findings are inconsistent with current accounts of templates that do not include prominence, edge-based factors and segmental effects. Additional findings in the data, such as trends in children’s one-syllable truncations, and the observation that children produce trochaic and iambic rhythmic forms in their early productions, offer further evidence against accounts based on prosodic circumscripton and template mapping.

We propose that the shape of a child’s early words might be best accounted for in terms of well-formedness conditions on linguistic structures, where a given input form is optimal for a certain ranking of linguistic constraints. Specifically, we assume that the initial output states for children learning all languages will be realized in terms of unmarked prosodic structures, and that these will change during the course of development in accord with language-particular realizations of phonotactic and prosodic constraints. We therefore assume that the following assumptions hold in (1), concerning unmarked prosodic structures and their emergence at the early stages of acquisition:

² Pater (1997) argues that the analysis of Demuth takes the unmarkedness of the minimal prosodic word to be a primitive notion and yields no explanatory dividends beyond those that are accrued by a minimal word template account.
(1) Acquisition assumptions

a. Core syllables (CV) are the unmarked form of syllable structure provided by Universal Grammar.
b. Minimal Words (binary feet) are the unmarked form of prosodic words provided by Universal Grammar (McCarthy and Prince 1995).
c. Following Jakobson (1941/68), we predict that children will move from unmarked to more marked prosodic structures in the course of acquisition.
d. Stages of acquisition can be characterized by a set of constraints (Prince and Smolensky 1993), where unmarked values emerge first, and where development involves the reranking of constraints over time.

Furthermore, we assume that also hold the following assumptions, in accord with the Optimality theoretic framework (Prince and Smolensky 1993):

(2) Optimality theoretic assumptions

a. Constraints are all available as part of Universal Grammar
b. A full set of phonological representations (segmental, prosodic) is available as part of Universal Grammar.
c. Constraints can be violated (i.e. they are soft constraints).

Constraints that are relevant to the realization of prosodic words are given in (3).

(3) Structural Constraints: Well-formedness of Output forms

ALIGN-Right Align the right edge of every foot the right edge of a prosodic word.

Parse-σ Every syllable must belong to a Foot.

Foot Binarity (FtBIN) Feet must be binary.

(4) Faithfulness Constraints: Mapping between Input and Output:

MAXI-O (No deletion). Every element in the Input has a correspondent in the Output (McCarthy and Prince 1995).

STRESS-Faith An Input stressed syllable must have as its Output correspondent a stressed syllable (Pater 1995, 1997).

Right-ANCHOR Any element at the right edge of the Input has a Correspondent at the right edge of the Output (McCarthy and Prince 1995).
2.1 Stage 1 (ages: 1;7,10-2;2)

At this stage the multisyllabic inputs are realised as truncated disyllabic outputs (5). The initial unstressed syllables of the input are truncated and the child preserves only the disyllabic trochaic foot of the input. The faithfulness constraint **MAX1-O** is violated but the higher ranked structural constraint **FRBIN** is satisfied (Table 1). We assume that the trochaic foot, consisting of core CV-syllables, is the unmarked prosodic word in Greek, i.e. the prosodically minimal word.

(5) | Adult form | Child’s form | Gloss |
--- | --- | --- | --- |
[ni’stazo] | [’tazo] | (I am sleepy) |
[xri’insula] | [’tula] | (proper name) |
[ɔ’breila] | [’bela] | (umbrella) |
[kara’mela] | [’mela] | (caramel) |
[tsu’liðra] | [’lita] | (slide) |
[kali’nixta] | [’nita] | (good night) |

Table 1

<table>
<thead>
<tr>
<th>/ni’stazo/</th>
<th>ALIGN-R</th>
<th>PARSE-ơ</th>
<th>FTBIN</th>
<th>MAX1-O</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [ni (’stazo)]</td>
<td>√</td>
<td>*!</td>
<td>*</td>
<td>√</td>
</tr>
<tr>
<td>b. [’tazo]</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>*</td>
</tr>
</tbody>
</table>

The disyllabic inputs are realised as disyllabic outputs (6). The structural constraints Align-Right, Parse-ơ, FTBIN as well as the faithfulness constraint Stress-Faith are completely satisfied (table 2). As it is widely reported in the acquisition literature, most children learning English, Dutch, Spanish begin with a maximal foot of two syllables, and words with two syllables are also produced faithfully and are not reduced to a single syllable.

(6) | Adult form | Child’s form | Gloss |
--- | --- | --- | --- |
[’spiti] | [’piti] | (house) |
[’poði] | [’bodi], | (foot) |
[’volta] | [’vota] | (walk) |
[’tora] | [’tola] | (now) |

Table 2

<table>
<thead>
<tr>
<th>Input: /poði/</th>
<th>ALIGN-R</th>
<th>PARSE-ơ, FTBIN</th>
<th>MAX1-O</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [l’bodi)]</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>b. (bo)</td>
<td>√</td>
<td>√</td>
<td>*</td>
</tr>
</tbody>
</table>
There are a few cases where penultimately stressed inputs are reduced and realised as final stressed outputs (7). In this case occurs truncation of the final syllables due to phonotactic reasons. In examples (7a, b), the child truncates the second syllable, which starts with an affricate onset and in example (7c) the child tries to avoid the hiatus. This results in compensatory lengthening as the vowel of the preceding syllable is lengthened and the syllable becomes heavy (bimoraic). In the case of example (7b) the child retains the underlyingly stressed syllable as an output too, i.e. the constraint Stress-Faith is active, highly ranked and yields the correct output.

(7) Adult form Child’s form Gloss
a. [’katse] [ka:] (sit down, 2.SG)
b. [pa’putsi] [ba’bu:] (shoe)
c. [’kloun] [ko:] (clown)

2.2 Stage 2 (ages: 2;2-2;9,7)

In the course of the phonological development the faithfulness constraints are promoted and the child tends to preserve the number of the input syllables. The trisyllabic inputs are realised as trisyllabic outputs via reduplication of the first syllable of the foot (8). The reranking and promotion of MAXI-O signals the development of the child’s phonology (Table 3).

(8) Adult form Child’s form Gloss
[ci’mame] [ma’mame] (I sleep)
[sxo’lio] [ci’cio] (school)
[so’fia] [pi’pia] (proper name)
[xri’sula] [tu’tula] (proper name)
[ka’pe lo] [pe’pe lo] (hut)

<table>
<thead>
<tr>
<th>/ci’mame /</th>
<th>MAX I-O</th>
<th>ALIGN-R</th>
<th>PARSE-σ</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. [ma (’mame)]</td>
<td>√</td>
<td>√</td>
<td>*!</td>
</tr>
<tr>
<td>b. [’mame ]</td>
<td>*</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

3 In adult Greek the vowels have not any length-contrast.
4 The transition from stage 1 to stage 2 is gradual, i.e. at the stage 2 we also find a few cases of words belonging to the older stage 1. It seems that these old words are already stored in the child’s lexicon, whereas new words are subject to analysis and hypothesis testing. The reranking of constraints will be immediately applied to new words and occasionally to the older ones. This would explain the appearance of gradualness.
The final-stressed inputs are realised as final stressed outputs as in (9). Many researchers report that children sometimes construct left-prominent feet, e.g., on words such as *balloon* and *giraffe*, and stress reversal occurs (cf. among others, Fikkert 1994, Archibald 1995, Kehoe and Stoel-Gammon 1996, 1997). This happens if the adult language has mostly left-prominent stress, which tends to predominate in the speech to and by children. Although the bisyllabic words are mostly left-headed in Greek, the child retains the input-stress without any stress reversal.\(^5\)

<table>
<thead>
<tr>
<th>(9)</th>
<th>Adult form</th>
<th>Child's form</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>[ne'ro]</td>
<td>[lo'lo]</td>
<td>(water)</td>
<td></td>
</tr>
<tr>
<td>[xar'ti]</td>
<td>[ta'ti]</td>
<td>(paper)</td>
<td></td>
</tr>
<tr>
<td>[fo'tja]</td>
<td>[ta'ta]</td>
<td>(fire)</td>
<td></td>
</tr>
<tr>
<td>[bu'fan]</td>
<td>[bo'pa]</td>
<td>(anorak)</td>
<td></td>
</tr>
<tr>
<td>[pavo'to]</td>
<td>[pa'to]</td>
<td>(ice cream)</td>
<td></td>
</tr>
</tbody>
</table>

The constraint *Stress-F* is highly ranked and yields the correct output. In the case of the trisyllabic input *pavo'to* ‘ice cream’ as in table (4), Sofia violates the constraint of *Contiguity* (‘no skipping syllables’). The optimal output consists of the first unstressed syllable and the (final) stressed syllable, while the second syllable is skipped. The constraint FTBIN is highly ranked, above that of Contiguity and it is crucial for the selection of the optimal disyllabic output. In this stage of development it is obvious that the child prefers the stops as syllable onsets, showing no contrast for the feature [continuant].

<table>
<thead>
<tr>
<th>Table 4</th>
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<tbody>
<tr>
<td>/pavo'to/</td>
</tr>
<tr>
<td>a. [pa (yo'to)]</td>
</tr>
<tr>
<td>b. [(pa'to)]</td>
</tr>
</tbody>
</table>

The child develops two strategies in order to confront the antepenultimately-stressed inputs.

a) *Via truncation:* The child preserves the stressed and the rightmost unstressed

\(^5\) Malikouti-Drachman and Drachman (1976) report that Greek children make only a few mistakes of primary stress, at the stage when they use no inflections whatever: stress is acquired with lexical items, and in fact partly determines the shapes of the words that can be uttered. According to their data on Modern Greek child language, the stress errors begin to be made and then remain common while the child is learning inflectional morphology and the use of enclitics, since it is at these stages that he/she must regulate the alternations of stress that he/she encounters, whether morphological or syntactic in origin.
syllable, thus the outputs are realised as penultimately stressed as in (10).

(10) \textbf{Adult form} \quad \textbf{Child's form} \quad \textbf{Gloss}
\begin{tabular}{l l l}
['\thetaalasa] & ['tata] & (sea) \\
['Stefanos] & ['teto] & (proper name, NOM. Masc.)
\end{tabular}

The above data in (10) support also the prediction of Echols and Newport (1992), that unstressed nonfinal syllables are more likely to be omitted than stressed or final syllables and this is consistent with the view that syllables that are stressed or final in the adult speech are particular salient to young children and, consequently, are particularly likely to be extracted and included in the first productions. Archibald (1995:103f) argues that the retention of final syllables falls out from other general principles such as prosodic circumscription and parsing strategies.

This effect can not be explained by a template-analysis, where only the stressed and the following syllable are picked-up, like the elephant case in Dutch. In the template-analysis the constraint of Contiguity is active and highly ranked and the optimal output would be the stressed syllable followed by its adjacent syllable. But this is not the case in the Greek examples. The constraint Right-Anchor (Pater 1997) is crucial and offers a special status to the edge of the domain (table 5).

Table 5
\begin{tabular}{l l l l l}
\hline
/\thetaalasa/ & R-Anchor & STRESS-F & CONTIGUITY \\
\hline
\textit{a.} ['tata] & \checkmark & \checkmark & * \\
\textit{b.} ['tala] & * & \checkmark & \checkmark \\
\hline
\end{tabular}

b) By means of stress-shift as in (11).\footnote{Sofia produces the optimal output along the lines of (11). There is a possibility that the child perceives the inputs as reduplicated forms and produces the outputs according to her constraint ranking.}

(11) \textbf{Adult form} \quad \textbf{Child's form} \quad \textbf{Gloss}
\begin{tabular}{l l l}
['kokoras] & [ko'kola] & (cock) \\
['vevea] & [ve'vea] & (of course) informal speech \\
(but: & [ve'veos] & [ve'veos] & (of course) formal speech
\end{tabular}

We assume that the child has no extrametrical syllables. Extrametricality is needed to produce the adult antepenultimate stress.\footnote{cf. Malikouti-Drachman and Drachman (1989) for stressing in Modern Greek.} We assume that in this
case the constraint *Extrametrical (no Extrametricality) is active in the child’s phonology and yields the optimal output. *Extrametrical seems to be the initial setting of the Extrametricality parameter in first language acquisition.

Data from the acquisition of Spanish support our claim above. Hochberg (1988) cited some evidence of adult forms and their realisation by children (12).

(12)  

<table>
<thead>
<tr>
<th>Adult form</th>
<th>Child’s form</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>[estómago]</td>
<td>[tomágo]</td>
<td>(stomach)</td>
</tr>
<tr>
<td>[fósforo]</td>
<td>[popúlo]</td>
<td>(phosphorus)</td>
</tr>
<tr>
<td>[hipopótamo]</td>
<td>[popotámo]</td>
<td>(hippopotamus)</td>
</tr>
</tbody>
</table>

The children are shifting what in adult Spanish are antepenultimate stresses to the penult. This follows from the assumption that they do not have any extrametrical syllables.

3. Conclusion

This study supports that the children in Greek produce trochaic rhythmic forms in their early words. These forms are the prosodically based minimal words. Final unstressed syllables are preserved more frequently than non-final unstressed syllables in their truncations. The children do not produce (up to a certain age) antepenultimate stressed syllables; therefore we assume that they do not have extrametrical syllables in their phonology.

References


